MINISTRY OF BUSINESS, INNOVATION & EMPLOYMENT
HĪKINA WHAKATUTUKI

Statutory Review of the Outer Space and High-altitude Activities Act 2017

A statutory review of the Act, pursuant to section 86

New Zealand Government

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PART ONE: INTRODUCTION

1. RATIONALE FOR REGULATING SPACE ACTIVITIES

1.1. ESTABLISHING THE CASE FOR INTERVENTION

1. In December 2015, Cabinet approved the high-level design of a regulatory regime to enable commercial space launches and the operation of payloads (eg satellites) from New Zealand (CAB 15 Min 0274 refers).
2. At that time, New Zealand did not have a regulatory regime for space launches, and there was limited scope to prevent anyone from launching space objects. The need to develop legislation, what would ultimately become the Outer Space and High-altitude Activities Act 2017 (OSHAA), was precipitated by Rocket Lab's intention to launch from New Zealand from 2016.
3. Becoming a launch state triggered new obligations under international treaties which New Zealand was already party to and legislative changes were required to give practical effect to treaty provisions that had not previously applied (ie when not a launch state). Legislative change was also needed to implement the Technology Safeguard Agreement (TSA) with the US Government, which was being negotiated at the time.
4. The design of the regulatory regime considered the need to manage risk and meet New Zealand's international obligations, but also the potential economic benefits of having a space industry. New Zealand adopted a permissive regime that provides what is necessary to meet international obligations and manage risks, while not imposing unnecessary regulatory costs which could deter the growth and development of the space industry.
5. The establishment of a commercial space industry in New Zealand presented significant economic and strategic opportunities, including:
    - Estimated economic benefits to New Zealand of $750m to $1.550bn over a 20-year period[1], including employment opportunities both directly within the space industry as well as in associated supporting industries.
    - Building capability and expertise in space activities and applying associated advanced technologies (eg space propulsion and carbon composites) to a range of downstream applications.
    - Potential intangible or unquantifiable benefits from the reputational impacts of being a first mover in the development of low-cost, high-frequency space launches.

1.2. EXTENDING THE SCOPE TO HIGH-ALTITUDE VEHICLES

6. Rocket Lab's proposal to launch rockets to space from New Zealand was the catalyst for developing the regime and the original scope of the work reflected this, in that it was limited to outer space activities. In the course of developing the regime a case was identified to include high-altitude activities within its scope, and Cabinet agreed to its inclusion.
7. The concept of regulating high-altitude vehicles (HAVs) was relatively novel at the time. While other countries are now regulating HAVs, New Zealand was at the forefront.

[1] According to analysis from Sapere Research Group conducted in 2015.

8. The rationale for including HAVs within the scope of the regulatory regime was based on the following key factors:

   - To 'future proof' the legislation in anticipation of technological advances.
   - To promote or enable consistent regulatory treatment across different technologies that perform similar functions.
   - To provide certainty for commercial operators about the rules that apply to their activities in New Zealand, recognising that a lack of certainty around this may have an inhibitory effect on investment in research and development activities, and new business ventures.
   - To ensure New Zealand is well placed to have appropriate oversight and control of high-altitude activities that originate from within its territory.

2. KEY FEATURES OF REGULATORY REGIME

2.1. SYSTEM OBJECTIVES

9. New Zealand's regulatory regime for outer space and high-altitude activities is designed to fulfil the core system objectives. The objectives, which form the basis of the Act's purpose, are to:

   - Facilitate the development of a space industry and provide for its safe and secure operation.
   - Implement certain international obligations relating to space activities and space technology.
   - Manage any potential or actual liability that may arise from the space industry.
   - Preserve New Zealand's national security and national interests.

2.2. KEY ELEMENTS OF THE REGIME

10. The OSHAA provides a flexible regulatory regime for space and high-altitude activities, with licensing and permitting functions primarily being achieved through its associated regulations, policies and operational procedures (including for launch vehicles, facilities, payloads, and high-altitude vehicles).

11. An overview of the core elements of the regime is set out below.

LICENSING AND PERMITTING

12. Internationally, standard practice for regulating commercial space activities is a licensing regime that provides the necessary controls over participation in space launches, including powers to veto launches and/or payloads. Commonly, this takes the form of an overarching licence for a certain type of activity or context (eg space launches) with the option to impose specific requirements via licence conditions.

13. New Zealand adopted a permissive licensing and permitting regime that affords the decision-maker with discretion around imposing licence conditions (as opposed to providing detailed conditions in primary legislation).

14. New Zealand's regime provides for six categories of permits and licences, as follows:

   - Launch licence (New Zealand based)
   - Overseas launch licence (for New Zealand nationals overseas)
   - Payload permit (New Zealand based)
   - Overseas payload permit (for New Zealand nationals overseas)
   - Facility licence

- High-altitude licence.

15. The Outer Space Treaty requires states parties to regulate 'national activities' in outer space. This has generally been interpreted as a requirement to license activities that take place within a state's territory and activities that are carried out by its nationals overseas. Accordingly, the launch licensing and payload permitting provisions in the Act have extraterritorial application.

RECOGNITION OF INTERNATIONAL AUTHORISATIONS

16. Section 51 of the Act prescribes that the Minister may take into account authorisations granted in countries other than New Zealand. Specifically, section 51(1) prescribes *"the Minister may treat a licence, permit, or other authorisation that concerns a matter relevant to the Minister's decision and that was granted, or is likely to be granted, to an applicant or other person in a country other than New Zealand as satisfying some or all of the criteria for granting a launch licence under section 9, a payload permit under section 17, an overseas launch licence under section 25, an overseas payload permit under section 33, or a facility licence under section 40."*

17. The recognition of international authorisations, where appropriate, creates significant benefits for the regulator and regulated parties alike, by limiting duplication of effort and unnecessary costs and allowing New Zealand to leverage the experience of regulatory agencies in other jurisdictions.

18. This feature of the Act is particularly important in the context of launch licensing because of the comprehensive requirements that apply to launch licensing, at least in the US. As Rocket Lab noted in its submission, the ability for the Minister to recognise its US Federal Aviation Administration (FAA) licence *"has supported rapid development of New Zealand-based endeavours, which in turn has encouraged and supported the local space and associated technology industry and economy."* The Minister has also recognised certain overseas licences and permits as meeting New Zealand's orbital debris mitigation requirements. However, as the assessment of orbital debris mitigation plans is a much more straightforward process than the assessment of launch licence applications, this is of less significance.

REGULATION MAKING POWERS

19. The regime provides a broad range of regulation-making powers. These were intended as a means of future proofing the regime because technologies relating to space and high-altitude activities are rapidly evolving. The range of regulation-making powers in the Act supports flexibility by providing options for classifying, and therefore managing, new technologies. That is not to say regulations must be made but they are available if necessary.

20. The regulation-making powers do not, in and of themselves, create any new costs or compliance burdens for the regulated parties, but having them available where required, supports the responsiveness and flexibility of the system's permissive approach.

21. Using regulation-making powers as a tool to future proof the regime was, and still is, considered to be the optimal approach to managing the challenges of regulating an industry undergoing fast-paced technological change and provides flexibility for the regulatory settings to evolve as new information becomes available and industry practice changes.

22. Two of the regulation-making powers were invoked alongside the introduction of the Act in late 2017, namely:

    - **Outer Space and High-altitude Activities (Definition of High-altitude Vehicle) Regulations 2017 (the Definition Regulations):** To provide clarification regarding vehicles that are not classified as high-altitude vehicles (HAVs) for the purpose of the Act and therefore will not require a licence.

- **Outer Space and High-altitude Activities (Licences and Permits) Regulations 2017 (the Licences and Permits Regulations):** To provide the requirements for licences and permits, particularly in relation to the information which applicants must provide.

23. In addition to the two which have already been invoked, the regime provides a broad range of other regulation-making powers, designed to empower the regulator with the flexibility needed to keep pace as the risk profile of the sector evolves and technology changes. The regulation-making provisions include, for example, powers to define (in regulation) certain terms (eg launch vehicle, payload, space objects); and to impose levies, fees and charges.

24. While several regulation-making powers are currently unused, retaining them in the Act provides flexibility to regulate future issues. The Ministry of Business, Innovation and Employment's (MBIE) Space Policy and Regulatory Systems (SPRS) team are of the view, and we agree, that broad regulation-making powers are necessary, and none of the powers are being used in ways that are not justified.

OPERATIONAL POLICIES AND GUIDANCE MATERIAL

25. To support the industry to meet the statutory criteria, MBIE's SPRS team publishes guidance material for a range of topics.

26. In most cases, the published guidance takes the form of outlining the operational policy that is applied by MBIE in the course of considering applications. Guidance of this nature is provided on the following topics:

- Orbital debris mitigation
- Liability, insurance and indemnities
- Payloads of a size less than 1U
- Technical capability.

27. The safety case guidance is the exception. Instead of setting out the operational policy for how the application is assessed by MBIE, the safety case guidance is focused on assisting applicants in meeting the current safety case requirements.

2.3. KEY FACTS AND FIGURES ON IMPLEMENTATION

APPLICATIONS FOR LICENCES AND PERMITS

28. MBIE has administered the licensing and permitting regime established by the Act since its inception.

29. The table below (Table 1) provides data on licensing and permitting activity under the Act from the time it came into force (on 21 December 2017) until 28 April 2022.

Table 1: Licensing and permitting activity under the Act (21 December 2017 – 28 April 2022)[2]

Licence type	Granted	Variations granted
Payload Permits	70	5
Overseas Payload Permits	3	0
Launch Licences	2	5
Overseas Launch Licences	0	0
Facility Licences	1	0
High-altitude Licences	3	1

DECLINING AN APPLICATION OR IMPOSING CONDITIONS

30. For each licence and permit type, provisions within the Act set the parameters for entry into and ongoing lawful operation in respect to activities carried out under New Zealand's jurisdiction for outer space and the high-altitude environment. In particular, this includes provisions for:

    - **Criteria which must be satisfied in order for the Minister to grant a licence or permit** – such as consistency with international obligations.
    - **Grounds on which an application may be declined** - such as national interest considerations.
    - **Conditions which may be imposed** – such as incident reporting requirements.

31. As of 28 April 2022, no applications for licences or permits have been declined, and every payload permit and licence has had ministerial conditions imposed. There are now a number of conditions which have become standard for all payload permits.

VARYING, SUSPENDING OR REVOKING PERMITS AND LICENCES

32. The Act prescribes the grounds on which the Minister may vary, suspend, or revoke a licence or permit that has been granted. This may be initiated by the licensee or the Minister may invoke these powers of their own accord in certain circumstances. For example, if the Minister believes on reasonable grounds that the revocation, variation or suspension of a launch licence is necessary in the interests of national security, public safety, compliance with any of New Zealand's international obligations or other national interests.

33. Since the inception of the Act, the revocation power has only been invoked on one occasion. In this case, the Minister revoked the licence (a high-altitude licence) at the request of the licensee. That licence holder has since applied for (and received) a subsequent high-altitude licence for the next generation of their vehicle.

34. The Minister has regularly varied permits and licences. For payload permits this has generally occurred at the permit holder's request to allow the launch of additional identical payloads. Rocket Lab's Launch licences have been varied several times to allow for new capabilities, most notably, Rocket Lab's plans to recover the first stage of the launch vehicle.

[2] Note that Table 1 only includes licensing and permitting activity conducted under the Act (and its regulations). In addition to the above, a further 19 approvals for payload launches were approved by the Minister under the contract which Rocket Lab and the New Zealand Government entered into as an interim measure before the legislative regime had been established and brought into effect. The table does not include applications under assessment, which may or may not be granted, nor discussions with potential applicants pre-application, which may or may not result in the submission of an application.

35. The Minister has not revoked any payload permits (New Zealand based), overseas payload permits, launch licences, or facility licences.

STATUTORY POWERS

36. The Act provides the following powers to support compliance with the regime. While not all have been invoked, it remains important that they continue to be available to the regulator. These powers include:

    - **Request for Information:** Section 50 of the Act empowers the Minister to ask an applicant or holder of any licence or permit under the Act to provide any information that the Minister requires for the purposes of performing functions or exercising powers under the Act in relation to the licence or permit. To date, there has been no cause to use this power. MBIE ensures that all requests for information to applicants come from officials with this delegated power. When applicants have been reluctant to provide information (eg due to commercial sensitivity concerns) this has been resolved via negotiation or a revision of the request to encompass only necessary information, negating the need to formally invoke this power. Applicants have been highly compliant and have a strong incentive to comply with requests for information, so it is not envisaged these powers will be invoked often.
    - **Declaration of a debris protection area:** Section 64 of the Act prescribes that the Minister may declare a debris protection area, if the Minister is satisfied that it is necessary to do so in order to comply with any international agreement relating to the protection of sensitive space technology. The Minister has delegated this power to the Chief Executive of MBIE. The Chief Executive has not needed to invoke this power to date.
    - **Sharing information with agencies:** Section 85 prescribes statutory provisions which enable information to be shared across specified agencies. Officials routinely share information with other agencies as permitted at Section 85 where this is necessary for the performance of their respective regulatory functions.

NON-STATUTORY PRACTICES TO SUPPORT COMPLIANCE

Compliance strategy

37. MBIE's compliance strategy describes the overall approach to ensuring that people carrying out activities under the Act comply with the statutory requirements and with licence and permit conditions.

38. Whereas the guidance material is public-facing and designed for the regulated parties, the compliance strategy is designed for internal use by MBIE.

39. The document describes:

    - The key features of the regulatory regime relevant to the compliance strategy, such as:
        - Recognition of authorisations from some overseas regulators as meeting certain requirements under the Act for some licences or permits[3]; and
        - that elements of some licensed activities fall under the remit of other New Zealand regulatory regimes.
    - The way MBIE works with its regulatory partners.

[3] OSHAA Section 51: Minister may take into account authorisation granted in country other than New Zealand.

- MBIE's responsibilities as steward of the regulatory system, including monitoring safety culture.
- MBIE's risk-averse approach to compliance.
- Assurance measures for each licence or permit type under the Act.

Preventative action and managing relationships

40. While statutory levers to enforce compliance, and address non-compliance, are available in the regime if needed, the day-to-day work of MBIE focuses on preventative steps which mitigate the likelihood that enforcement action will be required and help regulated parties to comply. These include:

    - Regular engagement with the only launch licence holder (Rocket Lab) to ensure they are aware of their obligations, and to provide clarity on which agency holds which regulatory responsibilities under the Act.
    - Publication of educational and guidance material, such as operational policies, to provide guidance to regulated parties and applicants.
    - Engagement with payload permit applicants prior to their applications being accepted to help ensure the applicants are aware of the requirements under the Act.
    - Regular communication with regulated parties and applicants.

41. Within the regime, and at its boundary with other systems, there are multiple regulators with overlapping mandates. As steward of this regulatory system, MBIE has taken steps to mitigate risks of either duplication of effort or gaps, such as:

    - Undertaking a 'regulatory mapping' exercise to determine who is responsible for which regulatory functions under OSHAA.
    - Entering into a Memorandum of Cooperation (MoC) with the New Zealand Civil Aviation Authority (CAA) and a separate MoC with the United States Federal Aviation Administration (FAA);
    - Developing MoCs (or equivalent) with WorkSafe New Zealand, the New Zealand Security Intelligence Service, and the New Zealand Police.

3. APPROACH TO THE REVIEW

3.1. SCOPE

42. The Terms of Reference (see Annex Three) set out the agreed scope of the statutory review.

43. Section 86 of the OSHAA prescribes that the Minister for Economic and Regional Development, as Minister responsible for the Act's administration, is required to:

    - as soon as practicable after three years from the Act's commencement, commence a review of the operation and effectiveness of the Act and prepare a report on that review; and
    - present the report to the House of Representatives as soon as practicable after its completion.

44. Consistent with the Terms of Reference, the scope of the statutory review includes an assessment of whether the licensing and permitting processes (within the Act and its regulations) are effectively and efficiently delivering on the purposes of the Act, and how they might be improved operationally. The statutory review of the Act is not intended to revisit first principles.

3.2. PROCESS

45. The consultation process ran from mid-August to the end of September 2021 and targeted those stakeholders directly affected by the OSHAA. Most submissions were received in written form, although verbal discussions with some stakeholders also took place.

46. Those targeted in the consultation process fell into four broad categories:

    - **Agencies involved in administering the licensing and permitting processes** – Over a dozen government agencies were included as part of this group, including relevant parts of MBIE, such as the Space Policy and Regulatory Systems (SPRS) and the Radio Spectrum Management team.
    - **International regulatory agencies –** MBIE emailed a targeted group of regulatory bodies in other jurisdictions to obtain their views on best practice in the regulation of the space and high-altitude sector and engage on matters relating to international obligations. Agencies from Australia, Japan, Europe and the United States were included in this group.
    - **Industry stakeholders who have applied, or will apply, for licences and permits –** Regulated parties (past, present and prospective) were the largest sub-set of the targeted consultation group, with several dozen falling into this category. Many were existing permit holders, but some were prospective applicants.
    - **Other stakeholders** (eg universities and sector providers).

3.3. RESPONSE

47. The Review Team received 17 written submissions and engaged in two stakeholder meetings which were treated as verbal submissions, with their agreement. Relevant extracts from Ministerial correspondence received during this period have also been treated as a submissions, as denoted by an [M] in the list below.

48. Written submissions were received from the following parties:

    - Aotearoa/New Zealand Peace Foundation (International Affairs and Disarmament Committee) [M]
    - Care Weather
    - Civil Aviation Authority*
    - Government Communications and Security Bureau and New Zealand Security Intelligence Service – joint submission*
    - Jan Marsh [M]
    - Land Information New Zealand
    - Ministry of Defence*
    - Ministry of Foreign Affairs and Trade*
    - New Zealand Defence Force*
    - New Zealand Nuclear Free Peacemakers and Space for Peace Aotearoa [M]
    - New Zealand Police
    - New Zealand Security Intelligence Service*
    - Orbital Astronautics
    - Robert Howell [M]
    - Rocket Lab
    - Space Operations New Zealand
    - Space Policy and Regulatory Systems team (within MBIE)*

    Note: Submitters marked with an asterisk (*) are those who were given, and provided substantive input into, the information framework which the Review Team engaged the cross-agency group

on. The framework outlined questions and prompts for input to draw out insights and evidence from these agencies which they may hold from their experience as an agency with a role in the system.

49. During the consultation period, the Review Team met separately with Kea Aerospace, LeoLabs, and with the FAA as a co-regulator. As relevant to the subjects covered in the report, the insights and perspectives from these discussions are reflected in the body of this report, in a similar manner to feedback received via the submissions process.

50. The Review Team also commissioned Professor Steven Freeland, an international law expert, to provide insights on the regulation of high-altitude activities internationally.

PART TWO: KEY FINDINGS

1. OVERALL VIEW OF THE REGIME

51. New Zealand's regime for the regulation of space and high-altitude activities has performed well. There have been no material safety or security issues, and decisions have been compliant with New Zealand's international obligations, and national security and national interests.

52. The submissions indicate that the regime is well regarded by those entities that engaged with it, and this is illustrated by some quotes:

"The space sector moves rapidly, and there's a need to keep up and stay relevant. In this regard, the OSHAA as a legislative framework is fantastic! New Zealand's legislative regime/the OSHAA is a major reason why we chose to locate here. The implementation of the regime and the speed at which the NZ Space Agency reacts/responds made New Zealand an attractive location option" – LeoLabs

"New Zealand is going in a very good direction. These issues with HAVs are not well addressed by other countries and New Zealand is relatively well-placed compared to other countries on the HAV side" – Dawn Aerospace

"Rocket Lab supports the purpose of the Act and acknowledges to date the Act has supported our success and, as a result, the success of our many suppliers and highly skilled employees across New Zealand. It is clear to Rocket Lab that the New Zealand Space Agency and the responsible Minister apply great diligence in reviewing our and our customers' launch and payload permit applications, ensuring that the activities continue to meet New Zealand's obligations in the Outer Space Treaty, other international obligations, and are in New Zealand's national interests"
– Rocket Lab

53. Submitters made a number of proposals for improving the regime, and these are addressed in the report. The issues have been divided into two broad categories: 'substantive matters' and 'other issues.'

54. In the substantive issues section of the report we discuss the key issues that have been identified in relation to the licensing and permitting functions under the Act. This has included several issues relating to the regulation of high-altitude vehicles, where technological advances since the legislation was developed may require legislative changes. In the 'Other issues' section of the report, we discuss a number of other issues raised in submissions, and identified by MBIE, including some areas where some legislative 'tidying up' may be desirable.

PART THREE: SUBSTANTIVE MATTERS

1) DEFINITION OF LAUNCH FACILITY

STATUS QUO

55. Section 38 of the Act provides a person must not operate a launch facility in New Zealand unless the person has a facility licence for the launch facility. The term 'launch facility' is defined to mean, subject to any regulations made under section 88(1)(12), —

    a) means a facility (whether fixed or mobile) or place from which it is intended to launch a launch vehicle; and

    b) includes all other facilities that are necessary to launch a launch vehicle from the facility or place.

56. This is potentially a very broad definition which extends not just to the launch range and mission control but also testing facilities and ground stations.

ISSUE

57. Space Operations New Zealand (Space Ops) has expressed concern about the definition on the basis that it could be interpreted as meaning that they are required to hold a licence in relation to their operation of ground stations.

ANALYSIS

58. We agree with Space Ops that the definition is too broad and should be amended to specifically exclude ground stations which were not intended to be caught by the definition. If ground stations are to be regulated, they need to be regulated separately from launch facilities since the operator of a ground station is generally a different person than the operator of a launch facility.

59. The issue is broader than just the inclusion of ground stations within the definition. The second limb of the definition that includes 'all other facilities that are necessary to launch a launch vehicle from the facility or place' extends the definition beyond what is necessary to ensure launch facilities are properly regulated. Accordingly, we propose that the definition be amended so that it applies only to what is often described as the 'launch range'. A possible approach that has been suggested is to repeal the second limb of the definition and add this into the first limb which captures the facility 'from which it is intended to launch a launch vehicle' and includes any other relevant installation or equipment necessary for the operation of the facility.

RECOMMENDATION

60. The Review recommends that the definition of 'launch facility' should be amended to remove the reference to ground stations.

2) ROLES AND RESPONSIBILITIES FOR REGULATING LAUNCH FACILITIES

STATUS QUO

61. The Act requires that the Minister may grant a facility licence only if the Minister is satisfied that—

    a) the applicant is technically capable of operating a launch facility safely; and

    b) the applicant has taken, and will continue to take, all reasonable steps to manage risks to public safety; and

c) the proposed operation of the launch facility is consistent with New Zealand's international obligations; and

d) the applicant and the proposed operation of the launch facility meet any other prescribed requirements relating to the launch facility.

ISSUE

62. The SPRS team has suggested it might be desirable to clarify the respective roles and responsibilities of MBIE and WorkSafe on the face of the legislation.

ANALYSIS

63. On the issue of the roles and responsibilities of MBIE and WorkSafe, we consider there is no need for the OSHAA to specifically regulate any of the facilities referred to in the definition for safety because they are already regulated under the Health and Safety at Work Act 2015.

64. There are two options for clarifying the roles and responsibilities of the respective agencies. The first option is to repeal the technical capability and safety requirements in clause 40 of the Act, leaving the regulation of launch facilities to be dealt with entirely under the Health and Safety at Work Act 2015.

65. The alternative option would be to repeal the technical capability and safety requirements in clause 40 and include a provision, such as that provided in section 29A of the Crown Minerals Act, that requires the Minister to seek the views of the health and safety regulator (WorkSafe) on whether the prospective licensee has the capability and systems required to meet the requirements under the Health and Safety at Work Act 2015 before granting a facility licence.

66. On balance, we prefer the latter approach because a simple repeal of the provision might be seen as a dilution of the emphasis on public safety. A requirement for the Minister to seek the views of WorkSafe on facility safety would also provide an additional check in the system which is appropriate for what is still a novel activity. This would have some resource implications for WorkSafe. However, the number of licence applications is likely to be very small and the SPRS team already asks WorkSafe to review the launch facility aspects of Rocket Lab's safety case, so we would not expect this to be significant.

RECOMMENDATION

67. The Review recommends that consideration be given to:

- repealing the requirement in clause 40(1) of the Act that, before granting a facility licence, the Minister must (a) be satisfied that the applicant is technically capable of operating a launch facility safely, and (b) that the applicant has taken, and will continue to take, all reasonable steps to manage risks to public safety.

- creating a new provision such as that provided in section 29A of the Crown Minerals Act, and that should be introduced, requiring the Minister to seek the views of the health and safety regulator (WorkSafe) on whether the prospective licensee has the capability and systems required to meet the requirements under the Health and Safety at Work Act 2015 before granting a facility licence.

3) LAUNCH LICENCES – MANAGING LAUNCH SAFETY

STATUS QUO

68. Currently, launch safety is managed through a threshold test in section 9 of the Act that requires the Minister to be satisfied that the applicant has taken, and will continue to take, all reasonable

steps to manage risks to public safety supported by requirements in the regulations for a safety case.

ISSUE

69. A key issue is whether this is the optimal approach to managing launch safety or whether it would be better managed through performance-based safety regulations such as the FAA Commercial Space Transportation Regulations. A related issue is whether the current requirements for a safety case are sufficiently specific about the types of safety systems that are required and, more generally, whether there needs to be more clarity about the safety standards against which a licence application will be assessed.

ANALYSIS

70. Performance-based regulation started to be adopted as more common regulatory approach in the 1980s. It was a reaction to the cost and innovation-inhibiting effect of the extant prescriptive approaches. The objective of performance-based systems is to provide certainty through prescribed safety standards, but also flexibility by allowing alternative means of compliance. The Building Act 2004 is an example of this form of regulation.

71. The requirement for safety cases as a means of regulation was also a reaction to extant prescriptive regulation, but in this case the defined problem was that operators focused on compliance rather than safety. The primary objective of the safety case approach was to shift responsibility for safety from the government (as the rule maker) to the operator. Flexibility was a secondary objective.

72. In practice, our current safety case approach has not been tested because the Minister is able to treat Rocket Lab's FAA launch licence as satisfying the safety and technical capability requirements, rather than relying on its safety case. However, we need to ensure that the legislative framework is sufficiently robust to manage safety appropriately if an application by a non-US applicant was made.

73. An advantage of the safety case approach is that it provides maximum flexibility and as a result readily accommodates changes in technology, therefore supporting innovation. However, it does not provide certainty to operators as to the safety standards that need to be applied or how licence applications will be assessed.

74. The FAA has had a great deal of experience in regulating the safety of commercial space activities and it has recently amended its regulations to move it to a more performance-based model, which mitigates earlier concerns that the regulations were too rigid to allow for innovation.

75. There would be several advantages in moving to a performance-based model based on the US regulations. As both the US and New Zealand regulate Rocket Lab's activities, there are significant advantages in the two systems being interoperable.

76. The US has a proven track record in regulating space launches and the requirements in the regulations are set to achieve a high standard of safety. However, the regulations also allow for alternative approaches to those provided for in the regulations, provided they achieve an equivalent level of safety.

77. As a result, the regulations provide certainty to both regulators and regulated parties about the safety standards that are required whilst providing flexibility to allow for innovation.

78. There is also an increasing interest in space launch activities internationally and there is an advantage in having safety regulations that are interoperable. There is a limited pool of people internationally who have the expertise to assess launch licence applications, a problem which would be compounded if there are a multiplicity of different approaches to safety regulation.

79. It seems likely that other jurisdictions that are establishing space regulatory systems will look to the US system as an exemplar of safety regulation given its experience in regulating launch safety.

80. Even if other jurisdictions do not look to the US safety standards and the full advantages of interoperability are not realised, a performance-based approach seems more appropriate than our current open-ended safety case approach because of the clarity and certainty it provides about the safety standards that are required. This seems important in a field of endeavour that is characterised by rapid technological change, and which is therefore inherently risky.

81. However, if the current safety case approach is to be retained, consideration needs to be given to whether the existing requirements are sufficiently specific to appropriately manage safety or whether a greater level of prescription is required, particularly as to the general nature of the safety analysis that is required.

82. The regulations require identification of safety critical systems, the safety standards applied, safety management systems and an emergency management plan but do not prescribe the type of safety analysis that is required. This contrasts with the new UK Space Industry Regulations 2021 which contain much more detailed requirements for a safety case, including detailed requirements for flight safety analysis and ground safety analysis.

83. The Australian regulations do not specifically require a safety case but are also much more specific than the New Zealand regulations about the information required for a launch licence and the type of safety analysis that is required.

RECOMMENDATION

84. The Review recommends that MBIE carry out a review of the safety requirements for launch licensing to assess whether more detailed safety regulation is required, whether through performance-based safety regulation or more detailed requirements about the contents of a safety case. At the same time, the Review Team is aware that MBIE is considering what is necessary to build its own capability so that it is in a position to appropriately regulate domestic launches in circumstances where recognition of an overseas licence is not possible.

4) LAUNCH LICENCES – THE MANAGEMENT OF ORBITAL DEBRIS

STATUS QUO

85. Section 9(1)(c) of the Act establishes, as a threshold test for a launch licence, that the applicant has an orbital debris mitigation plan that meets any prescribed requirements. Section 17(c) of the Act establishes a similar requirement for payload permits. Regulation 13 of the Outer Space and High-altitude Activities (Licences and Permits) Regulations 2017 specifies the requirements for an orbital debris mitigation plan (ODMP).

ISSUE

86. MBIE's consideration of Rocket Lab's imminent CAPSTONE mission to lunar orbit has identified that, in addition to the management of debris in Earth orbit, there is also a need to manage non-Earth space debris and to provide for planetary protection. There is currently discussion about whether and what changes need to be made to the regulations to take account of the fact that New Zealand's space activities now extend beyond activities in Earth orbit and now into lunar orbit.

87. Leaving aside the need to regulate space debris, Rocket Lab has submitted that the current orbital debris mitigation requirements in the regulations do not provide operators with sufficient certainty because they do not specify the standard or standards that need to be adhered to. The issue here is whether there needs to be an amendment to the regulations.

ANALYSIS

88. If space exploration takes place beyond Earth orbit, there is a potential for space debris that is non-Earth orbiting. This is particularly likely to arise in the context of the post-mission disposal of the launch vehicle, where this takes place beyond Earth orbit.

89. Planetary protection is the practice of protecting solar system bodies from contamination by Earth life and protecting Earth from possible life forms that may be returned from other solar system bodies. NASA's planetary protection policies and requirements provide a useful model for ensuring the protection of the Earth, the Moon and other celestial bodies. The Committee on Space Research (COSPAR) guidelines, which are similar, also provide a useful model.

90. Article 9 of the Outer Space Treaty requires states parties to conduct exploration of outer space, the Moon, and other celestial bodies so as to avoid their harmful contamination and adverse changes in the environment of the Earth resulting from the introduction of extra-terrestrial matter and, where necessary, shall adopt appropriate measures for this purpose.

91. In the short term it has been possible to manage the permitting of Rocket Lab's proposed CAPSTONE mission by developing a policy on post-mission disposal in the lunar orbit. In the longer term, it is desirable to develop regulations to manage space debris beyond Earth orbit and implement requirements for planetary protection.

92. On the existing regulations, we note that the regulations are based on the requirements for orbital debris mitigation developed by the Inter-Agency Space Debris Co-ordination Committee (IADC). The regulations specify the outcomes that are required for an ODMP, rather than specifying a particular means of achieving those outcomes. This gives operators flexibility about the standards they apply for managing orbital debris, providing they achieve the necessary outcomes. We would be reluctant to prescribe standards that the operator must adhere to since this would reduce flexibility and potentially inhibit innovation. MBIE provides information on its website about the standards that will meet the orbital debris requirements which helps provide certainty for operators.

RECOMMENDATION

93. The Review recommends:

- That the Act be amended to include a new threshold requirement that would apply if an applicant for a licence intends to conduct space exploration beyond Earth orbit. The new provision would require the Minister to be satisfied that non-Earth orbiting space debris and planetary protection are appropriately managed, in accordance with prescribed requirements (if any). In addition, there should be a new power to make regulations prescribing requirements relating to the management of non-Earth orbiting space debris and planetary protection.
- That MBIE's SPRS team considers publishing on its website a list of the international standards that provide an acceptable means of compliance with the regulations relating to the management of orbital debris.

5) RELATIONSHIP BETWEEN LAUNCH LICENCES AND HIGH-ALTITUDE LICENCES

STATUS QUO

94. There is currently no definition of 'outer space' in the Act. There is a definition of high-altitude.

95. High-altitude means an altitude above the higher of:

    (a) flight level 600; and

(b) the highest upper limit of controlled airspace under the Civil Aviation Act 1990.

96. Accordingly, the Act provides for the lower limit of high-altitude but does not provide an upper limit.

ISSUE

97. Professor Steven Freeland[4] , an international space law expert, has raised an issue about whether the relationship between launch licences and high-altitude licences is sufficiently clear. The submissions from Kea Aerospace and the SPRS team also raise issues about the lack of clarity about the boundary between launch licences and high-altitude licences.

98. The key concern is that there should be clarity and certainty about when launch licences, high-altitude licences and payload permits are required.

ANALYSIS

99. At the time the legislation was developed there was a deliberate decision not to define the term 'outer space' or to set the upper limit of 'high-altitude' because there is no international consensus about where airspace ends and space begins.

100. The issue is significant because the legal regimes that govern space and outer space are very different - states have jurisdiction over their airspace, no state has jurisdiction over space and different liability rules apply.

101. Over the last three years the absence of a definition of outer space or of a defined upper limit of high-altitude has not caused any difficulties in practice. Rocket Lab has been the only applicant for a launch licence and there have been two applications for high-altitude licences, one relating to an experimental rocket, the other to a high-altitude balloon. In each case, the applicant knew without being told what type of licence was required.

102. However, as new technologies develop and high-altitude vehicles reach higher and higher altitudes, the issue of whether the operator should apply for a launch licence, or a high-altitude licence may become more acute. This is because in the absence of any definition of where airspace ends and outer space begins, at very high altitude it may not be clear if a particular activity is a space activity or a high-altitude activity.

103. There are two options for introducing greater certainty about whether a particular activity requires a launch licence or a high-altitude licence.

OPTION 1

104. The first option is to introduce an upper limit into the high-altitude definition. There are a small number of jurisdictions that have adopted an upper spatial limit for the purposes of either defining when a launch licence is required or for the purposes of defining an upper limit of a high-altitude regime. These are described below.

Australia

105. The Space (Launches and Returns) Act 2018 incorporates into the definitions of 'launch', 'return' and 'space object', a reference to 'the distance of 100km above mean sea level'. The launch and

[4] The Review team commissioned Professor Steven Freeland to provide expert advice for our review in relation to high-altitude activities.

return of a space object requires a licence. There is a separate requirement for the launch of high-powered rockets below this level.

106. When the spatial limit was introduced in 2002 (as an amendment to the current Act's predecessor, the Space Activities Act 1998), the Australian government emphasised that the purpose of the amendment was to provide certainty to industry about when the provisions of the legislation applied, given there is no definitive explanation of the term in either Australian or international law. In other words, the legislation did not purport to decide where airspace begins and outer space ends, and the spatial limit is simply a mechanism to provide certainty to industry.

Denmark

107. The 2016 Outer Space Act defines the term 'outer space' as meaning: space above the altitude of 100km above sea level.

108. Like Australia, the Danish Government has acknowledged that there is no internationally agreed definition of 'outer space' and that the purpose of the definition is 'to clarify the scope of the Act to launches or attempted launches up to a clearly defined point and, thus, to provide certainty to industry'. The definition does not in any way prejudge a Danish position about the definition of the term 'outer space' according to international law.

United Arab Emirates (UAE)

109. Federal Law no. (12) of 2019 on The Regulation of the Space Sector introduced a high-altitude regime. It defines the upper limit of high-altitude as any area above an altitude of 80 kilometres or more.

110. Very few other jurisdictions include a spatial limit in their space laws to delimit where airspace ends and space begins, although we are advised by Professor Steven Freeland that several other jurisdictions are currently considering it.

OPTION 2

111. The alternative option is to define the activities that constitute 'launch activities' and to exclude 'launch activities' from the 'high-altitude' definition. This is similar to the approach taken in the UK legislation - the Space Industry Act 2018. The Act distinguishes between 'space activities' and 'suborbital launches'. Space activities are activities that involve going into Earth orbit and beyond. Suborbital activities involve the operation and return of craft capable of operating above the stratosphere, or balloons that can reach the stratosphere carrying crew or passengers.

112. While the definition of suborbital flights under the UK legislation is quite different from New Zealand's high-altitude definition (and relates only to activities above the stratosphere), we are attracted to defining the licensing requirements by reference to the distinction between activities that go into orbit and beyond, and suborbital activities (which would, under New Zealand law, be defined as to include vehicles capable of or intended to go above controlled airspace).

113. This is because a test based on the distinction between launches where the launch vehicle or part of it goes into Earth orbit and beyond sits much more neatly than a spatial limit with the threshold tests under our legislation.

114. The threshold tests that apply to launch licences and high-altitude vehicles are largely the same – they are concerned with safety, consistency with international obligations and managing national interests.

115. The key difference between launch licences and high-altitude licences is that a launch licence application is required to meet an additional threshold test relating to the management of orbital debris.

116. That being the case, it makes sense to have a definition of 'launch activities' that encompasses those activities that could create orbital debris (or more broadly space debris) as we discuss later in the report.

117. If a spatial limit was adopted, an applicant might be required to meet orbital debris requirements in circumstances where no orbital debris could, or would, be created.

118. We acknowledge that some sounding rockets, such as the German Aerospace Center's (DLR) MORABA rocket and NASA's Oriole IV do go to extremely high-altitude and that certain vehicles with ballistic profiles reach such heights that they could pose a safety risk to space objects. However, we consider this is best managed through the safety risk assessment for high-altitude vehicles, rather than being managed by an arbitrary spatial limit.

119. Finally, we note the possibility of 'hybrid' vehicles that are intended to go into both space and high-altitude. In these circumstances it would be appropriate for a launch licence rather than a high-altitude licence to be obtained. As the only difference in licensing requirements would be that a launch licence requires orbital (and other space) debris to be managed while a high-altitude licence does not, it would be unnecessary to require an operator to obtain two licences.

RECOMMENDATION

120. The Review recommends that consideration be given to including in the legislation a new definition of 'launch activity'. A launch licence would be required if a person was seeking to carry out a 'launch activity'. The definition of 'launch activity' would relate to an activity where a launch vehicle, or any part of the launch vehicle, is intended to go into Earth orbit or beyond Earth orbit. If that approach was taken, a consequential change could be made to the 'payload' definition to replace the reference to 'an object intended to go into space' with a reference to 'an object intended to go into Earth orbit and beyond'.

6) HIGH-ALTITUDE REGIME – MANAGING THE SAFETY OF HIGH-ALTITUDE ACTIVITIES

STATUS QUO

121. The high-altitude regime distinguishes between high-altitude vehicles that are aircraft and those that are not when it comes to managing the technical competence of operators and the safety of the high-altitude vehicles.

122. In relation to high-altitude licences that are not aircraft, the Minister needs to be satisfied that the applicant has the technical capability to conduct a safe launch and the applicant has taken, and will continue to take, all reasonable steps to manage risks to public safety.

123. To satisfy these requirements, The Regulations require the applicant to submit a safety case. This aligns with the approach to launch licences.

124. In the case of high-altitude vehicles that are aircraft, the Minister requires confirmation from the Director of Civil Aviation that the aircraft or (where relevant) the operator of the aircraft has the appropriate permits, certificates, or other documents required under the Civil Aviation Act 1990 (if any) or in the case of a foreign aircraft, that the aircraft is recognised under New Zealand law. The Minister must also take into account any advice or information provided by the Director of Civil Aviation in relation to the safety of the operation of the aircraft at high-altitude.

ISSUE

125. A key issue is whether the current approach to safety regulation of HAVs is appropriate. Does it make sense for the Minister to rely on the Civil Aviation Act 1990 to manage the safety of HAVs

that are aircraft? Is the safety case approach appropriate for managing the safety issues associated with HAVs that are not aircraft or would performance-based safety regulation be more appropriate? Related questions include whether the requirements applicable to rockets in part 101 of the Civil Aviation Rules are sufficient for dealing with high powered rockets and how to deal with 'hybrid' vehicles. For example, Dawn Aerospace's space plane is currently regulated as an aircraft but in many respects operates more like a rocket.

126. MBIE's SPRS team has also raised a separate but related issue about whether there should be a separate licence class for high powered rockets even if they do not reach high-altitude, noting that the Act does not currently regulate Missile Technology Control Regime (MTCR) category one rockets that are not launched to an altitude at or above flight level 600. The SPRS team considers there is a question of whether the applicable CAA Rule (101) is appropriate for managing public safety in this area because its concern is with the safety of aircraft and high-powered rockets are not aircraft.

ANALYSIS

127. The distinction between high-altitude vehicles that are aircraft and those that are not is sensible because aircraft are subject to a comprehensive safety regime under the Civil Aviation Act 1990. The term 'aircraft' means any machine that can derive support in the atmosphere from the reactions of the air otherwise than by the reactions of the air against the surface of the Earth. The civil aviation regime is designed to manage the technical competence of operators (where appropriate) and the safety of aircraft.

128. The CAA has the expertise in regulating aircraft safety and it would add an unnecessary cost and compliance burden if there was an additional layer of safety regulation for aircraft merely because they are intended to, or are capable of, going into high altitude.

129. A potential complication is that at very high altitude an aircraft may cease to be an aircraft. An example would be a spaceplane that is deriving atmospheric lift during ascent, then continuing a ballistic trajectory to an apogee followed by a descent that is initially ballistic but derives atmospheric lift for flight at lower altitude. However, we anticipate that in these circumstances the CAA would continue to be the safety regulator since it would make no sense for a different regulator to regulate safety for a small part of a vehicle's journey.

130. The Act contemplates that the CAA will provide the Minister with advice on whether there are additional safety risks from operating at high altitude. In our view this is sufficient to appropriately manage the safety risks associated with unmanned high-altitude vehicles because the safety risks at high altitude are not so different from the safety risks at lower levels as to require a separate and additional layer of regulation.

131. However, while the distinction between HAVs that are aircraft and those that are not remains appropriate to avoid the situation of having two different regulators regulating the same thing, there is a question about whether Parts 101 and 102 of the Civil Aviation Rules apply to, or are appropriate for, regulating all forms of high-altitude activity. The issue is particularly acute in the case of vehicles, such as Dawn Aerospace's spaceplane, which is regulated as an aircraft, though in many respects operates more like a rocket. While the timing of any review of Parts 101 and 102 of the Civil Aviation Rules is a matter for the CAA, we would support an early review being undertaken in conjunction with further work by MBIE on the regulation of high-altitude vehicles.

132. A related question is whether the OSHAA deals appropriately with the safety of HAVs that are not aircraft. Part 101 of the Civil Aviation Rules does provide some limited regulation of rockets, but this is largely for the purpose of ensuring the safety of aircraft. The CAA has acknowledged these rules are not appropriate for, and do not apply to, launch vehicles that are regulated by the OSHAA. A similar issue arises about whether they are appropriate for, or should apply to, high-powered high-altitude rockets which are also regulated by the OSHAA. We recommend that

MBIE's SPRS team engages with the CAA to discuss the appropriateness and applicability of Part 101 of the Civil Aviation Rules for managing high-powered high-altitude rockets. We also recommend engagement with the CAA on how to regulate HAVs.

133. Currently the OSHAA requires a safety case for HAVs that are not aircraft. The question is whether performance-based safety regulation would provide better safety outcomes than the current safety case approach. This is the same question we have asked in relation to launch vehicles. Our tentative view is that it would because it provides clarity about the safety standards that are required. Accordingly, we recommend that further work on this issue be undertaken in conjunction with a review of the safety requirements for launch licensing.

134. Whatever form of regulation is required, it will be important to consider the scope of the safety analysis that is required. Generally, the safety analysis will need to cover public safety on the ground and in the air. In the case of vehicles that go into very high altitude, particularly those with a ballistic profile, the safety of space objects will also need to be considered. In each case, the safety analysis will need to be proportionate to the risks associated with the activity.

135. On the issue raised by the SPRS team about the need for a new licence type to regulate high-powered rockets that are not capable of or intended to reach high-altitude, we have several reservations. We are not aware of any issues that have arisen with rockets that operate in altitudes of lower than flight level 600 and the regulation of rockets at these much lower altitudes seem a long way removed from a space law.

136. We note that Australia (which does not have a high-altitude regime) has recently adopted a licensing requirement for high-powered rockets. The definition of a 'high-powered rocket' is contained in rules and does not depend upon the altitude the rocket is capable of achieving.

137. The definition in rule 5 of the Australian rules specifies two elements for an object to be a high-power rocket. An object is a high-power rocket if it meets either paragraph 5(a) or 5(b). Paragraph 5(a) provides that rockets which have a large combined total impulse (greater than 889,600 Newton seconds) are captured as high-power rockets. Paragraph 5(b) ensures that rockets which have a lower combined total impulse (but still greater than 40,960 Newton seconds) than in paragraph 5(a) but include systems that allow active control of the rocket's trajectory, are captured as a high-power rocket.

138. We are confident, however, that a high-powered rocket that met the Australian definition would be capable of going into high altitude. On that basis we do not consider adopting the Australian approach would result in a different outcome than the New Zealand approach. Accordingly, the Review does not recommend any new licence type for rockets that are not capable of or intended to go into high altitude.

139. Finally, an issue has been raised whether the current rules are adequate if an operator was proposing to undertake manned high-altitude space flight. In our view, they are not. However, as there is currently no prospect of manned spaceflight on the horizon, we have not explored that matter any further.

RECOMMENDATION

140. The Review recommends:

- That MBIE engages with the CAA to discuss the applicability, and appropriateness of Part 101 of the Civil Aviation Rules, for high-powered rockets and more generally for HAVs; and
- That further consideration of whether performance-based regulation of the safety of non-aircraft HAVs be undertaken in conjunction with a review of the safety requirements for launch licensing.

141. The Review does not recommend the creation of a new licence for high-powered rockets that are incapable of going beyond flight level 600.

7) PAYLOAD PERMITS AND HIGH-ALTITUDE PAYLOADS

STATUS QUO

142. Section 15 of the Act requires a person who launches or procures the launch of a payload to have a payload permit if that payload is launched:

    a) from a launch facility in New Zealand; or

    b) from a launch vehicle that was launched from a launch facility in New Zealand or a vehicle in the air that was launched from New Zealand.

143. The term 'payload', subject to any regulations made under section 88(1)(11):

    a) means an object that is carried or placed, or is intended to be carried or placed, in outer space; and

    b) includes components of a launch vehicle that are specifically designed or adapted for the object (but does not otherwise include a launch vehicle or any of its component parts); and

    c) includes a load to be caried for testing purposes or otherwise on a non-profit basis.

144. Accordingly, persons who procure the launch of payloads (eg satellites or other space objects) are required to have a payload permit, whether that payload is launched from a launch services provider such as Rocket Lab or from a high-altitude vehicle.

145. The Act also contains a definition of 'high-altitude payload'.

146. A high-altitude payload, subject to any regulations made under section 88(1)(13):

    a) means an object that is carried or placed, or is intended to be carried or placed, at high-altitude; and

    b) includes components of a high-altitude vehicle that are specifically designed or adapted for the object (but does not otherwise include a high-altitude vehicle or any of its component parts); and

    c) includes a load to be caried for testing purposes or otherwise on a non-profit basis.

147. No permit is required for a high-altitude payload and the term has very limited application throughout the Act (it is used in section 60 in connection with enforcement powers and in section 88 which extends the regulation making powers to high-altitude payloads, but otherwise does not have any operative effect).

ISSUE

148. A key issue is whether a permit should be required for high-altitude payloads. A related question is whether the current definition of 'high-altitude payload' is appropriate.

149. The SPRS team noted that recent developments with high-altitude technologies make it desirable that equipment taken into high altitude, such as sensors used for remote sensing or other equipment used in scientific research, is permitted separately from the high-altitude vehicle itself.

150. Submissions have also highlighted that the current definition of 'high-altitude payload' may need refinement.

151. Dawn Aerospace, for example, noted that the current definition of high-altitude payload is problematic and confusing in their operational context and Kea Aerospace drew attention to the fact that the term 'payload' is used differently in the civil aviation and space contexts. In our discussions with the CAA, they also drew attention to the differences in terminology in the civil aviation and space contexts.

ANALYSIS

152. At the time the legislation was developed, the high-altitude vehicles that were in contemplation were high-altitude balloons, such as those operated by NASA for research purposes. It seemed unnecessary at the time to consider the payload of a vehicle separately from the high-altitude vehicle itself, because it was assumed that the owner and operator of the payload would be one and the same.

153. New technologies, such as the spaceplanes being developed by Dawn Aerospace and Kea, change that position because they open up the very real prospect of scientific and other activities being commissioned by someone other than the person who operates the vehicle. In such a case, the payload or equipment used to carry out the activity might be owned by either the operator of the high-altitude vehicle or by the person who is conducting the scientific research.

154. There is a clear rationale for requiring separate licences and permits for launch vehicles and payloads in the space context because a launch vehicle and its payload are separate and distinct space objects that need to be separately managed from the perspective of safety, management of orbital debris and protecting the national interest.

155. This distinction holds good whenever a payload is placed into orbit, whether by a launch vehicle or by a high-altitude vehicle, and in each case the legislation requires a payload permit under section 15 because the same interests are at play. These interests are the management of the collision risk in space, the management of orbital debris, and ensuring the activity is consistent with international obligations and not contrary to the national interest.

156. The position is much less clear cut in the case of high-altitude vehicles and the activities they perform at high-altitude. Safety issues relating to high-altitude vehicles are likely to be managed through licensing of the vehicle and the issue of orbital debris does not arise. There may not need to be a separate permit to manage the safety of its payload in the case of a high-altitude vehicle because the payload is unlikely to operate independently of the high-altitude vehicle. For example, a sensor for remote sensing is likely to be attached to the vehicle and the safety of the activity is likely to be assessed as part of the vehicle licensing requirement. However, further work is required to assess whether that will always be the case and to fully understand the impact of carrying various types of scientific equipment on vehicle safety.

157. It will always be necessary for activities carried out by a high-altitude vehicle to be consistent with our international obligations and not contrary to the national interest. These interests are as relevant to high-altitude activities as they are to launch activities.

158. Accordingly, we agree that in circumstances where the operator of the vehicle may not necessarily be the person that carries out the activity, there will almost certainly be a need for a permit that is separate from the vehicle licence to properly regulate the activity performed by the vehicle and ensure it is not contrary to the national interest.

159. However, in our view, a question that needs to be asked is exactly what it is that needs to be permitted. Is it the activity that the vehicle is carrying out or is it the payload it is carrying? Do the differences in context necessitate a difference in approach from the way in which launches and payloads are regulated?

160. Arguably, in the high-altitude context, it is more appropriate to regulate the activity carried out by a high-altitude vehicle rather than its payload because the payload (or equipment used to

carry out the activity) could be owned and operated by either the operator of the high-altitude vehicle who hires it out for commercial gain or by the person who has commissioned the high-altitude activity. If the concern is about the nature of the activity and who is carrying it out, then regulating the activity rather than the payload seems more appropriate. Against that, the capability of the payload may in and of itself give rise to national interest concerns.

161. In our view the question of how to regulate the new and emerging high-altitude technologies raises some significant issues that we are only able to touch on very briefly in the context of this review. Further work is necessary to get a better understanding of how the business models of the proposed operators will work, the nature of the payloads they are likely to carry and how the payload might impact on questions of vehicle safety. We recommend that further work on these issues be undertaken as soon as is practicable given that development of the technology is reasonably well advanced.

162. The issue of the existing definition of 'high-altitude payload' is of limited importance when looked at in the context of the much bigger issues surrounding the regulation of high-altitude activities. As the term is used in the legislation, it has very little operative effect. The term is used in the definition of 'technical data', in the enforcement provisions (which have never been used) and in the regulation-making powers (with no regulations having been made). While the definition will need to be looked at in the context of the further work on high-altitude vehicles, we do not see any need for urgent amendment.

RECOMMENDATION

163. The Review recommends that further work be undertaken on how best to regulate new and emerging high-altitude activities.

8) HIGH-ALTITUDE REGIME – THE SCOPE OF THE EXEMPTION REGIME

STATUS QUO

164. The Outer Space and High-altitude Activities (Definition of High-altitude Vehicle) Regulations 2017 regime excludes certain types of balloons from the high-altitude regime. These include certain types of weather balloon, balloons launched for educational purposes under the supervision of schools and universities, and balloons of a type readily available in retail stores in New Zealand if they are used solely for the purpose of describing or illustrating the progress of the balloon.

ISSUE

165. Dawn Aerospace submits that a broader category of balloons should be exempt from the regime. It notes that the Civil Aviation Rules distinguish between 'medium free balloons' and 'heavy free balloons'. It considers medium weight balloons should be exempt from the high-altitude regime.

In the Civil Aviation Rules the term 'medium free balloon' means a free balloon, that:

(1) carries a payload of 2 or more payload packages with a combined mass of—

i. more than 4 kg; and

ii. less than 6 kg; and

(2) does not meet any of the criteria specified in the definition of the term heavy free balloon.

ANALYSIS

166. The current exemptions in the Outer Space and High-altitude Activities (Definition of High-altitude Vehicle) Regulations 2017 exclude from the regime balloons of a type that are unlike to pose risks to national security or other national interests.

167. We have consulted relevant agencies who agree that medium weight balloons as defined in the Civil Aviation Rules are unlikely to give rise to any significant national interest concerns. This weight class has a limited utility for operations that could raise any issues that are sufficiently serious to warrant regulation. The limits imposed by weight affects complexity of activities, and the types of activity it can undertake, and duration of the operations of balloons of this type. On that basis, we agree that medium weight balloons can be excluded from the high-altitude regime.

168. On that basis, we consider that medium free balloons should be excluded from the high-altitude regime.

RECOMMENDATION

169. The Review recommends considering the case for amending the Outer Space and High-altitude Activities (Definition of High-altitude Vehicle) Regulations 2017 to exclude certain high-altitude vehicles, including medium free balloons and small rockets.

9) HIGH-ALTITUDE REGIME – ESTABLISHMENT OF A REGISTRATION SYSTEM

STATUS QUO

170. The Registration Convention requires that when a space object is launched into Earth orbit and beyond the launching state is required to enter the object on a domestic register and to provide certain information about the object to the Secretary General of the United Nations as soon as reasonably practicable.

171. MBIE has established a domestic space register and regularly provides information from the register to the Secretary of the United Nations as required by the Registration Convention.

ISSUE

172. There is no comparable registration requirement for high-altitude vehicles.

173. Professor Steven Freeland has suggested that there may nonetheless be utility in establishing a register of high-altitude launches for domestic use.

ANALYSIS

174. We agree. While there is no obligation to create a register or to furnish information to the UN, a register is likely to provide a quick and easy way to respond to requests for information about high-altitude launches. The establishment of a register is not onerous and does not require legislation.

RECOMMENDATION

175. The Review recommends the SPRS team establish a register of high-altitude vehicles.

10) THE NEED TO REGULATE THE RETURN OF SPACE OBJECTS AND HIGH-ALTITUDE VEHICLES

STATUS QUO

176. The OSHAA doesn't currently distinguish between the launch and return of launch vehicles and high-altitude vehicles. If the launch vehicles and high-altitude vehicles, or any part of them, return to Earth this is simply treated as an aspect of the launch licensing or high-altitude licensing process.

177. Under Australian law, a separate authorisation is required for the return of a space object.

ISSUE

178. Professor Steven Freeland suggests that consideration should be given to the need for a separate authorisation for the return of both space objects and high-altitude vehicles.

ANALYSIS

179. We do not consider there is a need for a separate authorisation for the return of a space object or a high-altitude vehicle where the person who launches the space object or high-altitude vehicle also returns the object or vehicle, since the issues relating to both launch and return can be appropriately dealt with in the same licensing process.

180. However, there may be a case for requiring a separate authorisation for a return of a space object or high-altitude vehicle if the launcher of the vehicle does not need a launch or high-altitude licence. This will generally be the case if the launch vehicle or high-altitude vehicle is launched from a country other than New Zealand.

181. For example, in Australia, launch vehicles launched in another jurisdiction have been returned to the Australian Outback. Theoretically, this could also occur with certain types of high-altitude vehicles, such as a high-altitude balloon.

182. If a high-altitude vehicle launched overseas returned to New Zealand, a diplomatic clearance would be required which would give New Zealand a measure of control. However, in the case of the return of a launch vehicle, no diplomatic clearance is required, and the return would be entirely unregulated.

183. In both cases, the return could give rise to both safety and environmental issues, and so a requirement for prior authorisation may be appropriate.

RECOMMENDATION

184. The review recommends that consideration be given to requiring a separate authorisation for the return of space objects and high-altitude vehicles. The requirement for a return authorisation would apply only if launch of the space object or high-altitude vehicle has not been licensed in New Zealand.

11) SECTION 3 OF THE ACT - THE PURPOSE PROVISION

STATUS QUO

185. Section 3 of the OSHAA sets out the purpose of the Act and provides:

The purpose of this Act is to:

a) facilitate the development of a space industry and provide for its safe and secure operation;

b) implement certain international obligations of New Zealand relating to space activities and space technology;
c) without limiting paragraph (b), implement the obligations in the Outer Space Treaty not to:
    i. place in orbit around the Earth any objects carrying nuclear weapons or weapons of mass destruction, install such weapons on celestial bodies, or station such weapons in outer space in any other manner;
    ii. establish military bases, installations, or fortifications on celestial bodies;
    iii. test any type of weapons or conduct manoeuvres on celestial bodies;
d) manage any potential or actual liability that may arise from the space industry;
e) establish a system for the regulation of space activities and certain high-altitude activities;
f) preserve New Zealand's national security and national interests.

ISSUE

186. Kea Aerospace submits that the legislation currently treats high-altitude activities as secondary to space activities and that there should be a reference to high-altitude activities in section 3(a) of the purpose provision in recognition of their equal importance.

ANALYSIS

187. The Review team agrees that it would be appropriate to include a specific reference to high-altitude activities in section 3(a) of the Act. Whilst Rocket Lab's launch activities were the original catalyst for the legislation, the past three years has seen the emergence of new technologies such as Dawn Aerospace's suborbital and orbital rocket-powered space plane which is under development, and Kea Aerospace's solar-powered, remotely piloted aircraft which is also being developed.

188. While there is a reference to high-altitude in clause 3(e), which relates to the objective of establishing a system for appropriately regulating these activities, there is no equivalent reference in section 3(a), which prescribes as an objective facilitating the development of a space industry and providing for its safe and secure operation. The objective of facilitating the development of a high-altitude industry and providing for its safe and secure operation is equally important as the development of a space industry and should be included in the purpose provision.

RECOMMENDATION

189. The Review recommends that section 3(a) of the Act be amended to include the purpose of facilitating the development of a high-altitude industry and providing for its safe and secure operation.

12) EMERGING TECHNOLOGIES – FUTURE PROOFING THE REGIME

STATUS QUO

190. The Act contains several regulations making powers that were designed to future-proof the regime. Regulation making powers are a useful and flexible mechanism for managing an emerging technology because they provide an option for regulating new technologies when they are sufficiently developed, without necessarily requiring it unless and until there is a case for regulation.

ISSUES

191. Since the OSHAA was developed there have been several developments that pose challenges for regulating the space environment. To future-proof the regime, we consider it would be useful to include new regulation-making powers to allow for the regulation of new issues and technologies in the future. For example, submissions identified technologies such as beacons, propulsion, and active debris removal as potential subjects for regulation.

192. The SPRS team can, and does develop, operational policies to deal with new and emerging issues. For example, it is currently developing a policy on constellations. New and emerging issues can also be regulated through the imposition of conditions on licences and permits if there is a need for binding obligations to be imposed. However, if these activities become widespread, regulations are a much more certain and transparent means of regulating them.

193. Arguably, the existing regulation-making powers could permit the making of regulations to regulate these emerging technologies, since they allow for regulations to do anything that is necessary or desirable to protect public safety, protect the environment, preserve national security and avoid interference with space or terrestrial telecommunications.

194. However, best practice may require specific regulation-making powers rather than general regulation-making powers that could be vulnerable to legal challenge.

195. The issues discussed below are not an exclusive list of the emerging technologies and issues that may warrant regulation in the future. They are intended only to illustrate the pace of change in the space sector and the need for the regime to include flexible mechanisms, such as regulation making powers, so that the law can keep pace with technology.

ANALYSIS

CONSTELLATIONS

196. The emergence of satellite constellations has posed new challenges because most international rules, norms and standards are premised on the operation of a single satellite and are not intended to, and may not be capable of, dealing with the issues raised by large constellations.

197. A specific concern has recently been raised by the International Astronomical Union (IAU) that the number of new low-Earth orbit satellite constellations interferes with optical and radio astronomy and the need to keep dark and quiet skies for science and society.

198. These concerns have arisen in the context of large constellations, such as the SpaceX Starlink, rather than in the context of small constellations of the kind that have thus far been launched from New Zealand. However, we cannot rule out the possibility in the future of applications for payload permits being made for payloads that will contribute to very large constellations.

199. MBIE is currently developing a constellations policy, but policies cannot create binding obligations and there may well be a need for regulations in the future, including regulations designed to protect the dark and quiet skies.

THE EMERGENCE OF VERY SMALL SATELLITES

200. The miniaturisation of satellite technology has revolutionised space making it more affordable and opening space to new space actors, such as Rocket Lab. Some of the satellites launched by Rocket Lab have been very small satellites of less than 1U (a “U” or unit is equivalent to a 10cm cube).

201. There are several new technologies emerging that are aimed at improving the ability to track very small satellites. Submissions to the review, for example, mentioned beacon technology and

propulsion as potentially useful technologies. Other passive means of de-orbiting are also being considered.

202. MBIE has adopted a policy for managing very small satellites, but it is foreseeable in the future that regulations relating to the tracking of satellites and management of collision risks will be required as international standards and norms develop about how to regulate satellites using these new technologies.

ACTIVE DEBRIS REMOVAL

203. The growing quantity of debris in space poses a danger to users of the orbital environment, such as spacecraft. It also increases the risk that humans or manmade structures could be impacted when objects re-enter Earth's atmosphere. There is increasing international interest in technologies that could assist in managing the problem of debris, such as active debris removal and on-orbit servicing of satellites.

204. These give rise to complex legal issues, including whether consent of the owner of the debris is required, what happens when there is no identifiable owner, how the liability rules operate in the context of space debris removal and on-orbit servicing, and the respective roles and responsibilities of the servicing and client states.

205. However, these technologies are potentially very beneficial and again it is foreseeable that regulations will be required to provide for their use in the future.

THE UTILISATION OF SPACE RESOURCES

206. The US is embarking on the largest space exploration programme since the Apollo Moon landings in the 1960s and 1970s. The Artemis Program prioritises the development of space resource utilisation technologies to enable deep-space exploration missions beyond the Moon and to Mars. The term 'space resource utilisation' refers to the extraction and use of resources available on the Moon and other celestial bodies. While the immediate interest in space resource utilisation relates to using those resources, such as water, that would facilitate exploration beyond the Moon, there is also the potential for mining for commercial purposes.

207. While NASA is leading the Artemis missions, it regards international partnerships with both governments and private sector actors as playing a key role in achieving a sustainable return to the Moon and the first human mission to Mars.

208. Accordingly, it invited several countries, including New Zealand, to join the Artemis Accords. This required New Zealand to agree to a non-binding set of principles designed to guide the safe and sustainable exploration of outer space, including principles relating to the utilisation of space resources. The issue of space resource utilisation is also being discussed in the United Nations Committee on the Peaceful Uses of Outer Space with a view to developing norms and standards

209. Rocket Lab is an early participant in the Artemis Program. It intends to launch the CAPSTONE payload as part of the program. This would involve Rocket Lab launching a satellite to test the lunar orbit for the proposed Lunar Gateway - a small space station that will act as an orbiting outpost to facilitate later parts of the programme.

210. Accordingly, we recommend a new regulation making power to prescribe requirements on New Zealand nationals relating to the utilisation of space resources on the Moon and other celestial bodies.

RECOMMENDATION

211. The Review recommends that the MBIE consider the inclusion of new regulation making powers to regulate new and emerging technologies when the OSHAA is next amended. The new

regulation making powers could include powers to make regulations regulating the activities that we have described above.

13) REMOTE SENSING

STATUS QUO

212. Remote sensing is the science of acquiring information about an object or phenomenon from a distance. Remote sensing involves the collection of data about a sensed object, area, or activity by making use of the electromagnetic waves emitted, reflected, or diffracted by the sensed object, area, or activity. Remote sensing can involve Earth observation or the observation of other objects in space. Remote sensing activities offer enormous benefits for science and a range of other disciplines but can give rise to national security risks and may give rise to national interest concerns.

213. The Act does not currently contain specific provisions relating to remote sensing activities but does have general provisions for managing national security risks and protecting the national interest. These apply to remote sensing as well as to other space activities. They include the power of the Minister to decline a permit if the Minister is not satisfied that the grant of a permit is in the national interest and the power to impose conditions on a permit.

214. The Act also contains a power to make regulations prescribing conditions or licences and permits which may include providing for the imposition of requirements relating to the collection and dissemination of data obtained by remote sensing. However, at this stage no regulations have been made relating to the collection and dissemination of remote sensing data.

215. There are also regulations prescribing the information a licensee must submit with a licence application, including some that are specific to remote sensing. Clauses 13 and 14 of schedule 4 of the Outer Space and High- Altitude Activities (Licences and Permits) Regulations 2017 require applicants to provide the following information in relation to payloads with remote sensing capability:

216. A description of any payload sensors and a summary of their capability, including information about the payload's:

    a) resolution, field of view, and field of regard; and

    b) on-board storage and processing capabilities; and

    c) geolocation accuracy; and

    d) persistence.

217. A summary of the proposed recipients of any enhanced and raw remote-sensing data, including details of:

    a) any customers or classes of customers who will receive enhanced remote-sensing data; and

    b) whether the applicant will provide any raw data to any customers or classes of customers; and

    c) any plans to provide the raw data generated by the payload—

        i. to governments whose territories have been sensed; or

        ii. for non-commercial, scientific, educational, or other public benefit purposes.

218. MBIE has not published a formal remote sensing policy. However, the Minister has agreed an approach to regulating remote sensing payload permits to protect national security and other national interest concerns. The approach involves relying on the technical controls imposed by

an overseas licence and otherwise imposing conditions on all remote sensing payloads that require the permit holder not to supply data to designated terrorist entities or to entities that are subject to our UN Sanctions Regulations.

ISSUES

219. The GCSB and NZSIS jointly submitted that it may be appropriate to enact regulations relating to the collection and dissemination of remote sensing data.

220. Two issues arise in considering the content of any remote sensing regulations. First whether the current requirement that payload applicants who carry out remote sensing activities provide information about their 'customers or classes of customers' is necessary or appropriate. Second whether steps should be taken to implement the UN's 'Principles relating to Remote Sensing of the Earth from Outer Space.'

ANALYSIS

221. We agree there is a case for dealing with remote sensing in a single set of regulations given recent technological advances, particularly Kea's development of high-altitude pseudo-satellite that has remote sensing capabilities. Currently the specific information requirements for remote sensing in the Outer Space and High-altitude Activities (Licences and Permits) Regulations 2017 apply only to payload permit applications. Rather than replicating the requirements for high-altitude applications, it would make sense to consolidate the requirements in a single set of regulations dealing with remote sensing.

222. An issue that arises with the current regulations is whether the existing requirement that the applicant provide information about "customers and classes of customers" is necessary or appropriate. The requirement is intended to identify end use customers to assist in managing national security and complicity risks. However, it is potentially problematic because commercial remote sensing products are widely available on the open market and many remote sensing companies will not necessarily know who their end use customers are. Even if they do know their customers, the products can be resold on the open market so there is simply no guarantee about where they will end up. The question is, does it make sense to try to impose restrictions on products that are readily available? However, there is also a view that more detailed information about an operator's customer base should be required if the operator has military or intelligence agencies as customers.

223. The enactment of new regulations would provide an opportunity to revisit this issue to assess whether our current approach is sound. One option is to consider the use of end user licence agreements which is the approach taken in Canada. It would also be useful to consult with the US. The US has recently adopted much less restrictive remote sensing regulations because of concerns that its earlier approach disadvantaged US companies without protecting national security, due to the availability of remote sensing data from companies operating outside the US. It would be interesting to know how the new regulations operate in practice and whether any issues have resulted from taking a less restrictive approach.

224. The other matter worth considering is whether to implement the UN's 'Principles relating to Remote Sensing of the Earth from Outer Space' and including a principle that the sensed state shall have access to remote sensing data on a non-discriminatory basis and on reasonable cost terms. The legislation in both the US and Canada requires the operators of remote sensing systems to make available to the government of any country unenhanced data collected by the system concerning the territory under the jurisdiction of such government on reasonable terms and conditions.

225. Apart from these matters, we anticipate the regulations would include our current standard condition forbidding applicants for licences or permits from supplying data to designated terrorist

entities or to entities that are subject to our UN Sanctions Regulations and would otherwise empower the Minister to impose any other condition necessary to manage New Zealand's national interests.

RECOMMENDATIONS

226. The Review recommends the enactment of regulations relating to the collection and dissemination of data obtained by remote sensing. These would apply to both applicants for payload permits and applicants for high-altitude licences if the payload or vehicle carries out remote sensing.

14) NATIONAL INTEREST ASSESSMENT

STATUS QUO

LAW

227. In each of the licensing and permitting provisions of the Act, the Minister may, despite being satisfied of all other prescribed matters (eg in relation to safety, compliance with international obligations etc.), decline to grant a licence or permit on national interest grounds.

228. In considering the national interest the Minister may have regard to—

- economic or other benefits to New Zealand of the proposed operation;
- any risks to national security, public safety, international relations, or other national interests;
- the extent to which the risks can be mitigated by licence or permit conditions;
- any other matters that the Minister considers relevant.

PRACTICE

229. To date no national interest analysis has been undertaken, but all applications are assessed to determine whether such an analysis should be undertaken.

230. A number of operational, policy and decision-making frameworks have been developed to inform decisions on whether to undertake national interest analysis and the processes to be followed if is undertaken. These include MBIE, ministerial and Cabinet approved activities, as set out below.

MBIE APPROVED

- Operational decisions on the level of detail that payload applicants must provide on their customers.
- The documentation of a National Interest Process to determine whether to undertake a national interest analysis. This states that 'Officials will undertake a National Interest Assessment (NIA) only when high risks are present, as determined by a risk review.'

MINISTER APPROVED

- Ministerial agreement to a policy on commercial remote sensing payloads (Commercial remote sensing payloads: national interest considerations and proposed approach to permitting (7 March 2019)).
- The current development of policies on mega constellations and potentially other topics.

CABINET APPROVED

- Cabinet agreement to an approach to payload permitting under the Act with the objective of enabling a 'consistent payload permitting decisions, particularly with regard to government applicants.' The approach included:
    - **PRINCIPLES**: The following principles will guide decision-making:
        - Responsibility – space activities from New Zealand should promote an orbital environment where users avoid causing harm or interference with the activities of others.
        - Sustainability – space activities from New Zealand should preserve the benefits of space for future generations through adherence to sustainable practices.
        - Safety – space activities from New Zealand should not jeopardise the safety of people on the ground or in space.
        - Space activities authorised by the Government should reflect New Zealand's values and interests and align with broader policy settings.
    - **ACTIVITIES NOT IN THE NATIONAL INTEREST:** The following activities will not be approved:
        - payloads that contribute to nuclear weapons programmes or capabilities.
        - payloads with the intended end use of harming, interfering with, or destroying other spacecraft, or space systems on Earth.
        - payloads with the intended end use of supporting or enabling specific defence, security or intelligence operations that are contrary to government policy.
        - payloads where the intended end use is likely to cause serious or irreversible harm to the environment.

ISSUE

231. The Minister is able to decline an application for a licence or permit on national interest grounds even when other tests in the Act are met. Effective use of this provision requires complete and accurate information on the capability and intended use of payloads in particular (in future high-altitude vehicles or HAVs), clear and agreed criteria in relation to what may be contrary to the national interest, and the involvement of relevant agencies and Ministers in the advice and decision-making process. However, what may be contrary to the national interest can both evolve over time and be application-specific, and hence there are inevitable uncertainties and resolving these through licensing and permitting can be time-consuming.

232. Operating a responsive regulatory system that supports space industry development requires licence and permit applicants to have maximum regulatory certainty, minimum compliance costs and timely decisions. The issue highlighted in submissions is the need for updated operational, policy and decision-making frameworks for ensuring that activities that are contrary to the national interest are not licensed or permitted, while continuing to deliver a responsive regulatory system that supports space industry development.

ANALYSIS

233. The national interest provisions in the Act were intended to be a final safeguard, to allow the government to prevent or impose conditions on space-related activities that would otherwise be approved. National interest is not defined in the Act and ill-defined generally, but in this context

would include New Zealand's values as well as interests ranging from our international reputation to defence and security.

234. Notably in this Act, economic benefits (as well as other benefits) can explicitly be taken into account in assessing the national interest. This is consistent with the first purpose in the Act, to facilitate the development of a space industry as well as provide for its safe and secure operation.

235. Outer space and increasingly high altitude, has significant strategic value for state and non-state actors, and can be used for both offensive and defensive purposes. Some of these purposes are consistent with New Zealand's values and interests and others are contrary to them.

236. As one of the few launching states, New Zealand also has the opportunity to promote and protect our interests through permitting activities that, for example, contribute to our defence and security, as well as influencing global norms and rules.

237. Acting in accordance with New Zealand's values and interests requires a good understanding of what these are in a space context, and with sufficient specificity that they are able to be operationalised within the framework of the Act. No submitter is suggesting changes are required to the Act or regulations, and the Review Team agrees with this. Hence, the articulation of New Zealand's values and interests, and the right level of specificity, will need to be provided in policies and decision-making frameworks.

RECOMMENDATIONS

MORE SPECIFIC NATIONAL INTEREST CRITERIA SHOULD BE DEVELOPED

238. The Review Team is required to consider the operation and effectiveness of the Act, and how it might be improved operationally. The Team is of the view that the effectiveness of the national interest provisions of the Act require clear criteria against which to assess whether a national interest assessment should be undertaken, and what should be taken into account in the assessment.

239. The Review Team recommends that consideration be given to developing more specific national interest criteria. These may need to be reflected in a revision of, and agreement by Cabinet to, the Approach to payload assessments under the Outer Space and High-altitude Activities Act, which was agreed by Cabinet in 2019, in relation to both the 'Principles that guide decision making' and 'Activities that are not in the national interest'.

REFLECT SPACE INDUSTRY AND ECONOMIC DEVELOPMENT OBJECTIVES THROUGH ESTABLISHING POLICY SETTINGS IN ADVANCE OF APPLICATIONS AND CONSIDER ESTABLISHING TIME LIMITS

240. Space industry development (in the Purpose to the Act) and economic benefits (in the factors that the Minister may take into account in assessing the national interest) are key features of the regulatory regime. The effectiveness of the Act depends on these outcomes being achieved.

241. Licence and permit applicants value maximum regulatory certainty, minimum compliance costs and timely decisions. Not addressing these will inevitably make New Zealand a less attractive place to undertake space activities.

242. Clearer criteria against which to assess whether a national interest assessment should be undertaken, and what should be taken into account in the assessment, should provide greater certainty, speed up the analysis, and allow decisions to be taken more quickly. Asking applicants to provide more information will increase compliance costs but should also reduce the time required to undertake due diligence of an application.

243. However, while the Review Team accepts some applications have a level of novelty that New Zealand's national interest stance will be determined through the assessment process, generally

policy should be established in advance as this contributes to certainty and timely decision-making.

244. Hence, the Review Team is of the view that continuing an upfront investment in establishing and keeping up-to-date policy on matters of national interest significance is important, noting that the policy will in most cases cover space industry and economic benefits as well as risks. There is a policy on remote sensing, but there are plans to update this, and work is underway on policies for mega constellations and space resources.

245. The Review Team also considers that establishing time limits for decision-making on payload applications could be considered.

UPDATE THE NATIONAL INTEREST PROCESS

246. Changes to criteria will inevitably require MBIE's National Interest Process to be updated. Matters that should be taken into account include the level of detail provided in the advice to the Minister on complex or sensitive payload applications, sharing of information between agencies in the course of assessing whether a national interest assessment should be undertaken and when it is being undertaken, and refreshing the types of information applicants are being asked to provide.

PART FOUR: INTRODUCTION TO OTHER ISSUES

247. The SPRS team, having had substantive experience in working with the Act and the associated regulations since their enactment, are well placed to understand how the regulatory regime operates in practice. With the benefit of this experience, they have identified a range of smaller technical matters where opportunities may exist to improve the Act or regulations. While many of the matters considered in this section were raised by MBIE, relevant feedback from other submitters was also received and has been integrated into the appropriate sections accordingly.

248. These issues, as set out in Annex One, fall into four broad categories:

- **Improving clarity and addressing gaps:** The Review has identified opportunities to refine the Act to provide clarity and address gaps or ambiguities within the regime.
- **Improvements to the operation and effectiveness of the Act** – The Review has identified opportunities to improve the efficiency of the Act so it can better support its purpose.
- **Enabling future responsiveness** – The Review has identified opportunities to further future proof the Act, for example to accommodate technological developments.
- **Other –** This section covers the remaining lower-level considerations which do not fit within the categories above, but that are within the remit of the Review.

ANNEX ONE: TABLE OF OTHER ISSUES

CATEGORY A: IMPROVING CLARITY AND ADDRESSING GAPS

LEGISLATIVE ISSUE	SUBMITTER	ANALYSIS	RECOMMENDATIONS
The Act does not provide for a situation where a New Zealand entity begins operating a payload launched from overseas that is already in space (eg when a person buys an existing satellite).	Space, Policy and Regulatory Team (MBIE)	The Review team notes that, there is no provision under the Registration Convention for a state that is not a launching state to register a payload even if its national subsequently acquires an interest in the payload. In these circumstances in international law, the launching state continues to have jurisdiction and control over the payload even if it changes hands in orbit. As a result, space laws in other jurisdictions do not generally require a licence in these circumstances. However, there may be merit in New Zealand regulating these activities even when is not strictly required under the international law to demonstrate that it is a responsible space actor. We do not anticipate that the situation will arise very often.	The Review recommends that SPRS monitor developments in other jurisdictions relating to the transfer of satellites in orbit and consider further whether any change is required at the time amending legislation is developed.
• **OSHAA Section 53(1)(b) states that 'if the licensee or permit holder is a body corporate, they must not undergo a change of control without prior approval of the Minister.' The issue is whether this provision is workable in the context of large corporations that have interests in multiple jurisdictions.** • **When considering a change of control application there are not defined criteria/prescribed requirements the Minister must/may take into account when determining "that the licensee or permit holder following the change of control is likely to be able to comply with the conditions, and give proper effect, to the licence or permit"**	Space, Policy and Regulatory Team (MBIE)	The change of control provision was tested when SpaceX purchased an interest in Swarm. The New Zealand transaction was the last of a long line of transactions involving a number of other jurisdictions involving SpaceX obtaining control of Swarm and which would proceed irrespective of the Minister's consent. While in the event, the Minister's consent was obtained before the transaction took place, it is worth exploring with PCO, whether and how the transaction can be made more workable. On the second issue, the review team considers that in assessing whether or not the change of control should be granted, the Minister will need to consider whether the threshold tests for a permit would continue to satisfy in the event of a change of control. The issue is whether this needs to be spelt out more clearly on the face of the statute.	The Review recommends that the SPRS team discusses with PCO how the change in control provision in section 53(1)(b) can be improved. A possible option is that this section of the Act be revised to expressly provide that: • If the licensee or permit holder is a body corporate, that they must inform the Minister before they undergo a change of control and apply for a transfer or change of control; • If the Minister has not approved a change of control at the time the change of control occurs then any licences or permits the licensee holds will be suspended until the change of control is approved; and • If the Minister declines the change of control, then the licence will be revoked. • Licence holders are required to take "all practical steps" to ensure the Minister makes a determination on the change of control prior to it occurring. The Review notes that when assessing a change of control application, the Minister will need to assess whether the threshold tests in the Act will continue to be satisfied. This is a necessarily implication from the overall scheme of the legislation and the Review Team is not convinced, that the threshold tests need to be replicated in this or other sections, such as the variation provision. However, it is recommended that there be a discussion with PCO at the time the legislation is amended about whether there is a need to spell this out more clearly on the face of the application.
Currently, when an application is 'accepted' is not defined in the Act or regulations. **The Act also currently does not provide the power to reject an application.**	Space, Policy and Regulatory Team (MBIE)	As there is no statutory power to reject an application, those that do not meet the standard are left in a suspended state, neither unable to proceed nor be finalised by way of a rejection. MBIE's submission to the Review on this issue presented two potential avenues for how this matter might be addressed or managed, which were: • Establishing a criterion for when an application may be accepted. This may be through operational policy, rather than the Act itself.	As a matter of practice, where an application is incomplete, MBIE works with operators to assist them in ensuring complete information is provided. While legislative options were considered, the Review concludes that the current statutory settings should be retained. The incomplete applications matter is best managed administratively by working with applicants to help them complete the application and providing guidance on what information is required to enable an application to be assessed.

		• Creating a statutory power (in the Act) to reject an application under circumstances when MBIE cannot accept an application.	
Clarification is sought regarding the mechanisms for verifying compliance once conditions have been imposed.	Ministry of Defence (seconded by the New Zealand Defence Force)	Defence's submission asked whether, when a condition is set in place, there is a mechanism that ensure a subsequent verification of compliance.	The Ministry has a compliance strategy in place which is currently under review. One aspect of the strategy is monitoring of satellites launched from New Zealand. MBIE has entered an agreement with LeoLabs, a company that specialises in space situational awareness, that allows it to monitor satellites launched from New Zealand. This is innovative technology allows MBIE to monitor satellites launched from New Zealand in real time. MBIE and LeoLabs have ongoing discussions about how this technology may be built upon to improve compliance monitoring in the future.

CATEGORY B: IMPROVEMENTS TO THE OPERATION AND EFFECTIVENESS

LEGISLATIVE ISSUE	SUBMITTER	ANALYSIS	RECOMMENDATIONS
Should payload permits and overseas payload permits be wrapped into a single permit that applies to payloads launched from New Zealand and payloads launched overseas.	Space, Policy and Regulatory Team (MBIE)	An issue that has arisen in relation to constellations where a New Zealand operator intends to launch some satellites that are part of a constellation in New Zealand and some overseas, where the timing of the launch is uncertain. While the assessment of satellites launched from New Zealand is necessarily different from satellites launched overseas, it may be administratively easier if no distinction was made between a payload permit and an overseas payload permit. We note however, that the same or similar benefits do not hold in the context of combining domestic and overseas launch licences, due to the fact that these often have location-specific safety requirements and do not have a set number of launches attached to the licence. A change to the payload permitting provisions would mean significant reformatting of the payload permit sections of the Act, but arguably this disadvantage would be outweighed by the benefits, such as greater efficiency, that are likely to be gained from a more streamlined approach. Contrarily, there are also advantages in treating the launch licensing and payload permitting sections in the same way since they arise from the same treaty obligation.	The Review recommends keeping this issue under active review and discussing with PCO when the legislation is amended if the possibility of combining payload permitting and overseas payload permitting provisions into a single payload permitting requirement is valid.
The Act is missing enforcement options for low-level issues without resorting to licence suspension or fines.	Space, Policy and Regulatory Team (MBIE)	MBIE, in its capacity as the regulator, has not taken any enforcement action under the regime to date and do not envisage needing to if the sector continues to be highly compliant. While the sector has been highly compliant to date, the potential for non-compliant behaviour in future remains a possibility. The Review provides an opportunity to be proactive about ensuring the regulatory levers available enable a proportionate response in the event where non-compliant behaviour warrants some form of enforcement action, but where suspension or revocation of a licence or permit is not justified. Furthermore, the existence of enforcement levers, even if not used, can have a deterrent effect against non-compliant behaviour arising in the first place. The existence of lower-level enforcement options may also help to prevent a regulated party from having their licence revoked or suspended, which may impact on future	The Review concludes that a prima facie case exists to support the introduction of lower-level enforcement options, and recommends that MBIE undertakes further policy work to: • Assess options for lower-level enforcement provisions (including, but not necessarily limited to, abatement notices, improvement notices, and enforceable undertakings). If supported by the findings of the policy work, and subject to Ministerial agreement, the lower-level enforcement options would then be included in the Act. • Add the ability to veto individual activities or launches, not just through launch licence conditions. This could be a useful option for when the payload is already in orbit (as revoking a permit at that point is not desirable). • Operation and effectiveness may benefit from consideration of legislative change in the compliance strategy.

		business opportunities, but while still providing a formal mechanism to discourage, and make explicit the unacceptability of, non-compliant behaviour.	
The Act does not explicitly allow the Chief Executive to appoint enforcement officers with a subset of the powers the Act provides.	Space, Policy and Regulatory Team (MBIE)	Other New Zealand acts (eg Hazardous Substances and New Organisms Act 1996) that allow for enforcement officers expressly state that enforcement officers can be granted one or any of the powers in the Act and that the powers must be outlined in their warrant. It is desirable to take the opportunity to make it clearer on the face of the legislation that the Chief Executive can extend a limited subset of the powers to enforcement officers.	The Review concludes it would be useful to refine the Act to provide greater clarity, so that it clearly and unambiguously empowers the Chief Executive to limit the powers granted to enforcement officers to only those that are commensurate with, and appropriate to, the particular circumstances. For instance, where an enforcement officer is primarily engaged to promote compliance with the Act, it is generally preferable that they do not have the power to use force to enforce debris protection areas, so it is desirable that the Act clearly provides for the limitation or restriction of powers, at the Chief Executive's discretion only be extended to suitably trained and qualified Government officials. To this end, the Review recommends that: • The requirement that the Chief Executive must issue a written warrant to appointed enforcement officers (under section 57(3) of the Act) is retained; and that: • This clause of the Act is extended to expressly provide that, when issuing the warrant, the Chief Executive may choose to limit the functions and/or powers afforded to the enforcement officer, by specifying these on the warrant.
The Act does not provide for the creation of single purpose enforcement officer with powers in relation to debris protection areas.	Space, Policy and Regulatory Team (MBIE) Rocket Lab	**MBIE COMMENT** The SPRS team has suggested that creating a 'single purpose enforcement officer' in the Act (with powers relating to debris protection areas) would allow Rocket Lab staff (or other launch operators) to have the powers they need to maintain these areas, and the legal distinction would help to clarify their role. **ROCKET LAB** Rocket Lab acknowledges that New Zealand's international obligations to protect sensitive technologies are substantial. They caution, however, that the option to delegate New Zealand's obligation to operators in New Zealand must be carefully considered, and advise that *"obligations delegated should be proportional to the risk, consider the equivalent protections required (or not required) of operators of the same technologies overseas, and balance the economic risk to the development of the industry in New Zealand from burdening commercial operators of space systems against the cost of employing New Zealand's existing security infrastructure to meet those obligations."* Rocket Lab's submission also stated that that powers and offences in the Act *"include ambiguities and scope for interpretation that Rocket Lab is not confident could be applied by a commercial enterprise in a way that would be seen to be universally fair and impartial."*	OSHAA section 64 sets out powers that can be used to protect a debris protection area that may be required for New Zealand to meet its Technology Safeguard Agreement (TSA) obligations. The Review recommends that the relevant legislative provisions are amended to create a 'debris protection area officer' role that is distinct from the role of an enforcement officers who promote/investigate compliance with the Act. The role of a debris protection officer would be to protect sensitive technology in the event of an incident that results in debris that are sufficiently intact to require the technology to be protected pending the arrival of an enforcement officer. We disagree with Rocket Lab that requiring an operator to perform this role is inappropriate or disproportionate. An operator reaps the benefits from using sensitive technologies and accordingly must bear some of the cost associated with its protection. An operator will generally also be in the best position to manage the risks in the immediate aftermath of an incident. We do not consider a debris protection officer should be able to exercise intrusive powers such as the power of arrest or the ability to use force. However, they should have the power to issue reasonable directions to ensure the protection of sensitive technology, breach of which would be an offence.
Section 62 of the Act grants constables the powers of a compliance officer under only parts of the Act. Constables do not have the powers of an	Space, Policy and Regulatory Team (MBIE)	By amending the Act in the way proposed, this would clarify constables to have all the powers an enforcement officer has under the Act, including those in debris protection areas.	The Review recommends that section 62 is refined along the lines of: "For the purpose of investigating compliance *or taking reasonable steps to ensure compliance* with this Act, regulations made under this Act, or the conditions of licences and permits issued under this Act, a constable may exercise any of the

enforcement officer in debris protection areas.			powers of an enforcement officer under *this Act* ~~section 60(1(a) to (f),~~ and sections 60(2) and 61 apply."
The Crown Minerals Act 1991 provides the ability for MBIE to grant non-interference zone permits, which provides for specific offences against the Act. **No such provision currently exists in the Act, but it may be beneficial to include.**	New Zealand Police	**NEW ZEALAND POLICE** This submission noted that MBIE, under the Crown Minerals Act, has the ability to grant non-interference zone (NIZ) permits for mining and oil exploration activities within the maritime spectrum. This provides for specific offences against the Act where vessels/persons enter a NIZ. The Police have suggested that a similar piece of legislation for the Act would be beneficial to ensure any vessels entering any exclusion zone are subject to specific legislation that can be used for prosecution where breaches occur. **REVIEW TEAM'S ANALYSIS AND RESPONSE** In considering what has been proposed in this submission, there was a question of whether it would be consistent with New Zealand's international obligations, recognising that the law of the sea provides only very limited exceptions to what we can do in waters that are not under our jurisdiction.	The Review Team considers that such an amendment would be inconsistent with New Zealand's international obligations under UNCLOS and recommends no change.
The Act does not allow a licence/permit holder to surrender a licence.	Space, Policy and Regulatory Team (MBIE)	Currently the only way a licence/permit holder can 'give up' their licence is to write to the Minister and request the Minister revoke it. This creates an administrative burden and may potentially change reportable figures (eg if a licence is revoked, they have to report it on future applications etc.). Providing the legislative mechanism to surrender a permit or licence would help to alleviate some of these issues (eg MBIE would no longer need to consult with the Minister and seek his revocation of a licence or permit, thereby reducing the compliance burden), and provide a quicker (and potentially more certain) route to achieving the same outcome for the applicant (ie that they no longer hold the permit or licence).	The Review recommends that the Act be amended to provide those licences and permits issued under the OSHAA can be surrendered by their holder, subject to the condition that payload permit holders may only surrender their licence if the payload has not been launched. The law should be clear that it cannot be used as a mechanism to avoid or in any way alter responsibilities for the payload when in orbit.
Review the criteria for the 'fit and proper person' test under OSHAA. **The 'fit and proper person' test (OSHAA Section 52) at 1(d) allows the Minister to take into account any history of 'mental health problems, or serious behavioural problems.'**	Space, Policy and Regulatory Team (MBIE)	The Review team notes that mental health and behavioural issues are commonly regarded as factors in assessing whether a person is a fit and proper person to carry out a potentially dangerous activity. The review team also notes that there is an issue about what needs to be taken into account when assessing regulatory compliance. For instance, there is a question of whether it should only apply to non-compliance with regulatory requirements relating to space and high-altitude activities, or whether it should extend to non-compliance with any law, such as tax law or employment laws.	The Review recommends that fit and proper person test (in section 52 of the Act) be reviewed to consider: • Whether it is still fit for purpose, with particular regard for whether the provisions relating to a person's mental health history are appropriate; and • Whether compliance with other legislation or regulatory regimes should also be taken into account as part of the fit and proper person assessment.
Section 10(d)(iv) of the Act prescribes a requirement for launch licensees to consult with Land Information New Zealand (LINZ) about any notices to mariners that are required. **As these notices are published fortnightly and annually, LINZ has indicated that they do not provide**	Land Information New Zealand	**SUMMARY OF FEEDBACK** The submission from LINZ notes that the intention behind this section of the Act is to provide for maritime safety by alerting mariners, through LINZ's 'Notices to Mariners,' to the safety considerations arising from rocket launches in New Zealand that they should be aware of. The fortnightly publishing schedule, long lead times for applications, and the fact that the notices to mariners cannot be easily updated all limit the ability to communicate usefully using these published notices, in this rapidly evolving context. In essence, it does not provide the timely information to mariners about rocket launches that other	The Review Team recommends that section 10(d)(iv) be repealed and replaced by a requirement to take reasonable steps to notify mariners of the fact a launch is taking place and the times and areas within which it may pose a danger to mariners.

timely information in the context of rapidly evolving and fast-moving space launch schedules.		electronic means do. To address this issue, LINZ has suggested that the wording of this section could be amended to require launch licensees to notify LINZ of rocket launches that have safety implications for mariners, but not go as far as to specify how LINZ provides this information to mariners. **ANALYSIS AND RESPONSE** At the time the Act was first developed, the FAA's launch licence (which Rocket Lab holds and which New Zealand recognises within the regime) included a requirement to issue a notice for mariners. This requirement has now been removed from the FAA licensing requirement on the basis that alternative means of publishing the fact the launch is taking place and the areas in in which it may pose a danger to mariners achieve an equivalent level of safety.	

CATEGORY C: ENABLING FUTURE RESPONSIVENESS

LEGISLATIVE ISSUE	SUBMITTER	ANALYSIS	RECOMMENDATIONS
The Act is currently lacking key mechanisms to effectively regulate human spaceflight or human high-altitude flight.	Space, Policy and Regulatory Team (MBIE)	In the US, the advent of commercial sub-orbital flights with passengers has already begun and it is likely that other jurisdictions will follow in the future. The extensive international agreements that regulate aviation and determine key aspects (such as liability and governance) when dealing with foreign nationals as passengers do not govern this activity, however, they do raise significant questions and decisions for launching states seeking to enable this type of activity within their regime. Significant policy work would be required to determine whether, and if so how, to enable this type of activity within New Zealand's regime.	The Review makes no recommendations, on the basis that it would be premature to do so ahead of the policy work being undertaken. It seems that changes to primary legislation will be necessary to deal with human spaceflight.
Regarding the development of a global space traffic management system, it is understood that significant work on this has, and continues, to take place and there are a number of possibilities for where this might lead in future. **The Review examines whether, or to what extent, New Zealand's legislative settings are well-placed to respond to future developments in this area.**	LeoLabs	LeoLabs spoke to the theme of a global space traffic management system. Its thinking on this is that while a country could develop one, it is not convinced it is likely to get buy-in from all major countries with an interest in space. While this is one view, the Review team is aware that there is a lot of work happening in this area, and there are a range of possibilities for how it might evolve in future. As it cannot be discounted entirely in future, the Review considers whether the existing statutory settings provide New Zealand with the flexibility to engage with developments in this area in future, should they arise.	The Review considers it to be premature to make pre-emptive adjustments to the statutory settings in relation to this matter. While discussions are underway at an international level on this topic, it is too early to determine what will ultimately arise in this space and any changes to New Zealand's regulatory settings would need to be coherent with international practice and norms that have not yet been established.

CATEGORY D: OTHER

LEGISLATIVE ISSUE	SUBMITTER	ANALYSIS	RECOMMENDATIONS
The Act's statutory licence conditions are in legislation rather than regulations. This limits the flexibility to update these.	Space, Policy and Regulatory Team (MBIE)	Since the inception of the Act, a number of 'standard' Ministerial conditions have been deemed necessary. These Ministerial conditions can be included as statutory conditions when the legislation is revised. Under the existing settings, licence conditions are prescribed via the Act which limits the flexibility to update them as new information comes to light, or in response to	The Review recommends that Ministerial conditions that are routinely imposed be prescribed as statutory conditions. The Review also recommends discussion with PCO about whether the statutory conditions are best placed in primary or secondary legislation.

		changes in the sector. Setting the conditions via regulations instead would enable greater responsiveness and help to ensure the system is better positioned to adapt as the sector continues to evolve.	
The term 'enforcement officer' can have negative connotations which Inspector/Compliance Officer can mitigate.	Space, Policy and Regulatory Team (MBIE)	The case for proposing the change in terminology in the regime from 'enforcement officers' to either 'inspectors' or 'compliance officers' is based on the following key factors: • It would align the terminology used in this regime with that used with the FAA and other New Zealand regulators. • It may also reduce any perceived issues with the term 'enforcement officer.'	The Review recommends that the terminology be discussed with PCO.
Where the term 'payload' is used in section 5(1)(b) of the Definition Regulations, it is not currently preceded by 'high-altitude.'	Dawn Aerospace	Section 5 of the Definitions Regulations prescribes the parameters or conditions for when a balloon is not classified as a high-altitude vehicle for the purpose of the Act. Section 5(1)(b) reads *"…the purpose of the payload is solely to measure all or any of…"* Dawn Aerospace, however, has expressed the view that this should be 'high-altitude payload' rather than just 'payload.' The reasoning behind this suggestion was not offered in the submission.	This is a minor drafting issue that should be discussed with PCO when the regulations are revised.
The Act defines the term high-altitude vehicle as follows: 'high-altitude vehicle, subject to any regulations made under section 88(1)(13), means an aircraft or any other vehicle that travels, is intended to travel, or is capable of travelling to high altitude'	Dawn Aerospace	Dawn Aerospace submits the definition should be refined so that it only requires a high-altitude licence only if a vehicle is intended to go into high-altitude. The Space Policy and Regulatory team question whether the 'capability' aspect of the definition is workable in the context of vehicles which are being progressively developed to reach high-altitude. For example, at what point in Dawn Aerospace's testing and upgrade process are its vehicles capable of reaching high-altitude?	At the time the legislation was developed, it was a deliberate decision to include vehicles that are capable of going into high-altitude in the regime. The concerns about safety and consistency with the national interest arise are the same whether a vehicle is intended to go into high-altitude or is merely capable of it. We do not consider there are workability issues where vehicles are being progressively developed and tested. It will be a question of fact at any given point in time whether or not the vehicle is capable of going into high-altitude. However, the issue should be monitored and if we are wrong and there are difficulties applying it, officials should work with PCO to refine it when the legislation is amended.
The question of whether the current physical inspection systems in place are sufficient to pre-detect risks that may lead to an incident was raised via the submissions process.	NZSIS and GCSB	The NZSIS and GCSB suggested that it may be worth asking whether the physical inspection systems in place are sufficient to pre-detect risks that may lead to an incident. For example, no enforcement officers have been appointed yet under section 57, and they are not aware of anyone else performing that inspection function (though the Protective Security Requirements (PSR) team do some in relation to security), so it remains unclear how much would be caught under current processes unless an incident were to actually occur. In other words, absence of an incident is not necessarily evidence of absence of risk.	The Review team notes that Space Policy and Regulatory systems team has a compliance strategy that employs several tools to manage compliance and that is specifically tailored to the nature of the industry and risks it poses. Mechanisms for ensuring compliance include regular reviews of Rocket Lab's protective security plans and regular engagement with Rocket Lab. In a regulatory system where there is only one regulated party there is less of a role for inspection than in systems where the regulator has to regulate a very large number of regulated parties.
Use of advisory circulars to support compliance	Dawn Aerospace	Dawn Aerospace invites consideration of the potential to use advisory circulars (ACs) (and potentially other instruments) as part of the regime. In response to this suggestion, the Review team discussed this with the CAA, as they use ACs in their regime. CAA indicated that they find ACs to be very helpful, noting that they offer excellent flexibility (a lot more so than regulations) and are effective in supporting compliance with rules. They also allow people to have other solutions that are not in the AC, but that meet the rules. In the context of aviation, those in the industry tend to be familiar with this type of instrument too.	The Review can see the merit in using advisory circulars because they are familiar to participants in the civil aviation system. Advisory circulars are used to provide guidance on means of compliance with the performance-based requirements of the regulations. While Advisory Circulars are intended to support compliance with statutory provisions, they do not have statutory status themselves, and no changes to the Act or regulations are required to enable or support the use of ACs.

DEFINITION OF TECHNICAL DATA **Technical data, as currently defined by the Act, means information in <u>any form</u> (including oral information, blueprints etc) that is required for the design, engineering, development, production, processing, manufacturing, use, operation, overhaul, repair, etc. of launch vehicles, payloads, high-altitude vehicles, high-altitude payloads or related equipment, but does not include publicly available information.** ***NB: This is a summarised version of the definition***	Rocket Lab	Rocket Lab is of the view that the term 'technical data' as currently defined is too broad, and that it extends to the inclusion of information which they consider to be benign and which should not be restricted, nor require the controls to applied by the Act. In response to this submission, the Review considered whether there is a case for refinements to be made in light of this comment, starting with an assessment of all sections of the Act where it features and the impact that it has in practice.	The definition reflects the definition of technical data in the Technology Safeguards Agreement and is necessary to ensure New Zealand acts consistently with its international obligations under that agreement. No change is recommended.
SEGREGATED AREAS **The Technology Safeguards agreement includes a number of requirements aimed at protecting sensitive technologies including requirements to create segregated areas and requirements relating to the use of identity cards. Sections 63, 73 and 74 of the Act were intended to implement these requirements. Section 63 gives the Minister the power to declare segregated areas and areas set aside. These are supported by the offence provisions in sections 73 and 74 of the Act and a related transitional provision.** **However, experience with the operation of the Act has demonstrated that the most effective mechanism for ensuring consistency with these obligations is through the imposition of protective security requirements on Rocket Lab rather than through the government declaring segregated areas and areas set aside.**	SPRS team (MBIE) Aotearoa / New Zealand Peace Foundation	**SPRS TEAM (MBIE)** MBIE's SPRS team advised that: • MBIE assesses compliance with the Technology Safeguards Agreement (TSA) are as part of its assessment of the consistency of licences and permits with international obligations. • The primary components of the TSA that are implemented specifically by the Act are the power to declare Debris Protection Areas and to inform the Minister of the intent to develop MTCR category 1 technology so the government may consult the US on the development of MTCR Category 1 technology. • Rocket Lab are actively working with other New Zealand agencies, such as WorkSafe and the NZSIS, to develop guidance materials to ensure other agencies and sector partners are fully aware of their TSA obligations. • It is relevant to note that there have been no incidents involving debris and the Minister has not needed to invoke the power to declare a segregated area.	The Review notes that there are several mechanisms in place to ensure compliance with the TSA, including the imposition of protective security requirements on licensees. We agree the following provisions in the Act are unnecessary and should be repealed: • Section 5 (Segregated areas to be treated as security areas) • Section 63 (Segregated areas and areas set aside) • Section 73 (Offences relating to segregated areas and areas set aside) • Section 74 (Person in control of segregated area or area specially set aside to ensure identity cards displayed) • Section 77 (Failing to display identity card).
LIABILITY **An issue has been raised about whether the current approach to liability and insurance is appropriate, considering the increasing risks of collision in the space environment.**	LeoLabs NZDF	**LEOLABS** LeoLabs made several observations about liability and insurance including: • It has conducted a study on the likelihood and impact of collisions in space, and highlighted these risks were increasing, as more and more satellites are launched into space. At the moment, there is no accepted liability chain for a collision in space, but it is clear that the Space Agency would be part of that chain if an incident were to occur. Whether or not the Space Agency is found to be liable would depend on the circumstances.	The Review Team considers the provisions in the Act relating to indemnity and insurance give the necessary tools to appropriately manage liability. We do note that some jurisdictions provide an indemnity for operators for loss or damage above a specified amount. These indemnity provisions are intended to ensure that operators are not discouraged from conducting space activities by the potential for very high losses if something goes wrong. We do not consider such a

Under the space treaties, launching states are liable for loss and damage caused by space activities. **The Act gives the Minister power to impose indemnity and insurance conditions on licensees and permit holders.** **However, to date, in the case of payload permits, insurance requirements have not been imposed. Liability has been managed by avoiding collision risks through appropriate orbital debris mitigation plans.**		• There are various mitigation practices that New Zealand can employ, eg asking questions on matters such as history of previous incidents etc. to assess risk profile, as insurers do. • There are countries considering the potential establishment of a global body for space activity, including an international space court. There is an increasing recognition/acceptance of the risks in this space and the need to manage them. • The role of re-insurers is evolving in this area. While many had left this market after experiencing losses due to mispriced risk some years ago, re-insurers are starting to re-emerge as more data becomes available (thereby providing more data to evaluate and price risk). LeoLabs expects that there is likely to be a re-emergence of re-insurers and insurance services in this industry and, as this happens, it is likely that clients will increasingly demand this from the satellite operators. • Insurance is just one tool for managing risk. Demanding best practice is another lever for managing risk; to prevent harm from occurring in the first place. A suite of steps can be implemented to appropriately manage risk. • An MBIE staff member seconded from the Ministry of Defence made a similar point about the exponential growth in the risks of collisions in space.	provision is necessary in the NZ context because there is no evidence that operators are deterred by liability risks. On the current practice of not imposing insurance requirements on payload operators, that is something that needs to be kept under active review and insurance requirements imposed if it appears warranted at the time of an application considering the assessment of risk. The review team agrees with LeoLabs that insurance is only one tool for managing risk and recommends ongoing consideration of other measures for managing risks such as exploring evolving technologies for actively manging debris.

ANNEX TWO: RECORD OF OUT-OF-SCOPE SUBMISSIONS

THEME	SUB-THEME	SUBMITTER	SUBMITTER COMMENT	ANALYSIS
LOCATION OF FUNCTIONS	Integration of the payload office with the radio frequency licensing office	Care Weather	Care Weather noted that they went through New Zealand's licensing process as part of a Rocket Lab launch in March 2021. Their feedback was that it may be helpful to integrate the payload office with the radio frequency licensing office in New Zealand. Care Weather considered several jurisdictions for radio frequency licensing and indicated that doing both radio frequency and payload licensing (as well as Earth observation licensing if not already integrated) in the same office may have been appealing to them as it would have reduced the number of agencies they have to work with. Care Weather's submission suggested that there may be merit in considering New Zealand's radio frequency licensing strategy in light of the international radio frequency licensing options to see whether an integrated licensing office may attract more applicants to our regime.	This matter is beyond the scope of the Review but is referred to MBIE for its consideration.
MITIGATION OF ENVIRONMENTAL IMPACT		Robert Howell	This submitter expressed concern that the Act does not feature any provisions about caring for, or avoiding any damage to the environment, and made reference to climate change matters.	Noted and no action required - This submission has been noted, but the direct relevance of this submission to the Review is not clear. Note: While it is not within the remit of the OSHAA to prescribe the statutory requirements for environmental matters of the nature that the submitter has raised, adherence to New Zealand's environmental legislation is incorporated into the OSHAA. There are several references in the Act which explicitly cites compliance with New Zealand's environmental legislation as a requirement. For example, section 10(1)(g)(iv) provides that, to obtain a launch licence, the licensee must conduct the launch and operations in a manner that complies with New Zealand law, including, without limitation, the Civil Aviation Act 1990, any regulations and rules made under that Act, and all health and safety and environmental legislation. This is one of many similar provisions in the Act.
ETHICAL INVESTMENT		Robert Howell	This submitter provided commentary on the theme of unethical investment funds and cited the OSHAA within their submission. The submission provides a suggestion regarding the definition of an ethical company and proposes that if this definition (or similar) were to be included in the Government's procurement policy, then the OSHAA could include a requirement to conform to this policy.	As the Act does not relate to investment, it is difficult to see the analogy that is being drawn with New Zealand Government procurement. Notwithstanding that the OSHAA is cited, the Review considers this part of the submission to be outside the scope of this review.
IMPOSING FEES AND CHARGES	Cost recovery	Rocket Lab	**ROCKET LAB** Given the unusual and novel nature of this industry in New Zealand and the potential for rapid changes in the nature of launch activities (such as a rapid growth in the number of payloads per launch, or a decrease in the mass of individual payloads, or changes in launch	The legislation provides all the tools necessary to impose fees, levies and charges. If a decision was taken to pursue cost-recovery, the Act provides the ability to impose fees if required and is flexible enough to accommodate different fee structures serving a range of policy goals.

			frequencies), Rocket Lab indicated that they were receptive to commenting on appropriate metrics by which the direct and indirect costs of administration which may be recovered so as not to conflict with the goal of further developing the industry.[5] By way of comparison, the FAA Office of Commercial Space Transportation (FAA-AST) does not accept payment or fees for licensing or permitting activities. Licensing and permitting fees in New Zealand would discourage payload operators from using providers operating in New Zealand, or industry or academia developing payloads and the associated economic activity, in an already highly mobile and international market.	The question of whether to impose fees, levies and/or charges is a policy question, for the Minister to consider. As no statutory amendments are required, and this issue is a policy matter, the Review makes no recommendations in respect to this theme.
PEACEFUL USES OF OUTER SPACE		Aotearoa / New Zealand Peace Foundation New Zealand Nuclear Free Peacemakers and Space for Peace Aotearoa Jan Marsh	A small number of submissions were received as part of the Review regarding the potential for weaponisation of space and the need for space to be used exclusively for peaceful purposes. These submissions included the following suggested amendments to the Act: • Add a new purpose of promoting the peaceful uses of outer space and ensure that no weapons or potential weapons are launched from New Zealand or by New Zealanders. • Include new threshold requirements in the payload permitting provision in the Act designed to ensure that the payload is not a test for, or potential part of, a weapon or of a device that can assist the operation of a weapon. • References to international obligations and national interest in the Act should be supplemented with the words "including disarmament and arms control treaties and agreements to which New Zealand is a party". • Require compliance with the New Zealand Nuclear Free Zone, Disarmament, and Arms Control Act 1987. • Require consultation with the Minister of Disarmament and Arms Control on licence and permit applications under the Act as it does with the Security Ministers. • The Minister of Foreign Affairs and Trade should be added into section 85(2) of the Act which provides for information sharing between the Minister and the various agencies that perform regulatory function affecting space activities.	This matter will be considered as part of the space policy review which ministers have recently agreed to.

[5] As the question of whether to pursue cost-recovery is a policy matter, and not within the scope of the statutory review, further discussions with Rocket Lab on this subject were not progressed as part of this work.

ANNEX THREE: TERMS OF REFERENCE

Review of the Outer Space and High-altitude Activities Act 2017
Terms of Reference

Section 86 of the Outer Space and High-altitude Activities Act 2017 (‘the Act') requires the Minister for Economic and Regional Development ('the Minister'), as Minister responsible for the Act's administration, to:

- As soon as practicable after three years from the Act's commencement, commence a review of the operation and effectiveness of the Act and prepare a report on that review; and
- Present the report to the House of Representatives as soon as practicable after its completion.

The Review of the Act will consider:

- The operation and effectiveness of the Act, since the Act came into force on 21 December 2017;
- Whether the provisions of the Act should be retained or repealed; and
- Whether any further amendments to the Act are necessary or desirable.

In carrying out the review, the Ministry of Business, Innovation and Employment (MBIE), as the administering agency of the Act, will assess the Act's operation and effectiveness through, inter alia, considering the following:

- Alignment of provisions with intent (eg do the provisions in the Act allow the purposes to be met?);
- Efficient (eg do they impose minimum compliance costs on the regulated entities and agencies involved in administering the Act, and do they result in the provision of timely and comprehensive information to inform decision-making?);
- Certain and predictable (eg does the regime provide a sufficient level of certainty and predictability to regulated entities?);
- Flexible (eg given that this is an area of rapid technology change, is the Act sufficiently technology neutral);
- Transparent (for the regulated entities and the general public).

There is no legislative requirement to review the Outer Space and High-altitude Activities (Definition of High-altitude Vehicle) Regulations 2017 and Outer Space and High-altitude Activities (Licences and Permits) Regulations 2017, but these will be considered within the Review to ensure the regime as a whole is operating effectively.

The following process will be led by MBIE officials:

- Collect views (including from government agencies and industry stakeholders) regarding the operation and effectiveness of the provisions of the Act.
- Identify how the Act and regulations can be improved operationally.
- Taking into account the consultation, prepare and present a final report to the Minister by 15 December 2021[6].

[6] In December 2021, the Minister agreed to an extension of the timeframe for the statutory review of the OSHAA. Since the original commissioning, the feasibility of delivering the final report within the original timeframe had been impacted by two key factors (alignment with other related work and the size and complexity of the work required to analyse and reach conclusions on certain matters raised via submissions). The report back date was extended to 31 March 2022.