



Grant Opportunity Guidelines

Moon to Mars Initiative: Trailblazer Stage 1

Opening date:	7 December 2021
Closing date and time:	17.00 Australian Eastern Daylight Time on 28 February 2022 Please take account of time zone differences when submitting your application.
Commonwealth policy entity:	Australian Space Agency
Administering entity:	Department of Industry, Science, Energy and Resources
Enquiries:	If you have any questions, contact us on 13 28 46.
Date guidelines released:	7 December 2021
Type of grant opportunity:	Open competitive

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1. Moon to Mars initiative Trailblazer Grant processes

The Moon to Mars initiative is designed to achieve Australian Government objectives

This grant opportunity is part of the above grant program, which contributes to the Department of Industry, Science, Energy and Resources Outcome 1, under Program 2: Growing Business Investment and Improving Business Capability. The Australian Space Agency and the Department of Industry, Science, Energy and Resources work with stakeholders to plan and design the grant program according to the [Commonwealth Grants Rules and Guidelines](#).



The grant opportunity opens

We publish the grant guidelines on business.gov.au and GrantConnect.



You complete and submit a grant application

You complete the application form, addressing all the eligibility and assessment criteria in order for your application to be considered.



We assess all grant applications

We review the applications against eligibility criteria and notify you if you are not eligible. We assess eligible applications against the assessment criteria including an overall consideration of value with relevant money and compare it to other eligible applications.



We make grant recommendations

We provide advice to the decision maker on the merits of each application.



Grant decisions are made

The decision maker decides which applications are successful.



We notify you of the outcome

We advise you of the outcome of your application. We may not notify unsuccessful applicants until grant agreements have been executed with successful applicants.



We enter into a grant agreement

We will enter into a grant agreement with successful applicants. The type of grant agreement is based on the nature of the grant and proportional to the risks involved.



Delivery of grant

You undertake the grant activity as set out in your grant agreement. We manage the grant by working with you, monitoring your progress and making payments.



Evaluation of the Moon to Mars Initiative

We evaluate the specific grant activity and Moon to Mars initiative as a whole. We base this on information you provide to us and that we collect from various sources.

2. About the Moon to Mars Initiative

The \$150 million Australian Moon to Mars initiative (the initiative) supports Australian businesses and researchers to join the [National Aeronautics and Space Administration's \(NASA\)](#) inspirational endeavour to go forward to the Moon and then go on to Mars. Investment focuses in Australia over a five-year period, commencing in 2020-21.

The initiative forms an important element of the [Advancing Space: Australian Civil Space Strategy 2019-2028](#), primarily addressing the National and International pillars to open doors for Australian businesses and researchers to access international space supply chains, create jobs in Australia and support the growth of industries across the economy through the development and application of space technologies. Through this, Australian organisations will join with NASA and other international partners to bring Australian capabilities to space, the Moon, Mars and beyond.

The objectives of the initiative are to:

- support Australia's ambitions to join NASA's endeavour to go forward to the Moon and then go on to Mars
- accelerate the growth of the Australian space industry
- build Australian space capability and capacity
- lift Australian involvement in national and international supply chains
- inspire the Australian public.

The intended outcomes of the initiative are:

- Australian involvement in international space programs and missions that support Moon to Mars activities
- increased growth of Australian space businesses
- an increase in Australia's space capability
- increased exports
- increased access to national and international supply chains
- strengthened relationships between international agencies and the Australian Space Agency
- increased employment in STEM related and highly skilled fields
- increased community engagement in space activities.

The initiative has three elements:

- **Supply Chain program:** supporting Australian industry to deliver products and services into domestic and international space supply chains through two components:
 - Supply Chain Capability Improvement Grants
 - Supply Chain Facilitation.
- **Demonstrator program:** supporting demonstrator and pilot projects that showcase Australia's strengths to the world through two components:
 - Demonstrator Feasibility Grants
 - Demonstrator Mission Grants.
- **Trailblazer program:** a major project supporting NASA's activities to return to the Moon and on to Mars.

2.1. About the Trailblazer program

2.1.1. Trailblazer program objectives and outcomes

The objectives of the Trailblazer program are:

- develop foundation services rover solutions, capable of collecting lunar regolith and delivering it to a NASA science in-situ resource utilisation (ISRU) facility
- demonstrate the ability for Australian capability to support international missions
- inspire the Australian public.

The intended outcomes of the Trailblazer program are:

- an Australian asset will have been operated on the Moon
- improved collaboration with international space agencies including NASA
- stimulated investment in the foundation services capability
- key technologies are spun out to develop other sectors of the Australian economy
- growth in Australian space capability
- increased interest in STEM and related highly skilled careers
- galvanisation of national pride in Australia's space activities
- increased community engagement in space activities.

2.1.2. The context

The Australian Space Agency (the Agency) is seeking to leverage Australia's world leading remote operations skills and experience by developing new foundation services capabilities, encouraging investment and opportunities in the Australian space sector.

NASA has recognised Australia's global competitive advantage in trusted remote operations and autonomous systems from our mining and resource sector. Australia has strengths in field robotic systems and sensing, resource technologies and planetary science and can leverage these strengths to provide a unique long-term contribution to emerging space exploration markets.

Significant opportunities exist for Australia to be part of the international effort to build-up planetary infrastructure. These activities will be conducted in a manner consistent with Australia's international obligations, including the UN space treaties, as well as the Artemis Accords.

2.1.3. What are foundation services?

Foundation services are operational activities that support exploration missions to build towards a sustained off-earth presence, and will ultimately support permanent outposts. Demand for foundation services is recurrent, continuous or enduring in nature. Foundation services can include:

- monitoring and inspection
- planning and logistics
- civil construction
- materials transport and cargo handling
- remote maintenance
- component manufacture and assembly.

These services are distinct from but complementary to mission critical systems (such as power, communications and life support).

An important element of foundation services is the coordinated deployment of multiple assets to provide more complex or extended services to a mission or permanent outpost. Developing such multi-asset service models will require interoperability standards agreed across multiple agencies and commercial providers.

2.1.4. Agreement with NASA

Australia has formed a partnership with NASA to give Australian businesses and researchers the opportunity to showcase their knowledge and capabilities in a project that can support NASA's Artemis program. As a part of this partnership, NASA has offered the possibility of a free flight to the lunar surface in 2026 for an Australian foundation services rover that can pick up and transfer lunar regolith to a NASA-operated in-situ resource utilisation unit (ISRU).

The Agency has signed an agreement with NASA to enable discussions leading up to a mission concept review (MCR), followed by system requirements review (SRR) for the foundation services rover. These responsibilities must be met for NASA to transport the foundation services rover to the lunar surface no earlier than 2026. Cooperative activities taking place following the SRR, including building, testing, ground preparation activities, delivery of hardware, and launch will be covered in a separate arrangement with NASA. Consultations will occur with the successful grantee on these future arrangements.

2.1.5. Trailblazer mission objectives and outcomes

As a first step to achieving its vision of Australia as a world-leader in foundation services, the Agency is collaborating with NASA on a mission to demonstrate an Australian foundation services rover platform operating on the lunar surface.

The primary Trailblazer mission objectives are to:

- demonstrate and progress Australian exploration foundation services capability with remotely operated and autonomous Australian robotic lunar assets (O-MIS-001), and
- deliver lunar regolith to ISRU facility to contribute to NASA's endeavour to go to the Moon and on to Mars (O-MIS-002).

Trailblazer mission destinations and scenarios are articulated in Appendix B.

The Trailblazer outcomes are:

- Australia is recognised as a provider of exploration foundation services capability with remotely operated and autonomous Australian robotic lunar assets
- Australia's foundation services automation capability on the lunar surface is demonstrated
- Australia's ability to safely and effectively manage interoperability between assets deployed on the lunar surface is proven.

2.1.6. Commercial Lunar Payload Services (CLPS) lander

It is anticipated that one of the companies within NASA's Commercial Lunar Payload Services (CLPS) program will transport the foundation services rover to the Moon. NASA's CLPS initiative allows rapid acquisition of commercial lunar delivery services for payloads that advance capabilities for science and exploration of the Moon. For further information on this service, please refer to <https://www.nasa.gov/content/commercial-lunar-payload-services-overview>.

2.1.7. In-situ resource utilisation (ISRU) facility

NASA has a strong interest in technologies that enable ISRU that could make commodities such as propellant and breathing air from lunar materials, to enhance human exploration beyond Low Earth

Orbit. A key target is the extraction of oxygen from lunar regolith (*NASA SBIR/STTR 2019 - Z12.01 Extraction of Oxygen from Lunar Regolith*). Technology options for extraction of oxygen include solar thermal concentrators, molten oxide electrolysis (MOE), carbo-thermal reduction and ionic liquid reduction. Each of these technologies present specific strengths and challenges with regard to implementation in a lunar environment.

More information can be found here: <https://www.nasa.gov/isru/overview>.

2.2. About the Trailblazer Stage 1 grant opportunity

The Trailblazer program is delivered through two separate grant opportunities:

- Trailblazer Stage 1 – an open competitive grant opportunity providing up to \$4 million for up to two successful applicants to develop foundation services rover solutions through early mission phases to Preliminary Design Review (PDR)
- Trailblazer Stage 2 – a closed competitive grant opportunity providing an expected \$42 million to a single successful applicant, selected from Trailblazer Stage 1, to take their foundation services rover to launch and lunar operations phase.

Figure 1 below shows the staging of the grants opportunities, the indicative broad timelines and key milestones.

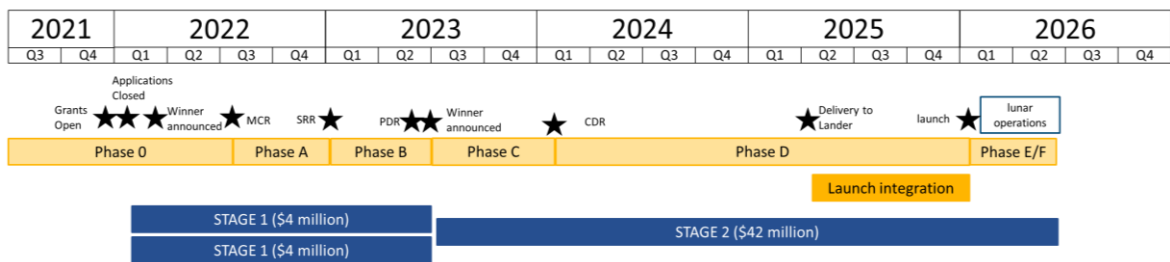


Figure 1: Trailblazer grant stages

These guidelines contain information for the Trailblazer Stage 1 grant opportunity. We strongly recommend you read the Stage 2 grant opportunity guidelines before applying for Stage 1. The Stage 2 grant opportunity guidelines will be reviewed and may be updated prior to them being opened for applications.

This document relates to the Stage 1 grant opportunity and sets out:

- the eligibility and assessment criteria
- how we consider and assess grant applications
- how we notify applicants and enter into grant agreements with grantees
- how we monitor and evaluate grantees' performance
- responsibilities and expectations in relation to the opportunity.

The Department of Industry, Science, Energy and Resources (we/the department) is responsible for administering this grant opportunity on behalf of the Agency.

We administer the program according to the [Commonwealth Grants Rules and Guidelines \(CGRGs\)](#)¹.

We have defined key terms used in these guidelines in the glossary at section 14.

¹ <https://www.finance.gov.au/government/commonwealth-grants/commonwealth-grants-rules-guidelines>

You should read this document carefully before you fill out an application.

3. Grant amount and grant period

The Australian Government announced \$150 million for the Moon to Mars initiative. An estimated \$50 million is available for the Trailblazer program.

3.1. Grants available

The Stage 1 grant amount for each successful applicant will be a maximum \$4 million. You must provide a minimum co-contribution of \$1 million. Your contribution must be cash.

We expect that to be successful you will leverage additional investment and industry support.

You are responsible for any remaining project expenditure, which we consider your contribution. We anticipate that you may need to use some funding from other State, Territory or local government grants to fund the project expenditure not covered by this program. We cannot fund your project if it receives funding from another Commonwealth government grant. You can apply for a grant for your project under more than one Commonwealth program, but if your application is successful, you must choose either the Trailblazer grant or the other Commonwealth grant.

3.2. Project period

Your project must be completed by 31 July 2023.

4. Eligibility criteria

We cannot consider your application if you do not satisfy all eligibility criteria.

4.1. Who is eligible?

To be eligible you must:

- have an Australian Business Number (ABN)

be one of the following entities:-

- an entity incorporated in Australia and a trading corporation, where your trading activities
 - form a sufficiently significant proportion of the corporation's overall activities as to merit it being described as a trading corporation; or
 - are a substantial and not merely peripheral activity of the corporation.
- a Publicly Funded Research Organisation (PFRO) as defined in section 14: Glossary.

If you are applying as a PFRO, your application must be a joint application including at least one eligible Australian trading corporation.

Joint applications are acceptable, provided you have a lead organisation who is the main driver of the project and is eligible to apply.

For further information on joint applications, refer to section 7.2.

4.2. Additional eligibility requirements

We can only accept applications where you:

- provide all mandatory attachments (see section 7.1) including your proposal (template link) and your project budget (Template link)

- you provide evidence from your board (or chief executive officer or equivalent) that the project is supported, that you can complete the project and meet the costs of the project not covered by Trailblazer Stage 1 grant funding, and confirms you are a trading corporation where applicable

We cannot waive the eligibility criteria under any circumstances.

4.3. Who is not eligible?

You are not eligible to apply if:

- you or any project partner are listed on the National Redress Scheme's website as an institution that has not joined or signified its intent to join the Scheme (www.nationalredress.gov.au)
- you or any project partner are named by the Workplace Gender Equality Agency as an organisation that has [not complied](#) with the [Workplace Gender Equality Act 2012](#).

You are also not eligible to apply if:

- you are an individual
- you are a partnership
- you are a trust (however, an incorporated trustee may apply on behalf of a trust)
- you are a Commonwealth, State, Territory or local government body (including government business enterprises) (other than a PFRO)
- you are a non-corporate Commonwealth entity.

If you are not eligible to apply, you may still be a part of a joint application provided you have a lead organisation who is the main driver of the project and is eligible to apply.

5. What the grant money can be used for

5.1. Eligible activities

To be eligible your Trailblazer Stage 1 project must:

- be aimed towards early development and planning of the primary task. The primary task is acquiring, transferring and delivering lunar regolith from the lunar surface to the NASA's ISRU facility for scientific purposes. This task is to be repeatable and provide higher levels of reliable autonomy through the task's operational phases in order to demonstrate Australia's foundation services. Any secondary objectives should not jeopardise or dominate the primary objectives/task of the mission.
- support Australia's ambitions to join NASA's endeavour to go forward to the Moon and then go on to Mars

Eligible activities must include:

- leading the integrated NASA-Australian Space Agency operational, safety and mission assurance reviews including a Mission Concept Review (MCR), System Requirements Review (SRR) and Preliminary Design Review (PDR)
- establishing, in consultation with the Agency and NASA, a joint program plan to include critical milestones and operational integration of the foundation services rover with the ISRU Facility

- designing and planning all activities over the spacecraft mission phases (phases A to F). Activities over mission phases including:
 - designing, developing, manufacturing, assembling, testing and operating the foundation services rover and lander deployment system, in accordance with the mission requirements stated in Appendix C and Appendix D,
 - any development models (including prototypes, engineering models, proto-flight and flight models) and ground support systems
- design, develop and build a functioning rover prototype that mitigates program risk
- ensuring the quality of your products and services meet the standards necessary to achieve the objectives and mission requirements (Appendix C and Appendix D)
- ongoing risk assessment, including national security, licencing, and regulatory, cyber, safety and other risks
- establishing and refining requirements for the foundation services rover's regolith delivery system to be compatible with the ISRU Facility's ability to receive regolith, and to support sunlit operations at a lunar polar location
- establishing and refining requirements for the foundations services rover, compatible with all other mission interfaces, including environmental requirements
- providing the Agency and NASA the program, system requirements, technical interface, systems design and systems operations information necessary for assessing the impact of the foundation services rover to the ISRU facility and developing selection criteria for the delivery lander
- involvement of the Agency and NASA in foundation services rover reviews as they pertain to its compatibility and interoperability with the ISRU facility
- establishing a review panel for system level reviews
- designing and developing your foundation services rover's regolith delivery system to be compatible with the ISRU Facility's ability to receive regolith, and to support sunlit operations at a lunar polar location
- conducting promotional and media activities including organising and hosting key mission events (see section 12.7)

There are additional activities that will be required for Stage 2. We strongly recommend that you read and consider the Stage 2 eligible activities in planning your project.

During the term of the Stage 1 Grant Agreement, we may add, remove or alter activities to further the objectives and outcomes of the mission or to align with obligations under arrangements with NASA. We will agree any changes with you in consultation with the Agency (please refer to section 12.5.1 on potential changes that could occur).

Eligible activities *may also* include:

- designing, developing, manufacturing, assembling, testing and operating any precursor and complementary missions in order to achieve the primary mission
- any activities to support secondary mission objectives providing these do not dominate or jeopardise the primary mission objectives.

Please consider Appendix A when developing your mission. We may also approve other activities that contribute towards achieving the program outcomes.

Ineligible activities include:

- product development that does not directly support mission activities, and/or cannot clearly demonstrate a pathway to the mission.

All mission requirements, risks and timelines are subject to change (please refer to section 12.5.1). These changes may arise after the signing of the agreement, and be reflected in reporting requirements.

About the mission requirements

Appendix C and Appendix D outline the mission and interface control requirements. We acknowledge that your project solution may require negotiation on these requirements.

5.2. Eligible expenditure

You can only spend grant funds on eligible expenditure that you have incurred on an agreed project as defined in your grant agreement.

To be eligible, expenditure must be a direct cost of your mission project.

Eligible expenditure includes:

- design, assembly, integration or test costs
- activities required to meet launch provider requirements (including insurance)
- direct labour costs of employees you directly employ on the core elements of the project. We consider a person an employee when you pay them a regular salary or wage, out of which you make regular tax instalment deductions.
- up to 30% labour on-costs to cover employer paid superannuation, payroll tax, workers compensation insurance, and overheads such as office rent and the provision of computers for staff directly working on the project
- project management costs
- staff training that directly supports the achievement of project outcomes
- software and consumable material costs directly related to the project, such as digital system engineering tools or analysis tools
- contract expenditure being the cost of any agreed project activities that you contract to others
- domestic and/or international travel limited to the reasonable cost of accommodation and transportation (including transportation of equipment) required to conduct agreed project activities (cannot exceed 20% of the total project costs)
- media and marketing expenditure
- contingency costs up to a maximum of 20% of the eligible project costs. Note that we make payments based on actual costs incurred.
- other eligible expenditure as approved by the Program Delegate.

If your application is successful, we may ask you to verify project costs that you provided in your application. You may need to provide evidence, such as quotes for major costs.

Not all expenditure on your project may be eligible for Trailblazer Stage 1 grant funding. The Program Delegate (who is an AusIndustry general manager within the department with

responsibility for the program) makes the final decision on what is eligible expenditure and may give additional guidance on eligible expenditure if required.

You must incur the project expenditure between the project start and end date for it to be eligible unless stated otherwise.

You must not commence your project until you execute a grant agreement with the Commonwealth.

5.3. What you cannot use the grant for

The Program Delegate may impose limitations or exclude expenditure, or further include some ineligible expenditure listed in these guidelines in a grant agreement or otherwise by notice to you.

Examples of ineligible expenditure include:

- business as usual expenses, or maintenance costs
- routine operational expenses, including communications, accommodation, office computing facilities, printing and stationery, postage, legal and accounting fees and bank charges, not directly related to the project
- non project-related costs, or costs associated with ineligible activities
- capital expenditure for the purchase of assets such as office furniture and equipment, motor vehicles, computers, printers or photocopiers and the construction, renovation or extension of facilities such as buildings and laboratories not directly related to the project
- activities that have previously received funding from other Commonwealth, State, Territory or local government grants.

Other costs may be ineligible where we decide that they do not directly support the achievement of the planned outcomes for the project or that they are contrary to the objective of the program.

6. The assessment criteria

You must address all assessment criteria in your application. We will assess your application based on the weighting given to each criterion. The application form asks questions that relate to the assessment criteria below. The amount of detail and supporting evidence you provide in your application should be relative to the project size, complexity and grant amount requested. You should provide evidence to support your answers. The application form displays size limits for answers.

You must attach a project proposal using the template provided.

Notwithstanding your overall score against the assessment criteria, unless you provide a **strong project proposal that addresses these guidelines and the mission requirements** (see Appendix C and Appendix D), you will not be successful for this grant opportunity.

6.1. Assessment criterion 1

The extent that your technical solution meets the mission constraints and how you will assure quality of your solution (35 points).

You should demonstrate:

- a. the merits of your technical solution against these guidelines and the mission requirements (refer Appendix C and Appendix D), including your project scope and concept of operations
- b. the engineering justification of your solution and the process you followed in selecting the technical solution as part of your feasibility activities
- c. the governance and quality assurance process that you have in place to review your technical solution as it progresses through the phases of mission development, along with the composition of your review panel (reference 10.3).

6.2. Assessment criterion 2

Your capacity, capability and resources to deliver your proposed mission and how this meets the mission constraints (as referred to in Appendix C and Appendix D) (35 points).

You should demonstrate:

- a. your ability to implement your mission proposal within the required timeframes (in accordance with these guidelines and the requirements – see Appendix C and Appendix D)
- b. your plan to manage your project, using the project proposal template provided, including how you will manage change, risk (including safety, technical, cyber security and national security), schedule, quality assurance, consortium and budget management
- c. the capability of your project team, including your combined track record and your access to personnel with relevant skills and experience, including project management, technical staff and your specified independent committees
- d. your access to any required finance, facilities, technology and intellectual property.

The mission requirements are expected to iterate over the project to meet mission needs. Your proposal must include consideration of how you will manage any changes.

6.3. Assessment criterion 3

How your involvement in this mission enhances your commercial viability and advances Australia's foundation services capability. (10 points)

You should demonstrate this through describing:

- a. how you will leverage this mission to further your organisation's commercial strategy into the longer term post project completion
- b. how you will maintain the capability, capacity and commercial potential developed through the project for future endeavours (including securing investment)
- c. what additional markets will this project open for your organisation.

6.4. Assessment criterion 4

The impact of grant funding on the Australian space sector (20 points)

You should demonstrate this by describing:

- a. any positive impact your project will have on the development of the Australian space ecosystem (see Appendix A section A.1), and how it will generate any direct/indirect employment growth
- b. the level of strategic value, investment in Australian capability (see Appendix A section A.2), commercial investment and skillsets your project will bring into the Australian space sector

- c. your plan to use your project and the mission to inspire the nation, and the Australian space industry.

7. How to apply

Before applying, you should read and understand the Stage 1 and Stage 2 Trailblazer guidelines, the [Advancing Space: Australian Civil Space Strategy 2019-2028](#) and the sample [grant agreement](#) published on business.gov.au and GrantConnect.

You can only submit an application between the opening and closing dates.

To apply, you must:

- complete the online [application form](#) via business.gov.au
- provide all the information requested
- address all eligibility and assessment criteria
- include all necessary attachments.

You should retain a copy of your application for your own records.

You are responsible for making sure your application is complete and accurate. Giving false or misleading information is a serious offence under the *Criminal Code Act 1995* (Cth). If we consider that you have provided false or misleading information we may not progress your application. If you find an error in your application after submitting it, you should call us immediately on 13 28 46.

If we find an error or information that is missing, we may ask for clarification or additional information from you that will not change the nature of your application. However, we can refuse to accept any additional information from you that would change your submission after the application closing time.

If you need further guidance around the application process, or if you are unable to submit an application online, [contact us](#) at business.gov.au or by calling 13 28 46.

7.1. Attachments to the application

You must provide the following documents with your application:

- completed proposal using the proposal template and guidance provided (template link and template guidance link)
- completed project budget using the template provided (template link)
- project plan
- evidence of funding strategy, e.g. financial statements, loan agreements, cash flow documents
- evidence of support from your board, CEO or equivalent (template provided on [business.gov.au](#) and [GrantConnect](#)). Where the CEO or equivalent submits the application, we will accept this as evidence of support.

If any of these documents are not included in your application, your application will be automatically excluded.

You must attach supporting documentation to the application form in line with the instructions provided within the form. You should only attach requested documents. We will not consider information in attachments that we do not request.

There is a 2 MB limit per attachment and 20 MB limit on all attachments.

7.2. Joint applications

An application must be lodged by an entity that meets the eligibility requirements set out in chapter 4 above – this must be the entity that will enter the grant agreement with the Commonwealth.

We also recognise that other organisations may want to join together as a group to deliver a project. In these circumstances, you must appoint a lead organisation. If you are applying as a PFRO, your application must be a joint application including at least one eligible Australian trading corporation.

Only the lead organisation can submit the application form and enter into the grant agreement with the Commonwealth. The application should identify all other members of the proposed group ('project partners') and include a letter of support from each of the project partners. Each letter of support should include:

- details of the project partner
- an overview of how the project partner will work with the lead organisation and any other project partners in the group to successfully complete the project
- an outline of the relevant experience and/or expertise the project partner will bring to the group
- the roles/responsibilities the project partner will undertake, and the resources (financial and in-kind) it will contribute (if any)
- details of a nominated management level contact officer.

The lead organisation will be required to have a formal legally binding arrangement in place with all proposed project partners prior to execution of the grant agreement.

Project partners can participate in multiple applications.

7.3. Timing of grant opportunity

You can only submit an application for Trailblazer Stage 1 grant between the published opening and closing dates. We cannot accept late applications.

You may commence your project from the date we execute a grant agreement with you. We are not responsible for any expenditure you incur until a grant agreement is executed.

Table 1: Expected timing for this grant opportunity

Activity	Timeframe
Assessment of applications	6 weeks
Approval of outcomes of selection process	4 weeks
Notification to unsuccessful applicants after successful announcement has been made	2 weeks
Negotiations and award of grant agreements	4 weeks (concurrent)
Earliest start date of Moon to Mars Trailblazer Grant	date of execution of grant agreement
End date of grant commitment	July 2023

8. The grant selection process

We first review your application against the eligibility criteria. If eligible, we will then assess it against the assessment criteria. Only eligible applications will proceed to the assessment stage.

The assessment process will follow the steps below:

1. the committee will review all applications
2. the committee will invite a shortlist of applicants to discuss their application with the committee to ask clarifying questions and to inform the assessment.
3. the committee will recommend the suitable applicants for funding

We consider your application on its merits, based on:

- the overall assessment of the likelihood of project success
- how well it meets the criteria
- how it compares to other applications
- whether it provides value with relevant money.

When assessing whether the application represents value with relevant money, in addition to assessing the application against the assessment criteria, we will have regard to:

- the overall objectives of the grant opportunity
- the evidence provided to demonstrate how your project contributes to meeting those objectives
- the relative value of the grant sought
- the strategic and financial value leveraged by your project
- the diversity of the capabilities to be developed by the supported projects
- any national interest, financial, legal/regulatory, governance or other issue or risk that we identify during any due diligence process that we conduct on you and your project partners.
 - This includes your directors, officers, senior managers, key personnel, your related bodies corporate (as defined in the *Corporations Act*) that could bring the Australian Government into disrepute if it were to fund your project.
 - Such issues and risks include where we consider that funding your application under this grant opportunity is likely to directly conflict with Australian Government policy.
 - Where possible¹, we will provide you with an opportunity to comment on any material risks identified during this due diligence process prior to our determining the extent (if any) to which those issues or risks affect our assessment of your application and, if so, whether they are sufficient to warrant the exclusion of your application from the assessment process.

We will establish a committee that has government and industry and/or space sector experience (Australian and international), including members from the Agency, to assess your application. The committee may also include external experts and may seek additional advice from independent technical experts and across government. It is expected that all non-commonwealth employees will perform their duties in accordance with the CGRGs.

If the selection process identifies unintentional errors in your application, we may contact you to correct or clarify the errors, but you cannot make any material alteration or addition.

8.1. Who will approve grants?

The Minister decides which grants to approve taking into account the application assessment, the findings of the committee, the advice from Head or Deputy Head of Agency, and the availability of Trailblazer Stage 1 funds.

The Ministers' decision is final in all matters, including:

- the grant approval
- the grant funding to be awarded
- any conditions attached to the offer of grant funding.

We cannot review decisions about the merits of your application.

The Minister will not approve funding if there is insufficient program funds available across relevant financial years for the program.

9. Notification of application outcomes

We will advise you of the outcome of your application via the [Portal](#). If you are successful, we advise you of any specific conditions attached to the grant.

If you are unsuccessful, we will give you an opportunity to discuss the outcome with us.

9.1. Further grant opportunities

We expect the Moon to Mars Trailblazer Stage 2 Grant Opportunity will open for applications in 2023. The Trailblazer Stage 2 grant will be a closed competitive process that will only be available to the two successful applicants of the Trailblazer Stage 1 grant. The focus of the Trailblazer Stage 2 grant will be on the development of a single project to meet the specifications and mission objectives of a NASA lunar mission.

We will publish the opening and closing dates and any other relevant information on business.gov.au and [GrantConnect](#).

10. Successful grant applications.

10.1. Grant agreement

You must enter into a legally binding grant agreement with the Commonwealth. A sample [grant agreement](#) is available on business.gov.au and [GrantConnect](#).

We will use a Commonwealth standard grant agreement. We must execute a grant agreement with you before we can make any payments. Execute means both you and the Commonwealth have signed the agreement. We are not responsible for any expenditure you incur until a grant agreement is executed. You must not start any Moon to Mars Trailblazer Grant activities until a grant agreement is executed.

The approval of your grant may have specific conditions determined by the assessment process or other considerations made by the Head of the Agency. Where possible, we will identify these in the offer of grant funding. It is likely that negotiation of the agreement will be required following assessment.

The Commonwealth may recover grant funds if there is a breach of the grant agreement.

You will have 30 days from the date of a written offer to execute this grant agreement with the Commonwealth. During this time, we will work with you to finalise details.

The offer may lapse if both parties do not sign the grant agreement within this time. Under certain circumstances, we may extend this period. We base the approval of your grant on the information you provide in your application. We will review any required changes to these details to ensure they do not impact the project as approved by the Head of the Agency.

10.2. Moon to Mars initiative: Trailblazer Grant specific legislation, policies and industry standards

You must comply with all relevant laws and regulations in undertaking your project. You must also comply with the specific legislation/policies/industry standards that follow. It is a condition of the grant funding that you meet these requirements. We will include these requirements in your grant agreement.

In particular, you may be required to comply with:

- *Space (Launches and Returns) Act 2018* and associated rules including:
 - *Space (Launches and Returns) (General) Rules 2019*
 - *Space (Launches and Returns) (Insurance) Rules 2019*
 - *Space (Launches and Returns) (High Power Rocket) Rules 2019*
- Export control legislation including the *Defence Trade Controls Act 2012* and *Customs Act 1901*
- *Radiocommunications Act 1992*
- Relevant work health and safety laws, including the *Work Health and Safety Act 2011 (Cth)*
- State/Territory legislation in relation to working with children
- any relevant export control requirements.

These activities will be conducted in a manner consistent with Australia's international obligations, including the UN space treaties, as well as the Artemis Accords.

10.3. Review panels

You must establish and manage a review panel for your project, for system level and critical technology reviews. You must appoint a lead reviewer who is independent of the project and has significant experience in space missions. Composition of your review panel should be guided by relevant standards, with members agreed by the Agency.

You must reserve a minimum of three positions for the Agency and NASA. These members will be funded by their respective agencies.

The review panel will provide advice on satisfactory progress of your project.

10.4. How we pay the grant

The grant agreement will state the:

- maximum grant amount we will pay
- proportion of eligible expenditure covered by the grant (grant percentage)
- any financial contribution provided by you or a third party.

We will not exceed the maximum grant amount under any circumstances. If you incur extra costs, you must meet them yourself.

We will make payments according to an agreed schedule set out in the grant agreement. Payments are subject to satisfactory progress on the project.

The Agency will determine satisfactory progress will be determined in consultation with NASA, taking into account any relevant advice from the review panel. Satisfactory progress may include, but is not limited to satisfactorily meeting and clearing with the approval of the Agency:

- reporting requirements of the grant agreement
- life-cycle review requirements of the mission
- any requirements set by NASA or the Agency to manage the mission
- any risk that relates to your project, the mission, the Agency or NASA.

We may discontinue funding if your project does not meet the timeframes, standards, expectations or assurances required by either the Agency or NASA at any time.

10.5. Tax obligations

If you are registered for the Goods and Services Tax (GST), where applicable we will add GST to your grant payment and provide you with a recipient created tax invoice. You are required to notify us if your GST registration status changes during the project period. GST does not apply to grant payments to government related entities².

Grants are assessable income for taxation purposes, unless exempted by a taxation law. We recommend you seek independent professional advice on your taxation obligations or seek assistance from the [Australian Taxation Office](#). We do not provide advice on tax.

11. Announcement of grants

We will publish non-sensitive details of successful projects on GrantConnect. We are required to do this by the [Commonwealth Grants Rules and Guidelines](#) unless otherwise prohibited by law. We may also publish this information on business.gov.au. This information may include:

- name of your organisation
- title of the project
- description of the project and its aims
- amount of grant funding awarded
- Australian Business Number
- business location
- your organisation's industry sector.

12. How we monitor your grant activity

12.1. Keeping us informed

You should let us know if anything is likely to affect your project or organisation.

We need to know of any key changes to your organisation or its business activities, particularly if they affect your ability to complete your project, carry on business and pay debts due.

You must also inform us of any changes to your:

- name
- addresses

² See Australian Taxation Office ruling GSTR 2012/2 available at ato.gov.au

- nominated contact details
- bank account details.

If you become aware of a breach of terms and conditions under the grant agreement you must contact us immediately.

You must notify us of events relating to your project and provide an opportunity for the Minister or their representative to attend.

12.2. Reporting

You must submit reports in line with the grant agreement. We will provide the requirements for these reports as appendices in the grant agreement. We will remind you of your reporting obligations before a report is due. We will expect you to report on:

- progress against agreed project milestones key performance indicators of the project (see Appendix A.3 for more information)
- project expenditure, including expenditure of grant funds
- contributions of participants directly related to the project
- risks or issues, your mitigation plans and expected outcomes.

We will monitor the progress of your project by assessing reports you submit and may conduct site visits to confirm details of your reports if necessary. Occasionally we may need to re-examine claims, seek further information or request an independent audit of claims and payments.

All progress reporting will require evidence of your project outcomes and demonstrate that milestone activities have been successfully completed. The Agency must be satisfied that a satisfactory progress report is submitted or we may discontinue funding if your reporting does not meet the timeframes, standards or expectations of either the Agency or NASA at any time.

12.2.1. Progress reports

Progress reports must:

- include details of your progress towards completion of agreed project activities, including key milestone deliverables that require the Agency's approval and endorsement
- show the total eligible expenditure incurred to date
- be submitted by the report due date (you can submit reports ahead of time if you have completed relevant project activities).

We will only make grant payments when we receive satisfactory progress reports.

You must discuss any project or milestone reporting delays with us as soon as you become aware of them.

12.2.2. End of project report

When you complete the project, you must submit an end of project report.

End of project reports must:

- include the agreed evidence as specified in the grant agreement
- identify the total eligible expenditure incurred for the project
- include a declaration that the grant money was spent in accordance with the grant agreement and to report on any underspends of the grant money
- be submitted by the report due date.

12.2.3. Ad-hoc reports

We may ask you for ad-hoc reports on your project. This may be to provide an update on progress, or any significant delays or difficulties in completing the project.

12.3. Independent audits

We may ask you to provide an independent audit report. An audit report will verify that you spent the grant in accordance with the grant agreement. The audit report requires you to prepare a statement of grant income and expenditure. The report template is available on business.gov.au and GrantConnect.

12.4. Compliance visits

We may visit you during the project period, to review your compliance with the grant agreement. We may also inspect the records you are required to keep under the grant agreement. We will provide you with reasonable notice of any compliance visit.

12.5. Grant agreement variations

We recognise that unexpected events may affect project progress. In these circumstances, you can request a variation to your grant agreement, including:

- changing project milestones
- extending the timeframe for completing the project but within the maximum time period allowed in grant opportunity guidelines
- changing project activities
- increasing grant funds (under exceptional circumstances and subject to available funding).

If you want to propose changes to the grant agreement, you must put them in writing before the project grant agreement end date. We can provide you with a variation request template.

If a delay in the project causes milestone achievement and payment dates to move to a different financial year, you will need a variation to the grant agreement. We can only move funds between financial years if there is enough program funding in the relevant year to allow for the revised payment schedule. If we cannot move the funds, you may lose some grant funding.

You should not assume that a variation request will be successful. We will consider your request based on factors such as:

- how it affects the project outcome
- consistency with the program policy objective, grant opportunity guidelines and any relevant policies of the department
- changes to the timing of grant payments
- availability of program funds.

12.5.1. Variations in the definition of the mission and requirements

All mission requirements, risks and timelines have the potential to change. These changes may arise after the signing of the agreement, and be reflected in reporting requirements. You are expected to manage any possible modifications to the project. To support this management, information of the likelihood of change can be found in Table 2.

Table 2: Potential changes in key elements of program after signing of agreement.

What can change		Likelihood of change	No more changes are expected after the following milestones
Mission definition			
	Key Task	Low	SRR
	Eligible activities (roles and responsibilities)	Medium	PDR
Requirements			
	Mission requirements	High	SRR
	Interface control document – Lander	High	Lander PDR
	Interface control document – ISRU facility	High	ISRU facility PDR
Timelines		High	

All changes are expected to occur no later than a month after a milestone review and will be delivered through a formal change request.

To ensure satisfactory progress of the agreement, the project will be managed through the key milestones and if a variation is required it will be determined by the Agency in consultation with NASA. Satisfactory progress may include, but is not limited to, satisfactorily meeting and clearing with the approval of the Agency:

- the reporting requirements of the grant agreement
- the life-cycle review requirements of the mission
- any requirements set by NASA or the Agency to manage the mission
- any risk that relates to your project, the mission, the Agency or NASA.

12.6. Evaluation

We will evaluate the grant opportunity to measure how well the outcomes and objectives have been achieved. We may use information from your application and project reports for this purpose. We may also interview you, or ask you for more information to help us understand how the grant impacted you and to evaluate how effective the program was in achieving its outcomes.

We may contact you up to two years after you finish your project for more information to assist with this evaluation.

12.7. Media and publicity

This section covers supporting communications activities we expect to be undertaken as part of this program. There may be other activities not captured that arise over the course of your project. The Agency expects the successful applicant to liaise with it for any similar activities.

Logo

The rover must have at least two Agency logos, one on each side of the rover, that are clearly visible by a camera located on the lander. Logos must be on the rover during assembly, testing, integration and during lunar operations.

The deployment system must have a single Agency logo, visible when viewing the integrated device on the lander.

You must propose and agree the details, size and location of the logo with the Agency. We will provide logo files for use on the lander. You must follow the Australian Space Agency brand use guidelines.

The Agency must approve any other use of the Agency logo.

The use of other logos on the rover or deployment system must be done in consultation with the Agency.

Naming

The name of the program is the Trailblazer program, which is a part of the Moon to Mars initiative. The Agency is responsible for naming the rover, deployment system as well as the mission which will be conducted in consultation with the grantee.

Merchandise

Development of mission merchandise must be done in consultation with the Agency and must be agreed by both parties. We expect only one common set of merchandise for the program.

Mission patch

The Agency is responsible for the design of the mission patch in consultation with the grant recipient.

Media

You are expected to keep the public informed of the mission's progress, including:

- at least one social media post per month
- at least one major media event per year developed in consultation with the Agency.

You are expected to provide the first images and/or videos taken by the cameras on the rover, to the Agency within 30 minutes of receiving them. The Agency will then coordinate associated media.

Events

We expect you to advise the Agency on any events and the Agency will work with participants on any relevant events involving the Trailblazer program.

Grant Acknowledgment

If you make a public statement about a project funded under the program, including in a brochure or publication, you must acknowledge the grant by using the following:

'This project received grant funding from the Australian Government through the Australian Space Agency.'

If you erect signage in relation to the project, the signage must contain an acknowledgement of the grant.

13. Probity

We will make sure that the grant opportunity process is fair, according to the published guidelines, incorporates appropriate safeguards against fraud, unlawful activities and other inappropriate conduct and is consistent with the CGRGs.

13.1. Conflicts of interest

Any conflicts of interest could affect the performance of the grant opportunity or program. There may be a conflict of interest, or perceived conflict of interest, if our staff, any member of a committee or advisor and/or you or any of your personnel:

- has a professional, commercial or personal relationship with a party who is able to influence the application selection process, such as an Australian Government officer or member of an external panel
- has a relationship with or interest in, an organisation, which is likely to interfere with or restrict the applicants from carrying out the proposed activities fairly and independently or
- has a relationship with, or interest in, an organisation from which they will receive personal gain because the organisation receives a grant under the grant program/ grant opportunity.

As part of your application, we will ask you to declare any perceived or existing conflicts of interests or confirm that, to the best of your knowledge, there is no conflict of interest.

If you later identify an actual, apparent, or perceived conflict of interest, you must inform us in writing immediately.

Conflicts of interest for Australian Government staff are handled as set out in the Australian [Public Service Code of Conduct \(Section 13\(7\)\)](#)³ of the *Public Service Act 1999* (Cth). Committee members and other officials including the decision maker must also declare any conflicts of interest.

We publish our [conflict of interest policy](#)⁴ on the department's website. The Commonwealth policy entity also publishes a conflict of interest policy on its website.

13.2. Exclusive Arrangements

You must not enter into, or seek to enter into an Exclusive Arrangement in relation to the grant opportunity with any entity without the prior written consent of the Commonwealth. We will include this requirement in your grant agreement if you are successful.

13.3. National security

Collaboration with foreign entities must be transparent, undertaken with full knowledge and consent, and in a manner that avoids harm to Australia's national interests. It is your responsibility

³ <https://www.legislation.gov.au/Details/C2019C00057>

⁴ https://www.industry.gov.au/sites/default/files/July%202018/document/pdf/conflict-of-interest-and-insider-trading-policy.pdf?acsf_files_redirect

to consider the national security implications of the proposed project, and identify and manage any risks, including risks relating to the unwanted transfer of sensitive knowledge technology.

You should ensure that you are informed about who you are collaborating with by undertaking appropriate due diligence, proportionate to the risk and subject to available information, of your global partners and their personnel participating in the project. This should take into account any potential security, ethical, legal and reputational risks, and where necessary, you should be prepared to demonstrate how you would manage and mitigate any identified risks.

You and any entities participating in the project must disclose all foreign ownership (including foreign government ownership), affiliations with foreign governments, organisations, institutions or companies, or membership of foreign government talent programs. You must report any material changes in the nature of the activity or key personnel involved, including affiliations/links with foreign governments or companies.

If you have acknowledged in the declaration that, you can appropriately manage national security risks, we may ask you to provide a satisfactory risk assessment plan outlining your approach as a condition of funding.

13.3.1. Keeping us informed

You should let us know if anything is likely to affect your project or organisation.

We need to know of any key changes to your organisation or its business activities, particularly if they affect your ability to complete your project, carry on business and pay debts due.

You must also inform us of any changes to your:

- name
- addresses
- nominated contact details
- bank account details.

You must also inform us of any material changes to:

- partners involved in the project (i.e. partners joining or withdrawing)
- foreign affiliations of any project partners or key personnel (as outlined in Section 7.2)
- any foreign funding contributing to the project.

13.4. How we use your information

Unless the information you provide to us is:

- confidential information as per 13.4.1, or
- personal information as per 13.4.3,

we may share the information with other government agencies for a relevant Commonwealth purpose such as:

- to improve the effective administration, monitoring and evaluation of Australian Government programs
- for research
- to announce the awarding of grants.

13.4.1. How we handle your confidential information

We will treat the information you give us as sensitive and therefore confidential if it meets all of the following conditions:

- you clearly identify the information as confidential and explain why we should treat it as confidential
- the information is commercially sensitive
- disclosing the information would cause unreasonable harm to you or someone else
- you provide the information with an understanding that it will stay confidential.

13.4.2. When we may disclose confidential information

We may disclose confidential information:

- to the committee and our Commonwealth employees and contractors, to help us manage the program effectively
- to the Auditor-General, Ombudsman or Privacy Commissioner
- to the responsible Minister or Assistant Minister
- the Prime Minister
- to a House or a Committee of the Australian Parliament.

We may also disclose confidential information if:

- we are required or authorised by law to disclose it
- you agree to the information being disclosed, or
- someone other than us has made the confidential information public.

13.4.3. How we use your personal information

We must treat your personal information according to the Australian Privacy Principles (APPs) and the *Privacy Act 1988* (Cth). This includes letting you know:

- what personal information we collect
- why we collect your personal information
- to whom we give your personal information.

We may give the personal information we collect from you to our employees and contractors, the committee, and other Commonwealth employees and contractors, so we can:

- manage the program
- research, assess, monitor and analyse our programs and activities.

We, or the Minister, may:

- announce the names of successful applicants to the public
- publish personal information on the department's websites.

You may read our [Privacy Policy](#)⁵ on the department's website for more information on:

- what is personal information
- how we collect, use, disclose and store your personal information

⁵ <https://www.industry.gov.au/data-and-publications/privacy-policy>

- how you can access and correct your personal information.

13.4.4. Freedom of information

All documents in the possession of the Australian Government, including those about the program, are subject to the *Freedom of Information Act 1982* (Cth) (FOI Act).

The purpose of the FOI Act is to give members of the public rights of access to information held by the Australian Government and its entities. Under the FOI Act, members of the public can seek access to documents held by the Australian Government. This right of access is limited only by the exceptions and exemptions necessary to protect essential public interests and private and business affairs of persons in respect of whom the information relates.

If someone requests a document under the FOI Act, we will release it (though we may need to consult with you and/or other parties first) unless it meets one of the exemptions set out in the FOI Act.

13.5. Enquiries and feedback

For further information or clarification, you can contact us on 13 28 46 or by [web chat](#) or through our [online enquiry form](#) on business.gov.au.

We may publish answers to your questions on our website as Frequently Asked Questions.

Our [Customer Service Charter](#) is available at business.gov.au. We use customer satisfaction surveys to improve our business operations and service.

If you have a complaint, call us on 13 28 46. We will refer your complaint to the appropriate manager.

If you are not satisfied with the way we handle your complaint, you can contact:

Head of Division
AusIndustry
Department of Industry, Science, Energy and Resources
GPO Box 2013
CANBERRA ACT 2601

You can also contact the [Commonwealth Ombudsman](#)⁶ with your complaint (call 1300 362 072). There is no fee for making a complaint, and the Ombudsman may conduct an independent investigation.

14. Glossary

Term	Definition
Application form	The document issued by the Program Delegate that applicants use to apply for funding under the program.
AusIndustry	The division of the same name within the department.

⁶ <http://www.ombudsman.gov.au/>

Term	Definition
Australian Space Agency (the Agency)	A separately branded entity located within the department. The Agency was established to coordinate civil space matters across government and support the growth and transformation of Australia's space industry
Australian space industry	<p>The Australian space industry comprises the Australian participants (organisations) of the Australian space sector.</p> <p>The Australian space sector is the set of space-related activities along the space value chain. Included in the space sector are all actors (private, public and academic) participating in production, operation, supply and enablement activities that form the space value chain. Space value chain segments include manufacturing and core inputs (consisting of ground and space segment manufacturing and services), space operations, space applications, and enablers (such as regulation and essential service delivery, infrastructure and capabilities, research, development and engineering, and specialised support services).</p> <p>See the Definition of the Australian Space Sector (Australian Space Agency, 2020).</p>
CLPS	Commercial Lunar Payload Service
Concept of Operations	A description of how the system will be operated as part of the mission including timeline and operational scenarios.
Critical design review	A technical review to determine whether the system design is mature enough to proceed with full-scale fabrication, assembly, integration, and test.
Department	The Department of Industry, Science, Energy and Resources.
Eligible activities	The activities undertaken by a grantee in relation to a project that are eligible for funding support as set out in 5.1.
Eligible application	An application or proposal for grant funding under the program that the Program Delegate has determined is eligible for assessment in accordance with these guidelines.
Eligible expenditure	The expenditure incurred by a grantee on a project and which is eligible for funding support as set out in 5.2.
Exclusive Arrangement	Any contract, agreement, understanding or other arrangement in connection with the Trailblazer program between you and a third party (including a project partner) that has the effect of preventing or limiting that third party from providing goods or services to any other third party in connection to the Trailblazer program.

Term	Definition
Grant agreement	A legally binding contract between the Commonwealth and a grantee for the grant funding.
Grant funding or grant funds	The funding made available by the Commonwealth to grantees under the program.
GrantConnect	The Australian Government's whole-of-government grants information system, which centralises the publication and reporting of Commonwealth grants in accordance with the CGRGs.
Grantee	The recipient of grant funding under a grant agreement.
Guidelines	Guidelines that the Minister gives to the department to provide the framework for the administration of the program, as in force from time to time.
ISRU	In-situ resource utilisation
ISRU Facility	An ISRU payload provided by NASA intended to travel to the lunar surface
lander	The lander that will take the Rover to the surface of the moon
Minister	The Commonwealth Minister for Science and Technology.
Mission	End-to-end system including space, ground and launch segment (when applicable) to achieve a defined mission goal. The space project may be a part of or the complete mission. (Note: Missions are in scope even if the space segment is already working in space)
Mission concept review	Early phase technical review to determine whether the proposed concept meets the mission needs and objectives.
Mission development phases	Development steps in the maturation of a space project and/or mission
Mission ready	Operable, tested, qualified and prepared for implementation or deployment as part of a mission.
Moon to Mars activities	Activities that could support NASA's Moon to Mars endeavours.
Moon to Mars initiative	The Australian Government program that supports Australian businesses and researchers to join NASA's Moon to Mars endeavours.
NASA	The National Aeronautics and Space Administration.

Term	Definition
NASA's Moon to Mars endeavours	<p>A NASA-led program of space exploration with commercial and international partners to return to the Moon as a step towards sending astronauts to Mars.</p> <p>The Australian Government's Moon to Mars initiative is a separate but related undertaking.</p>
National Civil Space Priorities	<p>The seven National Civil Space Priorities stated in the <i>Advancing Space: Australian Civil Space Strategy 2019-2028</i>:</p> <ul style="list-style-type: none"> • position, navigation and timing • earth observation • communications technologies and services • space situation awareness and debris monitoring • leapfrog R&D • robotics and automation on Earth and in space • access to space.
Personal information	<p>Has the same meaning as in the <i>Privacy Act 1988</i> (Cth) which is:</p> <p>Information or an opinion about an identified individual, or an individual who is reasonably identifiable:</p> <ol style="list-style-type: none"> a. whether the information or opinion is true or not; and b. whether the information or opinion is recorded in a material form or not.
Preliminary Design Review (PDR)	<p>An early phase technical review to determine whether the preliminary design meets all the system requirements within acceptable cost, schedule, and risk.</p>
Program Delegate	<p>An AusIndustry manager within the department with responsibility for the program.</p>
Program funding or Program funds	<p>The funding made available by the Commonwealth for the program.</p>
Project	<p>A project described in an application for grant funding under the program.</p>
Publicly funded research organisation (PFRO)	<p>All higher education providers listed at Table A and Table B of the <i>Higher Education Support Act 2003</i> (Cth)</p>
Qualification	<p>A formal proof that the design meets all the requirements of the specification and the parameters agreed.</p>
Small and medium sized enterprise (SME)	<p>A business with less than 200 employees.</p>

Term	Definition
Space Project	The Space Project is the entire proposed project from Pre Phase A to F. The Space Project may be an entire mission or a subset of it.
System requirements review (SRR)	An early-phase technical review to determine whether the functional and performance requirements and the selected concept satisfy the mission.
TBC	To be confirmed.
TBD	To be determined.

Appendix A. Program Considerations

A.1 Space sector ecosystem development

The Agency was established to support the growth and transformation of Australia's space industry. To achieve these goals, the Agency expects that successful applicants will carry out ecosystem development activities as part of their space project. These may include, but are not limited to:

- conference presentations on your project
- lessons learnt presentations
- internships
- STEM events to help support and encourage students into the space sector
- mentor space start-ups
- regular social media updates.

A.2 Investment in Australian capability

The Agency acknowledges that it may not be possible for all aspects of your space project to be carried out in Australia. The Agency expects that large majority of funding (for example, 80% excluding launch costs) to be spent in Australia subject to the strength of the case to build Australian capability and capacity. The proposal should articulate the geographic allocation of your project work to allow assessment of this percentage along with outlining the benefit to project and Australia for any funds spent overseas.

Additionally, the majority of skills and capabilities to perform space missions are expected to continue to contribute to the Australian space industry after the completion of the project. As an indication, the skills that are critical to the development of space projects that the project should seek to develop and continue to support in Australia include:

- systems engineering
- program management
- design
- key component and sub-system manufacturing
- critical technology development
- cyber security
- software development
- assembly, integration and testing.

Support from international organisations to develop the skills and capabilities stated above is acceptable, especially if there is a clear benefit to Australia, for example workforce upskilling or knowledge transfer. However, if any of the activities listed above are planned to be performed outside of Australia, the Agency expects strong justification to be given as part of your proposal.

A.3 Key milestones and schedules

Launch (Stage 2)

You should plan for a launch date of 1st Jan 2026, however this date may move to later in 2026/2027 as organised by the Agency and NASA throughout the development of the mission.

MCR, SRR and PDR (Stage 1)

Mission Concept Review and System requirements review will be finalised on the following dates.

Technical review	Due date
Mission Concept Review (MCR)	No later than 31st July 2022
System Requirements Review (SRR)	No later than 31st January 2023
Preliminary Design Review (PDR)	To be proposed by grantee, in consultation with the Agency

Please refer to Table 3.0-1 in the [NASA System Engineering Handbook](#), NPR 7120.5 Table I-4 and NPR 7123.1 Appendix G for guidance on milestones.

Other milestones (Both Stages)

You must outline MCR, SRR and other milestones, including delivery dates, in your application. Milestones will be refined and negotiated with you during negotiation of your grant agreement. We will further confirm milestones with you at system requirement review. At a minimum, we expect you to include following milestones:

Phase	Milestone
Pre-Phase A	<ul style="list-style-type: none">Mission Concept Review (MCR)
Phase A	<ul style="list-style-type: none">System Requirements Review (SRR)
Phase B	<ul style="list-style-type: none">Preliminary Design Review (PDR)
Phase C	<ul style="list-style-type: none">Critical Design Review (CDR)Safety review
Phase D, E, F	<ul style="list-style-type: none">Acceptance Review (AR)Qualification Review (QR)Flight Readiness Review (Flight Readiness Review)Operational Readiness Review (ORR)

Please refer to Table 3.0-1 in the [NASA System Engineering Handbook](#), NPR 7120.5 Table I-4 and NPR 7123.1 Appendix G for guidance on milestones.

CLPS lander schedule (Both Stages)

The CLPS program procures the services of payload delivery to the lunar surface. We expect the key dates associated with this procurement are as follows:

Timeline	Action
30-34 months pre-launch	Interface requirements are delivered to NASA for implementation in Task order
28-32 months pre-launch	Task order released by NASA to procure the lander
8 - 10 months pre-launch	Delivery of rover, including ground equipment, to the lander premises

ISRU facility schedule (Both Stages)

We expect the ISRU facility will fly on the same lander as the foundations services rover. This schedule for the ISRU facility is still to be determined.

A.4 Standards

NASA's standards cascade from program and project management standards down through to systems engineering and risk management standards. The Agency recommends you consider [NASA standards](#) as general guidance for your project. The NASA standards illustrate international engineering and project management standards, and should broadly inform your project management approach and your expectations of NASA's pre-flight requirements.

Notwithstanding the NASA standards and procedures, your own project planning documentation and your grant agreement are the documents that guide your project pathway and your reporting schedule. The Australian Commonwealth will determine and manage all agreements, reporting and project responsibilities.

Program and project management standards

The Agency recommends you consider the Program and Project management standards [NPR 7120.8](#) with tailoring to the [NPR 7120.5](#) milestones and deliveries, as general guidance for understanding pre-flight expectations. We expect that you will use these standards to inform your program and project management, including tailoring the standards to meet your needs.

[NPR 8705.4A](#) defines mission and instrument risk tolerance classes. This mission is currently considered as a class D, category C project. Class D is described as a high-risk tolerance project that is driven more by programmatic constraints. See Appendix C of NPR 8705.4A for further classification information.

Other standards and documents that may support your mission development include:

- [NASA System Engineering Handbook](#)
- [NPR 7123.1](#) – NASA Systems Engineering Processes and Requirements
- [EEE-INST-0002](#) – Instructions for EEE parts selection, screening, qualification and Derating
- [KSC-DE-512-SM](#) - Ground Systems Development Standards
- [NPR 7150.2](#) – NASA Software Engineering Requirements
- [ARC-8070-1](#) – Space flight system design and environmental test

Safety, quality, reliability and maintainability standards

The Australian Space Agency recommends you consider the ['8000' series](#) standards. These standards cover safety, quality, reliability, and maintainability requirements. Where applicable, you should align your approach to any relevant subordinate standards within the series, for example [NPR 8000.4B](#).

Other standards and documents that may support your mission development include:

- [NPR 8735.2](#) - Hardware Quality Assurance Program Requirements for Programs and Projects
- [NPR 8715.7](#) – Payload Safety Program

Appendix B. Trailblazer mission destinations and scenarios

B.1 Overview

We expect launch of the rover and its delivery to the lunar surface by NASA on a CLPS lander (or equivalent) in 2026, to conduct its mission within one lunar day (approximately 14 Earth days). The mission will involve acquiring lunar regolith from the surface of the moon and delivering it to NASA's ISRU facility for scientific purposes. The rover will demonstrate a range of foundation services skills and competencies that will leverage Australian-made capabilities from a range of industry sectors. The mission involves several phases including pre-launch, launch, cruise and orbit, landing, post-landing egress and rover on surface phases.

Pre-launch phase

These are all activities prior to launch including design, development, testing, integration and delivery to the lander. During pre-launch phase, we will select two Australian industry consortiums to undertake the mission during stage 1 and then down select to one consortium for stage 2. Note – you will need to apply for the relevant licences during this phase of the program.

NASA will start procurement of the lander during this phase. The Agency, with the successful grantee(s), will provide key information to support lander procurement. NASA will also specify and confirm the landing site during pre-launch phase, however we expect it will be at the south pole of the moon.

Development of the ISRU facility will be ongoing and the specifics of its design, including interface, will iterate throughout the pre-launch phase.

We expect delivery of the rover and support equipment to NASA approximately 8-10 months prior to launch, to allow the lander to conduct pre-launch checks.

You will ensure the rover can undertake the mission while surviving the predicted lunar environment and interfacing with both the lander and ISRU facility. We expect this development process will be quite iterative between all parties while following the standard space mission life-cycle process.

Launch

Launch phase includes all activities during the launch of the lander and rover. Launch will be demanding on the rover and lander, which need to be able to survive this phase. Typically, all the launcher negotiations will be done via the lander provider, thus the Australian industry consortium would not need to negotiate this.

Cruise and orbit:

Once the lander deploys from the launcher, the lander will continue on route to the moon. The environment of space is extreme with significant temperature variations, hard vacuum and a significant level of radiation. Cruise and orbit phase can be anywhere from 7 to 60 days in duration, but it is likely to take 8 to 14 days (depending on the lander chosen). Various other payloads will be on the lander, a few of which may be deployed to enter a lunar orbit.

Landing:

Landing phase includes all activities associated with the landing of the lander on the surface of the moon. We expect the landing site will be the south pole of the moon, however NASA will specify the potential location during the pre-launch phase.

Post-Landing:

Once the lander has touched down on the surface of the moon, payloads (including the rover) will receive a go-ahead to start preparation for deployment. Preparation typically includes checks of rover status especially the electrical and communication systems. Power and communications of the rover in this phase should primarily be from the Lander. We expect post-landing phase to be short, potentially no longer than 1 day.

Egress:

Once the rover receives the green light to deploy, the rover deployment system will deploy and bring the rover to the surface of the Moon.

Rover on Surface:

While on the surface of the moon, the rover has one primary task, to delivery lunar regolith to the ISRU facility. To achieve this, the rover will potentially need to survey the environment, find an acquisition site, acquire the regolith, transport it to the regolith delivery zone and deliver it to the ISRU facility. The rover will repeat this delivery task until the requirements are met. Through these repetitions, we expect the rover will learn from its environment and become more autonomous, to demonstrate its ability to conduct foundation services. The applicant may want to conduct other foundation services tasks, technology demonstrations or scientific investigations (but not at expense of the primary task). Other tasks could include:

- repeated loading and unloading of lunar regolith
- constructing regolith stores or stockpiles
- conducting remote asset inspection
- performing surface preparation - terrain assessment, shaping and/or rock clearing.
- end of life task into the permanently shadowed regions.

The rover will finally lay to rest when the mission is complete and the sun sets on its location.

Appendix C. Mission Requirements

All requirements are indicative. We will confirm requirements throughout the mission in consultation with you and NASA

C.1 Regolith provision

Functional requirements

Req ID	TBR-MIS-1110	
The Rover shall acquire lunar regolith from the target acquisition site on the lunar surface.		Verification Method: Test
		Verification Level: System

Req ID	TBR-MIS-1120	
The Rover shall transport the acquired lunar regolith from the target acquisition site to the ISRU regolith deposit location.		Verification Method: Test
		Verification Level: System

Req ID	TBR-MIS-1130	
The Rover shall deliver the acquired lunar regolith to the Regolith Transfer Mechanism (RTM).		Verification Method: Test
		Verification Level: System

Performance requirements

Req ID	TBR-MIS-1210									
The Rover shall deliver the following regolith amounts in the specified timeframe, as per Table 3, to the deposit zone.		Verification Method: Test								
		Verification Level: System								
<p>Table 3: Amount Lunar regolith delivered to the Rover Deposit Zone (RDZ) during the mission timeframe</p> <table border="1"> <thead> <tr> <th>Days after rover deployment from lander</th> <th>5 days (TBC)</th> <th>8 days (TBC)</th> <th>Total</th> </tr> </thead> <tbody> <tr> <td>Amount of lunar regolith</td> <td>1kg (TBC)</td> <td>1kg (TBC)</td> <td>2kg (TBC)</td> </tr> </tbody> </table>			Days after rover deployment from lander	5 days (TBC)	8 days (TBC)	Total	Amount of lunar regolith	1kg (TBC)	1kg (TBC)	2kg (TBC)
Days after rover deployment from lander	5 days (TBC)	8 days (TBC)	Total							
Amount of lunar regolith	1kg (TBC)	1kg (TBC)	2kg (TBC)							

Req ID	TBR-MIS-1220	
The Rover shall deliver regolith at minimum of 100g/day (24hr) (TBC) to the Rover Deposit Zone (RDZ).		Verification Method: Test
		Verification Level: System

Req ID	TBR-MIS-1230	
The Rover shall deliver regolith at a maximum of 1kg/hour (TBC) for a maximum of an hour (TBC) to the Rover Deposit Zone (RDZ).		Verification Method: Test
		Verification Level: System

Regolith properties

Requirement ID	TBR-MIS-1310	
The delivered lunar regolith shall contain particles no larger than 100 cm ³ (TBC)	Verification Method: Test	
	Verification Level: System	
Requirement ID	TBR-MIS-1320	
The delivered lunar regolith shall not contain particles with any single dimension greater than 5 cm (TBC)	Verification Method: Test	
	Verification Level: System	

Regolith Minerology

TBD

C.2 Foundation Services Demonstration

Table 4: Description of each Delivery Operation Tasks

Delivery Operation Task	Description
Survey	Based on pre-mission, lander and rover sensor data map and assess the Regolith Acquisition Zone for prospective sites for collection of regolith samples.
Mobility	Move to a (human) selected regolith Acquisition site
Acquisition	Using the sample acquisition device obtain a sample of regolith
Transfer	The Rover transports the acquired lunar regolith from the target acquisition site to the ISRU regolith deposit location
Delivery	The rover deposits the regolith sample at ISRU regolith deposit location

Table 5: Description of each Rover Autonomy Level

Rover Autonomy Level (RAL)	Description
0	Local direct control (Zero Autonomy)
1	Teleoperation Teleoperation is defined here as direct control of the rover by a remote-human at long distances in the midst of potential communication lag and packet loss. The rover sends the information of its current surroundings using its on-board sensors in a compact representation to the remote-human from

	<p>which they infer the situational awareness of the rover. The remote-human decides on a suitable plan of action, converts the plan of action into lower-level commands which are transmitted to the rover for local execution.</p> <p>An example of teleoperation would be a remote human, performing joystick control of a local rover which is sending back a video stream of sufficient resolution using its onboard camera. Thereby enabling the remote human to have a sufficient grasp of the situational awareness in order to decide on a set of directional and speed commands which are transmitted to the rover. The rover then executes them as they are received in sequence.</p>
2	<p>Assisted Tele-operation</p> <p>Assisted tele-operation is defined here as the rover having the ability to perform local corrections to the remote-human commanded actions (as above) in order to mitigate the effects of command lag or lack of situational awareness due to limited or time-delayed sensing.</p> <p>The rover sends the information about the local environment to the remote human and the human makes the decisions and plans the set of actions. The information transmitted by the rover and the human operator is the same as above.</p> <p>An example would be the rover correcting its course appropriately to avoid bumping into a boulder, lander or interpolating between the commands in the case of a communication lag or packet loss.</p>
3	<p>Assisted Tele-command</p> <p>Tele-command, a semi-autonomous capability, is defined here as the ability of remote-humans to give higher-level instructions and the rover performing such instructions autonomously. The rover has sufficient autonomy to perform a long string of actions, fully autonomously, to meet the requirements of the higher-level command using its onboard sensors and onboard computation for making local decisions and execution commands.</p> <p>The remote-human receives the information about the local environment in a representative form as computed by the rover in low bandwidth and at a low frequency rate. The remote-human uses this information to garner sufficient situational awareness to make the required higher-level decisions.</p> <p>An example of this is where the remote humans give a set of waypoints for the rover to navigate, the location of waypoints and their relative distances are decided by the human based on the complexity of actions being performed and the terrain challenges. The rover is able to completely autonomously perform navigation between these waypoints using its onboard sensors and report failure if unable to execute such paths.</p>
4	<p>Decision Support</p> <p>In this semi-autonomous mode, the human gives a higher-level instruction and the rover using its local autonomy is able to select the best set of actions to achieve the higher-level goals fully autonomous using its local sensors to perform local situational awareness and hazard detection.</p>

	<p>The rover sends back sufficient information, but not all the sensor stream to provide enough contextual information for the remote-human to perform an assessment of the situation, and provide or modify higher level commands based on such an information.</p> <p>An example would be where a previously unknown untraversable patch is detected and circumvented by the rover using its onboard sensors without human-in-the-loop support and this information is provided to the remote-human for future command generation.</p>
5	<p>Supervisory Control (offline planning)</p> <p>In this autonomous mode (supervisory mode) the rover performs all parts of the operation, e.g., sensing the environment, planning suitable actions according to the mission directive, and performing safe efficient actions, while only requesting information and assistance from the remote-human when required. In this autonomy level, the rover only executes the full plan of action once approved by the remote-human. The remote-human is able to override and modify portions of the plan of action, however, most of the time, the rover performs missions autonomously.</p> <p>An example of this autonomy level would be where the rover identifies suitable pathways to regolith acquisition sites and based on its local situational awareness, plans, selects and executes the best path towards the acquisition site post remote-human evaluation and approval.</p>
6	<p>Fully Autonomous (online planning)</p> <p>In a fully autonomous mode, the rover performs all parts of the operation, e.g., sensing the environment, planning the next set of actions, and executing the action depending on its internal and external circumstances without human-in-the-loop input.</p> <p>The remote human is able to truncate the actions remotely by a kill-switch but does so only in case of any perception of danger.</p> <p>An example would be where the rover changes the mode of operations in real time without input from the human to better suit the energy requirements of the task at hand and estimation of the changing situational awareness.</p>

Functional requirements

Req ID	TBR-MIS-2110	
The Rover shall conduct a minimum of 3 (TBC) delivery operation tasks (as defined in Table 4) at RAL3 (TBC) (as defined in Table 5)	Verification Method: Test	
	Verification Level: System	

Req ID	TBR-MIS-2120	
The Rover shall conduct a minimum of 1 (TBC) delivery operation task (as defined in Table 4) at RAL5 (TBC) (as defined in Table 5)	Verification Method: Test	
	Verification Level: System	

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Req ID	TBR-MIS-2130	
The Rover shall conduct a minimum of 1 (TBC) delivery operation tasks (as defined in Table 4) at RAL3 (TBC) (as defined in Table 5) a minimum of 5 times	Verification Method: Test	
	Verification Level: System	

Performance requirements

TBD

C.3 Mission assurance

Lifetime

Req ID	TBR-MIS-3110	
The rover shall be operate for a minimum of one standard lunar daylight period (354 hours) (TBC)	Verification Method: Test	
	Verification Level: System	

Loss of Mission

Req ID	TBR-MIS-3210	
The rover shall have a probability of loss of mission less than 0.05 once from the time the lander has successfully landed on the lunar surface.	Verification Method: Analysis	
	Verification Level: System	

Planetary protection requirements

To be generated by the applicant.

Safety

Req ID	TBR-MIS-3310	
The rover shall operate as per required zone behaviour in the defined operational zones (as per ICD Table 8)	Verification Method: Test	
	Verification Level: System	

Req ID	TBR-MIS-3320	
The rover shall cause no damage to the lander or the ISRU facility at any time during the project life cycle	Verification Method: Test	
	Verification Level: System	

Req ID	TBR-MIS-3330	
The rover shall cause no damage, to any payloads provided by the lander any time during the project life cycle	Verification Method: Test	
	Verification Level: System	

C.4 Interface requirements

Lander

Req ID	TBR-MIS-4110	
The rover shall interface to the procured CLPS lander as per the ICD (Appendix D) for all mechanical, electrical and communications interfaces.		Verification Method: Test
		Verification Level: System

ISRU Facility

Req ID	TBR-MIS-4210	
The rover shall interface to the ISRU facility as per the ICD (Appendix D) for all mechanical, electrical and communications purposes		Verification Method: Test
		Verification Level: System

C.5 Environmental requirements

To be generated and refined by the applicant. The Agency recommends that you refer to the [Design Specification for Natural Environments \(DSNE\)](#) for information.

Appendix D. Interface control document

All requirements are indicative and shall be stabilised throughout the project in consultation with NASA and the grantee

Table 6: Relevant phases with respect to Rover mechanical, electrical and communication interface definitions.

Phase	Description
Pre-launch	All activates prior to launch including validation, integration and commissioning.
Launch	Launch of the lander and rover from Earth into space
Cruise and Orbit	The lander is cruising to the moon and entering a lunar orbit
Landing	Entry, descent and landing on the surface of the moon(EDL)
Post-landing	Rover in lander on lunar surface (after landing and prior to egress)
Egress	Rover transition from Lander to the lunar surface
Rover on Surface	All Rover lunar surface activity including regolith provision and foundation service demonstrations

D.1 Lander Interface

General

Landing Site

Req ID	TBR-FSR-LAN-GEN-1110	
The rover shall land at a high-latitude, lunar polar site (TBD)	Verification Method: Test	Verification Level: System

Contamination

Req ID	TBR-FSR-LAN-GEN-1120	
The Rover shall comply with the following contamination standards from the lander TBD	Verification Method: Test	Verification Level: System

Post-delivery handling

Req ID	TBR-FSR-LAN-GEN-1130	
The Rover shall comply with the Post-delivery handling procedures from the lander TBD	Verification Method: Test	Verification Level: System

Post-installation instructions

Req ID	TBR-FSR-LAN-GEN-1140	
		Verification Method: Test

The Rover shall comply with the post-installation instructions from the lander TBD	Verification Level: System
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Mechanical Interface

General

Mass

Req ID	TBR-FSR-LAN-MEC-2110	
The rover mass (including the deployment system) shall not exceed 20 kg (TBC)		Verification Method: Test
		Verification Level: System

Stowed Rover Volume

Req ID	TBR-FSR-LAN-MEC-2120	
The stowed rover dimensions (including the deployment system) shall not exceed 300mm x 500mm x 500 mm (TBC) (Height x Width x Length), (height dimension is perpendicular to lunar surface)		Verification Method: Test
		Verification Level: System

Req ID	TBR-FSR-LAN-MEC-2130	
The Rover shall mechanically connect to the payload connector as per Figure TBD		Verification Method: Test
		Verification Level: System

Req ID	TBR-FSR-LAN-MEC-2140	
The Rover shall mechanically connect to the lander as per Figure TBD		Verification Method: Test
		Verification Level: System

Mechanical Loads

Req ID	TBR-FSR-LAN-MEC-2150	
The Rover shall survive the following mechanical loads (TBD) <ul style="list-style-type: none"> • Quasi-static • Sine Vibration • Random Vibration • Shock 		Verification Method: Test
		Verification Level: System

Mounting location

Req ID	TBR-FSR-LAN-MEC-2160	
The Rover shall comply with the lander mounting locations as per TBD		Verification Method: Test
		Verification Level: System

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Centre of Gravity

Req ID	TBR-FSR-LAN-MEC-2170	
The rover (including the deployment system) centre of gravity shall not deviate be more than 50mm (TBC) from the geometric centre of the specified stowed volume while in a stowed configuration.	Verification Method: Test	
	Verification Level: System	
	Verification Level: System	

Thermal

Req ID	TBR-FSR-LAN-MEC-2180	
The Rover shall survive the following Thermal environment from the lander TBD	Verification Method: Test	

Egress Phase

Deployment access to lunar surface

Req ID	TBR-FSR-LAN-MEC-2210	
The rover shall have an unencumbered volume of TBD cm ³ immediately adjacent to the Lander to provide access to the lunar surface from the Lander for egress.	Verification Method: Test	
	Verification Level: System	

Height from lunar surface

Req ID	TBR-FSR-LAN-MEC-2220	
The stowed rover volume shall be no further than 0.8m (TBC) from the lunar surface (Reference Figure 2)	Verification Method: Test	
	Verification Level: System	

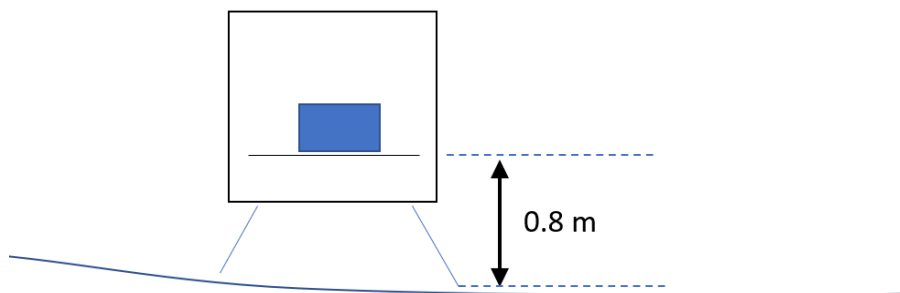


Figure 2: Side-view showing the lander and maximum rover payload ground clearance (values and figure TBC)

Electrical Interface

General

Req ID	TBR-FSR-LAN-ELE-3110	
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The Rover shall electrically connect to the payload connector as stated in TBD	Verification Method: Test
	Verification Level: System

Req ID	TBR-FSR-LAN-ELE-3120
The Rover shall have access to 28 ± 5% VDC (TBC)	Verification Method: Test
	Verification Level: System

Req ID	TBR-FSR-LAN-ELE-3130														
The Rover shall have the following power provided during the following phases (Table 7).	Verification Method: Test														
	Verification Level: System														
<p>Table 7: Current level available during the phases</p> <table border="1"> <thead> <tr> <th>Phase</th> <th>Nominal Power (W) (TBC)</th> </tr> </thead> <tbody> <tr> <td>Launch</td> <td>0 W</td> </tr> <tr> <td>Cruise and orbit</td> <td>20 W</td> </tr> <tr> <td>Landing</td> <td>0 W</td> </tr> <tr> <td>Post- Landing</td> <td>20 W</td> </tr> <tr> <td>Egress</td> <td>20 W</td> </tr> <tr> <td>Rover on Surface</td> <td>20 W</td> </tr> </tbody> </table>		Phase	Nominal Power (W) (TBC)	Launch	0 W	Cruise and orbit	20 W	Landing	0 W	Post- Landing	20 W	Egress	20 W	Rover on Surface	20 W
Phase	Nominal Power (W) (TBC)														
Launch	0 W														
Cruise and orbit	20 W														
Landing	0 W														
Post- Landing	20 W														
Egress	20 W														
Rover on Surface	20 W														

Req ID	TBR-FSR-LAN-ELE-3140
The Rover shall comply with the following time synchronizations TBD	Verification Method: Test
	Verification Level: System

Communication Interface

General

Req ID	TBR-FSR-LAN-COM-4110
The Rover shall communicate to the lander via the wired interface TBD	Verification Method: Test
	Verification Level: System

Req ID	TBR-FSR-LAN-COM-4120
The Rover shall communicate to the lander via the wireless interface TBD	Verification Method: Test
	Verification Level: System

Rover on surface phase

Req ID	TBR-FSR-LAN-COM-4210	
The rover shall operate within a maximum downlink data volume of 100 Gbits (TBC) for a single lunar day (354 hours)		Verification Method: Test
		Verification Level: System

Req ID	TBR-FSR-LAN-COM-4220	
The rover shall operate within a maximum uplink data volume of 10 Gbits (TBC) for a single lunar day (354 hours).		Verification Method: Test
		Verification Level: System

Operational Interface

Launch Phase

Req ID	TBR-FSR-LAN-OPS-5110	
The Rover shall be inhibited during the launch phase (TBC)		Verification Method: Test
		Verification Level: System

Req ID	TBR-FSR-LAN-OPS-5120	
The Rover shall comply to the lander inhibit requirements TBD		Verification Method: Test
		Verification Level: System

Post-Landing Phase

Req ID	TBR-FSR-LAN-OPS-5210	
The Rover shall be capable of landing on the surface of the moon with a minimum of 10 days (240hrs) (TBC) of sunlight left in the lunar day		Verification Method: Test
		Verification Level: System

Egress Phase

Req ID	TBR-FSR-LAN-OPS-5310	
The Rover shall be capable of being deployed no later than 1 day (24hrs) after landing		Verification Method: Test
		Verification Level: System

D.2 ISRU Facility Interface

All interaction with the ISRU facility will be conducted in the Rover on surface phase

General

Mission Operational Zones

Table 8: Definition of the Rover Mission Operational Zones

Zone	Zone Name	Zone Description (TBC)	Required Rover Behaviour in Zone (TBC)	Rationale
A	Rover Exclusion Zone (REZ)	Rover no-go exclusion zone Distance < 0.2m (TBC) between rover and lander/ISRU facility	Rover shall not enter REZ under any circumstances	Avoid Rover collision/impact or mechanical entanglement with Lander and ISRU systems
B	Rover Interaction Zone (RIZ)	Rover in near proximity to Lander, ISRU facility or RDZ. Distance < 5 m (TBC) between rover and the lander and/or ISRU facility	Rover shall not enter RIZ until permission received to enter RIZ. Rover will operate under constrained motion and orientation (TBD) within the RIZ. Rover shall follow a defined approach path (TBD) within the RIZ.	Minimise potential for collision/impact with Lander and ISRU systems (mechanical and dust)
C	Regolith Deposit Zone (RDZ)	Location where the Rover deposits the acquired regolith. This zone is within the RIZ (TBC). The RDZ is defined by the ISRU facility transfer requirements (TBD).	Rover will operate under constrained motion, orientation and approach path (TBD) within the RDZ.	Ensure safe and effective transfer of regolith from the Rover to ISRU facility
D	Solar Occlusion Zone (SOZ)	Lander solar panel illumination path.	Rover shall not stop in this zone.	Minimise any shadowing on Lander solar panels by Rover occlusion of sunlight
E	Field Activity Zone (FAZ)	> 5 m (TBC) between Rover and Lander/ISRU facility	Rover may operate with nominal motion and activity (e.g., maximum Rover speed, use of acquisition tool)	Not proximal to ISRU or Lander systems, minimal potential impact from Rover

				operations (e.g., dust generation)
F	Regolith Acquisition Zone (RAZ)	Regions identified for regolith acquisition It is possible for a RAZ to be located within the RIZ.	Rover may acquire regolith. Rover must not generate dust from regolith acquisition tool that impacts Lander and ISRU systems	Ensure rover does not generate dust from regolith acquisition that may impact Lander and ISRU systems

An example of the mission operational zones on the lunar surface is shown in Figure 3

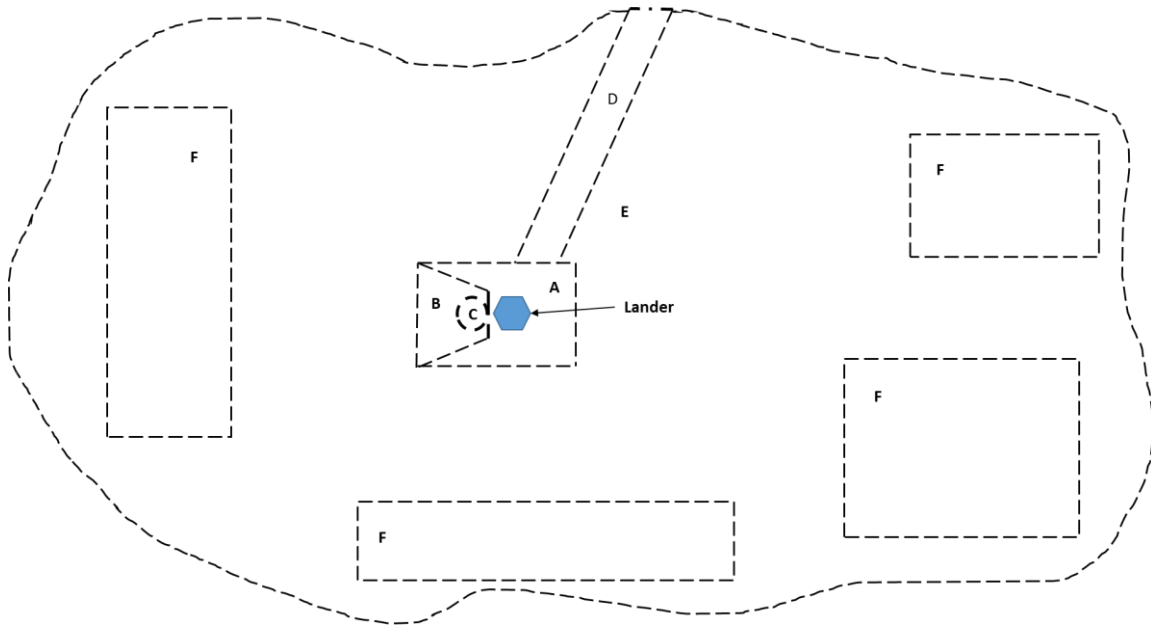


Figure 3: An example diagrammatic representation of Mission Operational Zones on the lunar surface.

Mechanical, Electrical & Communication Interface

Req ID	TBR-FSR-ISR-GEN-1110	
The Regolith Transfer Mechanism (RTM) shall be in the Regolith Deposit Zone (RDZ)	Verification Method: Test	
	Verification Level: System	

Req ID	TBR-FSR-ISR-GEN-1120	
The Regolith Transfer Mechanism shall one of the following regolith transfer options indicated in Table 9 (TBD)	Verification Method: Test	
	Verification Level: System	

Table 9: ISRU facility regolith transfer options located in the Zone C - RDZ

Regolith Transfer Mechanism	Description
Stockpile	Rover to deposit acquired regolith to a defined location on the lunar surface
Flat Tray	Rover to deposit acquired regolith onto an ISRU facility transfer mechanism consisting of a flat tray of dimensions not exceeding 300mm x 300mm at a height above the lunar surface not exceeding 300mm.
Hopper	Rover to deposit acquired regolith into an ISRU facility transfer mechanism consisting of a hopper chute of dimensions not exceeding 300mm x 300mm at a height above the lunar surface not exceeding 300mm.

Acquisition Site

Req ID	TBR-FSR-ISR-GEN-1210	
The acquisition site shall be in the Zone E - Regolith Acquisition Zone (RAZ)	Verification Method: Test	
	Verification Level: System	

Operational Interface

Mission Operational Zones

Req ID	TBR-FSR-ISR-OPS-2110	
The Rover shall comply with the required zone behaviour for Mission Operation Zone A (details in Table 8)	Verification Method: Test	
	Verification level: System	

Req ID	TBR-FSR-ISR-OPS-2120	
The Rover shall comply with the required zone behaviour for Mission Operation Zone B (details in Table 8)	Verification Method: Test	
	Verification level: System	

Req ID	TBR-FSR-ISR-OPS-2130	
The Rover shall comply with the required zone behaviour for Mission Operation Zone C (details in Table 8)	Verification Method: Test	
	Verification level: System	

Req ID	TBR-FSR-ISR-OPS-2140	
The Rover shall comply with the required zone behaviour for Mission Operation Zone D (details in Table 8)	Verification Method: Test	
	Verification level: System	

Req ID	TBR-FSR-ISR-OPS-2150	
The Rover shall comply with the required zone behaviour for Mission Operation Zone E (details in Table 8)	Verification Method: Test	
	Verification level: System	

Req ID	TBR-FSR-ISR-OPS-2160	
The Rover shall comply with the required zone behaviour for Mission Operation Zone F (details in Table 8)	Verification Method: Test	
	Verification level: System	

Req ID	TBR-FSR-ISR-OPS-2170	
The Rover shall comply with the required zone behaviour for Mission Operation Zone G (details in Table 8)	Verification Method: Test	
	Verification level: System	

