



“THE AQUALUNAR CHALLENGE”

APPLICANT GUIDE



Government
of Canada

Gouvernement
du Canada

Canada



**Canadian Space Agency
& Impact Canada**

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This Applicant Guide will provide you with the information you will need to determine if you are Eligible to apply for the Aqualunar Challenge (“The Challenge”) and with the necessary details to support you in completing your Stage 1 application.

The Challenge is stage-gated, with three total stages. Successful Applicants from Stage 1 will receive further information and instructions for Stage 2 once they are notified of their successful completion of Stage 1.

1 Summary

The Aqualunar Challenge is calling innovators to create innovative technologies for use on the Moon to purify lunar water. These technologies may also contribute to novel water purification technologies here on Earth.

The Challenge is a project of international collaboration between the United Kingdom and Canada, with joint but distinct tracks in the UK and Canada. This document relates to the Canadian track of the Challenge.

In Canada, the Challenge is organized and delivered by the Canadian Space Agency (CSA) in partnership with the Privy Council Office’s Impact Canada program, situated within the Impact and Innovation Unit (IIU).

In the UK, the Aqualunar Challenge is delivered by Challenge Works on behalf of the UK Space Agency. If you are a UK Applicant looking to apply to the UK- track of the Aqualunar Challenge, learn more and apply here: aqualunarchallenge.org.uk/.

Key Dates for Stage 1 are as follows:

January 17th, 2024	Challenge launch
April 08th, 2024	Application deadline
May 2024	Jury Review
Summer 2024	Up to 8 semi-finalists announced

2 Introduction

On October 9th 2009, a two-ton Atlas Centaur rocket body, which is a part of the Lunar CRater Observation and Sensing Satellite (LCROSS), impacted a permanently shadowed region (PSR) of the Cabeus crater on the Moon. This mission aimed to obtain evidence of water presence on Earth's closest celestial body by observing the plume of debris (vapor, fine dust, heavy material) that occurred when the rocket body impacted the crater. The mission was successful in finding evidence for the presence of water in the PSR. While the mission was not specifically designed as a basis for in-situ resource utilization (ISRU), it did provide valuable data that could be relevant to future ISRU efforts on the Moon¹.

ISRU refers to the process of collecting and utilizing locally available resources in space, for space. It is expected to play a significant role in enabling more ambitious and sustainable space exploration missions^{2,3}. By harnessing local resources, ISRU capabilities reduce the need for resupply missions.

Among all resources, water is of crucial interest for several reasons:

- **Life Support:** Water is essential for sustaining human life. It can be used for drinking, food preparation, hygiene, and as a source of oxygen.
- **Propellant Production:** Water can be split into hydrogen and oxygen through electrolysis and these gases can serve as propellants for rockets, providing the necessary thrust for space travel. Producing propellant in-situ reduces the need to transport large quantities of fuel from Earth, making space missions more cost-effective and enabling deep space exploration.

While LCROSS did reveal the presence of water on the Moon, the analysis of the ejecta also revealed multiple volatile compounds that could represent water contaminants preventing its use for future space missions. Water in its purified form is a critical resource and enabling its use in-situ could greatly benefit long-term sustained human presence of the Moon and exploration of deep space.

Lunar purification of in-situ water has never been demonstrated successfully on the lunar surface and there are multiple challenges that exist in a space-based environment that current terrestrial-based purification technologies are unable to meet. For example, the abrasive nature of lunar regolith and the constraining realities of launching systems into space including: the

¹ Colaprete et al (2010). Detection of Water in the LCROSS Ejecta Plume. Science, Vol 330: 6003, pp. 463-468. Retrieved from: <https://www.science.org/doi/10.1126/science.1186986>

² NASA (2023). NASA's Moon to Mars Strategy and Objectives Development. Retrieved from: [m2m_strategy_and_objectives_development.pdf \(nasa.gov\)](https://www.nasa.gov/m2m_strategy_and_objectives_development.pdf)

³ International Space Exploration Coordination Group (2022). Global Exploration Roadmap Supplement. Retrieved from: [GER_Supplement_Update_2022.pdf \(globalspaceexploration.org\)](https://www.globalspaceexploration.org/GER_Supplement_Update_2022.pdf)

lower gravity present on the lunar surface, smaller volume and mass requirements, limited power and other inputs, and many others.

Using the LCROSS data as a reference for possible contaminants found in lunar regolith, water purification technologies could have a substantial impact on the future of prolonged space exploration on the lunar surface and beyond.

2.1 Context

2.1.1 General Context

ISRU is a capability that includes resource assessment, preparation, processing, extraction and in-situ transportation, manufacturing, and construction. Current plans target the lunar South Pole to establish ISRU activities, including the extraction, and purification of in-situ lunar water-ice³. Lunar water purification technologies will need to be included in the broader lunar ISRU architecture, whether as a subsystem of a future ISRU plant, a large rover, or as a payload on a lunar lander. At present, there are various capability and technological gaps that must be addressed for successful ISRU activities on the lunar surface. The International Space Exploration Coordination Group (ISECG) has identified technological gaps that must be addressed to complete future ISRU activities and missions on the lunar surface⁴.

2.1.2 Presence and Content of Water-Ice on the Lunar Surface: Current Knowledge

The presence of water-ice on the lunar surface has been indicated by multiple missions, including the Clementine, Moon Mineralogy Mapper (M3) the Stratospheric Observatory for Infrared Astronomy (SOFIA), and others^{5, 6}. Potential lunar water sources include surface frost, pyroclastic deposits, deep bulk water and shallow bulk water. Shallow bulk water (up to 5 wt%) would be the primary target for ISRU activities on the lunar surface, of which there are four data

⁴ ISECG (2021). In-Situ Resource Utilization Gap Assessment Report. Retrieved from: <https://www.globalspaceexploration.org/wordpress/wp-content/uploads/2021/04/ISECG-ISRU-Technology-Gap-Assessment-Report-Apr-2021.pdf>

⁵ NASA Jet Propulsion Laboratory: California Institute of Technology (2013). "NASA-Funded Scientists Detect Water on Moon's Surface that Hints at Water Below". Retrieved from: <https://www.jpl.nasa.gov/news/nasa-funded-scientists-detect-water-on-moons-surface-that-hints-at-water-below>

⁶ Li and Milliken, (2017). Water on the surface of the Moon as seen by the Moon Mineralogy Mapper: Distribution, abundance, and origins. Retrieved from: <https://www.science.org/doi/10.1126/sciadv.1701471>

sets: LCROSS, Chandrayaan-1, Lunar Reconnaissance Orbiter (LRO), and Lunar Prospector (LP)⁷.

The LCROSS mission provided key insights into the presence of water-ice and other volatiles on the lunar surface in the Cabeus crater and is the single “ground truth” point data set⁸. The LCROSS mission found the several volatiles and minerals present in some capacity in lunar regolith found in Table 1⁹. Estimated water weight percentages have varied significantly in the literature for LCROSS measurements¹⁰.

Table 1.

Molecule	% Weight
Water (H ₂ O)	5.5
Hydrogen (H ₂)	1.4
Hydrogen Sulfide (H ₂ S)	1.74
Ammonia (NH ₃)	0.31
Hydroxyl (OH)	0
Carbon Monoxide (CO)	0.7
Ethylene (C ₂ H ₄)	0.27

⁷ Kleinhenz, Julie et al (2020). Lunar Water ISRU Measurement Study (LWIMS): Establishing a Measurement Plan for Identification and Characterization of a Water Reserve. Retrieved from: https://www.lpi.usra.edu/lunar/strategies/KleinhenzEtAl_NASA-TM-20205008626_ISRU%20MeasurementStudy.pdf

⁸ Kleinhenz, Julie (2020). Known PSR/Volatile Properties. John Hopkins University ISRU Supply and Demand Workshop. Retrieved from : <https://www.youtube.com/watch?v=-bt4t65kKH8>

⁹ Gladstone et al (2010). LRO-LAMP Observations of the LCROSS Impact Plume Retrieved from: [LRO-LAMP Observations of the LCROSS Impact Plume | Science](#)

¹⁰ Li et al (2018). Direct evidence of surface exposed water ice in the lunar polar regions. Retrieved from: [Direct evidence of surface exposed water ice in the lunar polar regions \(pnas.org\)](#)

Carbon Dioxide (CO ₂)	0.32
Methanol (CH ₃ OH)	0.15
Methane (CH ₄)	0.03
Sulfur Dioxide (SO ₂)	0.64
Calcium (CA)	0.2
Mercury (Hg)	0.24
Magnesium (Mg)	0.4
Sodium (NA)	-

2.1.3 Presence and Content of Water-Ice on the Lunar Surface: Future

NASA's Volatiles Investigating Polar Exploration Rover (VIPER) will land on the South Pole of the Moon in late 2024¹¹. VIPER has three spectrometers: neutron, infrared and mass, and is equipped with a drill that can dig up to one meter deep to provide data on the nature, amount, and accessibility of water on the lunar poles and in PSRs¹². The VIPER mission aims to spend at least 100 days exploring the lunar surface to collect this data and information. If successful, VIPER will provide key insight into the distribution of water-ice on the Moon, as well as its history and origin through resource mapping.

2.1.4 Possible Water Treatment Families to be adapted for Novel Lunar Water Purification Technologies

Current terrestrial water treatment and purification technologies could possibly be adapted to support lunar water purification on the Moon. The following is a non-exhaustive list of water treatment families that could be adapted for lunar surface water purification:

¹¹ NASA (2023). VIPER Mission Overview. Retrieved from: <https://www.nasa.gov/viper/overview#KeyFacts>

¹² Planetary Society (2023). VIPER Mission. Retrieved from: <https://www.planetary.org/space-missions/viper>

- Filtration¹³: This could include micro filtration, ultra-filtration, carbon filters, greensand filters, or others;
- Reverse Osmosis;
- Degasification;
- Differential Permeation.
- Fractional Distillation/ Sublimation;
- Ion exchange resins;
- Electrodeionization.

2.1.5 Contaminants to be Removed for the Challenge

Of the composition of molecules found in the evidence collected from the LCROSS mission, the following contaminants are relevant for water purification purposes for this Challenge:

- Hydrogen Sulfide (H₂S);
- Ammonia (NH₃);
- Carbon Monoxide (CO);
- Ethylene (C₂H₄);
- Sulfur Dioxide (SO₂);
- Methanol (CH₃OH); and
- Methane (CH₄).

In addition, it should be anticipated that there is remaining solid regolith particle from extraction that will also need to be removed.

¹³ Center for Disease Control (2008). Household Water Treatment. Retrieved from: https://www.cdc.gov/healthywater/pdf/drinking/Household_Water_Treatment.pdf

3 Challenge Prize Information

3.1 Problem Statement

With humankind returning to the Moon later this decade, purifying the water that exists in lunar regolith (soil) is critical to enabling more ambitious space missions. Using lunar water-as drinking water, to grow food, to create oxygen and to split into hydrogen and oxygen for rocket fuel- is a key enabler for supporting future deep space exploration.

Data suggests that large quantities of water-ice may exist in permanently shadowed regions near the lunar south pole. But this water is not pure, with a number of contaminants preventing its use unless it is purified.

3.2 Challenge Statement

The Aqualunar Challenge is calling innovators to create innovative technologies for use on the Moon to purify lunar water. These technologies may also contribute to novel water purification technologies here on Earth.

This Applicant Guide (“the Guide”) will inform the development of your Stage 1 application. Applicants are required to comply with this Guide and all applicable legislation and regulations.

3.3 Stages

The Challenge has a stage-gated structure, with successful Applicants receiving funding at the end of each stage. Selected Applicants from each stage will be invited to participate in the following stage of the Challenge.

Stage 1 - Concept Design

- Applicants will be required to submit an online application, including a concept design (Section 6.2) through the [Impact Canada Platform](#), which provides a description of how their technology meets the Challenge objectives, Mission Scenario, and judging criteria.
- If selected, successful Applicants from Stage 1 will receive further information and details for Stage 2.
- **NOTE:** The launch of Stage 2 is contingent on the determination of enough applications in Stage 1 that demonstrate a viable approach to achieving the Challenge objectives.
- Detailed information for later Stages will be provided prior to the launch of each Stage.

Stage 2 - Proof of Concept

- In Stage 2, Semi-finalists will begin developing components of a prototype based on their concept design (TRL3). Semi-finalists will be expected to submit video footage to demonstrate their system or components of their system and will provide a final report that outlines how their technology meets the judging criteria listed. Lines of evidence to be reviewed as part of this Stage could include: a final report form, virtual demonstration, validation through technical reviewers, and a jury summit.

Stage 3 - Prototype Scaling

In Stage 3, Finalists will be expected to integrate components of their prototype at a minimum TRL of 4+¹⁴. Finalists will be required to submit a final report that outlines how they meet the judging criteria as well as a solution adoption plan for their systems. Lines of evidence to be reviewed could include: a final report form, a virtual or live demonstration, validation through technical reviewers and a jury summit.

3.4 Prize Amounts

Up to \$1M CAD in total will be awarded in grant funding to Canadian semi-finalists (Stage 1), finalists (Stage 2), and grand prize winner (Stage 3).

Table 2.

Stage	Stage duration	Number of winners per stage	Prize amount per winner
Stage 1	4 months	Up to 8 semi-finalists	\$22.5K per semi-finalist
Stage 2	10 months	Up to 4 finalists	\$105K per finalist
Stage 3	10 months	1 grand prize winner	\$400k

3.5 Timeline

It is anticipated that the Challenge will run for a duration of approximately 24 months from the official launch to the announcement of the grand prize winner.

The following are the Challenge milestones:

Table 3.

Stage	Date	Activity
1 - Concept Design	January 17th, 2024	Challenge launch
	April 08th, 2024	Application deadline
	May 2024	Jury Review

¹⁴ NASA: Earth Science Technology Office (2023). Technology Readiness Levels (TRLs). Retrieved from: <https://esto.nasa.gov/trl/>

	Summer 2024	Up to 8 semi-finalists announced
2 - Proof of Concept	June 2024	Stage 2 begins
	January 2025	Stage 2 applications due
	February 2025	Jury Review
	Spring 2025	Up to 4 finalists announced
3 - Prototype Scaling	Spring 2025	Stage 3 Begins
	January 2026	Stage 3 applications due
	February 2026	Jury Review
	Spring 2026	Grand prize winner announced

CSA reserves the right to change any of these above dates at its discretion, and where applicable, CSA will inform Applicants of the date changes and will post them on the Challenge website as soon as possible.

Where dates are provided as deadlines for submissions by Applicants, the time-period for those submissions will close at 11:59 pm (Pacific Time) on the specified date, unless otherwise indicated.

4 Judging Criteria

Applicant technologies will be assessed on the below outlined judging criteria. The categories and subcategories of judging criteria will be consistent throughout the three Stages of the Challenge. It is possible the weighting may change at later Stages in the Challenge.

All Stage 1 Challenge Applicants will generate a concept design for an innovative technology that outlines how it will purify the listed contaminants and must demonstrate potential for future adaptation to the unique constraints of space. The contaminants, constraints and anticipated environment are outlined in the Mission Scenario in Section 5.

Table 4.

Category	Description	Percent of Score Stage 1
Contaminant Removal	To what extent does the technology remove contaminants thought to be present in lunar water?	20%
Appropriateness for Mission Scenario	To what extent is the technology appropriate for operation on the lunar surface, as specified in the Mission Scenario?	20%
Innovation	To what extent is the technology innovative compared to the current state of the art?	12%
Reliability	To what extent does the technology operate reliably?	12%
Solution Adoption Potential	To what extent has the team demonstrated a post-Challenge route to market, adoption and scale for their technology?	12%
Efficiency	To what extent does the technology maximise outputs and minimise inputs?	6%
Resource Recovery	To what extent does the technology recover the contaminants from the lunar water?	6%

Autonomy and Remote Monitoring	To what extent can the technology operate autonomously, without human intervention (including the extent to which it can provide telemetry)?	6%
Capacity to Deliver	To what extent does the team have the expertise to bring the technology forward.	6%
Total		100%

5 Mission Scenario

The Mission Scenario describes the long-term use case that you will be competing for to deliver the best technology to.

During the Challenge, Applicants won't be going to the Moon: you will be creating concept design (in Stage 1) a proof of concept (in Stage 2), then prototypes (Stage 3) of water purification technologies.

We understand that, during the Challenge, Applicants will not develop a technology that is ready to meet all of these constraints. But we are looking for your concept design, and subsequent proof of concept and prototype to take these objectives into account as much as possible.

The Mission Scenario outlines information about the hypothetical environment in which your technology would operate on the Moon. It also outlines the circumstances leading to the acquisition of the water sample you need to purify and what it is expected to contain. The scenario lists environmental factors and technology specifications, which act as constraints and decision points for you to base your design on.

The Mission Scenario is based on a conceivable mission on the lunar surface and represents the ultimate goal for lunar water purification technologies. You won't be expected to have all the assumptions tested but you should consider the implications of these assumptions and factor these into your design.



Mission Scenario

Your team's technology has been ferried to the Moon onboard an uncrewed spacecraft and has touched down near the rim of Shackleton Crater, near the Lunar South Pole. Inside the crater, buried in the regolith (soil) is ice.

There's a large regolith extraction area taking place in the permanently shadowed area of the Shackleton Crater. A separate subsystem is then doing an initial processing of the regolith, leaving dirty ice.

This is primarily frozen H_2O but is also contains varying levels of Hydrogen Sulfide (H_2S); Ammonia (NH_3); Carbon Monoxide (CO); Ethylene (C_2H_4); Sulfur Dioxide (SO_2); Methanol (CH_3OH); and Methane (CH_4) and a small amount of solid regolith particles left over in it.

You can assume that you are located next to this processing operation, or a short distance away from a permanently shadowed area if your process requires it.

Your technology must take this dirty water-ice and reliably produce at least one litre per hour of clean drinking water.

The Lunar conditions you need to take into account include:

- The low and fluctuating temperatures present in your chosen location (within or outside the Shackleton Crater).
- The presence of highly abrasive regolith particles.
- The low gravity on the Moon (1/6th Earth gravity).
- The lack of any atmospheric pressure.
-

In addition, you need to take into account the technical constraints of a lunar lander, including:

- Minimizing power consumption.
- Minimizing physical dimensions.
- Minimizing mass.
- Design for robustness to G forces in launch and landing.
- Robustness to radiation and solar wind.
- There will be no human intervention available to monitor, service or operate this technology.

6 Selection Process

6.1 Eligibility

Eligible Applicants to the Challenge include the following:

- Businesses or other for-profit organizations in Canada;
- Not-for-profit organizations in Canada;
- Indigenous organizations and groups located in Canada;
- Post-secondary/academic institutions located in Canada; and
- Individuals or groups of individuals based in Canada.

Individuals or groups of individuals are encouraged to submit an application to the Challenge, but in order to be Eligible to receive prizes, they will be required to establish a Canadian legal entity (such as a corporation or a not-for-profit organization) capable of entering into binding agreements in Canada.

Applicants may be asked to provide confirmation of legal entity if they are successful at Stage 1 of the Challenge. Confirmation of legal entity can be a copy of the status certificate, incorporation documents, patent letters, or articles of incorporation (as applicable). Note that in order for an Applicant to receive a prize, it must be an Eligible Recipient under the applicable CSA program. This requirement can be completed after submission of the Application but it must be prior to receiving any prizes. Note that the Duly Authorized Representative, if applicable, of the Canadian legal entity will be signing the grant agreement.

Note: UK Applicants must apply to the UK track of the Challenge hosted by the UKSA and Challenge Works.

6.2 How to Apply

Only Canadian applications, submitted through the Impact Canada website via the designated Challenge Application Form, will be accepted. Applications must be submitted through the online form no later than 11:59 Pacific Time on April 08th, 2024.

In order for an application to be considered for the Challenge, Applicants must complete and submit the following documents online by the closing date and time indicated above and on the Impact Canada website.

A complete application package consists of the Challenge Application Form, with the following sections:

Section 1: Applicant details

Section 2: Concept Design

- Design Summary, Concept Design, Design Animation (video, PowerPoint or other multimedia) & Intellectual Property

Section 3: Declaration

Section 4: Survey (optional)

Incomplete applications will not be considered or assessed further.

You will have the option to print your application for your records. If applicable, we encourage that you share this copy with the Duly Authorized Representative of your legal entity.

6.3 Application Form: Section by section description

Section 1: Applicant Details

Section 1 of the Application Form requests basic information on the Applicant and the primary contact applying to compete in the Challenge.

Section 2: Completing the Proposed Technology Section

Section 2 of the Application Form is the main section that will be used by the Judging panel in the assessment process. Below are detailed instructions to help you submit a good quality application based on each judging criteria you will be measured against.

2.0 Design Summary (0%)

Question A: Within a 500-word limit, please provide a summary description of your technology and explain how it will operate to purify lunar water. Focus on how the proposed technology will directly address the Challenge Statement. Applicants are welcome to attach a picture or diagram to aid in explaining your technology.

Question B: Within a 100-word limit, please briefly outline whether you are making any assumptions in your interpretation of the Mission Scenario which are critically important to the design of your technology, for example about the location of your technology in a permanently shadowed region (PSR) or the rim of the crater, or about how your technology has been ferried to the lunar surface?

2.1 Contaminant Removal (20%)

Question: Within a 1000-word limit, please explain how your technology will remove contaminants listed in the Mission Scenario. To what extent will your technology remove these contaminants?

Outline how your proposed technology will remove the listed contaminants. The contaminants are the following: H_2S , NH_3 , CO , C_2H_4 , SO_2 , CH_3OH , CH_4 and traces of regolith particles.

Please format your answer into sub-sections covering all contaminants and put the formula of the contaminants in the titles of each sub-section. If your solution does not affect or remove a contaminant, please state N/A in that section.

Explain what treatment methods your technology will integrate to remove the listed contaminants and explain the extent to which your technology will remove the contaminants.

Where possible, please support your reasoning by referencing the best possible evidence for the effectiveness of your chosen technologies.

2.2 Appropriateness for Mission Scenario (20%)

Question: Within a 500-word limit, please explain how your technology is adapted to the challenging lunar environment, addressing the factors listed in the Mission Scenario such as temperature, pressure, gravity and abrasive regolith particles. *Please also provide the planned technical specifications of your technology, including power, dimensions, and mass.*

Outline its planned robustness to G-forces during launch and landing, as well as its resilience against radiation and solar wind.

Ensure you're explaining to what extent you will deliver on the Mission Scenario. The Mission Scenario should be considered a long-term aspiration that Applicants aim to meet (beyond the timeline of the Challenge).

Where possible, please support your reasoning by referencing the best possible evidence for the effectiveness of your chosen technologies.

2.3 Innovation (12%)

Question: Within a 250-word limit, describe what is innovative (novel, combined or adapted) in your technology compared to current state-of-the-art technologies.

How is your technology different from other technologies that currently exist? Please use clear and simple language when detailing how you have adapted, combined and/or created novel technologies to achieve innovation.

2.4 Reliability (12%)

Question: Within a 250-word limit, please explain what is the optimal level that your technology will be designed to operate at? How long will it consistently operate at this level?

How are you designing your technology to achieve this?

Where possible, please support your reasoning by referencing the best possible evidence for the reliability of your chosen technologies.

2.5 Solution Adoption Potential (12%)

Question: Within a 250-word limit, please provide possible use cases for the technologies you will be developing and why you have chosen these use cases. If there are any terrestrial applications of your technology, please include them here.

2.6 Efficiency (6%)

Question: Within a 250-word limit, explain to what extent your technology will maximise purified water output and minimise inputs of the purification process.

Describe the inputs needed to run your water purification technology. Inputs can include electricity, reagents, equipment and labour, and others, for example.

2.7 Resource Recovery (6%)

Question: Within a 250-word limit, please outline how your technology will both reduce the amount of waste it produces and will recover any by-products created in the water purification process.

Please outline any by-products you expect your technology will produce. How and to what extent do you intend to re-use them?

2.8 Autonomy and Remote Monitoring (6%)

Question: Within a 250-word limit, please explain how your technology will employ remote monitoring and autonomous systems. To what extent could your technology be operated without direct human supervision?

2.9 Capacity to Deliver (6%)

Question: Within a 250-word limit, please explain the expertise required to develop your technology and outline your relevant expertise and/or your strategy for acquiring this expertise.

Outline whether there are gaps in the expertise and how you will address those gaps.

Section 3: Declaration

In this section, you must review and accept the terms and conditions for the Aqualunar Challenge, and review and accept the Consent for Use, Disclosure and Copyright requirements. At any point during the Challenge, CSA may request that consent be given in writing or in a form at its satisfaction.

Section 4: Survey (optional)

This section collects information on your experience with this Challenge, information about your organization, as well as demographic information.

Note that any data collected in the survey will be used strictly for administrative purposes to help Impact Canada understand the effectiveness of challenges, and to improve upon their design in the future. The data collected in this survey will be aggregated and no individual answers will be published. Your answers to this survey will not be used in the assessment process and will not affect your chances of success in this Challenge or any other federal funding application. This information may be shared with other government departments.

7 Information for Stage 1 Semi-Finalists

7.1 Judging Assessment Process and CSA Selection of Winners

All stages of the Challenge involve a judging assessment process of the applications. The judging panel will evaluate the applications using the evaluation criteria set out above.

Further to the judging panel's recommendations, the CSA will select and announce the winners. The CSA's decision will be final and not subject to appeal.

7.2 Prize Distribution

CSA will issue prize payments, by signing grant agreements, to the winning Eligible Recipient(s) within 60 calendar days after the announcement of the winner(s). All terms of payment for the prize will be set out in the grant agreement.

Applicants understand that CSA may only make Prize payments to an Eligible Recipient. If a winning Applicant is not an Eligible Recipient, it will be required to establish a Canadian legal entity (such as a corporation or a not-for-profit organization) capable of entering into binding agreements in Canada as indicated in Section 6.1 (Eligibility Details). CSA will require at a minimum from the Eligible Recipient the same information and consent submitted by the Applicant as part of the Stage 1 Application. Such information and consent must be provided upon request and to CSA's satisfaction. CSA may request additional information as the case may be.

7.3 Grant Agreement

In order to receive the prize payment at each stage, each successful semi-finalist, finalist, and winner will be required to enter into a grant agreement with CSA.

Prior to entering into the grant agreement, all selected Applicants will undergo a due diligence process to confirm that they meet all requirements to receive Aqualunar Challenge grant funding. This may include the review of documentary proof of establishing that the Applicant is a Canadian legal entity capable of entering into legally binding agreements. The grant agreement will be signed by the Duly Authorized Representative of the organization.

7.4 Organizations in Quebec

An organization in Quebec whose operations are partially or fully funded by the province of Quebec may be subject to the *Act respecting the Ministère du Conseil exécutif*, CQLR c M-30.

Under Sections 3.11 and 3.12 of this Act, certain entities/organizations, as defined in the meaning of the Act, such as municipal bodies, school bodies, or public agencies, must obtain authorization from the gouvernement du Québec as indicated by the Act, before signing any funding agreement with the Government of Canada, its departments or agencies, or a federal public agency.

Consequently, any entity that is subject to the Act is responsible for obtaining such authorization before signing any funding agreement with the Government of Canada.

Applicants having operations in Quebec will have to complete, sign and provide the M-30 Supporting Documentation form before signing the grant agreement (if applicable).

7.5 Subsequent Stages

Detailed information for Stages 2 and 3 will be shared with semi-finalists and finalists respectively, prior to the launch of each new Stage.

8 General Terms and Conditions

Applicants to the Challenge agree to the following when submitting their application:

- Applicants agree to comply with all applicable laws.
- Applicants must be able to demonstrate ownership of or permission to use any intellectual property (IP) used in the Challenge and provide necessary permission to CSA for the purpose of administering this Challenge.
- Applicants warrant that all information given in and with the Application Form for this technology is, to the best of their knowledge, complete, true and accurate.
- CSA has the discretion to cancel this Challenge or any part thereof at any time.
- If applicable, CSA may seek translation services for applications, for the purpose of evaluation.

8.1 Privacy

8.1.1 Use and/or Disclosure

The personal and/or business information in, accompanying and/or submitted in support of this application is being collected under the authority of the [Canadian Space Agency Act](#) and, by applying to the Challenge, Applicants agree that such information, may be used by CSA, or disclosed to third parties including other Government Departments, members of the Judging panel and their respective authorized representatives, to:

- Assess and review the eligibility of the Applicant and the technology under the applicable CSA program.
- Verify the accuracy of the information provided in or with the Application Form and additional documents.
- Assess the efficiency of the Challenge model in furthering departmental priorities.
- Assess how well the initiative contributed to CSA program objectives.

By applying, the Applicant consents that the information may also be used for the purposes of: contacting you should additional information be required; validating your credentials; facilitating payment of the grant in the event your application is successful; program administration; and evaluation, reporting, and statistical analysis.

All personal information created, held or collected by the Canadian Space Agency is protected in accordance with the Privacy Act. Information collected on the Aqualunar Application Form is in accordance with the Canadian Space Agency Act. The information you supply will be managed in accordance with Personal Information Bank pertaining to Grants and Contributions - Research Component (CSA PPU 045). More details about the departmental handling of your personal information can be found at www.infosource.gc.ca. You have the right to access your personal information held by the CSA, and to request that it be corrected, by contacting the CSA Access to Information and Privacy office at aiprp-atip@asc-csa.gc.ca. In addition, if you feel that your personal information is being handled inappropriately, you have the right to file a complaint to the Office of the Privacy Commissioner by calling their information centre at 1-800-282-1376 or by visiting their contact pages at www.priv.gc.ca.

All information provided to the CSA is also subject to the Access to Information Act. This information may be made available to someone who requests it, subject to the exempting provisions of the Act. Commercial information may only be disclosed in accordance with the provisions of the Access to Information Act. Information on the Privacy Act and the Access to Information Act can be found at <http://laws-lois.justice.gc.ca>. For more information on these laws, please contact the Access to Information and Privacy office at aiprp-atip@asc-csa.gc.ca.

8.2 Copyright permission

CSA may disclose, reproduce and distribute any part of or the whole of the documentation provided in or with this Application Form, within CSA and to its authorized third parties, including other Government Departments for purposes consistent with the receipt, assessment and subsequent treatment of the Application.

8.3 Intellectual property

Notwithstanding anything to the contrary in the Applicant Guide, CSA and the Privy Council Office claim no intellectual property (IP) rights from the application.

By applying, in addition to the consents and authorizations contained in the Application Form, Applicants:

- Agree and certify that, the Applicant owns the intellectual property rights or is authorized to use them in connection with its technology and the content presented in the application; and
- Agree that CSA may, at any time, require the Applicant, Recipient, its shareholders or members, as applicable, to provide it with any original document or additional information for the purpose of verifying the application or other information submitted or representation made in the course of the Challenge.

8.4 Delay, Cancellation or Termination

Applicants acknowledge that circumstances may arise that require the Challenge to be delayed, delayed indefinitely, or cancelled. Such delay or cancellation, and/or the termination of the Challenge, shall be within the full discretion of CSA. Applicants accept any and all risk of damage or loss due to such delay, cancellation, and/or termination.

8.5 Costs and Expenses

Applicants are not required to make a purchase or pay a fee to participate in or win the Challenge. Applicants are fully responsible for all, and any expenses incurred in connection with their participation in the Challenge, including, but not limited to, any expenses related to the submission of their application, for the elaboration or testing of technologies, supplies and materials, such as for prototyping, intellectual property, transportation of people or material, and any insurance.

Similarly, Applicants will remain fully responsible for all expenses incurred and resources expended in connection with preparing their proposals, attending and participating in the testing for Stages 2 and 3, if applicable.

8.6 Release, Liability and Compensation

Applicants agree to hold harmless and discharge CSA, the members of the Judging panel, other federal departments or agencies from any and all liability for claims, losses, damages or expenses arising from its technology and/or participation in the Challenge, as well as personal injury or death, loss or damage to property, or allegedly caused by the Applicant, its shareholders, members, directors, officers, employees, contractors or volunteers, as applicable, when carrying out its technology or during the course of its participation in the Challenge.

CSA, the members of the Judging panel and other federal departments or agencies will not be liable to the Applicant, its shareholders, members, directors, officers, employees, contractors or volunteers, as applicable, for any third party claims, lawsuits, demands or actions.

Applicants agree that CSA may, at any time and at its sole discretion, reject any application that fails to comply with the Applicant Guide, attempts to register for the Challenge in any manner or by any means other than those described in the Applicant Guide, attempts to disrupt the Challenge or circumvent the content of the Applicant Guide.

Applicants agree that CSA and the members of the Judging panel cannot be held responsible for any rejected, lost, delayed, illegible, damaged or undeliverable applications or any delay or problem in the sending, processing, receiving or review of applications.

8.7 Records

It should be noted that original documents may be required by CSA at any time during the Challenge for the purpose of evaluating the application and verifying the submitted documents. Applicants are required to retain, for the duration of the Challenge, all original documents pertaining to their participation in the Challenge. Failing to provide those original documents or send them within the given time frame will result in the application being rejected.

8.8 Communication

By applying, the Applicants consent to CSA and Impact Canada publishing photographs, videos or captions containing their name or image or of their representatives. They agree that this may include electronic publishing via the Internet, the social media or the Intranet, as well as publishing in printed documents and videos, or presenting at public events. They also agree that they cannot charge any fees or royalties in relation to the use of their name or image or of their representatives.

8.9 Legal Entities Constituted during the Challenge

If a new legal entity is constituted during the Challenge for purposes of recipient eligibility described in Section 6.1 above, and unless the context suggests otherwise, Applicant(s) include Eligible Recipient(s) for purposes of this section (8. General Terms & Conditions).

CSA is not responsible for any dispute between individuals of a group of individuals who applied for the Challenge regarding the distribution among that group of the prize or parts thereof. Any failure of the Applicant to share or otherwise make payments of any kind to individuals or a group of individuals who applied is the responsibility of the Applicant and not of CSA. CSA may, at any time and at its sole discretion, reject any application or ask reimbursement of any payments should such dispute arise.

8.10 Governing Law

The Challenge, including the Applicant Guide, shall be governed in accordance with the laws of the Province of Quebec and the applicable federal laws.

9 Official Languages

French and English are the official languages of Canada. The Government of Canada is committed to supporting the vitality and development of the English and French language minorities in Canada and encouraging full recognition of the use of French and English in Canadian society. Applicants can apply and require that they be contacted and served in the official language of their choice.

10 Contact

For any questions or comments regarding the Challenge, please contact the Canadian Space Agency Challenge team at defiaqualunaire-aqualunarchallenge@asc-csa.gc.ca. Updates will be made directly on the Impact Canada website, including all recent Challenge news and Frequently Asked Questions (FAQs).

Annex A: Definitions

Definition of Collaborators and Challenge Administrators

Canadian Space Agency (CSA): Is a federal agency responsible for managing all of Canada's civil space-related activities. CSA is responsible for advancing the knowledge of space through science and using its discoveries for the good of Canadians and all of humanity.

Privy Council Office (PCO): Supports the Canadian Prime Minister and Cabinet. Led by the Clerk of the Privy Council, the department helps the Canadian government in implementing its vision, goals and decisions in a timely manner.

Impact Canada: Housed within the Privy Council Office, is a Government of Canada-wide effort to help accelerate the adoption of innovative funding approaches to deliver meaningful results to Canadians. Challenge Prizes, Pay-for-Success technologies and Behavioral Science are its key business lines.

United Kingdom Space Agency (UKSA): The *UK Space Agency* (UKSA) is an executive agency of the Department for Science, Innovation and Technology. UKSA plays a major role in delivering the government's National Space Strategy, and supports a thriving space sector in the UK, which generates an annual income of £16.5 billion and employs 47,000 people across the country.

Challenge Works (CW): *Challenge Works* exists to design challenge prizes that help solve pressing problems that lack solutions. We shine a spotlight where it matters and incentivise people to solve these issues. We are independent supporters of change to help communities thrive. We inspire the best placed, most diverse groups of people around the world to take action. We support the boldest and bravest ideas to become real, and seek long term change to advance society and build a better future for everyone. *Challenge Works* is part of the global innovation foundation, *Nesta*.

Definition of Terms

Applicant(s): As defined in Section 6 of the Applicant Guide.

Application Form: Form described in Section 6.3 of the Applicant Guide.

Applicant Guide: Rules of the Challenge, including all terms and conditions contained in this present document and any new document published for Stage 2 and Stage 3 of the Challenge. Applicant Guide applies to all Applicants and Eligible Recipients.

Eligible recipient(s): Is an Eligible Applicant. As described in Section 6.1 of the Applicant Guide, Eligible to receive prizes under the applicable CSA program. If at the time of Application, the Applicant is not an Eligible Recipient, the Eligible Recipient will be the legal entity described in Section 6.1 and as identified by the primary contact (as they appear in the Application Form) to the CSA.

Judging panel: A panel of professionals and subject matter experts from government, academia, and industry who will evaluate and score all applications.

Stage: A stage of the Challenge representing a key step in the development of water purification technologies to remove contaminants found in lunar water. This Challenge will have up to three Stages.

Technology Readiness Level (TRL): A method for estimating the maturity of technologies. The use of TRLs enables consistent, uniform discussions of technical maturity across different types of technology.

Annex B: Additional References

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Sanders et al (2019). Current NASA ISRU Strategic Vision. Retrieved from: <https://ntrs.nasa.gov/api/citations/20190029199/downloads/20190029199.pdf>

Kleinhenz et al (2020) Lunar Water Pilot Plant Conceptual Design. Retrieved from: <https://arc.aiaa.org/doi/pdf/10.2514/6.2020-4236>

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Holquist et al (2022). Demonstration of Paragon's Water Purification Assembly for Lunar Water Processing. Retrieved from: <https://ttu-ir.tdl.org/handle/2346/89644>

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