Australian Government | Australian Institute of Marine Science

# Proposal for the expansion of the National Sea Simulator at the Australian Institute of Marine Science to support research for protecting the Great Barrier Reef

# Part A: Identification of the Need
# Part B: Technical Information


Statement of Evidence to the

Parliamentary Standing Committee on Public Works

Australian Institute of Marine Science
Cape Cleveland, Townsville, QLD

Submission no. 1
Date:

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# PART A – IDENTIFICATION OF THE NEED

## 1 Introduction

1.1 This evidence to the Parliamentary Standing Committee on Public Works (PWC) presents a proposal for the expansion of the National Sea Simulator (SeaSim) at the Australian Institute of Marine Science (AIMS) to support research for protecting the Great Barrier Reef. The need for the expansion was identified in the Research Infrastructure Investment Plan which "provides Australian researchers with access to modern and world-class national research infrastructure (NRI). This enables advances in science, technology and knowledge, boosting productivity, creating jobs, and delivering economic growth."

1.2 The SeaSim is a unique, world-class research aquarium facility for tropical marine research, located near Townsville in Queensland and was subject to a prior PWC approval at its inception in 2009. The SeaSim directly supports research into the sustainable use of Australia's tropical marine estate, including coral reef adaptation and resilience strategies for the Great Barrier Reef. The importance of the SeaSim to marine research in Australian has been recognised through the National Research Infrastructure Roadmap where it was identified that '*expanding access to the Sea Simulator will increase understanding of Australia's tropical marine organisms'.*

1.3 The expanded SeaSim capacity will directly support significant research under the Reef 2050 Long term Sustainability Plan and the Great Barrier Reef Restoration and Adaptation Program (RRAP). RRAP aims to create an innovative suite of safe, novel interventions to help keep the Reef resilient in the face of increasing impacts from stressors, including climate change. RRAP is the most ground-breaking and exciting marine research happening on the planet. Much of the work required in developing these interventions require sophisticated experimental systems, access to high quality seawater and ready access to the Great Barrier Reef and SeaSim is the only facility that has the capability to deliver these goals . It provides a unique platform where national and international researchers can come together to undertake the novel research required to develop tools in aid of the reef.

## 2 Background

2.1 The SeaSim was referred to the PWC in October 2009 as part of the proposal for the Tropical Marine Research Facilities project. Following an inquiry into the proposal and public hearing, the PWC recommended to the House of Representatives that it was expedient to proceed with the proposed work. The House voted on a motion to approve the works in November 2009.

2.2 Since its establishment in 2014, the SeaSim has proven its scientific value through the significant volume of research that has been enabled by its novel capabilities. Over 250 experiments have been undertaken with 171 peer reviewed publications produced.

2.3 The National Sea Simulator's unique capabilities has enabled experiments as near to the real world as possible allowing meaningful advice to stakeholders. For instance, the ability to vary turbidity in real-time along with other seawater conditions enabled testing of the marine organisms' responses to the dynamic nature of turbidity experienced in nature during dredging events. This research resulted in improved dredging guidelines, operational savings for industry and greater environmental protection for the receiving environment. The same is true of general ecotoxicology where complex communities of marine organisms, much like in nature, are exposed to tropical ecotoxicants so we can measure both the effects on the organisms and the effect of nature on the toxicants. Knowledge from these experiments informs regulators and industry alike, allowing them to tailor water quality guidelines and at-sea operational plans. The unique facilities have attracted researchers from around Australia and internationally from some of the world's leading research institutions fostering ongoing research collaborations.

2.4 The SeaSim has provided significant national infrastructure to support cutting-edge research on critical climate adaptation and mitigation issues such as ocean acidification and ocean warming.

2.5 SeaSim has provided a paradigm change in how scientists undertake seawater experiments, combining modern process automation engineering and marine science, supported through aquarium husbandry expertise. Along with a reliable, consistent supply of high-quality seawater, SeaSim enables fine control over many environmental variables, including light, temperature, ocean acidification, sedimentation and emerging and priority contaminants. The SeaSim also provides the capability to replicate these environmental variables over seasonal and diurnal cycles, which is not possible in other research facilities. The reliability of the controls and automation systems enable large scale, long term experiments where multiple generations of organisms can be studied under experimental conditions, a capability that does not exist in any other facility in the world. The ability to run long term experiments is critical in gaining an understanding of the ability and limitations of future generations of marine organisms to acclimatise and adapt to a changing environment. SeaSim' s unique capabilities enable researchers to create conditions which more closely resemble conditions found on the reef, and more accurately model conditions expected in the future. This means that the data generated from experiments run in this facility are better able to inform managers and policy makers in enabling continued sustainable use and greater environmental protection of Australia's tropical marine estate. The SeaSim capability also supports multi-generational studies, which are critical in understanding how marine organisms acclimatise and adapt to a changing environment. This experimental capability has significantly reduced the timeframes required to evaluate future climate scenarios and therefore increased the likelihood of timely intervention to protect Australia's tropical marine ecosystems, including coral reefs.

2.6 SeaSim' s success at meeting these complex research needs has seen it become a world-leading facility attracting national and international marine science researchers from some of the world's leading research institutes. An expansion of its capacity is therefore required to enable further research that supports growth in the sustainable use, effective environmental management, and protection of Australia's tropical marine estate.

2.7 An expansion of this facility was scheduled to commence in 2022–23, supported by the Australian Government's *2018 Research Infrastructure Investment Plan*. However, this additional capacity is required earlier, in 2020–21, to support the critical RRAP research and development phase. The Australian Government's *2020 Research Infrastructure Investment Plan* provides funding over the forward estimates (2020–21 to 2022–23) to support fast tracking of the design and construction of the SeaSim expansion program.

## 3 Project Objectives

3.1 The key objective is to increase the capacity of the SeaSim to meet the forecast increase in demand for research to support the protection of the Great Barrier Reef, primarily driven by the Reef 2050 Long Term Sustainability Plan knowledge gaps and RRAP interventions .

## 4 Need for the Works.

4.1 This project responds to the urgent need for more research facilities identified through the investment case for the RRAP. Existing work undertaken within the SeaSim is used to develop understanding, decision support tools and advice to the Commonwealth and Queensland governments on matters relating to the *Reef 2050 Long-term Sustainability Plan*, tropical water quality, and biodiversity research under the National Environmental Science Program. The expanded facility will be used for the development of methods and techniques to support reef restoration efforts and advice regarding the status, dynamics and vulnerabilities of habitats associated with Commonwealth marine reserves. Research on methods to increase resilience of coral reefs to rising sea temperatures is another key research focus in the SeaSim, which is the only facility of its type globally that can undertake experiments of the capacity, duration and complexity required. Designed to encourage scientific collaboration, the expanded facility will also accelerate the rate at which Australia realises the potential benefits of a rapidly growing blue economy.

4.2 The SeaSim Expansion is expected to contribute the following benefits and impact during 2022 – 2026: ·

4.2.1 Development of propagation techniques, both sexual and asexual, for coral reseeding and the environmental and biological conditions conducive to

coral growth and survival. This will provide key knowledge for the design and deployment of reef restoration and adaptation activities across the Great

4.2.2 Barrier Reef as this research field matures and moves towards larger scale implementation. ·

4.2.3 Support for multi-generational experiments replicating different climate scenarios aimed at understanding the innate capacity of corals to adapt to current and projected environmental conditions. ·

4.2.4 Development of methods to fast-track shore-based coral aquaculture systems to deliver the means to reliably breed corals in captivity at scale and at a low cost. Not only will this work be critical to developing broad-scale reef restoration deployment methods but it has potential to seed a new coral aquaculture export industry for Australia. ·

4.2.5 Experimental work to support the validation and development of predictive models for tropical reef environments under future climate scenarios. ·

4.2.6 Development of methods for control of Crown-of-thorns starfish outbreaks, which are a major contributor to declining coral cover on the Great Barrier Reef.

4.2.7 Development of some of the next generation of high-tech ready aquaria--focused marine scientists (including postgraduate-qualified Indigenous scientists) through mentoring and training.

## 5 Options Considered

5.1 The project leverages the existing infrastructure of SeaSim and expands upon the current unique capabilities. Options considered include:

| | Option | Description | Comments |
|---|---|---|---|
| 1 | Do nothing | Not expand the facilities | The current and forecast demands for research space within the SeaSim facility will not be met thus impacting research programs including the desired outcomes from Reef 2050 and RRAP.<br><br>This would negatively impact coral reef health and resilience, both on the GBR and internationally. |
| 2 | Develop facilities at AIMS | Extend the current seawater experimental area at AIMS (increase volume, ability to control temperature, salinity and acidity and create additional experimental spaces) | Leverages existing seawater infrastructure.<br>Good sea water supply.<br>Co-located at AIMS with access to world-leading marine laboratories (biomolecular analysis, analytical technology, microbiology, genetics, microscopy etc.).<br>Adjacent to the Great Barrier Reef.<br>Access to a fleet of sophisticated marine vessels for access to the GBR.<br>Lowest cost option since it leverages existing capabilities.<br>Co-location benefits in terms of operational and maintenance expertise.<br>Skilled marine experimental aquarium technicians. Critical mass of technical expertise allows more rapid capability development.<br>Engineering facility for capability development.<br>Townsville is a global centre of excellence for marine sciences and has the highest concentration of coral reef ecologists and marine scientists in the world. |
| 3 | Utilise facilities in a new location | Several small facilities with limited functionality. | None exist in Australia, and none are known to exist internationally, that can simulate tropical conditions in the flow quantities required.<br>Travel costs.<br>Not adjacent to microbiology and genetics laboratories that will be required for a large number of the experiments. |

| | Option | Description | Comments |
|---|---|---|---|
| 4 | Develop facilities at another location | Build facility at a site such as James Cook University (JCU) | Expensive, no other existing locations in tropical Australia that have access to high-quality seawater.<br>JCU do not have access to seawater (JCU trucks their water from AIMS). |

5.2 The only viable option is to develop the facility at AIMS. No other sites exist that have the combination of access to high-quality seawater volumes along with access to the existing SeaSim team together with the co-location benefits of access to microbiology, genetics, and other high technology laboratories. Further, developing the facility at AIMS is the lowest cost, whole-of-life option given it leverages the existing sea water capabilities, as well as providing the co-location benefits arising from the existing operational expertise.

5.3 Locating the facility at AIMS requires an extension to existing capabilities rather than development of a greenfield system.

## 6 Economic Impacts

6.1 The Project will produce 30 ongoing SeaSim positions and will support 30 -60 scientific roles in the broader marine research community including indigenous scientists. Many of the science roles supported will be in the Townsville region.

6.2 The construction project will generate short-term employment opportunities predominantly in the building, construction, and unskilled labour markets with an estimated 350 trade persons being engaged over the construction phase. It will also generate some off-site job opportunities from the manufacture and distribution of construction-related materials over a period of approximately 18 months. It is anticipated that local regional building contractors and regionally based tradespersons will be employed on a large proportion of the construction works. These employment opportunities will support the continuing economic recovery of North Queensland, which has been heavily impacted by the market downturn associated with the COVID-19 pandemic.

6.3 The completed facilities will provide the necessary infrastructure for AIMS to meet the projected demand for scientific outcomes and thus enable the employment and collaboration of additional staffing within the facilities.

6.4 The potential multiplier effect of wider employment in Australia due to the research outcomes to be achieved within the new facilities should also not be discounted. Further, an expected outcome of the RRAP research – a significant proportion of which will be conducted in the expanded SeaSim – is the development of techniques for large-scale coral aquaculture which may lead to a significant new local aquaculture industry, and potentially an international export industry in reef restoration techniques.

## 7 Environmental Considerations

7.1 The Cape Cleveland site is located within a 'brownfield site' that was previously cleared during the establishment of AIMS in the mid-1970s.

AIMS has developed the concept design for the infrastructure Project in accordance with AIMS' environmental policy and procedures. The concept design as developed to date has assessed various design responses and has progressed those providing a relatively low environmental impact. The works will also be subject to a Project-specific environmental and heritage impact assessment, with environmental compliance triggers already identified. The environmental impact assessment will further identify potential environmental impacts of the Project and will provide appropriate mitigation measures.

## 8 Heritage Implications

8.1 AIMS will undertake an assessment to evaluate the heritage implications associated with the proposed new facilities. However, based on prior master planning and reports undertaken on site, AIMS considers the likelihood of heritage implications to be low.

## 9 Social and Community Impacts

9.1 The Project will employ skilled construction workers from the Townsville and adjoining regions, providing a positive impact to local small and medium businesses. It is estimated that a total of 350 tradespersons will be employed over the construction phase of the project.

9.2 The contractors will be required to provide traffic, environment and site management plans for approval by AIMS.

9.3 Given the remote location of the Cape Cleveland site, there will be minimal disruption to the local community during the construction period.

## 10 Longer Term Planning / Related Projects

10.1 AIMS has developed a masterplan for the future growth and expansion of SeaSim, which provides for potential future stages and expansion of the facility as demand and funding allow. The following diagram details the current scope as stage 1, with future expansions in stage 2 and 3 noted in purple and orange, respectively.


**Figure 1: Concept master plan**

## 11 Consultation

11.1 AIMS develops its research plans in consultation with its stakeholders. Collaboration is central to AIMS' organisational culture and has been the key mechanism for increasing critical mass and broadening the skill base required to investigate complex research questions around the sustainable use and protection of marine resources. This approach includes national and international collaborations, strategic alliances and strong links to industry and community. In this way, AIMS makes its facilities available to a broad cross-section of the marine science community and coordinates its effort and resources with other research organisations.

11.2 AIMS has, and will continue to, consult with research partners and collaborating institutions in the development and implementation of this Project. For example, in developing preliminary functional specification for the SeaSim expansion with existing and potential users. This consultation will continue throughout the design process through user groups comprising selected experts in the areas of science for which the facility will be utilised.

11.3 Discussions with the various statutory bodies governing water catchment, power and emergency services are in this instance regarded as unnecessary as a consequence of there being no impact of the Project beyond the AIMS Cape Cleveland site. No local community or other interest groups have been identified that would be affected by the Project works at Cape Cleveland.

## 12 Revenue

12.1 No revenue will be derived in the construction of the Project.

# PART B – TECHNICAL INFORMATION

## 13 Project Location

13.1 The Project elements within the existing AIMS Cape Cleveland Site are located approximately 50km south-east of the Townsville CBD as shown in Attachments 2 and 3. The site sits adjacent to the centre of the Great Barrier Reef Marine Park and is surrounded by a national park and marine reserve. The site encompasses an area of 207.4 hectares. The works are in the Electorate of Dawson and Mr George Christensen MP is the sitting Member. Most of AIMS' staff and local business is in the Electorate of Herbert - Mr Phillip Thompson OAM MP is the sitting Member.

## 14 Project Scope

14.1 The work scope comprises the following project elements:

**SeaSim -Experimental Space and Science Support Space Expansions**

14.2 This project provides for the implementation of stage 1 of the SeaSim expansion as detailed in figure 1. The focus of stage 1 is to progress the expansion of the experimental spaces as an urgent project to meet current and forecast science program needs.

14.3 The experimental spaces and science support spaces are therefore to be expanded as follows:

(a) The outdoor open plan experimental areas will be expanded by greater than 200%.
(b) Up to 8 additional controlled environment rooms.
(c) The indoor aquaria space open plan experimental areas will also be expanded by approximately 40%.
(d) The science support spaces will also be expanded to support the increased scale of the facility.

14.4 The expansion requires the demolition of several small sheds and structures to the north of the existing SeaSim facility in accordance with the SeaSim masterplan.

**SeaSim -Expanded Outdoor Open Plan Experimental Areas**

14.5 The outdoor open plan experimental areas will be expanded in capacity by over 200%. These large open spaces are covered with a transparent roof which enables the transmission of full spectrum sunlight. This additional covered space provides for multiple large experimental tank systems. These systems enable replication of current and projected future conditions on the Great Barrier Reef.

Figure 2 - Current Outdoor Aquaria Space

**SeaSim – Additional Controlled Environment Rooms**

14.6 Up to eight additional controlled environment rooms will be incorporated into the existing facility, effectively doubling the capacity of this type of research space. These rooms are used for experiments that typically utilise small tanks. All input variables may be modified on dynamic seasonal, monthly, and daily profiles to reflect current and forecast climate scenarios (i.e., 50 – 100 years in advance) on the Great Barrier Reef.

Figure 3 - Current Controlled Environment Room

**SeaSim -Expanded Indoor Open Plan Experimental Areas**

14.7 The indoor aquaria space open plan experimental areas will be expanded by approximately 40%. The indoor open plan spaces enable further manipulation of lighting and diurnal cycles for large experimental tank systems.

Figure 4 - Current Indoor Open Plan Aquaria Space

**SeaSim -Expanded Science Support Spaces**

14.8 Additional building space of approximately 660m2 is required in support of the experimental functions and the following:

(a) Building services plant and equipment (e.g., Airconditioning plant rooms)
(b) Workshops (approximately 220m2).
(c) Circulation and egress space allocations.
(d) Office space (approximately 92m2)

**SeaSim -Expanded Seawater Processing Systems**

14.9 Whilst the new works leverage off the existing site services infrastructure, the expanded SeaSim experimental areas as detailed require a commensurate expansion in the associated seawater processing systems. This expansion will ensure the experimental seawater systems can meet the additional seawater demand.

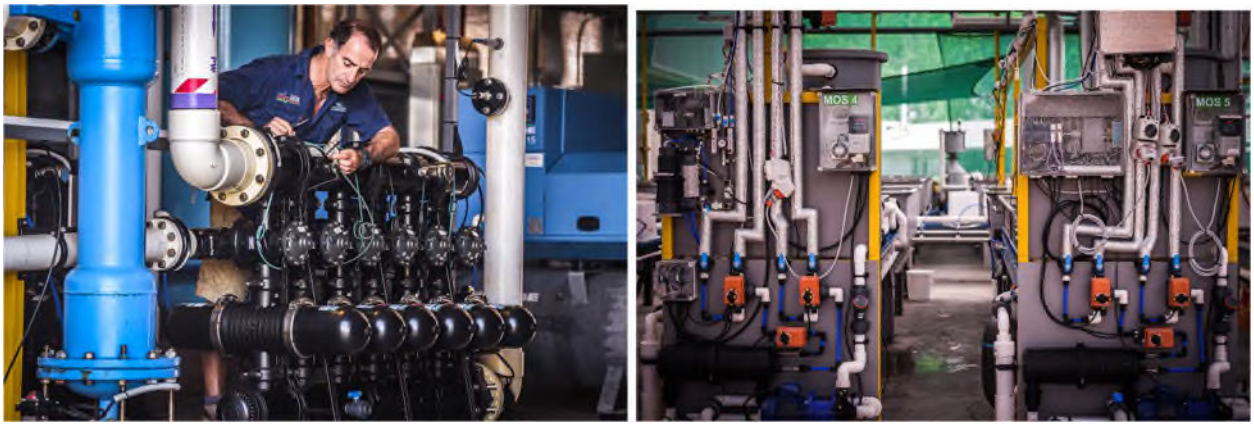


Figure 5 - Examples of Seawater processing system components

14.10 Seawater processing plant and equipment will therefore be expanded based on replication of current system components which have proven their reliability and fit-for-purpose application over time.

14.11 The expansion of this plant and equipment requires an expansion to the seawater processing shed and the construction of a new Reverse Osmosis (RO) shed, given the current RO shipping container approach lacks long-term durability/serviceability.

**AIMS Site Services Infrastructure Upgrades**

14.12 The mobilisation of contractors for the wider project scope provides AIMS the opportunity to progress with planned site services infrastructure upgrades on a concurrent cost-effective basis. This scope includes:

I. Completion of the High Voltage Ring Main around the main campus which has been progressively implemented on a staged basis over the last 20 years.
II. Installation of an additional cooling tower to provide a greater cooling load.
III. Generators to synchronise with the Ergon supply. Ergon has advised that there have been at least 53 HV outages between 2013 and 2018 at the AIMS site. With the diesel generators able to be synchronised to the mains for planned outages the generators can be operated and there will be no outage at the site when the outage starts and finishes. Additionally, when severe weather alerts occur the generators can be run in parallel with the mains to take over the site load in the event of an Ergon outage. This ensures that there is no chance of an outage at SeaSim, during these high-risk periods when staff access would potentially be limited.

14.13 The above services infrastructure scope has been previously budgeted in the AIMS capital plan and AIMS has taken the opportunity to leverage the project specific resources to deliver these works on a concurrent basis.

## 15 Site Selection and Description

15.1 The AIMS Cape Cleveland site location is detailed in Attachment 2 and is 50km south of Townsville.

15.2 The proposed site for the Project is shown in the below figure.

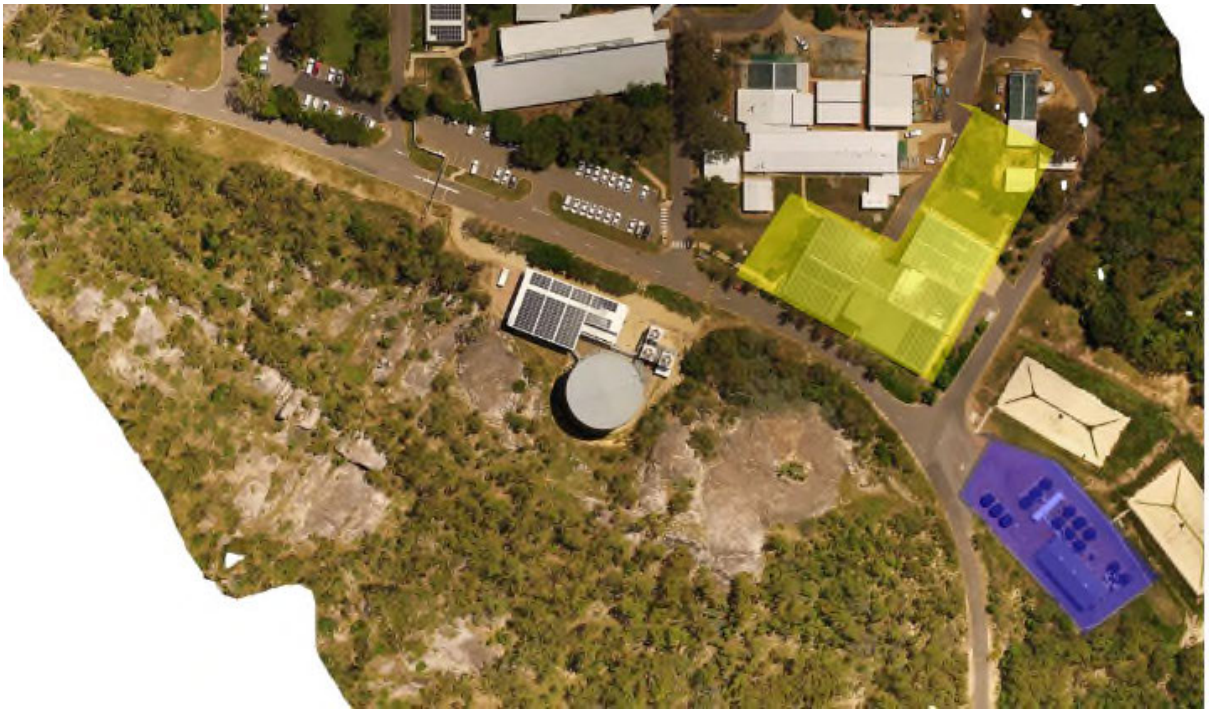

**Figure 6 - Part of the AIMS campus detailing existing SeaSim and the expansion area in yellow and the Seawater Processing facilities in blue.**

15.3 The site is contained within the AIMS Cape Cleveland boundary. AIMS is the registered owner of the site (Lot 35 of CP EP1474) under a deed of grant in trust for scientific purposes (under the *Land Act 1994* (Qld)). The land is accessed from Cape Cleveland Road via the Bruce Highway. Site selection has been undertaken in accordance with the AIMS Master Plan. AIMS will conduct a technical site selection process to address AIMS' environment, heritage, and operational considerations.

## 16 Zoning and Approvals

16.1 The land is held under a deed of grant in trust and the expansion is in accordance with the purposes of the trust, creating several exemptions from usual requirements to obtain development approval in relation to clearing of native vegetation and building works. AIMS is working with the Townsville City Council, the State Assessment and Referral Agency (Qld), the Great Barrier Reef Marine Park Authority (Cth.) and Queensland Parks and Wildlife Service to confirm whether any additional approvals are required. Any requirements for new approvals or variations to existing approvals will be built into the project plan and factored into the project's timeframes.

16.2 This proposal does not require the acquisition of additional land nor involve land disposal aspects. There will be no change to existing land use conditions at the Cape Cleveland site, which is for 'scientific purposes' under the deed of grant in trust referred to above.

## 17 Applicable Codes and Standards

17.1 Where appropriate, the design and construction of the proposed works and services will comply with any relevant and applicable sections of the following Standards and Regulations:

(a) Building Code of Australia
(b) Australian Standards and Codes
(c) Building and Construction Industry (Improving Productivity) Act 2016
(d) Building and Construction Industry (Improving Productivity) (Accreditation Scheme) Rules 2019
(e) Occupational Health, Safety and Welfare
(f) Commonwealth and State legislation

17.2 A qualified and practicing building certifier will certify that the design and the finished construction of the facilities meet the requirements of the Building Code of Australia, Australian Standards, and any applicable State and Local Government policies.

## 18 Planning and Design Concepts

18.1 The Project will provide safe, secure and efficient work and training facilities designed to meet the function of the Project. During the preliminary design stage, consideration was given to the selection of materials, equipment, finishes, construction techniques and build ability. All were considered for an ability to deliver economies and environmentally sustainable efficiencies on a whole-of-life basis. Consideration was given to achieving the necessary functional requirements, workflow patterns and work environment required to fulfil the Project design criteria. The selection of engineering services and associated equipment and energy systems, capital costs were assessed against the operational and maintenance costs.

## 19 Ecologically Sustainable Development, Water and Energy Conservation

19.1 The Commonwealth is committed to Ecologically Sustainable Development (ESD) and the reduction of greenhouse gas emissions. AIMS reports annually to Parliament in its Annual Report on progress in meeting statutory obligations under the Environmental Protection and Biodiversity Conservation (EPBC) Act 1999 to protect and maintain the biodiversity and heritage under AIMS' control. AIMS also implements policies and strategies in energy, water, and waste management to improve natural resource efficiency and to support its commitment to reducing energy consumption, potable water consumption and waste diversion to landfill. This Project has addressed these requirements by adopting cost-effective ESD as a key objective in the design development and delivery of new facilities and refurbishments.

19.2 The ESD targets and measures for the Project have been balanced with other requirements for AIMS buildings (e.g., security, heritage considerations, Work Health and Safety) to ensure that AIMS' operational capability is not compromised. All buildings included in this Project will be designed, constructed, operated, and maintained to ensure they use energy efficiently. Where applicable, the use of the Green Star and NABERS Energy design rating tool has been adopted. In addition, as applicable to the classification of each building, AIMS will comply with the following policies:

(a) Part I2 and Section J of volume One of the Building Code of Australia; and

(b) Part 3.12 of Volume Two of the Building Code of Australia.

## 20 Provision for People with Disabilities

20.1 Access and facilities to the new building will be provided in accordance with the Building Code of Australia (BCA), Australian Standards and AIMS procedures.

## 21 Occupational Health and Safety

21.1 The proposed facility will comply with the requirements of the Work, Health and Safety Act, the AIMS Health and Safety Manual, and relevant Queensland Government Health and Safety legislation. The construction contractors will be required to develop and implement an approved Health and Safety Plan incorporating compliance with AIMS Health and Safety policies.

21.2 The site will be secured to prevent unauthorised public access during the construction period. No special or unusual public safety risks have been identified.

21.3 The facility proposed to be delivered under this project will comply with the AIMS Work Health Safety Manual and the Work Health and Safety Act 2011 (Cth).

21.4 The facility is not known to contain any contaminated substances, such as asbestos.

21.5 In accordance with the Building and Construction Industry (Consequential and Transitional Provisions) Act 2016 (Cth), for works greater than $4 million, contractors will also be required to hold full work health and safety accreditation from the Office of the Federal Safety Commissioner under the Australian Government Building and Construction Work Health and Safety Accreditation Scheme.

21.6 Safety aspects of this proposal have been and will continue to be addressed during the design process and will be documented in the Safety in Design Report completed by a Design Consultant. The successful construction contractors will also be required to submit respective Safety Plans for the construction phase prior to the start of any construction activities.

## 22 Structural Design

22.1 Structural design will ensure that all works are designed to the current applicable design codes (including cyclonic wind loadings) and be suited to long-term durability for exposure to seawater in a tropical environment.

22.2 Existing structural systems will likely be replicated given they have been proven to be fit for purpose in their application and use.

## 23 Materials and Finishes

23.1 The materials and finishes to be utilised will largely replicate those existing which have proven suitable and fit for their associated purposes.

23.2 Materials and finishes will be selected from those readily available locally for their functionality, durability, low maintenance and Ecologically Sustainable Development properties. Commonwealth Government policy requires that Australian or New Zealand goods, materials and associated services will be sought and assessed in terms of value for money before seeking any overseas supply.

## 24 Mechanical Services

24.1 The facility expansion requires that building services and associated equipment must achieve an economic balance between capital cost, and operation and maintenance costs. Selection will be based upon a life cycle costing analysis and particular consideration will be given to energy efficient design solutions employing passive solar energy. Given this is an expansion to an existing facility, the replication of existing proven systems is considered low risk.

24.2 The facility expansion will extend existing building management systems, metering, and other provisions to measure and monitor energy use and to allow regular energy audits where practicable.

## 25 Hydraulic Services

25.1 Domestic water supply and sanitary drainage from fixtures located within the new facilities will be via new connection to the existing site services infrastructure.

25.2 New stormwater drainage pipelines will be provided where necessary to collect stormwater runoff and direct it into the existing infrastructure system.

25.3 Domestic water heating will be provided to the relevant facility by either gas-fired instantaneous hot water units or electric heaters where gas supply is not available. The design will be considered for the building dependent on demand requirements and energy efficiencies.

## 26 Electrical Services

26.1 The AIMS Cape Cleveland site receives electricity from the Ergon Energy substation, which connects to the AIMS Cape Cleveland site. This supply is sufficient to meet the increased load requirement to accommodate the new infrastructure within the AIMS Cape Cleveland site.

26.2 Related concurrent works (funded internally by AIMS) will, however, occur within the AIMS site to complete the High Voltage ring main (a HV cable of approximately 350m). This will help meet a long-term objective of AIMS to improve power supply redundancy and reliability and facilitate maintenance on the HV infrastructure.

26.3 Lighting, power, lightning protection, and fire protection will be provided to the buildings in accordance with the relevant Australian Standards. Electrical infrastructure and switchboards will have modest spare capacity to allow for future growth or increased demand.

## 27 Fire Protection

27.1 All construction and fire protection requirements will, as a minimum, be in accordance with the provisions of the Building Code of Australia (BCA) and all other applicable Codes and Standards. The Manual of Fire Protection and Engineering details AIMS fire protection policy for asset protection and building function protection.

## 28 Civil Works

28.1 Civil assessments were carried out during the early design stage at each element's new site location. There were no site conditions identified that pose any major civil engineering requirements; however, each site will be the subject of further survey and geotechnical investigation during detailed design.

28.2 New roadways will be constructed of asphalt, which is deemed the most cost effective and appropriate pavement solution for the Project. The extent of the pavement types will be selected subject to which is deemed the most cost effective and appropriate pavement solution for each relevant Project element.

## 29 Landscaping

29.1 Landscaping works will focus on the restoration of areas disturbed during construction. The landscape design is functional with low maintenance a high priority. A water sensitive design approach has been adopted with plants selected that are indigenous to the relevant site.

## 30 Security

30.1 In accordance with Government initiatives to improve physical security arrangements across Departments, advice from designated security authorities will be incorporated into the design solutions for the proposed facility as appropriate. The security threat assessment will be reviewed during the detailed design phase and the new facility will be secured as appropriate to the classification level required for the activities to be conducted. Appropriate security protection will be provided in accordance with AIMS security policies and specific Project requirements e.g. Access Control, Video surveillance, electronic alarming.

## 31 Noise and Acoustics

31.1 The acoustic performance within the facility will comply with the Building Code of Australia (BCA), relevant Australian Standards, Worksafe National Standard for Occupational Noise (NOHSC:1007(2000)), National Code of Practice for Noise Management and Protection of Hearing at Work (NOHC:2009(2000)) and the EPA Noise Policy.

31.2 It is not envisaged that this Project will increase noise output and therefore will not adversely affect the surrounding environments. Externally located mechanical plant will be appropriately selected and treated to minimise noise impact on the environment within a suitable internal and external noise range.

## 32 Information Communication and Technology

32.1 Passive and active information communication and technology infrastructure works will be provided for the Project. The existing site communications fibre optic cable and cable infrastructure will be extended to support the anticipated information, communication and technology services required for the new facilities.

## 33 Project Cost

33.1 The estimated out-turned cost for the Project is $27,493,000 (excluding GST). This cost estimate includes the construction costs, professional fees, furniture, fittings and equipment, IT infrastructure and equipment, contingencies, and an escalation allowance. The funding is split between $24,660,000 external grant funding via the National Collaborative Research Infrastructure Strategy (NCRIS) SeaSim Expansion grant announced in the October 2020 Budget and $2,833,000 in internal capital funds.

33.2 A modest increase in net operating costs is expected due to the construction of the new facilities and the associated increases in facilities maintenance, cleaning, and utilities expenses.

## 34 Project Delivery System

34.1 AIMS has engaged a Project Manager to manage the design phase through to completion of 100% design. This Project Manager is the same Project Manager that delivered the original SeaSim and hence is familiar with the functional requirements of the systems and the associated design requirements.

34.2 A Project Manager and Contract Administrator will be appointed to manage the procurement and construction phase of the project through to the completion of construction, including the Defects Liability Period.

34.3 Subject to Parliamentary approval of the project, the works will progress to construction via specific trade packages which are indicatively allocated as follows:

a) Buildings
b) Seawater Processing Equipment
c) Civils and Pipelines.

34.4 The proposed trade packages do not have significant interface risks and align their associated scope with specialist trade skills as appropriate. This approach also avoids unnecessary expenditure on contractor overheads and margins, and leverages AIMS internal capacity and specialist trade skills associated with the project scope.

34.5 AIMS has implemented Internal Project Governance via the establishment of a Project Board. Comprising relevant senior management and specialist staff with technical expertise, the Project Board will oversee the specifications for the proposed works and communications with staff as well as external stakeholders.

34.6 The AIMS Chief Operating Officer is the project sponsor and will report to the AIMS Chief Executive Officer, AIMS Leadership Team and the AIMS Council.

## 35 Risks

35.1 The project is considered relatively low risk given this is an expansion to an existing facility with demonstrated technologies and processes with known lessons learned.

35.2 Following risk workshops and risk registers being developed the following key risks have been identified:

- The operational interface risk to AIMS, given the project involves interfaces and expansions to existing operational experimental spaces and life support systems. The project scope and program therefore include staging approaches to mitigate this risk.
- The reputation risk to AIMS should the project fail to achieve its objectives.
- Whilst the product descriptions are well advanced, there are some specific deliverables which are yet to be defined effectively (e.g., existing conditions risk).
- Environmental approvals associated with varied license conditions may impact project timelines. AIMS has progressed early engagement with key authorities to mitigate this risk.

## 36 Project Schedule

36.1 Subject to Parliamentary approval of the project, construction works are expected to commence in March 2022, with staged completion of the facilities occurring from then until the end of 2023.

## 37 Attachments

Attachment 1: List of Abbreviations

Attachment 2: Location Map

Attachment 3: AIMS Cape Cleveland Site Locality Plan

**Attachment 1 – List of Abbreviations**

| | |
|---|---|
| AIMS | Australian Institute of Marine Science |
| BCA | Building Code of Australia |
| EPA | Environmental Protection Agency |
| ESD | Ecologically Sustainable Development |
| JCU | James Cook University |
| HV | High Voltage |
| IT | Information Technology |
| NCRIS | National Collaborative Research Infrastructure Strategy |
| Project | Expansion of the National Sea Simulator |
| PWC | Parliamentary Standing Committee on Public Works |
| RRAP | Great Barrier Reef Restoration and Adaptation Program |
| SeaSim | National Sea Simulator |

**Attachment 2: Location Map**

**Attachment 3: AIMS Cape Cleveland Site Locality Plan**