Proposed Museum of Underwater Art Project- Stage 1
John Brewer Reef, Townsville
Public Information Package
September 2019

Public Comment
The Museum of Underwater Art now seeks any public comment under Regulation 88PD of the Great Barrier Reef Marine Park Regulations 1983 (Cth). Public submissions will be considered by the Great Barrier Reef Marine Park Authority (GBRMPA) in making a decision on this permit application.

Submissions
All comments and submissions to:
Great Barrier Reef Marine Park Authority,
Environmental Assessment and Protection Unit,
PO Box 1379,
Townsville QLD 4810
Email: assessments@gbrmpa.gov.au
Website: www.gbrmpa.gov.au/about-us/consultation

Applicant
All questions and further information to:
Museum of Underwater Art
Breakwater Marina, Sir Leslie Theiss Drive
Townsville QLD 4810
Email: info@moua.com
Website: www.moua.com.au
Proposed Museum of Underwater Art Project  
John Brewer Reef, Townsville  
Public Information Package

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Townsville Enterprise Limited is the peak economic development and tourism organisation in North Queensland, encompassing the five major regional centres of Townsville, Charters Towers, Burdekin, Palm Island and Hinchinbrook. Townsville North Queensland contributes over $17B annually to the economy and plays a pivotal part in the community of Northern Australia.

Townsville is at the heart of Australia’s Great Barrier Reef marine science industry. The value of Australia’s marine industry has more than doubled in the last ten years and is projected to continue to grow. Deloitte Access Economics has identified ocean resources as being one of the top 25 future growth sectors in the Australian economy, with future growth earmarked at 4.4% per annum over the coming years.

Not only is the Great Barrier Reef Marine Park at the heart of our science community it attracts around 2m visitors per annum.

With AIMS, the GBRMPA and JCU all playing a key part in the North Queensland economy, a project such as the Museum of Underwater Art will bring together the community with a project that highlights not only the marine science industry but our educational tourism, our traditional owners and indigenous heritage in the region.

MOUA is a new and exciting, wonderful opportunity for the region to grow its tourism base. The Townsville North Queensland tourism industry employs over 6,800 local workers who welcome more than 1.5 million visitors per year and contribute approximately $1 billion to the regional economy.

Jason de Caires Taylor is the world leading artist in his field and we are thrilled to work with Jason and our local arts community on this project.

Tourism is a key part of North Queensland’s future and MOUA is a wonderful opportunity for the region to grow its tourism product diversity and benefit from tourism growth.

*Patricia O’Callaghan*  
*CEO TEL*
Message on Traditional owners

MOUA Ltd Board are committed to consultation with representatives of the Wulgurukaba, Nywaigi and Manbarra traditional owners and Bwgcolman historical peoples with ancestral and contemporary ties to the land and sea where the Museum of Underwater Art (MOUA) will be located. As First Nations representatives who maintain close spiritual and physical connections to the land and sea country and its conservation we are committed to consultation and process to work together for common goals.

As traditional and historical peoples of the land and sea country where the MOUA will be located we have the MOUA Board will work with traditional owners and Bwgcolman with regard to the sculptures to be installed, their scope and their scale. The contracted artist and representatives of the MOUA Board have undertaken numerous consultations on Palm Island and Magnetic Island since 2017 including establishing a Community Advisory Committee on Palm Island in 2018. In early 2019, Magnetic Island traditional owners representative Duane Fraser was invited to join the MOUA Ltd Board. Duane is a Wulgurukaba and Bidjara man who stands proudly on the shoulders of those that led before him and has spent the last two years solidly elevating the struggles and empowerment of Traditional Owners of the Great Barrier Reef.

MOUA Ltd will engage representatives of the traditional and historical peoples, as we are supportive of the development of the MOUA to enhance the natural environment, increase cultural interpretation and education and provide economic opportunities. In the future we anticipate that these underwater sculptures will lead to increased involvement of traditional owners, historical peoples, scientists, artists, guides, rangers and tourism operators in the protection of the Great Barrier Reef.

Paul Victory Chairman MOUA Ltd
The MOUA vision:

*A globally recognised underwater museum with a series of underwater sculptures that locals are proud of and tourists go to learn, be inspired and take action to protect the Great Barrier Reef*

Background

The Museum of Underwater Art (MOUA) is a major underwater sculpture installation project that has been under development in Townsville since March 2016. This project is large in scope and bold in vision, with a target budget of $8-10 million and installations spanning four sites at The Strand, John Brewer Reef, Magnetic and Palm Islands.

The aim of the MOUA is to create a global public art and marine tourism education attraction for Townsville, differentiating itself from other regional destinations and consolidating Townsville, Magnetic Island, Palm Island and the Great Barrier Reef (GBR) into a single visitor experience.

The MOUA is an innovative project combining underwater art, research and education proposed for the waters around Townsville, Queensland (MOUA, 2018). The project intends to design and implement an innovative underwater art installation at multiple locations on the GBR. The aims of the project are to increase knowledge, education, stewardship, tourism and conservation of the Reef and the region. The project is linked to a strategic analysis of opportunities for underwater tourism (Reef Ecologic, 2018).

The project has been developed with environmental, social-cultural and economic objectives. It is firstly a project that raises awareness about the state of the reef and what we can do to reduce impacts and implement positive actions. Secondly, it is a project that will be a local, national and globally significant tourism and edu-tourism attraction and generate significant pride, jobs and revenue for the Townsville region. Thirdly, the project will be a high profile research site with surveys, equipment and experiments currently occurring or proposed by James Cook University, Australian Institute of Marine Science, Reef Ecologic, Reef Check Australia and other citizen scientists.

The project is well advanced, with substantial funding committed from the public and private sectors securing the services of the world’s leading underwater artist, Jason deCaires Taylor for the project. The project has several unique advantages, including support from leading organisations. These include world-leading coral reef experts (James Cook University, Australian Institute of Marine Science, Reef Ecologic), one of Australia’s largest marine tourism and transport companies (Sealink Travel Group), the only Aboriginal and Torres Strait Islander community within the GBR Marine Park (Palm Island), Townsville Enterprise, the peak Economic Development body and Regional Tourism Organisation for Townsville North Queensland and one of the most established regional art facilities in Australia (Perc Tucker Gallery - Townsville City Council). The project is widely considered to be regionally important, gaining substantial media coverage and public engagement.

The whole project is planned to be completed in three stages:
- Stage 1 - Underwater installations at John Brewer Reef and a single intertidal installation on the Strand
- Stage 2 - Underwater and intertidal installations at Palm Island
- Stage 3 - Underwater and intertidal installations on Magnetic Island and further installations at John Brewer Reef.

As at July 2019, Stage One and Stage Two of the project are funded and are in progress while the MOUA Ltd Board are seeking further corporate, philanthropic and Government support for Stage Three. The Queensland Government has approved Stage 1 installation of Ocean Siren sculpture adjacent to Strand Jetty.
Public Information Package

This Public Information Package is designed for two purposes. Firstly to provide sufficient information for the public to understand the What, Where, When, Why and How of the project. We have addressed this purpose by simple text, photographs and a section on Frequently Asked Questions. The second purpose is for the Management Agencies to have sufficient information that is relevant to the legislation, regulations and plans for consideration in assessing the project to be permitted in the Great Barrier Reef Marine Park. We have addressed this purpose in Appendix 1, which addresses the requirements of the GBRMPA regulations.

This Public Information Package focuses only on Stage 1 of the Museum of Underwater Art at the John Brewer Reef site.

This Public Information Package provides relevant information for the permitting assessment phase associated with the installation of two sculptures at John Brewer Reef (Figure 1). It is anticipated that the underwater sculptures will be a positive asset and attraction for locals and tourists, will increase awareness of reef species, education, research and management and provide opportunities for visitors and the local community to actively engage in supporting the health of the Great Barrier Reef.

Figure 1. Museum of Underwater Art Project approach

Additional specific information on scientific monitoring, risk assessment, the artist Jason deCaires Taylor and underwater facilities in the Great Barrier Reef Marine Park are provided in Appendices.
What underwater sculptures are proposed for the Museum of Underwater Art at John Brewer Reef?

There are two interconnected themes for the underwater sculptures at John Brewer Reef. The deeper site will have a coral greenhouse with sixteen individual human sculptures (Figure 2).

Figure 2. Artist impression of Coral greenhouse at John Brewer Reef

The shallower site, Coral gardens will have a path and sixteen stainless steel plants and trees (Figure 3).

Figure 3. Artist impression of Coral gardens at John Brewer Reef
The following materials proposed for use are listed under Annex 1 and 2 of the London Protocol: Aluminium, Stainless steel and Concrete.

Table 2. Details of the underwater sculptures, weights, materials and where they can be inspected.

<table>
<thead>
<tr>
<th>Sculpture</th>
<th>Art Materials (t)</th>
<th>Estimated weight (t) sculpture</th>
<th>Mooring materials</th>
<th>Estimated weight (t) mooring</th>
<th>Inspection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coral greenhouse</td>
<td>Stainless steel, Concrete</td>
<td>56</td>
<td>4 screw moorings</td>
<td>Pacific Marine Group (under construction)</td>
<td></td>
</tr>
<tr>
<td>Coral gardens</td>
<td>Stainless steel, Concrete</td>
<td>2</td>
<td>Concrete</td>
<td>9</td>
<td>Pacific Marine Group (under construction)</td>
</tr>
</tbody>
</table>

How big are the sculptures?

It is often difficult to ascertain how big the planned sculptures will be compared to other structures. One way to reference the size of the sculpture is to think of the size of an average house. In Queensland the average footprint of a house is around 227m$^2$ (CommSec 2017). Both of the installations combined will result in a total footprint of around 147m$^2$ (Refer Table 3).

We have also compared the individual footprints of the sculptures to several scales of John Brewer Reef (Figure 6).

Table 3. The size of the Sculptures

<table>
<thead>
<tr>
<th>Installation</th>
<th>Length (m)</th>
<th>Width (m)</th>
<th>Total Footprint (m$^2$)</th>
<th>Height (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coral gardens</td>
<td>15</td>
<td>5</td>
<td>75</td>
<td>4</td>
</tr>
<tr>
<td>Coral Greenhouse</td>
<td>12</td>
<td>6</td>
<td>72</td>
<td>5</td>
</tr>
</tbody>
</table>
Figure 4. Schematic for ‘Coral gardens’ compared to average footprint of a Queensland house

Average footprint of a house in Queensland = 227m²

Approximate footprint of 'The Walkway' = 75m²

Figure 5: Comparison of the footprint of an average Queensland house with the ‘Coral Greenhouse’ and its components

Average footprint of a house in Queensland = 227m²

Approximate footprint of 'The Greenhouse' only = 72m²

Approximate footprint of the largest sculpture ‘The Greenhouse’ = 242m²

Note: The entire footprint is not completely filled in
Figure 6. Comparison of the footprint of Coral Greenhouse and Coral Gardens at various scales of John Brewer Reef
How did John Brewer Reef get its name?
The troop ships ‘John Brewer’, ‘Kelso’ and ‘Arab’ sailed from Sydney for India carrying a total of 26 officers and 700 men from the 18th Regiment of Foot (Sydney Gazette and New South Wales Advertiser 16/06/1842:2), commonly known as The Slashers (Stone 2006:463). The convoy was joined by the barque ‘Hopkinson’ when they were off Cape Bowling Green. On the 30th of June 1842 all ships grounded on reefs north-east of Palm Island (Sydney Morning Herald 28/12/1842:2). The Reefs derived their names from this event: the John Brewer Reef where the ‘John Brewer’ struck

John Brewer Reef, located offshore Townsville within the GBR Marine Park, is an ideal location for underwater art, education, science and tourism. It has a history of tourism infrastructure with moorings, pontoon and a floating hotel (Saenger and Dutton, 1994, Harriott and Saenger 1995, Kapitzke et al, 2002). John Brewer Reef has a history of scientific research by government, university and citizen scientists (Saenger and Dutton, 1994; Reef Check, 2004, AIMS 2019). John Brewer Reef has other current and historical users including fishing and Defence activities. A detailed scientific assessment of coral, fish, invertebrates and sediment at several sites at John Brewer Reef indicated it is highly suitable for installation of an underwater museum based on multiple ecological, aesthetic and logistical values. The site is 14-18m deep and described as 99% flat sand, no live coral cover, 50% fewer fish species 80% lower fish abundance and 90% lower invertebrate abundance compared to two control sites at John Brewer Reef.

John Brewer Reef is 40 Nm (74 km) offshore from Townsville (Figure 6), and the reef measures 6.1km x 2.8km. The preferred installation locations of the public art sculptures in the Townsville region has been selected by the MOUA Board in consultation with scientists, tourism industry, stakeholders and engineers. A total of two underwater sculptures are proposed to be installed at two sites at John Brewer Reef: Coral Greenhouse and Coral Gardens (Figure 7, 8).
How will the underwater sculptures be installed and decommissioned?

Prior to installation, the MOUA project team and contractors Pacific Marine Group (PMG) will work with GBRMPA Environmental Site Supervisors to mark underwater sculpture footprints (with temporary star pickets and floats) at the two proposed sites. This process will enable GBRMPA to confirm underwater sculptures will be installed on bare sand or coral rubble and in areas that do not impact on other infrastructure such as moorings, reef protection markers or navigation channels or on any important sites or
features for amenity, navigation or cultural, historic or scientific interest, fishing, endangered, rare or migratory species or sensitive habitats.

Underwater sculptures are installed at specific locations (Figure 6, 9, Table 4) by commercial vessels and expert teams to ensure safety, environmental, social-cultural and economic values. The size and weight of the sculptures are relevant to the selection of vessels, crane and installation method. The sculptures will be installed during calm weather by professional salvage operators with barges and cranes. The Board proposed to utilise local experienced contractors such as Pacific Marine Group for the installation and engineering certification of the sculptures in late 2019. The sculptures and their footings (comprising concrete stands) or anchors will be placed on sand or bare substrate in approximately 8 to 18 metres of water. An Environmental Management Plan will be prepared by MOUA and the contractor to guide installation and decommissioning processes.

A range of vessels, barges and commercial divers will be used for the installation including tugs, crane barge and medium/large barges. The final choice and configuration of equipment for installation of sculptures will be based on quotes, availability, expertise and price.

![Figure 9. Map of John Brewer reef with proposed locations for art installations. The black and white, higher resolution images of sites are from 1984 KZML file from AIMS](image)

Table 4. Proposed specific locations for installation of sculptures

<table>
<thead>
<tr>
<th>Sculpture</th>
<th>Island/Reef</th>
<th>GPS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coral Gardens</td>
<td>John Brewer Reef</td>
<td>-18.621800, 147.052050</td>
</tr>
<tr>
<td>Coral Greenhouse</td>
<td>John Brewer Reef</td>
<td>-18.614067, 147.068950</td>
</tr>
</tbody>
</table>

PMG who are an internationally recognised marine contractor with significant experience in marine installations, have advised that the sculptures will be built and assembled in the PMG premises in the Townsville Port, and will be crane lifted onto a barge in sections, steam to site, and lifted into position.
- Each crane lift will be under 50T
- The Greenhouse and coral garden which are being built in Townsville at a local marine fabricator, EDMS, will be made from 316 Marine Grade Stainless Steel and fixed to a concrete base. No toxic materials will be applied to the structures as the desire is to promote growth of benthic species such as coral.

The installation process involves an I beam base, that attaches onto 4 x grouted screw moorings (PMG’s patented environmentally friendly moorings). This would allow the moorings to be screwed down to the correct height, meaning the structure would be perfectly level on the 4 EFMs and no matter what the seabed did with scour or seabed accretion, the structure would stay at the same level, and these 4 EFMs would provide the hold down needed in extreme weather events (Figure 10).
Detailed environmental site assessments have been conducted (Reef Ecologic 2018). We will prepare Environmental Management Plans and Schedules of Works to document the installation and decommissioning process. We will seek two salvage quotes for decommissioning removal of the sculptures.

Figure 10. Proposed installation of Coral greenhouse in 3 sections with 4 screw moorings

What are the timeframes?
The proposed date of installation is between November - December 2019. This timing has been selected to coincide with completion of artworks and calm weather. We anticipate that installation of two underwater sculptures will involve 3-10 days of field work over a 28 day period in November to December 2019.

Are these artworks permanent?
It is proposed that the underwater sculptures will have a design life of 10 to 20 years. During this time the sculptures will be regularly checked for corrosion, damage and growth of marine life. MOUA will provide a Decommissioning plan if the sculptures are determined to be unsafe for divers or if the sculptures are assessed as a high risk of damage to the marine environment.

What are the Risks and benefits?
A detailed risk assessment is provided in Appendix 2 and a summary risk assessment in Table 5. The detailed risk assessment includes three activities: Construction and installation of a facility (Nov/Dec 2019), Operation of a facility (Dec 2019 to Dec 2025) and decommissioning of a facility (at expiration of the permit or in the case of an incident or issue). The risk assessment considers a range of environmental, social, heritage and cultural values, impacts, pre-management risk assessment, avoidance and mitigation measures and post management mitigation measures.
Underwater art installations can damage living reefs and the overall risk during construction, operation and decommissioning phases is assessed as Low risk, with careful management and agreed risk mitigation strategies. Underwater art installations can also provide benefits such as new habitat for marine plants and animals, increasing local biodiversity and providing convenient concentrations of marine life for observation by visitors.

Underwater art can provide social benefits for people to explore, learn and be inspired by the marine environment, science, education, art, management, issues and solutions. Underwater art has an appeal and “wow” effect on locals, visitors and tourists. Underwater art is subjective and some designs and artists are disliked by some people and a segment of the community prefer a natural experience without human-made attractions or other people.

Through complementary interpretation centres, trained guides and thoughtful design of both artworks and experiences, underwater art have educational benefits for conveying important messages about the threats to ocean systems, our dependency on healthy ecosystems, and the opportunities to act to improve their outlook. These experiences can expand and fortify the foundations of public support for marine management, and empower citizens to contribute to collective actions that are necessary to rebuild the resilience of vital habitats such as coral reefs. On a global level Jason deCaires Taylor’s works reached an audience of over 1 billion over the past 10 years

Underwater sculptures can generate economic benefits for tourism and local communities. In Australia, tourism generates approximately $11.2 billion of direct expenditures per annum for Queensland and $6.4 billion per annum for the Great Barrier Reef (Perry, 2017). More than 22 million tourists visit Queensland of which more than 2 million people visit the reef each year, many spending one or more days snorkeling

### Table 5. Summary of risk assessment for MOUA sculptures at John Brewer Reef

<table>
<thead>
<tr>
<th>Activity</th>
<th>Hazards</th>
<th>Values</th>
<th>Impacts</th>
<th>Avoidance and mitigation</th>
<th>Risk</th>
</tr>
</thead>
</table>
| Construction and installation of a facility | Direct death or removal of living things, including vessel strike | Coral reefs Corals Other invertebrates Traditional owner heritage Historic heritage Other heritage Appreciation Aesthetics Enjoyment Access | Coral and other invertebrates, and sessile/benthic fishes, struck by vessels/artworks/moorings/anchors causing injury or death | • Site is sand with adequate buffer for vessels and anchors  
• Select calm weather for transport and installation  
• Advise key stakeholders  
• EMP  
• Permit requires environmental site supervision by GBRMPA | Low |
| Operation of a facility         | As above                                     | As above                           | Structures become unsecured, damaging surrounding environment (particularly notable during cyclone/severe storm events) Underwater art causes conflict with current users/uses | • Environmental and social research  
• Educational materials (and trained guides) at facilities to ensure responsible reef practices  
• Contingency plan for cyclone/severe weather events  
• Annual inspections  
• Moorings  
• Communication plan | Low |
| Decommissioning of a facility   | As above                                     | As above                           | Damages facilities cause marine debris | • Contingency plan for cyclone/severe weather events  
• Annual inspections | Low |
or diving. Townsville has a small reef tourism industry based around Magnetic Island, day trips to the reef and multi-day trips to the reef and SS Yongala. It is estimated that the five commercial dive tourism operator transport approximately 8-10,000 dive tourists per annum. A similar number of snorkeling and SCUBA tourists use the waters around Magnetic Island.

Underwater art installations, especially those characterized by large scale and high-quality art works, have the potential to be significant economic developments. Previous examples, such as the underwater museums in Grenada, Bahamas and Mexico, have generated a range of unique opportunities to generate revenue that can be reinvested in the community, the management of the attraction and the conservation of the ecosystem.

Additionally, by increasing the appeal of a tourism destination and attracting increased tourism, underwater art installations can lead to significant flow-on benefits to businesses providing tourism services, including hotels, restaurants, public transport and retail outlets.

**Monitoring and evaluation of the project**

We will conduct environmental, social and infrastructure monitoring of the sculptures at John Brewer Reef. The MOUA project will be monitored by scientists (including AIMS and JCU) and citizen scientists. We propose to monitor a suite of ecological (fish, coral and benthic diversity on and around the sculptures), socio-cultural (satisfaction) and economic indicators (increase in tourism, visitation and the economic value of these) as suggested by Hein et al. 2017. We will aim to co-design monitoring indicators that are relevant to managers, industry and community.

Pre and post installation environmental monitoring will include Reef Health Impact Surveys of benthic habitat and visual fish surveys. It is proposed that these surveys will occur in Nov 2019 (pre) and Jan 2020 (post) and then be annual surveys.

Social monitoring will include surveys of tourists and visitor attitudes of the sculptures. We will build on the social monitoring undertaken in 2018 and 2019 for the Whitsundays Reef Recovery and Public Art project. It is proposed that approximately 1-400 tourists surveyed annually. The first annual survey is proposed from Mar-Aug 2020.

In water infrastructure monitoring assessments of all sculpture infrastructure will be conducted annually or within 30 days of a cyclone/destructive weather. Monitoring will use visual surveys to assess the structural integrity and overall condition of the sculptures will be given an overall assessment rating as either poor, fair or good.

Assessment ratings for underwater sculptures include three ratings:

- **Poor** - The sculpture is broken at attachment points, the integrity of the structure is compromised and parts of the sculpture are moving in the current. There is evidence that the underwater sculptures are moving (scarring on the seafloor). Urgent attention (maximum time 3 months from surveyed date) required to improve the condition of the sculptures to ‘Good’.
- **Fair** - The sculpture is showing signs of wear at anchor points and/or other joins or points of connection. There is no movement of the structure however consultation is required to consider medium term actions required.
- **Good** - The sculpture is showing minimal signs of wear at anchor points and/or other joins or points of connection. There is no movement of the sculpture and structural integrity remains high.

Effective management tools to mitigate the effects of underwater art installation and management include planning, risk assessment, site selection, training, site supervision, appropriate signage and briefings to educate visitors about best practice and their potential damaging activities. The MOUA Board recognises that there are potential risks associated with installation and ongoing operation of facilities such as underwater art and have carefully selected the sites for the location of underwater sculptures to prevent any damage to aquatic habitats such as coral or seagrasses. The Board will further reduce risk during installation by using expert marine contractors, select suitable calm weather and inviting supervision from
management agencies such as GBRMPA. In the July 2019 installation of four underwater sculptures in the Whitsunday region there was no environmental damage.

The MOUA sculptures will be regularly monitored and reviewed. We anticipate that the underwater sculptures will remain in situ for 6 to 10 years and then be assessed for remaining in situ or removal.

The process for considering decommissioning removal of the underwater sculptures will be related to annual inspections, incident reporting, risk assessment, information from environmental and social monitoring and discussions between the permittee, GBRMPA and key stakeholders.

Triggers and thresholds for discussion of removal of underwater sculptures

1. The sculpture is unsafe for tourists (number of injuries, deaths).
2. The sculptures have significantly reduced coral cover/diversity and fish abundance/biomass compared to baseline surveys
3. Greater than 50% of surveyed tourists agree with the statement “The underwater sculptures do not improve the marine environment, tourism or education”
4. High overall risk of Whitsunday Reef Recovery and Public Art Project

Following inspection of the underwater sculptures and annual environmental and social surveys, the MOUA risk assessment will be updated. If there is a high risk assessment that cannot be reduced by management the underwater sculpture(s) will be relocated or decommissioned.

Will the sculptures impact access by other marine park users?
It is possible that the sculptures will impact on other users of John Brewer Reef and the Great Barrier Reef Marine Park. The primary impact of access may be between different uses such as snorkelers and fishers who wish to use the small area. The public sculptures will be available for all people. The Board predict that the sculptures will be of particular interest to tourists and students and will increase visitation to the proposed locations.

What are underwater sculptures?
Underwater sculptures are artworks that are placed underwater on the seafloor or riverbeds to provide fascinating visual, emotional and physical experiences for visitors. Underwater sculptures provide opportunities for visitors to engage with the artworks through SCUBA diving or snorkeling, while intertidal or coastal installations provide opportunities for pedestrians or other non-swimming visitor to interact with the artworks.

Underwater art has a long history, with a range of artworks installed in underwater environments at popular dive locations around the world over the last few decades. Until recently, underwater art installations were usually individual sculptures, often installed by private businesses or local governments as isolated attractions and without overt connections to environmental issues or education.

Recently, an art movement has emerged with a strong focus on environmental issues and social engagement. Artists are placing environmental and social issues at the forefront of their art practice. This movement has spawned several major art installations, taking the form of mostly coastal or underwater museums. These are often designed and implemented with active participation and support from local communities and agencies responsible for conservation of underwater environments. Details of additional artwork projects can be found at Attachment 3

The Artist
Jason deCaires Taylor is a sculptor, environmentalist and professional underwater photographer. His permanent site-specific works span several continents and predominantly explore submerged and tidal marine environments. His multi-disciplinarily sculptural works explore modern themes of conservation and environmental activism; Over the past 10 years Taylor has created several large-scale underwater
"Museums" and "Sculpture Parks", with collections of over 850 life-size public works. More information about the artist and his work in Appendix 5.

A total of 36 intertidal and underwater art concepts were presented by deCaires Taylor (2017) for consideration by the Board. A second visit by Jason deCaires Taylor in October 2018 focused on the detail for the John Brewer Reef and Strand locations.

Who has funded the Museum of Underwater Art Project?
The proposed total cost for the MOUA at four locations is AUS$8-10 million dollars. Queensland Government has granted $2 million for Stage 1 (this project). Local Townsville businesses have provided $500,000 in cash and further in-kind support. In March 2019 the Federal Government granted AUD$1.5 million for the Palm Island component of the MOUA.

Stage 1 of the MOUA is co-funded by the Queensland Government, local businesses and managed by a volunteer Board. The people and organisations on the Board are at www.moua.com.au
The governance of MOUA is a Not for profit Board responsible for ongoing management and maintenance. The MOUA sculptures will be accessible to the public for free.

Engagement and consultation
Between March 2016 - August 2019 the MOUA project team have consulted widely with government, industry, tourists, scientists, artists, indigenous, media, community and technical experts to seek advice about the project. The consultation to date has involved meetings, festivals, events, field trips, presentations, media articles, social media and videos. The Board have developed a consultation logbook of over 120 consultation actions involving over 4000 stakeholder people/organisations. The consultation has refined the location(s) and design of artworks for this project.

A list of the organisations consulted to date includes:

- Great Barrier Reef Marine Park Authority
- Department of Innovation, Tourism and Industry Development
- Queensland Parks and Wildlife Service
- Townsville City Council
- Reef Check Australia
- Townsville Local Marine Advisory Committee
- James Cook University
- Australian Institute of Marine Science
- Palm Island Aboriginal Shire Council
- Pacific Marine Group
- Townsville Enterprise
- Townsville Chamber of Commerce
- Perc Tucker Regional Gallery
- Umbrella Studio
- Sealink Queensland
- Adrenalin Dive
- Bungalow Bay Koala Village
- Townsville Airport
- Port of Townsville
- Wulgurukaba traditional owners

Where do I go for more information?
General information on underwater sculptures can be obtained by viewing the 2015 TEDx talk ‘An underwater art museum teeming with life’ by Jason deCaires Taylor which has been viewed by over 1.5M people.
https://www.ted.com/talks/jason_decaires_taylor_an_underwater_art_museum_teeming_with_life?language=en
Or www.underwatersculpture.com
A presentation by Dr Adam Smith at the 2018 GBR Restoration Symposium ‘Can underwater art help reef restoration science’ https://vimeo.com/281558557 discusses two projects in Townsville and the Whitsundays.
Further frequently asked questions

Will there be a cost to see the underwater sculptures?
The sculptures are located at a remote location on John Brewer Reef and require a boat to access. The sculptures are public art and are freely accessible for Marine Park recreational visitors. The commercial tourism industry charges a fee for transport and services.

Can I go SCUBA diving and snorkeling at the sculpture sites?
Yes. SCUBA diving and snorkeling are encouraged and a great way to view the underwater sculptures at the proposed sites. Some sculptures will be more suitable to snorkeling while others will be more enjoyable on SCUBA.

Can I go fishing or spearfishing near the sculptures?
Yes. The sculptures are located within the Great Barrier Reef Marine Park and these activities are legally permitted at John Brewer Reef. If these extractive activities create conflicts we will propose mitigation or management strategies such as Special Management Areas (SMA), and this will be a decision for GBRMPA as to whether a SMA is implemented or not.

Can I touch the underwater sculptures?
Like coral reefs we advocate a no touching policy of the artworks. However on some part of the greenhouse divers will be allowed to access, touch and interact with it. We will document and encourage Responsible Reef Practices through training, websites and brochures. Over time the sculptures will accumulate marine life as corals and other life forms attached to them making the sculptures this will make the sculptures more interesting and ecologically more integrated into the local environment.

Is it safe for visitors to interact with underwater sculptures?
Visitor (and marine life) safety is a key consideration and the design of individual pieces to avoid entanglement and entrapment. The location, arrangement, and the method of installation are all important considerations to ensure minimal risk to visitors. The potential safety issues associated with marine life (sharks, stingers) and weather (currents, visibility), vessel traffic and snorkeling SCUBA activities must be considered and managed.

What is the size of the individual sculptures?
The sculptures are 3-Dimensional and vary in size. The human figurative sculptures are life-size and the Greenhouse design is approximately 7.5m tall. This is the approximate size of a standard house.

Will cyclones or extreme weather damage the underwater sculptures?
The sculptures have been placed in sheltered waters, secured with anchors, are extremely heavy with a low centre of gravity and have been certified by an engineer to withstand a category 3 cyclone. If the sculptures are damaged in category 4 or 5 cyclones the MOUA will clean-up, repair and restore.

Who owns the sculptures and who is responsible for them long-term?
The sculptures are owned by the Museum of Underwater Art Pty Ltd and they will be responsible for their care and maintenance.

What happens if sculptures are damaged?
If the sculptures are damaged, they will be assessed and a decision made by the Museum of Underwater Art Pty Ltd in consultation with the artist and GBRMPA to accept, repair or remove the sculpture.

Who will be responsible for ongoing maintenance of the sculptures?
Museum of Underwater Art Pty Ltd in consultation with the artist and GBRMPA is responsible for ongoing maintenance of the sculptures.
What can citizen scientists do to help with research and education?

Citizen scientists can assist by monitoring the habitats and species in the vicinity of the sculptures. We encourage GBRMPA Eye on the Reef monitoring protocols. You can learn more about Eye on the Reef at http://www.gbrmpa.gov.au/our-work/our-programs-and-projects/eye-on-the-reef. We also encourage sharing of photographs on social media and discussions about the environmental, social and educational benefits of underwater sculptures to raise awareness of issues and solutions.

References


Binney, J (2009). The recreational dive and snorkeling industry in the Great Barrier Reef [electronic resource]: profile, economic contribution, risks and opportunities. Research publication (Great Barrier Reef Marine Park Authority. Online) ; 95


Appendix 1. Concordance table
Museum of Underwater Art (Application G42006.1)
Regulation 88Q concordance table Great Barrier Reef Marine Park Regulations 1983

88Q Mandatory considerations in deciding whether to grant permission - The Authority must consider the following in deciding whether to grant a permission on an application, and whether or not to impose any conditions on the permission:

<table>
<thead>
<tr>
<th>Subregulation 88Q</th>
<th>Reef Ecologic Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) if the proposed conduct will take place in a zone—the objectives (if any) of the zoning plan for the zone;</td>
<td>John Brewer Reef is designated Conservation Park Zone</td>
</tr>
<tr>
<td></td>
<td>The Great Barrier Reef Marine Park Zoning Plan 2003 provides the following objective for the Conservation Park (yellow)</td>
</tr>
<tr>
<td></td>
<td>(a) to provide for the conservation of areas of the Marine Park; and</td>
</tr>
<tr>
<td></td>
<td>(b) subject to the objective mentioned in paragraph (a), to provide opportunities for reasonable use and enjoyment, including limited extractive use.</td>
</tr>
<tr>
<td></td>
<td>The proposal is small scale, low risk, focussed on reef science, restoration and education and we believe it will be a benefit for conservation. We believe the installation of underwater sculptures is consistent with the objectives of the zone and will NOT impact negatively on conservation values, areas or species. We acknowledge that the underwater sculptures will add a small area (174m for the entire marine park of 344,400km) and may be attractive for recruitment of benthic species such as coral and fish.</td>
</tr>
<tr>
<td></td>
<td>The underwater sculptures will provide new opportunities for an estimated 10,000 snorkelers and SCUBA divers per annum to enjoy the sculptures and associated coral reefs.</td>
</tr>
</tbody>
</table>
b) If the proposed conduct will take place in a specific area of the Marine Park to which a legislative instrument under the Act (whether these Regulations or another instrument), or a provision of such a legislative instrument, applies—that instrument or provision.

Note: Some examples of legislative instruments under the Act other than these Regulations are a zoning plan and a plan of management. Some examples of provisions are special management provisions of these Regulations for SMAs (such as regulations 47 and 88V) and regulation 117JB (about protection of whales in whale protection areas).

The proposed location is not within a Plan of Management Area and is not within any Special Management Areas.

c) Whether the applicant for the permission is a suitable person to hold a permission for the proposed conduct, having regard to:

(i) the applicant’s capacity to engage in and manage the proposed conduct to the satisfaction of the Authority; and

MOUA Ltd was established in 2018 as a Not for Profit Company to manage the affairs of the Museum of Underwater Art. MOUA Ltd established a Constitution that sets out its objectives focused on education, science, art and tourism supporting and promoting awareness of the Great Barrier Reef. MOUA Ltd is a membership based organisation with Directors and Members. MOUA Ltd is a registered organisation with ASIC. MOUA Ltd appointed a Company Secretary, Chairman, Deputy Chairman and Treasurer, holds relevant insurances and conducts its affairs in accordance with the Corporations Act 2001.

(ii) the applicant’s history in relation to environmental matters; and

MOUA Ltd is committed to environmental matters through its Constitution and the objectives for which the Company is established:

• To increase awareness, and promote the importance of the Great Barrier Reef, using sculpture to interpret the challenges the Reef faces in North Queensland such as climate change;
• To facilitate and promote activities consistent with the objectives that comply with the Great Barrier Reef Marine Park Authority and Queensland Government directions and permissions;
• To advance education and provide opportunities for students and tourists to engage in action based learning and meaningful travel destinations;
• To promote, establish and create Great Barrier Reef partnerships between government, industry, science, culture, education and the community;
• To increase the awareness of reconciliation with traditional owners and indigenous Australians and generate a benefit to traditional owners and indigenous Australians, particularly those of the Palm Island Group;
• To promote and advance Townsville and North Queensland as a sustainable and educational tourism destination.

(iii) If the applicant is a body corporate—the history of its executive officers in relation to environmental matters; and

MOUA Ltd Directors have been selected as leaders in their field who are able to guide the project through the regulatory framework. The MOUA Ltd Board is represented by science, legal, financial, traditional owners, tourism and governance specialists. The contracted artist has shown enormous commitment to global environmental awareness themes through his work.
<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>d)</td>
<td>the requirement in section 37AA of the Act for users of the Marine Park to take all reasonable steps to prevent or minimise harm to the environment in the Marine Park that might or will be caused by the user’s use or entry;</td>
</tr>
<tr>
<td></td>
<td>Our studies have determined that underwater sculptures can have positive and negative impacts on environmental, social and economic values depending on location, size and management. Our project was initiated by the Australian and Queensland governments to assist with new educational attractions for tourists and the community. Our baseline surveys, risk assessments and initial consultations have identified risks and MOUA are taking all reasonable steps to prevent or minimise harm. Examples of mitigation steps to minimise harm include training, material selection for sculptures and footings, RPEQ engineer certification of sculptures, site selection, calm weather selection for installation, advise key stakeholders of installation dates to avoid conflict, Environmental Management Plan, Environmental Site Supervisor, Statement of Works and these are described in more detail in the Risk Assessment (Appendix 3).</td>
</tr>
<tr>
<td>(iv)</td>
<td>if the applicant is a subsidiary of a holding company—the history of the holding company and its executive officers in relation to environmental matters; and</td>
</tr>
<tr>
<td></td>
<td>MOUA is not a subsidiary of a holding company.</td>
</tr>
<tr>
<td>(v)</td>
<td>whether the applicant owes any fee or other amount payable under the Act or these Regulations; and</td>
</tr>
<tr>
<td></td>
<td>MOUA has no outstanding fees payable under the Act or Regulations</td>
</tr>
<tr>
<td>(vi)</td>
<td>any other relevant matter;</td>
</tr>
<tr>
<td></td>
<td>The MOUA Coral Greenhouse sculpture is consistent with the GBRMPA (2017) Blueprint for Resilience priorities for Active, localised restoration and Fostering partnerships for action and innovation.</td>
</tr>
<tr>
<td>e)</td>
<td>whether there are feasible and prudent alternatives to the proposed conduct;</td>
</tr>
<tr>
<td></td>
<td>MOUA and the artist assessed six potential locations in the Townsville region (The Strand, Magnetic Island, Palm Island, Lodestone Reef, Keeper Reef, John Brewer Reef) for underwater sculptures. We workshoped the potential locations with stakeholders using environmental, social and economic values. The design of the underwater sculptures and their attachment to the substrate has considered cyclone ratings, safety, aesthetics and environmental factors.</td>
</tr>
<tr>
<td>f)</td>
<td>any written comments received under Division 2A.3A in connection with the application;</td>
</tr>
<tr>
<td></td>
<td>Not applicable at this stage. Pending public comment period.</td>
</tr>
<tr>
<td>g)</td>
<td>the relevant impacts of the proposed conduct;</td>
</tr>
<tr>
<td></td>
<td>The risk assessment considers a range of potential impacts during construction and installation of a facility, operation of a facility and decommissioning of a facility (Appendix 3). The potential impacts include: Heavy machinery and barges/boats/personnel temporarily cause noise disturbance (max 5 days); Movement of structures causes sediment suspension, smothering nearby corals; Use of machinery (e.g. barge, drill) causes local contamination, i.e. oil spillage; Nearby Coral and other invertebrates, and sessile/benthic fishes, struck by artworks/moorings/anchors causing injury or death; Building materials are left behind or, materials not tied down properly onboard become marine debris.</td>
</tr>
<tr>
<td></td>
<td>Our studies and experience have determined that the installation of underwater sculptures will have a very small ecological footprint and can be</td>
</tr>
</tbody>
</table>
installed with very small or no environmental impact. The sculptures will be installed on bare sand.
The sculptures will have a positive impact (benefit) by increasing the local habitat complexity and be an attractive site for settlement of benthos and small reef fish.
The sculptures will have a positive impact (benefit) for tourism, education and reef restoration activities.

h) options for avoiding, mitigating and offsetting those relevant impacts;

MOUA have implemented best practice environmental management through research and consultation to select the preferred sites to avoid impacts.

MOUA propose a range of mitigation steps to minimise harm include training, material selection for sculptures and footings, RPEQ engineer certification of sculptures, site selection, calm weather selection for installation, advise key stakeholders of installation dates to avoid conflict, Environmental Management Plan, Environmental Site Supervisor, Statement of Works and these are described in more detail in the Risk Assessment (Appendix 3).

i) options for monitoring and managing those relevant impacts;

The MOUA project will be monitored by scientists (including AIMS and JCU) and citizen scientists. We propose to monitor a suite of ecological (fish, coral and benthic diversity on and around the sculptures), socio-cultural (satisfaction) and economic indicators (increase in tourism, visitation and the economic value of these) as suggested by Hein et al.2017. We will aim to co-design monitoring indicators that are relevant to managers, industry and community.

Pre and post installation environmental monitoring will include Reef Health Impact Surveys of benthic habitat and visual fish surveys. It is proposed that these surveys will occur in Nov 2019 (pre) and Jan 2020 (post) and then be annual surveys.

Social monitoring will include surveys of tourists and visitor attitudes of the sculptures. We will build on the social monitoring undertaken in 2018 and 2019 for the Whitsundays Reef Recovery and Public Art project. It is proposed that approximately 1-400 tourists surveyed annually. The first annual survey is proposed from Mar-Aug 2020.

In water infrastructure monitoring assessments of all sculpture infrastructure will be conducted annually or within 30 days of a cyclone/destructive weather. Monitoring will use visual surveys to assess the structural integrity and overall condition of the sculptures will be given an overall assessment rating as either poor, fair or good.

The underwater sculptures will be managed by the permittee in accordance with permit conditions under the Great Barrier Reef Marine Park Act 1975 and the Environmental Protection (Sea Dumping) Act 1981.

j) a law of the Commonwealth or of Queensland as in force from time to time, or a relevant plan (as in force from time to time) made under such a law, that:

(i) relates to the management of the environment or to an area in the Marine Park; and

(ii) is relevant to the proposed conduct; except so far as that law or plan is covered by paragraph (b);

Public art installations are subject to several Commonwealth laws. A Sea Dumping Permit will need to be sought by MOUA and will progress following the public information package period.
<p>| | |</p>
<table>
<thead>
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</thead>
<tbody>
<tr>
<td><strong>k)</strong> if the proposed conduct also requires an approval or permit under the Environment Protection and Biodiversity Conservation Act 1999: &lt;br&gt; (i) whether the approval or permit has been, or is likely to be, granted and, if granted, the terms and conditions of it being granted; and (ii) any relevant assessment documentation (within the meaning given by subsection 133(8) of that Act) in relation to the approval or permit;</td>
<td>A referral under the EPBC Act is required to be made if a proposed action is likely to have a significant impact on Matters of National Environmental Significance (MNES). MOUAs assessment is that the project will not have a significant impact on MNES.</td>
</tr>
<tr>
<td><strong>l)</strong> if the proposed conduct also requires an approval or a permission (however described) under a law of Queensland—whether the approval or permission has been, or is likely to be, granted and, if granted, the terms and conditions of it being granted;</td>
<td>John Brewer Reef is in Commonwealth waters so no Queensland Government approvals are required.</td>
</tr>
<tr>
<td><strong>m)</strong> any recovery plan, wildlife conservation plan, threat abatement plan or approved conservation advice, that is relevant to the proposed conduct;</td>
<td>No recovery, conservation, marine debris or threat abatement plans necessary.</td>
</tr>
<tr>
<td><strong>n)</strong> any international agreement to which Australia is a party, or any agreement between the Commonwealth and a State or Territory, that is relevant to the proposed conduct;</td>
<td>Dumping of waste and other material from any vessel, aircraft or platform in Australian waters is prohibited under the Environment Protection (Sea Dumping) Act 1981, unless a permit has been issued. Permits are most commonly issued for dredging operations and the creation of artificial reefs. The Act fulfils Australia’s international obligations under the London Protocol (to prevent marine pollution by controlling dumping of wastes and other matter). The Act is administered by the Department of Environment and Energy (DEE); or by the Great Barrier Reef Marine Park Authority (GBRMPA) for activities inside the Great Barrier Reef Marine Park.</td>
</tr>
<tr>
<td><strong>o)</strong> any policies that are relevant to the proposed conduct and the management of the Marine Park or of its environment, biodiversity or heritage values and are:</td>
<td>Reef 2050 Long term Sustainability Plan (CoA 2015) &lt;br&gt; <strong>Blueprint for Resilience</strong> (GBRMPA (2017))</td>
</tr>
</tbody>
</table>
The following Authority policies and guidelines have been used to inform the environmental risk assessment and management plans:
- [Environmental Impact Management Permission System Policy](#)
- [Guidelines for the management of artificial reefs in the Great Barrier Reef Marine Park (GBRMPA 2011)](#)

None

The MOUA project is consistent with objective 2 of the Act.

1. The main object of this Act is to provide for the long term protection and conservation of the environment, biodiversity and heritage values of the Great Barrier Reef Region.

2. The other objects of this Act are to do the following, so far as is consistent with the main object:
   - (a) allow ecologically sustainable use of the Great Barrier Reef Region for purposes including the following:
     - (i) public enjoyment and appreciation;
     - (ii) public education about and understanding of the Region;
     - (iii) recreational, economic and cultural activities;
     - (iv) research in relation to the natural, social, economic and cultural systems and value of the Great Barrier Reef Region;
   - (b) encourage engagement in the protection and management of the Great Barrier Reef Region by interested persons and groups, including Queensland and local governments, communities, Indigenous persons, business and industry;
   - (c) assist in meeting Australia’s international responsibilities in relation to the environment and protection of world heritage (especially Australia’s responsibilities under the World Heritage Convention).
## Appendix 2. Risk assessment for MOUA sculptures at John Brewer Reef, Townsville

<table>
<thead>
<tr>
<th>Activity</th>
<th>Hazard(s)</th>
<th>Factors</th>
<th>Value(s)</th>
<th>Risk event</th>
<th>Impact</th>
<th>Pre-management</th>
<th>Post management</th>
<th>Avoidance and mitigation measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction and installation of a facility</td>
<td>Artificial light or change in natural light</td>
<td>Heavy equipment required for installation of structures</td>
<td>M</td>
<td>Sensitivity</td>
<td>Exposure</td>
<td>Heavy machinery and barges/boats/personnel temporarily cause noise disturbance (max 5 days)</td>
<td>Minor</td>
<td>Construction will occur on land</td>
</tr>
<tr>
<td></td>
<td>Change in current or future human use pattern</td>
<td>Coral reefs</td>
<td>M</td>
<td>Medium</td>
<td>Moderate</td>
<td>Movement of structures causes sediment suspension, smothering nearby corals</td>
<td>Possible</td>
<td>Site is sand with adequate buffer for vessels and anchors</td>
</tr>
<tr>
<td></td>
<td>Change in noise</td>
<td>Corals</td>
<td>M</td>
<td>Medium</td>
<td>Moderate</td>
<td>Use of machinery (e.g. barge, drill) causes local contamination, i.e. oil spillage</td>
<td>Possible</td>
<td>Advise key stakeholders about installation dates to avoid conflict</td>
</tr>
<tr>
<td></td>
<td>Change in sedimentation</td>
<td>Other invertebrates</td>
<td>M</td>
<td>Medium</td>
<td>Moderate</td>
<td>Nearby Coral and other invertebrates, and sessile/benthic fishes, struck by artworks/moorings/anchors causing injury or death</td>
<td>Possible</td>
<td>Permit requires approval of an Environmental Management Plan that covers construction activities and approval of RPEQ certified drawings to demonstrate artworks can withstand severe weather events</td>
</tr>
<tr>
<td></td>
<td>Contamination of water or sediment</td>
<td>Traditional owner heritage</td>
<td>M</td>
<td>Medium</td>
<td>Moderate</td>
<td>Building materials are left behind or, materials not tied down properly onboard become marine debris</td>
<td>Possible</td>
<td>Artsworks and moorings are constructed of materials approved by the Managing Agency, once assessed as low risk of environmental contamination.</td>
</tr>
<tr>
<td></td>
<td>Direct death or removal of living things, including vessel strike</td>
<td>Historic heritage</td>
<td>M</td>
<td>Medium</td>
<td>Moderate</td>
<td></td>
<td></td>
<td>Permit requires environmental site supervision to be undertaken through construction phase</td>
</tr>
<tr>
<td></td>
<td>Change in noise</td>
<td>Other heritage</td>
<td>M</td>
<td>Medium</td>
<td>Moderate</td>
<td></td>
<td></td>
<td>AMSA and MSQ are consulted as required.</td>
</tr>
<tr>
<td></td>
<td>Change in sedimentation</td>
<td>Appreciation</td>
<td>M</td>
<td>Medium</td>
<td>Moderate</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Contamination of water or sediment</td>
<td>Aesthetics</td>
<td>M</td>
<td>Medium</td>
<td>Moderate</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Direct death or removal of living things, including vessel strike</td>
<td>Enjoyment</td>
<td>M</td>
<td>Medium</td>
<td>Moderate</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Direct injury or disturbance of living things, including translocation</td>
<td>Access</td>
<td>M</td>
<td>Medium</td>
<td>Moderate</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Marine debris</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operation of a facility</td>
<td>Artificial light or change in natural light</td>
<td>Ongoing presence of six artworks</td>
<td>M</td>
<td>Underwater art causes conflict with current users/uses</td>
<td>Structures to be monitored and maintained in accordance with an EMP</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Coral reefs</td>
<td>M</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Corals</td>
<td>M</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Activity</td>
<td>Hazard(s)</td>
<td>Factors</td>
<td>Value(s)</td>
<td>Risk event</td>
<td>Impact</td>
<td>Pre-management</td>
<td>Post management</td>
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<td></td>
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<tr>
<td></td>
<td>Change in current or future human use pattern</td>
<td>Increased visitation</td>
<td>Other invertebrates</td>
<td>Structures affects water movement and leads to scouring around blocks/pylons</td>
<td>Educational materials (and trained guides) at facilities to ensure responsible reef practices</td>
<td>Stakeholders notified of location</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Change in noise</td>
<td>Reaction/s between materials used and receiving environments</td>
<td>Traditional owner heritage</td>
<td>Creation of habitat for corals/inverts/marine plants/fish</td>
<td>Contingency plan for cyclone/severe weather events</td>
<td>Permit duration to be issued in accordance with expected longevity of materials</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Change in sedimentation</td>
<td>Interaction between artworks and marine fauna</td>
<td>Historic heritage</td>
<td>Scouring occurs around blocks and influences how and where sediment moves in the local areas</td>
<td>Artworks to be secured in accordance with RPEQ certified drawings</td>
<td>Requirement for provision of inspection reports</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Contamination of water or sediment</td>
<td></td>
<td>Other heritage</td>
<td>Structures become unsecured, damaging surrounding environment (particularly notable during cyclone/severe storm events)</td>
<td>Installation of mooring(s) to prevent anchor damage and manage use</td>
<td>Communication plan for ongoing consultation and engagement with stakeholders is approved by the Managing Agency and implemented.</td>
<td></td>
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</tr>
<tr>
<td></td>
<td>Direct damage, removal or destruction of non-living things</td>
<td></td>
<td>Appreciation</td>
<td></td>
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<td></td>
</tr>
<tr>
<td></td>
<td>Direct death or removal of living things, including vessel strike</td>
<td>Aesthetics</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Direct injury or disturbance of living things, including translocation</td>
<td>Enjoyment</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td></td>
<td>Marine debris</td>
<td>Access</td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>
|         | Change in sedimentation                                                  |                                                                                             |用作结构,影响水的流动,导致周围结构浮力
|         | Contamination of water or sediment                                       |                                                                                             |用作结构,影响水的流动,导致周围结构浮力
|         | Direct damage, removal or destruction of non-living things               |                                                                                             |用作结构,影响水的流动,导致周围结构浮力
|         | Direct death or removal of living things, including vessel strike        |                                                                                             |用作结构,影响水的流动,导致周围结构浮力
|         | Direct injury or disturbance of living things, including translocation   |                                                                                             |用作结构,影响水的流动,导致周围结构浮力
|         | Marine debris                                                            |                                                                                             |用作结构,影响水的流动,导致周围结构浮力
<p>|         | Change in noise                                                          | Heavy equipment required for removal/demolition of structures                             | Coral reefs                                                               | Heavy machinery and barges/boats/personnel temporarily cause noise disturbance (max 5 days) | Minor                                                                                                                                  | Minor                                                                                                                                   |
|         | Change in sedimentation                                                  | Materials used                                                                              | Corals                                                                    | Movement of structures causes sediment suspension, smothering nearby corals | Possible                                                                                                                               | Unlikely                                                                                                                                  |
|         | Contamination of water or sediment                                       | Use of barges                                                                               | Other invertebrates                                                      |                                                                                           | Low                                                                                                                                     | Low                                                                                                                                      |
|         | Decommissioning of a facility                                            |                                                                                             | Traditional owner                                                        |                                                                                           |                                                                                                                                       |                                                                                                                                          |
|         | Change in noise                                                          |                                                                                             |                                                                                     |                                                                                           |                                                                                                                                       |                                                                                                                                          |
|         | Change in sedimentation                                                  |                                                                                             |                                                                                     |                                                                                           |                                                                                                                                       |                                                                                                                                          |
|         | Contamination of water or sediment                                       |                                                                                             |                                                                                     |                                                                                           |                                                                                                                                       |                                                                                                                                          |
|         | Direct damage, removal or destruction of non-living things               |                                                                                             |                                                                                     |                                                                                           |                                                                                                                                       |                                                                                                                                          |
|         | Direct death or removal of living things, including vessel strike        |                                                                                             |                                                                                     |                                                                                           |                                                                                                                                       |                                                                                                                                          |
|         | Direct injury or disturbance of living things, including translocation   |                                                                                             |                                                                                     |                                                                                           |                                                                                                                                       |                                                                                                                                          |
|         | Marine debris                                                            |                                                                                             |                                                                                     |                                                                                           |                                                                                                                                       |                                                                                                                                          |</p>
<table>
<thead>
<tr>
<th>Activity</th>
<th>Hazard(s)</th>
<th>Factors</th>
<th>Value(s)</th>
<th>Risk event</th>
<th>Impact</th>
<th>Pre-management</th>
<th>Avoidance and mitigation measures</th>
<th>Post management</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct damage, removal or destruction of non-living things</td>
<td>heritage</td>
<td>Use of machinery (e.g. barge, drill) causes local contamination, i.e. oil spillage</td>
<td>Dust of machinery (e.g. barge, drill) causes local contamination, i.e. oil spillage</td>
<td>Dust of machinery (e.g. barge, drill) causes local contamination, i.e. oil spillage</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Direct death or removal of living things, including vessel strike</td>
<td>Historic heritage</td>
<td>Nearby Coral and other invertebrates, and sessile/benthic fishes, struck by artworks/moorings causing injury or death; coral and other invertebrates which have settled on the artworks need to be relocated resulting in death</td>
<td>Permit requires environmental site supervision to be undertaken through demolition phase</td>
<td>Permit requires environmental site supervision to be undertaken through demolition phase</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Direct injury or disturbance of living things, including translocation</td>
<td>Other heritage</td>
<td>Building materials are left behind or, materials not tied down properly onboard become marine debris</td>
<td>Schedule of works conditions included to allow for any unexpected maintenance</td>
<td>Schedule of works conditions included to allow for any unexpected maintenance</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marine debris</td>
<td>Appreciation</td>
<td>Access</td>
<td>Use of machinery (e.g. barge, drill) causes local contamination, i.e. oil spillage</td>
<td>Use of machinery (e.g. barge, drill) causes local contamination, i.e. oil spillage</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**RISK RATING**

<table>
<thead>
<tr>
<th>RISK RATING</th>
<th>TREATMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>EXTREME</td>
<td>Risk is unacceptable; treatment is required in the immediate future.</td>
</tr>
<tr>
<td>HIGH</td>
<td>Develop and implement Corrective Actions as soon as possible.</td>
</tr>
<tr>
<td>MODERATE</td>
<td>Treatment to be considered conducive to operational requirements.</td>
</tr>
<tr>
<td>LOW</td>
<td>Considered acceptable to retain the risk, monitor and consider improvements if practicable.</td>
</tr>
</tbody>
</table>
Appendix 3. Scientific monitoring at John Brewer Reef

There is very good long-term scientific information of the benthic habitats and fish of John Brewer Reef with over 20 years of long-term monitoring by the Australian Institute of Marine Science (Figure 1, 2, Table 1, AIMS, 2019) and supplementary information from other research projects, coral bleaching surveys and citizen scientists. John Brewer Reef has been assessed most recently in 2019 as part of the AIMS monitoring programs. Coral cover was assessed as moderate (20-25%) and declining due to the effects of coral bleaching in 2016-17. COTS were observed in Active Outbreak during recent monitoring at John Brewer Reef. There has been significant effort in COTS control at John Brewer Reef by GBRMPA in 2018-19. AIMS long-term monitoring surveys are conducted along the reef slope parallel to the reef crest at about 6-9 m water depths.

Figure 1. Location of Long Term Monitoring Sites surveyed by Australian Institute of Marine Science (dotted line is the Manta tow survey path) and the location of proposed underwater sculptures.
Figure 2. Estimates of COTS (*Acanthaster solaris*), benthic cover and fish abundance at John Brewer Reef (from AIMS, 2019).

Table 1. Summary of status and trends of coral, crown of thorns starfish at John Brewer Reef (AIMS, 2019)

<table>
<thead>
<tr>
<th>Survey Method</th>
<th>Measure</th>
<th>1980s Average (range)</th>
<th>1990s Average (range)</th>
<th>2000s Average (range)</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
<th>2019</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manta tows on reef perimeter</td>
<td>Average percent cover of hard coral</td>
<td>5% (0-10%)</td>
<td>17% (0-40%)</td>
<td>7% (0-30%)</td>
<td>30-40%</td>
<td>40-50%</td>
<td>30-40%</td>
<td>10-20%</td>
</tr>
<tr>
<td></td>
<td>Crown-of-thorns starfish/tow</td>
<td>6.8 (0-34)</td>
<td>0 (0-0)</td>
<td>0.9 (0-4.4)</td>
<td>0.01</td>
<td>0</td>
<td>0.01</td>
<td>0.04</td>
</tr>
<tr>
<td></td>
<td>Outbreak Status*</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>AO</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Fixed transects on survey sites      | Average percent cover of hard coral | Not Surveyed | 24% (10-31%) | 8% (1-22%) | 24% Not Surveyed | 26% Not Surveyed | Not Surveyed |
|                                      | Total fish species        | Not Surveyed | 81 (76-84)  | 77 (71-84) | 81 Not Surveyed  | 70     | 74     |

Color coding reflects an assessment of the status of hard coral cover relative to long-term GBR-wide averages:

- **Low** (0-10%)
- **Moderate** (10-30%)
- **High** (30-50%)
- **Very High** (50-75%)
- **Extremely High** (75-100%)

* AO = Active outbreak, IO= Incipient outbreak, RE = Recovering from past outbreak, NO = No outbreak after recovering or no history of outbreaks.
Two rapid site evaluation surveys were conducted at John Brewer Reef of visibility, reef biomass, depth, access, storm exposure, anchoring/substrate, substrate level, art aesthetics, logistics accessibility and community engagement in July 2017 (Figure 3).

A detailed scientific assessment of coral, fish, invertebrates and sediment at the preferred site of the Coral Greenhouse at John Brewer Reef and two control sites was undertaken in May 2018 (Reef Ecologic, 2018). The surveys were undertaken in 14-18m of water, which is a deep, sand dominated habitat compared to AIMS long-term monitoring surveys of coral reefs, which occur in 3-9m. Sand habitat averaged 84.78% (±SE 6.17) and dominated the three sites surveyed. At the proposed museum of underwater art site the sand...
averaged 99% (±SE 4.18) with 1% consisting of benthic filamentous macroalgae. No live coral was recorded at the proposed underwater museum site. Live coral cover of 6 and 7% was recorded at the control sites. With an abundance of marine life on the surrounding reef it is expected that the Museum of Underwater Art installations will attract a variety of marine life further enhancing their appeal and attractiveness.
Appendix 4. Underwater Art in the Great Barrier Reef Marine Park

There are three underwater art projects in the Great Barrier Reef Marine Park that have been permitted and installed. The first was a temporary installation at Moore Reef, Cairns in 2013 of several paintings and an inflatable turtle (Figure 1). The second art research project involved four marine sculptures of a nudibranch, boxfish and crab that were temporarily installed (and since removed) at Langford Reef, Whitsundays by Reef Ecologic in 2018 (Figure 2). The four underwater sculpture project involves six sculptures of marine species installed in the Whitsunday region in July 2019 by Reef Ecologic and Whitsunday Regional Council (Figure 3).

Figure 1. Underwater paintings temporarily installed at Moore Reef, Cairns
Figure 2. Four underwater sculptures temporarily installed at Langford Reef, Whitsundays.

Figure 3. Four underwater sculptures installed in the Whitsunday region in July 2019.
Appendix 5. The artist – Jason deCaires Taylor


A prolific sculptor, Jason deCaires Taylor became the first of a new generation of artists to shift the concepts of the Land art movement into the realm of the marine environment. He gained international notoriety in 2006 with the creation of the world’s first underwater sculpture park, situated off the west coast of Grenada in the West Indies. Now listed as one of the Top 25 Wonders of the World by National Geographic the park was instrumental in the government declaring the site a National Marine Protected Area. This was followed in 2009 when he co-founded MUSA (Museo Subacuático de Arte), a vast collection of over 500 of his sculptural works, installed between Cancun and Isla Mujeres in Mexico.

Other major projects include Museo Atlantico (2016), a collection of over 300 submerged sculptures and architectural forms in Lanzarote, Spain, the first of its kind in European waters. The Rising Tide (2016 Thames London) and Ocean Atlas a monumental 60-ton single sculpture located in the Bahamas.

The works are constructed using pH neutral materials to instigate natural growth and the subsequent changes intended to explore the aesthetics of decay, rebirth and metamorphosis. His pioneering public art projects are not only examples of successful marine conservation, but works of art that seek to encourage environmental awareness, instigate social change and lead us to appreciate the breathtaking natural beauty of the underwater world.

He has received numerous sculpture and photography awards and is a member of The Royal Society of Sculptors, Ocean Ambassador to DAN (Divers Alert Network), Ocean Exemplar of The World Ocean Observatory and a featured TEDx speaker. In 2014 he was awarded The Global Thinker by Foreign Policy, described as the Jacque Cousteau of the Art world.
2006 GRENADA
Molinere Underwater Sculpture Park
Location: Molinere Beauséjour Marine Protected Area, Grenada
Depth: 6m
Feature: 1st underwater sculpture park ever created.

2009 MEXICO
M.U.S.A. Museo Subacuático de Arte
Location: Isla Mujeres, Cancún, Mexico
Depth: 4-8m
Installation Date: 2009
Feature: 1st underwater sculpture museum consisting of over 800 sculptures.

2014 BAHAMAS
Ocean Atlas
Location: Nassau, Bahamas
Depth: 5m
Feature: Largest underwater sculpture ever created. 5m high, 60 Tons.

2016 SPAIN
Museo Atlántico
Location: Las Coloradas, Lanzarote, Atlantic Ocean
Depth: 14m
Feature: First underwater museum in Europe and the Atlantic Ocean.

Figure 1. Examples of Jason deCaires Taylor’s underwater sculptures