

Noosa Oyster Ecosystem Restoration Project

Restoration and conservation of shellfish reefs in the Noosa River

Annual Report No. 2

Report prepared by: The Nature Conservancy

Reporting Period: September 2020 to August 2021



Figure 1: An example of a mature rock oyster patch, Gladstone, QLD. Courtesy of Ben Diggles.

This project was made possible by The Nature Conservancy, Noosa Shire Council, The Thomas Foundation, Australian Marine Conservation Society and Australian Government. The project is located on Kabi Kabi Sea Country.

Contents

Purpose and scope.....	3
Background.....	3
Project overview	4
Project partners and governance.....	5
Conservation deliverables	6
Work sequence	6
Progress summary.....	6
Reef Builder	8
Unforeseen issues arising and project adaptation.....	8
Total progress to date.....	10
Community engagement	20
Public information sessions.....	20
Community engagement workshop.....	20
Shuck Don't Chuck	23
Senior Schools Project	24
Junior Schools Project.....	24
Oyster Gardening Project	25
Waterwatch.....	26
Hatchery partnership.....	26
Handling oysters and oyster shell - biosecurity.....	27
Communication products	28
Media.....	33
Technical outputs.....	36
Restoration suitability model	36
Restoration zones	40
Bathymetric mapping	42
Habitat mapping	43
Project restoration plan.....	45
Permits.....	46
Pilot reef construction plans	47
Project finances.....	48
Next steps.....	50
Annex 1: Goals, objectives and deliverables of the project.....	51
Annex 2: Project Brief	56

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V1	For review by TAG + TNC + NSC	TNC	20.08.2021
V2	Final version submitted	TNC	30.08.2021

Purpose and scope

The purpose of this report is to provide an annual update as to the performance and progress of the project: *Noosa Oyster Ecosystem Restoration Project*; a partnership between The Nature Conservancy (TNC), Noosa Shire Council (NSC), The Thomas Foundation (TTF), Australian Government and the community of the Noosa shire. The governance arrangements for the Project are defined in the *Alliance and Funding Agreement* between The Nature Conservancy and Noosa Shire Council, which was executed on the 25th July 2019.

This report pertains to the period of 22nd of August 2020 and 21st of August 2021

Report Log

Six Monthly Report 1 – 28th July 2019 to 28th of February 2020

Annual Report 1 – 28th July 2019 to the 21st August 2020.

Six Monthly Report 2 - 22nd August 2020 to 28th February 2021

Annual Report 2 – 22nd August 2020 to 21st August 2021

Background

Over the last four years, Noosa Shire Council (NSC), The Nature Conservancy (TNC) and a range of stakeholders have worked together to build a deeper understanding of the environmental significance and long-term sustainable management options for the Noosa River. This has included:

Noosa River Expert Workshop, Powerhouse Museum, 2014

A two-day workshop, hosted by TNC on behalf of The Thomas Foundation and Noosa Parks Association, comprising 12 academic and NGO estuary scientists. The workshop identified 14 conservation activities that could lead to a healthier Noosa River, with oyster reef restoration listed as a priority action in addition to prawn restocking and Kin Kin sediment management. These activities (including further scoping studies) were later jointly funded by NSC Noosa Parks Association, The Thomas Foundation and the Noosa Biosphere Reserve Foundation.

TNC Oyster Restoration Scoping Study, 2015

TNC and Ecological Service Professionals Pty on behalf of NSC and others undertook a short, five-month ecological assessment to quantify oyster densities across 11 intertidal and subtidal sites within the estuary. The study confirmed high densities of oyster recruitment particularly around Weyba Creek, the main channel around Tewantin, and in the narrow channel between Goat Island and Noosa North Shore. The project recommended installing a number of pilot reefs for further assessment.

University of Queensland Historical Ecology of the Noosa Estuary fisheries, 2015

Ruth Thurston from the University of Queensland undertook a historical ecology study on behalf of TNC and NSC in the Noosa River estuary to develop an understanding of historical fisheries productivity, including oysters. The study confirmed oyster reefs used to exist in the estuary and were commercial harvested in the early 1900s. Fish populations were also significantly larger in the past than they are today.

University of Sunshine Coast, Bring Back the Fish, 2018-2020

A three-year study which installed a series of experimental 'reef units' consisting of coir bags filled with oyster shell at 15 sites across the estuary. The project studied the structural integrity, oyster recruitment, fish and invertebrate community assemblages and human interactions with the reefs. This project collected important ecological information that will support the final design and implementation of reef restoration in this Project. The project promised the delivery of oyster reefs but failed to deliver on that promise. The coir bags used to contain the oyster shells disintegrated rapidly, or were damaged, and became rapidly covered in silt in most locations. Coir bags were in vogue at that time and were used throughout the world for restoration purposes. Due to their high biodegradability, coir bags have largely been replaced with more durable products or alternative restoration methods.

NSC-TNC Partnership Agreement and Contract 2019

NSC and TNC, in addition to other organizations with an interest in the River's sustainability (including Noosa Parks Association, The Thomas Foundation and Noosa Biosphere Reserve Foundation), through a series of dialogue and presentations to Noosa Shire Council, have recognized the strategic priorities of both organizations and of others would be more effectively served through a formal partnership, rather than on an individual project basis. This agreement led to the development of this project, and associated contract between NSC and TNC, and is the main delivery mechanism of the TNC-NSC Partnership.

TNC Project Management Plan 2020

The TNC Project Management Plan including Communications Plan and Monitoring, Evaluation and Reporting (MER) Plan was completed and independently peer-reviewed in 2020. It was presented to, and endorsed by Noosa Council in July 2020.

Project overview

This project aims to restore oyster ecosystems in the Noosa River and with them, the multitude of benefits to people and nature they provide. Past research projects demonstrated that the Noosa River estuary held the promise of sufficient oyster recruitment and survival, and invertebrate colonization, at a number of locations to make the estuary a viable place to pursue an oyster reef restoration project at scale.

The primary objective of the *Noosa Oyster Ecosystem Restoration Project* ("The Project") is to construct and restore shellfish ecosystems to the Noosa River estuary. These oyster ecosystems will be here for the benefit of nature and for people.

Historically, oyster-dominated ecosystems were prolific throughout the Noosa River estuary. These ecosystems (beds and reefs) were created predominantly by Sydney rock oysters (*Saccostrea glomerata*) which formed three-dimensional infrastructure in the river and attracted a myriad of species and their associated ecosystem functions.

The oyster ecosystems added extensive 'natural infrastructure' to the estuary and provided the estuary with a range of environmental services including:

- Providing complex habitats for marine species such as fish, invertebrates, corals, ascidians, encrusting sponges and algae, and reef communities;
- Filtering sediment and pollution;
- Aiding bank stabilization and protection, and
- Providing complex vertical and horizontal living spaces, and feeding grounds, for a multitude of intertidal and marine creatures, which are today important for marine and coastal tourism activities such as fishing, diving and bird watching.

Project partners and governance

This Partnership commenced on 25 July 2019 and will run for three years and three months, with the outcomes of the Partnership to be reviewed in July 2022. The total operating budget is \$2.4M, inclusive of \$1.2M from The Nature Conservancy (TNC), which includes \$200,000 from the Australian Marine Conservation Society (AMCS), and \$1.2M from NSC. In 2021, the Australian Government-funded national Reef Builder project provided an additional \$1.2m to the project, bringing the total project budget to \$3.6m.

Project management is led by TNC in partnership with NSC and the Noosa community (see Figure 2). A Technical Advisory Committee will oversee scientific and technical aspects of the project and include representatives from TNC, NSC, State Government, Kabi Kabi Traditional Owners and other experts as required. The governance arrangements for this project are defined in the *Alliance and Funding Agreement* between TNC and NSC executed on 25th July 2019.

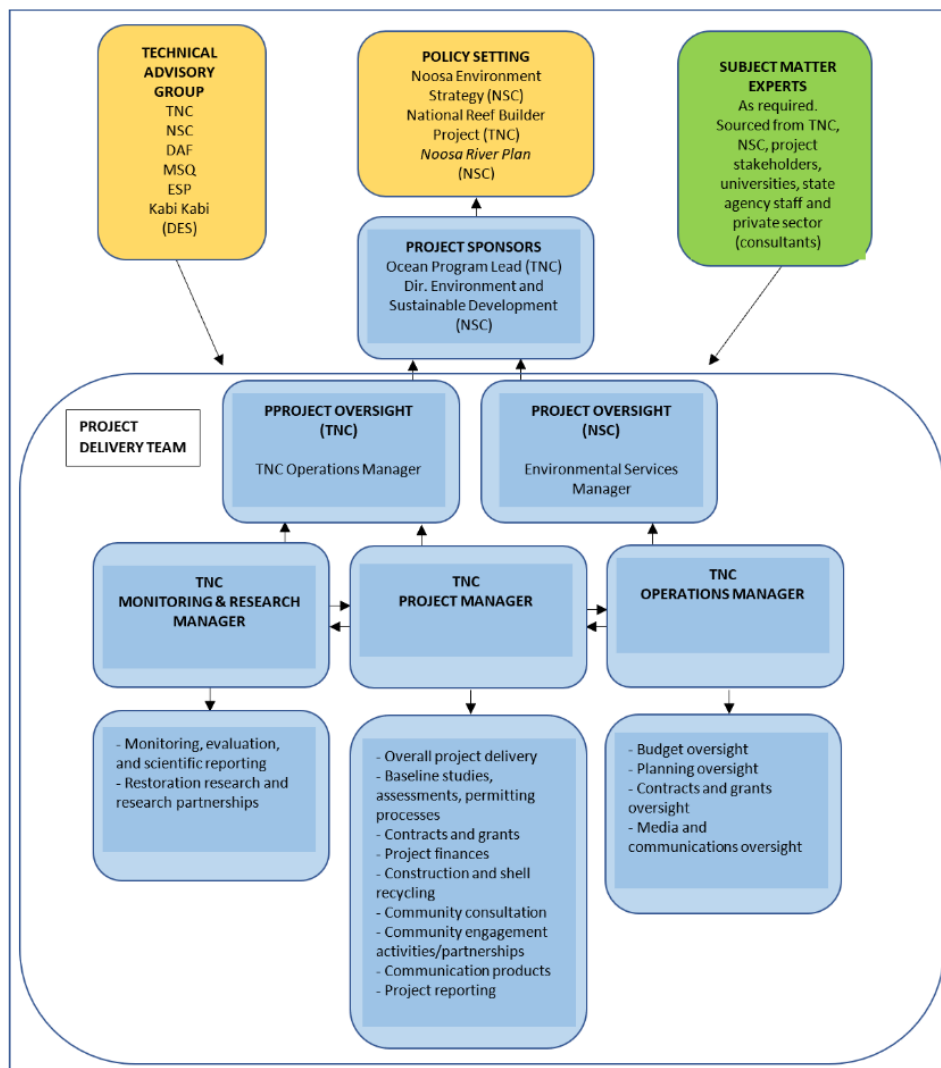


Figure 2. Project Delivery Team, including Project Sponsors, Technical Advisory Group and Subject Matter Experts.

Conservation deliverables

The Project principally delivers the following conservation initiatives:

1. Restoration of Noosa's oyster ecosystems at practical and agreed locations;
2. Engagement of the Noosa community and local businesses in meaningful volunteering and marine education opportunities;
3. Exploration of the potential to restore seagrass habitats in Lake Cooroibah (and potentially elsewhere) to reduce sediment resuspension and increase invertebrate and fish biomass in the estuary (to be delivered as part of Objective two and five), and
4. Provision of technical advice to NSC in identifying opportunities for sustainable commercial and recreational fisheries in the Noosa River.

Work sequence

The Project is split into three work packages, or phases, to reduce ecological and financial risks through the application of an adaptive management framework whereby learnings from previous phases are included in future phases to consider prior learning and minimize risk:

1. *Optimal design and siting* (2020) which includes pre-planning to determine the optimal design, locations and most cost-effective method of reef restoration;
2. *First site implementation* (2020-2021) which will construct full sized oyster beds at two sites in the estuary to test initial restoration methods and designs, and
3. *Full restoration* (2021-2022) which restore oyster beds at all suitable (and approved) sites within the estuary.

Progress summary

TNC has achieved the following:

- Permit applications submitted to government. Permits expected by 31 October 2021.
- Community Engagement Workshop with 10 stakeholder groups facilitated from which partnership projects were selected;
- Nine public information and consultation forums facilitated with 28 local stakeholders;
- Three local restaurants joined the Noosa *Shuck Don't Chuck* shell recycling project - Noosa Yacht and Rowing Club, Noosa Harbour Fish Market and Grenny's Noosa by the River;
- Over 90 face-to-face meetings held with Noosa stakeholders to date, either to brief them about the project or to harness their expertise or views;

- Media highlights included the joint TNC-NSC media release for the Reef Builder project
- TNC reached 436,547 people through mainstream media and 23,666 people through social media;
- 459 people visited the project website;
- 15 tonnes of oyster shell was recycled and prevented from entering landfill;
- One partnership formed with Noosa Integrated Catchment Association (NICA) to deliver oyster gardening and water quality monitoring;
- One partnership with Noosa Environmental Education Hub (EEhub) established to deliver the Noosa Senior Schools engagement project with three local schools;
- One partnership with Noosa Biosphere Community Association (NBCA) established to deliver the Junior Schools engagement project with three local schools including indigenous involvement and community awareness;
- Detailed bathymetry of four oyster ecosystem restoration sites mapped with partner Northgroup Consulting;
- Detailed habitat mapping of four oyster ecosystem restoration sites completed with partner Ecological Service Professionals (ESP);
- Three engineered concept models and four engineered site plans developed and certified for four oyster ecosystem restoration sites with coastal specialist partner, Integrated Coastal Management (ICM);
- Detailed Project Restoration Plan including risk assessments, site management and contingency measures developed and submitted to government. Annexed to the Restoration Plan are five detailed government code assessments;
- Project information sheet, Project Q&A information sheet, Rock Oyster Fact Sheet, and special Project Brief (reef design and restoration sites) developed and distributed;
- 101 stakeholders received the *Noosa Oyster Chronicle* news circular - Autumn 2021 and Winter 2021 editions;
- Three local quarries assessed for capacity to provide quality rock for oyster reef patches;
- One construction loadout site identified to support construction works with the support of Noosa Shire Council (NSC)

Currently in progress:

- Oyster seeding contract development to produce 5-10m oyster spat
- Shell washing and bagging of 2 tonnes of cured oyster shell;
- Monitoring and evaluation contract development and baseline survey planning;

- Request for Quotation and Construction contract development, and
- Signing up of 10+ oyster gardeners and rolling out of 3 community partnership projects.

Reef Builder

In January 2021, TNC launched the Australia-wide Reef Builder initiative. The initiative aims to bring shellfish reef ecosystems back from the brink of extinction across Australia— for the benefit of both people and nature. The initiative is a partnership between the Australian Government and TNC.

For Noosa, Reef Builder means a cash injection of an additional \$1.2m for reef building on top of the already \$1.2m already committed to the project from TNC and the Thomas Foundation. The additional Reef Builder funds means the project can restore an additional one hectare of oyster reefs in Noosa on top of the one hectare the project is already restoring in partnership with Noosa Shire Council and The Thomas Foundation.

Unforeseen issues arising and project adaptation

The following were unseen and required an adaptive management response:

Data acquisition

The shallow tidal and intertidal areas of the Noosa River estuary were largely uncharted. TNC therefore had to work collaboratively with Maritime Safety Queensland's (MSQ) hydrographic survey team to select the right consultant for this work to ensure the project's mapping outputs met with Queensland Government requirements. This took time.

Further, the hydrographic surveyors met with high levels of summer boating, bouts of poor weather and challenging tides during the surveys. Vessels were often moored in survey sites or generated waves which made underwater surveying challenging. The work was originally forecast to take two weeks but took 12 weeks in total to complete.

Multiple agencies have assets in the Noosa River including cross river cables, sewage pipes, electricity lines and telecommunication cables. It took four months to uncover the owners of all these assets and to acquire the necessary data sets and regulatory requirements regarding each.

The Noosa River is also fringed by multiple land tenures, infrastructure assets (private and public) as well as multiple in water uses (moorings, commercial charter operations, ferry services, recreational uses). Designing restoration parameters which took account of the multitude of user interests required extensive investigation and assessment. Originally forecast to take three months, this work took nine months to complete.

Permits

Due to the unique nature of this development (i.e., there is no state or local code which specifically covers marine restoration) and multiple layers of tenure and environmental protection over the river, the project faced multiple permitting considerations, which have led to delays in permitting and construction.

These considerations demanded the development of sophisticated restoration and site management plans, detailed risk assessments, multiple regulatory code and environmental assessments, ecological mapping, and site engineering, as well as multiple contingency measures for the construction and site management phases.

While TNC supported the thoroughness of the process, it took more time than was originally forecast in the partnership agreement. TNC responded by:

- Partnering with bathymetric, ecological and engineering consultants to help collect data, undertake analyses and populate the restoration plan and regulatory code assessments;
- Regularly liaising with stakeholders and agency staff;
- Actively enlisted the support of the Noosa TAG to advise on technicalities;
- Engaging two casual assistants to help with data acquisition, assessments and community consultation and engagement actions,
- Engaging consultant firm ICM to specifically to support TNC through the complex permit application review and submission process, and
- Enlisting the support of TNC's Chief Executive Officer, Operations Manager and Lead Scientist (Asia Pacific) to help expedite the numerous contracting and assessment steps.

TNC is now working directly with the Queensland Government to look possible efficiencies in the permitting process. The Noosa project is leading the way with identifying challenges and solutions to help the state move forward.

Community engagement

There is a high level of community enthusiasm about the project, which has been very encouraging. However, TNC discovered relatively limited local capacity to take the lead on developing relevant initiatives in a short time frame. TNC met with groups, heard their concerns, and responded by:

- Working closely with local groups to design great projects (which took 9 months);
- Engaging a TNC casual support staff to help develop the projects and help them get started;
- Resourcing some projects with contracts or grant agreements to increase local capacity (i.e., with NICA, NCBA, EEHub)
- Securing resources to fund an additional TNC staff position in Noosa, full time, to support community outreach and general project activities. The position will be locally active from October 2021 and is being funded under the Reef Builder program.

Total progress to date

Table 1a presents a summary of the delivery against milestones. Table 1b. presents this information in detail. The project milestones as per the Partnership Agreement are described in Annex 1.

Table 1a: Total Progress to Date

#	Deliverable	Progress
1.1	1 Technical Advisory Group with TOR established	Achieved
1.2	1 Project Manager appointed	Achieved
1.3	1 Project Implementation Plan completed and endorsed by Noosa Council 1 Detailed Risk Assessment included 1 Communications and Media Plan completed 1 Monitoring, Evaluation and Reporting Plan completed	Achieved
1.4	3 community engagement forums facilitated 3 media statements released	Achieved
1.5	3 six monthly status updates submitted to Noosa Council 3 annual reports submitted to Noosa Council	On Track
2.1	1 Habitat suitability model developed which incorporates industry, Kabi Kabi and public interests	Achieved
2.2	1 set of 'all' relevant state and local permits for oyster reef restoration obtained	Delayed
2.3	1 set of engagement records provided to Noosa Council of public and stakeholder consultations, including one-on-one meetings, open forums, media, etc.	Achieved
3.1	1 consultation completed 1 volunteering opportunities identified	Achieved
3.2	1 volunteering program defined 1 volunteering program implemented	Achieved
4.1	1 approval from Noosa Council secured to restore 2 trial restoration sites 2+ sites recovered with at least overall 80 m shore length of reef constructed	Delayed
4.2	1 approval from Noosa Council secured to restore an additional 2+ sites 2+ additional sites recovered with at least an overall additional 600m ² surface area	Delayed
4.3	1 related reef monitoring program established	Achieved
	2 six monthly status reports submitted 2 annual monitoring and evaluation report cards produced and published	Delayed
5.1	1 workshop facilitated	Achieved
5.2	5 peer review reports submitted to Noosa Council during the three-year term of this Agreement, if requested by Noosa Council.	On Track
5.3	3 study tours facilitated during the three-year term of this Agreement, if requested by Noosa Council.	On Hold
5.4	1 Conservation Action Plan developed, as required 1 set of Community Workshops facilitated, as required.	On Track
5.5	1 new formal networking connections facilitated to assist Noosa Council with ongoing and future marine conservation activities, as requested	On Track
5.6	1+ presentations given at national conference/s over 3 years 1+ presentations given at international conference/s over 3 years	On Track
5.7	1+ New corporate/ government/ philanthropic alliances formed 1+ New in-kind support/financial funding contributions secured	Achieved
5.8	1 Habitat mapping report, habitat suitability model, PhD study or similar output completed and presented to Noosa Council	On Track

Table 1b: Total Progress to Date - Detailed

Deliverables	Measurable outcomes	Expected Timeframe	Progress	Total progress to date and notes
(A1.1) A Technical Advisory Group (TAG) is established to provide project oversight. This will include a clear terms of reference (ToR) and consist of representatives from key stakeholders (NSC, TNC, Kabi Kabi and at least two other independent parties).	1 Technical Advisory Group with TOR established	30 April 2020	Achieved	Terms of Reference (ToR) for the TAG finalised Inaugural meeting held 13 May 2020. TAG meetings are held as required and TAG members engaged on a regular basis out of session to advise on project components and to review project reports.
(A1.2) Appointment of dedicated project manager who is a marine biologist with extensive project management experience, for the term of the Agreement.	1 Project Manager appointed	31 January 2020	Achieved	Craig Bohm appointed by TNC as Marine Coordinator for South East Queensland, based in Noosa. Position commenced 29 January 2020.
(A1.3) A Project Implementation Plan detailing at a minimum: A detailed risk assessment associated with the project. A communications and media plan, outlining media protocols, opportunities and the role of TNC and NSC. A monitoring, evaluation and reporting plan which identified ecological and social monitoring programs, how they will be reported on and how this will fed-back into the project.	1 Project Implementation Plan completed and endorsed by Noosa Council 1 Detailed Risk Assessment included 1 Communications and Media Plan completed 1 Monitoring, Evaluation and Reporting Plan completed	31 December 2019	Achieved Achieved Achieved Achieved	The project implementation plan was endorsed by Noosa Shire Council as the 'Project Management Plan' at its <i>Ordinary Meeting</i> held 16 July 2020. The Project Management Plan included a detailed risk assessment, Communications and Media Plan and Monitoring, Evaluation and Reporting (MER) Plan. The MER Plan was then reviewed by an independent consultant and the recommendations responded to and adopted by TNC.
(A1.4) Participation and delivery of public education and	3 community engagement forums facilitated	30 June 2022	Achieved	Noosa Community Engagement Workshop - 18 participants 7/12/20 (see report below)

<p>engagement forums and media statements</p>	<p>3 media statements released</p>		<p>Achieved</p>	<p>9 Public Information Sessions – 28 participants 14/12/20 (see report below)</p> <p>Produced and distributed:</p> <ul style="list-style-type: none"> - 2 editions of Noosa Oyster Chronicle - Project information sheet - Project Q&A sheet - Rock oyster fact sheet - Project Brief (restoration sites and designs) <p>3 media statements:</p> <p>Promotion of Noosa Public Information Sessions (27 Nov to 13 Dec 2020 – social media circulation</p> <p>Noosa Reef Builder announcement – 12 May 2021</p> <p>Shuck Don't Chuck restaurants partnerships in Noosa release – 1/6/2021</p> <p>2 media articles:</p> <p>Noosa Today – Back from the Brink – 15/12/20</p> <p>Sunshine Coast Daily – Back from the Brink – 15/12/20</p> <p>Social media reach = 23,666 people</p> <p>See Table 4 in this report for further details.</p> <p><i>Previous reporting periods:</i> Project manager and team met with more than 70 stakeholder groups to talk with them about</p>
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				<p>the project and to secure their in-principal support.</p> <p>2 Noosa <i>Enviroforum</i> seminars held in November 2019 with TNC Chief Scientist, Pr. Hugh Possingham and Dr Chris Gillies.</p> <p>1 media statement: The surprising history of Queensland's oyster reefs revealed</p> <p>2 project-related publications:</p> <p>2020 Thurston et al - Charting Two Centuries of Transformation in a Coastal Social-ecological System - A Mixed Methods Approach - SE Queensland</p> <p>2020 Gillies et al - Conservation Status of Oyster Reef Ecosystem of Southern and Eastern Australia - Global Ecology and Conservation</p> <p>1 TNC-orchestrated interview between the project manager and <i>Noosa Today</i></p> <p>1 positive media story in <i>Noosa Today</i> - Oysters for the river not the menu</p>
<p>(A1.5) Annual project reports and final report each of which address, at a minimum: Activities undertaken during the subject financial year, status and progress against deliverables, budget progress, income and expenditure, report against monitoring and evaluation program and measurable outcomes and outline of proposed</p>	<p>3 six monthly status updates submitted to Noosa Council</p> <p>3 annual reports submitted to Noosa Council</p>	<p>First Report: 31 January 2020</p> <p>For each annual report - yearly</p>	<p>On track</p> <p>On track</p>	<p>Two of three 6 monthly reports have been submitted</p> <p>Six Monthly Report 1 Six Monthly Report 2</p> <p>Two of three annual reports have been submitted.</p> <p>Annual Report 1 Annual Report 2 (this one)</p>

<p>upcoming works/activities for future period.</p>				
<p>(A2.1) Oyster reef restoration suitability model incorporating physical parameters of oysters and public and industry usage, access etc. to identify priority sites for restoration.</p>	<p>1 Habitat suitability model developed which incorporates industry, Kabi Kabi and public interests</p>	<p>30 June 2020</p>	<p>Achieved</p>	<p>Habitat Suitability Model + refined Restoration Suitability Model developed.</p> <p><i>Previously reported:</i></p> <p>1 restoration suitability model developed as well as associated habitat suitability model and socio-economic suitability models.</p> <p>1 restoration suitability presentation</p>
<p>(A2.2) Obtain necessary State Government permits/authorities including particular resource allocation authority, for oyster reef restoration</p>	<p>1 set of 'all' relevant state permits for oyster reef restoration in the Noosa River obtained</p> <p>1 set of 'all' relevant local government permits for oyster reef restoration in the Noosa River obtained</p>	<p>30 June 2020</p>	<p>Delayed</p>	<p>Permit applications submitted:</p> <ul style="list-style-type: none"> - Owners Consent - Resource Allocation Authority - General Fisheries Permits <p>Part 2 permit applications ready and will be submitted on approval of Part 1 package.</p> <ul style="list-style-type: none"> - development approval (DA)
<p>(A2.3) Community, industry and stakeholder consultation sufficient to gain majority support for reef restoration locations.</p>	<p>1 set of engagement records provided to Noosa Council of public and stakeholder consultations, including one-on-one meetings, open forums, media, etc.</p>	<p>30 June 2020</p>	<p>Achieved</p>	<p>The project met with more than 80 key stakeholders to date in one-on-one meetings. Most meetings have occurred since February 2020 when the project manager was appointed.</p> <p>In December 2020, TNC facilitated 9 Public Information Sessions at "The J" in Noosa junction. 38 people attended. See further on in this report for details.</p> <p>TNC has continued to meet with stakeholders, to keep them</p>

	1 written permit secured from Noosa Council formally allowing the project to construct reefs.			<p>updated and seek input to various aspects of the project.</p> <p>Community oriented publications and media opportunities have been developed and are presented in Table 4 in this report.</p>
(A3.1) Community, industry and stakeholder consultation to identify most appropriate community volunteering opportunities (e.g. shell recycling, oyster gardens, oyster watch, video monitoring).	<p>1 consultation completed</p> <p>1 + volunteering opportunities identified</p>	31 August 2020	Achieved	TNC facilitated a community engagement workshop on the 7 th of December 2020 at the offices of Noosa Shire Council to identify community volunteering opportunities.
(A3.2) Establish at least one community volunteering program identified from the above process which considers current and future resources, management and interest.	<p>1 + volunteering program defined and implemented</p> <p><i>Record of volunteer hours dedicated to community volunteering programs, such as: shell recycling, oyster gardens, oyster watch, video monitoring.</i></p>	31 December 2020	Achieved	<p>TNC established community-based oyster gardening with NICA, who will lead oyster gardening activities with 20 households/businesses/groups</p> <p>TNC established a volunteer water quality monitoring project with the NICA.</p> <p>TNC established three community partnerships with local restaurants who now voluntarily supply the project with oyster shell under the <i>Shuck Don't Chuck</i> project banner.</p> <p>The restaurant partners are:</p> <ul style="list-style-type: none"> - Noosa Yacht and Rowing Club - Noosa Harbour Fish Market - Grenny's Noosa by the River <p>TNC established a senior schools and indigenous engagement project with Noosa Environmental Education Hub (EEHub).</p> <p>TNC has established a junior schools and indigenous project</p>

				<p>with Noosa Biosphere Community Association (NBCA).</p> <p>TNC is working with Tewantin Bushcare to establish a foreshore demonstration project at Tewantin</p> <p>TNC has agreed with Noosa and District Landcare (NDL) to provide training opportunities for Kabi Kabi Youth once oyster beds are laid.</p> <p>TNC collaborates with Ozfish to collect underwater footage of the Noosa River and is planning actions to educate fishers about oyster ecosystem restoration and the value of conserving and restoring river riparian and aquatic habitats.</p>
<p>(A4.1) Restoration at two sites (approx. 40m-50m shore length per site) which test reef design and construction and oyster growth and survival.</p>	<p>1 approval from Noosa Council secured to restore 2+ trial restoration sites in the Noosa River estuary</p> <p>2+ sites recovered with at least overall 80 m shore length of reef constructed</p>	<p>30 June 2021</p>	<p>Delayed</p>	<p>In planning for summer 2021, subject to permits being secured.</p> <p>The complexity of the data acquisition, community consultation and permit process were not foreseen and required the engagement of additional staff, three separate consultancy firms and numerous meetings with stakeholders and agencies to ensure a robust restoration proposal was developed and submitted to government.</p>
<p>(A4.2) Restoration across multiple further sites, as determined by habitat suitability modelling and outcomes of community consultation.</p>	<p>1 approval from Noosa Council secured to restore an additional 2+ sites as agreed to by stakeholders, in the Noosa River estuary</p>	<p>30 June 2022</p>	<p>Delayed</p>	<p>Full reef build in planning for spring / summer 2022.</p>

	2+ additional sites recovered with at least an overall additional 600m ² surface area of established oyster reef, constructed in the Noosa River estuary.			
(A4.3) Monitoring and evaluation study for both pilot and full restoration sites. Monitoring to include oyster metrics, invertebrates and fish use (detailed in MER plan).	<p>1 related reef monitoring program established</p> <p>2 six monthly status reports submitted</p> <p>2 annual monitoring and evaluation report cards produced and published</p>	As required	Delayed	<p>The Monitoring, Evaluation and Reporting (MER) Plan is in place. Water quality monitoring has commenced with local partner, NICA. Trials of Remove Underwater Video (RUV) techniques has commenced with local partner, Ozfish. Baseline monitoring will commence in summer 2021.</p> <p>First report is expected in winter 2022. The second report in winter 2023.</p> <p>The first annual monitoring report is expected in summer 2022. The second report in summer 2023.</p>
(A5.1) Run workshop with Noosa Council to identify ongoing focus areas for TNC support.	1 workshop facilitated	31 March 2020	Achieved	<p>2019 workshop held between TNC and NSC and discussions resulted in the development of the Alliance and Funding Agreement.</p> <p>TNC and NSC communicate weekly on areas of mutual interest and support.</p>
*(A5.2) Provide technical/peer review on minimum five plans/reports/studies if requested by Noosa Council.	5 + peer review reports submitted to Noosa Council during the three-year term of this Agreement, if	30 June 2022	On Track	As requested

	<p>requested by Noosa Council.</p> <p><i>If Noosa Council requests a peer review, TNC will provide a minimum of 3 experts who are qualified in the relevant area of expertise for Noosa Council consideration and Noosa Council's acceptance of 1 expert for the peer review.</i></p>			
<p>*(A5.3) Facilitate a minimum of three study tours of relevant sites in line with objectives and scope of the program in Australia/US if requested by Noosa Council (flights and incidentals covered separately by Noosa Council, accommodation and in country travel covered by this Grant).</p>	<p>3 + study tours facilitated during the three-year term of this Agreement, if requested by Noosa Council.</p>	<p>30 June 2022</p>	<p>On hold</p>	<p>Study tour 1 was in planning for 2020 but has been placed on hold due to COVID-19 travel restrictions.</p> <p>The study tour schedule will be revisited by TNC and NSC once COVID-19 travel restrictions have been eased or lifted.</p>
<p>*(A5.4) Review and feasibility of opportunities for sustainable commercial and recreational fishing management options for the Noosa River.</p>	<p>1 Conservation Action Plan developed, as required</p> <p>1 set of Community Workshops facilitated, as required.</p>	<p>30 June 2022</p>	<p>On track</p>	<p>If requested by Noosa Shire Council</p>
<p>*(A5.5) Facilitate access to TNC conservation networks and researchers if requested by Noosa Council.</p>	<p>1+ new formal networking connections facilitated to assist Noosa Council with ongoing and future marine conservation activities*</p> <p><i>* As and if requested by Noosa Council</i></p>	<p>30 June 2022</p>	<p>On track</p>	<p>TNC have provided two peer reviews when requested on the following:</p> <ol style="list-style-type: none"> 1. Draft Noosa River Plan 2. Fishing Futures Report

<p>(A5.6) Promote Noosa Council's Noosa River Plan and shellfish restoration project in at least one national and one international conference.</p>	<p>1+ presentations given at national conference/s over 3 years</p> <p>1+ presentations given at international conference/s over 3 years</p>	<p>30 June 2022</p>	<p>On track</p>	<p>Reef Builder presentation with a spotlight on Noosa given at the National Coast to Coast Conference (July 2021)</p> <p>Further opportunities are being sought.</p>
<p>(A5.7) Promote Noosa Council's Noosa River Plan and shellfish restoration project to corporate, philanthropic and state/federal government audiences to establish further support for conservation activities that support the Noosa River Plan</p>	<p>1+ New corporate/ government/ philanthropic alliances formed</p> <p>1+ New in-kind support/financial contributions secured</p>	<p>30 June 2022</p>	<p>Achieved</p>	<p>TNC has secured an additional \$1.2m under the Reef Builder program to support oyster ecosystem restoration in Noosa.</p> <p>TNC sits on the Department of Environment and Science (DES) Oyster Reef Restoration and Adaptation Working Group and is collaborating with DES to progress oyster ecosystem restoration at a state level.</p> <p>TNC is currently entering a partnership with the state government owned Bribie Island Research Centre (BIRC), to enhance its capacity to support oyster ecosystem restoration in Noosa and across the state, as well as commercial oyster aquaculture development.</p>
<p>(A5.8) Assess feasibility of seagrass restoration in Lake Cooroibah as a method of reducing sediment resuspension and increasing invertebrate biodiversity</p>	<p>1 Habitat mapping report, habitat suitability model, PhD study or similar output completed and presented to Noosa Council</p>	<p>30 June 2022</p>	<p>On track</p>	<p>TNC contracted Ecological Service Professionals Pty Ltd to develop a map of seagrass beds in the Noosa River estuary.</p> <p>The field work is complete, data sets submitted, and the final report is pending. The report will be given to council and presented to stakeholders in the next reporting period.</p> <p>TNC is negotiating a seagrass restoration research project for Noosa with the Central Queensland University.</p>

Community engagement

Public information sessions

On Monday the 14th of December 2020, TNC facilitated 9 public information sessions about the Noosa Oyster Ecosystem Restoration Project. The purpose of the event was to:

- Inform the Noosa community about the project
- Seek further local endorsement for the project
- Seek specific feedback and endorsement for the oyster restoration sites presented (Tewantin, Goat Island, Noosa Sound East, Noosa Sound West and Weyba Creek A and B)
- Gain feedback as to further oyster ecosystem restoration opportunities in the Noosa River estuary

The public information sessions were promoted widely via TNC's social media outreach system.

In response, 132 people viewed the project on the TNC Website and on social media the event received 16,561 hits (Table 2).

Community Participants

28 community members attended the sessions (9 females, 19 males). Another four people called TNC with information queries about the project and expressed that they supported the project but could not attend. Some 17 participants of the 28 participants were formally interviewed.

In summary, 15 of 17 respondents expressed unequivocal support for the project and its plans. Two respondents expressed concerns that were unresolvable on the day. Of the 28 participants, we estimate that 24 of 28 participants expressed strong support for the project and for the project sites and plans. This support echoes the outcomes of virtually all 70+ one-on-one meetings the project had held with stakeholders leading up to the consultations and represents a fantastic result.

From the public information sessions, four participants however, expressed strong objections to the project, objections which were unreconcilable at the time. Two of these participants raised matters unrelated to the project (access to historic water quality data + the projects potential contribution to the spread of 2378 Tera-chloro-dibenzo-dioxin). Another participant strongly objected to the project having linkages to the Noosa Parks Association. The fourth participant raised concerns about a raft of issues relating to oyster abundance, river health, project partners and the results of past river management actions. Although TNC invested heavily in this individual, looking to find some common ground or agreement, the participant remained unconvinced about the project's relevance.

Community engagement workshop

On Monday the 7th of December 2020, TNC facilitated a community engagement workshop with key Noosa River stakeholders. The objective of the workshop was to discuss opportunities for piloting community-based education, volunteering and citizen science activities in 2021 that complement the project. These activities will be led by project partners and supported, where resources allow, by TNC.

A summary of the meeting outcomes is presented below. TNC wishes to thank Noosa Shire Council for hosting this event.

Attendees

John News - Noosa Community Biosphere Association

Dalia Mikhail - Noosa Environmental Education Hub

Richard Howard - Noosa Integrated Catchment Association

Bruce McConkey - Noosa Integrated Catchment Association
 Nick Hluszko - President of the Noosa North Shore Association Inc.
 Chris Massoud - Commercial fishing family
 Ben Broadfoot - Ozfish - Noosa Chapter
 Peter Hunnam - Tewantin Bushcare
 Michael Gloster - Noosa Parks Association
 Bryan Walsh - Noosa Parks Association
 Bruce Davidson - Recreational fisher's interest
 Jady Smith - Noosa Biosphere Reserve Foundation
 Craig Doolan - Noosa Shire Council
 Callum Dittes - The Nature Conservancy
 Helen Bowyer - The Nature Conservancy
 Craig Bohm - The Nature Conservancy
 Simon Branigan - The Nature Conservancy
 Tom Wegener - Noosa Shire Council (workshop walk in)

Also invited:

Brian Warner - Kabi Kabi Nation
 Juanita Bloomfield - Tourism Noosa

The workshop participants discussed these topics enthusiastically, identifying project areas that best fit their interests and expertise, and which could be explored in further detail. Table 3 summarises the state of play with these partnerships.

Table 3: Community Partnerships Update

Project area	Objective	Partnership	Status
<i>Shuck Don't Chuck</i>	Engage local businesses in the project	3 restaurants participating in supplying local oyster shell to the project as Shuck Don't Chuck partners: <ul style="list-style-type: none"> - Noosa Yacht and Rowing Club - Noosa Harbour Fish Market - Grenny's Noosa by the River 	Restaurants enthusiastically collecting, washing and storing shells. Contractor engaged to collect shell from restaurants on a fortnightly basis.
	Collect oyster shells to add to oyster beds and for use in oyster gardening	Resource Recovery Australia (RRA), Cleanaway and Mooloolaba Fish Market -	15 tonnes of oyster shell are now curing at the Doonan Solid Waste Facility following strict biosecurity protocols
<i>Water quality monitoring</i>	Improve resolution of water quality data sets at the oyster restoration sites	NICA to provide water quality information at the oyster restoration sites	Partnership established Baseline monitoring has commenced
<i>Oyster gardening</i>	Engage local households, businesses and/or groups in the project	NICA to implement oyster gardening, beginning with a pilot phase, then review and consideration of upscaling, if practical	Partnership established Grant agreement in place and work has commenced

	Improve public knowledge about shellfish restoration		
Indigenous inclusion	Support the aspirations of Kabi Kabi Nation Benefit from traditional knowledge	Noosa and District Landcare to involve indigenous youth in hands-on or on-water actions, where opportunities arise.	Partnership established Events to be planned on an ongoing basis. Endorsement from Kabi Kabi elders and permission to integrate traditional knowledge in project-related products secured. Elders kept up to date with project happenings. TNC will meet with elders as they request.
Schools participation	Engage local schools in the project Improve public knowledge about shellfish restoration	Noosa Environmental Hub to integrate Sunshine State High School into the project Noosa Biosphere Community Association to carry out school activities and indigenous river awareness actions with Tewantin schools	Partnerships established and activities in planning and underway.
Tewantin Demonstration Site	Provide a focus site for community education activities and access to one of the oyster restoration sites	Tewantin Bushcare to help develop restoration demonstration site at Tewantin	Partnership established Discussions underway
Fish habitat monitoring	Bring Noosa's underwater life and the value of habitat diversity to life in the public realm, particularly to fishers	Ozfish – Noosa Chapter Ozfish to use Remote Underwater Video (RUV) techniques to seek out and record marine species diversity Ozfish to also help test RUV techniques at different river locations and promote the importance of marine habitats and restoration to its members and public	MoU in place between TNC and Ozfish Ozfish has equipment locally and is being supported by TNC where needed to identify and record Noosa River fish habitats TNC is also being supported by the Pumicestone Passage oyster ecosystem restoration project (Ozfish + Healthy Land and Water). The project is sharing oyster gardening experiences and equipment with the Noosa project team.

Broader River Context

During the workshop, participants also discussed the wider river management context of the Noosa oyster project.

The participants made many interesting points. Some of these are captured below:

- The Noosa River needs a common narrative, a narrative which all people can understand, are familiar with and support.
- The contribution of the oyster restoration project, and associated projects, to the health and resilience of the Noosa River, will only be realised once we have all agreed on a clear vision for the river and have defined tangible management objectives and targets against which the contribution of projects can be measured.
- The oyster project is but one of a number of projects which contribute to river health and resilience. Work on sediment management in the catchment, riparian zone protection and restoration works along the shorelines and water quality/stormwater management actions, for example, also contribute.
- Oyster ecosystems are important but so are seagrass and mangrove ecosystems. The health and functioning of the estuarine ecosystem in its entirety should be considered. Oyster ecosystem restoration is but one component that should be addressed.
- The river needs to be biodiverse, productive and our uses of it, sustainable.
- The project provides an opportunity to further reconciliation efforts with Traditional Owners, this is particularly so at the Tewanin restoration site, which is of deep cultural significance to the Kabi Kabi people.

Participant feedback:

“Some of these people haven’t spoken for 20 years...amazing!”

“How did you ever get this particular group of people to meet. Great effort!”

“Good to see things slowly coming for the project and seeing some shared views on river management starting to come through.”

Shuck Don’t Chuck

TNC established exciting community partnerships with three local Noosa restaurants:

- Noosa Yacht and Rowing Club
- Noosa Harbour Fish Market
- Grenny’s Noosa by the River

These proud project partners supply the project with buckets of washed oyster shell, which they collect from their customers, then wash and store.

The shell is collected fortnightly from the restaurants by the project’s contractor, Resource Recovery Australia (RRA).

This is a big effort for the restaurants and an important contribution, which is adding to the project’s shell recycling collection? at the dedicated site at the Doonan Solid Waste Depot.



Senior Schools Project

TNC entered a partnership with Noosa Environmental Education Hub (EEHub) to deliver the Senior Schools Project. This project engages local secondary schools in curriculum-centred student activities, which celebrates the values of the Noosa River, the role that oyster ecosystem restoration plays, and the important connection between the Kabi Kabi Nation. Dalia Mikhail has been working closely with local schools to identify activities, which will be rolled out over the next 12 months.



Junior Schools Project

TNC entered a partnership with the Noosa Community Biosphere Association (NCBA) to deliver the Noosa Junior Schools and Community Awareness Project. This project engages local junior schools and the general Noosa public in actions which lead to the local participation in on-ground activities, which raise awareness about the oyster restoration project and the importance of environmental restoration.



In June 2021, NCBA used its creative minds to run some exciting children's events at Noosa's famous *Festival of Water 2021*. NCBA used the opportunity to celebrate the importance of river health and oyster ecosystem restoration. The NCBA team worked with Noosa's kids to produce some endearing oyster friends (Figure 3).



Figure 3: Creative kids celebrate Noosa River oyster ecosystems. Courtesy of NCBA

Oyster Gardening Project

TNC partnered with NICA to facilitate oyster gardening in Noosa. Oyster gardening is an activity whereby locals grow out local oysters, provide by the project, in baskets, or 'oyster gardens' suspended from jetties. The volunteer gardeners care for the gardens, keep citizen science records of their experience and become better educated about oysters and oyster restoration in the process. Once the juvenile oysters are large enough to survive on their own, they are carefully placed onto the oyster reef patches in the project's restoration sites. These oysters help kick start ecosystem recovery.



Figure 4a, b and c. TNC and NICA launch Oyster Gardening for Noosa (top left). NICA Oyster Project Coordinator, Alex Western & Secretary, Richard Howard, inspect the oyster shells at the Doonan shell recycling site. Alex and Richard meet with Michael McIntyre, project partner and official restaurant shell collector from Resource Recovery Australia. Courtesy of Sharon Wright & Helen Bowyer.

Waterwatch

TNC is also partnering with NICA to record water quality information at the restoration sites.

NICA volunteers led by Bruce McConkey have been busy collecting baseline water quality information for the Tewantin restoration site.

Other restoration sites will be added to this data set in the coming months and ultimately a valuable monitoring output.

NOOSA TNC Oyster reef site - Tewantin						
	19/02/2021	26/03/2021	21/04/2021	21/05/2021	17/06/2021	14/07/2021
Temp	26.21	27.13	23.8	20.46	19.7	17.58
pH	8.25	7.85	8.27	8.24	8.38	8.11
Condy	45	18.9	27.4	33.7	29.6	29.6
Turbidity	6.1	13.5	12	8.2	15.3	8.3
Diss Oxygen mg/l	5.9	6.15	6.17	7.09	7.07	6.5
Diss Oxygen %	87.8	83.3	82.1	90.4	88.4	78
Salinity_ppt	29.1	11.2	16.8	21	18.3	18.2
TDS ppt	27.5	11.7	17	20.5	18.4	18.4
Rain <30 days	101	353	314	143	55	103
Time	1005	1024	1007	0904	0933	0926
Low tide @ NH	649	1036	0946	0948	0709	0503

Hatchery partnership

TNC is working with the Bribie Island Research Centre (BIRC) in a new project, which will spawn a handful of adult rock oysters (called ‘brood stock’) under controlled conditions in tanks and settle the oyster larvae onto the project’s cured oyster shell (called ‘cultch’). The oyster larvae attach to the oyster shell and form oyster ‘spat’. The oyster cultch set with oyster spat is called ‘seeded oyster cultch’. An oyster seeding event is called a ‘set’. A set takes 2-3months to orchestrate.

The seeded oyster cultch is then collected from BIRC and deployed onto the oyster reef patches to help kick start the restoration process. Oyster seeding acts as an insurance policy against highly variable natural oyster recruitment. The seeded oyster cultch is also used to grow oysters in community-managed oyster gardens.

For the hatchery and oyster release, TNC will comply with the requirements of the Queensland Government health protocol for the movement of live bivalve molluscs. TNC is working closely with DAF and BIRC to ensure compliance with the protocol.

For the pilot phase, the project will use approximately 1.5 tonnes of seeded oyster cultch (one set). The cultch will be hand placed into voids in the oyster reef patches at a density of 2.5kg/metre squared over 50 percent of each patch area. Between 200-500kg of seeded oyster cultch is provided to oyster gardeners for further grow out of the oyster spat before release onto the oyster reef patches. A second set will be required for full restoration in 2022.

The TNC-BIRC partnership is new and cutting edge. It is involving many personnel, as spawning rock oysters for restoration purposes is highly technical and has not been undertaken before. Even though TNC would typically partner with the private sector to undertake the hatchery work, there are few commercial shellfish hatcheries in South East Queensland and none with the current capacity to support oyster ecosystem restoration. This raised a considerable challenge for the project as TNC sort to engage the commercial sector, but the sector was not able to support.

The outcome, however, is welcome. The TNC-BIRC partnership will support the Noosa project, aligns with the Queensland Government’s strategy for marine habitat restoration and will deepen the Queensland Government’s involvement in delivering on that strategy. The partnership will also benefit the rock oyster aquaculture industry throughout Queensland, as TNC’s support of BIRC has helped reinvigorate BIRCs investment in oyster research and industry development.

Handling oysters and oyster shell - biosecurity

TNC is a registered as a 'resource provider' with the Department of Environment and Science, as per the *Queensland End of Waste Code - Oyster shells (ENEW07278317)* and *Waste Reduction and Recycling Act 2011*.

TNC cures the oyster shell following best practice, in compliance with the Code, and in consultation with Queensland Department of Agriculture and Fisheries biosecurity, who also sits on the project's Technical Advisory Group. Shell curing occurs using the following protocol:

1. Shell is only cured at the designated and sign-posted shell curing site;
2. Clean, shucked oyster shell is collected by the contractor from wholesaler/s, in bulk, in 1 tonne food-safe seafood transport containers and delivered to the shell curing site;
3. Pre-washed shell is collected by the contractor from oyster retailers in Noosa in clean 20 litre buckets, and delivered to the designated shell curing site;
4. All containers used for shell transport are thoroughly washed and disinfected before storage and re-use;
5. At the shell curing site, shell is placed on the ground in rows separated and sign-posted by month collected;
6. The shell is dried and cured (desiccated) in direct sunlight for 6 months, which is two months more than is required by the End of Waste Code;
7. The shell is turned after three months of curing, as an additional desiccation measure;
8. Each shell pile is no higher than 1 metre, which further enhances the desiccation process;
9. The site is regularly monitored and maintained to reduce contamination of the shell piles;
10. The curing site is located in an isolated area of the depot, so the risk of contamination from the depot's other waste management activities is negligible;
11. Once cured, and prior to its removal from the depot, oyster shell may be washed with freshwater to remove any cumulated sediment or dried organic matter, and
12. The shell, when needed, is transported in clean containers.

Communication products

Project brochure

The project brochure is a significant production that has been well received. The brochure continues to be circulated digitally and is available from the TNC website for download. Over 300 hard copies have already been distributed locally with several being requested by local schoolteachers (Figure 5).



Figure 5: Project brochure

Frequently Asked Questions

TNC compiled responses to a set of Frequently Asked Questions (FAQ), that the project team compiled using feedback from more than 70 one-on-one meetings with Noosa stakeholders and direct feedback from the Public Consultation Forums (Figure 6). This information now appears on the TNC website. The Community Outreach Officer is now working to make this important information source widely available.



THE NOOSA OYSTER ECOSYSTEM RESTORATION PROJECT

RESTORING LOST ROCK OYSTER ECOSYSTEMS TO THE NOOSA RIVER ESTUARY

An aerial view of the beach at Noosa © Darren Tierney

Introduction to us, the project and partners

- [Who is The Nature Conservancy?](#)
- [What is our vision for the Noosa Estuary?](#)
- [What is the Noosa Oyster Ecosystem Restoration Project?](#)
- [Why Noosa?](#)
- [Why oysters?](#)
- [How did this project evolve?](#)
- [Who is involved and how?](#)
- [How are the Kabi Kabi People involved in this project?](#)

Processes and implementation

- [How much does this project cost and who are the funders?](#)
- [Where are the restoration sites?](#)
- [What are the oyster restoration steps?](#)
- [What is the shell recycling project: Shuck Don't Chuck?](#)

Outcomes

- [How does the ecosystem form and how long does it take?](#)
- [Is oyster restoration like oyster farming?](#)
- [Can I eat oysters off the restored beds?](#)
- [Do oyster beds need management long-term?](#)
- [How long will the project take?](#)
- [What does this mean for me?](#)
- [What can I do?](#)

Figure 6: Project Frequently Asked Questions

Rock oyster fact sheet


TNC produced the first in a planned series of fact sheets about rock oysters and rock oyster ecosystems. The fact sheet highlights key attributes of the Sydney Rock Oyster (Figure 7).

THE SYDNEY ROCK OYSTER (*SACCOSTREA GLOMERATA*)

The Sydney rock oyster (*Saccostrea glomerata*) is the dominant oyster species in the salty bays and inlets of eastern Australia. This remarkable organism can create vast, low oyster beds and high oyster reefs. These structures create ecosystems, providing homes and refuge for numerous aquatic plants and animals. Historically, oyster ecosystems were a dominant feature of most east coast estuaries, where they shaped the ecology, hydrology, and water chemistry. By the early 1900s, oyster ecosystems had become functionally extinct. Today, 85% have been lost across Australia and globally, and need help to recover.



Oyster shell - inner surface. Photo © John Healy



Oyster shell - Outer surface. Photo © John Healy



Juvenile oysters growing on oyster shell. Photo © Ben Diggles

HABITAT

Found in sheltered temperate to subtropical, saline, and brackish bays and estuaries from Wingham Inlet in northern Victoria to Hervey Bay in south east Queensland. Endemic to Australia. Attaches to hard surfaces such as rock, gravel, tree roots, other oysters, and shelled invertebrates, as well as artificial structures e.g. seawalls, jetties, pylons.

SHAPE

Widely variable, depending on the environment where the oyster is attached. The shell is radial, rounded and often extremely rough and sharp. Lower shell moderately/well cupped generally with fine lamellae externally. The lower shell has broad folds. Chomata not always visible on the ventral margin.

COLOUR

External colour is pale grey/brown often with dark pigmentation around the margin. Internally the shell is white, black, or grey, and sometimes with a black/grey or yellow margin (shell valve), and pale coloured adductor scar.

SIZE

Up to 10cm in length and 60 grams in weight.

FEATURES	THE SYDNEY ROCK OYSTER
Scientific name	<i>Saccostrea</i> : 'true' oyster, <i>glomerata</i> : 'to gather, heap up'
Size (adult shell)	Up to 10cm in length
Shell colour	External: Pale grey/brown, can have dark pigmentation around the margin. Internal: white, black, or grey. Shell (valve) Margin: black/grey or yellow.
Shape of upper shell/valve	Moderate/well cupped with external fine lamellae. Lower shell has broad folds.
Habitat	Estuarine. Intertidal zone down to 8 metres.
Habitat value - HIGH	Provides habitats for numerous marine species e.g. fish, invertebrates, marine plants.

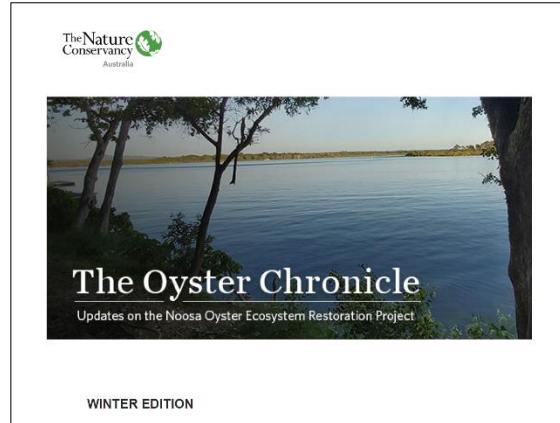
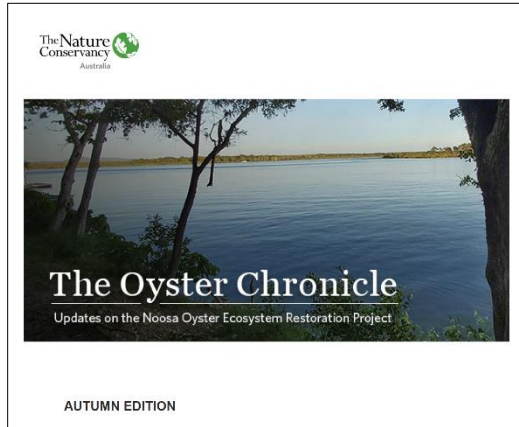
RESTORING LOST OYSTER ECOSYSTEMS

To learn more about our work to restore shellfish ecosystems across Australia, visit natureaustralia.org.au/shellfishreefs

Figure 7: Sydney Rock Oyster fact sheet

Noosa Oyster Chronicle

TNC introduced a new digital project update, the Noosa Oyster Chronicle, which is produced quarterly. Stakeholders and community members can sign up to receive these updates by contacting TNC. Two editions of the Chronicle have been produced in Autumn 2021 and Winter 2021 (Figures 8a,b). The next edition will be produced in spring 2022.



Figures 8a,b. The Oyster Chronicle, Autumn and Winter editions.

Project Brief

In July 2021, TNC produced and distributed a special project brief with detailed information about the project sites and designs to Noosa stakeholders via TNC’s Noosa stakeholder mailing list (Figure 9). The brief continues to be distributed to local groups and individuals as requested and as opportunities arise. The project brief is also annexed (Annex 2).

Detailed designs for proposed oyster ecosystem restoration sites in the Noosa estuary

Background

For the last 18 months, The Nature Conservancy (TNC) has been working alongside community members, local indigenous leaders, hydrographic services, marine ecologists, coastal engineers and government agencies to select the most appropriate sites and reef designs for the restoration of oyster ecosystems in the Noosa River estuary.

This location, shape and size of oyster reef patches, outlined in the figures below, were designed to give the best response to the estuary. This location was specifically selected to ensure public access, public safety and to provide education, fishing, recreation and other-based tourism opportunities.

The reef patch designs meet all regulatory government requirements relating to stability, erosion, maintenance, maintenance of fish passage, restoration of a degraded ecosystem and fish habitat, protection of marine plants and benefits to fisheries.

Proposed locations

- Four locations have been selected as oyster ecosystem restoration sites after extensive community feedback, scientific analysis and government input. These sites are Trowan’s Cove Island, Noosa Island East and Noosa Island West.
- We anticipate that up to half of the restoration work will be completed this summer (2021-2022) at two sites, likely at Trowan and Gool Island, with the remaining work to be completed the following spring/summer (2022-2023) at the Noosa Island sites.
- The four restoration sites were selected as those that optimise ecological, engineering, public safety and low erosion requirements.
- The oyster ecosystem recovery process will take about five years, that is, from when the oyster reef patches are laid in the river, and those patches are established with oysters, after routine investigations and plant life.

Process undertaken for site selection and reef patch design

The process of site selection and design included:

- Development of a restoration suitability model by scientists at TNC that identified areas of the estuary where oysters were likely to thrive. Information used in the table Response Criteria at the end of this brief.
- The maps produced from this model were further refined through community and industry consultation and extensive scientific and state agency input to ensure current river values and public access were maintained.
- After the restoration sites were selected, and consulted on publicly engineers from CSIRO planning and reef alongside restoration practitioners and expert ecologists to consider a range of design that would support oyster survival and growth, fish habitat and biodiversity whilst also providing education to visitors to the Noosa River. The final design are provided in figures 2-5, below.
- The location and design of the oyster reef patches were presented to an independent Scientific Committee made up of Queensland Government representatives, Noosa Shire Council staff and local marine biologists prior to that formal submission to Government to seek restoration permits.

A huge thank you to the many fishers, residents, Traditional Owners, shop and restaurant owners, local scientists and engineers who helped provide local knowledge and support throughout the site selection and design process. Thank you!

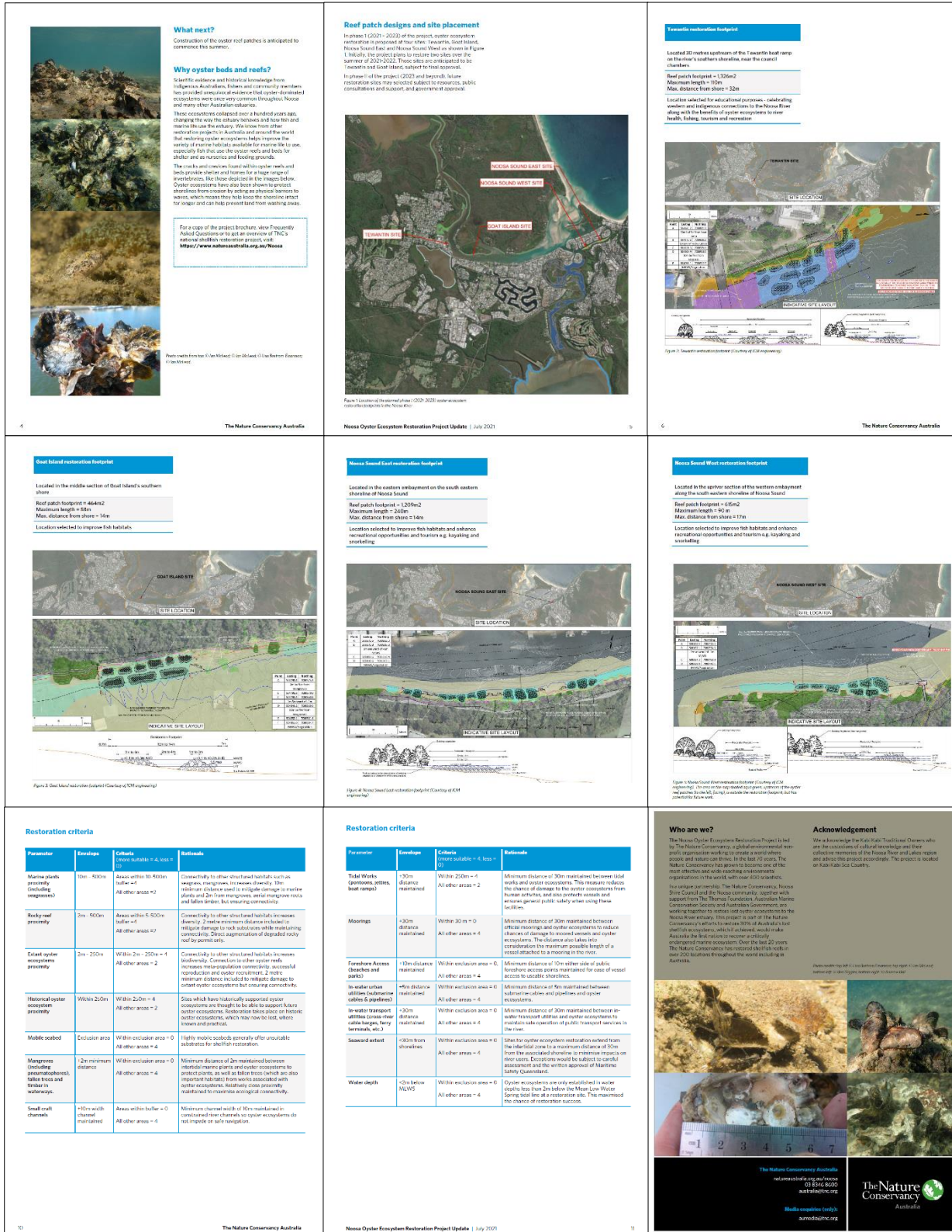


Figure 9: Project Brief (July 2021)

Media

TNC secured media in mainstream media, via hits to the TNC Noosa website, distribution of TNC’s Noosa Oyster Chronicle circular and via social media. Some, 436,547 people were reached via mainstream media and 23,666 people via social media. 101 people directly received the project’s *Oyster Chronicle* news circular in Autumn and Winter 2021. The TNC project website received 514 hits. See Table 4 below for details.

Media highlights included the joint TNC-NSC Reef Builder announcement for \$1.2m project funds (Figure 10), media secured due to the independent review of the project MER plan (Figure 11), and the profile of two Noosa restaurants and the Harbour Fish Market who joined TNC’s *Shuck Don’t Chuck* shell recycling project (Figure 11a).

Table 4: Media highlights

Media highlights		
Date	Outlet	Reach
25 September 2020	Independent review gives oyster restoration project a tick of approval <ul style="list-style-type: none"> • Mirage News • National Tribune • My Sunshine Coast 	297,441 22,134 18,340
13 October 2020	Inside the Noosa Biosphere – Noosa Today	5,042
10 December 2020	ABC Sunshine Coast FM (3 segments)	90,000
1 June 2021	Noosa restaurants join shell recycling project - Noosa Today	3,590
	Total	436,547
TNC Website		
Date	Page title	Page views
27 Nov to 13 Dec	Events page: Noosa info sessions	132
12 May 2021	Media release” The Nature Conservancy Australia announces \$1.2m towards oyster bed restoration in Noosa	327
1 June 2021	Media release: Noosa restaurants and Harbour Fish Market join award-winning shell recycling project to build reefs	59
	Total	518
Social Media		N/A
Date	Page title	Page views
eDM 20/07/21 – 1 st send 3/8/21 - resend 4/8/21 – resend	Noosa Oyster Chronicle – Winter	Avg open rate: 58% Avg click through rate:

		Received: 24%
		106
eDM 9/03/21– 1 st send 25/03/21 – resend	Noosa Oyster Chronicle – Autumn	Avg open rate: 54%
		Avg click through rate: 26%
		Received: 101
Date	Type	Reach
27 Nov to 13 Dec	Facebook event	5,472
3-Dec	Facebook event post	4,569
27 Nov to 1 Dec	Facebook event advertisement	2,907
3 Dec to 13 Dec	Facebook event post advertisement	3,613
12 May 2021	Instagram post Funding announcement	502
12 May 2021	Facebook post Funding announcement	4,650
2 June 2021	Facebook post Shuck Don't Chuck Noosa	1,953
	Total	23,666

Media examples

The screenshot shows a media statement page with logos for The Nature Conservancy Australia and Noosa Council. The main heading is "Media Statement". The text includes a release date of Wednesday 12 May 2021 and a title: "The Nature Conservancy Australia announces \$1.2m towards oyster bed restoration in Noosa". The body text details the funding for oyster bed restoration in the Noosa River estuary, mentioning the Reef Builder Project and the Noosa Shire Council's contribution. It also includes quotes from local officials and information about the project's goals and funding sources.

Figure 10: TNC-Noosa Shire Council media collaboration regarding Reefbuilder funds announcement

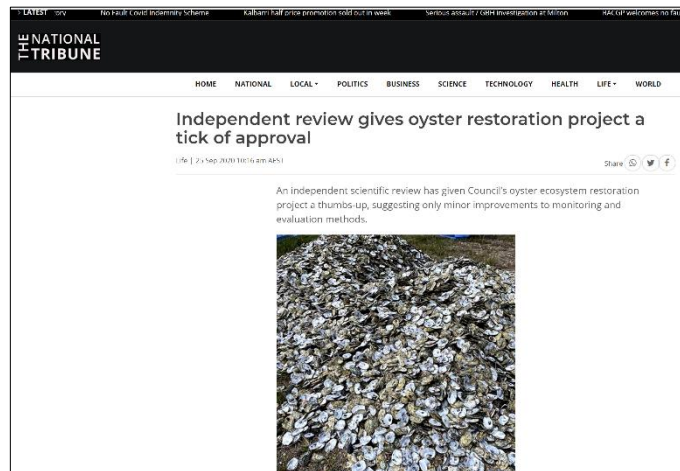


Figure 11: News articles regarding the success of the independent review of the project Monitoring, Evaluation and Reporting plan reached 338,000 people.

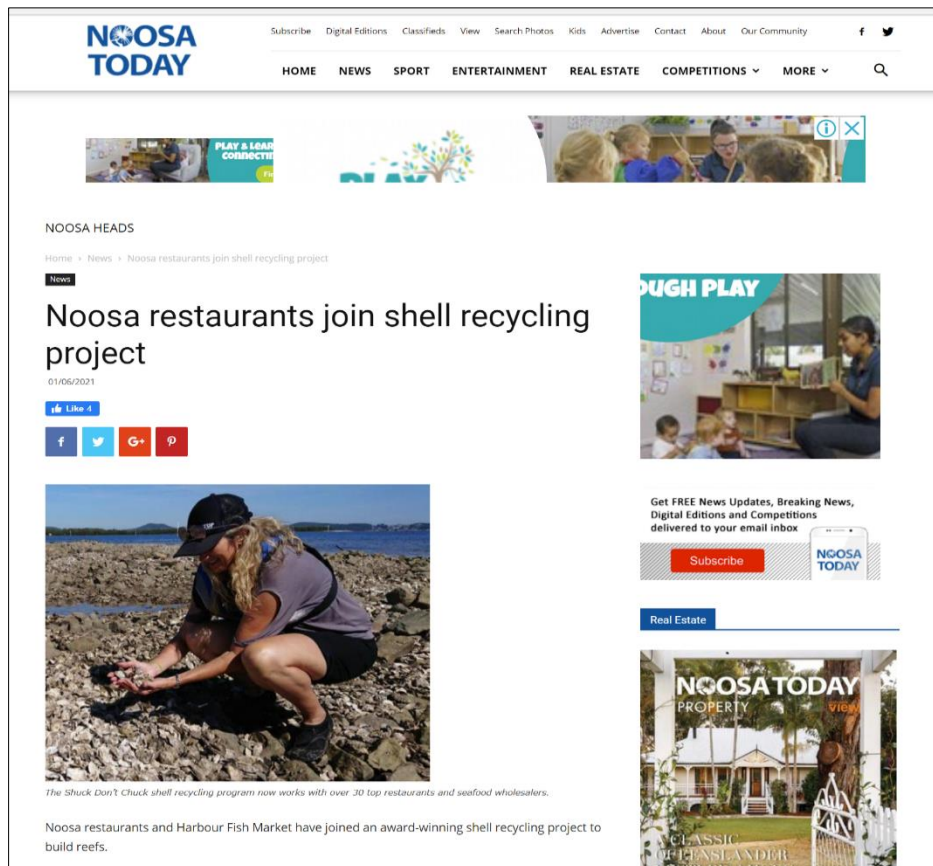


Figure 11a. Noosa restaurants and Harbour Fish Market join the project

Technical outputs

Restoration suitability model

The project used a standardized habitat suitability indices and geospatial decision support tools to confirm the suitability of the Noosa River estuary for oyster ecosystem restoration. Known environmental and biological criteria were compared with physical parameters of the estuary (i.e., bathymetry, salinity, temperature, dissolved oxygen). Areas of the estuary which are suitable for oyster restoration were then rated for their suitability and presented, geospatially (Figure 12). This work was completed in the previous reporting period, but new data sets recently made available from authorities, namely Unity Water, enabled us to upgrade the model with more refined water quality information.

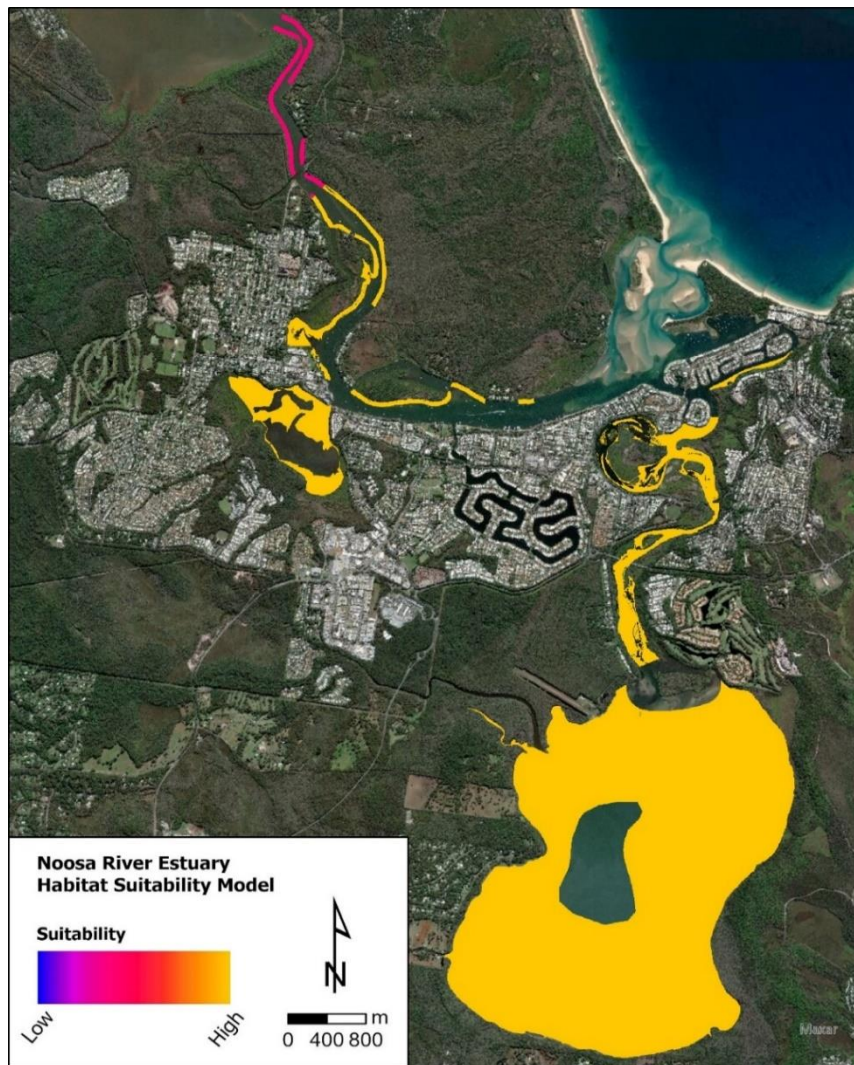


Figure 12: Habitat suitability model

The project team then overlaid the ecological considerations, logistical constraints, and details of the built infrastructure and human uses of the Noosa River to the model (i.e. proximity to seagrass and rocky reef, proximity

to extant and historic oyster reefs, alluvial sands, small craft channels, tidal works, moorings, foreshore access, in-water urban utilities).

These parameters were then allocated ‘exclusion criteria’, to create buffers and minimize potential interactions with river uses (e.g. distances from tidal works, foreshore access points, moorings, submarine cables, main channels). The exclusion criteria were determined in consideration of regulated distances applied to vessels (e.g. distances from moorings) and on practical consideration of river uses (e.g. access to foreshores from the river, distances from navigation channels) and position of utilities (cables, pipes) (Table 5). This later work was undertaken in close liaison with MSQ.

This work was a major undertaking involving the compilation of multiple-data sets, collaboration with multiple agencies and then negotiations where there were no buffers for restoration works identified in the regulations.

The tabulated results were then entered into the restoration suitability model and presented spatially (Figure 13).

Table 5: Restoration suitability parameters and criteria for Sydney rock oyster ecosystems in the Noosa River

PARAMETER	ENVELOPE	CRITERIA (more suitable = 4, less = 0)	Rationale	Source
Seagrass proximity	10m - 500m	Areas within 10-500m buffer =4; all other areas =2	Connectivity to other structured habitats increases diversity. Two metre buffers included to mitigate damage to complex ecosystems but ensuring connectivity.	(Duncan et al. 2019) confirm with engineers
Rocky reef proximity	2m - 500m	Areas within 5-500m buffer =4; all other areas =2	Connectivity to other structured habitats increases diversity. Two metre buffers included to mitigate damage to complex ecosystems but ensuring connectivity.	
Extant oyster ecosystems proximity	Within 250 m	Within 250m = 4; all other areas = 2	Connectivity to other structured habitats increases biodiversity. Connection to other oyster reefs increases meta-population connectivity, successful reproduction and oyster recruitment. Two metre buffers included to mitigate damage to extant oyster ecosystems but ensuring connectivity.	(Boor et al. 2018, Guy et al. 2018, Duncan et al. 2019)
Historical oyster ecosystem proximity	Within 250 m	Within 250m = 4; all other areas = 2	Sites which have historically supported oyster ecosystems are generally thought to be able to support future oyster ecosystems.	(Gillies 2018)
Alluvial Sands	Exclusion area	Within exclusion area = 0, all other areas = 4	Alluvial sands are relatively or mobile and generally offer unsuitable substrates for restoration work	Agreed with TNC restoration scientists

Small craft channels	+ 10 m buffer	Areas within buffer = 0; all other areas = 4	Creates 20 m buffer with centre as per Maritime Safety Queensland Beacon to Beacon suggested passage. Allows for adequate restoration site area at narrow sections of the estuary while maintaining safe navigational passage. In relative, restoration sites will be closer to shorelines to avoid boating interactions.	Agreed with MSQ
Tidal Works (pontoons, jetties, boat ramps)	+ 30 m buffer	Within 250m = 4; all other areas = 2	Prefers restoration sites closest to access points. Included as a way of reducing cost of substrate deployment. 30 m buffer included to reduce chance of damage to restored oyster beds, vessels, and for the safety of workers.	Agreed with MSQ
Moorings	+ 30 m buffer	Within 30 m = 0, all other areas = 4	Ensures safe distance to eliminate chances of damage to moored vessels or restored oyster beds.	Agreed with MSQ
Foreshore Access	+ 10 m buffer	Within exclusion area = 0, all other areas = 4	Areas excluded to maintain high level of public access to foreshore. 10 m adjacent buffer included for ease of vessel access.	Agreed with MSQ
In-water urban utilities (submarine cables & pipelines)	+ 5 m buffer	Within exclusion area = 0, all other areas = 4	Ensures safe distance to eliminate chances of damage to submarine cables and pipelines.	Proposed to Unity Water and Telstra
In-water urban utilities (cross-river cable barges, ferry terminals, etc.)	+ 30 m buffer	Within exclusion area = 0, all other areas = 4	Avoid existing infrastructure	Agreed with MSQ

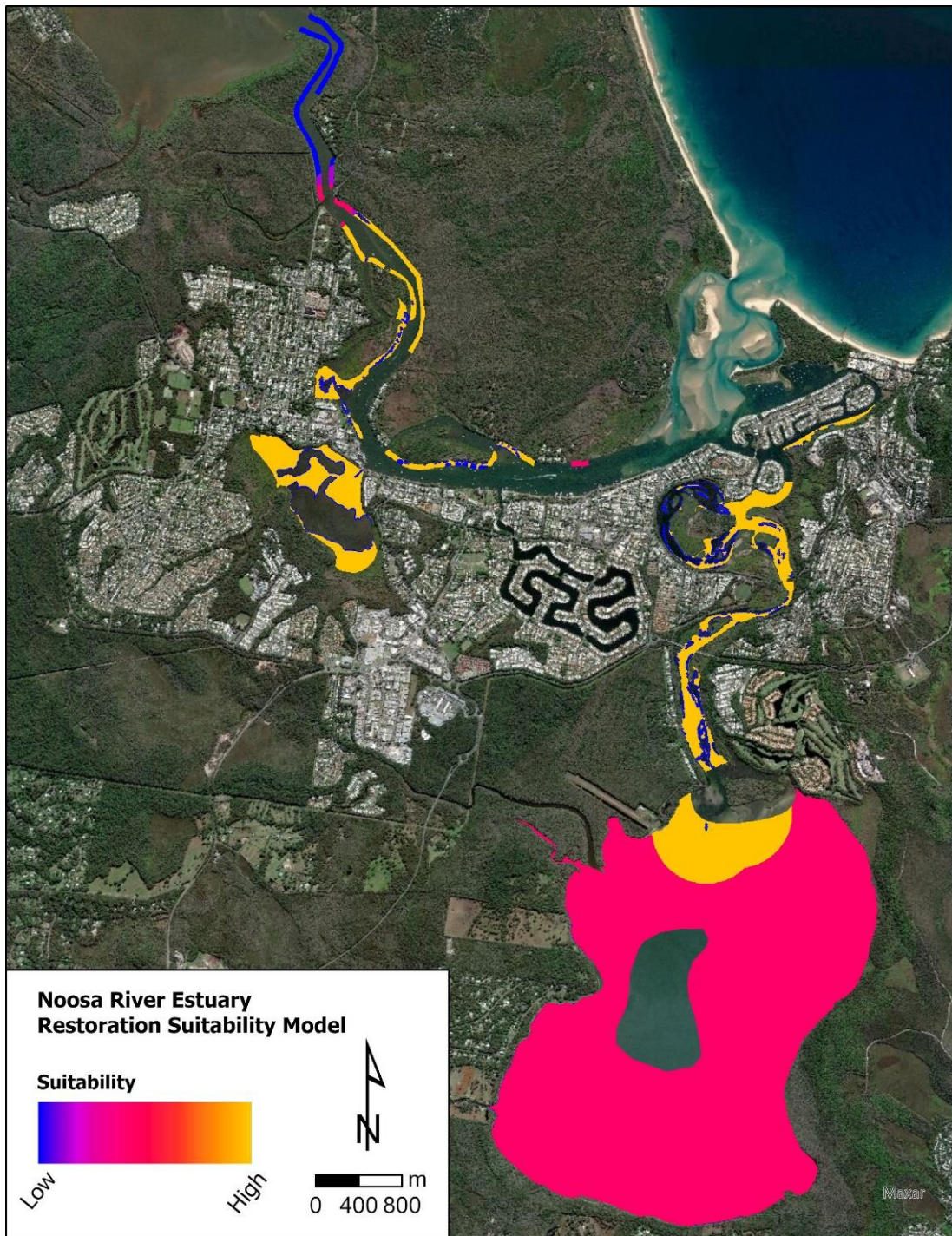


Figure 13: Restoration Suitability Model

Restoration zones

The project delineated restoration zones in the estuary which give an indication of where oyster ecosystem restoration could possibly occur. Within the restoration zones, specific restoration sites are selected and evaluated using the restoration suitability modelling.

The project defined five (5) restoration zones in the Noosa River estuary. The restoration zones are:

1. Main Channel
2. Noosa Sound
3. Weyba Creek
4. Lake Weyba
5. Lake Donella

The criteria for defining the five zones is presented in Table 6. Restoration zones are presented in Figure 14.

Table 6 – Criteria for the determination of oyster ecosystem restoration zones

Parameter	Zone Criteria	Rationale
Habitat Suitability Model	Must be suitable or highly suitable for oyster survival	Oyster ecosystem restoration can only occur in areas of the river where habitat parameters will natural allow oyster survival.
Restoration Suitability Model	Must be suitable or highly suitable against ecological, social use and regulatory parameters	Oyster ecosystem restoration must occur in relative proximity to other estuarine ecological features and processes, without impacting on existing habitats, social uses or government regulations. These include exclusions: Around seagrass, mangrove and saltmarsh habitats to eliminate chances of damage to the existing ecosystem. Around navigation channels, moorings, boat ramps, pontoons and jetties to ensure the safety of river users and mitigate potential damage to restored oyster beds. In areas adjacent to public and private foreshore access so as not to impact river use.
Additional zone criteria	Within 50 m from shore in 20 knot and unrestricted speed areas.	Ensures safe working distance in high speed areas to minimise chances of damage to vessels or restored oyster beds.
Seagrass	Not within 10m of seagrass	Ensures minimal disturbance to existing seagrass beds while maintaining habitat association with oyster beds
Mangroves and other identifiable aquatic habitats	Not within 5m of mangroves or other identifiable aquatic habitats	Ensures minimal disturbance to existing mangrove trees other identifiable habitats while maintaining habitat association with oyster beds

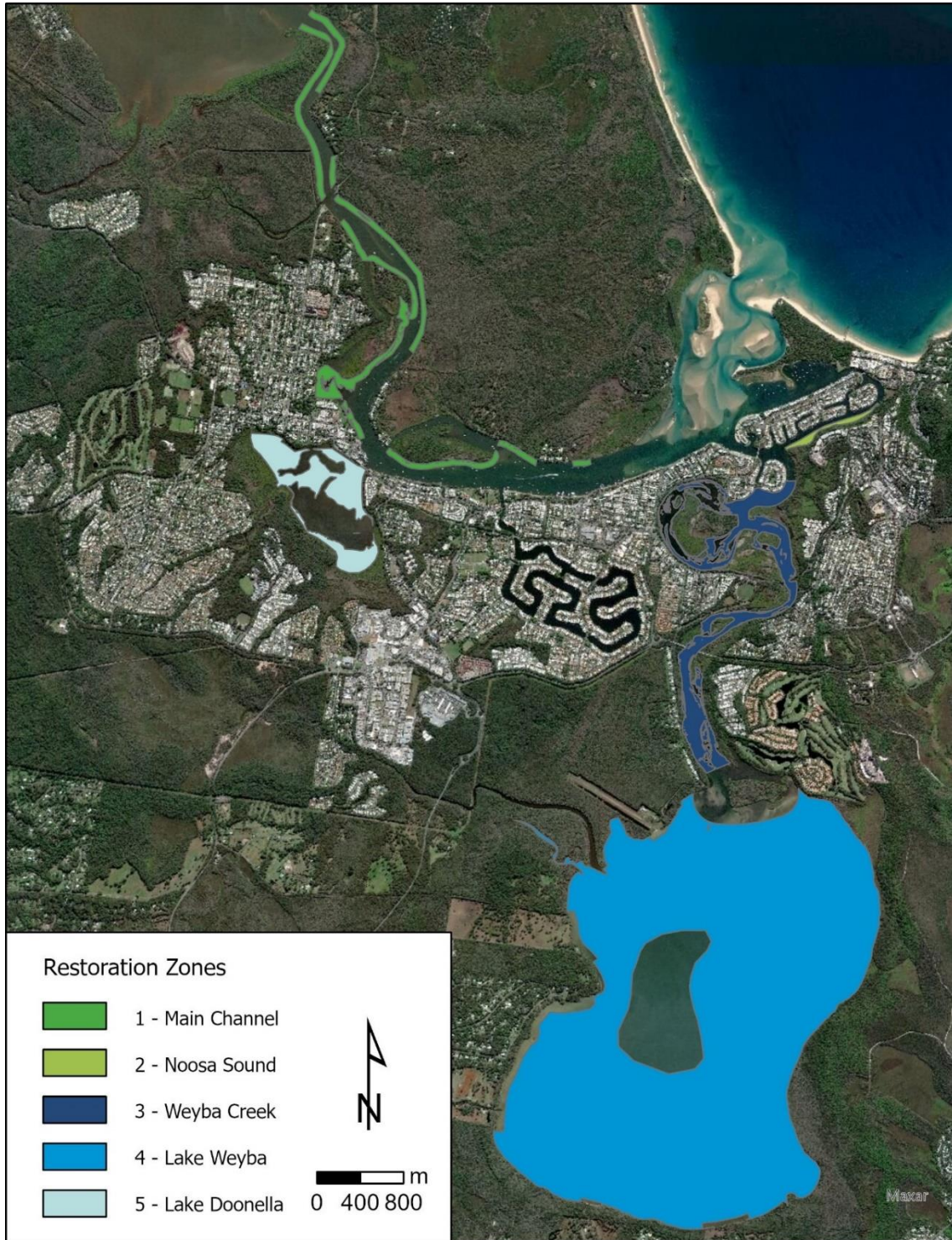


Figure 14: Restoration zones

Bathymetric mapping

TNC contracted Northgroup Consulting to undertake bathymetric mapping and three-dimensional laser scanning of the four planned restoration sites – Tewantin, Goat Island, Noosa South (East) and Noosa Sound (West). These complex bathymetric maps guide the placement of the oyster reef patches within sites. The bathymetry of the Tewantin restoration site is given below as an example (Figure 15).

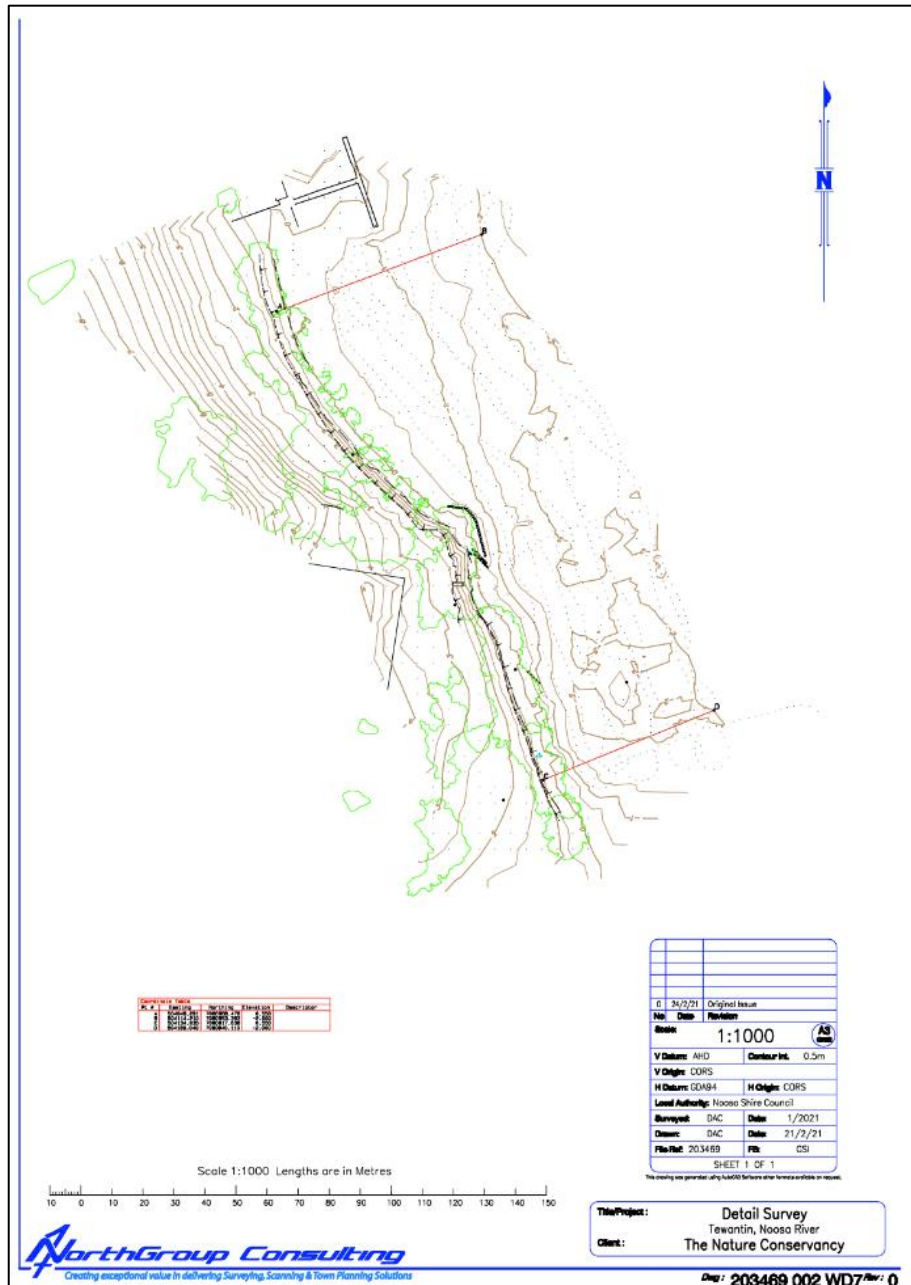


Figure 15: Tewantin bathymetric map

Habitat mapping

TNC contracted Ecological Service Professionals (ESP) to map marine habitats within the four planned restoration sites, as well as at two sites in Weyba Creek, which have since been withdrawn for consideration as restoration sites, pending further analysis. The work included mapping marine habitats including seagrass beds, mangroves, remnant oyster beds, rocky reefs and shoreline vegetation. This information was then overlaid with the bathymetric information to guide the placement of the oyster reef patches. This extensive body of work was also critical to support the permitting process, in which the project had to demonstrate no significant impact on marine habitats. The habitats of the Tewantin restoration site are given below as an example (Figure 16).

TNC extends a special thanks also to Simon Walker from ESP, who worked way beyond his mandate, in a voluntary capacity, to undertake this work and to provide extensive technical input to the multiple code and environmental impact assessments undertaken.

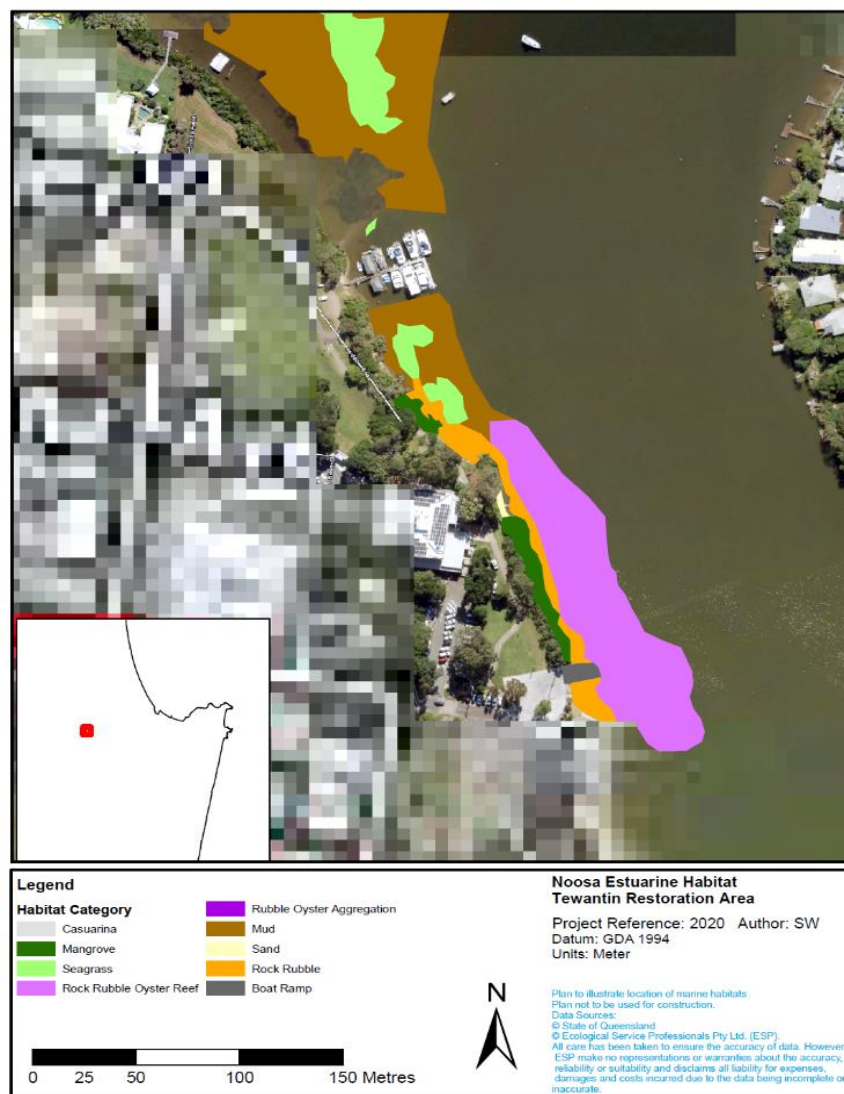


Figure 16: Tewantin habitat map

Engineering

TNC contracted coastal engineering specialists, International Coastal Management (ICM), to support development of the designs, specifications, and site layouts of oyster reef patches at the four restoration sites (the footprints). The work was extensive and is at the cutting edge of rock oyster restoration within constrained, and highly populated, estuaries. ICM also assisted TNC with refining protocols for construction, sediment plume minimization, erosion avoidance, reef patch rectifications, the use of oyster shell in oyster reef patch construction, and for the secure placement of seeded oyster cultch within the oyster reef patches. The site engineering for the Tewantin restoration site is given below as an example (Figure 17).

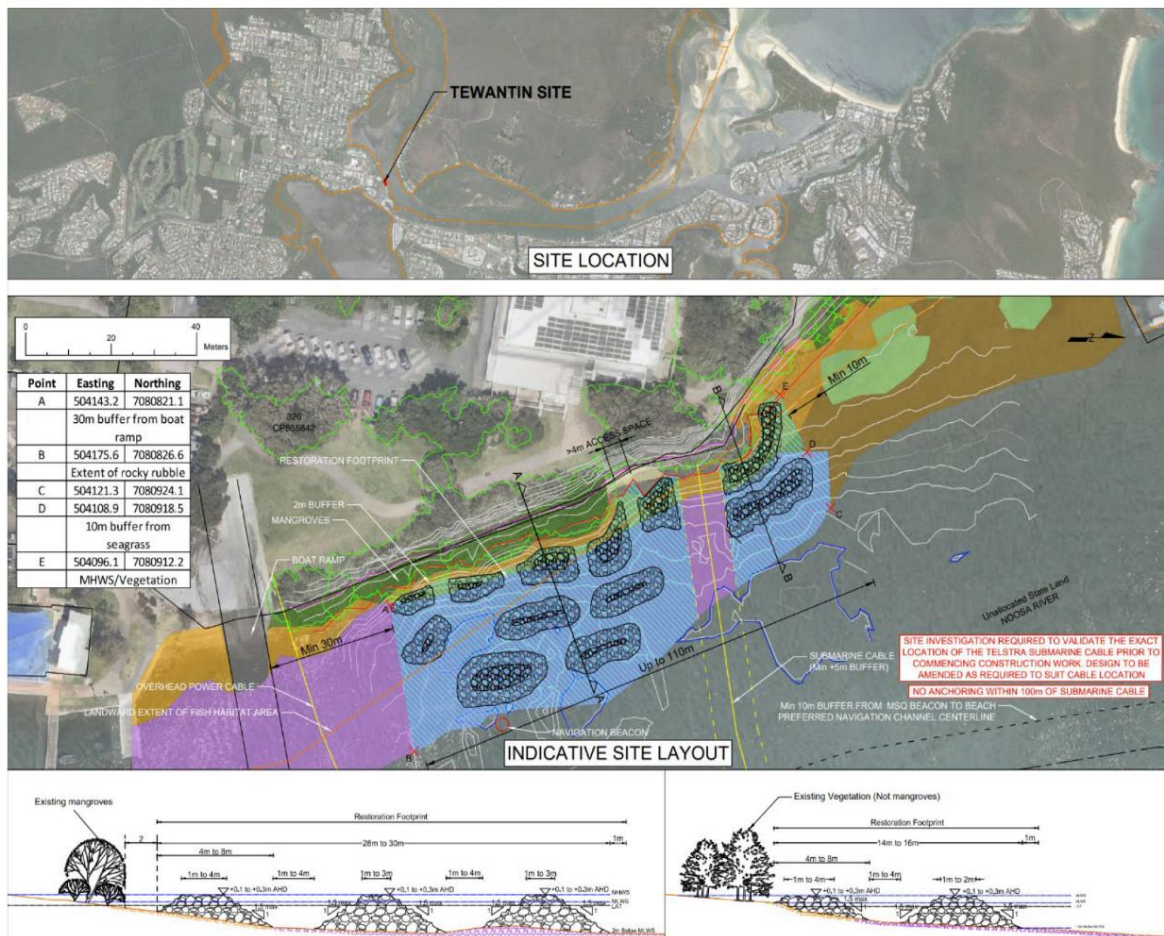


Figure 17: Tewantin site engineering

Project restoration plan

TNC developed the Project Restoration Plan tailored to government requirements (Figure 18). The plan is a central tennet of permit applications. The plan provides agencies with an overview of the project context and management arrangements, and outlines technical details pertaining to the selection and design of restoration sites in the Noosa River estuary.

The plan includes risk assessments assessed against environmental, social and aesthetic parameters and details management arrangements for the four restoration sites. The plan is supported by 14 annexes, including engineering certified site plans and multiple regulatory assessments.

The plan represents a major and unique (for Queensland) body of work involving four consultancy firms, TNC restoration specialists, input from members of the project Technical Advisory Group (TAG), local stakeholders, project partners, DAF and MSQ.

Key content from the plan is available in project reports or project briefs. Additional information regarding construction and site management will be reformatted into publically digestible formats and released widely at the appropriate times. Before implementation, the Project Restoration Plan will be updated in line with permit conditions.

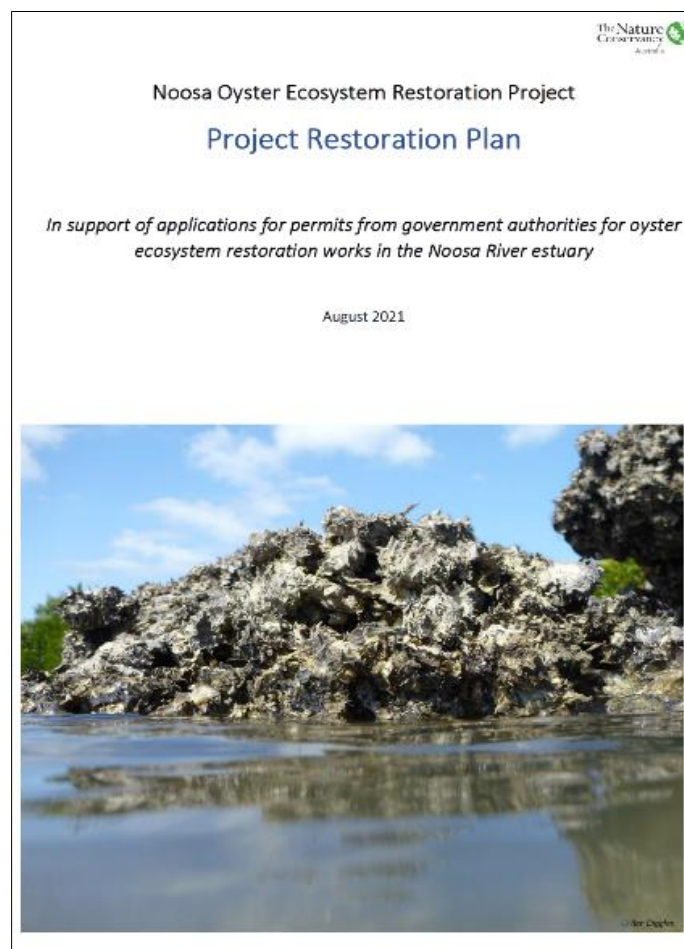


Figure 18: Project Restoration Plan

Permits

There are four steps in the permitting process for this project:

1. Lodgment of a draft project proposal and formal meeting with state agencies
2. Formal feedback on the proposal, amendments to proposal and additional assessments and evaluations
3. Request for Owners Consent, Resource Allocation Authority (RAA) and General Fisheries Permits (GFPs)
4. Request for development approval (DA)

TNC has completed steps 1, 2 and 3 and is awaiting the outcome of step 3, expected by the end of September 2021, before requesting development approval (step 4). A breakdown of the permitting steps and progress to date is presented below:

Step 1 – Formal pre-lodgment of restoration submission and meeting with the Queensland State Assessment and Referral Agency (SARA) - complete

In May 2021, TNC submitted the draft project submission to SARA. In June 2021, TNC and NSC met with SARA and relevant state agencies, principally the Department of Environment and Science (DES), MSQ and DAF and received constructive feedback on the draft project submission.

Step 2 – Project Restoration Plan/ Code Assessments / Matters of State Environmental Significance - complete

SARA provided TNC with formal written advice on the draft submission. In the advice, the agencies requested converting the submission into a restoration plan, and sought further clarifications as to project activities, a series of minor amendments to the five government code assessments, additional habitat mapping, amendments to the engineering schematics and six additional assessments of Matters of State Environmental Significance (MSES) relating to the Tewanin and Goat Island restoration sites.

Step 3 – Owners Consent / Resource Allocation Authority / General Fisheries Permits – Applications submitted

TNC has formally submitted the project restoration plan and has made requests to the respective agencies for:

1. Owners Consent – Permission to proceed to a development application. The request was made to the Queensland Department of Natural Resources, Mines and Energy (DNRME). The request is expected to be processed by mid-September 2021.

2. Resource Allocation Authority (RAA) – Permission to work in the Noosa River Fish Habitat Area. The application was submitted to DAF. The application is expected to be processed by the end of September 2021.

3. General Fisheries Permits (GFP) – Permission to collect oyster brood stock from the Noosa River, to handle live oysters for use in restoration works and oyster gardening, and to use oyster shell to construct composite rock/shell oyster reef patches. The applications were submitted to DAF. The applications are expected to be processed by October 2021.

Step 4 – Development approval (DA) – application prepared, pending submission

Once Owners Consent and the RAA are secured, TNC will send the documentation to SARA for development approval. SARA has advised TNC that with Owners Consent and the RAA in hand, the assessment for development approval would be expedited, and associated assessment costs, which collectively may total over \$20,000, will be significantly lowered. The DA is expected to be processed by the end of October 2021.

Pilot reef construction plans

Locations

As part of the pilot phase of the project, TNC plans to construct oyster reef patches at the Tewantin and Goat Island restoration sites. These sites are close to the planned load out site on Hilton Esplanade, Tewantin, making access optimal.

Construction is expected to commence in December 2021, subject to permits. If the construction company is unable to complete the work by the start of the summer school holiday period, then work may be halted and re-commence in late January 2022 to avoid this hectic period on and around the river.

Subject to the success of the pilot phase, full restoration of the Tewantin and Goat Island sites as well as construction in Noosa Sound will be undertaken in spring and summer of 2022.

Quarries

In preparation for the construction phase, TNC visited three local quarries to assess their capacity to provide igneous porphyry rock to construct the oyster reef patches. Those quarries were Boral (Moi Pocket), Sunshine Coast Quarries (Nambour) and Kin Kin Quarry.

The quality of the rock is important, and this relates to the position in the rock face (or hill) that the rock is sourced from. The size of the rock is also important, the project requires rock between 150mm-500mm diameter, as is the quarry's handling processes, which determine the cleanliness of the rock and its mode of transport and timing and delivery. TNC will work with the project's construction contractor to select the most appropriate quarry for the job.

Hatchery

The partnership with BIRC will deliver seeded oyster cultch as required to seed the new oyster reef patches.

Monitoring

Baseline water quality monitoring by NICA has commenced at the Tewantin restoration site and will be shortly extended to the Goat Island restoration site.

Baseline ecological monitoring, led by TNC but supported by an independent contractor, will in summer 2021 and continue throughout the restoration permit period, which is anticipated to be three or four years. Monitoring beyond the permit phase will be subject to further discussions between project partners and agencies.

Reporting of monitoring results will after six months, in the first year, followed by annually. Monitoring will be reported annually against the three key criteria:

1. Ecological performance (restoration extent, ecological recovery, ecological productivity);
2. Social performance (job creation, community engagement, community support and reef stewardship); and
3. Economic efficiency performance (timeliness, budget, leveraged financial support, project management).

Project finances

The financial reporting period is 1 July 2020 till 30 June 2021.

This section details the project finances. Table 7 presents project expenditure across five activity codes:

1. Reef Building
2. Hatchery and seedling
3. Reef integrity and performance assessment
4. Community engagement, volunteering and media
5. Project management

By the 30 June 2021, the project spent 48 percent of the total project budget.

Considerable savings have been made in the following areas:

- Data analysis and restoration suitability mapping – achieved in-house rather than outsourcing.
- Office space and equipment and sundry costs – project manager is working from home office.
- Technical assessments – project manager and extensive in-kind contributions from experts.
- Travel, training and conferences – COVID-19 impact.

Contracts

- NorthGroup Pty Ltd – Bathymetric and intertidal surveys at oyster restoration sites (\$13,200).
- Ecological Service Professionals Pty Ltd - Seagrass and habitat mapping contract (\$42,592).
- Integrated Coastal Management Pty Ltd – Engineering advice and RPEQ certifications (\$37,290), permitting support (\$10,000).
- Resources Australia Ltd - Oyster shell transport contract to wholesalers and restaurants (up to approx. \$30,000 over two and a half years) – ongoing.
- Casual support – Callum Dittes (technical assistant), Helen Bowyer (community outreach assistant).

The additional \$1.2m of funding provided by the Federal Government under the Reef Builder program will be used to offset the cost of oyster seeding, additional project staff and construction.

Table 7: Total project expenditure

PROJECT COSTS	Total Budget \$	FY20 Expenditure \$	FY21 Expenditure \$	Total Expenditure \$	Remaining Budget \$
Reef Building Bathymetric, hydrological assessments, oyster bed engineering, rock and shell material procurement, construction and engineering assessments.	861,982	100,915	256,678	357,593	504,389
Hatchery and seeding Procurement of oysters, hatchery/farmer engagement, shell transport, recycled shells collection, permitting, record keeping and reporting.	293,332	29,575	104,913	134,488	158,844
Reef integrity and performance assessment Pre-substrate deployment site assessments (bottom ecology, surface profiles, oyster densities, vulnerable habitats mapping (e.g. seagrass), river uses analysis (e.g. boating, fishing), data analysis, WHS and safety plans, operational equipment, periodic reports.	580,289	24,325	140,001	164,326	415,963
Community engagement, volunteering and media Community engagement products, engagement coordination, sub-contractor identification, contracting and management, volunteer briefings, volunteer recruitment, stakeholder meetings, personal protective equipment, media statements, media management and education material production and distribution.	424,397	177,722	171,912	349,634	74,763
Project Management Production of Project Management Plan, Monitoring Evaluation and Reporting Plan, Communications Plan, project risk assessments, plan and risk refinements and revisions, government permitting, legal, technical science support	240,000	102,017	135,947	237,964	2,036
Total expenditure	2,400,000	434,554	809,452	1,244,006	1,155,994

Next steps

The steps planned for the next six months of the project include:

- Contract BIRC to support oyster seeding/oyster gardening
- Wash and bag more than 2 tonnes of cured oyster shells for hatchery reseeding (2 weeks work)
- Instigate a tendering process for the construction work
- Contract a suitable construction company to build pilot reefs at Tewanin and Goat Island
- Construct reefs, map reefs and provide construction report to government
- Contract independent Monitoring, Evaluation and Reporting company
- Undertake baseline monitoring
- Support Oyster Gardening Project activities
- Support Senior Schools Project activities with EEHub
- Support Junior Schools Project activities with NCBA
- Establish river sediment project with Noosa Parks Association (NPA)
- Establish Tewanin demonstration project site
- Produce Spring and Summer editions of the Noosa Oyster Chronicle
- Produce construction information package and distribute to community
- Finalise seagrass report and progress seagrass research

Annex 1: Goals, objectives and deliverables of the project

Project Goal	To improve the environmental health of the Noosa River Estuary through active restoration and conservation activities that engage the Noosa Community in meaningful conservation and support economic and community wellbeing.			
Objectives	Deliverables	Expected completion date (from 1 July 2019 unless otherwise stated)	Measurable outcomes	Party responsible for Deliverable
A-1 Project establishment and management Establish effective project governance, management, communication and reporting sufficient to successfully implement shellfish restoration project	(A1.1) A Technical Advisory Group (TAG) is established to provide project oversight. This will include a clear terms of reference and consist of representatives from key stakeholders (NSC, TNC, Kabi Kabi and at least two other independent parties).	3 months from appointment of Project Manager	<p>Terms of reference for the TAG developed, TAG is established and at least one meeting held.</p> <p>Evidence of Kabi Kabi involvement.</p>	<p>TNC</p> <p>TNC</p>
	(A1.2) Appointment of dedicated project manager who is a marine biologist with extensive project management experience, for the term of the Agreement.	6 months	Appointment of Project Manager to oversee the Project.	TNC
	(A1.3) A Project Implementation Plan detailing at a minimum: A detailed risk assessment associated with the project. A communications and media plan, outlining media protocols, opportunities and the role of TNC and NSC. A monitoring, evaluation and reporting plan which identified ecological and social monitoring programs, how they will be reported on and how this will fed back into the project.	6 months	<p>A project implementation plan produced by TNC and approved by NSC.</p> <p>Approval for the plan (if acceptable) provided in writing by NSC by no later than two months after delivery.</p>	<p>TNC</p> <p>TNC & NSC</p>

Project Goal	To improve the environmental health of the Noosa River Estuary through active restoration and conservation activities that engage the Noosa Community in meaningful conservation and support economic and community wellbeing.			
Objectives	Deliverables	Expected completion date (from 1 July 2019 unless otherwise stated)	Measurable outcomes	Party responsible for Deliverable
	(A1.4) Participate in public forums to provide the Noosa community opportunities to learn about the project and TNC.	Ongoing for the duration of the project	<p>Participate in at least three public presentations/forums in the first 12 months (ideally within first 9 months) with the purpose to provide the Noosa community opportunities to learn about the project and TNC.</p> <p>Participate in at least six public presentations/forums in years 2 and 3, with the purpose to provide the Noosa community opportunities to learn about the implementation and outcomes of the project.</p> <p>A minimum three media statements throughout duration of project</p>	<p>TNC</p> <p>TNC</p> <p>TNC & Noosa Council</p>
	(A1.5) Annual project reports and final report each of which address, at a minimum: Activities undertaken during the subject financial year, status and progress against deliverables, budget progress, income and expenditure, report against monitoring and evaluation program and measurable outcomes and outline of proposed upcoming	<p>For each annual project report - Yearly</p> <p>For the final report – 30th September 2022</p>	<p>An annual project report (and, when applicable, final report) is prepared and produced by TNC, endorsed by Technical Advisory Group, and delivered by TNC to Noosa Council, within 60 days of the end of each financial year during the term of the Agreement.</p> <p>The annual report (and, when applicable, final report) in Measurable Outcome 9 is presented</p>	<p>TNC</p> <p>TNC & NSC</p>

Project Goal	To improve the environmental health of the Noosa River Estuary through active restoration and conservation activities that engage the Noosa Community in meaningful conservation and support economic and community wellbeing.			
Objectives	Deliverables	Expected completion date (from 1 July 2019 unless otherwise stated)	Measurable outcomes	Party responsible for Deliverable
	works/activities for future period.		to Noosa Council by TNC in conjunction with Noosa Council officers for its approval for endorsement within 90 days of the end of each financial year during the term of the Agreement, and (if acceptable) approved by Noosa Council.	
	(A1.6) 6 monthly status and progress reports which address, at a minimum: Progress against deliverables and monitoring and evaluation report. 6 monthly financial statements including a statement of Project income/funding and expenditure	6 monthly	6 monthly status and progress reports, and financial statement, are produced, endorsed by the Technical Advisory Group, and provided to NSC, within 30 days of end of each six (6) month period. Reports and financial statements due at the end of the financial year may be included with annual reports and the final report.	TNC
A-2: Site selection Identify suitable restoration sites for Phase II and Phase III and appropriate reef design that minimize estuary-user conflict whilst optimizing reef rehabilitation	(A2.1) Oyster reef restoration suitability model incorporating physical parameters of oysters and public and industry usage, access etc. to identify priority sites for restoration.	12 months	Habitat suitability model which incorporates industry, Kabi Kabi knowledge and public interests.	TNC
	(A2.2) Obtain necessary State government permits/authorities including particular resource allocation authority, for oyster reef restoration	18 months	Outcomes: (a) Obtain all required State government permits/authorities for installation of oyster reefs. (b) Obtain all required Local government	13(a) - TNC 13(b) – NSC

Project Goal	To improve the environmental health of the Noosa River Estuary through active restoration and conservation activities that engage the Noosa Community in meaningful conservation and support economic and community wellbeing.			
Objectives	Deliverables	Expected completion date (from 1 July 2019 unless otherwise stated)	Measurable outcomes	Party responsible for Deliverable
	Obtain necessary local government permits/approvals including in particular fisheries development approval for oyster reef restoration		permits/approvals for installation of oyster reefs are obtained.	
	(A2.3) Community, industry and stakeholder consultation sufficient to gain majority support for reef restoration locations.	18 months	Records of public and stakeholder consultation, including one-on-one meetings, open forums, media, etc.	TNC
A-3 Community engagement Strengthen community interest, support and participation in Noosa River restoration by establishing a community volunteering program to support reef restoration	(A3.1) Community, industry and stakeholder consultation to identify most appropriate community volunteering opportunities (e.g. shell recycling, oyster gardens, oyster watch, video monitoring).	18 months	Records of public and stakeholder consultation, including one-on-one meetings, open forums, media, etc.	TNC & Noosa Council
	(A3.2) Establish at least one community volunteering program identified from the above process which takes into account current and future resources, management and interest.	18 months	Record of volunteer hours dedicated to community volunteering programs, such as: shell recycling, oyster gardens, oyster watch, video monitoring.	TNC & NSC
A-4 Reef restoration Restore oyster reef ecosystems across the lower estuary	(A4.1) Restoration at two sites (approx. 40m-50m shore length per site) which tests reef design and construction methods and oyster growth and survival.	24 months	At least two (2) sites with at least overall 80m shore length of reef restored, and being actively monitored.	TNC
	(A4.2) Restoration across multiple sites, as determined by habitat suitability modelling and	36 months	In addition to the two pilot sites, a number of sites comprising a minimum of a further	TNC

Project Goal	To improve the environmental health of the Noosa River Estuary through active restoration and conservation activities that engage the Noosa Community in meaningful conservation and support economic and community wellbeing.			
Objectives	Deliverables	Expected completion date (from 1 July 2019 unless otherwise stated)	Measurable outcomes	Party responsible for Deliverable
	outcomes of community consultation.		aggregated 600m ² surface area of restored oyster reef in the Noosa River estuary.	
	(A4.3) Monitoring and evaluation study for both pilot and full restoration sites. Monitoring to include oyster metrics, invertebrates and fish use (detailed in MER plan).	Ongoing for duration of project, at least 6 monthly	Annual monitoring and evaluation report card with 6 monthly status reports to be provided.	TNC
A-5 Noosa River Plan Provide technical and expert support to Noosa for planning, implementation and evaluation associated with appropriate elements of the Noosa River Plan and other coastal and marine management plans	(A5.1) Run workshop with NSC to identify ongoing focus areas for TNC support.	9 months	Workshop completed.	TNC & NSC
	*(A5.2) Provide technical/peer review on minimum five plans/reports/studies if requested by Noosa Council.	Ongoing for duration of project	Minimum 5 peer review reports completed during the three-year term of this Agreement, if requested by NSC. If NSC requests a peer review, TNC will provide a minimum of 3 experts who are qualified in the relevant area of expertise for NSC consideration and Noosa Council's acceptance of one expert for the peer review.	TNC
	*(A5.3) Facilitate a minimum of three study tours of relevant sites in line with objectives and scope of the program in Australia/US if requested by Noosa Council (flights and incidentals covered separately by Noosa Council, accommodation	36 months	Minimum three individuals on study tours completed during the three-year term of this Agreement, if requested by Noosa Council.	TNC & NSC

Project Goal	To improve the environmental health of the Noosa River Estuary through active restoration and conservation activities that engage the Noosa Community in meaningful conservation and support economic and community wellbeing.			
Objectives	Deliverables	Expected completion date (from 1 July 2019 unless otherwise stated)	Measurable outcomes	Party responsible for Deliverable
	and in-country travel covered by this Grant).			
	*(A5.4) Develop a Conservation Action Plan for specific issues (not yet determined) relevant to the Noosa Estuary (including community workshops) if requested by Noosa Council. ¹	36 months	Conservation Action Plan and Community Workshops completed as required.	TNC & NSC
	*(A5.5) Facilitate access to TNC conservation networks and researchers if requested by Noosa Council.	Ongoing for duration of project	A number of new contacts/networks to assist Noosa Council with ongoing and future marine conservation activities.	TNC
	(A5.6) Promote Noosa Council's Noosa River Plan and shellfish restoration project in at least one national and one international conference.	36 months	Presentation to at least one national and one international conference.	TNC & NSC
	(A5.7) Promote Noosa Council's Noosa River Plan and shellfish restoration project to corporate, philanthropic and state/federal government audiences to establish further support for conservation activities that support the Noosa River Plan.	Ongoing for duration of project	A number of new corporate/ government/ philanthropic alliances and new in-kind support/financial funding contributions.	TNC & NSC

Annex 2: Project Brief



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NOOSA OYSTER ECOSYSTEM RESTORATION PROJECT

Project Update

July 2021

Detailed designs for proposed oyster ecosystem restoration sites in the Noosa estuary

Background

For the last 18 months, The Nature Conservancy (TNC) has been working alongside community members, local indigenous elders, hydrographic surveyors, marine ecologists, coastal engineers and government agencies to select the most appropriate sites and reef designs for the restoration of oyster ecosystems in the Noosa River estuary.

The location, shape and size of oyster reef patches, displayed in the figures below, were designed to give the best environmental outcome. The locations were specifically selected to ensure public access, public safety and to provide education, fishing, recreation and water-based tourism opportunities.

The reef patch designs meet strict regulatory government requirements relating to stability, erosion minimisation, maintenance of fish passage, restoration of a degraded ecosystems and fish habitats, protection of marine plants and benefits to fisheries.

Proposed locations

- Four locations have been selected as oyster ecosystem restoration sites after extensive community feedback, scientific analysis and government input. These sites are Tewantin, Goat Island, Noosa Sound East and Noosa Sound West.
- We anticipate that up to half of the restoration work will be completed this summer (2021-2022) at two sites, likely at Tewantin and Goat Island, with the remaining work to be completed the following spring/summer (2022-2023) at the Noosa Sound sites.
- The four restoration sites were selected as those that optimise ecological, engineering, public safety and river access requirements.
- The oyster ecosystem recovery process will take about five years, that is, from when the oyster reef patches are laid in the river, until these patches are encrusted with oysters, other marine invertebrates and plant life.

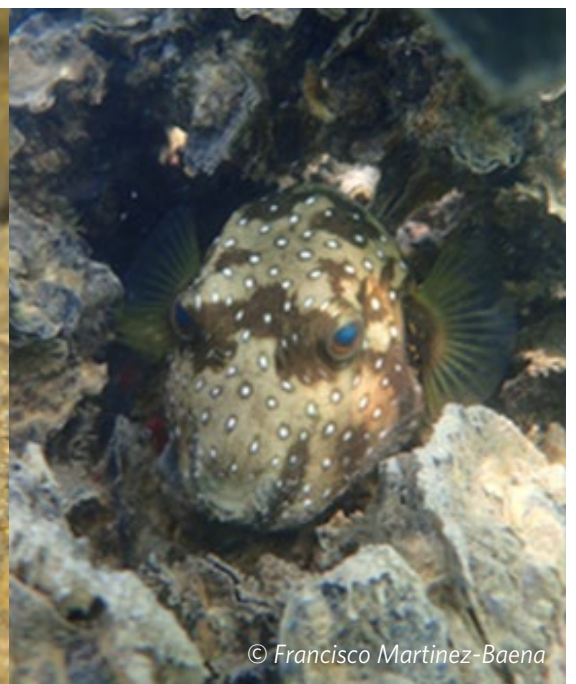


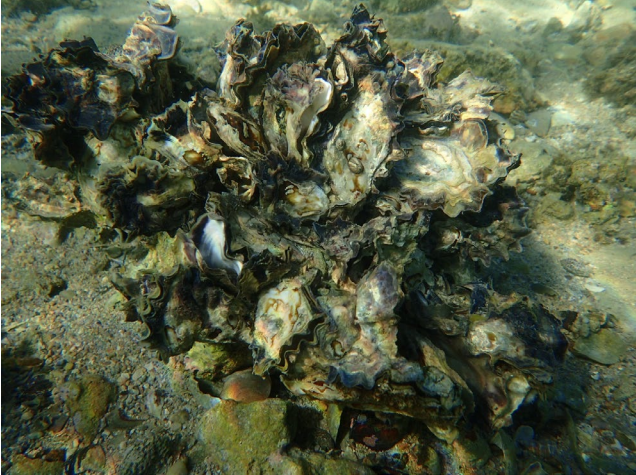
Process undertaken for site selection and reef patch design

The process of site selection and design included:

1. Development of a restoration suitability model by scientists at TNC that identified areas of the estuary where oysters were likely to thrive (information listed in the table *Restoration Criteria* at the end of this brief).
2. The maps produced from this model were then further refined through community and Indigenous consultation and extensive scientific and state agency input to ensure current river values and public access were maintained.
3. After the restoration sites were selected, and consulted on publicly, engineers from ICM Engineering worked alongside restoration practitioners and expert ecologists to consider a range of designs that would support oyster survival and growth, fish habitats and biodiversity whilst also minimising disturbance to natural processes in the Noosa River. The final designs are provided in Figures 2-5 below.
4. The location and designs of the oyster reef patches were presented to an independent Scientific Committee made up of Queensland Government representatives, Noosa Shire Council staff and local marine biologists prior to their formal submission to Government to seek restoration permits.

A huge thank you to the many fishers, residents, Traditional Owners, shop and restaurant owners, local scientists and engineers who helped provide local knowledge and support throughout the site selection and design process. Thank you!





What next?

Construction of the oyster reef patches is anticipated to commence this summer.

Why oyster beds and reefs?

Scientific evidence and historical knowledge from Indigenous Australians, fishers and community members has provided unequivocal evidence that oyster-dominated ecosystems were once very common throughout Noosa and many other Australian estuaries.

These ecosystems collapsed over a hundred years ago, changing the way the estuary behaves and how fish and marine life use the estuary. We know from other restoration projects in Australia and around the world that restoring oyster ecosystems helps improve the variety of marine habitats available for marine life to use, especially fish that use the oyster reefs and beds for shelter and as nurseries and feeding grounds.

The cracks and crevices found within oyster reefs and beds provide shelter and homes for a huge range of invertebrates, like those depicted in the images below. Oyster ecosystems have also been shown to protect shorelines from erosion by acting as physical barriers to waves, which means they help keep the shoreline intact for longer and can help prevent land from washing away.

For a copy of the project brochure, view Frequently Asked Questions or to get an overview of TNC's national shellfish restoration project, visit: <https://www.natureaustralia.org.au/Noosa>

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Reef patch designs and site placement

In phase 1 (2021 - 2023) of the project, oyster ecosystem restoration is proposed at four sites: Tewantin, Goat Island, Noosa Sound East and Noosa Sound West as shown in Figure 1. Initially, the project plans to restore two sites over the summer of 2021-2022. Those sites are anticipated to be Tewantin and Goat Island, subject to final approval.

In phase II of the project (2023 and beyond), future restoration sites may selected subject to resources, public consultations and support, and government approval.



Figure 1: Location of the planned phase 1 (2021-2023) oyster ecosystem restoration footprints in the Noosa River

Tewantin restoration footprint

Located 30 metres upstream of the Tewantin boat ramp on the river's southern shoreline, near the council chambers

Reef patch footprint = 1,326m²
 Maximum length = 110m
 Max. distance from shore = 32m

Location selected for educational purposes - celebrating western and indigenous connections to the Noosa River along with the benefits of oyster ecosystems to river health, fishing, tourism and recreation

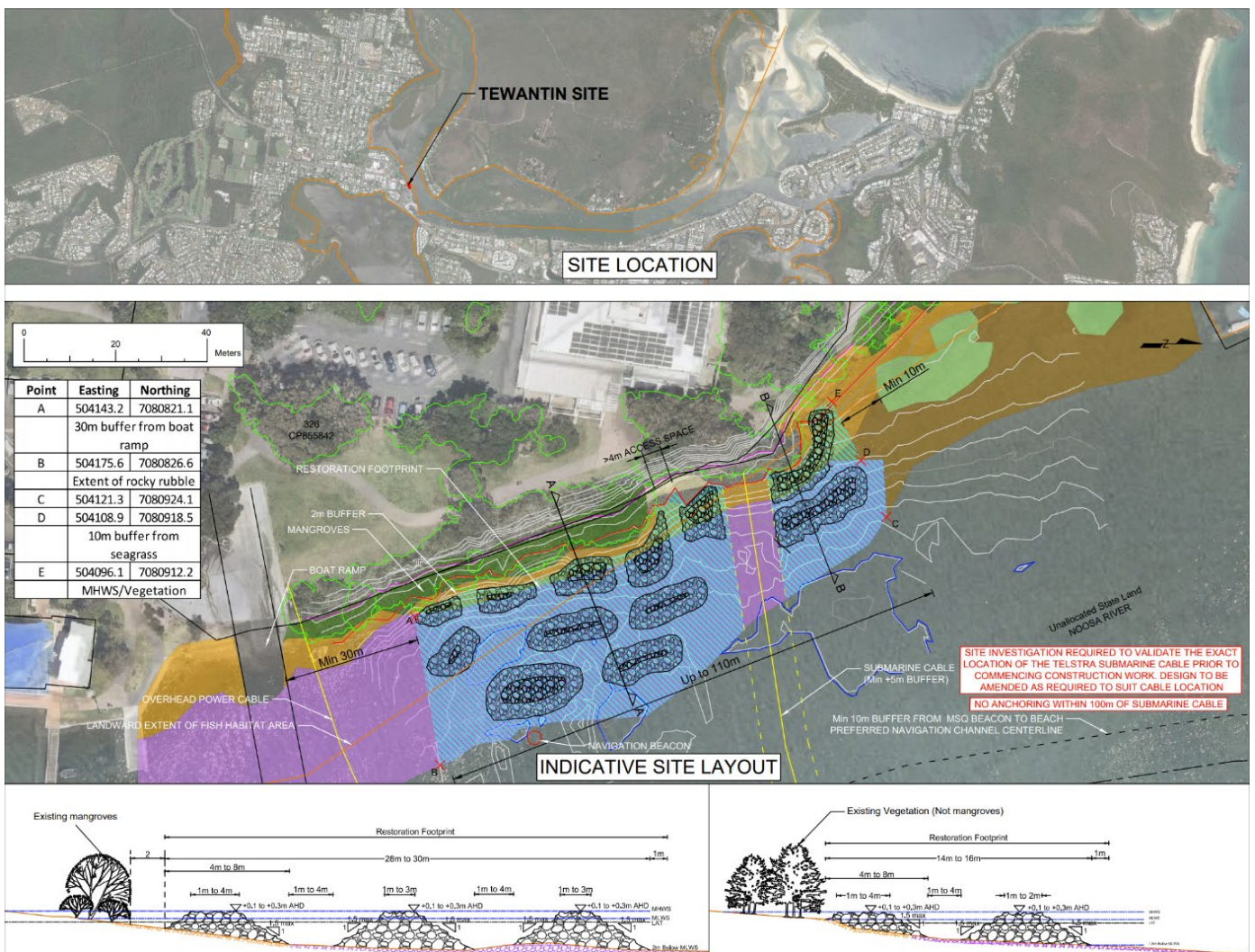


Figure 2: Tewantin restoration footprint (Courtesy of ICM engineering)

Goat Island restoration footprint

Located in the middle section of Goat Island's southern shore

Reef patch footprint = 464m²
 Maximum length = 58m
 Max. distance from shore = 14m

Location selected to improve fish habitats

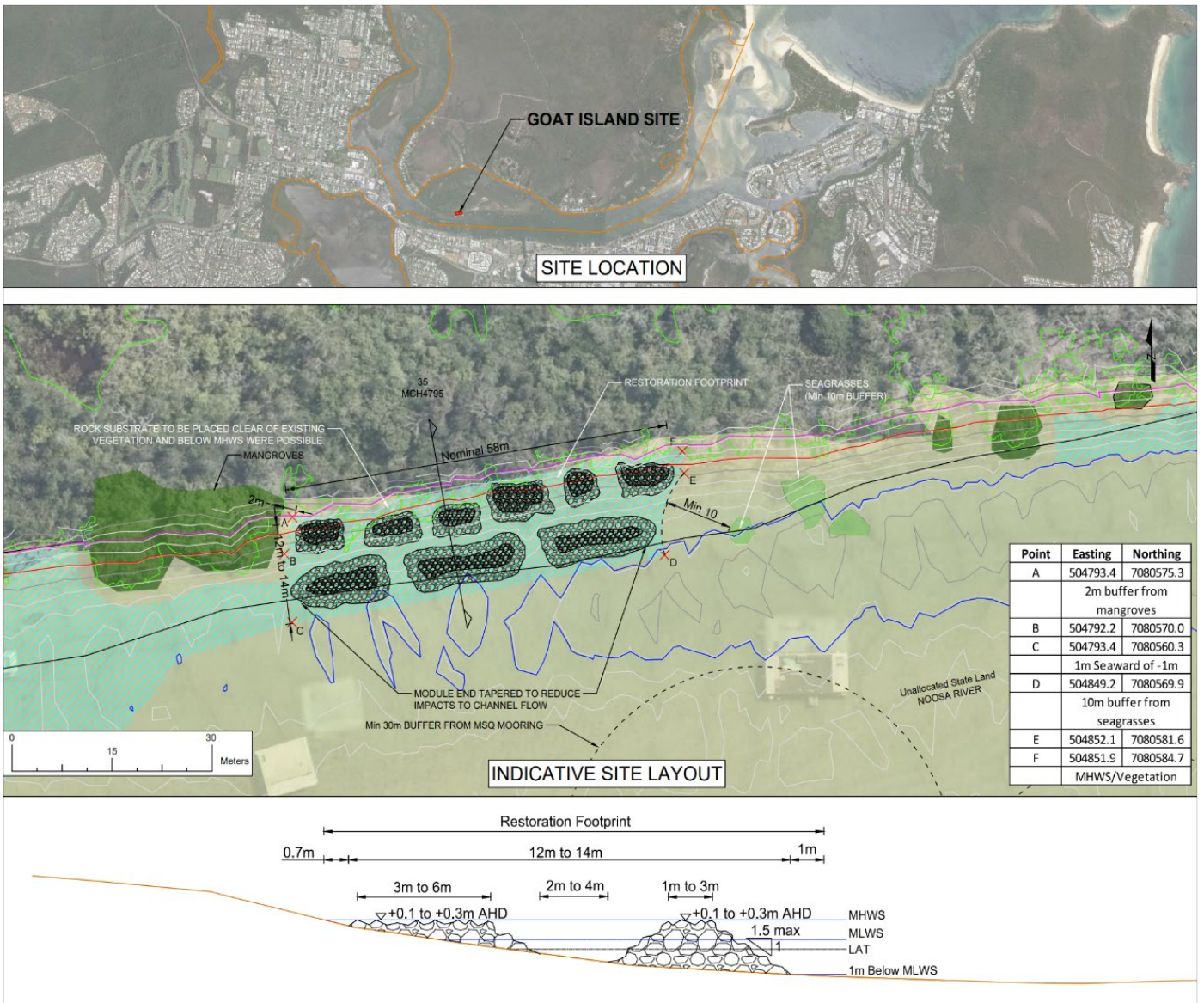


Figure 3: Goat Island restoration footprint (Courtesy of ICM engineering)

Noosa Sound East restoration footprint

Located in the eastern embayment on the south eastern shoreline of Noosa Sound

Reef patch footprint = 1,209m²
 Maximum length = 240m
 Max. distance from shore = 14m

Location selected to improve fish habitats and enhance recreational opportunities and tourism e.g. kayaking and snorkelling

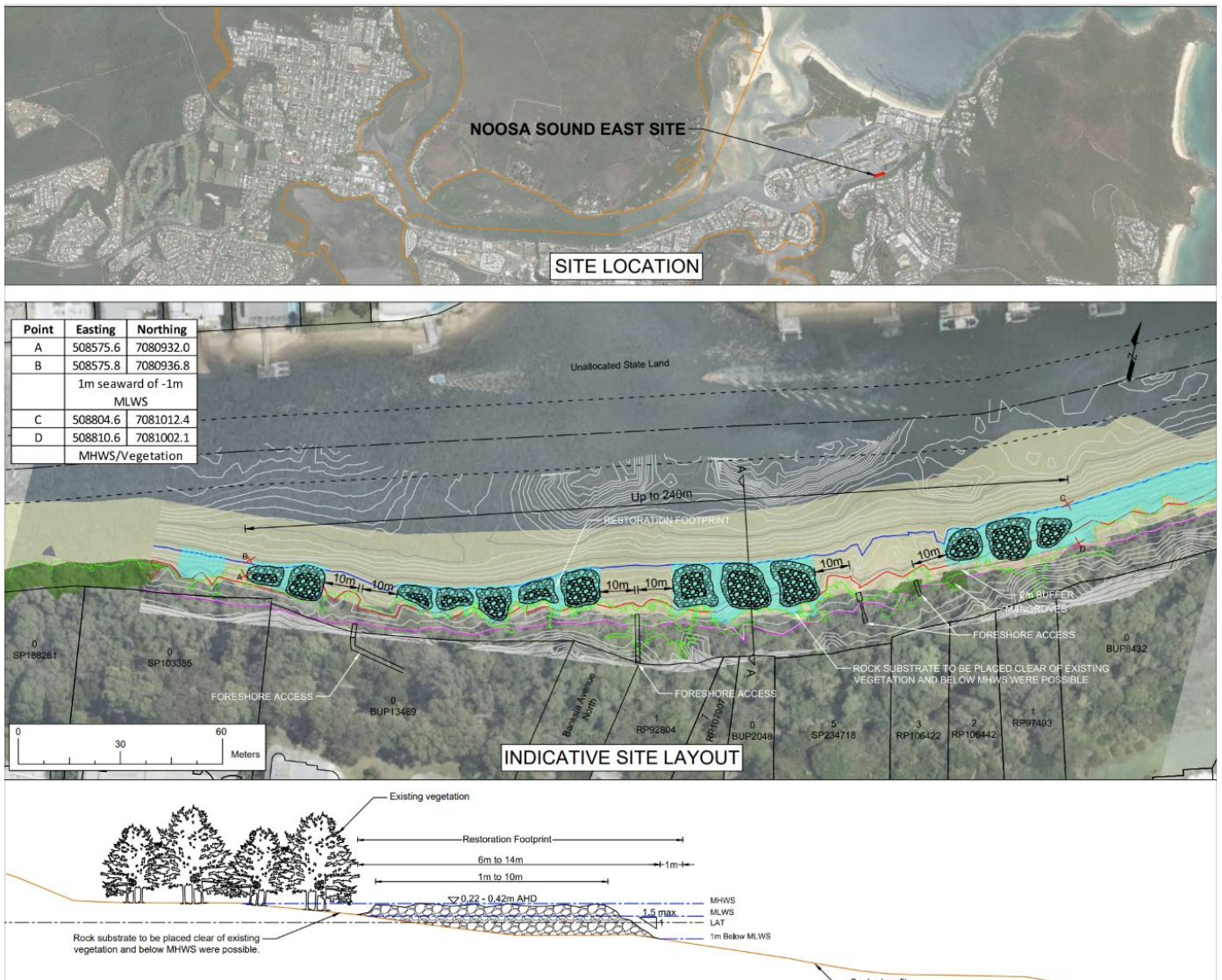


Figure 4: Noosa Sound East restoration footprint (Courtesy of ICM engineering)

Noosa Sound West restoration footprint

Located in the upriver section of the western embayment along the south eastern shoreline of Noosa Sound

Reef patch footprint = 615m²
 Maximum length = 90 m
 Max. distance from shore = 17m

Location selected to improve fish habitats and enhance recreational opportunities and tourism e.g. kayaking and snorkelling

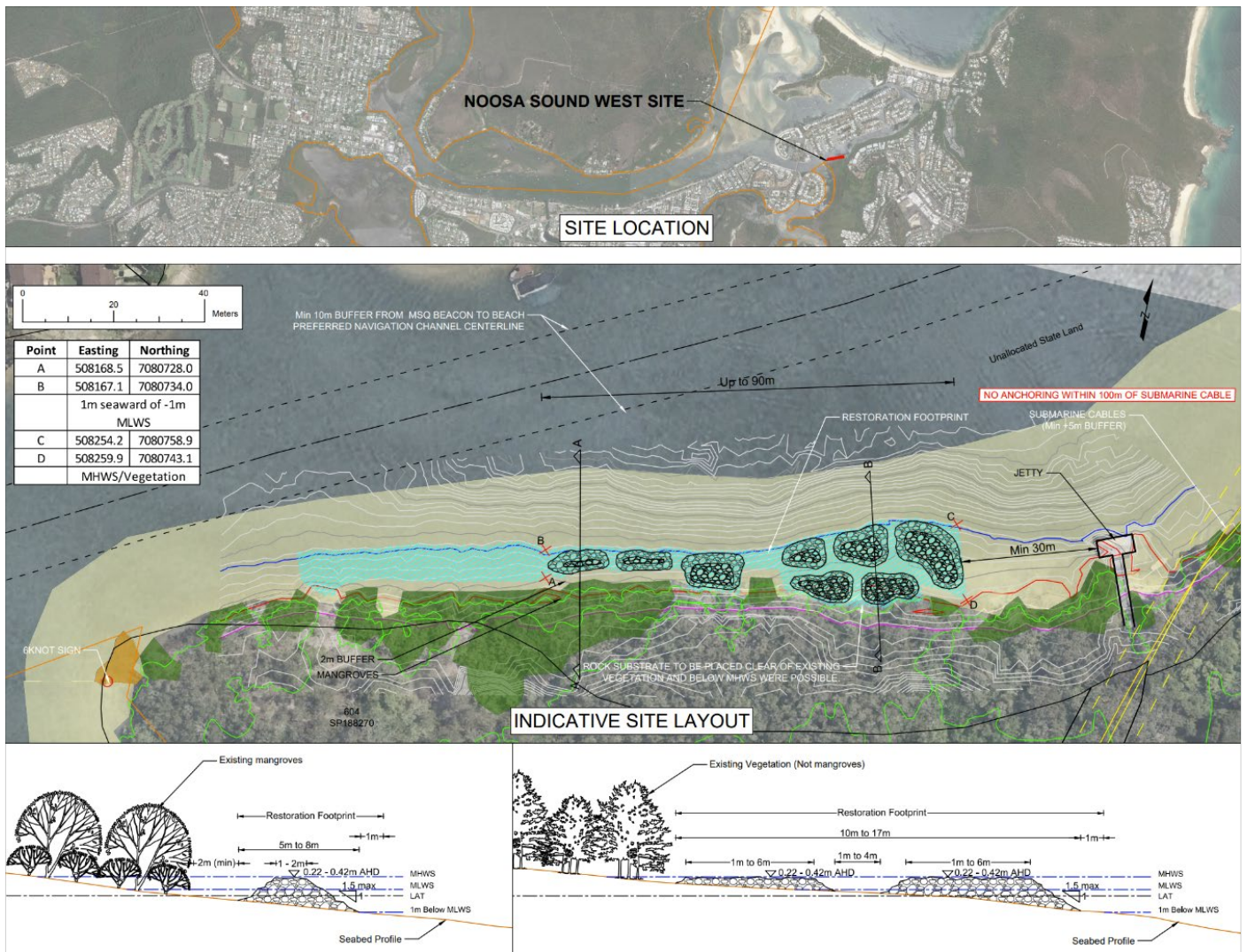


Figure 5: Noosa Sound West restoration footprint (Courtesy of ICM engineering). The area on the map shaded aqua green, upstream of the oyster reef patches (to the left, facing), is outside the restoration footprint, but has potential for future work.

Restoration criteria

Parameter	Envelope	Criteria (more suitable = 4, less = 0)	Rationale
Marine plants proximity (including seagrasses)	10m - 500m	Areas within 10-500m buffer =4 All other areas =2	Connectivity to other structured habitats such as seagrass, mangroves, increases diversity. 10m minimum distance used to mitigate damage to marine plants and 2m from mangroves, aerial mangrove roots and fallen timber, but ensuring connectivity.
Rocky reef proximity	2m - 500m	Areas within 5-500m buffer =4 All other areas =2	Connectivity to other structured habitats increases diversity. 2 metre minimum distance included to mitigate damage to rock substrates while maintaining connectivity. Direct augmentation of degraded rocky reef by permit only.
Extant oyster ecosystems proximity	2m - 250m	Within 2m - 250m = 4 All other areas = 2	Connectivity to other structured habitats increases biodiversity. Connection to other oyster reefs increases meta-population connectivity, successful reproduction and oyster recruitment. 2 metre minimum distance included to mitigate damage to extant oyster ecosystems but ensuring connectivity.
Historical oyster ecosystem proximity	Within 250m	Within 250m = 4 All other areas = 2	Sites which have historically supported oyster ecosystems are thought to be able to support future oyster ecosystems. Restoration takes place on historic oyster ecosystems, which may now be lost, where known and practical.
Mobile seabed	Exclusion area	Within exclusion area = 0 All other areas = 4	Highly mobile seabeds generally offer unsuitable substrates for shellfish restoration.
Mangroves (including pneumatophores), fallen trees and timber in waterways.	+2m minimum distance	Within exclusion area = 0 All other areas = 4	Minimum distance of 2m maintained between intertidal marine plants and oyster ecosystems to protect plants, as well as fallen trees (which are also important habitats) from works associated with oyster ecosystems. Relatively close proximity maintained to maximise ecological connectivity.
Small craft channels	+10m width channel maintained	Areas within buffer = 0 All other areas = 4	Minimum channel width of 10m maintained in constrained river channels so oyster ecosystems do not impede on safe navigation.

Restoration criteria

Parameter	Envelope	Criteria (more suitable = 4, less = 0)	Rationale
Tidal Works (pontoons, jetties, boat ramps)	+30m distance maintained	Within 250m = 4 All other areas = 2	Minimum distance of 30m maintained between tidal works and oyster ecosystems. This measure reduces the chance of damage to the oyster ecosystems from human activities, and also protects vessels and ensures general public safety when using these facilities.
Moorings	+30m distance maintained	Within 30 m = 0 All other areas = 4	Minimum distance of 30m maintained between official moorings and oyster ecosystems to reduce chances of damage to moored vessels and oyster ecosystems. The distance also takes into consideration the maximum possible length of a vessel attached to a mooring in the river.
Foreshore Access (beaches and parks)	+10m distance maintained	Within exclusion area = 0, All other areas = 4	Minimum distance of 10m either side of public foreshore access points maintained for ease of vessel access to useable shorelines.
In-water urban utilities (submarine cables & pipelines)	+5m distance maintained	Within exclusion area = 0 All other areas = 4	Minimum distance of 5m maintained between submarine cables and pipelines and oyster ecosystems.
In-water transport utilities (cross-river cable barges, ferry terminals, etc.)	+30m distance maintained	Within exclusion area = 0 All other areas = 4	Minimum distance of 30m maintained between in-water transport utilities and oyster ecosystems to maintain safe operation of public transport services in the river.
Seaward extent	<30m from shorelines	Within exclusion area = 0 All other areas = 4	Sites for oyster ecosystem restoration extend from the intertidal zone to a maximum distance of 30m from the associated shoreline to minimise impacts on river users. Exceptions would be subject to careful assessment and the written approval of Maritime Safety Queensland.
Water depth	<2m below MLWS	Within exclusion area = 0 All other areas = 4	Oyster ecosystems are only established in water depths less than 2m below the Mean Low Water Spring tidal line at a restoration site. This maximised the chance of restoration success.

Who are we?

The Noosa Oyster Ecosystem Restoration Project is led by The Nature Conservancy, a global environmental non-profit organisation working to create a world where people and nature can thrive. In the last 70 years, The Nature Conservancy has grown to become one of the most effective and wide-reaching environmental organisations in the world, with over 400 scientists.

In a unique partnership, The Nature Conservancy, Noosa Shire Council and the Noosa community, together with support from The Thomas Foundation, Australian Marine Conservation Society and Australian Government, are working together to restore lost oyster ecosystems to the Noosa River estuary. This project is part of The Nature Conservancy's efforts to restore 30% of Australia's lost shellfish ecosystems, which if achieved, would make Australia the first nation to recover a critically endangered marine ecosystem. Over the last 20 years The Nature Conservancy has restored shellfish reefs in over 200 locations throughout the world including in Australia.

Acknowledgement

We acknowledge the Kabi Kabi Traditional Owners who are the custodians of cultural knowledge and their collective memories of the Noosa River and Lakes region and advise this project accordingly. The project is located on Kabi Kabi Sea Country.

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