Appendix | 1

PREVIOUS MINUTES - UNCONFIRMED MINUTES for WWASC Ordinary Council Meeting - 13 August 2024

Wujal Wujal Aboriginal Shire Council

Ordinary Council | Minutes

Date: Tuesday 13 August 2024
Time: 9.00am
Venue: Council Administration and MS Teams

1. Opening of Meeting

1.1 Welcome | Opening of Meeting

The Mayor opened the meeting at 9.07am and provided acknowledgement of the Traditional Owners.

2. Attendance, Leave of Absence and Apologies

2.1 Attendance

Councillors:

Councillor Alister Gibson, Mayor
Councillor Claudia Doughboy, Deputy Mayor
Councillor Robert Bloomfield
Councillor Nikita Tayley
Councillor Lucas Creek

WWASC Staff Representatives

Chief Executive Officer, Kiley Hanslow
Operations Manager, Works and Building Services, Perry Gould
Corporate and Commercial Services Manager, Micah Nkiwane
Community Services Manager, Kesa Strieby
Acting Executive Assistant, Tania Edwards (Microsoft Teams)

2.2 Leave of Absence | Apologies

None

2.3 Visitors | Presenters

The schedule for these presentations is as follows:

Time	Topic	Agency/Presenter
11.30am-12pm	Alternate Care	Rhonda Wills
1.00pm	Higher Places Zoning Map	CEO Kiley Hanslow, Emergency Management Coordinator Justin Smith and Community Recovery Officer Kate Hams
~~2.00pm~~ Now at 10am	Review of the Alcohol Management Plan	Lisa Scott, DSDSATSIPCA

3. Condolences | Congratulations

Condolences to the following families:

- Darkin, Kulka and Fischer families
- Naylor Thomspon and Cabis families of Hopevale
- Shuan Smith family of Mossman
- Patterson family in Yarrabah
- Congratulations to all the children who went to Mareeba Peninsular Athletics Trials
- Congratulations to Councillor Bloomfields Granddaughter Kyesharlia for an Australian Mathematics award
- Congratulations to Karen for her role as the cook for the Aged Care Centre.
- Congratulations to Damita Gibson and Colin Friday for their new roles in the Depot

4. Mayoral Motion

Mayoral minutes/motion are used to introduce urgent/non routine matters only.

None

5. Confirmation of minutes of the Previous Meeting

5.1 Minutes of the Ordinary Council Meeting | 16 July 2024

Councillors considered the previous minutes as presented.

Resolution: acceptance of the minutes meeting held Tuesday 16 July 2024

Resolution:	That the minutes of the Ordinary Council Meeting held on Tuesday 16 July 2024 accepted as a true and correct record of that meeting.	
Moved:	Mayor Alister Gibson	Carried 5/5
Seconded:	Councillor Nikita Tayley	
Resolution No	20240813-01	

5.2 Minutes of the Special Council Meeting | 29 July 2024

Councillors considered the previous minutes as presented.

Correction to the minutes for the Budget Overview item: update the minutes to note the full names of the Mayor and Deputy Mayor in the item.

Resolution: Acceptance of the minutes meeting held Monday 29 July 2024

Resolution:	That the minutes of the Ordinary Council Meeting held on Monday 29 July 2024 accepted as a true and correct record of that meeting subject to amending Mayor and Deputy Mayor to read Mayor Alister Gibson and Deputy Mayor Claudia Doughboy.	
Moved:	Councillor Lucas Creek	Carried 5/5
Seconded:	Councillor Nikita Tayley	
Resolution No	20240813-01	

6. Declarations of Interest in the matters on the Agenda

- Declaration of Prescribed Conflict of Interest of any Item of Business
- Declaration of Declarable Conflict of Interest of any Item of Business
- Councillors to review existing Registers of Interest and Related Parties Disclosures

Nothing to declare.

7. Business Arising or Outstanding Matters from Previous Meeting

- Discussion regarding agencies entering community without first requesting permission, and possible improvements to the process around that.

8. Items for Consideration and Decision

8.1 LGAQ Annual Conference Attendance

Report to:	Mayor, Councillors and Chief Executive Officer
Subject:	LGAQ Annual Conference Attendance
Reporting Officer:	Chief Executive Officer
Status:	Decision

- Councillors discussed the importance of the conference, the program and attendance.

Proposed Resolution:

1. That all Councillors and the Chief Executive Officer attend the LGAQ Annual Conference 2024.
2. That the Council Ordinary Meeting scheduled for 22 October 2024 be moved to 29 October 2024.

Resolution: LGAQ Conference Attendance

Resolution:	1. That all Councillors and the Chief Executive Officer attend the LGAQ Annual Conference 2024. 2. That the Council Ordinary Meeting scheduled for 22 October be moved to 29 October 2024.	
Moved:	Deputy Mayor Claudia Doughboy	Carried 5/5
Seconded:	Councillor Nikita Tayley	
Resolution No	20240813-03	

8.2 Lease of the Rural Transaction Centre

Report to:	Mayor, Councillors and Chief Executive Officer
Subject:	Lease of the Rural Transaction Centre
Reporting Officer:	Chief Executive Officer
Status:	Decision

- Council is reviewing all leases / properties owned by Council.
- Preston Law have confirmed there is no record of there ever being a lease agreement for the Rural Transaction Centre (RTC) building.
- Charges will begin with the start of the new lease agreement.
- Lease agreements state there is no subleasing.

Proposed Resolution:

Council resolve to inform the Wujal Justice Group of the requirement for a lease for the offices used by the Wujal Justice Group at the RTC building and then approach Preston Law to create the market value lease documents for those offices.

Resolution: Lease of Rural Transaction Centre

Resolution:	Council resolve to inform the Wujal Justice Group of the requirement for a lease for the offices used by the Wujal Justice Group at the RTC building and then approach Preston Law to create the market value lease documents for those offices.	
Moved:	Mayor Alister Gibson	Carried 5/5
Seconded:	Councillor Lucas Creek	
Resolution No	20240813-04	

8.3 Lease break for Lot 88 in Wujal Wujal

Report to:	Mayor, Councillors and Chief Executive Officer
Subject:	Lease break for Lot 88 in Wujal Wujal
Reporting Officer:	Chief Executive Officer
Status:	Decision

- Land was leased to church for the use of a residential church house but has not been used for that purpose.
- Council's priority is for housing for the Community.

Proposed Resolution:

Council resolves to inform the Lutheran Church that Council will terminate the lease on Lot 88 on the lease break date of 31 July 2025.

Resolution: Lease break for Lot 88 in Wujal Wujal

Resolution:	Council resolves to inform the Lutheran Church that Council will terminate the lease on Lot 88 on the lease break date of 31 July 2025 to facilitate the build of community housing in that location.	
Moved:	Councillor Nikita Tayley	Carried 5/5
Seconded:	Councillor Lucas Creek	
Resolution No	20240813-05	

9. Reports: Elected Members and Council Officers

9.1 Mayor's Monthly Portfolio Report

Report to:	Councillors and Chief Executive Officer
Subject:	Monthly Portfolio Report: Finance, Governance and all other portfolios
Reporting Officer:	Councillor Alister Gibson, Mayor
Status:	Noting

- Councillors considered the report as presented

Resolution: That Council note Mayor Alister Gibson's portfolio report as presented.

Resolution:	That Council note Mayor Alister Gibson's portfolio report as presented.	
Moved:	Councillor Nikita Tayley	Carried 5/5
Seconded:	Councillor Robert Bloomfield	
Resolution No	20240813-06	

9.2 Deputy Mayor Claudia Doughboy: Economic Development and Tourism

Report to:	Mayor, Councillors and Chief Executive Officer
Subject:	Monthly Portfolio Report: Economic Development and Tourism
Reporting Officer:	Councillor Claudia Doughboy, Deputy Mayor
Status:	Noting

- Councillors considered the report as presented.

Resolution: Deputy Mayors Report

Resolution:	That Council note Deputy Mayor's portfolio report for as presented.	
Moved:	Councillor Lucas Creek	Carried 5/5
Seconded:	Councillor Robert Bloomfield	
Resolution No	20240813-07	

9.3 Councillor Robert Bloomfield: Community Sports and Lifestyle

Report to:	Mayor, Councillors and Chief Executive Officer
Subject:	Monthly Portfolio Report: Community Sports and Lifestyle
Reporting Officer:	Councillor Robert Bloomfield
Status:	Noting

Councillors considered the report as presented.

Resolution: That Council note Councillor Robert Bloomfield's portfolio report as presented.

Resolution:	That Council note Councillor Robert Bloomfield's portfolio report as presented.	
Moved:	Mayor Alister Gibson	Carried 5/5
Seconded:	Deputy Mayor Claudia Doughboy	
Resolution No	20240813-08	

9.4 Councillor Nikita Tayley: Environment and Culture

Report to:	Mayor, Councillors and Chief Executive Officer
Subject:	Monthly Portfolio Report: Environment and Culture
Reporting Officer:	Councillor Nikita Tayley
Status:	Noting

Councillors considered the report as presented.

Resolution: That Council note Councillor Nikita Tayley's portfolio report as presented.

Resolution:	That Council note Councillor Nikita Tayley's portfolio report as presented.	
Moved:	Councillor Robert Blomfield	Carried 5/5
Seconded:	Councillor Lucas Creek	
Resolution No	20240813-09	

9.5 Councillor Lucas Creek: Law and Order

Report to:	Mayor, Councillors and Chief Executive Officer
Subject:	Monthly Portfolio Report: Law and Order
Reporting Officer:	Councillor Lucas Creek
Status:	Noting

- Councillors considered the report as presented.

Resolution: That Council note Councillor Lucas Creek's portfolio report presented.

Resolution:	That Council note Councillor Lucas Creek's portfolio report as presented.	
Moved:	Councillor Robert Blomfield	Carried 5/5
Seconded:	Deputy Mayor Claudia Doughboy	
Resolution No	20240813-10	

9.6 Chief Executive Officer Report

Report to:	Mayor and Councillors
Subject:	Chief Executive Officer's Report
Reporting Officer:	Chief Executive Officer Kiley Hanslow
Status:	Noting

- Councillors considered the report as presented.

Resolution: Acceptance of the Chief Executive Officer's Monthly Report

Resolution:	That Council receive the Chief Executive Officer's Monthly Report as presented.	
Moved:	Mayor Alister Gibson	Carried 5/5
Seconded:	Councillor Robert Bloomfield	
Resolution No	20240813-11	

9.7 Corporate and Commercial Report

Report to:	Mayor, Councillors and Chief Executive Officer
Subject:	Monthly Portfolio Report: Corporate and Commercial Finance Report
Reporting Officer:	Manager Corporate and Commercial, Micah Nkiwane
Status:	Noting

- Councillors considered the report as presented.

Final Audit

To meet the requirements for asset disposal of the Art Centre, a Council resolution is required.

Resolution: Council resolve to write off the Art Centre asset through an asset disposal form

Resolution:	That Council approve the "writing off" of the Art Centre through an Asset Disposal form.	
Moved:	Councillor Lucas Creek	Carried 5/5
Seconded:	Councillor Nikita Tayley	
Resolution No	20240813-12	

- The process of the Final Audit was explained.

Resolution: Acceptance of the Corporate and Commercial Report

Resolution:	That Council accept the Financial Corporate and Commercial Report as presented.	
Moved:	Mayor Alister Gibson	Carried 5/5
Seconded:	Councillor Robert Bloomfield	
Resolution No	20240813-13	

10.3 Review of the Alcohol Management Plan in Wujal Wujal

Report to:	Mayor, Councillors and Chief Executive Officer
Subject:	Review of the Alcohol Management Plan in Wujal Wujal
Presenters:	Lisa Scott, DTATSIPCA
Status:	Decision
Time on agenda:	2.00pm – 3.00pm

Attendance: Lisa Scott of DTATSIPCA joined the meeting at 10.02am

- The recommended process and learnings from other communities who have gone through this process was outlined.
- Councillors discussed the survey process and potential alcohol carriage limits.

Proposed Resolution:

Council resolves to request assistance from DTATSIPCA to hold a new community consultation survey to determine if changes are required to the AMP.

Resolution: AMP community consultation survey

Resolution:	Council resolves to request assistance from DTATSIPCA to hold a new community consultation survey to determine if changes are required to the AMP.	
Moved:	Deputy Mayor Claudia Doughboy	Carried
Seconded:	Councillor Nikita Tayley	
Resolution No	20240813-14	

Attendance: Lisa Scott of DTATSIPCA left the meeting at 10.30am

Attendance: Meeting adjourned at 10.31am

Attendance: Meeting reconvened at 10.53am

9.8 Operations Report

Report to:	Mayor, Councillors and Chief Executive Officer
Subject:	Monthly Operations Report
Reporting Officer:	Operations Manager, Perry Gould
Status:	Noting/Information

- Splash Park is expected to be operational by the end of this week.
- Aged Care kitchens were audited by Queensland Health, and with a few minor matters to tidy up the report was a good one.
- NQ Petro will undertake and be responsible for installation of all equipment in the fuel station.

- Football field status: field has been cleared, drains and infrastructure. Submissions for funding will be required.
- Crocodile safety discussed as some children have been throwing stones at crocodile in the water. This matter will be raised at the next Community Meeting.

Resolution: Works and Building Services Monthly Report

Resolution:	That Council receive the Works and Building Services Monthly Report as presented.	
Moved:	Councillor Robert Bloomfield	Carried 5/5
Seconded:	Councillor Nikita Tayley	
Resolution No	20240813-15	

9.9 Community Services Report

Report to:	Mayor, Councillors and Chief Executive Officer
Subject:	Monthly Community Services Report
Reporting Officer:	Community Services Manager, Kesa Strieby
Status:	Noting

Note the correction to spelling error in the report "especially Henrietta Fourmile".

- Sports and Rec positions remain available.
- Pig Hunting Competition discussed. CEO to report back to council on how this is operated by other Councils.
- Children's after school and school holiday programs discussed.

Attendance: Deputy Mayor Claudia Doughboy left the meeting at 11.29am.

- Sporting recognition discussed. Most children are recognised for their sporting achievements through their school and parents also join their children into sporting clubs which provides further opportunity for sporting recognition.

Attendance: Deputy Mayor rejoined the meeting at 11.32am.

- Promotion of children to Rugby League discussed.
- Sporting scholarships discussed.

Resolution: Community Services Report

Resolution:	That Council accept the Community Services Report as presented.	
Moved:	Councillor Nikita Tayley	Carried 5/5
Seconded:	Councillor Lucas Creek	
Resolution No	20240813-16	

10. Presentations to Council

10.2 Higher Ground Zoning

Presentation to:	Mayor, Councillors and Chief Executive Officer
Subject:	Higher Ground Zoning
Presenters:	Chief Executive Officer Kiley Hanslow, QPS Emergency Management Coordinator Justin Smith and Community Recovery Officer Kate Hams
Status:	Discussion
Time on agenda:	Brought forward to 11.43am

Attendance: Kate Hams and Justin Smith joined the meeting at 11.43am.

- It is essential to have a plan in place so community feels safe and prepared prior to the coming Wet Season
- The plan presented here is a draft.
- An evacuation strategy is required, this requires input from all levels of Government and community.
- This is a local program, this is our program.

Situation

After the devastation caused by TC Jasper extreme rainfall it is pertinent that we work together to review and improve Evacuation process within Wujal Wujal. This is an opportunity to plan, practice and review evacuation processes in collaboration with the community and key stakeholders.

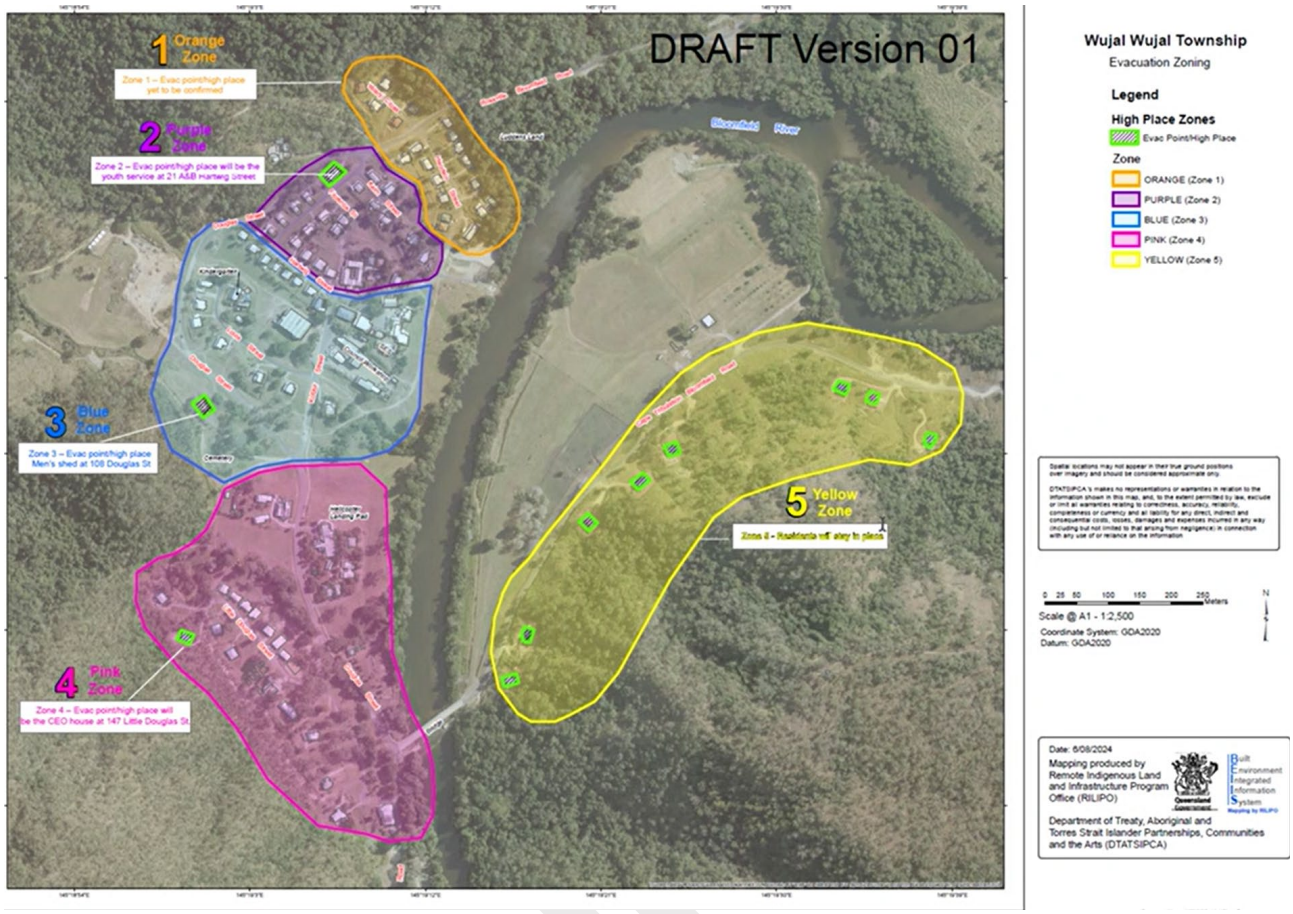
Mission

Develop and practice an interim evacuation strategy to assist the community to feel a level of safety in consideration of the upcoming wet season. The lessons learnt and expertise collected will help inform and update the LDMG Evacuation Sub Plan.

How are we going to work together

- Gather input from Mayor ,Deputy Mayor, Councillors and CEO regarding appropriate property – Completed
- Have selected data displayed on a mapping overlay to indicate what areas evacuate to what properties – Draft map completed
- Indicate community leaders for each of the indicated properties- Assigned
- Ensure appropriate Human and Social support services are available through the process of planning and practicing – ongoing
- Present the map to the community of the 28th of Aug 2024
- Undertake a community exercise on the 11th of Sep 2024
- Utilise lessons learned to inform the review of the LDMG Evacuation Sub Plan

- Coloured zones indicate different areas of Higher Places.
- Zone 5 indicates the homes where residents can stay in place as their homes are high.



- Next stage is to conduct a Community Meeting to discuss the plans with Community, for their feedback, to discuss what the intent of the plan and then to undertake at least one evacuation exercise.
- Community consultation will determine the trigger points for voluntary evacuation.
- Zone Leaders will be determined, taking into consideration the operation of the LDMG during an evacuation, which will mean the Mayor, Deputy Mayor, CEO and Operations Manager cannot be Zone Leaders.
- Discussion regarding boundaries of current zones with some suggestions for slight changes.
- Council will review the Zones and to determine what the trigger points are to have a finalised map before the Community Meeting on 28 August for community consultation.
- Wraparound support for Community will be provided for both the Community Meeting on 28 August 2024and for the practice evacuation on 11 September 2024.
- Business Continuity also discussed.

Attendance: Justin Smith and Kate Hams left the meeting at 12.16pm

Resolution: Council note the presentation

Resolution:	That Council note the Higher Ground Zoning presentation.	
Moved	Deputy Mayor Claudia Doughboy	Carried 5/5
Seconded:	Councillor Bloomfield.	
Resolution No	20240813-17	

10.1 Alternate Care

Presentation to:	Mayor, Councillors and Chief Executive Officer
Subject:	Alternate Care
Presenters:	Rhonda Wills, Brian Beattie, Annette Bewert and Brooke Keeley
Status:	Discussion
Time on agenda:	11.30am – 12noon (arrival may be delayed to 11.45 or 12 noon)

Attendance: Alternate Care representatives joined the meeting at 12.19pm (Rhonda Wells: Operations Manager Foster Care, Brian Beattie: Senior Operations Manager Residential Care, Annette Bewert: Case Manager Foster Care)

- Alternate care outlined what they do and the support they operate.
- Foster and Respite Carer options discussed.
- Allowances for Foster Carers outlined.
- Child Safety cares for the children, Alternate Care works with the carers.

Attendance: Councillor Bloomfield left the meeting at 12.44pm and rejoined the meeting at 12.47pm.

- Cultural Protocols for accessing community discussed.

Attendance: Alternate Care presenters left the meeting at 12.48pm

Resolution: Council. Note the presentation by Alternate Care

Resolution:	That Council note the presentation by Alternate Care.	
Moved:	Deputy Mayor Claudia Doughboy	Carried 5/5
Seconded:	Mayor Alister Gibson	
Resolution No	20240813-18	

Attendance: meeting adjourned at 12.50pm.

Attendance: meeting reconvened at 1.31pm

11. General Business

- Mobile Red Kidney Bus (mobile dialysis) discussed. The CEO has already contacted Kidney Health Australia including the Big Red Kidney Bus team regarding the need for one in the area to the relevant authorities.
- Discussion regarding the requirement of the Justice Group to transport Wujal Wujal community members to Cooktown for court hearings by Justice Group.
- Discussion regarding the community member who held a party with alcohol within the community.
- Council request Lachlan Walker from Department of Justice and Attorney-General provide a presentation at the September 2024 Council meeting on the programs service providers the Wujal Justice Group are funded to deliver. CEO emailed Lachlan Walker on 13.08.2024 to request this presentation.
- Road between the Middle Shop and Wujal Wujal will be resurfaced by the end of September.
- Road between Ayton to Middle Shop will be repaired, not resurfaced.
- Road Ayton to Cooktown is due for resurfacing by the end of the year.
- Concern by Degarra residents on how the double bridges will hold up in future flooding, encouraged the resident to approach Douglas Shire Council.
- Radio Tower is being removed shortly. Australian Private Networks will be in community in the next few months to install the new community Wifi system.
- Boundary extension discussed.

- Rubbish collection from outside the properties discussed. Council will not collect rubbish from inside yards, only from on front nature strips.
- Number of employees in Operations was discussed. Currently limited by current plant and equipment, as more equipment becomes available, depending on budget and supervision, Council may take on more staff. Council's preference is to contract to local businesses.
- Thompson Creek Mowing will be restarting their services and potential for Council to contract out work to local businesses who can employ local Bama.
- Dry House Signs discussed – responsibility sits with Dept of Housing.
- China Camp Road clearance:

Background:

  - Slips on concrete section of the road.
  - No access at present for vehicles over 5 tonnes.
  - Geotech assessments undertaken, 5 tonne loading applied. They are too busy to provide the report on the assessment and we will need to seek an alternate provider to provide a report.
  - An unauthorised track has been put up the side of the road, without engineering assessment. Subsequent engineer assessments have advised that track is unsafe and road closure signs have been put in place and camera to learn who has been removing the close signs.
  - Unauthorised clearing of Wujal Wujal Aboriginal Shire Council's road reserve by Douglas Shire has impacted on the safety and stability over the road.
  - The clearing was undertaken without notification to or approval by WWASC.
  - The lawyers we typically use are representing Douglas Shire and we have had to approach a 3rd lawyer to find legal representation for Council in this matter.
    - A community member is lobbying Council for their cattle truck, to have a permit / exemption to move their cattle. The truck weighs more than 5tonne, without cattle on board.
    - Douglas Shire Council is responsible for providing access to their freehold landowners through the Zig Zag Road.
    - Wujal Wujal has placed a closed sign on the unauthorised track to prevent its use as it is unsafe and poses a serious risk to drivers if used.
    - WWASC is seeking legal advice, and another engineering report.
    - Anticipate at least 12 months for the engineering process and rectification works to complete.
    - This unauthorised clearing poses a risk to WWASC in sourcing QRA funding for the repair of the China Camp Road.
    - Note the 5-tonne limit on the WWASC Website.
    - TMR also visited and viewed the China Camp Road and made recommendations to safeguard the road from further damage during high rainfall.
- Oval is not available for camping. No toilets, no facilities. Not listed as a camping area.
- RACQ Cyclone Recovery Assistance Project outlined. Two weeks from 09 September 2024.

12. Next Ordinary Council Meeting Date

The next Ordinary Council Meeting is set for Tuesday 17 September 2024.

13. Meeting Closure

The meeting was closed at 3.10pm

Approval of Minutes

Appendix | 2

Equitable Access Policy

Equitable Access Policy

Document Control

Version History:	September 2024	Resolution Ref	
Next review due	2026		

1. ORIGIN/AUTHORITY

Local Governments are a public entity under the Human Rights Act 2019 (Queensland).
The Human Rights Act 2019 (Queensland) outlines the responsibility of government entities to support the human rights of all Queenslanders.

As a First Nations Council, we recognise the significance of its recognition of the right of Aboriginal peoples and Torres Strait Islander peoples of Queensland to self-determination. The Human Rights Act 2019 upholds the right to Aboriginal peoples and Torres Strait Islander peoples to enjoy, maintain, control, protect and develop their identity and cultural heritage, including their traditional knowledge, distinctive spiritual practices, observances, beliefs and teachings.

2. Purpose

This Policy provides a management framework for Wujal Wujal Aboriginal Shire Council to ensure equitable access to community facilities for all members of the community, especially those experiencing or who have experienced disadvantage.
Its purpose is to ensure all voices, concerns, and experiences are an integral to the design, implementation, monitoring of policies and programs.

3. Objective

To outline Wujal Wujal Aboriginal Shire Council's responsibilities for the provision of sporting and recreation facilities that meet the needs of the community, balances community needs and applies the principles of equitable use.

4. Scope

This policy applies to Wujal Wujal Aboriginal Shire Council staff and facility users.

5. Policy Statement

The Policy aims to outline the plans for Council to identify and eliminate systemic causes of inequality in policy, program development and delivery.

Wujal Wujal Aboriginal Shire Council aims to progressively build its capacity and capability to identify and eliminate systemic causes of inequality in policy, program development and delivery while fostering community participation through the promotion of respect and fair mindedness for all people.

Wujal Wujal Aboriginal Shire Council will consider the following groups in its planning of equitable access to community infrastructure:

5.1 Women and girls

Wujal Wujal Aboriginal Shire Council aims to:

- Ensure women and girls have equitable access to community, sporting and recreation facilities and equipment.
- Foster positive community, sport and recreation participation experiences for women and girls.
- Increase utilisation of community facilities by women and girls.

5.2 Persons with disabilities (PWD)

Wujal Wujal Aboriginal Shire Council aims to:

- Ensure newly planned community facilities incorporate Universal Design Principles, ensuring accessibility and usability for all individuals, including able-bodied persons, ambulant persons, and persons with disabilities (PWD).
- Foster positive community, sporting and recreation participation experiences for persons with disabilities
- Increase utilisation of community facilities by persons with disabilities.

5.3 Respect for cultural practices and protocols

Wujal Wujal Aboriginal Shire Council aims to:

- Respect and consider cultural protocols related to gender-specific activities.
- Where appropriate, this may involve the scheduling of facility usage to accommodate separation of genders or the planning of gender-exclusive facilities.

5.4 Section 2 – Guidelines

Wujal Wujal Aboriginal Shire Council commits to embedding the following guidelines into its planning and services to implement equitable access to community facilities:

- All new community facilities should adhere to universal design standards, wherever possible.
- These standards should be integrated into the project planning and design phase, ensuring that accessibility for all individuals, including persons with disabilities (PWD), are considered.
- The schedule for community facilities use should reflect both cultural protocols and gender fairness. This may include designated times for gender-specific activities or programs, ensuring equitable access for all genders.
- Where identified as appropriate through community consultations, plan for the inclusion of gender-exclusive spaces within new or existing facilities. These spaces should be designed to meet the specific needs of each gender, ensuring privacy, safety, and cultural sensitivity
- Implement a monitoring and evaluation framework to assess the effectiveness of gender-based scheduling and gender-exclusive facilities. Regular feedback should be solicited from users to ensure the procedures continue to meet community needs and respect cultural protocols.

Responsibility

Responsible department:	Community Services
Policy Administrator:	Chief Executive Officer

6. Related Documents

External

Activate! Queensland 2019-2029:

Queensland Government's Best practice design principles fact sheet (2023):

Queensland's Disability Plan 2022-2027:

Queensland Development Code: NMP 1.10 - Accessible Adult Change Facilities and MP 4.1 - Sustainable Buildings

National Construction Code (NCC) Building Code of Australia (BCA)

Disability (Access to Premises–Building) Standards 2010

Queensland Human Rights Act 2019

Local Government Act 2009

Australian and Queensland anti-discrimination legislation

Internal

Corporate Plan

Operational Plan

Cultural Protocol and Practices

7. Review and Monitoring

Council will formally review this community engagement policy after two years of operation.

In order to ensure that the actions detailed within this policy are undertaken and information is co-ordinated Council will charge the Community Services Manager with monitoring and reporting on the implementation of this policy.

Kiley Hanslow
Chief executive Officer

Appendix | 3

Advertising Expenditure Policy

Advertising Expenditure Policy

Document Control

Version History:	21.9.2010	Resolution Ref	n/a
Reviewed and Adopted	17.6.2021	Resolution Ref	0317062021
Reviewed and Adopted	17 Sept 2024	Resolution Ref	
Next review due	2026		

1. Origin / Authority

Wujal Wujal Aboriginal Shire Council

2. Purpose and Scope

To establish the processes and the conditions for official advertising.

3. Policy Statements

All advertising spending must be directed to providing value to Council and information or education to the community in the public interest. Expenditure on advertising is subject to allocations in Council's annual budget. Accordingly, the following media may be used for the stated purpose:

3.1 Newspapers and noticeboards

- Notices prescribed by relevant legislation.
- Employment advertisements.
- Advertisement of tenders called, or quotations sought.
- Notices of interruptions or restrictions to services.
- Notices of traffic changes or interruptions.
- Notices of forthcoming events/functions/community programs.
- Notices in relation to matters of community education, safety and protection.

Newspaper(s) selected will be at the discretion of the Chief Executive Officer or delegate.

3.2 Radio

- Notices of interruptions or restrictions to services.
- Notices of traffic changes or interruptions (where lead time is critical);
- Notices of forthcoming events and functions.
- Notices in relation to matters of community education, safety and protection.

Radio station(s) selected will be at the discretion of the Chief Executive Officer or delegate.

3.3 Internet (Council and Third-Party Web Sites)

- Employment advertisements.
- Advertisement of tenders called, or quotations sought.
- Notices of forthcoming events/functions.
- Notices in relation to matters of community education, safety and protection.
- Promotional material aimed at promoting tourism and economic or community development for the shire and region.

3.4 Other Print Media

- Promotional material aimed at promoting tourism, economic and community development in the Shire.
- Flyers and notices in relation to matters of community education, safety and protection.

3.5 Signage

- Roadside signage such as for major road works and major projects.
- Roadside signage for promotion of major Shire or regional events.
- Promotion of the Shire (e.g. Welcome signs)
- Promotional material aimed at promoting tourism, economic and community development;

The erection of signage for major road works and major projects will be subject to approval of the Chief Executive Officer or delegate.

3. Application

This policy shall be applicable at all times including prior to any local government election, but expenditure on promotional advertising shall not be permitted in the three-month period immediately before such elections.

4. Associated Policies

Procurement Policy
Community Engagement Policy

5. Review

Council will formally review this policy every two years.

Kiley Hanslow
Chief executive Officer
Wujal Wujal Aboriginal Shire Council

Appendix | 4

Attachment B – Site Plan and QS Cost Estimates Admin

PEDDLE THORP
FAR NORTH

Wujal Wujal Schedule of Accommodation

Space / Function	Quantity	sqm	Total	Occupancy	Notes / Assumption
Council Administration					
Reception / Waiting Area /Council Support Service Desk	1	25	25	10	2 Receptionist 6 Waiting seats
Print Station + Stationary Storage	1	6	6		Printer and copier area. Locate adjacent reception area.
Office - CEO	1	20	20	1	Work desk with 2 guest seats and small meeting table to seat 4
Office - Executive	4	16	64	4	Work desk with small meeting table to seat 2 Assumes office for CFO, COO, Mayor + Community services manager
Shared General Office	1	48	48	8	One open place office area with up to 8 workstations
Council Chambers	1	40	40	20	Council Chamber with table seating of up to 16 people, with a row of seats for council observation and guests. Operable wall between event space
Event Space	1	40	40	20	Kitchenette Operable wall between council chambers
Meeting Room - Small	2	12	24	4-6	Suitable to seat 4-6 people Space to double up as LDCC
Meeting Room - Large	1	24	24	8-12	Suitable to seat 8-12 people Space to double up as LDCC
Staff Hub	1	40	40		Kitchenette and dining space Suitable to accommodate number of staff
Staff Amenities	1	25	25		Male: 1 AMB, 1WC. 1 basins Female: 1 AMB, 1WC, 1 banins 1 Unisex PWD with shower
Visitor Amenities	2	9	18		2 Unisex PWD with shower
Storage	1	10	10		Located adjacent to reception Document store / Furniture Store / equipment Store
Comms	1	12	12		Comms / Switchboard
Out-door veranda break outspace	1	20	20		To be used for the council admin and business hub
Sub total			416		
Circulation (20%)			83.2		
Contigency (10%)			41.6		Other non prescribed areas
Total			**540.8**		

Space / Function	Quantity	sqm	Total	Occupancy	Notes
Business Development Hub					
Entry Foyer	1	12	12		
Shared Office for 4	4	28	112	16	Suitable for 4 people
Shared Office for 2	4	16	64	8	Suitable for 2 people
Meeting Room - Small	1	12	12	12	Suitable for 4-6 people. Assume larger meetings can utilise Council Admin Building Meeting Room, Event Space, and Refuge Building Training Room
Print Hub & Store	1	12	12		Print station with an adjoining storage space
Kitchen and Break-out Space	1	20	20		Suitable to accommodate staff
Comms	1	6	6		
BOH Amenities	1	25	25		Male: 1 AMB, 1 WC. 1 basins Female: 1 AMB, 1 WC, 1 banins 1 Unisex PWD
Sub total			263		
Circulation (20%)			52.6		
Other (10%)			26.3		Other non prescribed areas
Total			**341.9**		

Space / Function	Quantity	sqm	Total	Occupancy	Notes
External					
Undercover car parking					Accommodate staff parking and visitor parking. Assume 500sqm (undeecroft space of Admin building)

External event entry space	1	75	75	30	Connected to carparking
Plant Enclosure / Generators /Bins	1	12	12		
Vertical Transport	3	10	30		Lift and Stairs
Landscaping	1	40	40		Yarning Circle
Sub total			157		
Other (10%)			15.7		Other non prescribed areas
Total			**172.7**		
Minimum spatial GFA for Admin Building + Business Hub			**1055.4**		

Space / Function	Quantity	sqm	Total	Occupancy	Notes
Multi-purpose Place of Refuge					
Assembly Space	1	510	510	230	Assume full size basketball court with run off
Commercial Kitchen	1	40	40	10	Preparation of food for community events / disasters
Cold Room / Fridge / Panty	1	20	20	2	Storage to support commercial kitchen Adjacent to commercial kitchen
Kiosk	1	10	10	2	
Storage	1	20	20		Equipment, chair , stage storage
Amenities	1	50	50		Male: 1 AMB, 2WC. 3 urinals, 2 basins Female: 1 AMB, 4WC, 2 basins 2 Unisex PWD with showers
Trianing Room	2	48	96	48	Community space for training, events and meetings Operable walls to make space larger or smaller according to usage NCC assumes 2 sqm per person
Offices - Small	2	12	24		1 person office
Comms	1	12	12		
Sub total			782		
Circulation (20%)			156.4		
Other (10%)			78.2		Other non prescribed areas
Total			**1016.6**		
Space / Function	Quantity	sqm	Total	Occupancy	Notes
External					
Car parking	50				Assumption only
SES Shed	1	120	120		Connected to carparking
Plant Room	1	10	10		
Generator Shed	1	20	20		
Helipad	1	6415	6415		1600sqm for helipad with Suitable for a chinook chopper
Landscaping	1	40	40		
Sub total			6605		
Other (10%)			660.5		Other non prescribed areas
Total			**7265.5**		
Minimum spatial GFA for Place of Refuge			**8282.1**		

Appendix | 5

Attachment C – Site Plan and QS Cost Estimates

Wujal Wujal - Council Administration & Building Hub

Order of Cost Estimate 01 (R0)

COUNCIL ADMIN / BUSINESS HUB										Wujal Wujal
Description	Qty	Unit	Rate		SubTotal	Factor		Total		Rate/m2
SITE WORKS										
DEMOLITION	500	m2	$250	$	125,000	1.42	$	177,752		
EARTHWORKS	1	item		ref U/croft Carpark			ref U/croft Carpark			
EXTERNAL SERVICES	1	item		$	100,000	1.42	$	142,202		
EXTERNAL WORKS & LANDSCAPING	193	m2	$1,639	$	315,850	1.42	$	449,144		
Site Works SubTotal				**$**	**540,850**		**$**	**769,099**		
BUILDING WORKS										
COUNCIL ADMIN	541	m2	$2,565	$	1,387,100	1.42	$	1,972,482		
BUSINESS HUB	342	m2	$2,487	$	850,300	1.42	$	1,209,142		
UNDERCROFT CARPARK	500	m2	$1,500	$	750,000	1.42	$	1,066,514		
LIFT & STAIRS	30	m2	$5,000	$	150,000	1.42	$	213,303		
Building Works SubTotal	**1,413**	**m2**	**$2,221**	**$**	**3,137,400**		**$**	**4,461,440**	$	3,158.09
Site Works & Bldg Works SubTotal	**1,605**	**m2**	**$2,291**	**$**	**3,678,250**		**$**	**5,230,539**	$	3,258.09
CONSTRUCTION WORK ADD ONS										
LOCALITY (155/109)	1.42	factor			included			included		
BUILDER'S PRELIMINARIES (inc Scaffold)	21	%	$3,678,250	$	772,433	1.42	$	1,098,413	$	42,912.92
BUILDER'S MARGIN	8	%	$4,450,683	$	356,055	1.42	$	506,316		
CONTINGENCY - DESIGN	15	%	$4,806,737	$	721,011	1.42	$	1,025,290		
CONTINGENCY - CONSTRUCTION	10	%	$5,527,748	$	552,775	1.42	$	786,056		
ESCALATION (Q3 2024) +12 MTHS	8	%	$6,080,522	$	486,478	1.42	$	691,385		
SubTotal				**$**	**2,888,750**		**$**	**4,107,461**		
CONSTRUCTION WORKS SUBTOTAL	**1,605**	**m2**	**$4,091**	**$**	**6,567,000**		**$**	**9,338,000**	$	5,816.62
ADDITIONAL PROJECT ADD ONS										
PROFESSIONAL FEES	10	%	$6,567,000	$	656,700	1.42	$	933,839		
PM FEES	3	%	$6,567,000	$	197,010	1.42	$	280,152		
CLIENT PM FEES	1	item			excluded			excluded		
DECANTING/RELOCATION OF STAFF & EQUIPMENT	1	item			excluded			excluded		
CLIENT FF&E	1	PS	$300,000	$	300,000	1.42	$	426,606		
ERGON TRANSORMER	1	item			excluded			excluded		
QLEAVE	0.575	%	$7,720,710	$	44,290	1.42	$	63,403		
SubTotal				**$**	**1,198,000**		**$**	**1,704,000**		
PROJECT TOTAL (exc GST)	**1,605**	**m2**	**$4,837**	**$**	**7,765,000**		**$**	**11,042,000**		

Order of Cost Estimate Range

$10m to $12m (excluding GST but including Contingencies) depending on final scope and specification.

For Funding purposes, we recommend the higher cost estimate range is considered.

Notes & Assumptions

Factor = Locality for Wujal Wujal over Cairns

All items and costs listed above are Preliminary only based on a Schedule of Areas with limited information provided

Assumed Ergon Transformer not required

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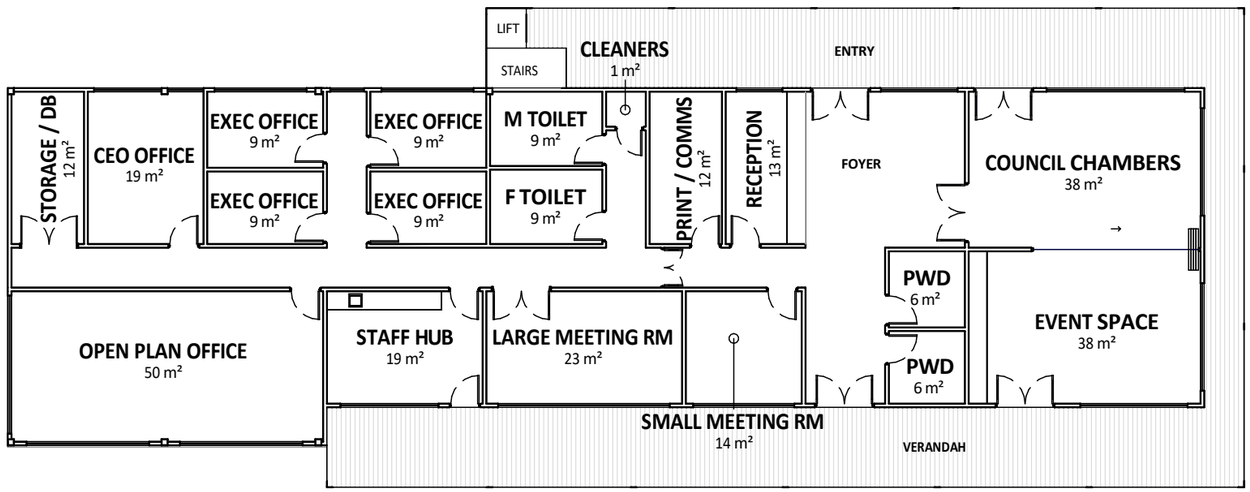
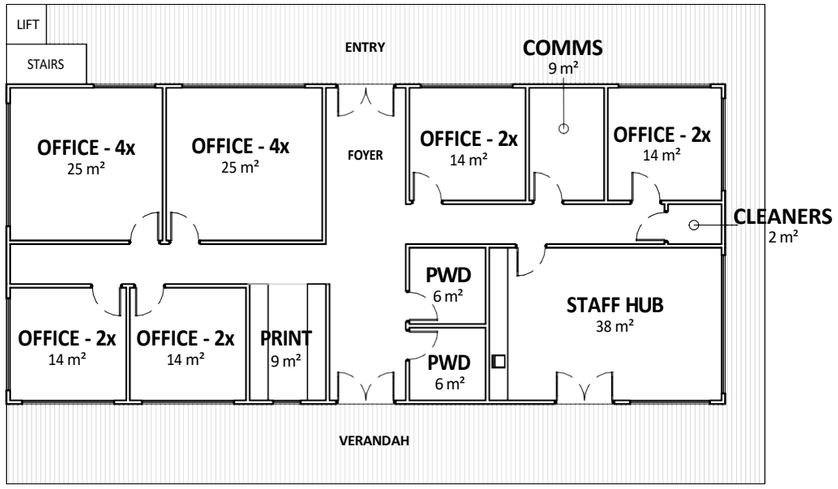
WUJAL WUJAL COUNCIL ADMIN BUILDING & BUSINESS HUB

SITE PLAN

A3 | SCALE (at A3) 1 : 200 | DATE 07.08.24
250020 | DRAWING No. **A-01**



FIRST FLOOR - COUNCIL ADMINISTRATION



SECOND FLOOR - BUSINESS HUB

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WUJAL WUJAL COUNCIL ADMIN BUILDING & BUSINESS HUB

FLOOR PLANS

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	DRAWING No. 250020	**A-02**

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WUJAL WUJAL COUNCIL
ADMIN BUILDING &
BUSINESS HUB

CONCEPTUAL ARTISTS
IMPRESSIONS

A3	SCALE (at A3)	DATE
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250020		DRAWING No. **A-03**

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Appendix | 6

Attachment C – Site Plan and QS Cost Estimates

Wujal Wujal - Place of Refuge & Community Building

Order of Cost Estimate 01 (R0)

APEC PROJECTS

PLACE OF REFUGE / COMMUNITY BUILDING										Wujal Wujal Rate/m2
Description	Qty	Unit	Rate		SubTotal	Factor		Total		
SITE WORKS										
DEMOLITION	1	item			excluded			excluded		
EARTHWORKS	1	item		$	100,000	1.42	$	142,202		
EXTERNAL SERVICES	1	item		$	200,000	1.42	$	284,404		
EXTERNAL WORKS & LANDSCAPING	459	m2	$571	$	262,250	1.42	$	372,924		
Site Works SubTotal				**$**	**562,250**		**$**	**799,530**		
BUILDING WORKS										
MULTI-PURPOSE HALL	1,017	m2	$1,001	$	1,017,200	1.42	$	1,446,477		
HELIPAD & SURROUNDS	1,600	m2	$500	$	800,000	1.42	$	1,137,615		
CARPARK	900	m2	$300	$	270,000	1.42	$	383,945		
Building Works SubTotal	**3,517**	**m2**	**$594**	**$**	**2,087,200**		**$**	**2,968,037**	$	844.01
Site Works & Bldg Works SubTotal	**3,976**	**m2**	**$666**	**$**	**2,649,450**		**$**	**3,767,567**	$	947.67
CONSTRUCTION WORK ADD ONS										
LOCALITY (155/109)	1.42	factor			included			included		
BUILDER'S PRELIMINARIES	18	%	$2,649,450	$	476,901	1.42	$	678,162	$	26,494.50
BUILDER'S MARGIN	8	%	$3,126,351	$	250,108	1.42	$	355,658		
CONTINGENCY - DESIGN	15	%	$3,376,459	$	506,469	1.42	$	720,208		
CONTINGENCY - CONSTRUCTION	10	%	$3,882,928	$	388,293	1.42	$	552,159		
ESCALATION (Q3 2024) +12 MTHS	8	%	$4,271,221	$	341,780	1.42	$	486,246		
SubTotal				**$**	**1,963,550**		**$**	**2,792,434**		
CONSTRUCTION WORKS SUBTOTAL	**3,976**	**m2**	**$1,160**	**$**	**4,613,000**		**$**	**6,560,000**	$	1,650.07
ADDITIONAL PROJECT ADD ONS										
PROFESSIONAL FEES	10	%	$4,613,000	$	461,300	1.42	$	655,977		
PM FEES	3	%	$4,613,000	$	138,390	1.42	$	196,793		
CLIENT PM FEES	1	item			excluded			excluded		
DECANTING/RELOCATION OF STAFF & EQUIPMENT	1	item			excluded			excluded		
CLIENT FF&E	1	PS	$150,000	$	150,000	1.42	$	213,303		
ERGON TRANSORMER	1	PS	$150,000	$	150,000	1.42	$	213,303		
QLEAVE	0.575	%	$5,362,690	$	30,309	1.42	$	42,624		
SubTotal				**$**	**930,000**		**$**	**1,321,999**		
GRAND TOTAL (exc GST)	**3,976**	**m2**	**$1,394**	**$**	**5,543,000**		**$**	**7,882,000**		

Order of Cost Estimate Range

$7m to $9m (excluding GST but including Contingencies) depending on final scope and specification.

For Funding purposes, we recommend the higher cost estimate range is considered.

Notes & Assumptions

Factor = Locality for Wujal Wujal over Cairns

All items and costs listed above are Preliminary only based on a Schedule of Areas with limited information provided

Assumed Ergon Transformer required

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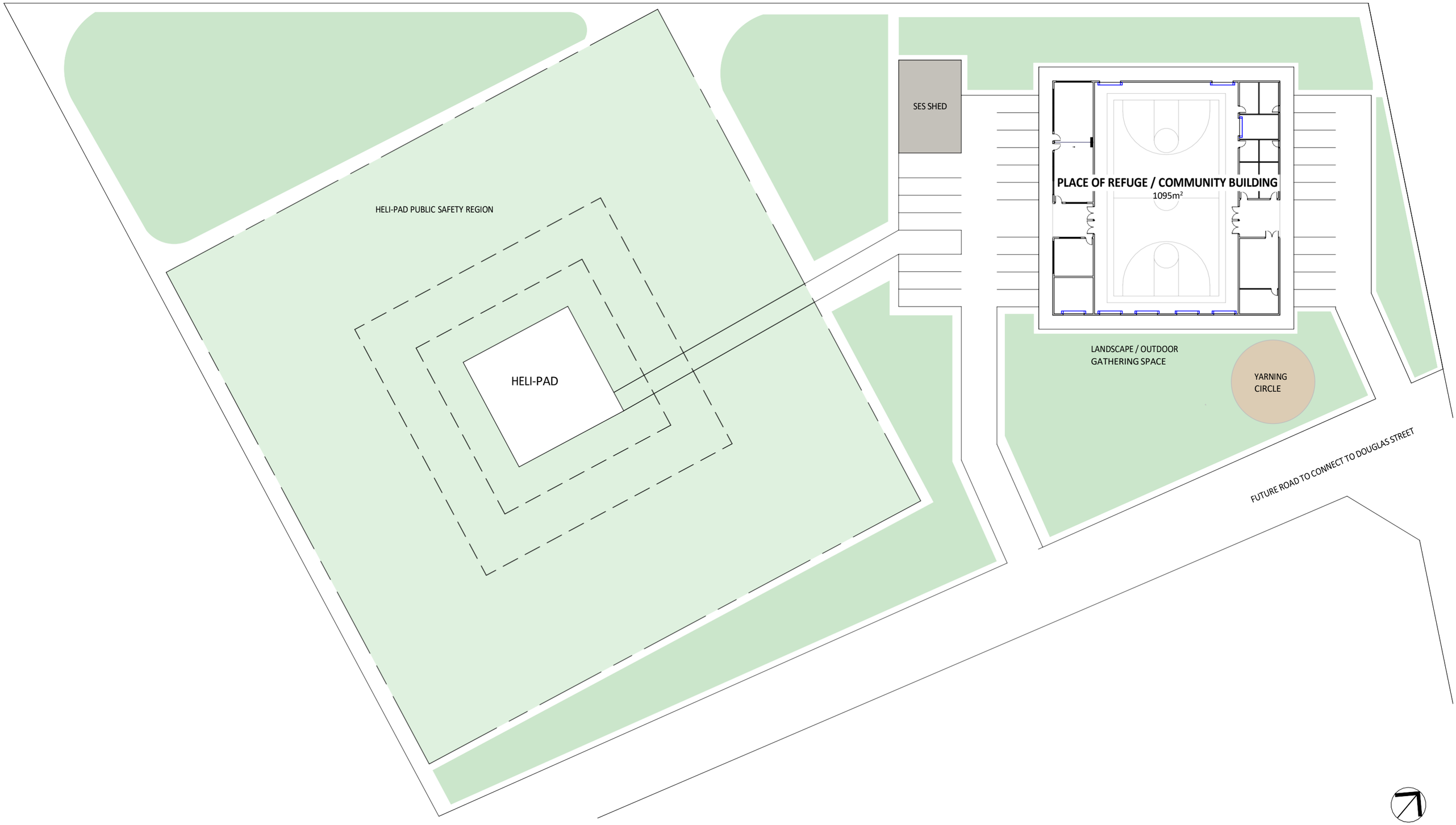

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WUJAL WUJAL COUNCIL
PLACE OF REFUGE &
COMMUNITY BUILDING

SITE PLAN

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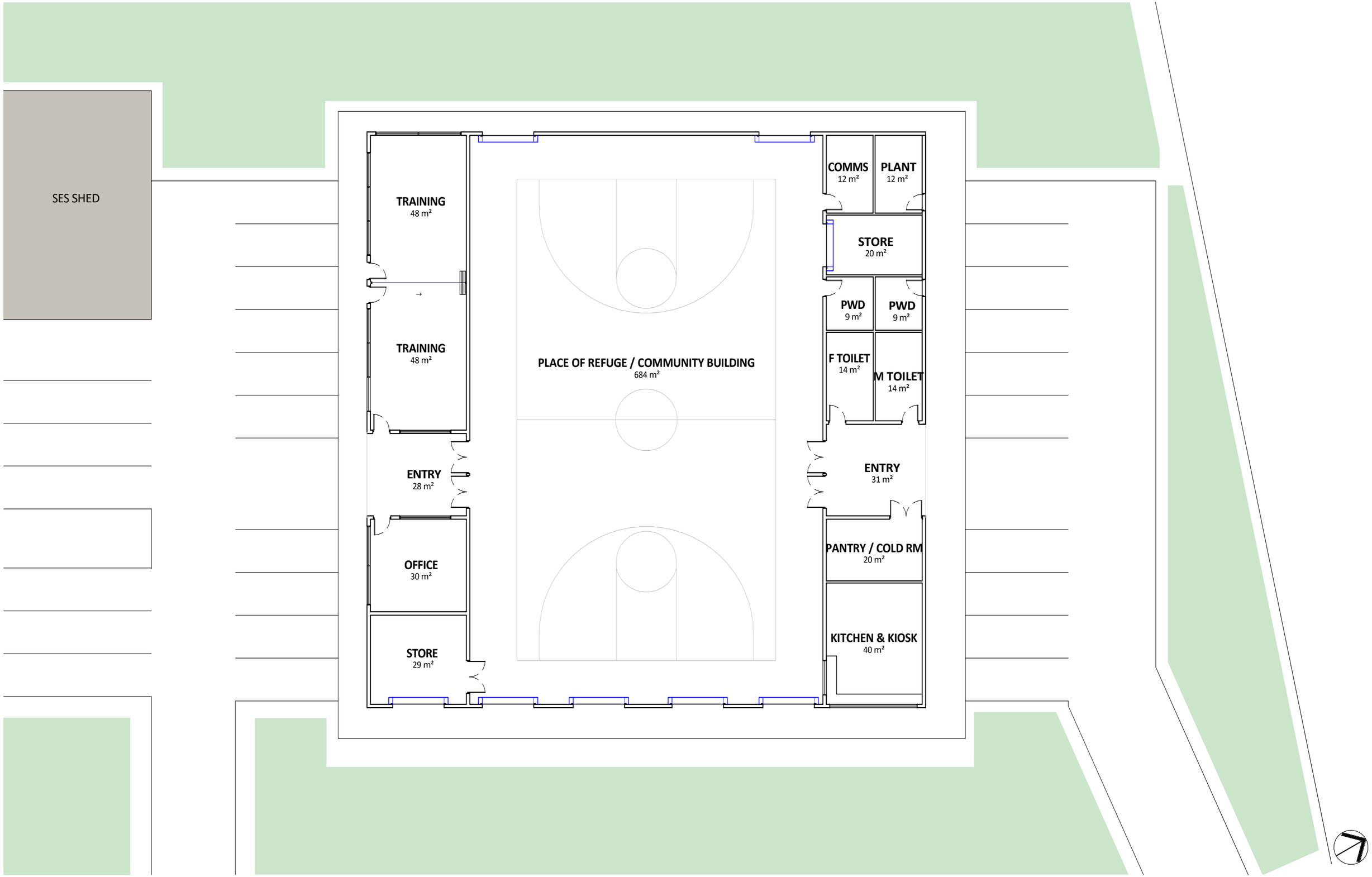
	250020	A-01



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WUJAL WUJAL COUNCIL
PLACE OF REFUGE &
COMMUNITY BUILDING

FLOOR PLAN

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WUJAL WUJAL COUNCIL
PLACE OF REFUGE &
COMMUNITY BUILDING

CONCEPTUAL ARTISTS
IMPRESSIONS

A3	SCALE (at A3)	DATE
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250020		DRAWING No. **A-03**

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Appendix 7

QCoast First Nations Hazard Report - Final

Local Government Association of Queensland

First Nations Coastal Hazard Study

ASSET EXPOSURE AND RECOMMENDATIONS FINAL REPORT – Wujal Wujal Aboriginal Shire Council

alluvium

September 2023

Alluvium recognises and acknowledges the unique relationship and deep connection to Country shared by Aboriginal and Torres Strait Islander people, as First Peoples and Traditional Owners of Australia. We pay our respects to their Cultures, Country and Elders past and present.

Artwork by Vicki Golding. This piece was commissioned by Alluvium and has told our story of water across Country, from catchment to coast, with people from all cultures learning, understanding, sharing stories, walking to and talking at the meeting places as one nation.

This report has been prepared by Alluvium Consulting Australia Pty Ltd for **Local Government Association of Queensland (LGAQ**) under the contract titled **'– QCoast2100 2.0 Funding Program 2: Appraisal of the exposure of First Nations councils in Far North Queensland to coastal hazards'.**

Authors: Billy Howitt, Adam Brook, Marika Seden

Review: Adam Brook
Approved: Adam Brook

Version: 03 – Final
Date issued: June 2024
Issued to: LGAQ (Emma Schofield,), DESI (Sel Sultmann)

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Date issued: September 2023
Issued to: LGAQ (Emma Schofield), DES (Sel Sultmann)
Citation: DO NOT CITE

Version: 01 – working draft
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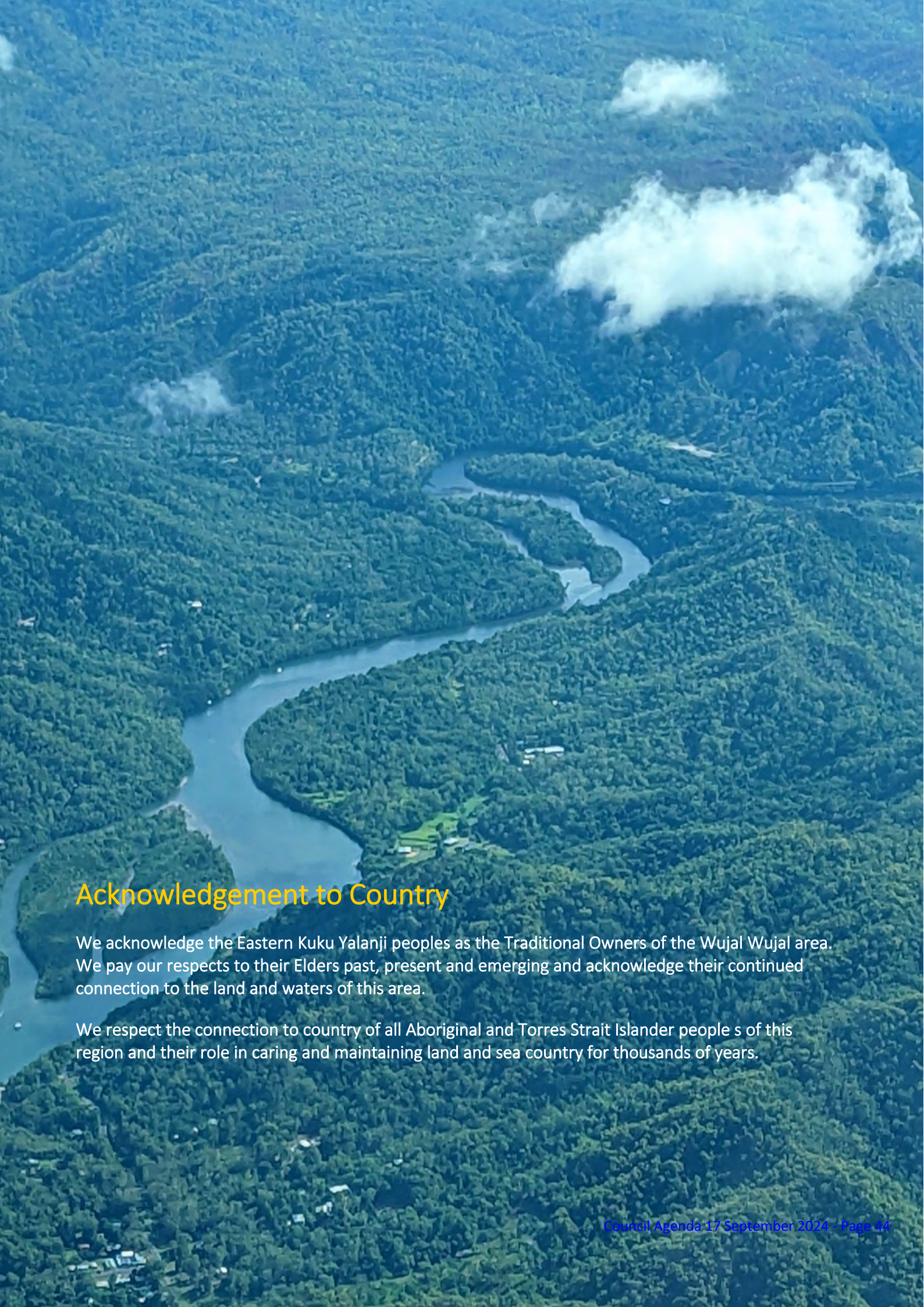
Issued to: LGAQ (Emma Schofield)



Acknowledgement to Country

We acknowledge the Eastern Kuku Yalanji peoples as the Traditional Owners of the Wujal Wujal area. We pay our respects to their Elders past, present and emerging and acknowledge their continued connection to the land and waters of this area.

We respect the connection to country of all Aboriginal and Torres Strait Islander people s of this region and their role in caring and maintaining land and sea country for thousands of years.

Executive Summary

Alluvium Consulting Australia Pty Ltd (Alluvium) has been engaged to deliver QCoast$_{2100}$ 2.0 Funding Program 2 (FP2): Appraisal of the exposure of First Nations councils in Far North Queensland to coastal hazards.

The QCoast$_{2100}$ program is a collaboration between the Local Government Association of Queensland (LGAQ) and the Department of Environment, Science and Innovation (DESI) funded by the Queensland Government to assist councils with their coastal hazard adaptation planning.

The first round of the QCoast$_{2100}$ program supported Coastal Hazard Adaptation Strategy (CHAS) development and enabled the implementation of adaptation actions to commence. The FP2 program (QCoast$_{2100}$ 2.0) is intended to support First Nations councils that did not participate in the original QCoast$_{2100}$ program such as Wujal Wujal Aboriginal Shire Council (WWASC) to better understand coastal hazards and how these affect their communities by identifying potential risks to cultural, economic, and environmental assets in these Local Government Areas (LGA's).

Scope

The project scope included the following key tasks;

- Collection of coastal hazard data where available,
- Collection of built asset data where available,
- Engaging with community to understand cultural assets potentially exposed to coastal hazards,
- Utilising the available data to assess potential exposure to coastal hazards, and
- Making recommendations on whether the council region should proceed to development of a full CHAS based on exposure of the community to coastal hazards and what further studies/data collection may be required to support this.

Whilst the remit of the QCoast$_{2100}$ program is adapting to coastal hazards, when areas become inundated it is difficult for community members to differentiate between coastal or fluvial inundation. Therefore, to better understand potential causes of inundation, fluvial flooding exposure was also assessed where fluvial flooding data was available. Noting that any work to better understand or mitigate fluvial flooding risk is outside the authority of the QCoast$_{2100}$ program and DESI. With Queensland Reconstruction Authority (QRA) the responsible supporting authority for councils for fluvial flooding matters.

The data that was able to be collected on both built assets and coastal hazards was better than expected would be available. As such the scope of the project was able to extend beyond making a recommendation on whether a CHAS should proceed for the council region, to providing a good assessment of community exposure to coastal hazards and further recommendation to improve understanding or adapt to coastal hazards.

Engagement

Alluvium Consulting Australia Pty Ltd (Alluvium) met with the Council and First Nations community members of WWASC between 22nd November 2022 and 24th November 2022. Various key community members were engaged during the on-country engagement in 2022, including the CEO of WWASC, the CEO of the Wujal Wujal Justice Group, the Coordinator of the Binal Mungka Bayan Indigenous Knowledge Centre, the WWASC Cultural officer, several Elders, community members and others.

- Marie Shipton – community Elder, Dabu Jajikal Aboriginal Corporation
- Chris Patterson – CEO, Dabu Jajikal Aboriginal Corporation
- Kiley Hanslow - Chief Executive Officer (CEO), Wujal Wujal Aboriginal Shire Council (WWASC)
- Allan Baird – community Elder
- Victor Mills – Director Works & Building Services, WWASC
- Kylie Mills – Coordinator, Binal Mungka Bayan Indigenous Knowledge Centre
- Skye – community member
- Doreen Ball – Elder, storyteller & member of Wujal Wujal Justice Group
- Sharon Anderson – NDIS Remote Community Connector
- Joh Anthonis - CEO/Coordinator, Wujal Wujal Justice Group
- Keryl Tayley – community member
- Roderick Nunn – community Elder
- Mervyn Nunn – community Elder
- Rosie Olber – Artist & community Elder
- Anne Nunn – Artist & community Elder
- Lila Creek – Artist & community Elder
- Council works crew

Findings / Recommendations

The foreshore areas of Wujal Wujal are outside the Wujal Wujal council region and managed by neighbouring councils (Cook Shire to north of Bloomfield River and Douglas to the south). The Wujal Wujal township is also at minimal risk from coastal inundation, with fluvial inundation risk far greatly exceeding coastal inundation. The dominant hazard for WWASC is fluvial flooding, not coastal hazards.

There would be minimal value in preparing a coastal hazard adaptation strategy for Wujal Wujal Aboriginal Shire Council (WWASC) Local Government Area (LGA). Managing the fluvial flooding risk within this LGA should be of higher priority than developing a CHAS. In terms of managing coastal hazards there'd be more value in collaborating with Cook Shire Council (CSC) to improve management of areas within the Cook Shire LGA that are accessed by the Wujal Wujal community. The foreshore shoreline area to the south of the Bloomfield River under Douglas Shire Council management is much more rocky and stable and there is not any real need to collaborate with them to improve management.

This project was able to create an extensive asset database for the Wujal Wujal Council region. An exposure analysis of these assets was undertaken and GIS data for the assets was tagged with their exposure to coastal and potential fluvial hazard. Working with Department of Seniors, Disability Services and Aboriginal and Torres Strait Islander Partnerships DSDSATSIP we've been able to provide GIS data that's been created from this project to be loaded into a GIS web portal that will be a resource for council to utilise. (DSDSATSIP) is already working on this for the Wujal Wujal Council region. Built-Environment Integrated Information System (arcgis.com).

This project identified that the fluvial flooding risk for WWASC is much greater than risk associated with coastal hazard exposure. Managing fluvial flood risk should take higher priority for WWASC than coastal hazards. The Queensland Reconstruction Authority (QRA) is the responsible supporting authority for councils for fluvial flooding matters.

Contents

Figures

Tables

Historical Cemetery, Wujal Wujal

1 Introduction

1.1 Wujal Wujal LGA

The Wujal Wujal Aboriginal Shire Council (WWASC) Local Government Area (LGA) is located on the eastern Cape York Peninsula in far north Queensland. The township is 100 km geographically from Cairns; however, the actual travel distance via the inland road is around 340 km or 160 km via the coastal route. The Wujal Wujal LGA is situated along the Bloomfield River, covering 64 hectares and surrounded by Douglas Shire Council and Cook Shire Council (AECOM 2020). The region has many sacred waterfalls in the Bloomfield valley, and the area is also known for its beautiful ranges, rivers, and coastline (Wujal Wujal Aboriginal Shire Council 2021).

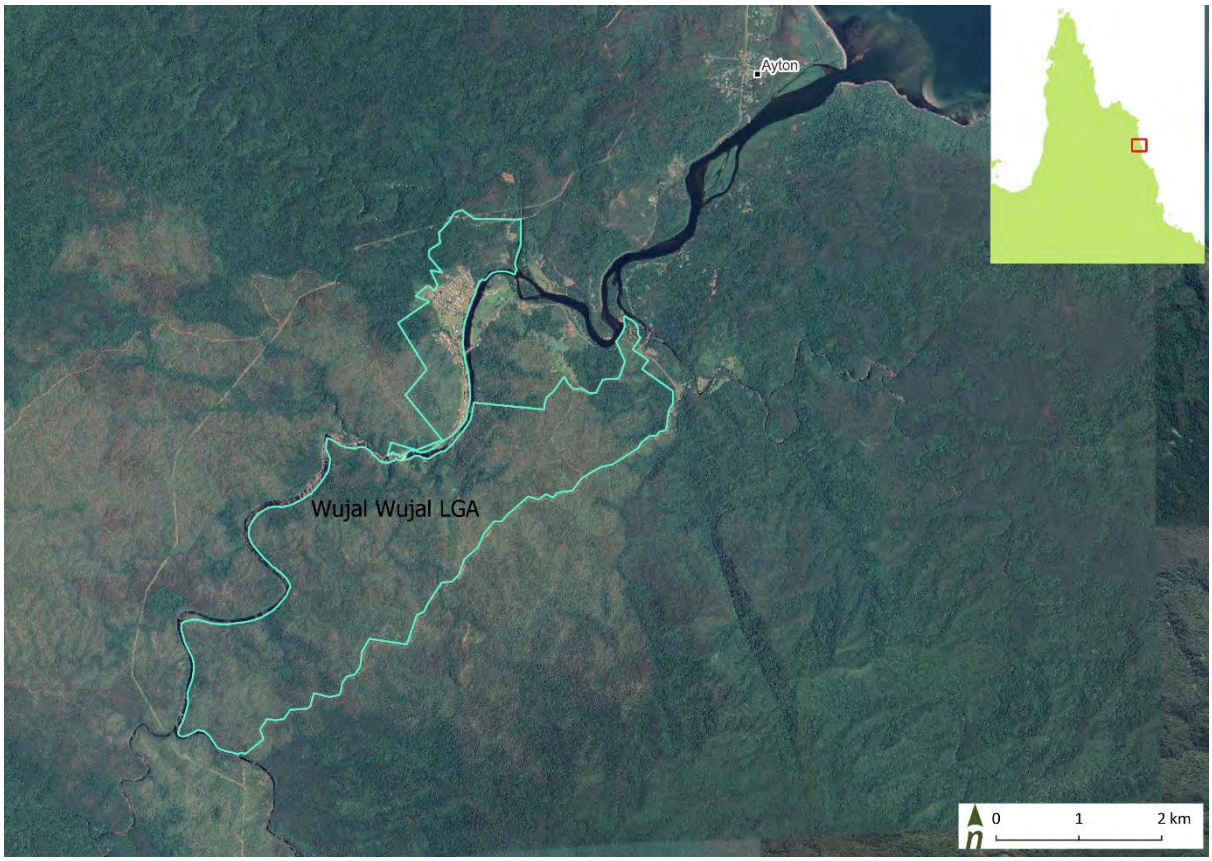


Figure 1. *Wujal Wujal LGA*

1.2 People and communities

Wujal Wujal means 'many falls' in the local language. The area's Traditional Owners are the Eastern Kuku Yalanji people (Federal Court of Australia 2007). The main clan group languages are Kuku Yalnji, Kuku Nyungul and Jalunji. Some elders speak Kuku Yalnji; however, English is widely spoken throughout the community (AECOM 2020). The unique land and sea environment around Wujal Wujal is managed by the Eastern Kuku Yalanji (EKY) Rangers, hosted by Jabalbina Yalanji Aboriginal Corporation (Wujal Wujal Aboriginal Shire Council 2021). The Wujal Wujal township area has key community facilities, including a health centre, police station, Bana Yirriji Art and Cultural Centre, community hall, community kindergarten, library, and Indigenous Knowledge Centre.

Engagement with Marie Shipton at Wujal Wujal.

Bloomfield River Mouth, Ayton

1.3 Coastal processes

The Wujal Wujal LGA is in the eastern Cape York Peninsula region. The Great Barrier Reef (GBR) shelters the entire coast from ocean swell, with onshore trades producing low to moderate seas across the GBR lagoon (Short 2020). Due to the sheltering effect of the GBR, Northern Queensland's coast experiences low ambient wave conditions with average wave heights of 0.5-0.8 metres and short-wave periods of 6 seconds. Tides are meso, and the beaches are predominantly tide modified in northern Queensland (DERM 2011).

The Wujal Wujal LGA has a semidiurnal tide, and the closest tide gauge is at Cooktown (PSM 20031), which has a Highest Astronomical Tide (HAT) of 3.2m (LAT/CD) and 1.72 m AHD (MSQ 2022). With climate change, the Cape York region is projected to have less frequent but more intense tropical cyclones, more intense downpours, sea level rise and more frequent sea level extremes (DES 2019).

1.4 Reporting regions

The First Nations Coastal Hazard Study considers all parts of Wujal Wujal at risk of coastal hazards. For reporting purposes, the LGA has been split up into two reporting regions (Figure 2):

- Township and Master Plan Area
- Outside Township and Master Plan Area

The regions for reporting were established according to the Master Plan area specified in the Wujal Wujal Master Plan Report (AECOM 2020).

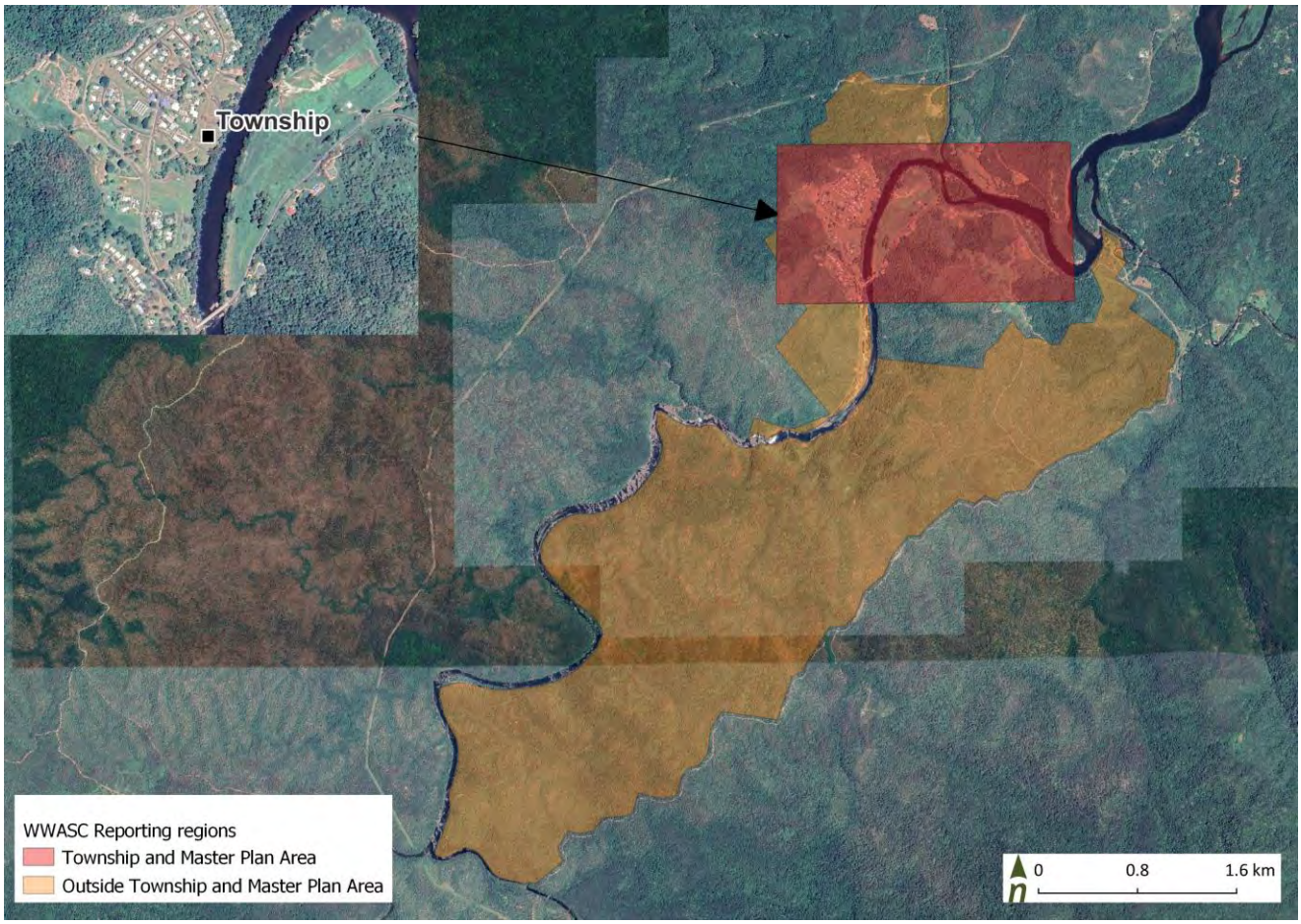


Figure 2. *Reporting regions for Wujal Wujal*

1.5 QCoast$_{2100}$ Program

Context

The QCoast$_{2100}$ program is a state-wide initiative of the Queensland Government and the Local Government Association of Queensland (LGAQ). Its purpose is to help coastal councils proactively plan for managing coastal hazard impacts from the present day to 2100.

The first round of the QCoast$_{2100}$ program supported Coastal Hazard Adaptation Strategy (CHAS) development and enabled the implementation of adaptation actions to commence.

Alluvium was awarded funding through the QCoast$_{2100}$ 2.0 Funding Program 2 (FP2) to appraise First Nations councils' exposure to coastal and other hazards in Far North Queensland. The FP2 program is intended to support First Nations councils that did not participate in the first round of the QCoast$_{2100}$ program to better understand coastal and other relevant hazards and how these affect their communities by identifying potential risks to cultural, economic, and environmental assets in these Local Government Areas (LGA's). The appraisal was completed through a project called the First Nations Coastal Hazard Study, in collaboration with the Local Government Association of Queensland (LGAQ), the Department of Environment, Science and Innovation (DESI) and the Department of Seniors, Disability Services and Aboriginal and Torres Strait Islander Partnerships (DSDSATSIP).

Purpose

The purpose of the First Nations Coastal Hazard Study is to:

- Establish an initial understanding of coastal hazards based on existing studies and data,
- Engage with councils and communities to establish the key values of the coast and identify the assets that support those values (beaches, boat ramps, cultural sites etc.),
- Provide an assessment to aid community understanding of coastal hazard risk, and
- Identify if further action is required based on program outcomes and community consultation completed throughout the process.

Approach

The First Nations Coastal Hazard Study broadly aligns with but does not strictly follow the QCoast2100 Minimum Standards and Guidelines (MS&G) or complete the eight phases a traditional CHAS incorporates. The Study does, however, include components of Phases 1,2,3 and 4 to ensure that the above objectives are satisfied. The FP2 Study has been broken up into four stages (Table 1).

Figure 3. *QCoast$_{2100}$ process for developing a Coastal Hazard Adaptation Strategy* (LGAQ & DEHP 2016)

Table 1. Stages of FP2

Stage	Description	Project status
1	Project Inception / Project Management Deliverable: Project & Engagement Plan	Complete
2	Project Inception / Project Management Deliverable: Coastal Hazard Summary Report	Complete
3	Community Engagement	Complete
4	Report & Recommendations Deliverable: Final Report	This report/complete

1.6 Content of the First Nations Coastal Hazard Report

The First Nations Coastal Hazard Study includes:

- Section 2: An overview of the Wujal Wujal community engagement
- Section 3: An overview of coastal hazards, including erosion, inundation, and areas that may be exposed to coastal hazards.
- Section 4: An overview of asset exposure analysis.
- Section 5: Cost of no adaptation – potential impacts of coastal hazards.
- Section 6: Living with coastal hazards now and into the future.
- Section 7: How could Wujal Wujal adapt to future coastal hazards.
- Section 8: Recommendations.

Bloomfield Falls, Wujal Wujal

2 Wujal Wujal engagement

Alluvium Consulting Australia Pty Ltd (Alluvium) met with the Council and First Nations community members between 22nd November 2022 and 24th November 2022. Alluvium visited various sites within the Wujal Wujal LGA plus other areas of significance and gained an important understanding of areas that have significance for the community for their cultural, historical, environmental, recreational and community health and wellbeing values.

2.1 Listening to the community

Various key community members were engaged during the on-country engagement in 2022, including the CEO of WWASC, the CEO of the Wujal Wujal Justice Group, the Coordinator of the Binal Mungka Bayan Indigenous Knowledge Centre, the WWASC Cultural officer, several Elders, community members and others. A comprehensive breakdown of the different stakeholders and key findings can be found in Attachment 5. Outlined below are some of the noteworthy discoveries found during the engagement. While some discussions may not directly relate to coastal management, listening and understanding the community's perspective holistically was important. This approach enabled us to include historical and cultural context integral to the project and the findings' overall value.

- Several community members raised concerns about four-wheel driving on Weary Bay Beach and the negative impact that this is having on the beach.
- Concerns over rainfall events and lingering anxiety amongst some community members regarding the flooding event in 2019 and fears of this happening again. Temporary structures that were used for cultural purposes have not been replaced since the 2019 flood due to concerns about flood events in the future destroying them.
- Concerns with interference with the natural flow of the Bloomfield River above the falls by industry, government and other organisations trying to address energy concerns that community members do not have or identify with.
- Concerns were raised over unimproved freehold land sold along the coastline and the impact of development on areas of cultural significance, particularly burial sites. The community would like real estate agents and prospective buyers to better understand cultural heritage legislation and their duty of care responsibilities.
- Council advised there have been discussions with Douglas Shire Council (DSC) about extending the WWASC LGA boundary to include some secondary roads and cultural, historical, and residential areas that are important to the community and where WWASC and the Easter Kuku Yalanji (EKY) Rangers undertake monitoring, maintenance and other activities. Additional discussion had begun about changing the secondary access road in the DSC LGA to the primary access road for WWASC and upgrading it.
- Concerns about changes in weather patterns, related impacts on the availability of bush foods and how this inhibits opportunities to pass on culture and stories.
- Ayton Wharf is used by vessels of various sizes to unload goods, passengers, fuel and produce. It also provides for vital access and service during emergency disaster events when the community of Wujal Wujal is cut off, and road access is restricted even for short periods. In the past, this area has been used for helicopter and boat access by emergency and medical services to provide critical support to the Wujal Wujal community. There are two gazetted but unconstructed roads in the vicinity, and practical access to the wharf is currently via tracks through freehold land owned by Trailfinders Pty Ltd who refer to the area as Port Bloomfield. Trailfinders also own Bloomfield Wilderness Lodge, which is accessible only by boat; Port Bloomfield (Ayton Wharf) serves as a guest parking area and boat transfer point. The community raised concerns about recent attempts by the owner to close gazette roads as well as restrict community access. Cook Shire Council and WWASC oppose the closure of these roads and any esplanade areas.
- Ayton Wharf has significant cultural and historical importance, whereby it was used as a setting-off point for tribes to cross the river and engage in cultural exchange with other tribes. This area is used to pass on cultural knowledge and is popular for fishing, particularly amongst Elders and women.

2.2 Key community values

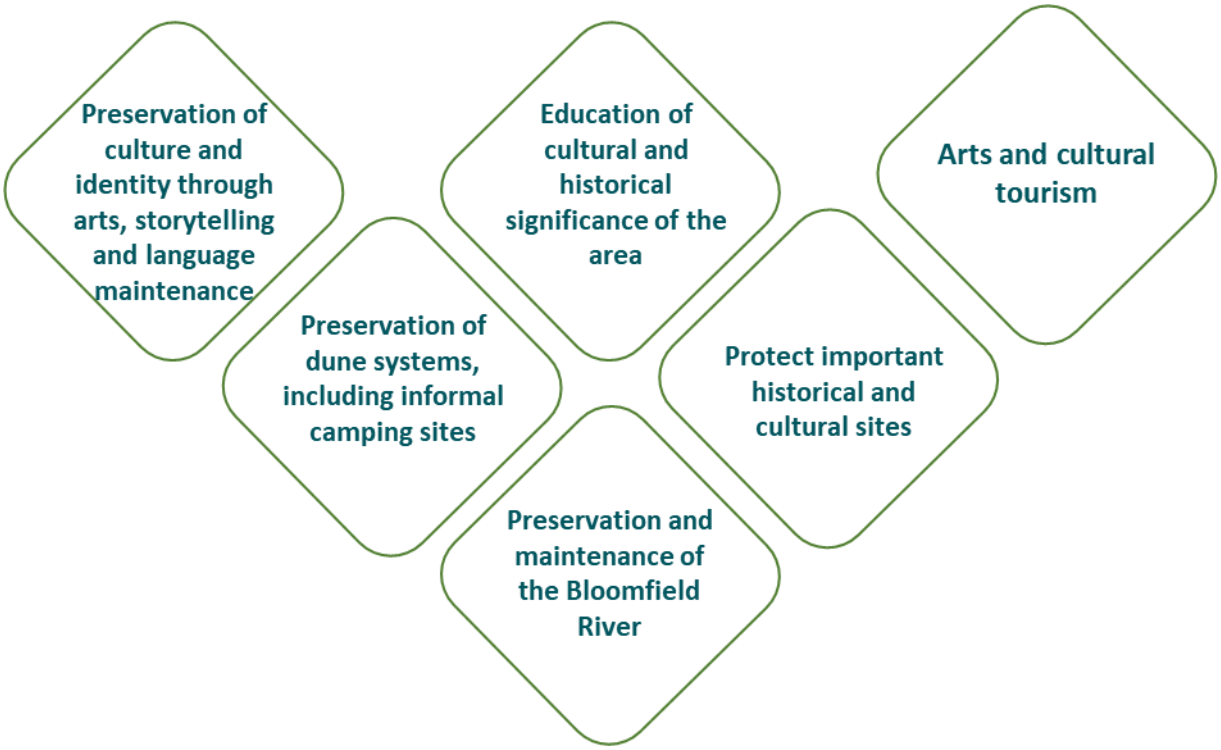


Figure 4. *Key community values highlighted during on-country engagement in 2022*

2.3 Key assets

Table 2. Key cultural/community assets and built assets

Key cultural and community sites/assets	Key assets
Alligator Point	Police station
Ayton Wharf	Arts and cultural centre
Banabilla	Health and welfare
Bloomfield River Mouth	Library
Burial Site	Recreation centre
Degarra	Women's group meeting place
Endeavour Creek	Kindergarten
Historical Cemetery	Boat ramp
Waterfall	
Weary Bay	

2.4 Goals and aspirations for Wujal Wujal

- Continue to promote culture through the arts, storytelling, and language maintenance.
- Secure access for the delivery of goods and services during emergency events.
- Secure practical and dedicated public access to Ayton Wharf.
- Protect the foreshore area from coastal hazards and impacts of four-wheel driving.
- Ensure infrastructure development does not impact sacred sites within or nearby the development area.
- A community better supported with dedicated infrastructure to respond to hazard events.
- A regional tourism protocol that embeds an education program about aboriginal cultural heritage, the impacts of four-wheel driving and other tourist-related activities.
- Raise awareness for real estate agents and property developers regarding cultural heritage legislation and duty of care obligations.
- Continue to promote and support Traditional Owner natural resource management groups.
- Re-align the shire boundary to include adjacent areas of high historical and cultural importance to Traditional Owners and the Wujal Wujal community; e.g., Banabilla, Degarra, historical cemetery, the sites of former settlement camps.

Bloomfield River Mouth, Ayton

3 Coastal hazards

3.1 Hazards

The coastal hazards which are the focus of the First Nations Coastal Hazard Study include:

- Coastal erosion of the shoreline
- Storm tide inundation
- Inundation of low-lying coastal land from expanding tidal extents associated with sea level rise.

Whilst fluvial flooding is outside the scope of the $QCoast_{2100}$ program, for completeness it has been considered within this work.

Periodic inundation and erosion are natural processes and contribute to shaping the unique landforms of our coastal zone. However, when these processes have an adverse impact on communities, infrastructure and some natural assets, they are considered coastal hazards. Major coastal hazard impacts in northern Queensland are typically associated with storms and tropical cyclones.

3.2 Coastal erosion

Coastlines naturally erode and accrete periodically over time, driven by sediment supply, tidal currents and waves.

Short-term erosion

Coastal erosion occurs when winds, waves and coastal currents take sand away from the shoreline. This can be a temporary change, often associated with storm activity (termed storm bite), and the beach will gradually rebuild (Figure 5). When a beach is stable, all the sand moved offshore during a storm eventually moves back onto the beach (potentially taking months to years). In this case, short-term beach erosion does not result in a long-term landward movement of the shoreline.

Shoreline recession

In other cases, due to changing sediment supply or climate conditions, the beach may not be able to rebuild between storm events. Without intervening, long-term erosion (termed recession) may occur, which is the landward movement of the shoreline over a longer timeframe (decades).

Both short-term and long-term erosion processes may impact on coastal assets, depending on how close to the shoreline assets are located.

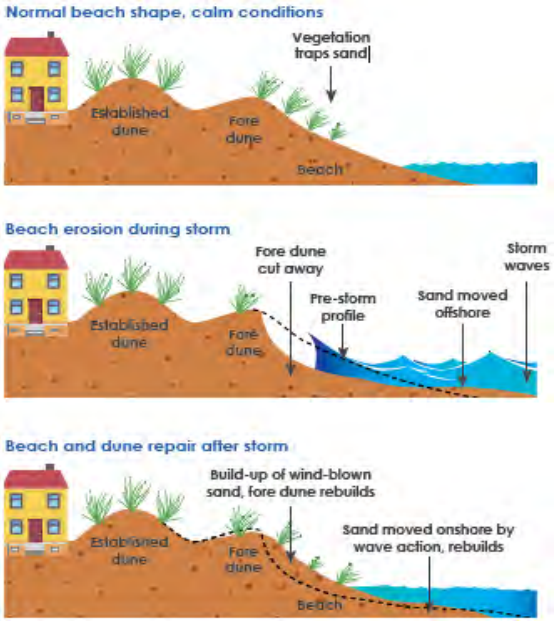


Figure 5. *Natural short-term erosion and dune rebuilding process*

3.3 Tidal inundation due to sea level rise

Tidal inundation is regular flooding from the tidal cycle, including up to the Highest Astronomical Tide (HAT). Very high tides, also called king tides, can impact low-lying areas. This can lead to increased damage, especially if a high tide coincides with a cyclone or other storm. Areas of low-lying coastal land will experience increasing tidal inundation with sea level rise. The Queensland State Government plans for a 0.8 m sea level rise by 2100.

3.4 Storm tide inundation

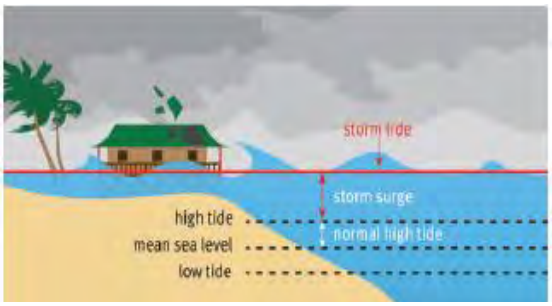


Figure 6. *Components of storm tide (Source: coastadapt.com.au)*

Storm tide inundation is the temporary flooding of low-lying coastal land from a locally raised sea level (the 'storm tide'). The storm tide is a combination of the normal tide, storm surge, and wave action (Figure 6). Storm surge is driven by the low atmospheric pressure and high winds associated with events such as tropical cyclones.

3.5 Fluvial flooding

It is important to note that fluvial flooding is not within the QCoast$_{2100}$ scope however, for Wujal Wujal potential flooding hazard has been taken into consideration. An asset exposure analysis has been completed using available local flood information although not in QCoast$_{2100}$ scope to address fluvial flooding.

Riverine and creek flooding is caused when the runoff from major storms exceeds the channel capacity of a river or creek and overflows onto the surrounding floodplains. When this rain is of significant enough quantity that the rivers and creeks become elevated and expand out over normally dry land, this is known as fluvial or riverine flooding.

3.6 Current and future exposure

Coastal hazard information

Wujal Wujal occasionally experiences cyclone and storm events which can cause erosion and inundation. These coastal hazard impacts are predicted to increase with project sea level rise. At the same time, the coastline is sheltered by the Great Barrier Reef. However, the region still experiences erosion and inundation due to cyclones, offshore wind and the wave climate. King tides associated with storm and cyclone events also cause flooding. Coastal hazard impacts are predicted to increase with a changing climate and rising sea levels.

As highlighted in the stage two Coastal Hazard Area Assessment Report (WWASC 2023), various coastal hazard information was assessed for availability and suitability for Wujal Wujal (Summary provided in Attachment 1). The most suitable hazard data for each hazard was used for the asset exposure analysis; an overview of this is data is provided in

Table 3.

Storm Tide

Three sources of storm tide data were available for Wujal Wujal , including;

1. *Natural Disaster Recovery Program (NDRP) Storm Tide Hazard Interpolation Study* (GHD 2014),
2. *Douglas Shire Council CHAS* Storm Tide Mapping (DSC2020)., and
3. the Default 2100 storm tide levels for Queensland of HAT + 2.0 m (DEHP 2013).

it was determined that the DSC Storm Tide data represents the best available storm tide data. After further interrogating it was determined that the DSC Storm Tide levels would be re-mapped for improved storm tide mapping for Wujal Wujal. The following likelihoods and planning horizons have been used to remap storm tide for Wujal Wujal and adopted for the asset exposure analysis:

- Present day 1% AEP
- 2060 – 1% AEP
- 2100 – 1% AEP

The Department of Environment and Science (DES) provided more accurate digital elevation data (HAT DEM) to create a present-day HAT. Additionally, new hazard layers were developed from this data to improve the precision of mapping.

Erosion Prone Area

For the erosion prone area, the following State layers are usually adopted and used for the asset exposure analysis:

- **Component 1 – 40m buffer from highest astronomical tide (HAT).** Areas within 40 metres landward of the present-day HAT level (except in specific cases such as adjacent to approved seawalls).
- **Component 2 – calculated erosion distance.** Areas estimated to be at risk of open coast sandy-beach erosion, following the approach defined within the *Coastal Hazard Technical Guide* (DEHP 2013). This considers short and long-term erosion trends, future impacts due to sea level rise, and allowances for dune slumping to a time horizon of 2100.
- **Component 3 – sea level rise (SLR).** Areas subject to (permanent) inundation by the HAT level in 2100 due to sea level rise (present-day HAT plus 0.8 m vertical elevation).
    - Component 1 was not adopted because it stops short of what the actual extent is likely to be. A new 40 m buffer from HAT was created using the HAT DEM, which provides a greater extent to include further upstream to the township and adopted for the asset exposure (described further in Attachment 1).
    - Component 2 – Calculated erosion distance was not available for the Wujal Wujal LGA (as its not open coast); however, it is available for the coastal areas of Cook Shire Council and Douglas Shire Council seaward of the Wujal Wujal LGA.

- Component 3 – Sea level rise (SLR) was not adopted due to abnormalities, including gaps in the hazard extent where it does not extend as far upstream as it should. Thus, using the DES HAT DEM, a new HAT + 0.8 m was created and adopted for the asset exposure.

As aforementioned, present-day HAT was also created using the HAT DEM (supplied by DES), and this was used in the asset exposure analysis to represent tidal inundation for the present day for Wujal Wujal (described further in Attachment 1).

For fluvial flooding, flood levels from the Bloomfield River Hydrological and Hydraulic Study (Queensland Government 2009) were used to map 1% AEP for the present day using a bathtub approach to create mapping of flood extents these however may not be an accurate representation of a 1% AEP event due to the simplistic bathtub mapping

The Queensland Reconstruction Authority (QRA) has assessed the flood risk to all Council Queensland LGAs.

This work has identified that the biggest flooding problem for Wujal Wujal is the town's isolation and re-supply issues. QRA also recognises that the Wujal Wujal road network may also be vulnerable to periods of flooding, damages and closures. Fluvial flooding is outside the scope of the $QCoast_{2100}$ program and the Department of Environment, Science and Innovation (DESI) authority. However, QRA has recently completed an assessment of needs with respect to delivering contemporary flood risk management across Queensland.
Statewide Assessment of Flood Risk Factors | Queensland Reconstruction Authority (qra.qld.gov.au)
Statewide Assessment of Flood Risk Factors App (arcgis.com)

Planning horizons

Various sources were utilised for the First Nations Coastal Hazard Study for Wujal Wujal to complete the asset exposure analysis. It is important to note that the available coastal hazard information has varying planning horizons and event likelihoods, as shown in Table 3.

What is planning horizons?
Planning horizons are points in the future for which strategic decisions are made. This Study considers planning horizons of present day and 2100.

What is Annual Exceedance Probability (AEP)?
The Annual Exceedance Probability is the probability of a storm event occurring in a given year. The defined storm event for Queensland State coastal hazard mapping is a 1% AEP. This means that in any given year there is a 1% chance of an event of that magnitude occurring or a 55% chance over an 80 year period.

What are likelihoods?
Likelihoods are words to describe how common or rare an event is. Likely events are expected to happen regularly and multiple times within the average lifespan. Possible events are expected to happen every so often and a few times in the average lifespan. Rare events are unusual and might occur once or twice in the average lifespan.

FUTURE IMPACTS

Projected sea level rise and an increase in cyclone intensity for the Queensland coastline is anticipated to increase the extent and impact of coastal hazards.

Coastal erosion:

- Increased water levels will accelerate coastal erosion
- Sediment transport patterns may be altered by shifts in wave direction, triggering changes to the form and location of shorelines
- Low-lying land may be permanently inundated
- Increased cyclone and storm activity will escalate the severity of coastal erosion events

Storm tide inundation:

- Sea level rise will increase the apparent severity and frequency of storm tide inundation and will cause inundation to occur further inland
- Increased cyclone and storm intensity will add to the magnitude of storm tide events and the extent of inundation

Source: Coastal Hazard Technical Guideline (DEHP 2013)

Table 3. Coastal hazards, likelihoods and planning horizons used for asset exposure analysis

Hazard	AEP(Likelihood)	Planning horizons		
		Present day	2060	2100
Storm tide inundation				
Douglas Shire Council Storm Tide Maps for CHAS	1% AEP	✓	✓	✓
Natural Disaster Recovery Program (NDRP) Storm Tide Hazard Interpolation Study	(0.01%, 0.1%,0.2%,0.5%,1%, 2% AEP and the Theoretical Maximum Storm Tide)	~	×	×
Default 2100 storm tide levels for Queensland of HAT + 2.0 m 2015		×	×	~
Erosion-prone area (40m buffer from HAT)		×	×	✓
Tidal inundation (Present day HAT and HAT +0.8m)		✓	×	✓
Fluvial flooding - Bloomfield River Hydrological and Hydraulic Study	1% AEP	✓	×	×

✓ Available and used for the asset exposure analysis for Wujal Wujal.
~ Available but not used for the asset exposure analysis for Wujal Wujal.
× Not available.

How we identified potential impacts

Coastal hazards have the potential to negatively impact the Wujal Wujal community, infrastructure, essential community services such as water supply, and our lifestyle today and long into the future. As part of the First Nations Coastal Hazard Study, technical assessments have been used to determine the assets exposed to coastal hazards.

Weary Bay, Cook Shire

4 Asset Exposure analysis

The technical work completed during the Stage Four First Nations Coastal Hazard Study Report for Wujal Wujal includes;

1. Database compilation (Section 4.1)
2. Exposure assessments (Section 4.2)
3. Coastal hazard vulnerability (Section 4.3 & 4.4)
4. Cost of no adaptation (Section 5)

This has been undertaken based on the available asset and coastal hazard information. Whilst comprehensive for the data available, due to the available data it does have some limitations in terms of LGA coverage. However, it would typically meet the requirements of the CHAS Minimum Standards and Guidelines (LGAQ & DEHP 2016). This work covers the typical scope of a CHAS Phase 4 process, with Section 5 extending beyond typical Phase 4 work undertaking aspects of Phase 7 work.

4.1 Database compilation

Purpose and use of data

The asset database collated for the First Nations Coastal Hazard Study process explores the exposure of coastal hazard impacts across Wujal Wujal. The region-wide assessment enables the identification of the following:

- High-risk asset types
- Changing risk profiles across the LGA
- Changing risk profiles from the present day to 2100 (where data is available)
- Key issues.

The primary purpose of the data collation, exposure and risk assessment is to enable strategic planning and adaptation initiatives targeted at priority areas and issues. An additional benefit can be that data and the new attribute fields generated on coastal hazard exposure can be used to build on the existing DSDSATSIP GIS-based asset management system and other relevant operational programs.

DSDSATSIP has a range of spatial asset data for Wujal Wujal, consisting of coastal and general assets. Most of this data was compiled when Master Plan was completed in 2020. Additional data sets were sourced from publicly available State databases. Unique IDs were retained for the DSDSATSIP data sets and assigned to the State data. Land use overlays and other available data sets have been sourced from Queensland Spatial Catalogue (QSpatial).

Database

The data compiled includes a range of point, linear and polygon data that spans the asset themes outlined in Figure 7. This builds upon the data collation undertaken in Stage Two of the First Nations Coastal Hazard Study (WWASC 2023) summarised in Attachment 1..

Asset data included in the spatial database is listed in Attachment 1. Due to the amount of asset data compiled, fields/attributes have been condensed to those required for the region-wide exposure and risk assessment. Unique ID codes retained can later be used by DSDSATSIP and other relevant asset management teams to track information back to original attribute fields and specific information for individual assets. Where unknown, assumptions have been made about asset types and materials.

Building footprints for Wujal Wujal were sourced from Microsoft (GitHub). Available building information sourced from DSDSATSIP and QSpatial has been merged with the footprints to create a comprehensive database of the buildings across the region. However, flood levels are not available for the buildings in Wujal Wujal. There are 104 building footprints within Wujal Wujal. Not all building footprints are included in the building footprints layer, as the source (Microsoft-GitHub) only provides data up to 2018. However, in most cases, point data can be attributed to buildings not captured in the Microsoft building footprints.

The buildings and facilities asset list comprises various structures, including residential, educational, emergency services and others. Buildings are significant assets as they are relied upon for business, recreation, shelter and accommodation for locals and visitors. Most buildings are considered permanent structures and are expensive to build, replace or repair. Some buildings are within the hazard extents in the present day and, by 2100, thus may be exposed to coastal/fluvial hazards. A detailed breakdown of building features and their exposure to the various hazard types is presented in Table 5, Table 6, Table 7 and Table 8.

Beach and foreshore assets within Wujal Wujal include a boat ramp only. The nature of beach and foreshore assets means they are inherently located in hazard areas and have been designed to withstand these processes.

Utility assets assessed include electrical, sewer, stormwater, telecommunications, and water. These assets comprise linear assets such as electrical cable and water mains and point assets that represent items such as electrical poles and manholes.

The transport infrastructure assessed comprises local roads only. In addition to the beach and foreshore assets, buildings and facilities, transport and utility assets, and other assets in Wujal Wujal are at risk from coastal and fluvial hazards at present and by 2100. These include sites identified as part of the on-Country engagement in 2022 and other land, environmental and cultural assets.

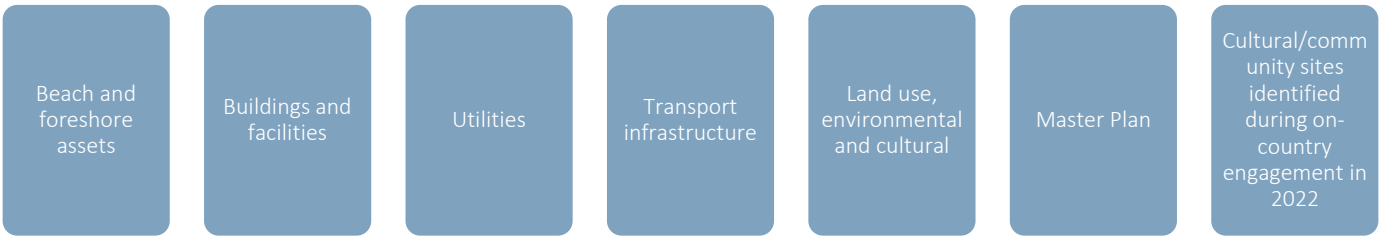


Figure 7. *Asset types/themes.*

Alignment with Wujal Wujal Master Plan

A Master Plan for Wujal Wujal was prepared for the Council in partnership with DSDSATSIP by AECOM in 2020 to provide a strategy for future residential and commercial development for the region (AECOM 2020). The Master Plan provides an overview of existing infrastructure and planning arrangements, summarises stakeholder consultation activities, and outlines concept development options, including preferred options for Wujal Wujal.

DSDSATSIP have provided a digitised version of the Master Plan, which offers indicative infrastructure locations, land use zone and preferred options, which have been included in the asset database for Wujal Wujal. This enables the Master Plan outcomes to be considered in the First Nations Coastal Hazard Study asset exposure analysis. The Master Plan has taken into consideration the Planning Scheme for the LGA.

4.2 Exposure assessment

Approach

The technical approach to the exposure analysis has included a substantial GIS analysis process to overlay all coastal hazard layer scenarios (erosion, tidal inundation and storm tide) with all the asset data layers. This process has included:

- Data set up of GIS inputs and outputs format, and code/model development to run the overlays.
- Spatial overlays using a vector-on-vector approach for extent assessments – enabling spatial information to be tagged to relative parts of impacted assets and providing overall information on lengths, areas and % potentially exposed. For example, outputs for roads analysed include the length impacted, % impacted relative to the total length in the region, and spatial mapping of which parts of the asset are impacted. This provides information for the strategic risk assessment and detailed information of specific assets as a spatial product that can be fed into a GIS database for DSDSATSIP and other relevant asset management teams.
- Overlays completed for all components of the coastal/fluvial hazard scenarios, including storm tide, tidal inundation, component 1 of the erosion prone area and fluvial flooding.
- Hazard areas and intersects

4.3 Exposure assessment results

Exposure results are presented in the following tables. Summary tables provide detailed results from the exposure assessment with a separate table for each hazard. These summary tables contain information on the number, length or area (depending on the asset type) of exposed assets for Wujal Wujal, with results available for each planning horizon as outlined in Table 3.

1. *Township/ Master Plan Area*

Most community, infrastructure and built assets are in the township. This area has limited exposure to tidal inundation, storm tide inundation and erosion from the present day to 2100. However, there is a larger exposure to fluvial flooding in the present day, whereby various assets such as residential buildings and health and welfare buildings may be exposed. Additionally, a significant percentage of linear utility assets and Master Plan areas are potentially exposed to fluvial flooding in the present day.

A detailed breakdown of all mapped assets that could be affected by coastal hazards is provided in Table 5,

Table 6, Table 7 and Table 8.

4.4 Key area and assets at risk

2. Outside Township and Master Plan Area

For Wujal Wujal, many of the assets/sites identified during the on-Country engagement in 2022 are situated outside the LGA but have been captured as part of the asset exposure analysis. This includes Ayton Wharf, a critical piece of infrastructure which plays a critical role in community safety for Wujal Wujal. Further discussion around specific areas where specific adaptation actions or studies may need to be adopted will be outlined in Section 8.

Table 4 outlines the cultural and community assets identified during on-Country engagement in 2022, indicating whether they lie within the hazard area, the type of hazard, and the planning horizon.

Table 4. Key community and cultural assets at risk in hazard areas

Key cultural and community assets included in the asset exposure analysis	**Coastal/fluvial hazard**						
	Erosion-prone area (40 m from HAT)	**Tidal inundation (present-day HAT)**	**Tidal inundation (HAT + 0.8 m)**	**Storm tide (present-day - 1% AEP)**	**Storm tide (2060 - 1% AEP)**	**Storm tide (2100 - 1% AEP)**	**Fluvial Flooding (present-day - 1% AEP)**
Alligator Point	×	×	×	×	×	×	×
Ayton Wharf	✓	✓	✓	✓	✓	✓	✓
Banabilla	×	×	×	×	×	×	×
Bloomfield River Mouth	✓	✓	✓	✓	✓	✓	✓
Burial Site	×	×	×	×	×	×	✓
Degarra	×	×	×	×	×	×	×
Endeavour Creek	×	×	×	×	×	×	×
Historical Cemetery	×	×	×	×	×	×	×
Waterfall	×	×	×	×	×	×	×
Weary Bay	✓	✓	✓	✓	✓	✓	✓

✓ asset in the coastal/fluvial hazard area

× asset not in the coastal/fluvial hazard area

Table 5. Asset exposure - erosion prone area

Wujal Wujal Aboriginal Shire Council (WWASC)			Asset totals		Erosion prone area 2100		
Asset group	**Asset type**	**Feature type**	**Total length (m) or area (m2)**	**Total region count**	**Exposed length (m) or area (m2)**	**Exposed number of assets**	**% exposed**
Buildings (results reported as #)							
Buildings and facilities	**Building**						
		Residential		59			0%
	Educational						
		CDEP training office		1			0%
	Emergency services						
		Police station		1			0%
		State emergency services		2			0%
	General						
		Arts and cultural centre		1			0%
		Butcher shop		1			0%
		Council Workshop		1			0%
		Health and welfare		7			0%
		Library		1			0%
		Petrol station		1			0%
		Recreation centre		1			0%
		Retail		1			0%
		Rural transaction centre		1			0%
		Shed		1			0%
		Women's group meeting place		1			0%
	Other						
		Other		23		2	9%
Utilities	**Water**						
		Water tanks		1			0%
Points (results reported as #)							
Beach and foreshore	**Facility**						
		Boat ramp		1		1	100%
Buildings and facilities	**Building**						
		Residential		17			0%
	Educational						
		Kindergarten		1			0%
	Other						
		Other		19		2	11%
Culturally important sites or sites identified during engagement in 2022	**Cultural heritage**						
		Alligator Point		1			0%
		Ayton Wharf		1		1	100%
		Banabilla		1			0%

Wujal Wujal Aboriginal Shire Council (WWASC)			Asset totals		Erosion prone area 2100		
Asset group	**Asset type**	**Feature type**	**Total length (m) or area (m2)**	**Total region count**	**Exposed length (m) or area (m2)**	**Exposed number of assets**	**% exposed**
		Bloomfield River Mouth		1		1	100%
		Burial Site		1			0%
		Degarra		1			0%
		Endeavour Creek		1			0%
		Historical Cemetary		1			0%
		Waterfall		1			0%
		Weary Bay		1		1	100%
Utilities							
	Electrical	Distribution substation		55		3	5%
		Pillar		10			0%
		Pole		189		23	12%
		Air valve		1			0%
		Draw pit		2			0%
		Filters		2			0%
		Inspection opening		1			0%
	Sewer	Manhole		72		1	1%
		Pumpwell		1			0%
		Rotating biological contactor		1			0%
		Septic Tank		60			0%
		Septic tank - effluent		1			0%
		Tank		1			0%
		Valve box		19		2	11%
		Drain		6			
	Stormwater	Headwall		9			0%
		Other		3			0%
		Pit		2			0%
		Trap Gully		4			0%
		Air valve		26		2	8%
		End cap		5			0%
		Generator		1			0%
		House connection branch		13			0%
	Water	Hydrant		51			0%
		Meter		2			0%
		Pumping Station		2			0%
		Reducer		4			0%
		Reservoir		1			0%
		Scour valve		16		1	6%
		Stop valve		138		1	1%

Wujal Wujal Aboriginal Shire Council (WWASC)			Asset totals		Erosion prone area 2100		
Asset group	**Asset type**	**Feature type**	**Total length (m) or area (m2)**	**Total region count**	**Exposed length (m) or area (m2)**	**Exposed number of assets**	**% exposed**
		Tank		1			0%
Lines (results reported as metres)							
Transport	**Transport**						
		Road	9,285.39		539.80		6%
Utilities	**Electrical**						
		Electricity cable	11,331.08		3,269.43		29%
		Electricity cable - low voltage	10,140.27		635.15		6%
		Line	306.80				0%
	Sewer						
		Main	3,639.81		119.48		3%
		Overflow	26.35				
		Rising main	1,894.53		127.50		7%
	Stormwater						
		Drain	2,851.85		512.91		18%
		Pipe	339.84				0%
	Telecommunications						
		Cable	9,677.55		19.19		0%
	Water						
		Building	263.52				0%
		General	55.10				0%
		House connection branch	139.72				0%
		Rising main	2,077.49				0%
		Tank	93.92				0%
		Water main	5,412.81		125.11		2%
		Water pipe	1,004.93				0%
Polygons (results reported as m2)							
Master plan	**Master plan**						
		Community	20,768.08				0%
		Infrastructure	14,603.29				0%
		Open Space	44,747.40		36,015.95		80%
		Residential	78,903.81				0%
		Tourism	61,357.24		10,656.56		17%
Land, environment and culture	**Culture**						
		Native title	11,722,178.64		129,556.17		1%
	Environment						
		Essential habitat	5,479,388.70		72,357.46		1%
		Fisheries	266,750.49		18,909.56		7%

Wujal Wujal Aboriginal Shire Council (WWASC)			Asset totals		Erosion prone area 2100		
Asset group	**Asset type**	**Feature type**	**Total length (m) or area (m2)**	**Total region count**	**Exposed length (m) or area (m2)**	**Exposed number of assets**	**% exposed**
		Remnant regional ecosystems	11,734,862.95		130,384.04		1%
		Vulnerable or endangered wildlife habitat	6,102,626.27		72,425.36		1%
	Land use						
		Conservation and natural environments	10,388,436.22		76,222.85		1%
		Intensive uses	425,966.78		33,320.24		8%
		Production from relatively natural environments	723,230.39				0%
		Water	197,231.70		20,840.93		11%

Key observations from the erosion prone area: open coast and default erosion area exposure analysis:

For the 2100 erosion-prone area, 2 out of 104 building footprints may be exposed to erosion by 2100; this includes 2 other buildings. For buildings not attributed by footprints and represented by point data, 2 other buildings may be exposed to erosion by 2100. For beach and foreshore assets, the boat ramp may be exposed to erosion by 2100; it is important to note that this type of asset is inherently located in the hazard area and has been designed to withstand these processes. Around 5% of the total number of utilities attributed by point data may be exposed to erosion by 2100. The potential exposure of linear transport assets includes 6% of the road network potentially exposed to erosion by 2100. In terms of linear utility assets, 10% of the total length may be exposed to erosion by 2100. For the Master Plan area, 21% of the total area may be exposed by 2100, with 80% of the Open Space category potentially exposed. For the land, environment, and culture assets, 1% of the total area may be exposed to erosion by 2100. By 2100, 3 out of the 10 assets/sites identified during the on-Country engagement in 2022 are within the erosion-prone area. This includes Weary Bay and the Bloomfield River Mouth, which are geographical features inherently located in the hazard area. Ayton Wharf may also be exposed to erosion by 2100. However, this type of infrastructure is also inherently located in the hazard area and designed to withstand these processes.

Overall exposure to coastal erosion hazard is low out to 2100. *With minimal built assets in the coastal zone and only a small percentage of the overall built assets in the LGA.*

Table 6. Asset exposure - tidal inundation

Wujal Wujal Aboriginal Shire Council (WWASC)			Asset totals		Expanding tidal inundation Present day HAT			Expanding tidal inundation 2100 HAT + 0.8m vertical		
Asset group	**Asset type**	**Feature type**	**Total length (m) or area (m2)**	**Total region count**	**Exposed length (m) or area (m2)**	**Exposed number of assets**	**% exposed**	**Exposed length (m) or area (m2)**	**Exposed number of assets**	**% exposed**
Buildings (results reported as #)										
Buildings and facilities	**Building**									
		Residential		59			0%			0%
	Educational									
		CDEP training office		1			0%			0%
	Emergency services									
		Police station		1			0%			0%
		State emergency services		2			0%			0%
	General									
		Arts and cultural centre		1			0%			0%
		Butcher shop		1			0%			0%
		Council Workshop		1			0%			0%
		Health and welfare		7			0%			0%
		Library		1			0%			0%
		Petrol station		1			0%			0%
		Recreation centre		1			0%			0%
		Retail		1			0%			0%
		Rural transaction centre		1			0%			0%
		Shed		1			0%			0%
		Women's group meeting place		1			0%			0%
	Other									
		Other		23			0%			0%
Utilities	**Water**									
		Water tanks		1			0%			0%
Points (results reported as #)										
Beach and foreshore	**Facility**									
		Boat ramp		1		1	100%		1	100%
Buildings and facilities	**Building**									
		Residential		17			0%			0%
	Educational									
		Kindergarten		1			0%			0%
	Other									
		Other		19			0%			0%
Culturally important sites or sites identified during engagement in 2022	**Cultural heritage**									
		Alligator Point		1						

Wujal Wujal Aboriginal Shire Council (WWASC)			Asset totals		Expanding tidal inundation Present day HAT			Expanding tidal inundation 2100 HAT + 0.8m vertical		
Asset group	**Asset type**	**Feature type**	**Total length (m) or area (m2)**	**Total region count**	**Exposed length (m) or area (m2)**	**Exposed number of assets**	**% exposed**	**Exposed length (m) or area (m2)**	**Exposed number of assets**	**% exposed**
		Ayton Wharf		1		1	100%		1	100%
		Banabilla		1			0%			0%
		Bloomfield River Mouth		1		1	100%		1	100%
		Burial Site		1			0%			0%
		Degarra		1			0%			0%
		Endeavour Creek		1			0%			0%
		Historical Cemetary		1			0%			0%
		Waterfall		1			0%			0%
		Weary Bay		1		1	100%		1	100%
Utilities										
	Electrical	Distribution substation		55			0%		1	2%
		Pillar		10			0%			0%
		Pole		189		2	1%		8	4%
	Sewer									
		Air valve		1			0%			0%
		Draw pit		2			0%			0%
		Filters		2			0%			0%
		Inspection opening		1			0%			0%
		Manhole		72			0%			0%
		Pumpwell		1			0%			0%
		Rotating biological contactor		1			0%			0%
		Septic Tank		60			0%			0%
		Septic tank - effluent		1			0%			0%
		Tank		1			0%			0%
		Valve box		19			0%			0%
	Stormwater									
		Drain		6			0%			0%
		Headwall		9			0%			0%
		Other		3			0%			0%
		Pit		2			0%			0%
		Trap Gully		4			0%			0%
	Water									
		Air valve		26			0%			0%
		End cap		5			0%			0%
		Generator		1			0%			0%
		House connection branch		13			0%			0%
		Hydrant		51			0%			0%
		Meter		2			0%			0%
		Pumping Station		2			0%			0%
		Reducer		4			0%			0%
		Reservoir		1			0%			0%
		Scour valve		16			0%			0%

Wujal Wujal Aboriginal Shire Council (WWASC)			Asset totals		Expanding tidal inundation Present day HAT			Expanding tidal inundation 2100 HAT + 0.8m vertical		
Asset group	**Asset type**	**Feature type**	**Total length (m) or area (m2)**	**Total region count**	**Exposed length (m) or area (m2)**	**Exposed number of assets**	**% exposed**	**Exposed length (m) or area (m2)**	**Exposed number of assets**	**% exposed**
		Stop valve		138			0%			0%
		Tank		1			0%			0%
Lines (results reported as metres)										
Transport	**Transport**									
		Road	9,285.39		20.03		0.2%	36.78		0.4%
	Electrical	Electricity cable	11,331.08		1,448.13		12.8%	1,864.97		16%
		Electricity cable - low voltage	10,140.27				0%	180.00		2%
		Line	306.80				0%			
	Sewer	Main	3,639.81				0%	6.73		0%
		Overflow	26.35				0%			0%
		Rising main	1,894.53				0%	5.94		0%
Utilities	**Stormwater**	Drain	2,851.85		111.75		4%	294.56		10%
		Pipe	339.84				0%			0%
	Telecommunications	Cable	9,677.55				0%			0%
	Water	Building	263.52				0%			0%
		General	55.10				0%			0%
		House connection branch	139.72				0%			0%
		Rising main	2,077.49				0%			0%
		Tank	93.92				0%			0%
		Water main	5,412.81				0%			0%
		Water pipe	1,004.93				0%			0%
Polygons (results reported as m2)										
Master plan	**Master plan**	Community	20,768.08				0%			0%
		Infrastructure	14,603.29				0%			0%
		Open Space	44,747.40		232.65		1%	1,756.70		4%
		Residential	78,903.81				0%			0%
		Tourism	61,357.24				0%	1,038.54		2%
Land, environment and culture	**Culture**									
		Native title	11,722,178.64		26,055.63		0.2%	47,755.63		0.4%
	Environment									
		Essential habitat	5,479,388.70		21,104.77		0.4%	40,608.38		1%

Wujal Wujal Aboriginal Shire Council (WWASC)			Asset totals		Expanding tidal inundation Present day HAT			Expanding tidal inundation 2100 HAT + 0.8m vertical		
Asset group	**Asset type**	**Feature type**	**Total length (m) or area (m2)**	**Total region count**	**Exposed length (m) or area (m2)**	**Exposed number of assets**	**% exposed**	**Exposed length (m) or area (m2)**	**Exposed number of assets**	**% exposed**
		Fisheries	266,750.49		15,126.85		6%	17,431.37		7%
		Remnant regional ecosystems	11,734,862.95		25,972.56		0.2%	48,133.60		0.4%
		Vulnerable or endangered wildlife habitat	6,102,626.27		21,113.82		0.3%	40,629.75		1%
	Land use	Conservation and natural environments	10,388,436.22		8,679.61		0.1%	26,887.32		0.3%
		Intensive uses	425,966.78		590.15		0.1%	2,201.60		1%
		Production from relatively natural environments	723,230.39				0%			0%
		Water	197,231.70		16,702.77		8%	19,044.66		10%

Key observations from the expanding tidal area inundation exposure analysis:

For the present-day scenario, no building footprints are potentially exposed to tidal inundation. Similarly, no buildings attributed by point data are potentially exposed to tidal inundation in the present day. For beach and foreshore assets, the boat ramp may be exposed to tidal inundation in the present day. It is important to note that this type of asset is inherently located in the hazard area and has been designed to withstand these processes. In terms of utilities attributed by point data, 2 electrical poles may be exposed to tidal inundation in the present day. The potential exposure of linear transport assets includes 0.2% of the road network. In terms of linear utility assets, 3.2% of the total length may be exposed to tidal inundation in the present day. For the Master Plan area, less than 1% of the total area may be exposed to tidal inundation in the present day. For land, environment, and culture assets, less than 1% of the total area may be exposed to tidal inundation in the present day. 3 out of the 10 assets/sites identified during the on-Country engagement in 2022 are within the hazard area for tidal inundation in the present day. This includes Weary Bay and the Bloomfield River Mouth, which are geographical features inherently located in the hazard area. Ayton Wharf may also be exposed to tidal inundation in the present day. However, this type of infrastructure is also inherently located in the hazard area and designed to withstand these processes.

By 2100, there are no building footprints potentially exposed to tidal inundation. Similarly, no buildings that are represented by point data are potentially exposed to tidal inundation by 2100. For beach and foreshore assets, there is no change in the asset potentially exposed to tidal inundation by 2100. In terms of utilities attributed by point data, there is an increase in the number of utility assets potentially exposed to tidal inundation by 2100, which includes 8 electrical poles and 1 distribution substation. There is a small increase in the potential exposure of transport assets to tidal inundation by 2100, including 0.4% of the road network. There is an increase in linear utility assets potentially exposed to tidal inundation by 2100, with around 4.8% within the hazard area. For the Master Plan area, 1.3% may be exposed to tidal inundation by 2100. For land, environment and cultural assets, there is an increase in the total area potentially exposed to tidal inundation by 2100; however, this remains under 1%. There is no increase in the number of assets/sites identified during the on-Country engagement in 2022 potentially exposed to tidal inundation by 2100.

Overall exposure to coastal inundation hazard is low. *With minimal built assets in the coastal zone*

Table 7. Asset exposure - storm tide inundation

Wujal Wujal Aboriginal Shire Council (WWASC)			Asset totals		Storm tide Present day 1.8 m AHD			Storm tide 2060 2.6 m AHD			Storm tide 2100 3.2 m AHD		
Asset group	**Asset type**	**Feature type**	**Total length (m) or area (m2)**	**Total region count**	**Exposed length (m) or area (m2)**	**Exposed number of assets**	**% exposed**	**Exposed length (m) or area (m2)**	**Exposed number of assets**	**% exposed**	**Exposed length (m) or area (m2)**	**Exposed number of assets**	**% exposed**
Buildings (results reported as #)													
Buildings and facilities	**Building**												
		Residential		59			0%			0%			0%
	Educational												
		CDEP training office		1			0%			0%			0%
	Emergency services												
		Police station		1			0%			0%			0%
		State emergency services		2			0%			0%			0%
	General												
		Arts and cultural centre		1			0%			0%			0%
		Butcher shop		1			0%			0%			0%
		Council Workshop		1			0%			0%			0%
		Health and welfare		7			0%			0%			0%
		Library		1			0%			0%			0%
		Petrol station		1			0%			0%			0%
		Recreation centre		1			0%			0%			0%
		Retail		1			0%			0%			0%
		Rural transaction centre		1			0%			0%			0%
		Shed		1			0%			0%			0%
		Women's group meeting place		1			0%			0%			0%
	Other												
		Other		23			0%			0%			0%
Utilities	**Water**												
		Water tanks		1			0%			0%			0%
Points (results reported as #)													
Beach and foreshore	**Facility**												
		Boat ramp		1		1	100%		1	100%		1	100%
Buildings and facilities	**Building**												
		Residential		17			0%			0%			0%
	Educational												
		Kindergarten		1			0%			0%			0%
	Other												
		Other		19			0%			0%			0%
Culturally important sites or sites identified during engagement in 2022	**Cultural heritage**												
		Alligator Point		1									
		Ayton Wharf		1		1	100%		1	100%		1	100%

Wujal Wujal Aboriginal Shire Council (WWASC)			Asset totals		Storm tide Present day 1.8 m AHD			Storm tide 2060 2.6 m AHD			Storm tide 2100 3.2 m AHD		
Asset group	**Asset type**	**Feature type**	**Total length (m) or area (m2)**	**Total region count**	**Exposed length (m) or area (m2)**	**Exposed number of assets**	**% exposed**	**Exposed length (m) or area (m2)**	**Exposed number of assets**	**% exposed**	**Exposed length (m) or area (m2)**	**Exposed number of assets**	**% exposed**
		Banabilla		1									
		Bloomfield River Mouth		1		1	100%		1	100%		1	100%
		Burial Site		1									
		Degarra		1									
		Endeavour Creek		1									
		Historical Cemetary		1									
		Waterfall		1									
		Weary Bay		1		1	100%		1	100%		1	100%
Utilities													
	Electrical	Distribution substation		55			0%		1	2%		3	5%
		Pillar		10			0%			0%			0%
		Pole		189		3	2%		8	4%		17	9%
	Sewer	Air valve		1			0%			0%			0%
		Draw pit		2			0%			0%			0%
		Filters		2			0%			0%			0%
		Inspection opening		1			0%			0%			0%
		Manhole		72			0%			0%			0%
		Pumpwell		1			0%			0%			0%
		Rotating biological contactor		1			0%			0%			0%
		Septic Tank		60			0%			0%			0%
		Septic tank - effluent		1			0%			0%			0%
		Tank		1			0%			0%			0%
		Valve box		19			0%			0%			0%
	Stormwater	Drain		6			0%			0%			0%
		Headwall		9			0%			0%			0%
		Other		3			0%			0%			0%
		Pit		2			0%			0%			0%
		Trap Gully		4			0%			0%			0%
	Water	Air valve		26			0%			0%			0%
		End cap		5			0%			0%			0%
		Generator		1			0%			0%			0%
		House connection branch		13			0%			0%			0%
		Hydrant		51			0%			0%			0%
		Meter		2			0%			0%			0%
		Pumping Station		2			0%			0%			0%
		Reducer		4			0%			0%			0%
		Reservoir		1			0%			0%			0%
		Scour valve		16			0%			0%			0%
		Stop valve		138			0%			0%			0%

Wujal Wujal Aboriginal Shire Council (WWASC)			Asset totals		Storm tide Present day 1.8 m AHD			Storm tide 2060 2.6 m AHD			Storm tide 2100 3.2 m AHD		
Asset group	**Asset type**	**Feature type**	**Total length (m) or area (m2)**	**Total region count**	**Exposed length (m) or area (m2)**	**Exposed number of assets**	**% exposed**	**Exposed length (m) or area (m2)**	**Exposed number of assets**	**% exposed**	**Exposed length (m) or area (m2)**	**Exposed number of assets**	**% exposed**
		Tank		1			0%			0%			0%
Lines (results reported as metres)													
Transport	**Transport**												
		Road	9,285.39		23.32		0.3%	70.34		0.8%	136.82		1%
Utilities	**Electrical**												
		Electricity cable	11,331.08		1,518.45		13%	1,907.43		17%	2,884.74		25%
		Electricity cable - low voltage	10,140.27		30.51		0.3%	226.56		2%	1,022.72		10%
		Line	306.80				0%			0%			0%
	Sewer												
		Main	3,639.81		0.82		0.02%	7.59		0.2%	12.53		0.3%
		Overflow	26.35				0%			0%			0%
		Rising main	1,894.53		1.01		0.1%	6.32		0.3%	9.23		0.5%
	Stormwater												
		Drain	2,851.85		125.75		4%	327.46		11%	390.19		14%
		Pipe	339.84				0%			0%			0%
	Telecommunications												
		Cable	9,677.55				0%			0%			0%
	Water												
		Building	263.52				0%			0%			0%
		General	55.10				0%			0%			0%
		House connection branch	139.72				0%			0%			0%
		Rising main	2,077.49				0%			0%			0%
		Tank	93.92				0%			0%			0%
		Water main	5,412.81				0%			0%	14.35		0.3%
		Water pipe	1,004.93				0%			0%			0%
Polygons (results reported as m2)													
Master plan	**Master plan**												
		Community	20,768.08				0%			0%			0%
		Infrastructure	14,603.29				0%			0%			0%
		Open Space	44,747.40		319.02		1%	2,148.04		5%	6,199.75		14%
		Residential	78,903.81				0%			0%	0.37		0%
		Tourism	61,357.24		2.01		0%	1,281.56		2%	4,863.83		8%
Land, environment and culture	**Culture**												
		Native title	11,722,178.64		33,513.83		0.3%	50,708.02		0.4%	65,057.74		0.6%
	Environment												
		Essential habitat	5,479,388.70		28,052.15		0.5%	42,475.32		0.8%	50,942.76		0.9%
		Fisheries	266,750.49		15,652.14		5.9%	17,526.80		6.6%	17,812.49		6.7%
		Remnant regional ecosystems	11,734,862.95		33,557.21		0.3%	51,101.32		0.4%	65,570.37		0.6%

Wujal Wujal Aboriginal Shire Council (WWASC)			Asset totals		Storm tide			Storm tide			Storm tide		
					Present day			2060			2100		
					1.8 m AHD			2.6 m AHD			3.2 m AHD		
Asset group	**Asset type**	**Feature type**	**Total length (m) or area (m2)**	**Total region count**	**Exposed length (m) or area (m2)**	**Exposed number of assets**	**% exposed**	**Exposed length (m) or area (m2)**	**Exposed number of assets**	**% exposed**	**Exposed length (m) or area (m2)**	**Exposed number of assets**	**% exposed**
		Vulnerable or endangered wildlife habitat	6,102,626.27		28,062.40		0.5%	42,496.83		0.7%	50,968.34		0.8%
	Land use	Conservation and natural environments	10,388,436.22		15,539.92		0.1%	29,435.79		0.3%	41,209.43		0.4%
		Intensive uses	425,966.78		703.72		0.2%	2,518.59		0.6%	4,809.45		1.1%
		Production from relatively natural environments	723,230.39				0%			0%			0%
		Water	197,231.70		17,313.56		9%	19,146.93		10%	19,551.47		9.9%

Key observations from the storm tide inundation exposure analysis:

No building footprints are potentially exposed to storm tide inundation for the present-day storm tide event. Likewise, for those buildings that lack footprint data but are identified by point data, none of which are potentially exposed to storm tide inundation in the present day. For beach and foreshore assets, the boat ramp may be exposed to storm tide inundation in the present day. It is important to note that this type of asset is inherently located in the hazard area and has been designed to withstand these processes. For utility assets attributed by point data, there is a limited number of assets potentially exposed to storm tide inundation in the present day; this includes 3 electrical poles. The potential exposure of transport assets to storm tide inundation in the present day contains 0.3% of the road network. For linear utility assets, 3.5% of the total length may be exposed to storm tide inundation in the present day. For the Master Plan area, less than 1% of the total area may be exposed to storm tide inundation in the present day. For land, environment, and cultural assets, less than 1% of the total area may be exposed to storm tide inundation in the present day. 3 out of the 10 assets/sites identified during the on-Country engagement in 2022 are within the hazard area for storm tide inundation in the present day. This includes Weary Bay and the Bloomfield River Mouth, which are geographical features inherently located in the hazard area. Lastly, Ayton Wharf may also be exposed to tidal inundation in the present day, but like the boat ramp, it is designed to withstand such processes as it is also located in the hazard area.

For the 2060 storm tide event, no building footprints or buildings attributed by point data are potentially exposed to storm tide inundation. The exposure of beach and foreshore assets to storm tide inundation remains unchanged. For utility assets represented by point data, there is a small increase in the number of assets potentially exposed to tidal inundation by 2060. This includes 8 electrical poles and 1 distribution substation. There is an increase in potential exposure of transport assets to storm tide inundation by 2060; this includes 0.8% of the road network. For linear utility assets, there is also an increase in the total length potentially exposed to storm tide inundation by 2060, with 5% within the hazard area. For the Master Plan area, 1.6% of the total area may be exposed to storm tide inundation by 2060. For the land, environment and cultural assets, there is an increase in the total area potentially exposed to storm tide inundation by 2060; however, this remains under 1%. There is no increase in the number of assets/sites identified during the on-Country engagement in 2022 potentially exposed to storm tide inundation by 2060.

For the 2100 storm tide event, no building footprints or buildings attributed by point data are potentially exposed to storm tide inundation. The exposure of beach and foreshore assets to storm tide inundation remains unchanged. For utility assets attributed by point data, there is an increase in the potential exposure to storm tide inundation by 2100, with 17 electrical poles and 3 distribution substations located within the hazard area. There is a small increase in the potential exposure of transport assets to storm tide inundation by 2100, with 1% of the road network within the hazard area. For linear utility assets, there is an increase in the potential exposure to storm tide inundation by 2100, with 8.8% of the total length within the hazard area. By 2100, 5% of the Master Plan area may be exposed to storm tide inundation. For the land, environment and cultural assets, there is an increase in the total area potentially exposed to storm tide inundation by 2100; however, this remains under 1%. There is no increase in the number of assets/sites identified during the on-Country engagement in 2022 potentially exposed to storm tide inundation by 2100.

Overall exposure to coastal inundation hazard is low. *With minimal built assets in the coastal zone*

Table 8. Asset exposure - fluvial flooding

It is important to note that fluvial flooding is not within the QCoast$_{2100}$ scope however, for Wujal Wujal potential flooding hazard has been taken into consideration. An asset exposure analysis has been completed using available local flood information although not in QCoast$_{2100}$ scope to address fluvial flooding. For fluvial flooding, flood levels from the Bloomfield River Hydrological and Hydraulic Study (Queensland Government 2009) were used to map 1% AEP for the present day using a bathtub approach to create mapping of flood extents, these however may not be an accurate representation of a 1% AEP event due to the simplistic bathtub mapping. .

Wujal Wujal Aboriginal Shire Council (WWASC)			**Asset totals**		Fluvial Flooding Present day 1% AEP (7.7 m AHD)		
Asset group	**Asset type**	**Feature type**	**Total length (m) or area (m2)**	**Total region count**	**Exposed length (m) or area (m2)**	**Exposed number of assets**	**% exposed**
Buildings (results reported as #)							
Buildings and facilities	**Building**						
		Residential		59		1	2%
	Educational						
		CDEP training office		1			0%
	Emergency services						
		Police station		1			0%
		State emergency services		2			0%
	General						
		Arts and cultural centre		1			0%
		Butcher shop		1			0%
		Council Workshop		1			0%
		Health and welfare		7		4	57%
		Library		1			0%
		Petrol station		1			0%
		Recreation centre		1			0%
		Retail		1			0%
		Rural transaction centre		1			0%
		Shed		1			0%
		Women's group meeting place		1			0%
	Other						
		Other		23		7	30%
Utilities	**Water**						
		Water tanks		1			0%
Points (results reported as #)							
Beach and foreshore	**Facility**						
		Boat ramp		1		1	100%
Buildings and facilities	**Building**						
		Residential		17			0%
	Educational						
		Kindergarten		1			0%

Wujal Wujal Aboriginal Shire Council (WWASC)			Asset totals		Fluvial Flooding Present day 1% AEP (7.7 m AHD)		
Asset group	**Asset type**	**Feature type**	**Total length (m) or area (m2)**	**Total region count**	**Exposed length (m) or area (m2)**	**Exposed number of assets**	**% exposed**
	Other						
		Other		19		2	11%
Culturally important sites or sites identified during engagement in 2022	**Cultural heritage**						
		Alligator Point		1			
		Ayton Wharf		1		1	100%
		Banabilla		1			0%
		Bloomfield River Mouth		1		1	100%
		Burial Site		1		1	100%
		Degarra		1			0%
		Endeavour Creek		1			0%
		Historical Cemetary		1			0%
		Waterfall		1			0%
		Weary Bay		1		1	100%
Utilities	**Electrical**						
		Distribution substation		55		12	22%
		Pillar		10		1	10%
		Pole		189		52	28%
	Sewer						
		Air valve		1			0%
		Draw pit		2			0%
		Filters		2			0%
		Inspection opening		1		1	100%
		Manhole		72		18	25%
		Pumpwell		1			0%
		Rotating biological contactor		1			0%
		Septic Tank		60			0%
		Septic tank - effluent		1			0%
		Tank		1			0%
		Valve box		19		6	32%
	Stormwater						
		Drain		6			0%
		Headwall		9			0%
		Other		3			0%
		Pit		2			0%
		Trap Gully		4			0%
	Water						
		Air valve		26		9	35%
		End cap		5			0%
		Generator		1			0%
		House connection branch		13			0%
		Hydrant		51		3	6%
		Meter		2			0%

Wujal Wujal Aboriginal Shire Council (WWASC)			Asset totals		Fluvial Flooding Present day 1% AEP (7.7 m AHD)		
Asset group	**Asset type**	**Feature type**	**Total length (m) or area (m2)**	**Total region count**	**Exposed length (m) or area (m2)**	**Exposed number of assets**	**% exposed**
		Pumping Station		2			0%
		Reducer		4			0%
		Reservoir		1			0%
		Scour valve		16		9	56%
		Stop valve		138		12	9%
		Tank		1			0%
Lines (results reported in metres)							
Transport	**Transport**	Road	9,285.39		1,399.46		15%
	Electrical	Electricity cable	11,331.08		5,986.33		53%
		Electricity cable - low voltage	10,140.27		2,734.78		27%
	Sewer	Line	306.80		30.00		10%
		Main	3,639.81		1,311.83		36%
		Overflow	26.35		26.35		100%
		Rising main	1,894.53		836.06		44%
Utilities	**Stormwater**	Drain	2,851.85		984.80		35%
		Pipe	339.84		33.13		10%
	Telecommunications	Cable	9,677.55		840.06		9%
	Water						
		Building	263.52				0%
		General	55.10				0%
		House connection branch	139.72				0%
		Rising main	2,077.49				0%
		Tank	93.92				0%
		Water main	5,412.81		1,495.61		28%
		Water pipe	1,004.93		40.67		4%
Polygons (results reported as m2)							
Master plan	**Master plan**						
		Community	20,768.08				0%
		Infrastructure	14,603.29		5,245.76		36%
		Open Space	44,747.40		44,747.40		100%
		Residential	78,903.81		8,005.63		10%
		Tourism	61,357.24		35,871.04		58%
Land, environment and culture	**Culture**						
		Native title	11,722,178.64		234,268.22		2%

Wujal Wujal Aboriginal Shire Council (WWASC)			Asset totals		Fluvial Flooding Present day 1% AEP (7.7 m AHD)		
Asset group	**Asset type**	**Feature type**	**Total length (m) or area (m2)**	**Total region count**	**Exposed length (m) or area (m2)**	**Exposed number of assets**	**% exposed**
	Environment	Essential habitat	5,479,388.70		83,649.23		2%
		Fisheries	266,750.49		18,788.91		7%
		Remnant regional ecosystems	11,734,862.95		235,284.49		2%
		Vulnerable or endangered wildlife habitat	6,102,626.27		86,352.34		1%
	Land use	Conservation and natural environments	10,388,436.22		119,690.00		1%
		Intensive uses	425,966.78		95,257.96		22%
		Production from relatively natural environments	723,230.39				0%
		Water	197,231.70		20,336.50		10%

Key observations from the fluvial flooding exposure analysis:

For the present-day fluvial flooding event (1% AEP), there are 12 building footprints, including 1 residential, 4 health and welfare buildings and 7 other buildings potentially exposed. For buildings attributed by point data, 2 other buildings may be exposed to fluvial flooding at present. For beach and foreshore assets, the boat ramp may be exposed to fluvial flooding in the present day. This type of asset is inherently located in the hazard area and is designed to withstand these processes. Out of 699 utility assets attributed by point data, 123 (17.6%) may be exposed to fluvial flooding at present. 15% of the road network and 29% of the total length of linear utility assets may be exposed to fluvial flooding in the present day. The potential exposure of transport assets to fluvial flooding in the present day includes 15% of the road network. For the Master Plan area, 43% of the total area may be at risk of fluvial flooding, with some land use categories significantly exposed. For instance, 100% of the open space and 58% of the tourism categories fall within the hazard area. For land, environment, and cultural assets, 1.9% of the total area may be exposed to fluvial flooding in the present day. 4 of the out of the 10 assets/sites identified during the on-Country engagement in 2022 are within the hazard area for fluvial flooding in the present day. These include geographical features such as Weary Bay and the Bloomfield River Mouth, which are inherently located in the hazard area. Ayton Wharf may also be exposed to fluvial flooding in the present day. However, this type of infrastructure is also inherently located in the hazard area and designed to withstand these processes. A burial site is also within the hazard area and potentially exposed to fluvial flooding in the present day.

Overall exposure to flooding hazard is high for present day and will increase towards 2100 *with potential for increased rainfall intensity. With the location of the township nearby to Bloomfield river there is a high risk of exposure to fluvial flooding for many assets.*

5 Cost of no adaptation – potential impacts for coastal hazards

Building on the physical analysis of coastal risks for the Wujal Wujal Aboriginal Shire Council, this section outlines the approach, results, and discussion relating to the calculation of an economic base case for the Wujal Wujal Aboriginal Shire Council associated with coastal hazards.

These economic findings are the output of a 'lite touch' economic analysis to provide economic insight within the available budget for this project. The level of analysis conducted is high-level, using available data information. It is important to note that this analysis does not delve into the intricacies of a traditional CHAS as the First Nations Coastal Hazard Study broadly aligns with but does not strictly follow the $QCoast_{2100}$ Minimum Standards and Guidelines (MS&G) or complete the eight phases a traditional CHAS incorporates.

5.1 Approach

Context

The base case is the potential economic costs (damages/losses) associated with coastal hazards (and no adaptation – i.e., 'do nothing different') (Figure 8). The base case also becomes the reference condition to estimate the effectiveness of each adaptation option, assessing the suitability of potential investment.

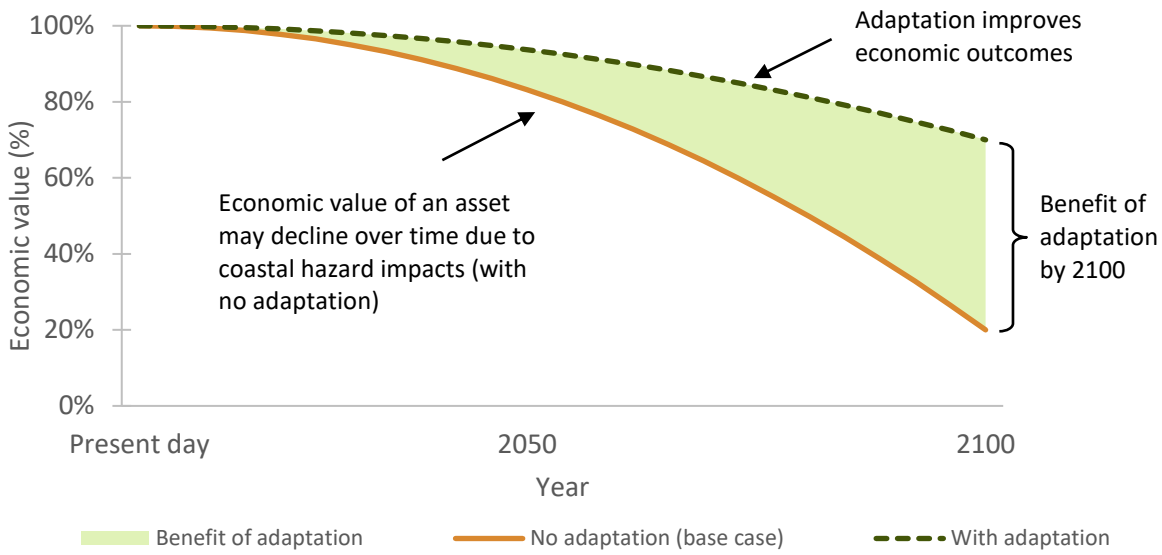


Figure 8. *Conceptual diagram - Decline in economic value due to coastal hazards: economic base case (no adaptation) compared to the scenario with adaptation*

Economic costs are considered in terms of 'damages' (i.e., asset damage) and 'losses' (i.e., profit or value foregone). For the First Nations Coastal Hazard Study for Wujal Wujal, the base case is focused on direct damages to key infrastructure assets (buildings and facilities, transport, and utilities), as well as consideration of potential damages to some key land uses.

The base case is determined by examining the likelihood and consequence ($ damage) of coastal hazard impacts on assets across the Wujal Wujal region, for different planning horizons (i.e., present day and 2100). Incorporating event likelihoods into an assessment of the value of risk accounts for the uncertainty associated with knowing the exact nature (e.g., size, severity) of the coastal hazard events that will occur in any one year. The consequence is assessed as the total cost of fixing or replacing damaged assets. Damage and loss are estimated using available unit rates (provided directly, inferred or transferred, as noted in Text Box 1 and included in Attachment 4).

Coastal hazard scenarios, likelihoods and corresponding annual exceedance probability (AEP) are defined in Table 9 and Table 10.[1]

Table 9. Coastal hazard scenarios

		Present day	2060	2100
Erosion prone area	Default erosion area (HAT + 40 m)	N/A	N/A	HAT + 40m
Tidal inundation	Tidal area with sea level rise	HAT	N/A	HAT + 0.8m
Storm tide inundation*		Modelled 1% AEP	Modelled 1% AEP	Modelled 1% AEP
Fluvial flooding		Modelled 1% AEP	N/A	N/A

**Storm tide inundation incorporates the same sea level rise factors*

Table 10. Annual Exceedance Probability

Likelihood	AEP
Possible	1%

Text box 1. Monetary values

The economic analysis requires a monetary value for assets be defined. Value is defined for a range of assets including:

- **The built environment:** Including public and private infrastructure, buildings and services. Costs associated with the built environment include public assets (as provided in unit rates by Council, or values inferred from other similar locations), and private dwelling costs (based on available market rates).

- **The natural environment:** Examples include unique coastal landforms, vegetation communities, mangroves, wetlands, endangered species and culturally significant sites. Monetary values for the Palm Island's natural assets are derived from benefit transfer from relevant studies where available.

Hazards and assets

The base case has been developed for the three different hazard area types:

1. 40 m default erosion (40 m landward buffer component of the Erosion Prone Area) across the region.
2. Tidal inundation due to sea level rise (HAT plus vertical sea level rise) across the region.
3. Storm tide inundation (modelled extents) across the region.
4. Fluvial flooding (modelled extents) across the region.

For the Wujal Wujal region, four key components of damages have been considered for the base case:

1. **Damage to buildings and facilities** – Buildings and facilities include public and private buildings, and structures such as schools and medical facilities, among others. This is the financial cost of repairing or replacing these assets.

[1] The Annual Exceedance Probability is the probability of occurrence of an event in a given year. It is analogous to an Annual Recurrence Interval which is the average period between the recurrence of a given event. E.g., A 1% AEP is equivalent to a 1 in 100-year ARI.

2. **Damage to transport infrastructure** – Transport assets include only roads as roads were found to be the only transport infrastructure class to be impacted by any of the coastal hazards across the planning horizons. This is the financial cost of repairing or replacing such roads.

3. **Damage to utility infrastructure –** Utility infrastructure include assets such as electricity, sewerage, drainage, and water supply infrastructure. This is the financial cost of repairing or replacing these assets.

4. **Natural asset damages** –The assessment of land and environmental assets was focused on wetlands due to their presence in the coastal zone and generally high economic values, however there was no data on coastal wetlands for Wujal Wujal due to its geography.

For storm-tide inundation, only buildings and facilities damages have been included due to absence of reliable data/information on storm tide impacts for other asset types. Furthermore, transport assets, natural assets and ecosystems have a relatively high resilience to the temporary marine disturbances that result from storm-tide inundation, consequently, a large proportion of these transport and natural assets are unlikely to experience any significant damages in the event of storm-tide inundation.

Natural assets are considered separately to infrastructure assets, as complementary base case information.

Estimating damages
Damages have been estimated as average annual damages (AAD).

The **average annual damage (AAD)** is the probability-weighted estimate of damages and losses that may occur. It can be understood using the standard risk equation:

$$Risk = Expected\ average\ annual\ damage\ = \sum_{i=1}^{n} (Consequence_i\ \times Likelihood_i)$$

Where: *i* is the hazard event, *n* is the number of hazard events, *consequence* is the damage or loss from a hazard event, and *likelihood* is the probability of a hazard event occurring.

The AAD is the best practice approach for understanding potential economic impacts of coastal hazards and for economic analysis of climate adaptation options.[2]

The AAD has been estimated for the different hazard types in the following ways, to account for the different data sets available.

Erosion prone area: AAD has been estimated based on a 2100 1% AEP hazard extent for the erosion prone area. This is based on the following considerations:

- The default 40m horizontal distance from HAT has been assumed to represent a 2100 1% AEP event.

Tidal inundation: With only one event likelihood for tidal areas under each planning horizon (HAT plus sea level rise), the AAD adopts an event-based probability-weighted approach, with a nominal 10% AEP assigned for the purposes of this assessment. The event-based probability-weighted approach means the damages associated with an event (hazard scenario) are multiplied by the assigned annual likelihood of that event to provide an AAD.

Storm tide inundation: AAD has been estimated based on the modelled AEP of 1% at relevant locations.

Fluvial flooding: AAD has been estimated based on the modelled AEP of 1% level the Bloomfield River bridge. This was mapped using a bathtub approach to create mapping of flood extents, these however may not be an accurate representation of a 1% AEP event due to the simplistic bathtub mapping.

[2] This is effectively the same procedure used by the insurance industry to work out the economic value of risk.

5.2 Results

The combined coastal hazard economic base case results for Wujal Wujal are presented by hazard type for the present day, 2060 and 2100 in Figure 9, and by asset category in Figure 10 for the infrastructure assets included in the base case. These results are presented as AAD. That is the expected economic value of damages in any given year. This figure will be significantly lower than the potential cost of an event. For example, a coastal hazard event with damages valued at $1,000 occurring with 1% probability (or once every 100 years) would have an AAD of $10.

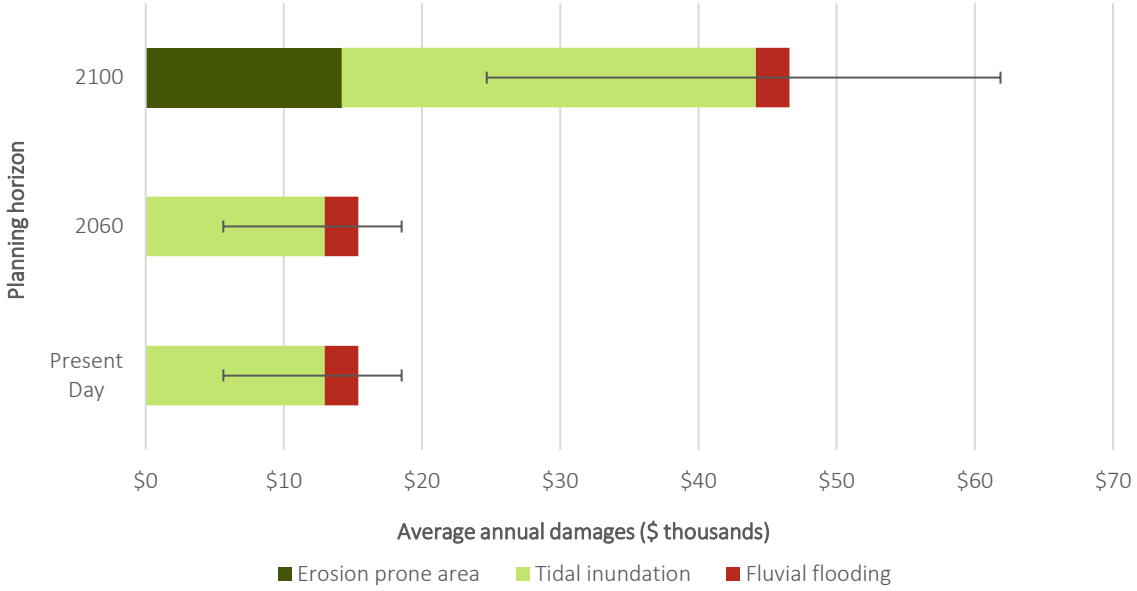


Figure 9. *Wujal Wujal base case summary by hazard type - potential annual damages to infrastructure assets due to coastal hazards*

Note: Due to the absence of any estimates on TI in 2060 and FF in 2060 and 2100, it was assumed that TI AADs in 2060, and FF AADs in 2060 and 2100 are the same as present day estimates. This is likely an underestimate.

From prior experience across CHAS studies for other council regions where data was available for present day, 2050 and 2100 planning horizons for all hazards present day damages tend to represent approximately 10-20% of 2100 damages and 2050 approximately 30-50% of 2100 damages.

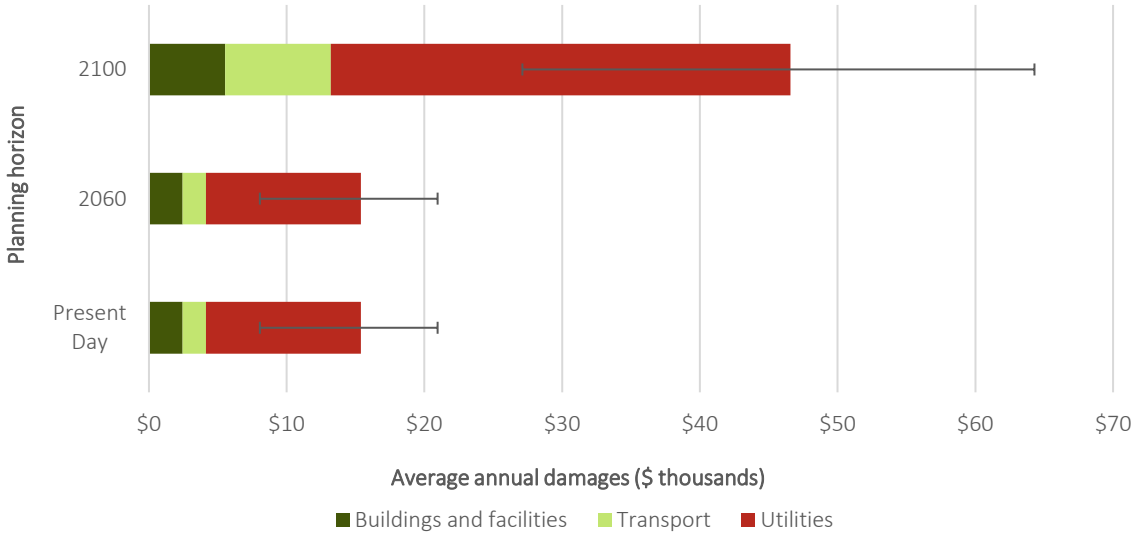


Figure 10. *Wujal Wujal base case summary by asset category - potential annual damages to infrastructure assets due to coastal hazards*

Note: Due to the absence of any estimates on TI in 2060 and FF in 2060 and 2100, it was assumed that TI AADs in 2060, and FF AADs in 2060 and 2100 are the same as present day estimates. This is likely an underestimate.

The key observations include:

- Present day potential AAD from TI, FF, and STI is estimated at approximately $15K. There were no assets found to be impacted by the STI hazard.
- There were no assets found to be impacted by the STI hazard in the 2060 planning horizon.
- Potential AADs in 2100 from EPA, STI and TI rise to around $45K. The key asset class driving these estimated damages was found to be utilities. There were no assets found to be impacted by the STI hazard.

Depending on the specific dynamics of natural processes in the coastal zone, areas such as wetlands and mangroves can migrate and re-establish themselves as sea levels rise, particularly where there is sufficient room for these assets to naturally adapt. This can have an impact on the ultimate value of damages (e.g., areas of mangroves lost may be replaced by mangrove recruitment elsewhere with the net impact being negligible). The damages reflect the estimated physical exposure from the mapping of assets and hazard extents. This is a function of the local landscape, where most of the at-risk ecosystem services are already within the erosion prone area zone (i.e., low-lying coastal wetlands) and the increase in depth is assumed to make those areas uninhabitable for the current flora and fauna. Predicted damages will also vary depending on the ability of natural areas to naturally migrate (move) as sea levels rise (e.g., wetlands extending inland).

Table 11 provides a summary of the base case results for the Wujal Wujal region.

Table 11. Wujal Wujal base case summary - potential annual damages to infrastructure and natural assets due to coastal hazards

Hazard	Category	Present Day			2060			2100		
		Low	Mid	High	Low	Mid	High	Low	Mid	High
EPA	Buildings and facilities	N/A***	N/A***	N/A***	N/A***	N/A***	N/A***	$1,548	$3,096	$4,644
	Transport	N/A***	N/A***	N/A***	N/A***	N/A***	N/A***	$4,359	$4,564	$4,769
	Utilities	N/A***	N/A***	N/A***	N/A***	N/A***	N/A***	$3,625	$6,524	$9,423
TI*	Buildings and facilities	$0	$0	$0	$0	$0	$0	$0	$0	$0
	Transport	$1,618	$1,694	$1,770	$1,618	$1,694	$1,770	$2,970	$3,110	$3,250
	Utilities	$6,435	$11,254	$16,073	$6,435	$11,254	$16,073	$14,612	$26,852	$39,092
STI	Buildings and facilities	$0	$0	$0	$0	$0	$0	$0	$0	$0
	Transport	$0	$0	$0	$0	$0	$0	$0	$0	$0
	Utilities	$0	$0	$0	$0	$0	$0	$0	$0	$0
FF**	Buildings and facilities	$0	$2,437	$3,115	$0	$2,437	$3,115	$0	$2,437	$3,115
	Transport	$0	$0	$0	$0	$0	$0	$0	$0	$0
	Utilities	$0	$0	$0	$0	$0	$0	$0	$0	$0

* Note: Due to the absence of any estimates on TI in 2060, it was assumed that TI AADs in 2060 are the same as Present Day estimates. This is likely an underestimate.
** Note: Due to the absence of any estimates on FF in 2060 and 2100, it was assumed that FF AADs in 2060 and 2100 are the same as Present Day estimates. This is likely an underestimate.
***Note: 'N/A' indicates a lack of an observation (i.e., no data).

5.3 Discussion

Estimates of AADs outlined in the Results section provide a basis for decision-making around adaptation as they represent the maximum potential benefit of any adaptation pathways that may be explored in the future (i.e., a monetary value for avoiding all damages). However, it should be noted that there are some key limitations associated with this analysis.

Damages towards physical infrastructure (often referred to as direct damages) represent the only form of damages in this analysis, this understates the scope of actual AADs. Natural hazard events are likely to also result in significant indirect and intangible damages.[3] Indirect damages are typically calculated as a percentage of direct damages, with percentages ranging from 15% (DNRM 2002) to 55% (DNRM 2002) observed to have been previously implemented in the literature. Intangible damages are calculated as a percentage of direct and indirect damages, with percentages ranging from 25% (Stewart 2012) to 150% (DAE 2016) observed to have been previously implemented in the literature.

Furthermore, this analysis has not attempted to include AADs resulting from losses of cultural values due to coastal hazards. The lands in which the Wujal Wujal Aboriginal Shire Council lies and its adjacent coastline have been home to the Kuku Yalanji, Kuku Nyungul and Jalunji clans for thousands of years. These First Nation groups retain a connection with the Wujal Wujal region, and their history, culture and livelihoods are closely intertwined with its country, coastline, and coastal waters. There are also many specific sites that are of particular cultural significance to the Kuku Yalanji, Kuku Nyungul and Jalunji clans situated within the Wujal Wujal region. Such sites include traditional hunting and gathering areas, as well as burial sites.

Placing monetary values on First Nation cultural values in a cost-benefit analysis can be problematic due to the inherent differences between Indigenous worldviews and the monetary-driven approach of cost-benefit analysis, and in most circumstances is not appropriate at all. Australian First Nation groups often prioritize holistic well-being, spiritual beliefs, and the preservation of ecosystems, which are not easily quantifiable or compatible with the narrow focus on economic factors. First Nation cultural values are likely to require the use of alternative valuation frameworks, where people-focused' indicators are prioritised, and entire landscapes rather than component parts are considered in order to better capture First Nations cultural connections (Stoeckl 2021). Discounting and sensitivity analysis also represent typical steps undertaken in an economic assessment which may not be appropriate to apply to First Nation cultural values. Finally, First Nation cultural valuation should involve genuine First Nation leadership and decision-making (Australian Institute of Aboriginal and Torres Strait Islander Studies 2020), which was not able to be undertaken within the scope of this analysis.

Additionally, the following considerations and assumption are relevant to the base case and economic analysis:

- Estimates of potential economic losses are based on available data for direct tangible damages and losses. This is particularly relevant to the STI and FF hazard where data on flood depth above floor level was not available. Given the unavailability of flood depth data for the STI and FF hazard, for the most likely estimate of STI AADs a flood depth of 0.3m was assumed, 0.0m for the low estimate, and 0.6m for the high estimate. For the STI and FF hazards, if an asset was found to be impacted in the PD and 2100 planning horizons, flood depth was increased by 0.8m in 2100 to account for sea level rise. This results in low end AAD estimates of $0 for these hazards.
- Estimates of losses are indicative only and have been assessed to inform a high-level understanding of the significance of coastal hazards for the Wujal Wujal region.
- Unit cost rates (Attachment 4) are estimates only based on past experience and values from other comparable locations. These estimates should only be used as a guide and rates can vary significantly from region to region, and over time. This is particularly the case where building and repairing built infrastructure in remove regions is very high due to the cost of transport of materials and the greater scarcity and cost of labour.

A low, more likely and high estimate of unit cost rates and associated economic damage has been provided for each event in each modelled year, to reflect uncertainty / variability in pricing of assets. The low and high values are typically based on a 25% variance of the price estimates used in analysis, representing a typical contingency for price during construction. There is a greater uncertainty around items like ecosystem services, where valuation techniques commonly used have considerable variability.

[3] Indirect damages represent losses incurred as a consequence of a coastal hazard occurring, but not due to direct impact. Indirect damages include any tangible flow-on effects that are not directly caused by the hazard but arise as a result of the consequences of the damage and destruction, such as displaced tourism activity, emergency costs and alternative accommodation. Intangible damages represent losses incurred that can't be 'bought or sold'. Intangible damages arise from adverse social and environmental effects caused by flooding, such as loss of life, injury, stress, and anxiety. Intangible damages are calculated as a percentage of direct and indirect damages.

6 Living with coastal hazards now and into the future

Adaptation response

A general framework for the First Nations Coastal Hazard Study for Wujal Wujal has been adopted, including Avoid (and maintain), Monitor (look and learn), Actively manage, and Transition and change (Table 12). A high-level preliminary suggested adaptation response was determined for Wujal Wujal and for each time frame (planning horizon) (Table 13). It is important to note that the comprehensive risk assessment satisfied as part of Phase 5 of the CHAS process has not been completed. After analysing the data collected for the First Nations Coastal Hazard Study, it has been concluded that there is sufficient information to recommend a preliminary suggested adaptation response at a high level.

Table 12. Adaptation responses for WWASC

	Coastal hazard adaptation			
Adaptation response – How do we respond and adapt to coastal hazards?	Avoid (and maintain)	Monitor (look and learn)	Actively manage	Transition and change
	Prevent new risks from occurring and avoid placing new development or assets in coastal hazard areas.	Monitor the risk of coastal hazards. Monitor until local trigger levels are reached to initiate mitigation.	Proactively manage or mitigate the risk of coastal hazards through a range of adaptation options. Mitigate until management options are no longer socially, culturally or economically feasible or local trigger levels are reached to initiate transition.	A strategic decision to transition or change a specific land use (or location) to an alternative land use. Active management or mitigation may be part of the transition process.
Adaptation options What can we do?	Apply land use and development planning controls. Protect natural landscapes and beaches from harm. Maintain assets in good condition.	Watch for any changes to the coast that might indicate a change in the risk. Collect and record information about important cultural sites and places.	Create community custodians & educate people about coastal hazards and how to care for our coasts. Plan for possible natural disasters. Use nature-based solutions to create healthy dunes and coasts. Upgrade infrastructure and sites to be more resilient. Relocate infrastructure to safer locations. Change how we use the land.	

Avoid (and maintain)

The general first principle is to avoid placing new development or built assets in coastal hazard areas. The preference is to develop (or transition over time) land use in coastal hazard areas to locations with lower risk of coastal hazard impacts, while allowing for uses that maximise economic, cultural, social and environmental value to the LGA. Any new development or infrastructure in coastal hazard areas must be in accord with local and State Planning Policy and approvals requirements and include necessary mitigation measures.

It is also important to avoid creating new risks or increasing existing ones. Maintaining infrastructure in good condition and protecting coastal areas from future harm will increase the natural resilience and help to avoid or delay the need for more active management.

Monitor (look and learn)

At localities where the coastal hazard risk profile is low, the adaptation response is to monitor risk by observing changes and regularly reviewing what these changes mean in terms of changing risk – look and learn. Best practice is to undertake maintenance/asset management activities and continue active stewardship of the coastal zone. Where these observations suggest an increased risk (as indicated by local trigger levels), then the adaptation response may change to active management.

Continuing to collect and record data on culturally significant sites and places, and places of high environmental value will help to grow knowledge and inform future decisions.

Actively manage

At localities where coastal hazard risks have been identified, the adaptation response is to proactively manage the risk through implementing a range of adaptation options. Adaptation options will be tailored to each locality, incorporating site-specific processes, community input, and statutory planning considerations. If, over time, the risk profile is observed to increase (as indicated by local trigger levels), and active management becomes infeasible (due to economic or other factors), then the adaptation response may shift to transition requiring a change in land use or relocation of assets.

Transition and change

In some specific areas within a community, if the coastal hazard risk profile is very high, and active management becomes infeasible (due to economic or other factors), a strategic decision may be made in consultation with the local community to transition to an alternative land use. Transition is likely to be a gradual process over time, where mitigating hazards for a period is part of the transition process. A range of adaptation options will be part of the transition process.

Table 13. Preliminary suggested adaptation response for Wujal Wujal

Reporting region	Present day	2050	2100	Comment
Wujal Wujal	Monitor (Look and learn)	Monitor (Look and learn)	Monitor (Look and learn)	For Wujal Wujal, it is recommended that Monitor (Look and Learn) is an adequate preliminary suggested adaptation response for the LGA as a whole. However, specific locations sit outside of the LGA but hold significance to the Wujal Wujal community, whereby an actively managed preliminary suggested adaptation response may be required. Further details on these sites are discussed in Section 8.

7 How could Wujal Wujal adapt to future coastal hazards

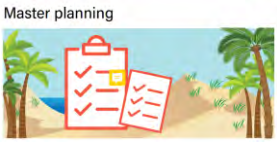
With the main township approximately 5 km inland of the coastline on the Bloomfield River and as aforementioned in terms inundation hazard, fluvial flooding represents a far greater risk to Wujal Wujal than coastal hazards. However, a suite of broad adaptation options for adapting to coastal hazard has been provided in Section 7, as many of these are still generally applicable for fluvial hazards and riverbanks.

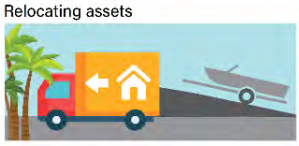
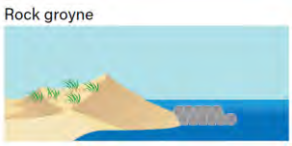
There are various options for adapting to coastal hazards, including avoiding, mitigating, and managing risks. These options can be categorized into six themes:

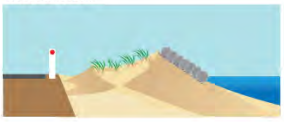
1. Shire-wide initiatives to enhance community custodianship
2. Planning updates
3. Maintaining and improving infrastructure
4. Nature-based coastal management
5. Coastal engineering and nature-based
6. Coastal engineering.

Table 14 highlights a range of adaptation options, with additional details in Attachment 3. It's important to note that a preliminary screening of the relevance of these options for Wujal Wujal has not been conducted as part of the First Nations Coastal Hazard Study. Therefore, it's unclear whether some of these common adaptation strategies will be suitable for Wujal Wujal.

Table 14. Adaptation options by theme

Theme	Adaptation options	Description	Attachment 3 summary sheet number
Council-wide initiatives to enhance custodianship	Community custodianship	Developing programs and partnerships to enhance custodianship of the coastline	Sheet 1
	Education and knowledge sharing 	Facilitating knowledge sharing and education on coastal values, hazards and adaptation	Sheet 2
	Monitoring 	Monitoring changes in coastal hazard risk and effectiveness of adaptation.	Sheet 3
Planning updates	Land use planning 	Informing statutory planning and strategies, such as the WWASC Master Plan Includes consideration of land purchase or land swap/relocation	Sheet 4
	Disaster management	Updating emergency response planning	

Maintaining and improving infrastructure	Increase infrastructure resilience Upgrading boat ramps / carparks  Resilient housing 	Modifying critical infrastructure (e.g. raising floor levels) Modifying drainage networks Building resilient homes	Sheet 5
	Relocate infrastructure Relocating assets 	Relocating critical infrastructure	
Nature-based coastal management	Foreshore, dune and riparian vegetation protection and maintenance Dune revegetation and maintenance 	Minimising dune disturbance, maintaining vegetation	Sheet 6
Coastal engineering and nature-based	Beach nourishment Beach or sand nourishment 	Beach scraping and / or importing additional sand to the beach	Sheet 7
	Living shorelines	Living structures and vegetation can be planted to create a zone where wave energy will break and dissipate prior to reaching the beach.	Sheet 8
Coastal engineering	Structures to assist with sand retention Buried geobag wall  Rock groyne 	Using structures (groynes, sand fencing) to help retain sand	Sheet 9
	Structures to dissipate wave energy	Constructing offshore breakwaters or artificial reefs to dissipate wave energy (submerged or exposed)	Sheet 10

Last line of defence structures		
Rock seawall 	Constructing seawalls / revetments	Sheet 11
Structures to minimise inundation		
Earth bund or levee 	Constructing levees / dykes	Sheet 12

Bloomfield Falls, Wujal Wujal

8 Recommendations

The overall purpose of the First Nations Coastal Hazard Study was to primariliy establish;

- The available coastal hazard and asset data, and detemine its suitability/limitations that may require the need for further data capture, and
- To provide pros/cons regarding the need for further studies and/or provision of a CHAS.

For the Wujal Wujal LGA the available and collected data was reasonable for understanding asset exposure to coastal hazards. The available tidal and stormtide inundation boundaries appeared to be erroneous around their landward extents, so new hazard areas were recreated with the best available data to improve understandng of these areas (refer Attachment 1). Given the available data for assets and coastal hazards there is not a need to collect or create new data beyond what has already been created as part of this study. There would be greater benefit in utilsing the data gathered and created as part of this study to support actual on ground priority works.

Three types of recommendations have been provided;

1. Recommendations for planning amendments, further invesitgiations and knowledge sharing, including whether a CHAS should be undertaken (Section 8.1), and
2. Recommendations for actual on ground prioirty works (Section 8.2).
3. Recommendations for studies out of QCoast and LGAQ/DES authority that would be better supported by QRA or other resilience programs (Section 8.3).

A summary of potential recommendations is provided in a preliminary implementation schedule (Section 8.4).

8.1 Planning, investigations, and knowledge sharing

Planning

The Wujal Wujal Aboriginal Shire Council Planning Scheme (2013) designates that no built development is to occur with the Coastal Management District or Coastal Hazard areas in overlay map. This area should be reviewed against the coastal hazard areas created as part of this study and this map updated to include these new boundaries.

The DES should also review these newly created boundaries and update the state EPA and Storm tide layers if they believe to be appropriate.

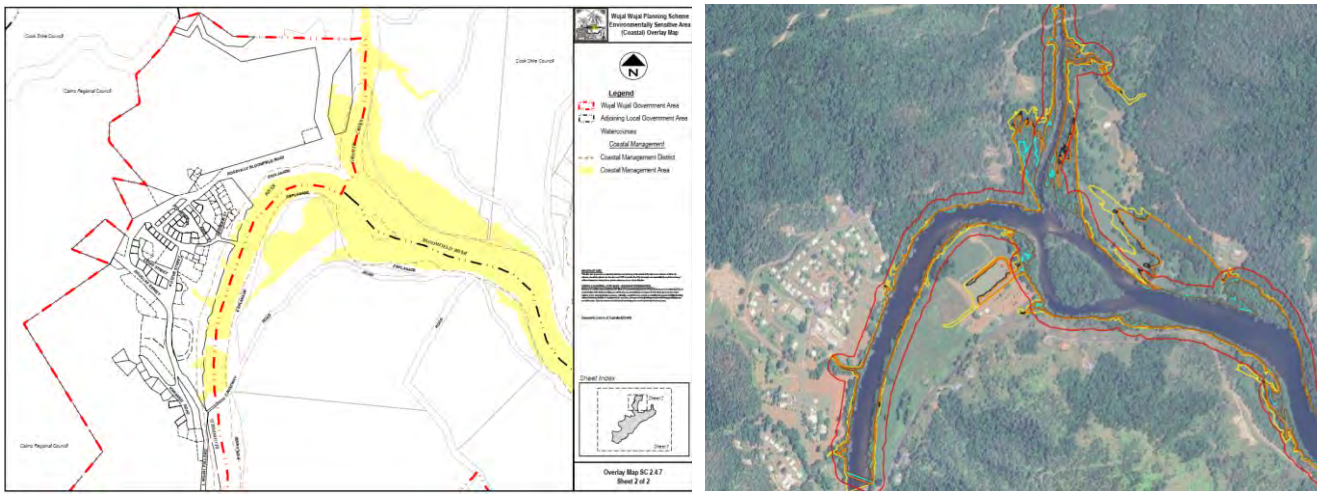


Figure 11. *Planning scheme (left), created layers (right) – HAT + 40m (red), storm tide (yellow)*

Culturally Appropriate CHAS

The foreshore areas of Wujal Wujal are outside the Wujal Wujal council region and managed by neighbouring councils (Cook Shire to north of Bloomfield River and Douglas to the south). The Wujal Wujal township is also at minimal risk from coastal inundation, with fluvial inundation risk far greatly exceeding coastal inundation.

There would be minimal value in preparing a coastal hazard adaptation strategy for Wujal Wujal Aboriginal Shire Council (WWASC) Local Government Area (LGA). As described further below there'd be move value in collaborating with Cook Shire Council (CSC) to improve management of areas within the Cook Shire LGA that are accessed by the Wujal Wujal community. The foreshore shoreline area to the south of the Bloomfield River under Douglas Shire Council management is much more rock and stable that there is not any real need to collaborate with them to improve management.

Knowledge Sharing

GIS data in Web portal

Working with DSDSATSIP we've been able to provide GIS data that's been created from this project to be loaded into a GIS web portal that will be a resource for council to utilise. DSDSATSIP is already working on this for the Wujal Wujal Council region.

Working with Cook Shire Council

The foreshore of Weary Bay between the Cook Shire communities of Ayton and Bloomfield is a valued cultural area (Figure 12). Through on-country engagement with Wujal Wujal community members concerns were raised about the negative impact that four-wheel driving and other activities are having at Weary Bay and their endeavours to stop this.

The Cook Shire Council CHAS lists the preferred adaptation option for Ayton/Bloomfield as Protect (Monitor and Regenerative Option). Restricting 4WD access certainly aligns with CSC's CHAS regenerative option. Collaborating with CSC to ensure 4WD access is managed along the Weary Bay would be a sensible aligning management approach. The Wujal Wujal community members could help with education on negative impacts of 4WD on valued Weary Bay cultural area.

Figure 12. *Weary Bay Foreshore for suggested 4WD management*

8.2 Recommendation for studies or work out of QCoast and LGAQ/DESI authority.

8.2.1 Emergency Management

During flooding, cyclone and disaster events road access to Wujal Wujal can become cut off. In these type of events the only access to the community is via boat or helicopter at the Ayton Wharf (Figure 13/Figure 14). This area has been used for helicopter and boat access by emergency and medical services during disaster events when road access to the Wujal Wujal community and surrounding residential areas has been cut. A high proportion of Wujal Wujal residents have significant health needs that can become critical during even short periods of restricted access; during severe flooding, there is no area within the community where a helicopter can safely land, to evacuate people, deliver emergency supplies or personnel. Community members raised concerns about the property being listed for sale and recent attempts by the current land manager to restrict access. This highlights a need for the appropriate authorities to review existing disaster management plans for both Wujal Wujal and adjacent communities in Cook and Douglas Shires and investigate land tenure arrangements at Ayton Wharf to ascertain overall benefits of providing practical public access, and the land administration and planning options for this. DSDSATSIP Indigenous Land and Infrastructure Program Office and the Department of Resources may assist in identifying all feasible land management solutions. The impacted freehold landowner, Trailfinders Pty Ltd, must also be included in discussions as compensation would be a consideration. This area falls within the hazard area for all hazards explored in the asset exposure analysis. During on-Country engagement, it was deemed that the Wharf could withstand current hazard events; however, if the area were to be used for emergency access, upgrades would be required to ensure it was fit for purpose. Therefore, this would be recommended if funding were available to upgrade this area to satisfy the requirements of an emergency access point.

The Queensland Resilience and Risk Reduction Fund (QRRRF) has potential to be a funding source for WWASC to help address this issue. Application for this funding will likely open in mid to late 2024.

Figure 13. *WWASC Ayton Wharf Option*

Figure 14. *Ayton Wharf*

8.2.2 Flood Modelling

As identified as part of the Stage 2 Hazard and Data Assessment (summarised in Attachment 1) there has been fluvial flood modelling for the bridge over the Bloomfield River, but no flood modelling for the Bloomfield River adjoining the Wujal Wujal Township. Fluvial flooding is outside the scope of the $QCoast_{2100}$ program and the Department of Environment, Science and Innovation (DESI) authority. However, QRA has recently completed an assessment of needs with respect to delivering contemporary flood risk management across Queensland and represent the most relevant supporting party for developing improved understanding of flooding. From QRA's work it was found that a Level 3 flood study has not been conducted for Wujal Wujal in the past five years. Therefore, it would be beneficial to conduct a new fluvial flood study in alignment with the 2019 Australian Rainfall and Runoff guidelines.

Specifically, the Queensland Resilience and Risk Reduction Fund (QRRRF) has potential to be a funding source for WWASC to address some of their needs for improved understanding of fluvial flooding at the Township. Application for this funding will likely open in mid to late 2024.

8.3 Preliminary Implementation Schedule

The purpose of this Preliminary Implementation Schedule is to summarise recommendations of this and provide guidance on potential lead parties and funding.

Table 15. Preliminary Implementation Schedule – Priority Coastal Actions for next 5-10 years

Theme	Adaptation action	Description	Recommendation	Estimated timeframe/ priority	Lead and responsible parties	Supporting parties	Estimated budget requirements	Potential Funding sources
Planning	Planning scheme update	Update coastal hazard map in planning scheme	Update coastal hazard map in planning scheme to incorporate new mapping in this study.	By 2026 / medium priority	WWASC	State Government Planning consultant		Council Budget
	State Hazard Mapping	Review EPA and Storm Tide Mapping	State to review and update EPA (HAT+40m) and storm tide mapping for Wujal Wujal;	By 2026 / low priority	DESI			As part of state coastal hazard mapping updates
Knowledge Sharing	GIS data	GIS web portal for viewing data	DSDSATSIP	2024 / high priority	DSDSATSIP	Supported by Alluvium		DSDSATSIP budget
	Education / 4WD management	4WD management at Weary Bay	4WD management to implemented at Weary Bay Wujal Wujal to support with education.	2024/2025 / medium priority	Cook Shire Council	WWASC Community support		Council Budgets
Outside QCoast / LGAQ/DESI authority	Emergency Management / Public Access	Secure practical public access to Ayton Wharf.	Investigate the potential solutions to secure practical public access to Ayton Wharf.	Immediate / High Priority	WWASC / CSC Department of Resources Department of Treaty, Aboriginal and Torres Strait Islander Partnerships, Communities, and the Arts (Indigenous Land and Infrastructure Program Office)	DESI / LGAQ Douglas Shire Council Cook Shire Council Traditional Owners Easter Kuku Yalanji (EKY) Rangers Department of Treaty, Aboriginal and Torres Strait Islander Partnerships, Communities, and the Arts	Unsure / TBC	State & Federal Government grants QRRRF

Theme	Adaptation action	Description	Recommendation	Estimated timeframe/ priority	Lead and responsible parties	Supporting parties	Estimated budget requirements	Potential Funding sources
	Flood modelling	Improve understanding of Flooding risk	Develop and/or improve Flood modelling to provide a greater understanding of flooding	Start 2024 / complete by June 2026 / medium priority	WWASC /QRA	QRA Consultant support	$200K	QRRRF

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Attachment 1. Spatial database , Data availability/quality

Contents

Figures

Tables

A1 Wujal Wujal data sources

The availability of data sources relevant to assessing coastal or fluvial hazards for the Wujal Wujal LGA has been reviewed as part of the Stage 2 report. This includes data on coastal erosion, tidal inundation, storm tide inundation and fluvial flooding. This section provides an overview of the different data sources examined as part of the Study.

A1.1 Erosion Prone Area

In Queensland, statutory Erosion Prone Areas (EPA) for 2100 are defined under section 70 of the Coastal Protection and Management Act 1995 (Coastal Act). Erosion Prone Areas have been mapped by the Queensland State Government (State)– initially by the Department of Environment and Heritage Protection (DEHP), now known as the Department of Environment and Science (DES). The defined 2100 Erosion Prone Area includes three components:

1. **Component 1 – 40m buffer from highest astronomical tide (HAT).** Areas within 40 metres landward of the present-day HAT level, (except in specific cases such as adjacent to approved seawalls).
2. **Component 2 – calculated erosion distance.** Areas estimated to be at risk of open coast sandy-beach erosion, following the approach defined within the *Coastal Hazard Technical Guide* (DEHP 2013). This considers short and long-term erosion trends, future impacts due to sea level rise, and allowances for dune slumping to a time horizon of 2100.
3. **Component 3 – sea level rise (SLR)**. Areas subject to (permanent) inundation by the HAT level in 2100 due to sea level rise (present day HAT plus 0.8 m vertical elevation).

The 2100 Erosion Prone Areas have been completed at a relatively high-level, state-wide scale, and are periodically updated by the State when site-specific studies are undertaken. These Erosion Prone Areas for the Wujal Wujal LGA are mapped in Attachment 2. The 2100 Erosion Prone Areas provide a useful data set for a preliminary review of the likely exposure of the Wujal Wujal LGA to coastal erosion process in 2100.

Historical aerial photography – for use in determining long term erosion trends

When suitable historical aerial photography is, available long-term erosion rates can be determined through Digital Shoreline Analysis System (DSAS) plugin for Esri ArcGIS (or similar). This can be used to establish erosion trends and, in the case of open coast sandy beaches, inform the calculated erosion distance (component 2).

There are aerial images of the Wujal Wujal LGA and the nearby coastlines of Ayton and Degarra on QImagery across several years with varying coverage and quality, which is outlined in Section A2.2. Multiple sets provide complete coverage of the LGA and the nearby coastal areas; however, the 2017 set is the only georeferenced set. Using fixed points across the Wujal Wujal, Ayton and Degarra areas, it would be possible to match those aerial images that provide suitable coverage to further investigation into erosion rates/trends if required. However, with the Wujal Wujal LGA not having any open coast shoreline and Component 2 (calculated erosion distance) already existing for the shoreline seaward of Wujal Wujal it is unlikely to be required.

Another sources of erosion rates/trends, DEACoastlines, is discussed below and provides a record of 32+ years of erosion rates/trends.

DEACoastlines – Medium term erosion trends

Digital Earth Australia (DEA) Coastlines is a useful tool that could be used to determine erosion trends/rates and monitor erosion along the nearby coastlines to the Wujal Wujal LGA of Ayton and Degarra. (DEA) Coastlines (Geoscience Australia) combines satellite data with tidal modelling to map the typical location of the Australian coastline at mean sea level every year since 1988. Resulting shorelines and detailed rates of change show how beaches, sand-spits, river mouths, and tidal flats have grown and eroded over time.

It should, however, be noted that as it tracks the MSL shoreline position, a coastline can still be undergoing erosion at the more critical high tide marks whilst still showing minimal or no erosion at MSL. So can only be used as a supporting tool, not a definitive measure of whether a coastline has a long-term erosion trend. It also does not provide a suitable long-term erosion rate for including in a calculated erosion prone area. DEA Coastlines does,

however, provide full coverage of the coastlines nearby to the Wujal Wujal LGA (Figure 8) for a 32+ year timeframe making it a useful tool for understanding medium term erosion trends and potentially long-term trends into the future as the length of record increases.

Figure 1. *DEA Coastline rate of change 1988 To 2020 (Geosciences Australia)*

A1.2 Tidal inundation

Where suitable tidal planes are available tidal inundation can reasonably be mapped using a bathtub approach. Hydrodynamic modelling can provide a better understanding of extents of inundation; however, both are dependent on reasonable topographic data. As summarised in Section 5.1 elevation data, there is elevation data that may be suitable to map areas of inundation near the mouth of the Bloomfield River, north in Ayton (Cook Shire Council) and south in Degarra (Douglas Shire Council).

Under the Coastal and Estuarine Mitigation Program, the State is undertaking works to improve the accuracy of tidal levels for ten remote locations. Wujal Wujal is one of the remote communities selected to have a tide gauge installed. This will improve the accuracy of the tidal levels and may assist with more accurate coastal hazard risk assessment in helping to understand inundation for the Wujal Wujal community.

Where available, the State's HAT (published in 2013) is another potential source of indicative tidal inundation created by a combination of methods, including bath-tub mapping of interpolated tidal planes and identifying the tidal limit on aerial photography from vegetation lines and other features. EPA Component 3 provides a representative 2100 HAT inundation area. The availability and quality of this data are discussed further in Section 5.2.

A1.3 Storm tide inundation

Potentially relevant storm tide information for the Wujal Wujal LGA includes:

- Default 2100 storm tide levels for Queensland of HAT + 2.0 m (DEHP 2013)
- Natural Disaster Recovery Program (NDRP) Storm Tide Hazard Interpolation Study (GHD 2014)
- Douglas Shire Council Storm Tide Mapping for CHAS (2018)

General information on these potential sources is discussed further below. The coverage and suitability of these data sets are discussed and summarised in Section 5.2.

Default 2100 storm tide levels for Queensland of HAT + 2.0 m (DEHP 2013)

The default 2100 storm tide levels for Queensland of HAT + 2.0 m (1.5 m above HAT in SEQ) is a very high-level assessment and indicates areas potentially impacted by storm tide inundation by 2100. While useful as a default zone of interest, it only very approximately represents areas above this at very low risk of time inundation over the next 100 years.

Natural Disaster Recovery Program (NDRP) Storm Tide Hazard Interpolation Study (GHD 2014)

The NDRP Storm Tide Interpolation Study (GHD 2014), hereafter referred to as the 'NDRP study', was completed in 2014 by GHD. The NDRP study used a range of available cyclone reports throughout Queensland, which were combined, normalised, and interpolated to provide new storm tide levels along a regular chainage of the coastline. This Study provides a present-day scenario only, with the following Average Recurrence Interval (ARI) of 20 (5% AEP), 50 (2% AEP), 100 (1% AEP), 200 (0.5% AEP), 500 (0.2% AEP), 1000 (0.1% AEP), 10000 (0.01% AEP), plus the estimated Theoretical Maximum Storm Tide (TMST) levels (GHD 2014). This Study also includes water levels and water depths.

Douglas Shire Council CHAS Storm Tide Mapping (Alluvium/JBP 2018) / Cairns Region Storm Tide Study (BMT WBM 2013).

The Douglas Shire Council CHAS storm tide mapping was developed by Alluvium/JBP utilised the Cairns Region Storm Tide Study (BMT WBM 2013) and improved on it by running a local wave model to calculate improved accuracy wave setup and runup. It also interpolated levels for 2060. The model extents extend beyond the Douglas Shire Council LGA into Wujal Wujal LGA and cover the Bloomfield River. It provided storm tide mapping for present day, 2060 and 2100 planning horizons and 10%, 1% and 0.2% AEP hazard events.

A1.4 Fluvial flooding – *(Note; Fluvial Flooding is outside QCoast$_{2100}$ scope).*

Note; Fluvial Flooding is outside QCoast$_{2100}$ scope, and outside the Department of Environment and Sciences (DES) Authority.

Potentially relevant fluvial flooding extents for the Wujal Wujal LGA include:

- Queensland floodplain assessment overlay (Department of Natural Resources, Mines and Energy 2013)
- Bloomfield River Hydrological and Hydraulic Study (Queensland Government 2009)

General information on these potential sources is discussed further below. The coverage and suitability of these data sets are discussed and summarised in Section 5.2.

Queensland Reconstruction Authority (QRA) has recently completed a review the quality and coverage flood studies across Queensland. When collecting data for this study we also cross checked with QRA to confirm consistency of known available flood studies and LiDAR data.

Queensland floodplain assessment overlay (Department of Natural Resources, Mines and Energy 2013)

The Queensland Floodplain Assessment Overlay (QFAO) represents a floodplain area within drainage sub-basins in Queensland. It has been developed for local governments as a potential flood hazard area. It represents an estimate of areas potentially at threat of inundation by flooding. The data has been developed through a process of drainage sub-basin analysis utilising data sources including 10 metre contours, historical flood records, vegetation and soils mapping and satellite imagery. This data represents an initial assessment and will

be subject to refinement by respective Local Government Authorities (Department of Natural Resources, Mines and Energy 2013).

Bloomfield River Hydrological and Hydraulic Study (Queensland Government 2009)

The Department of Main Roads completed a hydrological and hydraulic study in 2009 for a new bridge across the Bloomfield River near the Wujal Wujal Community. The hydrological study was undertaken to determine the flood peak discharges for a range of design floods up to an annual recurrence interval of 100 years. For the hydraulic study, HEC-RAS software was used to model the flooding of Bloomfield River at the bridge site. The hydrology and hydraulics of Bloomfield River Bridge have been assessed for an ARI, 1in 100, 50, 10, 5, 2 and 1 year flood events.

Wujal Wujal Flood visualisation (AECOM).

The are 2D and 3D visualisations for levels of 5.5m, 7.5m, 11.5m and 13.5m. These have been created using a bathtub approach. No flood modelling has been undertaken as part of this visualisation creation. No AEPs have been assigned to the levels. They were created just to help with visualisation of potential flooding events.

Bloomfield Falls, Wujal Wujal.

A2 Data availability and gaps

This section of the report aims to assess the suitability, coverage, and gaps in the Wujal Wujal LGA data. It will then be determined based on the assessment of the hazard data, on which data can be used to proceed to the preliminary exposure assessments. This section will outline the hazard data reviewed as part of the Study.

A2.1 Topography

Topography datasets are essential for the First Nations Coastal Hazard Study as they inform landscape interpretation, modelling, and mapping. Data availability and suitability are summarised for the Wujal Wujal LGA in Table 1.

Table 1. Availability of topographic data

Type	Description	Source	Coverage	Suitability
Topography	North Queensland 2009 Reclassified Project 1 m Digital Elevation Model (DEM)	Elevation Information System (ELVIS), Geosciences Australia	The LiDAR covers most of the township and nearby coastal areas of Ayton (Cook Shire Council) and Degarra (Douglas Shire Council). It covers approximately 90% of built areas in the Wujal Wujal LGA.	Suitable for the First Nations Coastal Hazard Study. Vertical accuracy 0.2 m and horizontal accuracy 0.6 m.
	Douglas Topo 15cm		Covers the Degarra area in Douglas Shire Council.	Suitable for the First Nations Coastal Hazard Study.
	2011 1 Second (30 m resolution) Shuttle Radar Topography Mission (SRTM) Digital Elevation Models (DEMs)	Elevation Information System (ELVIS), Geosciences Australia	Full LGA coverage.	Unsuitable. Elevation accuracy is poor, thought to be approximately +/-5 m. 30 m resolution.

The North Queensland 2009 Reclassified Project 1 m Digital Elevation Model (DEM) provides elevation data for most of the Wujal Wujal LGA and the nearby coastal areas, suitable for use in the First Nations Coastal Hazard Study. The LiDAR extent for the North Queensland 2009 Reclassified Project 1 m DEM is mapped in Attachment 2. As can be seen from the mapping, whilst the coverage of the North Queensland 2009 Reclassified Project 1 m DEM provides coverage of part of the LGA and the nearby coastal areas, it does cover most of the built areas in the LGA.

The 2011 1-second SRTM DEMs provide elevation data for the whole LGA, and the following datasets were assessed (GA 2011):

- A bare-earth DEM (DEM): regular grid representing ground surface topography, and where possible, excluding other features such as vegetation and man-made structures.
- A smoothed DEM (DEM-S): A smoothed DEM based on the bare-earth DEM that has been adaptively smoothed to reduce random noise typically associated with the SRTM data in low relief areas.
- A hydrologically enforced digital elevation model (DEM-H): A hydrologically enforced DEM is based on DEM-S that has had drainage lines imposed and been further smoothed using the ANUDEM interpolation software.

The SRTM DEM-S has low elevation accuracy. The quoted vertical accuracy of this dataset is estimated at ±3 m in relatively featureless de-vegetated regions (GA 2010). Through our verification selectively comparing with LiDAR, married up with the +/- 6m. The GHD (2013) Gulf Storm Tide Study similarly found that the SRTM data had quite variable levels of accuracy.

As the DEM-H can be used for flood modelling purposes, it was thought this dataset might be useful and potentially have better relative accuracy than the actual elevation accuracy. Given there is LiDAR coverage in some of the area, if the relative accuracy is okay, then the levels may be able to be corrected. Not possible to use this data with elevations varying over +/-8 m to LiDAR.

SRTM DEM-S is best set, but with accuracy confidence of less than 6 +/-m, not of high enough quality to be useful for determining inundation areas and their level of risk.

The 2011 1-second SRTM DEMs were assessed, and it was determined after some investigation that due to the resolution, the quality of this data is limited for the First Nations Coastal Hazard Study

Additional data sources

Tropical Cyclone Risk Assessment and Mitigations in Cape York Communities
Unganco Pty Ltd has been funded to complete work in various First Nations communities, including Wujal Wujal, under the Australian Government's Preparing Australia Program. This will include drone photogrammetry surveys of mainly waste and water infrastructure. The data collated as a part of this project may be appropriate for use in the First Nations Coastal Hazard Study.

Tropical Cyclone Risk Assessment and Mitigations in Cape York Communities
Unganco Pty Ltd has been funded to complete work in various First Nations communities, including Kowanyama, under the Australian Government's Preparing Australia Program. This will include drone photogrammetry surveys of mainly waste and water infrastructure. Photogrammetry surveys provide less vertical accuracy than LiDAR survey, but are likely to provide much greater accuracy than the satellite derived SRTM datasets.

The data collated as a part of this project may be appropriate for use in the First Nations Coastal Hazard Study, and be useful if it covers any area's not already covered by LiDAR. It may also be useful in providing asset specific data. This dataset was currently not yet available to be able to be assessed and incorporated in this stage of work.

A2.2 Hazard data

As reviewed in Section 4, the following coastal hazard information has been assessed for availability and suitability for the Wujal Wujal LGA.

- State 2100 Erosion Prone Area Mapping
- Default 2100 storm tide levels for Queensland of HAT + 2.0 m
- Natural Disaster Recovery Program (NDRP) Storm Tide Hazard Interpolation Study (GHD 2014)
- Douglas Shire Council Storm Tide Maps for CHAS
- Queensland floodplain assessment overlay (Department of Natural Resources, Mines and Energy 2013)
- Bloomfield River Hydrological and Hydraulic Study (Queensland Government 2009)

Data availability and suitability are summarised below in Table 2.

Table 2. Availability of coastal and fluvial hazard data

Type	Description	Source	Likelihood	Planning horizons	Coverage	Availability/suitability
Erosion prone area	Erosion Prone Areas have been mapped by (DES) 2016	QSpatial (DES)		2100	Component one (40 m HAT buffer) is available for a small area of the eastern side of the LGA. Component two (calculated erosion distance) is not available for the Wujal Wujal LGA (as it is not open coast); however, it is available for the coastal areas of Cook Shire Council and Douglas Shire Council seaward of Wujal Wujal LGA. Component three (HAT + 0.8 m) is available for the Wujal Wujal LGA, covering low-lying areas along the Bloomfield River plus the coastlines of Ayton and Degarra.	Limited use for actual LGA. New component 1 & 3 to be created.

Type	Description	Source	Likelihood	Planning horizons	Coverage	Availability/suitability
Erosion prone area	Aerial photography to be used for long term rate of change	QImagery		1957 - 2017	Good coverage on many aerial photography sets.	Suitable if required. Unlikely to be required as Wujal Wujal has not open coast coastline, and coastline seaward of LGA is covered by EPA Component 2 (calculated erosion distance) mapping.
Erosion prone area	DEA Coastline – Medium term trends	DEA Earth Geosciences Australia		1988-2020	Good coverage of coastline in Ayton (Cook Shire Council) and Degarra (Douglas Shire Council).	Maps the change in MSL shoreline position. So, whilst it can be helpful with understanding erosion/accretion trends, not good for erosion risk like mapping a highwater line HAT.
Tidal inundation/tide data	Component three (HAT+0.8 m) - Sea Level Rise 2016	QSpatial (DES)		2100	Component three (HAT + 0.8 m) is available for the Wujal Wujal LGA covering the low-lying areas along the Bloomfield River. However, to not extend up Bloomfield river as far as it potentially should.	Suitable for the First Nations Coastal Hazard Study. Component three (HAT + 0.8m) has been trimmed, and there are gaps in the hazard extent where it is pixelated; thus, the full hazard extent is not shown.
	Highest Astronomical Tide (HAT) line 2013	QSpatial (Department of Resources)		2013 (present day)	Available for the Wujal Wujal LGA.	Unsuitable. The data is of poor quality, particularly upstream of the Bloomfield River; thus, HAT could not be derived from this.
	Highest Astronomical Tide (HAT) Digital Elevation Model (DEM) 2013 (1 m)	DES			Covers most of the township area and the nearby coastal areas of Ayton (Cook Shire Council) and Degarra (Douglas Shire Council).	Suitable for the First Nations Coastal Hazard Study.
	Tidal plane data for Cooktown and Low Islets	Marine Safety Queensland (MSQ)		2022 (present day)	The two sites could be used to reasonably interpolate tidal levels for the coastal areas near the Wujal Wujal LGA.	Suitable for the First Nations Coastal Hazard Study.

Type	Description	Source	Likelihood	Planning horizons	Coverage	Availability/suitability
	Tide gauge installation at the Wujal Wujal LGA under the Coastal and Estuarine Risk Mitigation Program.	Coastal and Estuarine Risk Mitigation Program.			A tide gauge is expected to be installed at Wujal Wujal, which will help improve tidal level accuracy for this community.	Not yet available.
	Aerial & Satellite Photography	Various sources		2022 (present day)	Good coverage of LGA	Due to tree coverage not suitable for determining HAT extent
Wave data	Data are available from the Cape Flattery Datawell GPS 0.9 m Waverider Buoy.	DES			Closet Buoy to North of coastline seaward of Wujal Wujal	Wujal Wujal doesn't have coastline exposed to waves, of limited use
	Data are available from the Cairns Datawell GPS 0.7 m Waverider Buoy.	DES			Closet Buoy to South of coastline seaward of Wujal Wujal	Wujal Wujal doesn't have coastline exposed to waves, of limited use
Storm tide inundation	Default 2100 storm tide levels for Queensland of HAT + 2.0 m 2015	QSpatial (DES)		2100	Covers a small part of the LGA, including some low-lying areas along the Bloomfield River. Part of the east of the Bloomfield River in Douglas Shire Council is covered.	Suitable for the First Nations Coastal Hazard Study.
	Natural Disaster Recovery Program (NDRP) Storm Tide Hazard Interpolation Study (GHD 2014)	QSpatial (DES)	0.01%, 0.1%,0.2%, 0.5%,1% 2% AEP and the TMST.	2014 (present day)	Covers part of the LGA, particularly the low-lying areas near the Bloomfield River. Part of the east of the Bloomfield River in Douglas Shire Council is covered.	Suitable for the First Nations Coastal Hazard Study.
	Douglas Shire Council Storm Tide Maps for CHAS		Likely (HAT), possible (1% AEP) and rare (0.2% AEP)	Present day, Intermediate (2060) and 2100.	Covers the Bloomfield River upstream to the edge of the township area, including the nearby coastal areas of Ayton and Degarra.	Useful for First Nation Study. Appears to be some errors in modelled and mapped data, however levels can be re-mapped for improved Storm Tide mapping for Wujal Wujal

Type	Description	Source	Likelihood	Planning horizons	Coverage	Availability/suitability
Fluvial flooding	Queensland floodplain assessment overlay (Department of Natural Resources, Mines and Energy 2013)	QSpatial (Department of Natural Resources, Mines and Energy)			Covers the flood plain areas, including the Bloomfield River. Most of the township area is covered.	Not suitable for determining hazards extents. It is very high level and only suitable for understanding whether a flooding hazard may exist in the region.
	AECOM 5.5 m, 7.5 m, 11.5 m, 13.5 m 2D and 3D visualisation of river water height based on contour data.	QSpatial (Department of Natural Resources, Mines and Energy)	Unknown		Covers the township area.	Not suitable. Not linked to a likelihood and no mapping data available.
	Bloomfield River Hydrological and Hydraulic Study (Department of Main Roads, Queensland Government 2009)	DES			Covers the area near the Cape Tribulation – Bloomfield Bridge. Not mapped.	Suitable. Levels can be mapped using a bathtub approach, however, will only be a consistent level.

Erosion prone area observations

The erosion prone area is made up of three components, as previously highlighted in Section 4. For the erosion prone area observations EPA Component 1 (40m buffer from HAT) and Component 2 (calculated erosion distance). Component 3 (SLR HAT +0.8m) is discussed further within the tidal inundation observations further below. Wujal Wujal not having any open coast shoreline, only two components (Component 1 HAT + 40 m and Component 3 HAT + 0.8 m) are directly relevant for the LGA. Both of these extend into the LGA but stop short of what their actual extents are likely to be. Utilising the HAT DEM supplied by DES these areas can be created for a greater extent to include further upstream to the township. Calculated erosion distance (Component 2) is available for coastline to the north (Cook Shire Council, Ayton) and south (Douglas Shire Council, Kangkiji Beach).

Historical aerial photography provides suitable coverage for calculating erosion rates, however with calculated erosion distance (Component 2) already existing and Wujal Wujal not having any open coast coastline they are unlikely to be required.

Tidal inundation observations

As previously highlighted in Section 0, the third component of the erosion prone area is HAT plus 0.8 m vertical elevation (Component 3) to represent the future HAT level in 2100 due to sea level rise. The HAT plus 0.8m vertical elevation covers the low-lying areas along the Bloomfield River plus the coastlines of Ayton and Degarra. The HAT DEM supplied by DES can determine the inundation depth for present day HAT for most of the township area and the nearby coastal areas of Ayton (Cook Shire Council) and Degarra (Douglas Shire Council). Component three (HAT + 0.8m) there are gaps in the hazard extent where it appears to not extent as far upstream as it actually should. Component three can be used to determine the inundation extent for the nearby Ayton and Degarra coastlines.

There's likely to be value in remapping the HAT and HAT+0.8m for Wujal Wujal due to the abnormalities in the current mapping.

Storm tide observations

Three storm tide data sources are investigated for the Wujal Wujal LGA, as outlined in Section 4. The default 2100 storm tide levels indicate potential areas impacted by storm tide by 2100. However, there is no indication of what this event may correspond to; thus, this is useful as a default zone only. The default 2100 storm tide levels cover a small part of the LGA, including some lying areas along the Bloomfield River and some parts of the Bloomfield River in Douglas Shire.

The NDRP study provides a present-day scenario with the following likelihoods, including 0.01%, 0.1%,0.2%,0.5%,1%, 2% AEP and the TMST. The NDRP study covers part of the LGA, including some low-lying areas near the township area and to the east of the Bloomfield River in Douglas Shire. The NDRP study is suitable for the First Nations Coastal Hazard Study when assessing storm tide inundation for most Wujal Wujal built assets. The mapping appears to have some unusual areas, likely errors so might not be the best source of mapping for storm tide inundation.

The third storm tide data is the Douglas Shire Council Storm Tide Maps for CHAS providing storm tide mapping for present day, 2060 and 2100 planning horizons and 10%, 1% and 0.2% AEP hazard events. Reviewing the modelled and mapped data there are clearly errors in the levels around the township as there is a significant change in storm tide level likely due to edge effects of the model boundary rather than actual reasons for change in the storm tide level. Due to there being LiDAR coverage and no storm tide levels, storm tide can be remapped using a bathtub approach to provide improved storm tide mapping for Wujal Wujal.

Fluvial flooding observations

Queensland floodplain assessment overlay (QFAO) (Department of Natural Resources, Mines and Energy 2013) covers the flood plain areas, including the Bloomfield River. The QFAO acts as the baseline flood mapping for an LGA where a local government does not have a region-wide understanding of the flood hazard (Department of

Infrastructure, Local Government and Planning 2017). The QFAO is unsuitable for determining hazard extents as it is very coarse and only provides general information on where inundation hazards should be explored further.

The Bloomfield River Hydrological and Hydraulic Study (Queensland Government 2009), was completed by TMR to assess flooding levels at the proposed bridge site over the Blomfiedl River near the Wujal Wujal township. It contains levels for flood levels for AEPs 1%, 2%, 5%, 10% and 20%. No mapping is available from this study as it was directly undertaken for purposes of assessing the bridge. However, the bridge is close in location to the township, and these levels can be mapped with a bathtub approach as part of this study to create reasonable mapping of flood extents. However, will only be a consistent level, so upstream of the bridge will likely underestimate flood level.

The Wujal Wujal Flood visualisation (AECOM) were purely visualisations with no AEPs assigned and not GIS mapping provided. As such they are not suitable for use in developing hazard areas for this study.

QRA has recently completed an assessment of needs with respect to delivering contemporary flood risk management across Queensland. From this work, Wujal Wujal LGA have identified that their most significant flooding concern is the town's isolation and re-supply issues. QRA's work in better understanding needs to support flood risk management in Queensland LGA's potentially represents an excellent opportunity for collaboration in the future to understand and adapt to this risk within the Wujal Wujal LGA.

Wujal Wujal Flood Visualisation (AECOM).

A2.3 Environment and cultural values data

Data from a wide range of sources is needed to understand the implications of coastal hazards for the social, demographic, cultural, and tourism values of the Wujal Wujal LGA. Data availability and suitability are summarised in Table 3.

Table 3. Availability of social data

Type	Description	Source	Coverage	Suitability
Population data	General population data is available through the 2021 census and demographic information from the Wujal Wujal Master Plan (AECOM 2020)	Australian Bureau of Statistics. Wujal Wujal Master Plan (AECOM 2020)	The ABS data provides a base understanding of the demographic profile of the LGA, as other agencies, such as the council, may have more accurate data.	Suitable for the First Nations Coastal Hazard Study, other data sources, such as the council, should be used to represent the population accurately.
Tourism and recreation	General information regarding tourism and recreation.	Australian Bureau of Statistics	Not available.	Not available.
Environment	Mapping of natural environments and natural assets is available from the Queensland Land Use Mapping Program (QLUMP).	QSpatial (DES)	Covers all the Wujal Wujal LGA.	Suitable for the First Nations Coastal Hazard Study.
Cultural and indigenous values*	Traditional Owners of the Wujal Wujal LGA were consulted between 21st November and 25th November 2022.	Alluvium	Several Wujal Wujal LGA community members were consulted between 21st November and 25th November 2022.	Suitable for the First Nations Coastal Hazard Study. Further engagement might be required based on the recommendations or outcomes of the final report.

* Summary of key community values/assets is supplied in Attachment 2, and further details will be outlined in the final report.

Engagement activities

Alluvium met with the council and First Nations community members of the Wujal Wujal LGA between 21st November and 25th November 2022. Alluvium visited various sites across the Shire and was provided vital information regarding areas of cultural significance that coastal hazards could impact. From this visit, key cultural values and culturally significant sites have been identified in Attachment 5. In the Stage four report, the key cultural values and culturally significant sites will be explained further, and key recommendations will be supplied.

A2.4 Land use

Various sources of land use data have been reviewed to understand how coastal hazards might impact different land use types in the Wujal Wujal LGA. Data availability and suitability are summarised in Table 4.

Table 4. Availability of land use data

Type	Description	Source	Coverage	Suitability
Land zones	Information regarding land zones.	Wujal Wujal Planning Scheme 2013	Covers the township area of the Wujal Wujal LGA.	Suitable for the First Nations Coastal Hazard Study.
Land use	Mapping of natural environments and natural assets is available from the Queensland Land Use Mapping Program (QLUMP).	QSpatial (DES)	Covers all the Wujal Wujal LGA.	Suitable for the First Nations Coastal Hazard Study.

A2.5 Buildings and infrastructure

Data from various sources have been reviewed for buildings and infrastructure for the Wujal Wujal LGA. Data availability and suitability are summarised in Table 5. The spatial database lists asset data, including buildings and infrastructure, in Attachment 1.

Table 5. Availability of buildings and infrastructure data

Type	Description	Source	Coverage	Suitability
Property-level data	Building footprints derived from Bing Maps satellite imagery.	Microsoft (2013-2018)- majority 2018	Covers mainly the township area, with some of the building footprints across the LGA. Evident from the township area some footprints are not captured. In the township area, these are identifiable from more recent aerials and site visit.	Suitable for the First Nations Coastal Hazard Study. Does not cover anything beyond 2018.
	Property address information, including address, property type etc	DSDSATSIP	Covers the township area of the Wujal Wujal LGA. However, the majority of built assets in Wujal Wujal LGA are within the township area.	Suitable for the First Nations Coastal Hazard Study.
Roads	Baseline roads and tracks	QSpatial (Department of Resources)	Covers the baseline roads and tracks for the township area plus the main roads of the Wujal Wujal LGA.	Suitable for the First Nations Coastal Hazard Study
Heliports and landing grounds	Locations of heliports and landing grounds.	QSpatial (Department of Resources)	No landing ground in LGA. However, Ayton Wharf in Cook Shire Council was identified during the site visit and is used as an access point (landing ground) during the wet season.	Not available.

A2.6 Utilities

Several spatial datasets are available for assets, infrastructure, and utilities throughout the township of Wujal Wujal; there is limited information outside this area for the Wujal Wujal LGA.

Data availability and suitability are summarised in Table 6. Asset data included in the spatial database is listed in Attachment 1.

Table 6. Availability of utility data

Type	Description	Source	Coverage	Suitability
Stormwater infrastructure	Pipes, culverts, drains, headwalls etc.	Cardno/Stantec - RPS - Wujal Wujal Digital Asset Management - 2013/RPS - Wujal Wujal Digital Asset Management Community Plan - 2013	Covers the township area of the Wujal Wujal LGA. However, the majority of built assets in the Wujal Wujal LGA are within the township area.	Suitable for the First Nations Coastal Hazard Study.
Sewer infrastructure	Mains, rising mains, manholes, tanks, draw pits etc.	Cardno/Stantec, RPS - Wujal Wujal Digital Asset Management Community Plan - 2013, GFIS	Covers the township area of the Wujal Wujal LGA. However, the majority of built assets in the Wujal Wujal LGA are within the township area.	Suitable for the First Nations Coastal Hazard Study.
Electricity network	Electrical Infrastructure data, including cables, zone/ distribution substations, poles etc.	Cardno/Stantec, Qspatial/Ergon Energy	Covers the township area of the Wujal Wujal LGA. However, the majority of built assets in the Wujal Wujal LGA are within the township area.	Suitable for the First Nations Coastal Hazard Study.
Telecommunications	Telecommunications data, including Telstra cables.	Cardno/Stantec/Telstra	Covers the township area of the Wujal Wujal LGA. However, the majority of built assets in the Wujal Wujal LGA are within the township area.	Suitable for the First Nations Coastal Hazard Study.

A3 Discussion and Recommendations

The main Wujal Wujal township is approximately 5 km inland of the coastline on the Bloomfield River. The actual open coast coastline is not part of the Wujal Wujal LGA with the area to the north part of Cook Shire Council (Ayton) and the area to the south part of Douglas Shire Council (Kangkiji Beach). Including these coastal areas from the other LGAs, all 3 EPA components and storm tide are mapped for the stretch of coastline seaward of the township, however extents for EPA comments 1 (HAT + 40m) & 3 (HAT + 0.8m) appear to not extend as far upstream as they should. In any case the township upstream of the Bloomfield River mouth is generally at very low risk from coastal hazards, with it being at much great risk of fluvial flooding. When the township is impacted by fluvial flooding Ayton Wharf in Cook Shire is a critical supply and emergency access point which is within erosion and storm tide hazard areas.

Wujal Wujal LGA erosion prone mapping needs to be revisited for component 1 & 3 to ensure it extends into the LGA as far as the LiDAR allows. Component 2 (calculated erosion distance) is mapped for the whole relevant open coast coastline seaward of Wujal Wujal.

The Wujal Wujal LGA has a number of important cultural sites and build assets outside the LGA boundary should be considered further even though they are not within the LGA boundaries. The township area has good coverage of asset data, the majority of built assets are within the township area and have GIS asset data available for these assets. Elevation data for the township area is good with LiDAR survey covering the main township area, downstream to the Bloomfield River mouth. Beyond that though there is only satellite derived elevation data (SRTM) which is not of suitable accuracy to be used for understanding inundation hazard areas. Although, upstream and away from the Bloomfield River banks the topography increases quite rapidly that further elevation data is unlikely to be required to understand risk from coastal hazards.

The current available mapping of coastal and inundation hazards is not suitable for informing the Final Report and Recommendations. There is however suitable information available to create new mapping for erosion, coastal inundation and fluvial inundation using a bathtub approach. Although, mapping of fluvial flooding will be of low confidence as it is the least suitable for utilising a bathtub method.

Note; Fluvial Flooding is outside QCoast$_{2100}$ scope, and outside the Department of Environment and Sciences (DES) Authority.

In terms of inundation hazard, fluvial flooding represents by far the biggest risk to the Wujal Wujal LGA. In 2009 the Department of Main Roads completed a flood study for a new bridge across the Bloomfield River near the Wujal Wujal Community. This provides information on potential flood levels but did not provide mapping that can be used. Although outside the scope of this study, an improved flooding and drainage study for the LGA and surrounding area would be greatly beneficial for understanding the inundation risk of the community.

QRA has recently completed an assessment of needs with respect to delivering contemporary flood risk management across Queensland.
Statewide Assessment of Flood Risk Factors | Queensland Reconstruction Authority (qra.qld.gov.au)
Statewide Assessment of Flood Risk Factors App (arcgis.com)

From this work, Wujal Wujal LGA have identified that their most significant flooding concern is the town's isolation and re-supply issues. QRA's work in better understanding needs to support flood risk management in Queensland LGA's potentially represents an excellent opportunity for collaboration in the future to understand and adapt to this risk within the Wujal Wujal LGA.

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Year	Source	Asset group	Subtype	Description	Original name(s)	Geometry
2022	Alluvium	Cultural heritage	Culture heritage	Sites identified during community engagement in Wujal Wujal in 2022.	WWASC_Cultural_Heritage	Point
2019	QSpatial	Beach and foreshore	Boating facilities	Jetties, boat ramps, pontoons and floating walkways	data — Recreational_Boating_Facilities	Point
2022	QSpatial	Buildings and facilities	Buildings	Building points with a footprint <625sqm	QLD_Building_Points	Point
2013-2018 (majority 2018)	Microsoft	Buildings and facilities	Building footprints	Building footprints derived from Bing Maps satellite imagery	vector_Building footprint_Australia_2020-06-21	Polygon
	DSDSATSIP	Buildings and facilities	Buildings	Property address information, including address, property type etc	Location_Address_database	Point
2019	QSpatial	Land, environment and culture	Land use	QLUMP Land use mapping from 2019 for QLD	QLD_LANDUSE_June_2019 QLD_LANDUSE_CURRENT_X	Polygon
2021	QSpatial	Land, environment and culture	Fisheries	Fisheries areas	Areas_host_to_fisheries_resources	Polygon
2022	QSpatial	Land, environment and culture	Remnant regional ecosystems	Biodiversity status of remnant regional ecosystems	data Biodiversity_status_of_remnant_regional_ecosystems	Polygon
2022	QSpatial	Land, environment and culture	Cultural heritage	Cultural heritage boundaries	data Cultural_Heritage_Party_boundaries	Polygon
2022	QSpatial	Land, environment and culture	Regulated vegetation	MSES regulated vegetation that is essential habitat	data MSES__Regulated_vegetation__essential_habitat	Polygon
2022	QSpatial	Land, environment and culture	Endangered or vulnerable wildlife	MSES endangered or vulnerable wildlife habitat	data MSES__wildlife_habitat__endangered_or_vulnerable_wildlife	Polygon
2020	DSDSATSIP	Master Plan	Master Plan	Master plan completed by AECOM for DSDSATSIP	GDA2020_Master_Plan — ALLUVIUM_MasterPlan_Polygons	Polygon
2022	QSpatial	Transport	Roads and tracks	Street centrelines	data_Baseline_roads_and_tracks	Line
2022	QSpatial	Utilities	Network LV	Overhead and underground electrical distribution network	Network_LV	Line
2022	QSpatial	Utilities	Network	Overhead and underground electrical distribution network	Network	Line
2022	DSDSATSIP	Utilities	Telecommunications	Telecommunication lines, including Telstra cables	RILIPO_DAMP — Communications_LINE	Line
2022 -2003/2012	DSDSATSIP	Utilities	Stormwater	Stormwater infrastructure, including pipes, culverts etc	RILIPO_DAMP — Drainage_LINE	Line
2022-2003/2012/2013	DSDSATSIP	Utilities	Stormwater	Stormwater infrastructure, including drains, headwalls, trap gullies etc	RILIPO_DAMP — Drainage_POINT	Point
2022	DSDSATSIP	Utilities	Electrical	Cables/electrical cables	RILIPO_DAMP — Electricity_LINE	Line
2022	DSDSATSIP	Utilities	Electrical	Electrical points, including distribution substation and poles	RILIPO_DAMP — Electricity_POINT	Point
2022 -2006	DSDSATSIP	Utilities	Sewer	Sewer infrastructure including mains, rising mains and overflows.	RILIPO_DAMP — Sewer_LINE	Line
2022 - 2006/2013	DSDSATSIP	Utilities	Sewer	Sewer infrastructure, including septic tank, manholes, valve boxes, tanks, draw pits etc.	RILIPO_DAMP — Sewer_POINT	Point
2022-2013	DSDSATSIP	Utilities	Water	Water infrastructure, including water pipes, mains, rising mains, house connection branches etc.	RILIPO_DAMP — Water_LINE	Line
2022 - 2009	DSDSATSIP	Utilities	Water	Water infrastructure, including valves, hydrants, house connection branches etc.	RILIPO_DAMP — Water_POINT	Point

Memo

Subject	Wujal Wujal additional hazard layer creation
Project	QCoast2100 2.0 Funding Program 2: Appraisal of the exposure of First Nations councils in Far North Queensland to coastal hazards'
Distribution	LGAQ (Emma Schofield), DES (Sel Sultmann)
Date	August 2023

The purpose of this memo is to provide LGAQ and DES with the approach used in developing the additional hazard layers, for Wujal Wujal for the First Nations Coastal Hazard Study, using the data available. During the investigation, it was discovered that the Douglas Shire storm tide model, which extends north to Degarra and upstream of the Bloomfield River, was not suitable due to the model resolution. This became evident after the yellow circle highlighted in Figure 1, where the accuracy and resolution dropped significantly.

Figure 1. *Douglas Shire storm tide model (Wujal Wujal LGA boundary - red) and the 2100 rare scenario (raster)*

DES supplied Alluvium with the Highest Astronomical Tide Digital Elevation Model (HAT DEM), which was considered for use in creating the additional hazard layers for Wujal Wujal. However, upon investigation, it was found that the HAT DEM (Figure 2) was significantly patchier than the North Queensland 2009 ReClassified Project LiDAR (Figure 3). As a result, it was decided to use the North Queensland 2009 ReClassified Project 1-metre LiDAR to create the additional hazard layers for Wujal Wujal. Figure 4 shows the six new additional hazard layers that were created for Wujal Wujal using the North Queensland 2009 ReClassified Project LiDAR.

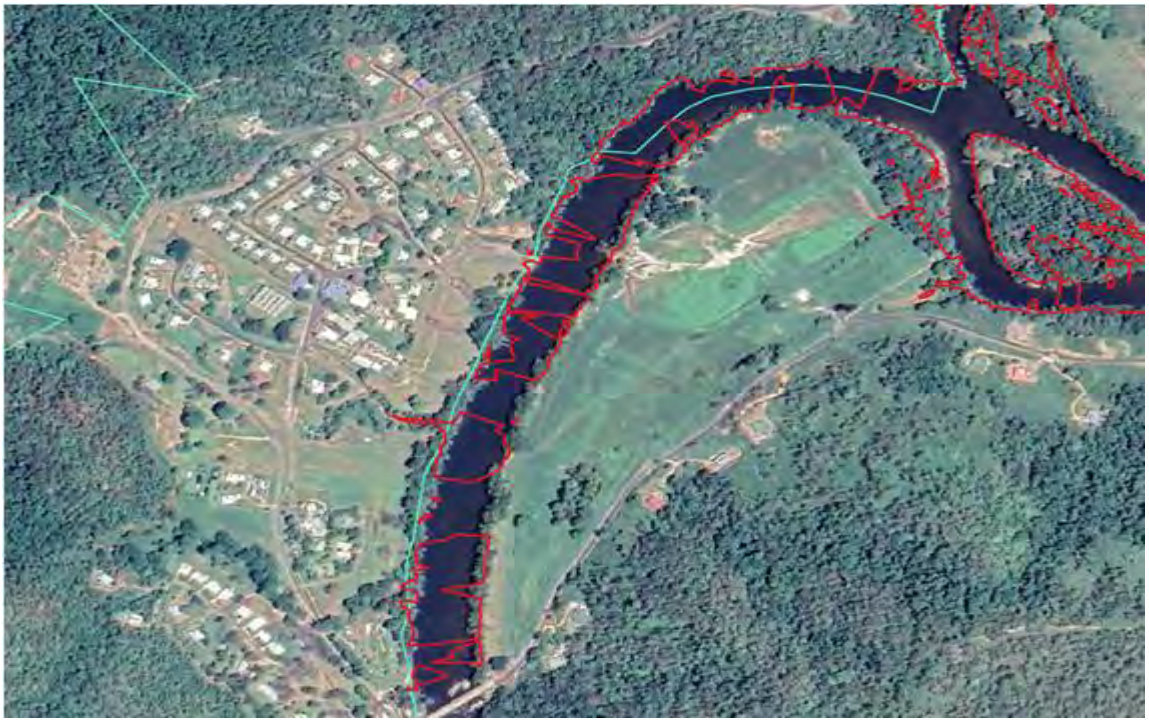


Figure 2. *HAT DEM (Contour at 1.72 m AHD)*

Figure 3. *North QLD 2009 LiDAR (Contour at 1.70 m AHD)*

Contours were extracted for HAT, HAT+0.8 m, and three storm tide scenarios using the North Queensland 2009 ReClassified Project LiDAR. To create component 1 of the erosion-prone area, a 40-metre buffer was to the HAT extracted from the LiDAR. However, there were still some patches in the LiDAR after extracting the associated contours (Figure 3), so manual adjustments to smooth them out were applied. Figure 4 shows the six new additional hazard layers that were created for Wujal Wujal using the North Queensland 2009 ReClassified Project LiDAR.

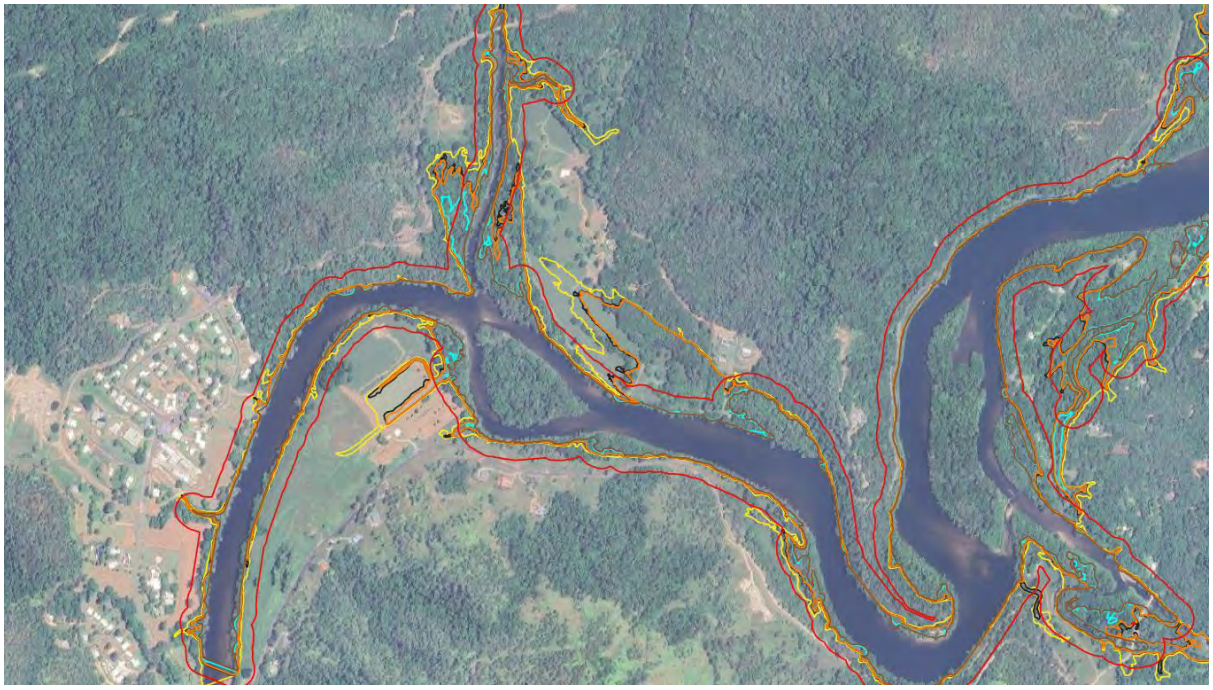
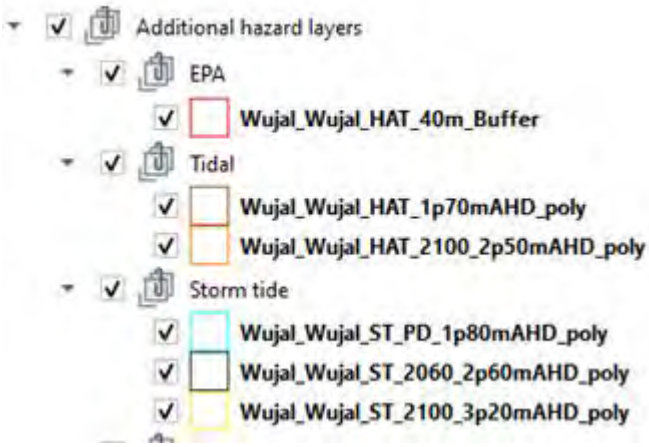
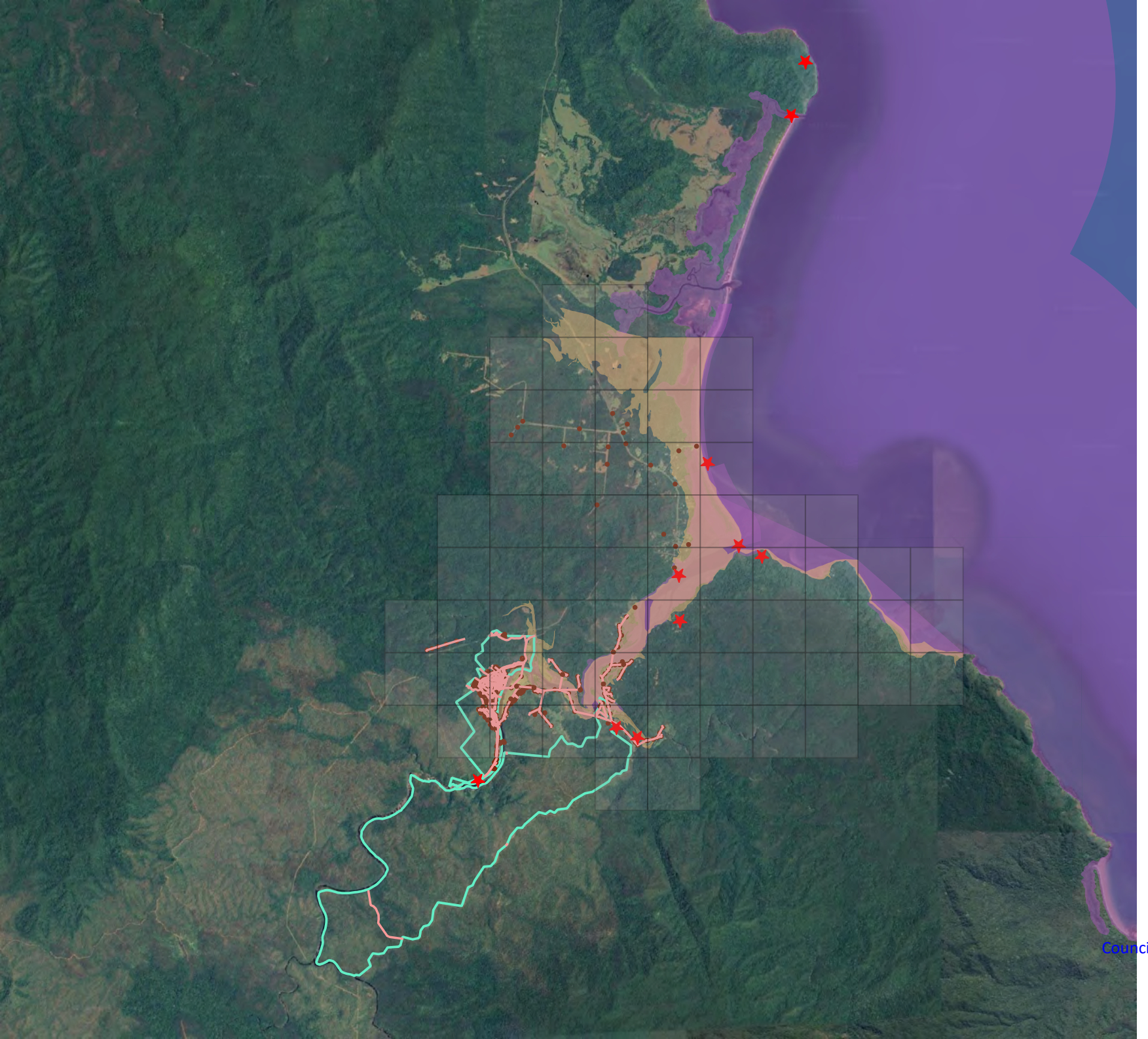


Figure 4. *Additional hazard layers created for Wujal Wujal*



Attachment 2 Maps



Legend

- Wujal Wujal Shire
- LiDAR coverage

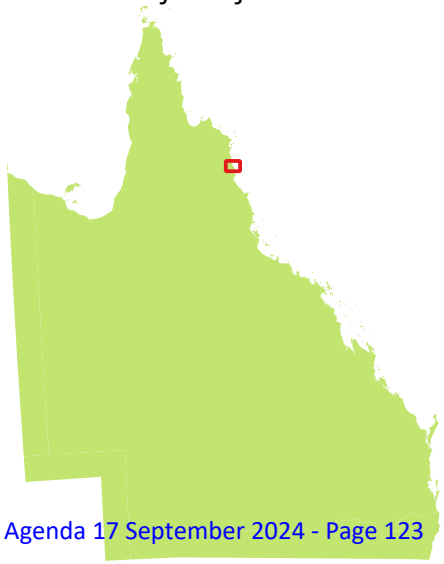
Hazards

- Erosion prone area
- State storm tide hazard
- NDRP maximum storm tide hazard

Assets

- Building footprints
- Master plan
- Linear assets
- Point assets
- Observed cultural significant assets

Wujal Wujal Shire



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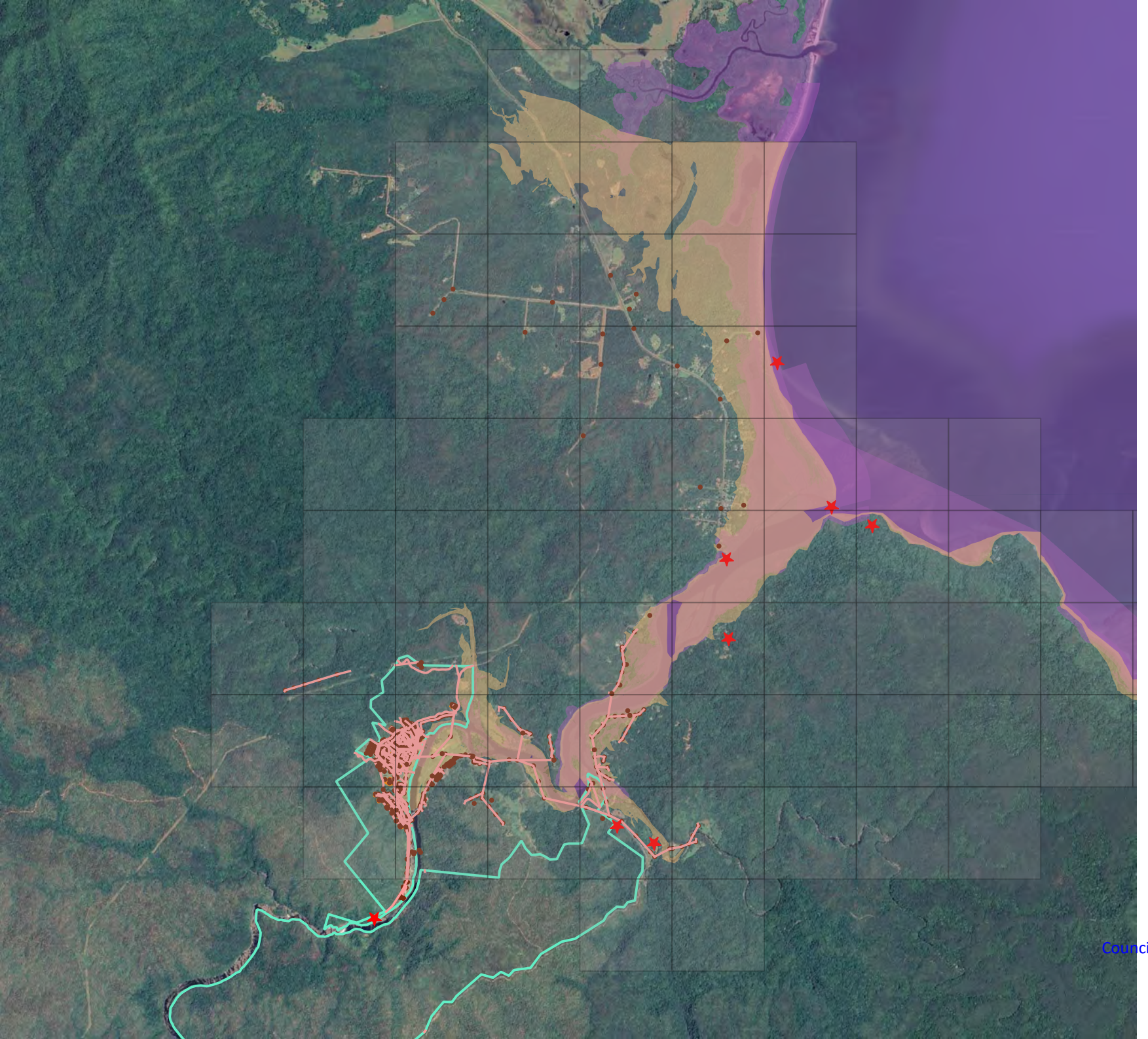

Legend

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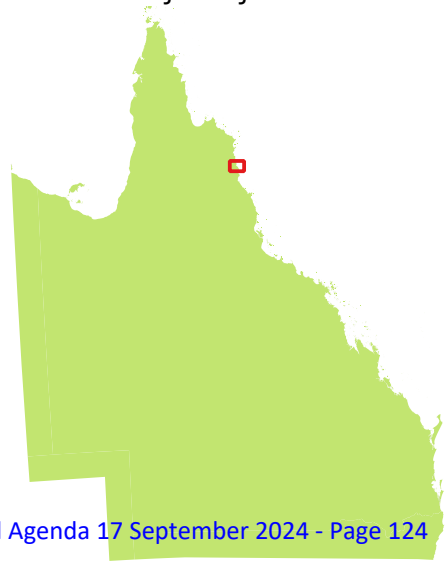
Wujal Wujal Shire



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0 1 2 km

Legend

- Wujal Wujal Shire
- LiDAR coverage

Hazards

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- State storm tide hazard
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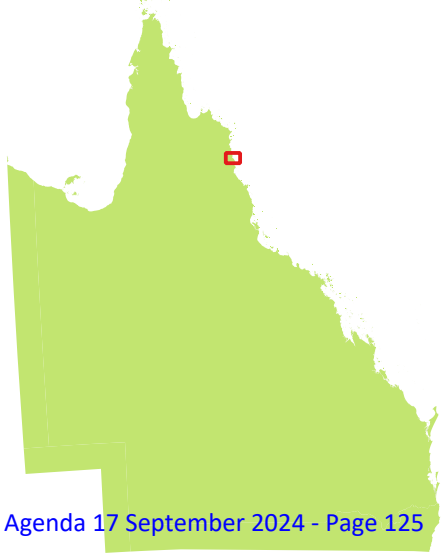
Wujal Wujal Shire



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Attachment 3. Adaptation options – summary sheets

SHEET 1 TO 3 – ADAPTATION ACTIONS – REGION-WIDE INITIATIVES TO ENHANCE CUSTODIANSHIP

SHEET 1 - COMMUNITY CUSTODIANSHIP

Active community custodianship of the coastline provides a strong foundation for long-term success in coastal management. Supporting the shared care of the coastline near the Wujal Wujal LGA will maximise resilience and adaptive capacity.

Enhancing stewardship of the coastline
Community involvement in coastal management is important for enhancing the resilience of our beaches to coastal hazards.

Across the Wujal Wujal region, the coast is an essential part of community wellbeing and lifestyle. Access is important for a range of activities (e.g., boating, fishing). Maintaining access while promoting stewardship is key to achieving balanced management and adaptation.

A priority action for coastal hazard adaptation is the ongoing coordination and support of custodianship initiatives that will seek to further empower and equip communities to:

- Contribute to on-ground dune protection and maintenance
- Manage access in a way that seeks to minimise dune disturbance
- Promote and advocate for the care and protection of dune systems
- Share knowledge on observed changes to the coast
- Contribute to monitoring and evaluation of the implementation and success of adaptation actions
- Promote coastal protection and management through regional commercial enterprises, e.g. ecotourism

The full range of initiatives and activities that Council may undertake as part of the custodianship program include to:

- Utilise new communication platforms (website, apps)
- Seek new funding and grant opportunities
- Coordinate and facilitate community events
- Provide support to community/volunteer groups
- Identify complementary activities and synergies
- Seek partnerships and collaboration opportunities
- Deliver education and training programs
- Establish relationships between Council field staff and community/volunteer groups
- Promote use and development of innovative tools and products
- Encourage participation and awareness.

Dune protection and maintenance
As a priority, to provide the best possible outcome for coastal hazard protection, community custodianship should have a strong focus on dune protection and maintenance. Community involvement may include:

- Fencing and creating designated walkways
- Pest, weed and litter control
- Native revegetation (where appropriate)
- Education and awareness (giving talks)
- Protecting cultural sites
- Surveys – coastal user groups, values, activities
- Contributing to the monitoring program – photo points and on-ground monitoring
- Building their long-term understanding of coastal risks
- Monitor and report on coastal wildlife, e.g. turtles, dugongs, shorebirds

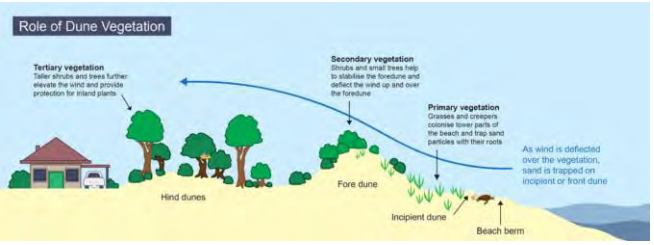
SHEET 1 TO 3 – ADAPTATION ACTIONS – REGION-WIDE INITIATIVES TO ENHANCE CUSTODIANSHIP

SHEET 2 - KNOWLEDGE SHARING

An important element in growing adaptive capacity is knowledge sharing. Knowledge sharing includes initiatives to promote education and awareness of coastal hazards, what the adaptation options are, and how other agencies and individuals can meaningfully be involved / act to reduce the risk of coastal hazards.

Coordination of knowledge sharing initiatives will further empower and equip stakeholders to:

- Understand coastal hazard risk and adaptation options
- Contribute to community custodianship initiatives
- Be informed, empowered and equipped to manage risk to private assets
- Be informed of implementation progress of adaptation actions
- Contribute to monitoring



The importance of coastal vegetation information.

Initiatives and activities that Council may undertake as part of coordinating a knowledge sharing program include to:

- Establish collaborative partnerships with Traditional Owners
- Promote collaborative action across stakeholder groups (host meetings, facilitate cross-agency communication)
- Generate communications materials to raise awareness of coastal hazard risk and the adaptation options being implemented
- Manage perceptions on:
  - Levels of risk and tolerance
  - Shared responsibilities in the management of coastal hazard risks
- Communicate the need for adaptive management
- Deliver / facilitate training programs and workshops (and link in with community custodianship education initiatives)
- Coordinate information sharing across agencies (data, maps, monitoring data).

SHEET 3 - MONITORING

Targeted monitoring provides a means to assess how the coastal environment is changing over time, and the effectiveness of adaptation options in mitigating the risk of coastal hazards.

The development and implementation of a targeted monitoring program to inform triggers for adaptive management is an important component of all adaptation options.

A useful approach to monitoring coastal environments may include:

- Simple and frequent photo point monitoring and on-ground observations suitable for community participation
- Event based monitoring (beach profile elevations)
- More detailed surveys (on-ground or aerial) every 5 – 10 years
- Geolocated standard photo reference points for regular beach nourishment locations

Monitoring observations may include:

- Video monitoring
- Dune movement
- Erosion extent
- Sand characteristics (colour, grain-size, composition)
- Sand coverage / beach shape
- Vegetation coverage, type, density and health
- High water mark
- Flood extent
- Exposure of rock
- Exposure of structures (i.e., footings, foundations)
- Migratory, stranded or dead marine wildlife
- Litter, debris and algal blooms (Lyngba)

Initiatives and activities that Council may undertake as part of a coastal monitoring program include to:

- Establish a photo point monitoring system
- Confirm a program of monitoring actions
- Create a platform and process for data management
- Tailor the monitoring program to align with / inform a 5 - 10 year review of adaptation response and options

Photo point monitoring
Photo posts with a defined outlook/viewpoint can be installed to enable photos to be captured from the same perspective each time. Systems use an email address or online app to help collect and collate photos, creating a photo record over time. This approach provides a simple way for community members and visitors to contribute to monitoring of the beach. Formal or informal versions of this system can be estabslihed for any section of coast.

CoastSnap
community beach monitoring

Periodic aerial imagery / drone survey can be added to provide an aerial perspective of shoreline changes over time. The drone surveys can also provide elevation data that can be analysed to quantify changes in the beach profile over time (i.e., dune width, slope, toe position, berm height). Elevation surveys can also be undertaken with on-ground equipment (survey stations and GPS).

SHEET 4 – ADAPTATION ACTIONS - PLANNING UPDATES

Planning instruments can assist to increase built-form resilience and mitigate the risk (likelihood and consequence) of coastal hazards, including erosion and storm tide inundation.

Statutory planning / planning scheme
The Updated Erosion Prone Area mapping produced as part of Council's adaptation study will be adopted by State Government and Council. Council will continue to refer to the Erosion Prone Area for planning overlays and controls. The Erosion Prone Area, together with the Council's adaptation initiatives, will enable Council to:

- Ensure coastal hazards and risks are identified and considered
- Avoid new development in high-risk inundation or erosion prone areas, including the current and future Planning Schemes.
- Enable Council to manage and control / condition development and statutory approvals
- Incorporate flexibility and adaptability (i.e., triggers)
- Maintain values that are integral to the community
- Promote/encourage appropriate design and mitigation as part of new developments (resilience opportunities)
- Protect areas of environmental significance
- Plan ahead for required mitigation / transition actions
- Rezone areas unsuitable for new development in long-term.

Other strategic planning
Adaptation response and actions also informs other planning related to infrastructure, open space, parks and recreation, foreshore master plans and asset management.

Integrating an up-to-date understanding of coastal hazards and appropriate mitigation options into existing and new relevant strategies will assist to mitigate risk, enhance resilience, and achieve multiple benefits from adaptation (e.g., aesthetic and recreation benefits combined with risk mitigation). As part of strategic planning, Council may look to consider options of land purchase / swap / relocation for limited properties where coastal hazard risk becomes very high, and a long-term transition response is required.

Disaster management
A review and update of emergency response planning based on outcomes of adaptation planning will allow Council to plan accordingly with an aim to minimise the consequence of coastal hazard impacts during extreme events.

Up-to-date understanding of coastal hazard prone areas, likely event magnitudes and extents, and possible access and infrastructure constraints, will improve planning and preparation as well as response and recovery efforts.

SHEET 5 – ADAPTATION ACTIONS – MAINTAINING AND IMPROVING INFRASTRUCTURE

Maintaining and improving infrastructure is a practical way to mitigate the risk (likelihood and consequence) of coastal hazards, including erosion and storm tide inundation.

Upgrading infrastructure
Upgrades can be made to critical infrastructure that cannot be readily relocated out of a coastal hazard zone. Typical upgrades include raising floor levels to reduce inundation risk and changing infrastructure design and materials to be more flood tolerant (reduce the consequence of inundation).

For efficiency, upgrades would typically coincide with upgrades and renewals scheduled in an asset management / maintenance program. Updated coastal hazards zones, identified risks to infrastructure assets, and recommendations from adaptation planning will inform updates to asset management plans.

Improving drainage networks
Improving drainage networks in the areas immediately surrounding infrastructure and in the main settlement areas can reduce the duration and consequence of coastal inundation. This should be considered as part of the adaptation study and asset management plan for a locality.

However, as sea levels rise, the effectiveness of drainage networks to operate can diminish. For drainage networks to operate long-term, an area may need to be filled in conjunction with upgrades to the drainage network.

Relocating infrastructure
Where it is feasible to do so, critical infrastructure can be relocated out of the high-risk coastal hazard zone. This often requires long-term planning as the location of critical infrastructure is driven by demand, and the need to support surrounding settlements and services. Long-term planning is built into asset management plans.

Building resilient homes
In coastal areas, public buildings and private dwellings may be exposed to impacts from coastal hazards, including inundation and erosion.

Smart choices in the design of homes can reduce the impact of inundation. This is applicable for rebuilding, renovating, or building a new dwelling. Some of these changes may have higher initial upfront costs but provide a longer term benefit. Making these changes over time can reduce damage from future inundation, and help residents get back to normal quicker after a flood event.

For new buildings, it is also possible to design resilient or relocatable housing to reduce the risk of other hazards that the region experiences, including inundation and erosion. These designs may include a lightweight dwelling on piled or pier footings. The design should be undertaken in consultation with the residents to understand the community's needs.

SHEET 6 – ADAPTATION ACTIONS – NATURE-BASED COASTAL MANAGEMENT

FORESHORE, DUNE AND RIPARIAN VEGETATION PROTECTION AND MAINTENANCE

The natural foreshore, dune system, riparian vegetation and tidal wetlands are the primary natural defence from coastal hazards. The natural foreshore, foredunes and riparian vegetation dissipate wave, tidal and fluvial energy and protect the land behind from impacts of erosion and storm tide inundation. A natural foreshore can also recover faster than modified environments from erosion.

Dune protection and maintenance is important to encourage sand to accumulate across the dunes and be stabilised by vegetation. Similarly, riparian vegetation protection and maintenance is important to maintain and protect riverbanks and avoid disturbance, erosion and land loss. In most cases a well vegetated, stable dune system, or foreshore can be achieved through actively reducing disturbance and facilitating native vegetation establishment.

Native vegetation has an important role in dune development and stabilisation. Native vegetation actively captures wind-blown sand, which accelerates the build-up of dune volume and height, which in turn provides increased protection from coastal hazards to the land behind. Similarly, native vegetation has an important role in riverbank stabilisation. Native vegetation actively stabilizes the bank substrate and increases rates of sediment deposition, which in turn provides increased protection from coastal hazards.

The coastline near the Wujal Wujal LGA has coastal dune systems, riparian vegetation and mangroves that provide protection from erosion and inundation to many assets. Active protection and enhancement of these dune systems is an ongoing priority action across the region.

Reduce disturbance

Reducing disturbance to the dune system can be achieved and balanced with access needs through fencing, signage, and providing defined / formalised access points and walkways / boardwalks at the most appropriate locations. Minimising through-traffic across the dune system is important to allow native vegetation to establish and contribute to building the dune system.

Weed removal and native vegetation regeneration

Native vegetation is best adapted to the role of enhancing dune development and stability in different localities. Exotic / weed species can inhibit native vegetation establishment, and therefore controlled weed removal is an important part of dune protection and maintenance. In most locations, controlled weed removal, combined with reduced disturbance, will be sufficient to allow native vegetation to regenerate from existing seed banks.

Revegetation (if required)

In some cases, if the native vegetation seed bank has been diminished due to clearing or other disturbance, revegetation with local species may be required as part of dune protection and maintenance. Vegetation plans can be tailored to consider suitable species, access, views and other site-specific needs. Matting (geo-fabric) and fencing to prevent casual access across the dunes can be used to stabilise dunes while new vegetation establishes.

SHEET 7 TO 8 – ADAPTATION ACTIONS – COASTAL ENGINEERING AND NATURE-BASED SOLUTIONS

SHEET 7 - BEACH NOURISHMENT

Beach nourishment involves providing additional sand to increase the volume of sand on the upper beach.

Sand can be sourced from intertidal zone, quarries, offshore (if appropriate) or other local sand accretion sources. Beach nourishment is typically combined with dune maintenance and protection to enhance resilience to coastal hazards.

Beach nourishment has the benefit of providing increased protection from coastal hazards while maintaining the natural values and aesthetics of the beach and coastline. Beach nourishment is typically achieved through sand scraping or importing sand.

Importing sand

Importing sand to nourish the beach involves sourcing and distributing sand to increase sand volume and build up the dune system. Sand can be placed through a variety of methods, including pumping via a pipeline, sand rainbowing from offshore, or direct profile nourishment and dune nourishment with excavators.

Beach nourishment volumes can be designed to mitigate coastal hazards at specific sites for a number of years. A routine beach nourishment program can often be a more cost-effective adaptation option (with added recreational / aesthetic benefits) for mitigating coastal hazards than last line of defence structures (seawalls).

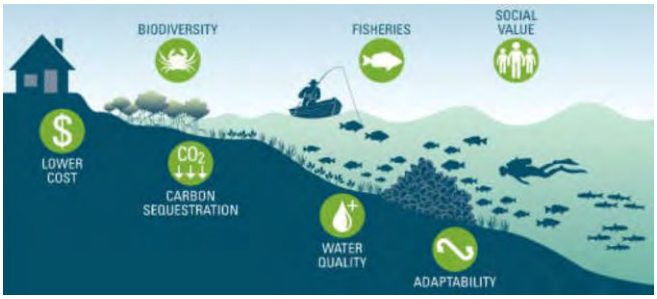
Sand scraping/reprofiling

Whilst not beach nourishment as new sand is not being introduced to the system, sand scraping can offer protection through the use of natural sand. Sand scraping involves mechanically moving sand from the intertidal zone to the dune or upper beach zone, mimicking the natural beach recovery processes (at an accelerated rate). The overall sediment budget of the beach remains the same.

SHEET 7 TO 8 – ADAPTATION ACTIONS – COASTAL ENGINEERING AND NATURE-BASED SOLUTIONS

SHEET 8 – LIVING SHORELINES

Living structures and vegetation can be planted offshore to create a zone where wave energy will break and dissipate prior to reaching the beach. Living shorelines include nearshore vegetation, shoreline vegetation and offshore structures.



Marine plants in the nearshore zone offer many of the same benefits described above. Whilst they can be less resilient to waves, they provide some additional benefits such as carbon sequestration, habitat for a more diverse range of species and intertidal marine plants.

Mangroves have an important role in providing natural dissipation of wave energy. The role of mangrove communities in providing coastal hazard protection is becoming increasingly recognised.

The protection, enhancement, and restoration of mangrove communities along shorelines are becoming a key focus of coastal hazard adaptation initiatives. Where extensive mangrove communities are established, these should be protected and encouraged to expand to provide additional protection for the shoreline from wave energy. This is typically an extension of dune protection and maintenance activities.

Quintel Beach, Lockhart River LGA

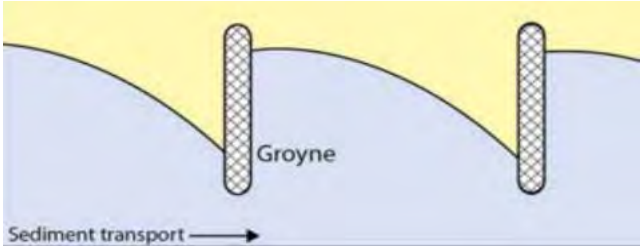
Shoreline vegetation holds together the shoreline and can reduces erosion caused by land-side factors such as runoff, wind-blown erosion and erosion caused by traffic (foot traffic or vehicles)

Artificial reefs can similarly be used to reduce wave energy and erosion of shorelines and are typically composed of base materials such as rock or geo-bags. They are submerged structures that function through wave dissipation and wave rotation, leading to salient growth in the lee of a reef. To a greater extent than breakwaters, artificial reefs can also be used to enhance marine biodiversity and recreational amenity.

Offshore structures can be made of many different material types such as rock, geotextile sand containers, oyster reefs, steel, concrete, timbers, or a combination of some of these.

SHEET 9 - STRUCTURES TO ASSIST WITH SAND RETENTION

Structures can be installed to assist with retaining sand in a specific area of the shoreline. Groynes are the most common structure used for this purpose, extending perpendicular to beach. Groynes are typically combined with beach nourishment to provide the most enduring benefit to the beach.



Groynes intercept the longshore movement of sand and assist to retain sand on the beach between structures. Sand will accumulate to the side of the structure where sediment is moving towards. Some localised erosion can occur on the leeside. Permeable groynes allow water to flow through at reduced velocities, while impermeable groynes block or deflect the current.

Groynes can be constructed from a range of materials including rock, geotextile bags (geo-bags), and other materials (sheet piles, gabions, concrete). The design of rock or geo-bag groynes are most common in Australian marine environments, linked to the durability and availability of materials, suitability for design standards, and aesthetics.

Sand fencing

Sand fencing or brush matting can also be strategically located to encourage sand accumulation in a desired place, generally along the seaward side of existing or newly constructed dunes to promote dune growth. Although it should be noted that this is not a preferred option on its own and vegetation is preferred.

Rock groynes

Groynes constructed of rock become relatively permanent features of the landscape. Rock groynes are typically used to assist with retaining large volumes of sand in a localised area on an ongoing basis.

Geo-bag groynes

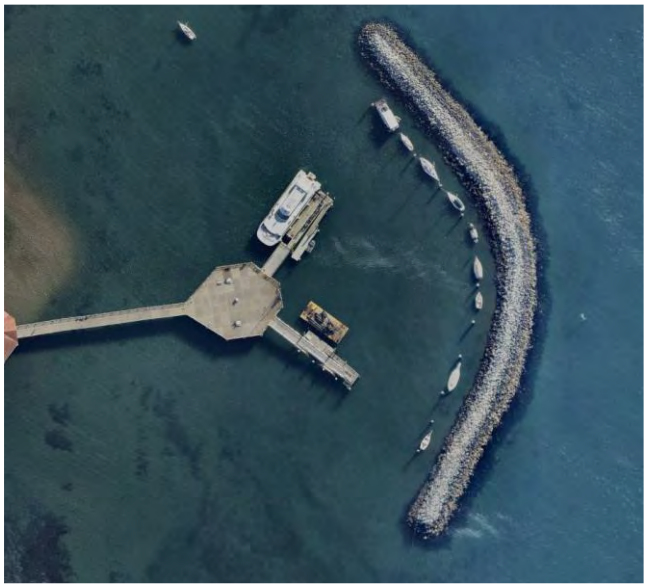
Geo-bag groynes are becoming increasingly more favourable in coastal management. Groynes are constructed of large geo-textile containers (bags) filled with sand. These groynes will be periodically covered and exposed. Geo-bags have a shorter design life than rock, however they are more suited to adaptive management (can be removed or changed if the management approach changes).

SHEET 10 - STRUCTURES TO DISSIPATE WAVE ENERGY

Structures can be installed offshore to create a zone where wave energy will break and dissipate prior to reaching the beach. These structures include breakwaters.

Breakwaters are erosion control structures most frequently placed parallel to the coast. Breakwaters are typically constructed using rock or geo-bags. **Exposed breakwaters** have a crest that rises above the surface of the water, whereas **submerged breakwaters** do not.

Offshore breakwater
An offshore structure that is not connected to the beach. Offshore breakwaters function by sheltering the shoreline in its lee side by providing a “wave shadow”. Reducing the wave energy landward of the breakwater helps to minimise waves from moving sand along the shoreline.



Floating breakwater is an alternative option to the conventional breakwater and offers similar level of protection from wave attack. It is typical made of reinforced concrete pontoons with polystyrene core. Floating breakwater can be effective in coastal areas with mild environment conditions. The advantage of this option is that it has minimal interaction with water circulation and fish migration, and it is independent from tidal range.

Submerged breakwater
Similar to an offshore breakwater, a submerged breakwater also reduces the wave energy impacting the beach. Submerged breakwaters often have greater habitat value and encourage marine life to establish, mimicking a more natural system. Breakwaters assist with sand retention in areas prone to cross-shore drift.

SHEET 11 - LAST LINE OF DEFENCE STRUCTURES

Last line of defence structures can be used to protect critical assets from coastal hazards. These structures are typically in the form of a seawall that provides a barrier between the ocean and adjacent coastal land.

Seawalls can be vertical or sloped structures and are typically made of rock, concrete or geo-textile containers (geo-bags), and can be designed as buried revetments or exposed walls.

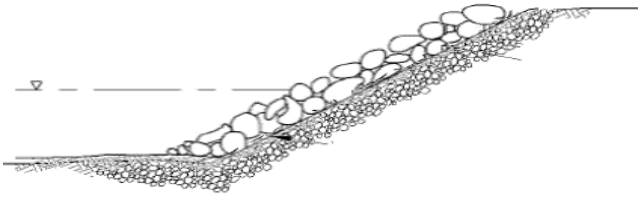


Figure adapted from USACE Coastal Engineering manual

Seawalls are normally very large structures designed to withstand extreme events. A seawall structure must be appropriately engineered to ensure the design (size, height, grade, layers, filters and material) meets the required standards to provide sufficient protection from the local wave climate.

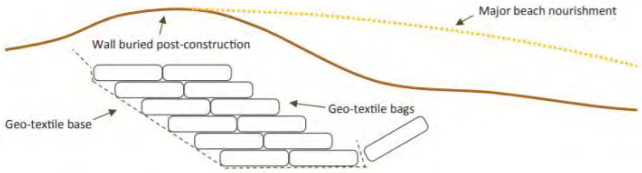
Exposed seawall

An exposed seawall is a hard barrier to wave energy. Unlike a dune system, a seawall has limited capacity to dissipate (spread out and absorb) energy when it hits the wall. Consequently, waves refract off the seawall and can scour sand from the base, resulting in a change in, or progressive loss of the sandy beach.

An exposed seawall will change the natural aesthetics of the beach and coastline. Exposed seawalls are typically used only as a last line of defence to protect critical assets (a last access road or other critical infrastructure) and in urbanised foreshore environments.

Buried seawall

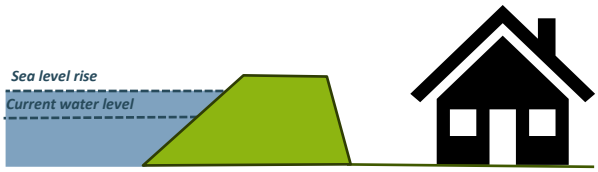
In some cases, seawalls can be constructed as buried revetments. In these cases, the wall is buried and the dune system revegetated, and effort is made to ensure sufficient sand is retained to keep the wall buried (in all except extreme events).



A buried seawall provides protection from extreme events while maintaining natural beach aesthetics, however it may involve additional costs of periodic beach nourishment to ensure the wall remains buried.

SHEET 12 - STRUCTURES TO MINIMISE FLOODING

Structures such as levees and storm surge barriers can be used to protect low-lying coastal land from inundation.



Levees take the form of elevated mounds or walls that can be made of earth, rock, concrete, geo-fabric bags or other materials.

The term levee is often used to refer to a structure that prevents water from flooding a specific area. Levees help to prevent land from being inundated from flood events (land that in the absence of the levee would only be occasionally inundated).

Storm surge barriers (tidal barrages or gates) are physical barriers that prevent storm surges travelling inland along rivers, lagoons, inlets or other waterways.

Storm surge barriers can generally be opened and closed and are most effectively implemented at narrow tidal inlets. They can vary in size from a flow valve on pipes and culverts to large scale barrages.

Attachment 4. Preliminary asset costings

Table 16. Unit rates by asset type – Wujal Wujal Aboriginal Shire Council

Data type	Layer name	Asset type	Indicative (low) rate	Indicative (mid) rate	Indicative (high) rate	Units	Reference	Comment
Polygon	Buildings and facilities	Commercial	4,437	4,608	4,779	$ / sqm	Rawlinsons (pg. 20)	Administration office, single storey
Polygon	Buildings and facilities	Community Centre	4,180	5,472	6,764	$ / sqm	Rawlinsons (pg. 20)	Civic centre
Polygon	Buildings and facilities	Place Of Worship	3,401	5,691	7,980	$ / sqm	Rawlinsons (pg. 20)	Chapel, chrich, synagogue
Polygon	Buildings and facilities	Education Facility	3,753	4,166	4,579	$ / sqm	Rawlinsons (pg. 23)	Secondary School Overall Max. 3 Storeys
Polygon	Buildings and facilities	State Emergency Service Facility	4,779	4,964	5,149	$ / sqm	Rawlinsons (pg. 21)	Fire station suburban
Polygon	Buildings and facilities	Health and Medical Facility	4,879	5,068	5,257	$ / sqm	Rawlinsons 2023 (pg.26)	Multi purpose health centre
Polygon	Buildings and facilities	Industrial facility	2,936	6,247	9,559	$ / sqm	https://www.bmtqs.com.au/construction-cost-table	Low based on low cost industrial warehouse, high based on 8-level office building.
Polygon	Buildings and facilities	House	3,211	5,074	6,937	$ / sqm	https://www.bmtqs.com.au/construction-cost-table	Low based on low cost 3BR weatherboard home single level, high based on high cost 4BR full brick two level home.
Polygon	Buildings and facilities	Retirement Village	3,211	5,074	6,937	$ / sqm	https://www.bmtqs.com.au/construction-cost-table	Low based on low cost 3BR weatherboard home single level, high based on high cost 4BR full brick two level home.
Polygon	Land, environment, and culture	Marsh/wetland	5	8	13	$ / sqm	Natural Capital Economics (2018)	Benefit transfer for mangrove ecosystem service values. Capitalised with 7% discount rate.
Line	Transport	Local	808	846	884	$ / m	Rawlinsons (pg.721)	Suburban road 8m wide
Line	Utilities	Cable	16	20	23	$ / m	Rawlinsons (pg. 557)	Assume copper cable 25sqmm (19/1.35)
Point	Utilities	Electrical box	10,260	11,970	13,680	No.	Rawlinsons (Pg. 522)	Assumed main control unit - controlling 1 to 8 items of plant
Line	Utilities	Pipework	192	451	709	$ / m	Rawlinsons (Pg. 495)	FRC non pressure pipe 225m to 750mm

Data type	Layer name	Asset type	Indicative (low) rate	Indicative (mid) rate	Indicative (high) rate	Units	Reference	Comment
Line	Utilities	Sewer Gravity Main	545	742	938	$ / m	Rawlinsons (pg. 491)	CAST IRON Access door / short pipe (full range)
Line	Utilities	Sewer Main	192	336	480	$ / m	Rawlinsons (Pg. 486)	PVC pipe with cast iron (class 20): 100mm to 200mm
Line	Utilities	Sewer Rising Main	545	742	938	$ / m	Rawlinsons (pg. 491)	CAST IRON Access door / short pipe (full range)
Line	Utilities	Culvert	506	585	663	$ / m	Rawlinsons (Pg. 718)	Culverts: Precast concrete pipe Class 2 (450mm to 600mm)
Line	Utilities	Drain	371	753	1,134	$ / m	Rawlinsons (Pg. 500)	Medium duty channels (AS 3996 Class C-D): 100mm to 300mm deep (full range)
Line	Utilities	Floodgate pipe	506	585	663	$ / m	Rawlinsons (Pg. 718)	Culverts: Precast concrete pipe Class 2 (450mm to 600mm)
Point	Utilities	Manhole	3,040	3,610	4,180	No.	Rawlinsons (Pg. 502)	Manhole 1000 to 1100mm dia (1000mm to 2000mm deep)
Line	Utilities	Water Main	142	436	731	$ / m	Rawlinsons (pg. 161)	Service distribution pipe (water / fire / fuel gas), with fittings, buried in light / sand / clay ground 600mm to 1000mm deep. 25mm dia copper as low, 150mm dia copper as high
Point	Utilities	Hydrant	1,976	2,470	2,964	No.	Rawlinsons (Pg. 667)	Standard spring fire hydrant
Point	Utilities	Water valve	437	1,762	3,088	No.	Rawlinsons (Pg. 624)	Industrial/Heavy Commercial Butterfly Valves 50mm to 200mm
Line	Utilities	Fence	86	171	257	$ / m	Rawlinsons (Pg. 226)	1200mm high fence of galvanised welded mesh roll top panels and tubular posts
Point	Utilities	Property pole	1,311	2,271	3,230	No.	Rawlinsons (Pg. 534)	Mains pole: 100-125 dia.

*The rates were adjusted using a regional index of 190 as per Rawlinsons (2023). This means that cost of replacement in Wujal Wujal would be 1.9 times that of Brisbane.

Table 17. Summary of stage damage values used for estimating storm-tide impacts – Wujal Wujal Aboriginal Shire Council *

Height over floor (m)	Residential ($/m2)	Industrial ($/m2)	Other commercial ($/m2)
0.0	$0	$0	$0
0.1	$2,528	$221	$442
0.2	$2,691	$331	$552
0.3	$2,854	$442	$663
0.4	$2,854	$552	$773
0.5	$2,854	$663	$883
0.6	$2,936	$795	$1,060
0.7	$3,018	$928	$1,237
0.8	$3,099	$1,060	$1,414
0.9	$3,181	$1,193	$1,590
1.0	$3,181	$1,325	$1,679
1.1	$3,262	$1,491	$1,921
1.2	$3,344	$1,656	$2,142
1.3	$3,425	$1,822	$2,474
1.4	$3,507	$1,988	$2,761
1.5	$3,670	$2,153	$3,092

*The rates were adjusted using a regional index of 190 as per Rawlinsons (2023). This means that cost of replacement in Wujal Wujal would be 1.90 times that of Brisbane.

Attachment 5. On country engagement findings

First Nations Coastal Hazard Study Engagement Team

There was a split project team for this study with a group of people involved in the engagement or community intel side of the project team and others undertaking a desktop gap analysis of existing studies and data that relate to the six shires. These functions overlapped and there was close collaboration across the project team.

The First Nations Coastal Hazard Study Engagement Team (the team) comprised the following people from Alluvium and the Department of Seniors, Disability Services and Aboriginal and Torres Strait Islander Partnerships (DSDSATSIP):

Ashleigh Farada
Billy Howitt
Ricardo Sandoval
Marika Seden
Lauren Varley

Each community is visited initially by 2-3 team members.

1 Key community consults

The identifiers attributed to the people included in this section are not definitive and there is no intention to disrespect, label or misrepresent persons or their interests. The team has applied these identifiers simply as a way to link persons with the separate conversations they had with them, as a prompt or reminder of that person and their story. The identifiers also generally algin with how persons identified themselves through their conversations, how they were referred to [to the team] by others in their community and/or their workplace role title and responsibilities.

Wujal Wujal

- Marie Shipton – community Elder, Dabu Jajikal Aboriginal Corporation
- Chris Patterson – CEO, Dabu Jajikal Aboriginal Corporation
- Kiley Hanslow - Chief Executive Officer (CEO), Wujal Wujal Aboriginal Shire Council (WWASC)
- Allan Baird – community Elder
- Victor Mills – Director Works & Building Services, WWASC
- Kylie Mills – Coordinator, Binal Mungka Bayan Indigenous Knowledge Centre
- Skye
- Doreen Ball – Elder, storyteller & member of Wujal Wujal Justice Group
- Sharon Anderson – NDIS Remote Community Connector
- Joh Anthonis - CEO/Coordinator, Wujal Wujal Justice Group
- Keryl Tayley – community member
- Roderick Nunn – community Elder
- Mervyn Nunn – community Elder
- Rosie Olber – Artist & community Elder
- Anne Nunn – Artist & community Elder
- Lila Creek – Artist & community Elder
- Council works crew

2 Key points discussed.

- Several community members raised concerns about four-wheel driving on Weary Bay Beach and the negative impact that this is having on the beach.
- Concerns over rainfall events and ongoing anxiety amongst community members regarding the flooding event that occurred in 2019 and fears of this happening again. Temporary structures that were used for cultural purposes have not been replaced since the 2019 flood due to concerns about flood events in the future destroying them.
- Concerns with interference with the natural flow of the Bloomfield River above the falls by industry, government and other organisations trying to address energy concerns that community members do not resonate with.
- Concerns raised over freehold land sold along the coastline and the associate impact of development on areas of cultural significance such as burial sites. Community would like real estate agents and other associated parties to have a greater understanding of the cultural heritage legalisation and their duty of care responsibilities.
- Council highlighted those conversations with Douglas Shire Council (DSC) had begun in relation to extending the WWASC LGA boundary to include some secondary roads and areas of cultural, historical and residential areas that are still of importance to community. These areas are currently maintained by WWASC and the rangers. Additional discussion had begun about making the secondary access road which lies in the DSC LGA to be changed to primary access road for WWASC and for it to be upgraded.
- Concerns about the changes in the weather patterns and the impact it has on the availability of bush foods and how this is inhibiting opportunities to pass on culture and stories.
- Ayton Wharf has high significance for access and service during emergency disaster events when the community of Wujal Wujal is cut off and road access to the area is restricted even for short periods. In the past it has been used for helicopter and boat access by both emergency and medical services to provide critical support to the Wujal Wujal community. Currently, Ayton Wharf and access to it is located entirely within a privately owned freehold parcel of land. The community raised concerns about recent attempts by the owner (or land manager) to restrict community access.
- Ayton Wharf has significant cultural and historical importance, whereby it was used as a setting off point for tribes, to cross the river and have cultural exchange with other tribes. Additionally, this area is a popular fishing, particularly amongst Elders and woman. The area is also used to pass on cultural knowledge.