

5.2. STORM TIDE INUNDATION METHODOLOGY STUDY

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RECOMMENDATION

That Council adopts in principle the draft Storm Tide Inundation Methodologies Study prepared by JBA Pacific Scientists and Engineers Pty Ltd, with the final version being reviewed and approved by the Chief Executive Officer and such final version being considered as Council's best practise position for determining 1% AEP storm tide inundation for the year 2100 having regard to a 0.8m AHD sea level rise.

EXECUTIVE SUMMARY

The purpose of the Douglas Shire Storm Tide Inundation Methodologies Study is to review and analyse different methodologies, identify a best practise model for the Shire's coastal urban areas, run this preferred best practise model and calculate the minimum heights for the 1% AEP storm tide inundation for the year 2100 having regard to a 0.8m AHD sea level rise for urban coastal properties. The Study also aimed to achieved research and data that could be utilised by other coastal areas throughout the State. The study aimed at achieving a higher level of certainty for the community.

The Study outcomes provide levels for current day storm tide inundation 1% AEP events to assist with disaster management as well as levels for the future year 2100 event that is relevant to Planning Scheme considerations. In addition to the study Council has also gained specific site levels for individual properties in urban areas along the coast. The increased number of attributes included in the model has reduced uncertainty and identified a significant number of properties that can be removed from the mapped overlay areas. While the Study has been presented in a draft form and requires minor modification of formatting and editing, the calculated levels are not technically challenged.

Council has gained benefit from the increased knowledge in this area of coastal engineering. Those wishing to build a house along the coastline will have a greater understanding about the potential risk of storm tide and the study increases the Shire's knowledge and resilience to the extreme events of storm tide inundation.

BACKGROUND

Council's current 2018 Planning Scheme includes a storm tide inundation overlay code, as required by the State Planning Policy, having regard to a sea level rise of 0.8m AHD for the year 2100. The associated Planning Scheme Policy references the Cairns Region Storm Tide Inundation Study, initially prepared in 2013 and reissued in 2017 as part of the Coastal hazard Adaptation Strategy (CHAS) project, by the well qualified coastal Engineers BMT WMB.

This study, funded by Cairns Regional Council, was quite broad scale and based on a bathymetric model that assumed a standard beach profile and a similar coast throughout the Shire.

The Planning Scheme Overlay code is accompanied by maps that reflected the best knowledge held to date, being the BMT WBM study. However, this data is now quite old, known to be very conservative and includes a number of uncertainties requiring high freeboard levels. In addition, there is a significant difference in the required immunity level for areas where wave runup will occur (being a distance 200m from the front dune) to the areas where wave runup does not occur (land beyond the 200m distance from the front dune). However, in reality the impact of wave runup is graduated away from the frontal dune.

On 2 July 2017 the new Planning Act 2016 came into effect as part of the Queensland Government's commitment to delivering planning reform across the State and the State Planning Policies reinstated the need to consider the 1% storm tide inundation level for the year 2100 with a 0.8m sea level rise. In the same year, the Department of State Development Manufacturing, Infrastructure and Planning invited local governments to apply for grants under the Department's Round 2 of the Innovation and Improvement Fund to promote planning improvement and innovation across Queensland. The fund "provides local governments with opportunities to explore and deliver planning innovation and improvement projects that will contribute to creating a better planning system for all Queenslanders."

While significant information has been applied on historic cyclonic activity and understanding of cyclone behaviour (pattern of movement, wind speed etc.), the information available on coastal impact and in particular storm tide inundation is limited. Council officers are aware of the general need for the research for storm tide inundation methodologies to be advanced, in particular, due to the possible impacts of storm tide inundation on our unique coast on which a number of our urban communities have been established.

Council officers successfully achieved a funding grant under the Innovation and Improvement fund grants to firstly investigate a number of different methodologies developed by coastal engineers to identify a more accurate model coastal hazard for storm tide inundation; and secondly apply the best model to the Shire's coastline to identify more refined minimum levels.

It had been anticipated the Study would be completed by an earlier date, however due to Covid-19 the project start was delayed.

REPORTED PROJECT

The finalised project brief was distributed to a select number of Queensland and Australian expert coastal engineering firms. JB Pacific (JBP) Scientists and Engineers were chosen as the successful provider from a group of experienced and qualified Coastal Engineers to undertake the project and have delivered a draft report, together with examples of animated modelling and commentary on future planning scheme amendments.

The project identified characteristics of a coast that can have significant impacts on extent of hazard, such as coastal profile, geomorphology, vegetation, consideration of coral reef and environmental form (e.g. inlets). The variation of the Douglas Shire coastal type ranges from granite rock cliff faces, to rocky foreshores and various profiles sandy beaches. They classified the Douglas shoreline into different shoreline types and vegetation zones: natural beach and dunes; wetlands and marshlands, including estuaries; rocky outcrops, cliffs and hard structures; and mangroves.

The second stage of the project analysed different Australian and international methodologies. Although the project brief required the consultant to consider at least three different storm tide models, other than the bathymetry model, the consultant is assessing four models.

The analysis of the different methodologies was internationally peer reviewed by the separate entity JBA Consulting who are based in Yorkshire in the UK, with engineers participating from England, Scotland and Singapore.

While the Study outcomes can be applied directly to the Douglas Shire Council area, there is a greater applicability of the study to enable other Council's to then choose the best methodology for their respective coastline types.

The third stage of the project applied this best practise model to identify current day event levels as well as future levels. These levels were reported by maps in the Study together with a data set for Council's mapping system for individual properties. The project has refined data for required minimal levels for the coastal areas, understanding and considerations of difference with and without wave run-up, identifying where the wave run drops off and how and understanding necessary freeboards (margins of error) giving due respect to variables. The present day and future storm tide inundation maps from the study are included in Appendix 1. The new Study recommends a nominal 0.5m freeboard and the following table details the range of levels in the key coastal communities. The new range of levels within a community reflects the variables applicable to particular properties and coastal types.

Table 1. – Present day storm tide level range for key communities, including 0.5m freeboard

Locality	Storm tide level range (present day, 1% AEP), mAHD	Faceboard level (storm tide for present day, 1% AEP, plus 0.5m), mAHD	Storm tide level range (2100 0.8m SLR, 1% AEP), mAHD	Freeboard level (storm tide for 2100 0.8m SLR, 1% AEP, plus 0.5m), mAHD
Port Douglas	1.21 – 3.06	1.71 – 3.56	2.66 – 3.08	3.16 – 3.58
Cooya	2.13 – 2.64	2.63 – 3.14	2.85 – 3.94	3.35 – 4.44
Newell	1.53 – 4.00	2.03 – 4.50	2.34 – 4.08	2.84 – 4.58
Wonga	1.56 – 3.10	2.06 – 3.60	1.95 – 3.38	2.45 – 3.88
Degarra	1.04 – 1.77	1.54 – 2.27	1.28 – 2.62	1.78 – 3.12

The final stage of the project, separate to the reported Engineering Study, provides a review for a future planning scheme review for the inclusion of the Study in a Scheme Amendment. The project outcomes result in a significant number of properties over which the hazard mapping can be removed. This matter will be reported separately to Council.

The review of the methodologies and consideration of coastline types is transferable to other coastlines throughout the State and will enable local planning and improvements throughout Queensland. The outcomes for the study provide more precise data for Douglas Shire properties and how potential storm tides will impact them.

FINANCIAL/RESOURCE IMPLICATIONS

The project has been fully funded by the Queensland State Government grant with Council's role as supervising the procurement brief, reviewing quotes, engagement of a suitably qualified professional service provider and managing the project.

Any resultant changes necessary to the Planning Scheme, as an outcome of the project have always been identified as Council's responsibility. Without the Queensland State Government funding the project could not have been progressed.

Council's commitment has been a minimal cost related to officer resources that have been utilised under normal wage costs. The adaptation of the data into a self-activating reporting tool, available 24/7 by providing a property address is being investigated. The costs associated with this new tool are anticipated to be sourced from the balance of the available Innovation Fund grant and supplemented with funds from within the Council's existing budget.

RISK MANAGEMENT IMPLICATIONS

No risk implications to Council have been identified in the reported Study. Considerations of a future planning scheme amendment to incorporate the revised overlay hazard areas will be reported separately to Council.

SUSTAINABILITY IMPLICATIONS

- Economic:** The Study provides greater certainty for the community. The reduction in the number of properties affected by Storm tide inundation reduces the economic cost to develop these lots.
- Environmental:** The Study identified the significance of coastal vegetation to reduce the impact of storm tide inundation. The reduced need to fill future lots for development is also considered a good environmental outcome.
- Social:** The greater certainty for development levels increases the community's resilience to this hazard. The improved learnings through the models for present day levels increases the community's awareness and understanding of possible present day impacts. The modelling will eventually be incorporated into Council's Storm Tide Evacuation mapping and used in disaster management decisions.

CORPORATE/OPERATIONAL PLAN, POLICY REFERENCE

This report has been prepared in accordance with the following:

Corporate Plan 2019-2024 Initiatives:

Theme 1 - Celebrating Our Communities

Douglas Shire Council embraces the diversity of our communities and values the contribution that all people make to the Shire. We recognise that it is a core strength of the region. We acknowledge our past so that it may guide us in the future. We recognise the wrongs done to our Indigenous community and we actively seek to reconcile so that we may all benefit from and enjoy our Shire. We acknowledge early European settlers who forged an agricultural base for our economy and we welcome all new arrivals as part of our broader community.

Goal 3 - We will develop programs that promote health, well-being and safety in the community.

Theme 3 - Leading Environmental Stewardship

Our visitors and residents deeply value the unparalleled environment in which we live. We recognise our responsibility in protecting and preserving our natural world for generations to come. We understand the strong link between the environment and the economy: they are interdependent. Douglas Shire will be at the forefront of environmental protection by developing strategies, setting policies, and working with all stakeholders to become the envy of and to inspire locations across Australia and the World.

Goal 1 - *We will protect our sensitive environment and plan for the impact of climate change.*

Goal 4 - *We will partner with the community to educate and monitor.*

Theme 4 - Inclusive Engagement, Planning and Partnerships

In delivering for our communities, economy and environment, Douglas Shire will ensure open and transparent engagement and communication. We will develop robust strategic plans and we will partner with our community and key stakeholders.

Goal 2 - *We will develop forward looking strategies for the future of our communities and we will ensure balanced and appropriate planning decisions.*

Operational Plan 2020-2021 Actions:

4.2.1 - *Engage with key stakeholders including building certifiers, planning consultants and surveyors on identifying areas for improvement within the current Planning Scheme.*

5.4.1 - *Deliver and implement community disaster awareness and resilience education. Continue to seek existing and alternative funding to stimulate community cohesion and strengthen resilience.*

5.4.2 - *Continue to implement community flood warning infrastructure (software and hardware) to increase disaster information and awareness.*

COUNCIL'S ROLE

Council can play a number of different roles in certain circumstances and it is important to be clear about which role is appropriate for a specific purpose or circumstance. The implementation of actions will be a collective effort and Council's involvement will vary from information only through to full responsibility for delivery.

The following areas outline where Council has a clear responsibility to act:

Advocate	Council makes representation on behalf of the community on important issues, funding opportunities, projects and programs. Council will use its influence to seek the best outcomes for the community.
Information Provider	Council provides the community with important information on services, events, policies, rules, strategies, and any other relevant data that helps the community to stay informed. In performing this role, Council seeks to be open and transparent.
Regulator	Council has a number of statutory obligations detailed in numerous regulations and legislative Acts. Council also makes local laws to ensure that the Shire is well governed. In fulfilling its role as regulator, Council will utilise an outcomes based approach that balances the needs of the community with social and natural justice.

CONSULTATION

Internal: Planning officers and Council's Sustainability Officer.

External: Queensland Government has sponsored the project and has been provided with monthly progress reports.

COMMUNITY ENGAGEMENT

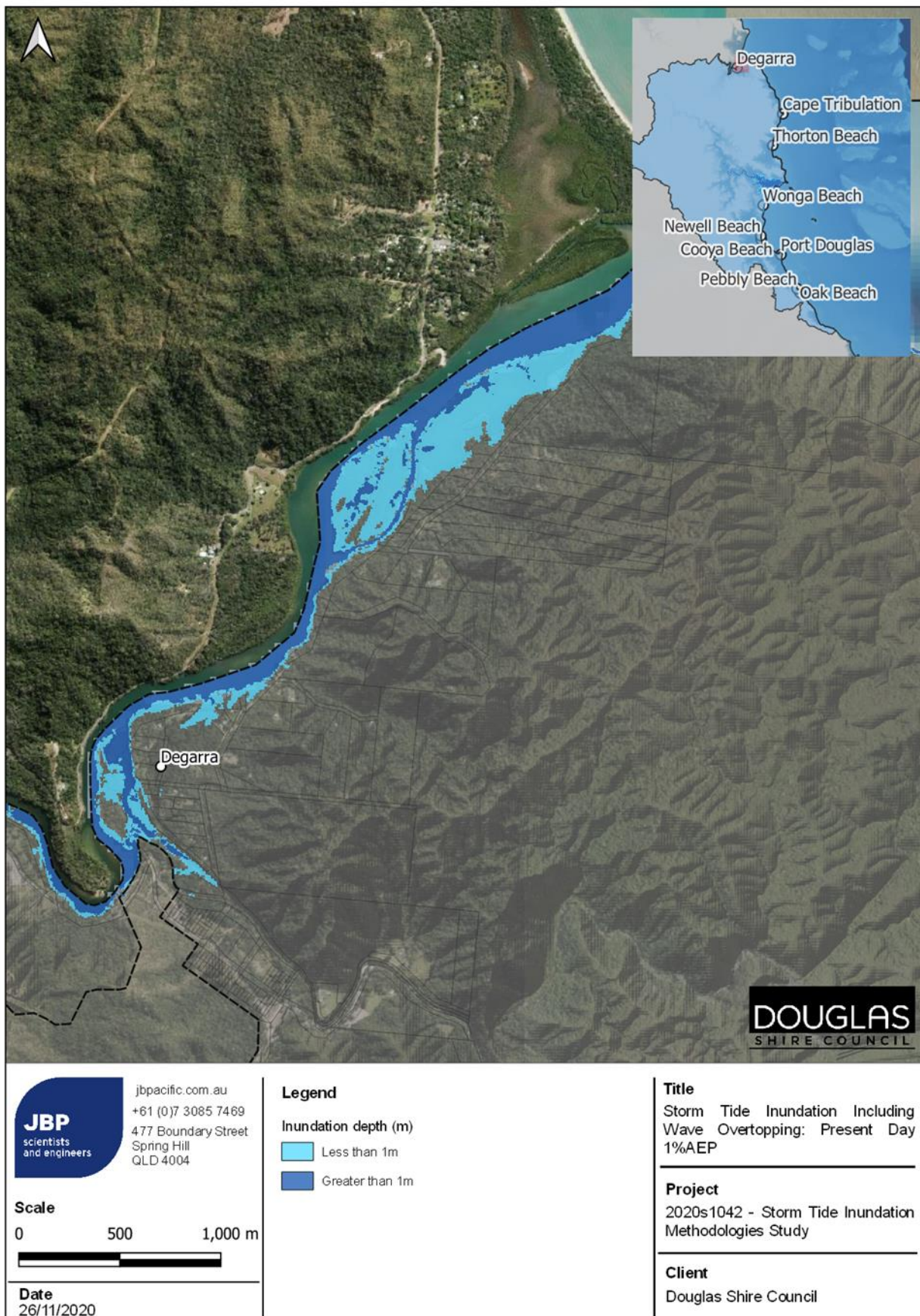
None. Any proposed Planning Scheme Amendments will be subject to separate reporting to Council and will consider requirements for public notification under the minister's guidelines and Rules for Planning Scheme Amendments.

ATTACHMENTS

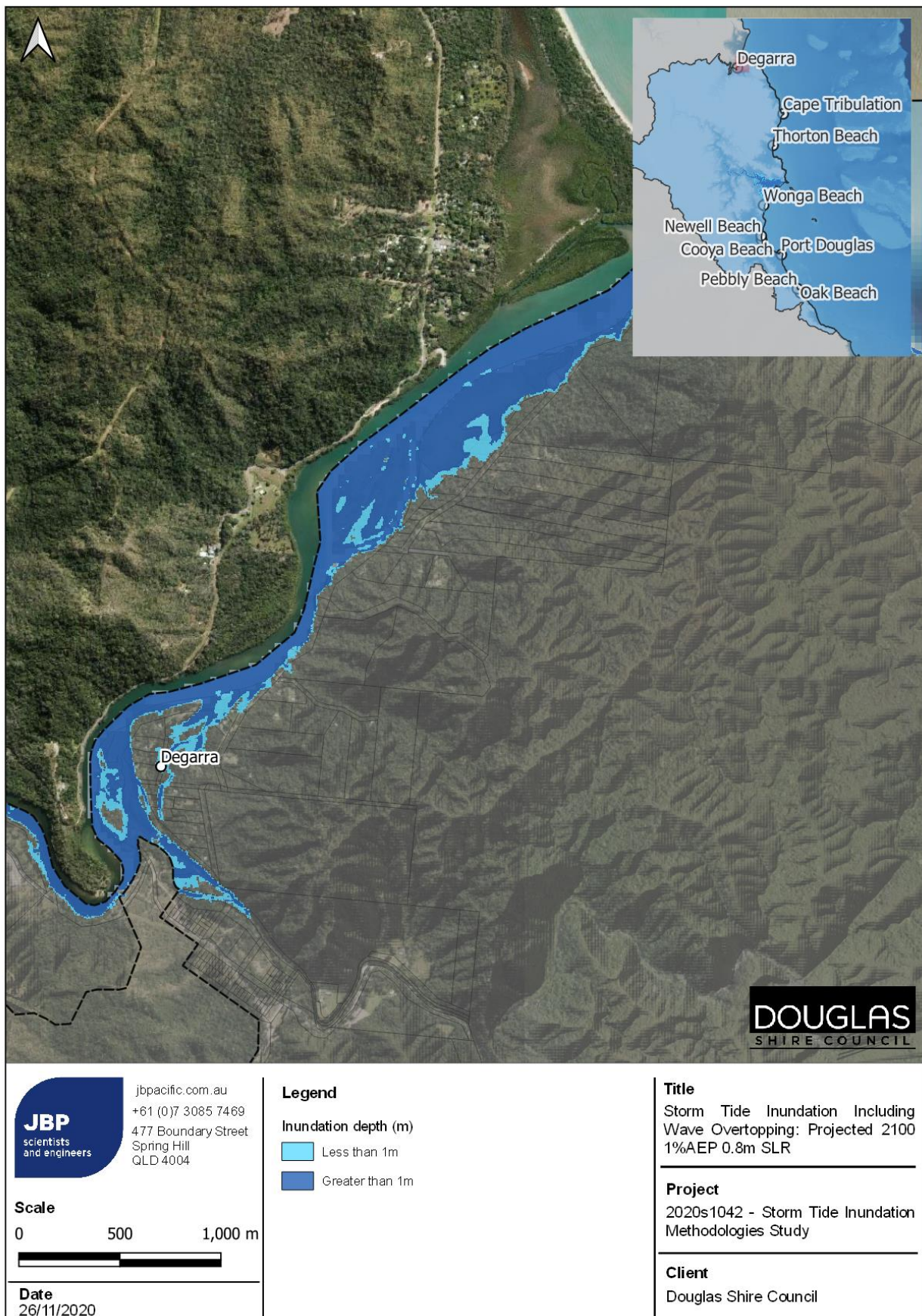
1. Storm Tide Inundation Study Attachment 1 [5.2.1 - 14 pages]

Appendix A: 1% AEP Storm Tide Mapping

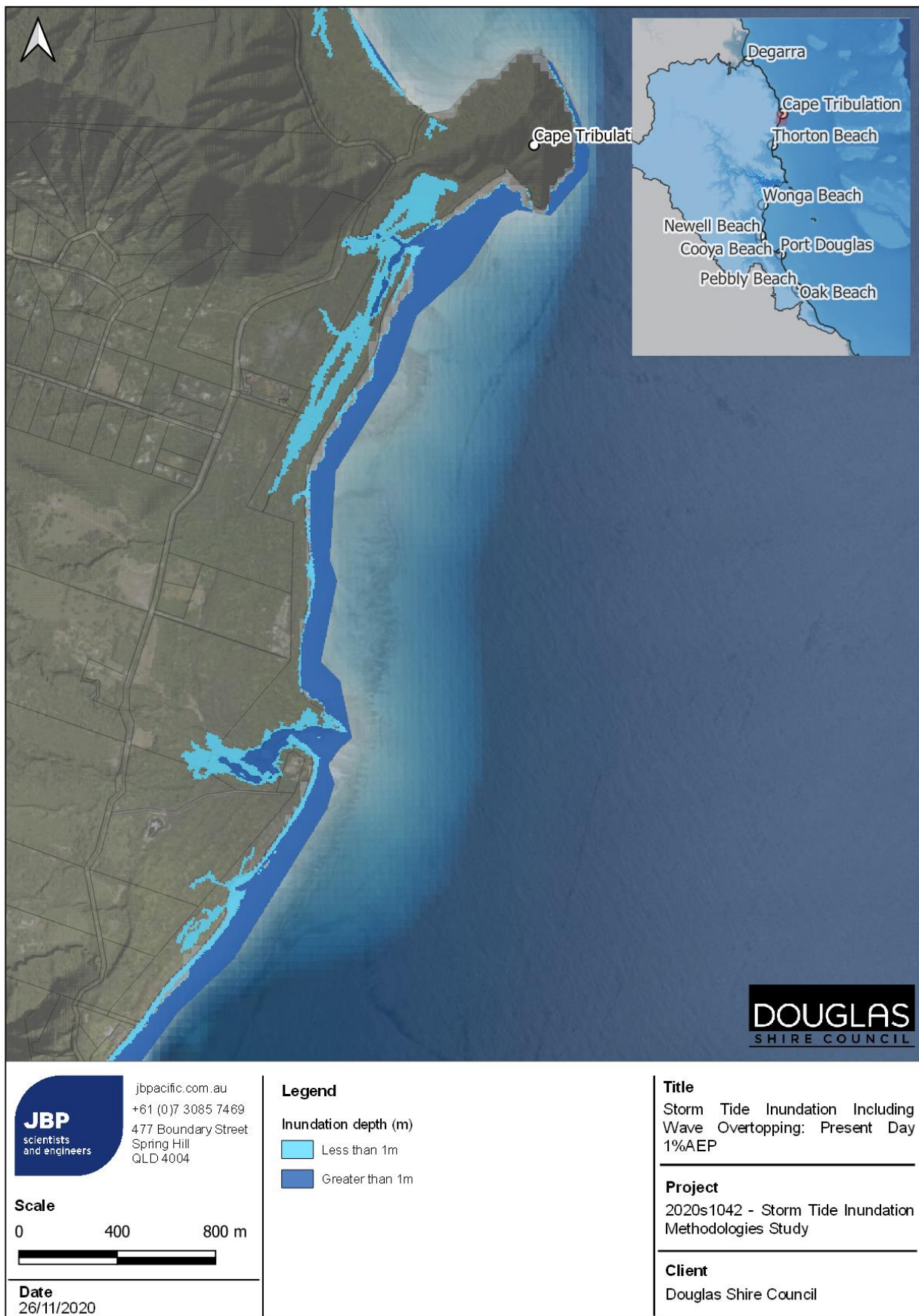
Degarra Domain Present Day 100yr Depth Map



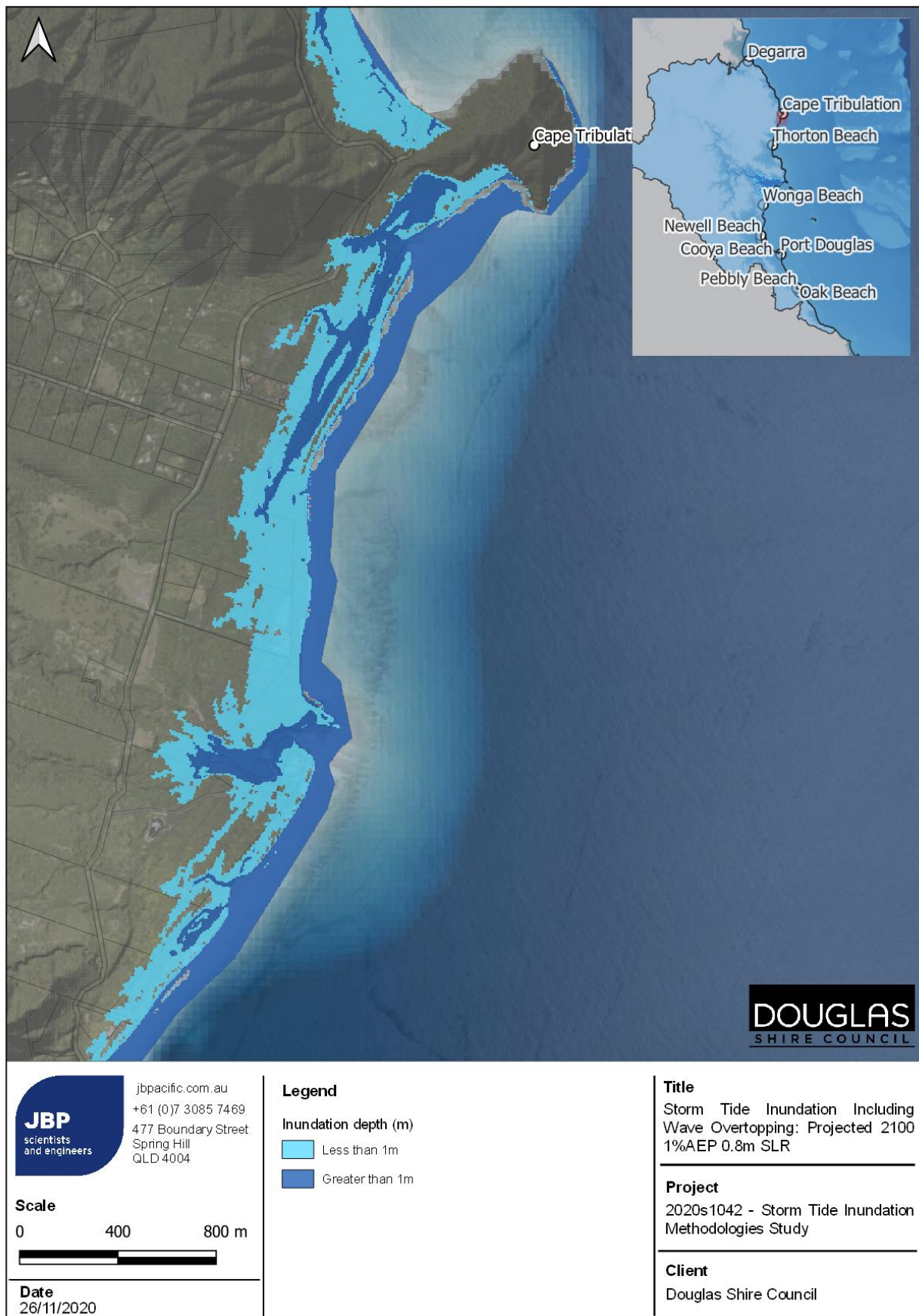
Degarra Domain Future 100yr Depth Map



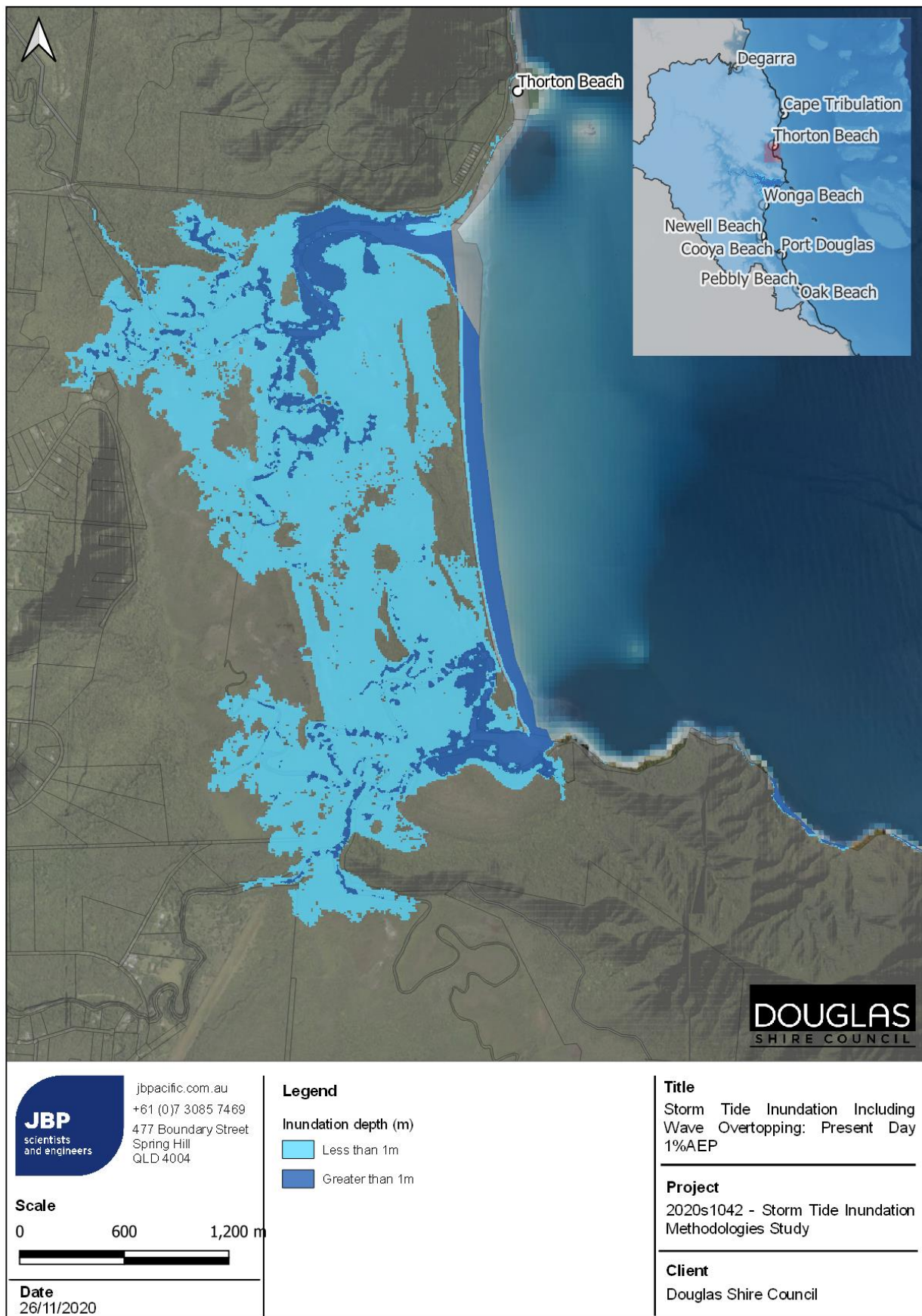
Cape Tribulation Domain Present Day 100yr Depth Map



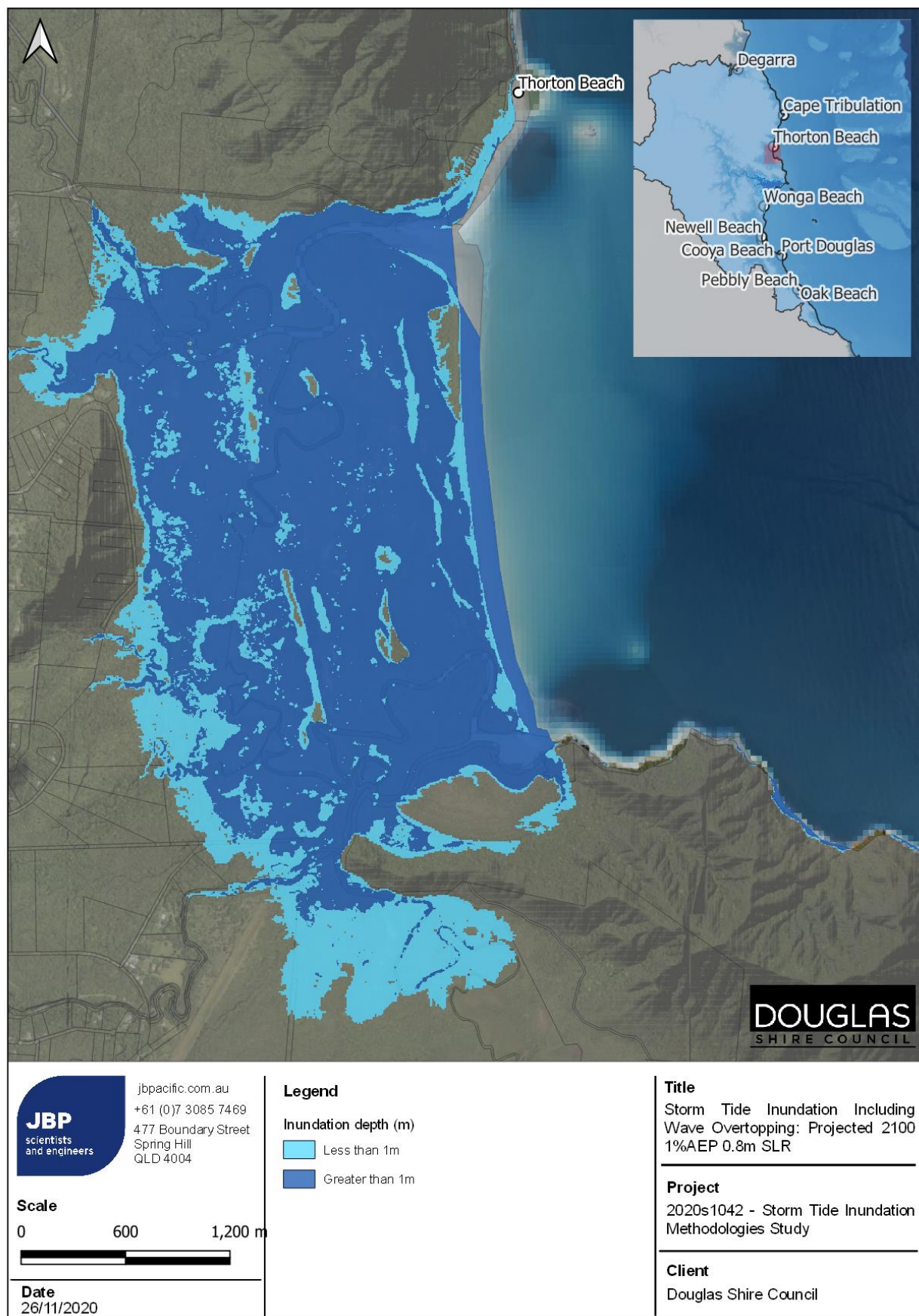
Cape Tribulation Domain Future 100yr Depth Map



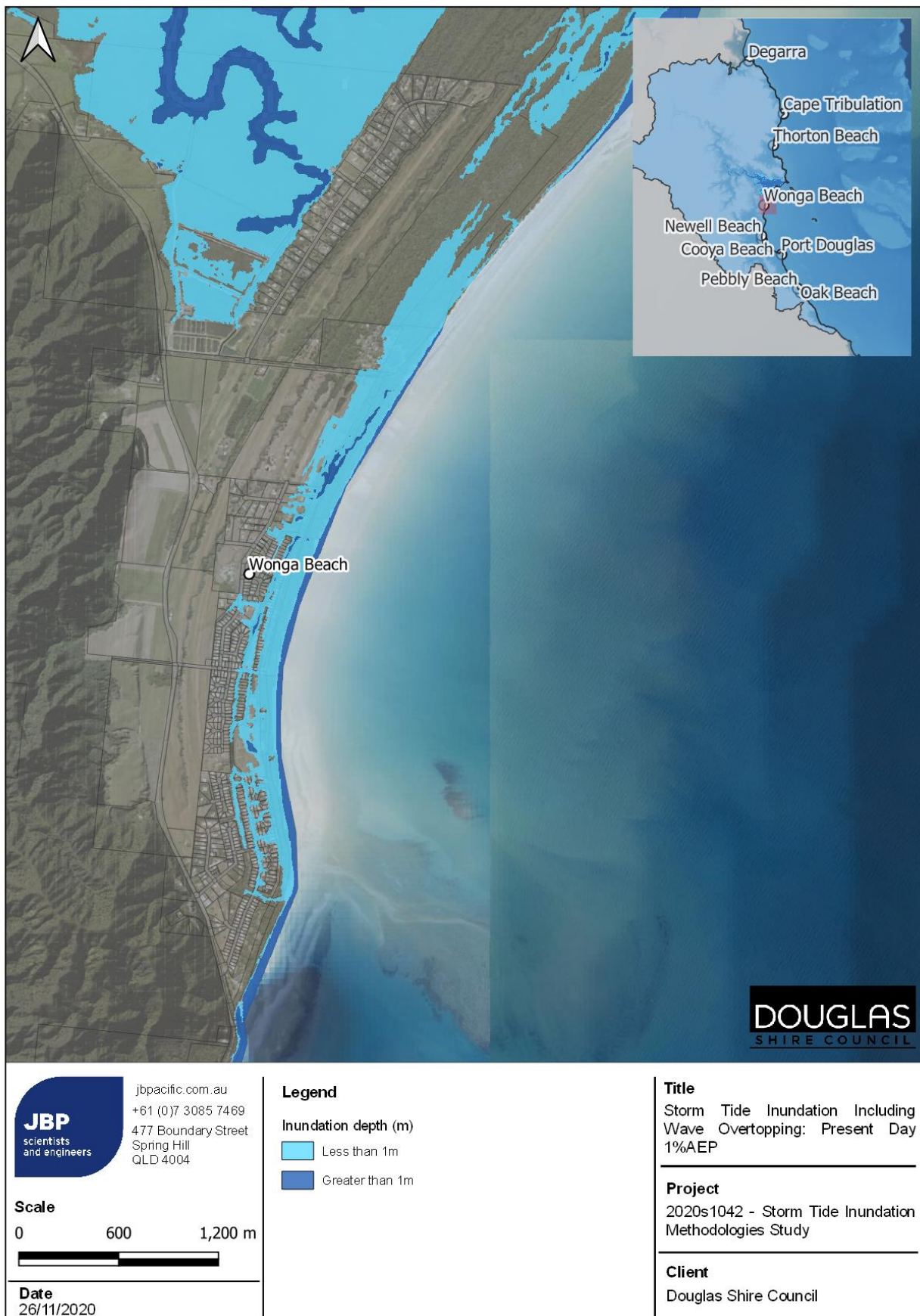
Thornton Domain Present Day 100yr Depth Map



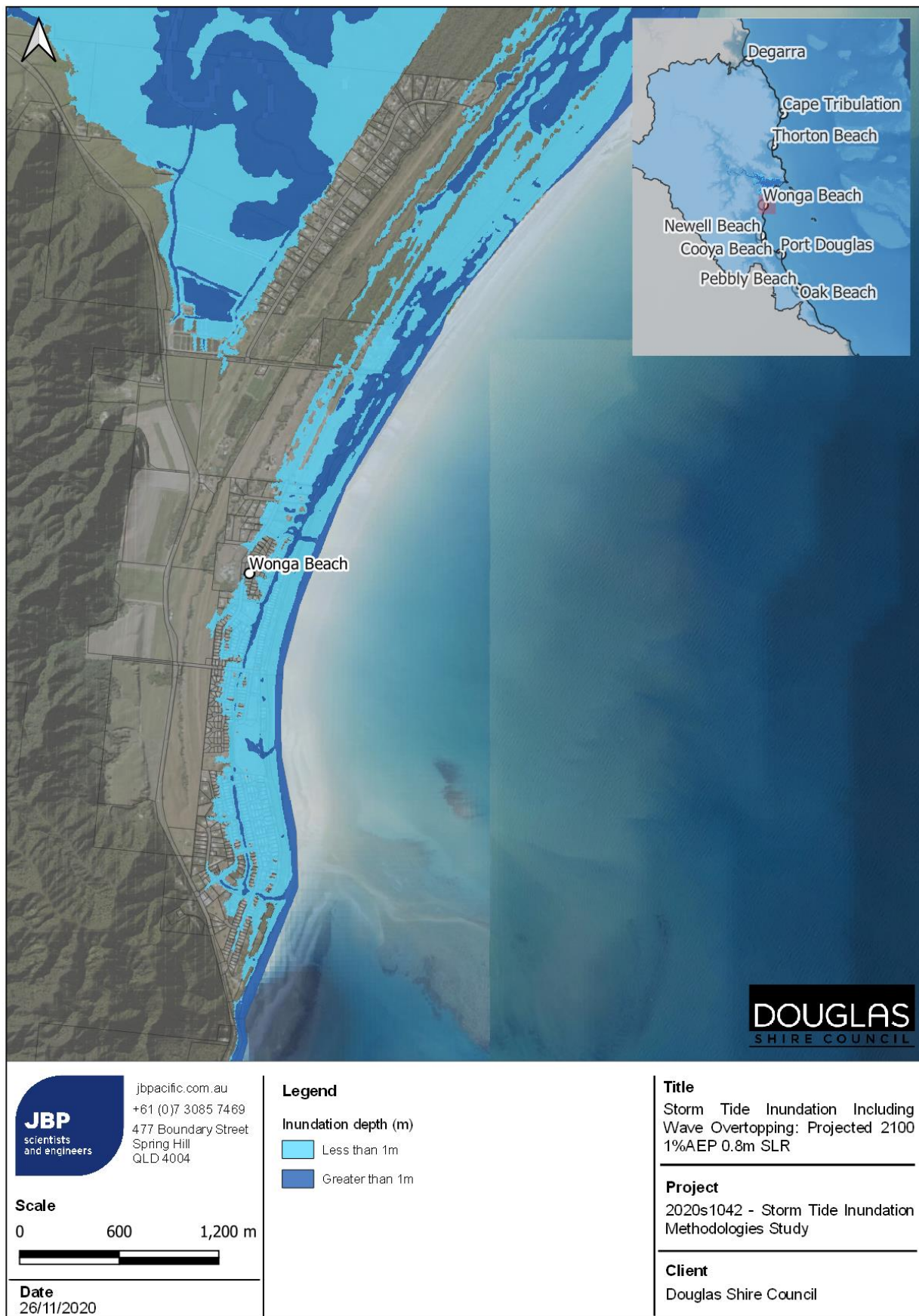
Thornton Domain Future 100yr Depth Map



Wonga Domain Present Day 100yr Depth Map



Wonga Domain Future 100yr Depth Map



Cooya/Newell Beach Domain Present Day 100yr Depth Map



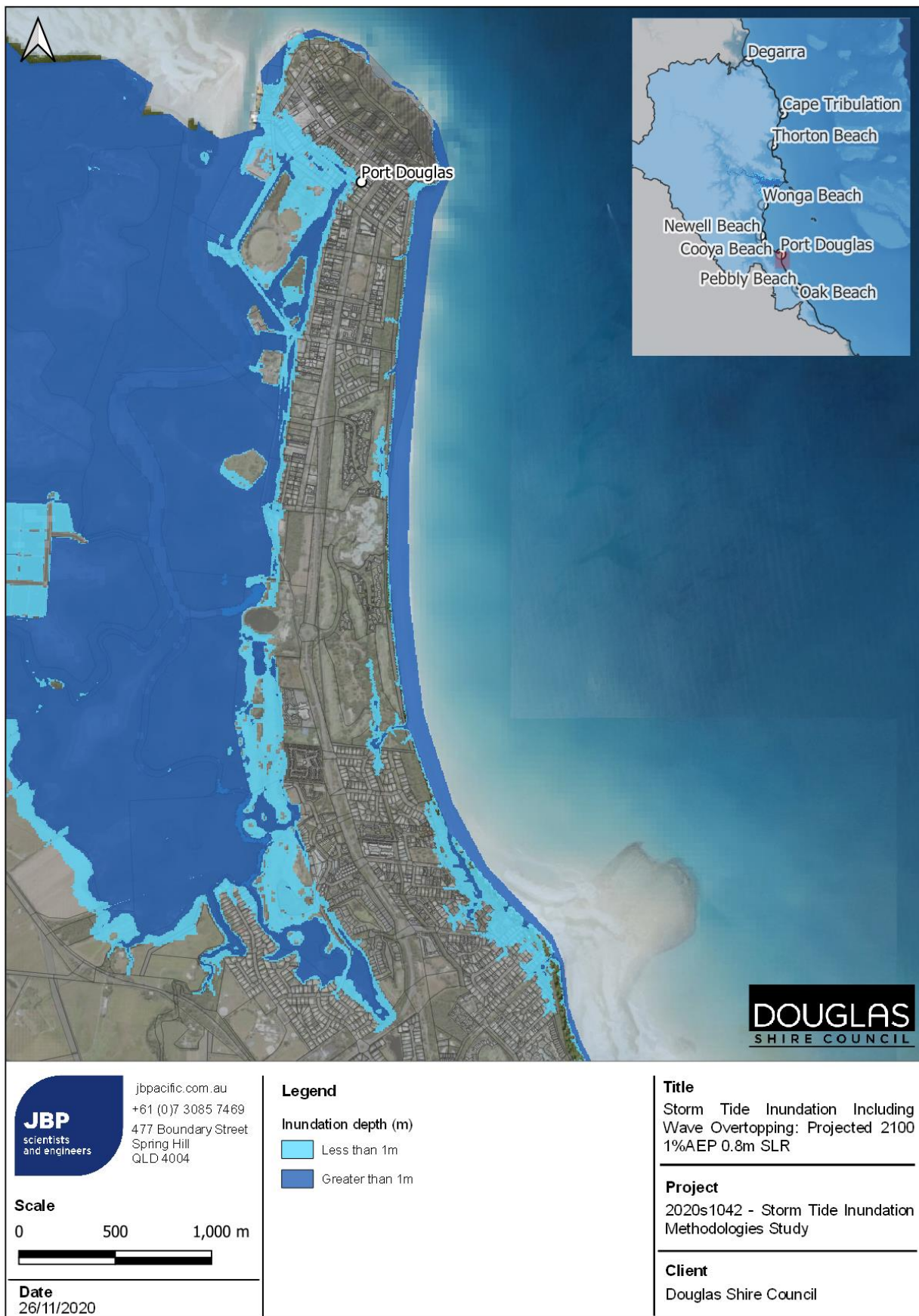
Cooya/Newell Beach Domain Future 100yr Depth Map



Port Douglas/Pebbly Beach Domain Present Day 100yr Depth Map



Port Douglas/Pebbly Beach Domain Future 100yr Depth Map



Oak Beach Domain Present Day 100yr Depth Map



Oak Beach Domain Future 100yr Depth Map

