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REPORT

Supplementary Expert Report of Stuart Bettington

Pabai & Anor v Commonwealth of Australia
(VID622/2021)

Client:

Reference: PA3434-RHD-ZZ-AU-RP-C-0002
Status: Final/01
Date: 10 November 2023

Royal HaskoningDHV
Enhancing Society Together

Project related

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Author(s):	Stuart Bettington
Drafted by:	
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Date:	9 November 2023
Approved by:	Stuart Bettington
Date:	10 November 2023

Classification
Project related

Project related

Royal HaskoningDHV

Table of Contents

1 Amendments to expert report arising from expert's conclave

1 Please provide amendments to the following in your expert report:

a. Boigu flood levels and HAT levels, and the corresponding tables;
b. Boigu island mapping to account for the revised Boigu flood levels;
c. Tables containing ARI events and figures containing ARI plotting; and
d. HAT levels in table 4.

1.1 Explanation

Many tables and figures from my original expert report have been altered following agreed changes discussed in the expert's conclave. The critical issues are:

- Updated Highest Astronomical Tide (HAT) levels relative to Mean Sea Level (MSL) were agreed, impacting many tables in my original report.
- An error in transposing SEA storm tide levels for Boigu was identified and has been rectified. This has impacted many tables, figures and some flood maps.
- In preparing the exceedance plots for each island, the original report utilised HAT values with prescribed recurrence intervals in the preparation of trend lines. In the expert's conclave this was identified as an issue and it was agreed that HAT should not have been used in this way. The probability of exceedance trend lines have been revisited with HAT excluded from the analysis.

1.2 Amended Tables and Figures

Table 3 had an incomplete title, used outdated HAT values and incorrect flooding levels for Boigu. The values for this table were included in the expert's conclave report.

Table 3 Storm tides, including wave setup from SEA 2011

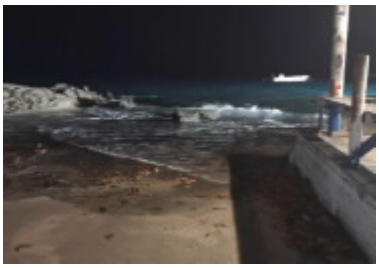
Average recurrence interval (ARI years)	Boigu Storm tide (m MSL)	Saibai Storm tide (m MSL)	Poruma Storm tide (m MSL)	Warraber Storm tide (m MSL)
HAT	2.29	2.06	2.27	2. 23
10 years	2.49	2.14	2.47	2.53
25 years	2.55	2.19	2.51	2.61
50 years	2.59	2.22	2.55	2.65
100 years	**2.62**	**2.26**	**2.56**	**2.67**
500 years	2.72	2.35	2.60	2.72

In my original report Table 4 related flooding relative to HAT, with no clear explanation of how the flood levels were derived. In response to the expert's conclave outcomes and the recognised need to identify land levels Table 4 has been revised. In the revised table water levels to m AHD (AUSGeoid98) are defined relative to features with surveyed elevations. The still water levels are then converted to tidal datums of MSL and HAT. Further in demonstrating the datum and level issues for the expert's conclave additional flooding evidence with very clear level indicators were considered and have been added to this table. These additional examples are:

- Sabai January 2006 where a very clear flood line on the road provided a good level indicator.
- Poruma August 2023 where the submerged jetty deck provided a good measure for water levels.

Table 4 Some of the recently observed flooding due to abnormally high-water levels in non-Cyclonic (ambient) conditions

Event	Observation	Impact
Iama 2006	Low wall 3.9 m AHD, house corner 3.75 m AHD Still Water Level 3.9 m AHD = 2.33 m MSL 0.18 m above HAT	
Warraber January 2006	Behind pergola 3.2 m AHD Top of ramp 2.95 m AHD Jetty Deck 3.12 m AHD Still Water Level 3.0 m AHD = 2.53 m MSL 0.25 m above HAT	
Saibai January 2006	Wet line on concrete road 2.95 m AHD Still Water Level 2.95 m AHD = 2.23 m MSL ~0.2 m above HAT	 
Boigu date unknown (likely 2009)	Ground level in front of school building and the vacant block 3.1 m AHD Still Water Level 3.4 m AHD = 2.57 m MSL ~0.3 m above HAT	 
Saibai 2009	Wall crest at 2.9 m AHD Still Water Level 3.0 m AHD = 2.28 m MSL ~0.3 m above HAT	 
Saibai 2010	Wall crest at 2.9 m AHD Still Water Level 2.85 m AHD = 2.1 m MSL ~0.1 m above HAT	 
Saibai January 2018	New wall crest 3.4 m AHD Still Water Level 3.00 m AHD = 2.30 m MSL ~0.25 m above HAT	

Event	Observation	Impact
Iama January 2018	Buildings damaged. Road Level 3.65 m AHD Flooding impacted by overtopping waves. Still Water Levels ~4.0 m AHD = 2.43 m MSL ~0.3 m above HAT	 
Poruma Feb 2019	Jetty deck 2.6 m AHD Still Water Level 2.7 m AHD = 2.34 m MSL ~0.1 m above HAT	
Iama January 2023	Road level 3.5 m AHD Still Water Level 3.7 m AHD = 2.13 m MSL ~ HAT	 
Poruma August 2023	Jetty deck 2.6 m AHD Still Water Level 2.8 m AHD = 2.44 m MSL ~0.2 m above HAT	 

For completeness and comparison with Table 4, Table 5 is included. This table is a copy of the table included in the expert's conclave report.

Table 5 Adopted Extreme Water Levels Relative to Mean Sea Level

Average recurrence interval (ARI years)	Boigu Storm tide (m MSL)	Saibai Storm tide (m MSL)	Poruma Storm tide (m MSL)	Warraber Storm tide (m MSL)
HAT	2.29	2.06	2.27	2.23
10 years	2.49	2.14	2.47	2.53
25 years	2.65	2.29	2.61	2.71
50 years	2.79	2.42	2.75	2.85
100 years	**2.92**	**2.56**	**2.86**	**2.97**
500 years	3.22	2.85	3.10	3.22

Table 7 presented here is a duplicate of the Table 7 in the experts conclave but has been included as it was used to generate the revised Figure 11. The revised Figure 11 contains the updated Boigu values and does not use HAT in the generation of the trend lines.

Table 7 Baseline (1900) Extreme Water Levels Relative to AHD

Average recurrence interval (ARI years)	Boigu Storm tide (m AHD)	Saibai Storm tide (m AHD)	Poruma Storm tide (m AHD)	Warraber Storm tide (m AHD)
HAT	2.95	2.61	2.46	2.53
10 years	3.15	2.69	2.66	2.83
25 years	3.31	2.84	2.80	3.01
50 years	3.45	2.97	2.94	3.15
100 years	**3.58**	**3.11**	**3.05**	**3.27**
500 years	3.88	3.40	3.29	3.52

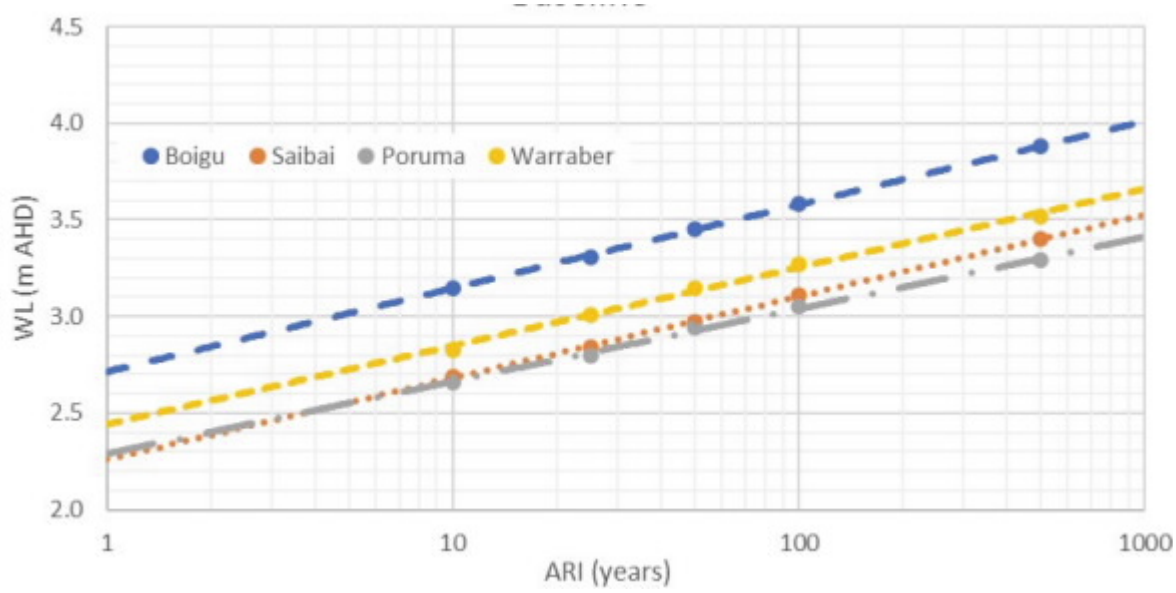


Figure 11 Baseline Extreme Water Levels

For completeness when considering the revised frequency of flooding and inundation mapping, Table 8 has been included. This table is a duplicate of the Table 8 in the expert's conclave report.

Table 8 Current (2023) Extreme Water Levels Relative to AHD

Average recurrence interval (ARI years)	Boigu Storm tide (m AHD)	Saibai Storm tide (m AHD)	Poruma Storm tide (m AHD)	Warraber Storm tide (m AHD)
HAT	3.16	2.82	2.67	2.74
10 years	3.36	2.90	2.87	3.04
25 years	3.52	3.05	3.01	3.22
50 years	3.66	3.18	3.15	3.36
100 years	**3.79**	**3.32**	**3.26**	**3.48**
500 years	4.09	3.61	3.50	3.73

Based on the revised flood levels and updated frequency plot values for Boigu Table 9 have also been updated.

Table 9 Township Inundation Event Water Levels Relative to AHD with Baseline and Current Frequency of Exceedance

	Boigu	Saibai	Poruma	Warraber
~50% of township flooded (m AHD)	3.4	2.8	3.6	3.5
Baseline Frequency (years)	35	25	>500	500
Current Frequency (years)	12	5	>500	100

The flood inundation mapping for Boigu has been updated with the revised flood levels, as seen in Figure 12 and Figure 16

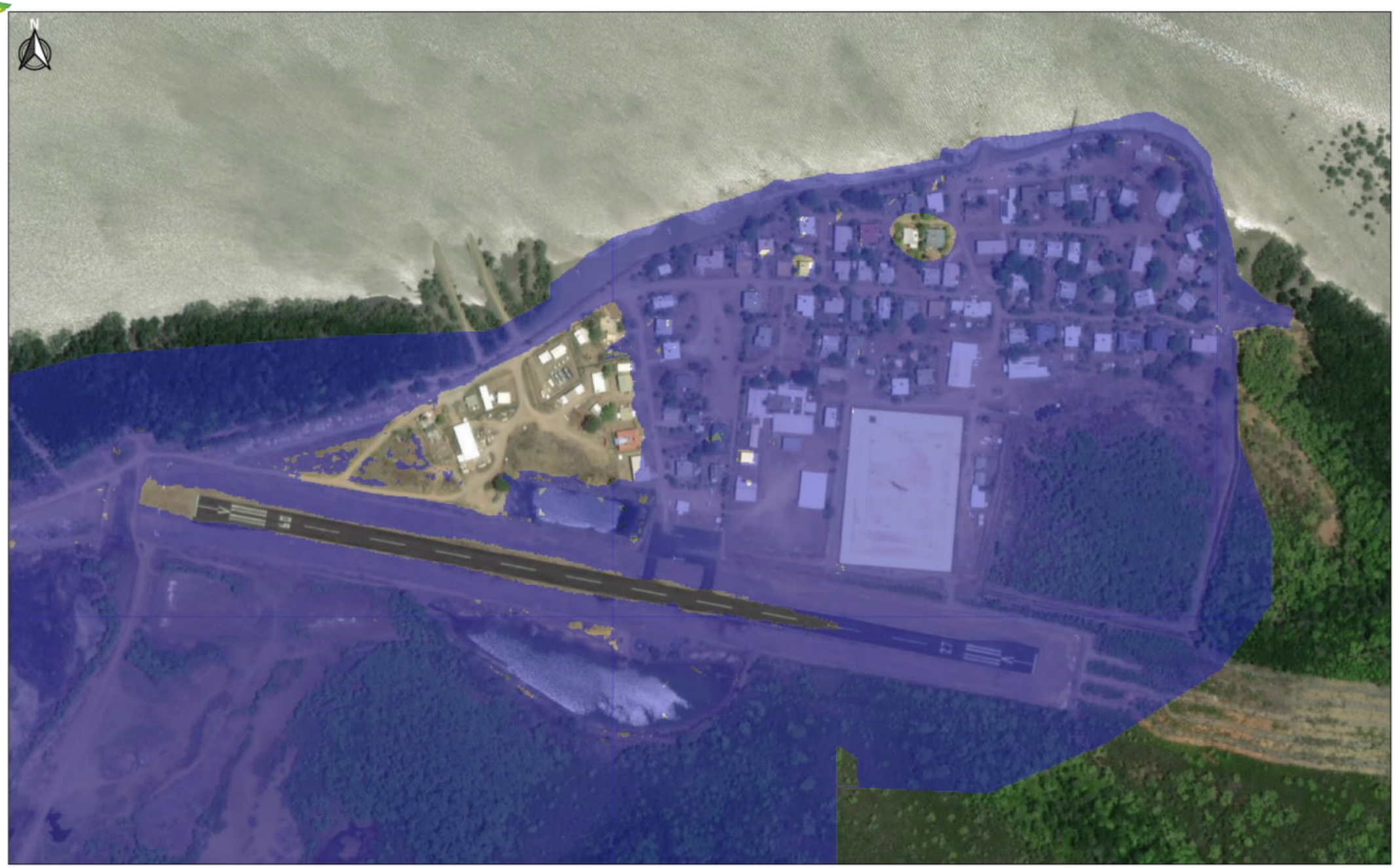


Figure 12 Boigu Baseline (1900) 100 year ARI flood

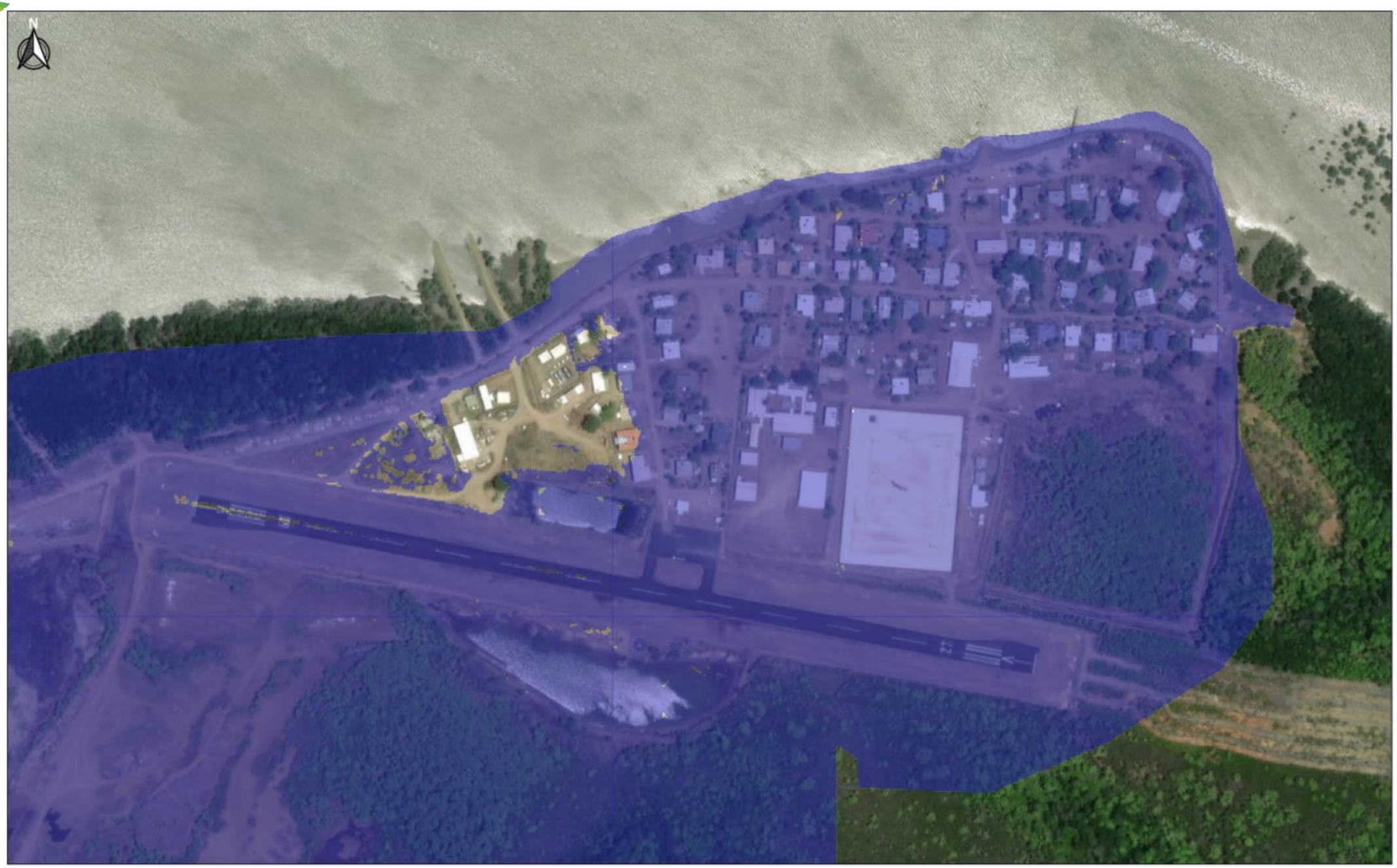


Figure 16 Boigu Current (2023) 100 year ARI flood

The 2050 flooding forecasts are also impacted by the changes to the flood levels on Boigu. Below is a duplicate of the Table 12 in the expert's conclave report. This table is included because it directly relates the updated levels in Figure 47 and the revised flood mapping in Figure 48. Further Table 14 has been updated for the revised Boigu flood frequency.

Table 12 2050 SSP 1-2.6 (SLR = 0.36m) Projections for Water Levels Relative to AHD

Recurrence Interval (ARI years)	Boigu (m AHD)	Saibai (m AHD)	Poruma (m AHD)	Warraber (m AHD)
MHWS/MHHW	2.33	2.01	1.71	1.72
HAT	3.31	2.95	2.80	2.87
10 years	3.51	3.05	3.02	3.19
25 years	3.67	3.20	3.16	3.37
50 years	3.81	3.33	3.30	3.51
100 years	**3.94**	**3.47**	**3.41**	**3.63**
500 years	4.24	3.76	3.65	3.88

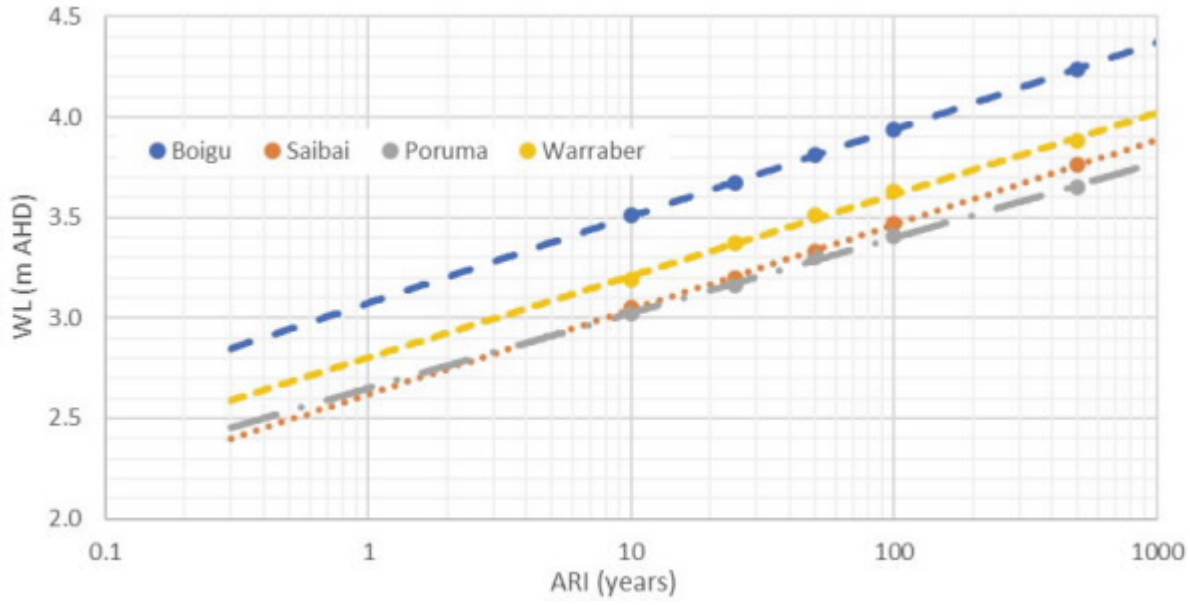


Figure 47 SSP 1-2.6 2050 Extreme Water Levels

Table 14 Township Inundation Event Water Levels Relative to AHD with 2050 Frequency of Exceedance

	Boigu	Saibai	Poruma	Warraber
~50% of township flooded (m AHD)	3.4	2.8	3.6	3.5
SSP1-1.9 2050 Frequency (years)	7	3	250	60
SSP1-2.6 2050 Frequency (years)	5	2.5	200	50
SSP3-7.0 2050 Frequency (years)	4	2	150	40

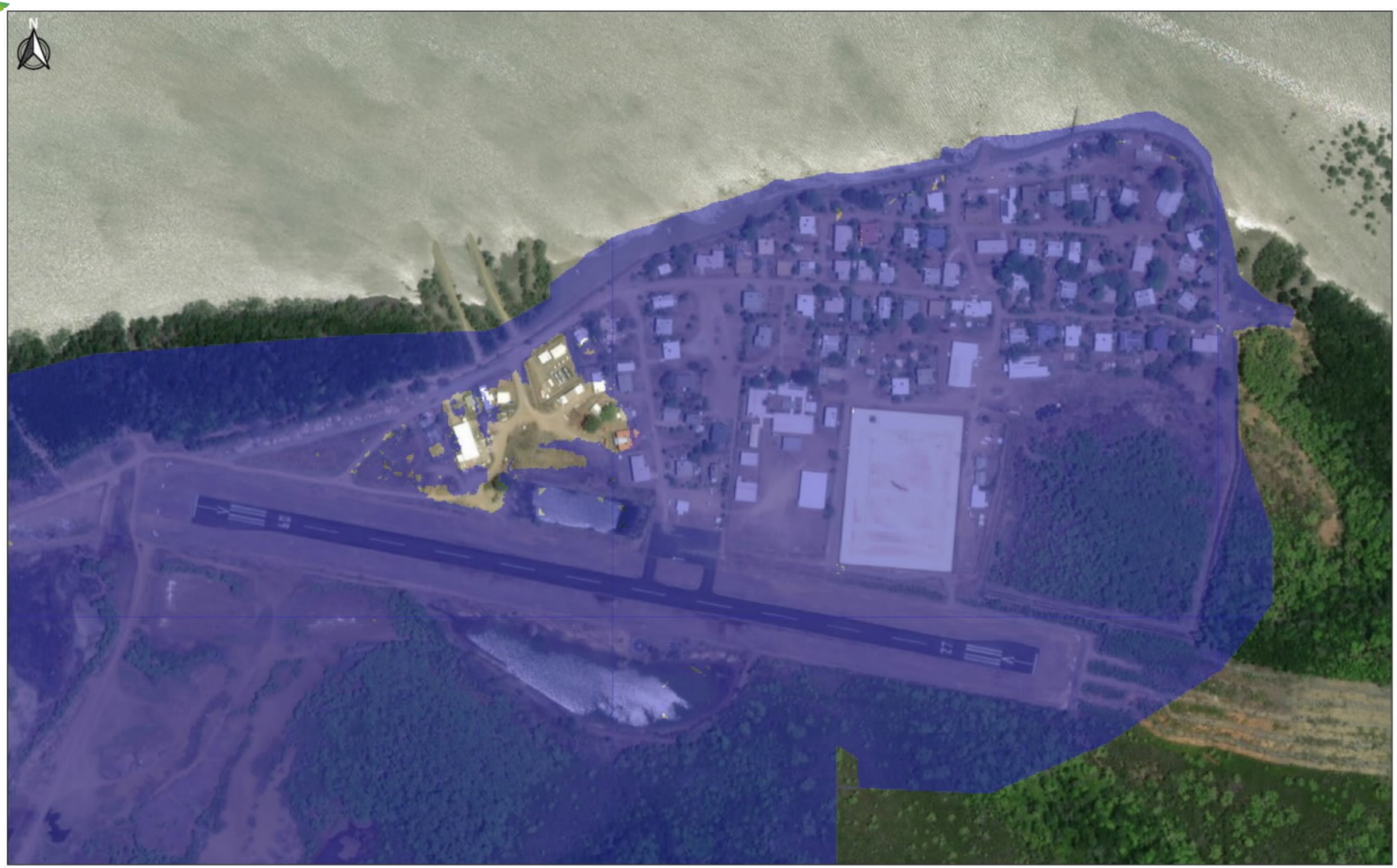


Figure 1 Boigu 2050 SSP 1 – 2.6 100 year ARI flood

The 2100 floods are also impacted by the changes to the flood levels on Boigu. Below is a duplicate of the Table 12 in the expert's conclave report. This table is included because it directly relates the updated levels in Figure 52 and the revised flood mapping in Figure 53. Further Table 18 has been updated for the revised Boigu flood frequency.

Table 16 2100 SSP 1-2.6 (SLR = 0.62m) Projections for Water Levels Relative to AHD

Recurrence Interval (ARI years)	Boigu (m AHD)	Saibai (m AHD)	Poruma (m AHD)	Warraber (m AHD)
MHWS/MHHW	2.59	2.27	1.97	1.98
HAT	3.57	3.23	3.08	3.15
10 years	3.77	3.31	3.28	3.45
25 years	3.93	3.46	3.42	3.63
50 years	4.07	3.59	3.56	3.77
100 years	**4.20**	**3.73**	**3.67**	**3.89**
500 years	4.50	4.02	3.91	4.14

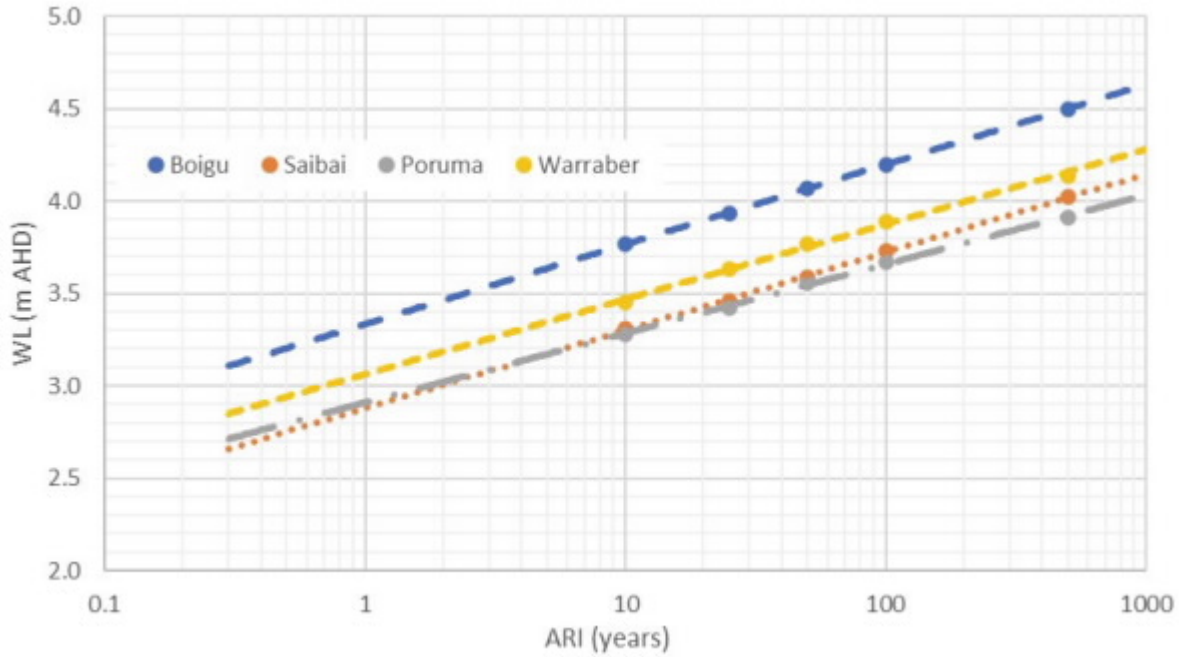


Figure 52 SSP 1-2.6 2100 Extreme Water Levels

Table 18 Township Inundation Event Water Levels Relative to AHD with 2100 Frequency of Exceedance

	Boigu	Saibai	Poruma	Warraber
~50% of township flooded (m AHD)	3.4	2.8	3.6	3.5
SSP1-1.9 2100 Frequency (years)	2	1	100	15
SSP1-2.6 2100 Frequency (years)	1.5	0.7	70	11
SSP3-7.0 2100 Frequency (years)	0.5	0.2	20	3

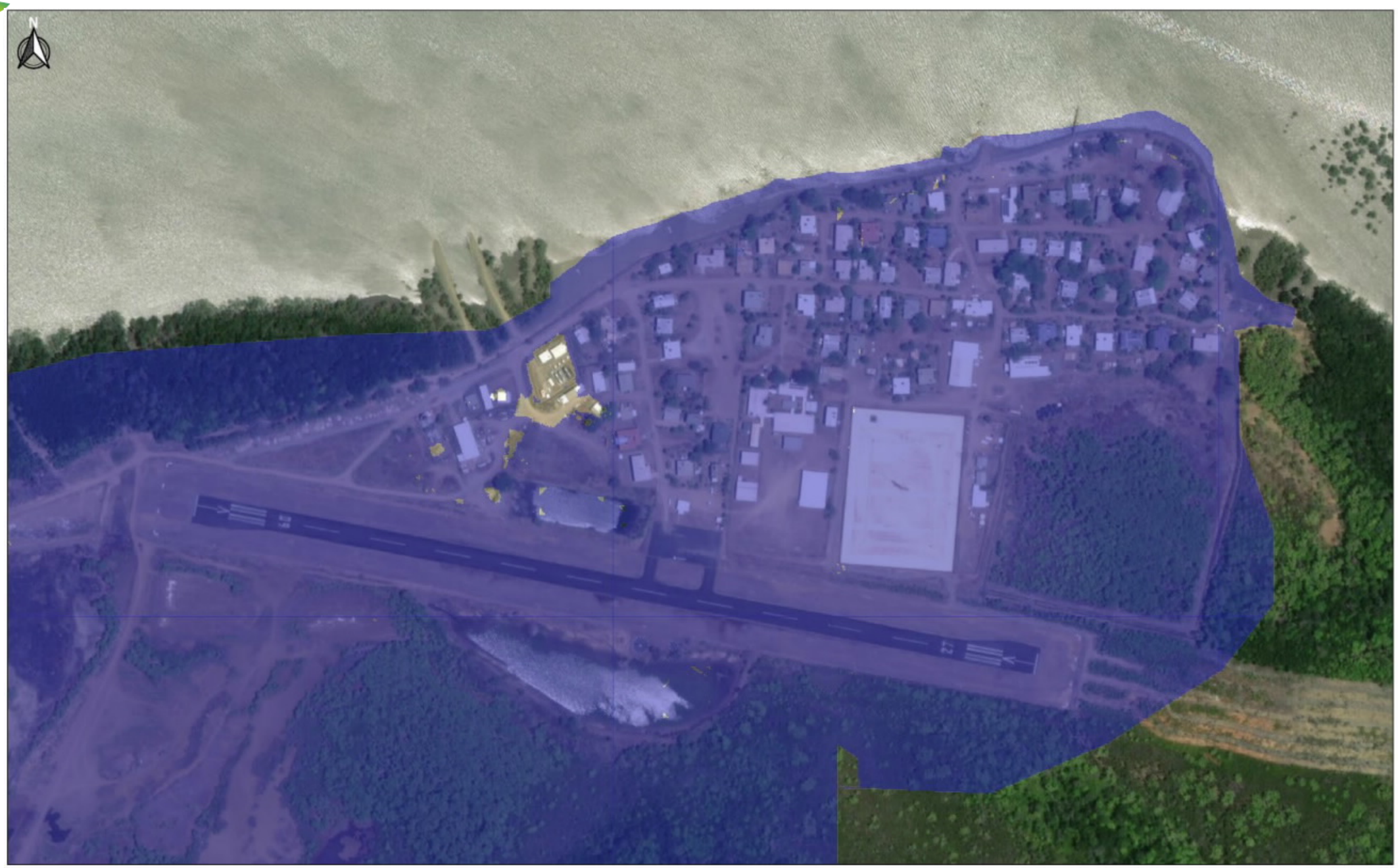


Figure 2 Boigu 2100 SSP 1 – 2.6 100 year ARI flood

2 Basis of statements in your expert report

2. Please explain the basis for the following statements made in your expert report dated 3 August 2023:
   a. section 2.2.2, the opinions in the first paragraph, and table 4 including the 'observation' column;
   b. sections 2.3.3 and 4.1.2, the basis on which the Township Inundation Event water levels were calculated and the township inundation maps (figures 20, 21, 22, 23), including the statement that the township inundation event was "defined based on visual assessment of the flood mapping";
   c. section 4.2.1, the underlying facts and assumptions for the flood maps (Figures 12-23, 48-51, 53-56) including how the data sources were used to generate ground levels;
   d. section 3.1.1, the sentence "It is recognized that the extensive lengths of exposed beach rock is an indication of abnormal morphologic conditions";
   e. section 3.1.2.2, the opinion that the community on Mer is one of the most vulnerable of the volcanic islands with most of the assets located on the flats;
   f. section 4.1.4 regarding climate change impacts in 2050;
   g. section 4.2.4 regarding climate change impacts in 2100;
   h. section 5.1.3 regarding mangrove and coral health;
   i. section 5.3.1 the sentences "The barriers do leak which means that some water does enter the community during high events"; "Even though water levels on Boigu are 0.5m higher to AHD than those on Saibai the elevation and shape of the Saibai community (low, long and narrow) and a comparatively lower crest has meant that the flood protection on Saibai experience more leakage issues than Boigu"; and "Flood barriers that exist on Iama are largely ineffective today".
   j. sections 5.3.2 and 5.3.3, the conclusions about the effectiveness of seawalls in 2050 and 2100.

2.1 Section 2.2.2 – Observed Anomalies (a)

In Section 2.2.2 the observed water levels captured in Table 4 were defined based on known levels for ground and or features seen in the images. The level of the ground and features were captured by terrestrial surveys undertaken for various projects on the different islands. The revised Table 4, presented previously, now contains some of the relevant ground levels used in defining the flood level.

2.2 Section 2.3.3 and 4.1.2 and Township Inundation Level (b)

The determination of Township inundation levels involved identifying the water level that would flood roughly 50% of the community. This process entailed manually adjusting the water levels in small (0.1m) incremental steps and mapping the resulting flood impact on the Township (visual assessment). Upon reaching a water level where I assessed that 50% of the township's land was flooded, it was considered the Township inundation event.

2.3 Section 4.2.1 and Flood Maps (c)

In preparing the flood maps both ground survey data and digital terrain data (LiDAR) were obtained from the Queensland Government Elvis – Elevation and Depth – Foundation Spatial Data system. The ground survey was considered reliable with levels given relative to AHD (AUSGeoid98) and was prioritised over digital data. The digital data is less accurate than terrestrial survey and it is not properly tied back to a vertical datum. The digital data was rectified to AHD (AUSGeoid98) by matching levels over the areas where the ground survey overlapped.

As discussed in the expert's conclave, the ground level data sets used by both experts were similar, drawing on the same sources, albeit using slightly different methods to correct the levels of the digital terrain data.

The modelling of the flooding was a simple bathtub analysis where ground levels below the nominated flood level are shown as flooded. This method of flood modelling is simplistic with both overland flow paths and the impacts of wave run-up on flooding depths ignored.

2.4 Section 3.1.1 and Beach Rock Observations (d)

As discussed beach rock is formed under the beach, meaning that is covered by sand for extended periods. Exposed beach rock, caused by the erosion of covering sand, is a natural process as the islands move. Persistent widespread exposure of beach rock, particularly when the pattern of exposure is seen across a number of locations, is seen as a good indicator of broad scale changes in morphology. In my original report, when referring to the extensive exposed beach rock as an indicator of unusual erosion patterns, I was drawing on my knowledge of coastal processes and reef top morphology to identify that this indicated changed conditions.

2.5 Section 3.1.2.2 and Mer Vulnerability (e)

When I discussed the vulnerability of Mer, I drew upon expertise and knowledge gained from examining coastal processes and vulnerability in island communities within the Torres Strait, including on Mer. Part of this experience is captured in reports I authored that examined the volcanic islands; refer to AECOM 2014 and AECOM 2021 for further insights.

2.6 Section 4.1.4 and Climate Change Impacts in 2050 (f)

As an experienced coastal engineer I am required to have broad understanding of a range of natural systems as they interact with coastal processes and morphology. This includes biological systems such as reefs and mangroves. As way of background to this knowledge base I refer to Bettington 2019.

2.6.1 Reef Vigour and Sand Supply

I have a broad understanding of the sediment supply and morphological processes as they impact coastlines, with a particular focus on erosion and accretion of foreshores. For systems dominated by carbonate sediments such as the coral cays this extends to an understanding of coral reefs and their production of sediments.

The impact of climate change on the reef health and the resultant loss of reef vigour is well publicised and I would consider it common knowledge. My opinion that the sand supply would be diminished is based on the simple premise that less vigour will mean less organisms creating calcium carbonate material and thus less supply of sediment. This hypothesis is supported by Cornwall, et. al. 2021.

2.6.2 Reduction in Mangrove Function

The role of mangroves in stabilising coastlines and assisting accretion is well understood and I would consider it common knowledge. The impact of sea level and tidal planes on mangrove health and colonisation is also well understood and again I would consider it common knowledge that mangroves exist within specific tidal ranges. This understanding logically leads to the conclusion that rising sea levels will result in a reduction in mangrove ability to colonise and survive at the lower range of the existing habitat, leading to a reduction in mangrove extent on the seaward edge of habitats (foreshores of the mud islands). This logic is supported by findings in Xie, et. al. 2020, where the impact of sea level rise on mangroves is considered.

2.6.3 Impacts on Groundwater

My opinion on the adverse impact of sea level rise and marine inundation on Groundwater is based on:

- Observed impacts on flooded islands, as described in Bettington 2017.
- Commentary on the threat to groundwater in the Torres Strait provided by CSIRO, refer Green 2006.
- Commentary on the groundwater threats contained in the monitoring report for Torres Strait (refer Iles 2022).
- Reported impacts on Saibai gardens being rendered unusable for 2 years (refer Native Affairs 1948), as a result of the 1948 marine flooding event, described in Green 2006.
- As a water engineer my understanding of hydraulic principals is that the impact of having seawater levels raised above ground water levels for extended periods will result in seawater contamination of ground water.

2.7 Section 4.2.4 and Climate Change Impacts in 2100 (g)

The findings in this section are based on the same logic and information as discussed for Section 4.1.4 (refer to Section 2.6 above).

2.8 Section 5.1.3 Ecological Impacts Regarding Coral and Mangrove Health (h)

My opinions on the impacts of climate change on ecological systems such as corals and mangroves is part of the required knowledge as an experienced coastal engineer working in tropical settings. As discussed previously in Section 2.6 above, my understanding is based on extensive experience and supported by published data.

2.9 Section 5.3.1 Effectiveness of Current Adaptations (i)

My opinions of the effectiveness of coastal defences in the Torres Strait is based on extensive experience in examining the threats faced by the communities and the functionality of built works. Key inputs into my opinion include:

1 Numerous inspections/condition assessments and discussions with residents.

2 Hazard studies completed in the Torres Strait.

3 Experience in the design of numerous coastal defence structures over my career.

4 Observed performance during extreme events in the Torres Strait.

When specifically considering the effectiveness of community built infrastructure the observed failures of seawalls are common, with a relevant example including recent attempts to halt erosion on Warraber with tires and other rubbish, that is ineffective and unsightly.

As identified the engineered infrastructure including Saibai and Boigu seawalls are functioning well at halting erosion, however, the flood barriers are only partly effective at preventing flooding of low lying land. The basis of my opinion draws on the direct experience in the design and post construction performance.

- The flood barriers on Boigu and Saibai are designed to mitigate, not prevent, flooding [redacted]
- [redacted]

[redacted]

- The shape of Saibai exacerbates the issues in backflow and wave overtopping. With a long narrow community there are more locations for the issues to arise. This is combined with the narrow width of the community meaning the water has less space to spread out over.
- On Boigu the shape of the community is better for the overtopping and backflow issues but exacerbates the fluvial drainage issues with a larger catchment impacted by high tailwater events.

[redacted]

2.10 Sections 5.3.2 and 5.3.3 Effectiveness in the Future (j)

As an experienced coastal engineer my expertise extends to the functionality and performance of seawalls and the materials that are used. The design of engineered seawalls considers the design life looking at both material selection and design conditions, including sea level rise. When commenting on the performance of engineered seawalls in 2050 and 2100 consideration of both the design events and materials contribute to my opinion on the expected functionality of the seawalls.

Commentary regarding declining performance of flood barriers over time is directly related to the simple hydraulic reality of the impact of increased sea levels on the risk and volume of overtopping and risk of high tail water preventing drainage, plus increased opportunity for high tail waters to backflow through drains.

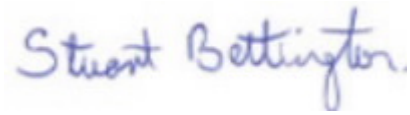
4 Declaration

I have been asked to produce a supplementary expert report in response to a supplementary letter of instruction which is included at Annexure A. I have read the letter and responded to all questions asked in it. I have read, understood and complied with the Expert Evidence Practice Note (GPN-EXPT) of the Federal Court and the Harmonized Expert Witness Code of Conduct and agree to be bound by them.

All opinions expressed herein are my own and are based wholly or substantially on my specialised knowledge arising from my training and experience as a climate scientist.

I have made all inquiries which I believe are desirable and appropriate and no matters of significance which I regard as relevant have, to my knowledge, been withheld from the Court. I have referenced all assumptions and material facts on which my opinions are based throughout my report.

Regards



Stuart Bettington
Technical Director Coastal

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5 References

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8 Native Affairs Information contained in Report of Director of Native Affairs for the Twelve Months ended 30th June, 1948, sourced:

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9 Xie, D., Schwarz, C., Brückner, M.Z.M., Kleinhans, M.G., Urrego, D.H., Zhou, Z. and van Maanen, B., 2020, “Mangrove diversity loss under sea-level rise triggered by bio-morphodynamic feedbacks and anthropogenic pressures”, Environ. Res. Lett. 15 (2020).

Project related

Appendix A Supplementary Letter of Instruction

PHI X FINNEY X MCDONALD

7 November 2023

PRIVILEGED AND CONFIDENTIAL

Mr Stuart Bettington
Royal Haskoning DHV

By email: [redacted]

Dear Mr Bettington,

Pabai & Anor v Commonwealth of Australia (VID622/2021)

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1. Supplementary Letter of Instruction

1.1. We refer to:

(a) our letter of retainer dated 1 June 2023 (**Retainer Letter**);

(b) our letter of instruction dated 21 June 2023 (**Letter of Instruction**);

(c) our supplementary letter of instruction dated 4 July 2023 (**Supplementary** L**etter of Instruction)**; and

(d) your expert report dated 3 August 2023 (**Your Report**).

1.2. We confirm that you are retained by Uncle Pabai Pabai and Uncle Paul Kabai (**Applicants**) to act as an independent expert in the matter of *Pabai & Anor v Commonwealth of Australia*, VID622/2021 (**Proceeding**).

1.3. We confirm that the confidentiality obligations in respect of documents and information provided to you for the purpose of this engagement are governed by the terms of the Retainer Letter and the Deed of Confidentiality dated 16 May 2022.

1.4. We also remind you of the roles and duties of expert witnesses as set out in the Retainer Letter and ask that you refer to them as you prepare your expert report(s) in this proceeding. In particular, please take some time to reacquaint yourself with the following documents, which we provided to you with our original letter:

(a) the Federal Court of Australia Expert Evidence Practice Note (**GPN-EXPT**), including the Harmonised Expert Witness Code of Conduct (the **Code**) at Annexure A of that Practice Note and the Concurrent Expert Evidence Guidelines (the **Guidelines**) at Annexure B (collectively, the **Practice Note**); and

(b) Rule 23.13 of the *Federal Court Rules 2011* (Cth).

1.5. The purpose of this letter is to request that you prepare a supplementary written report providing your independent expert opinion in response to the questions outlined at Annexure B to this letter.

2. Brief of Materials

2.1. Set out at Annexure A is an index of the documents provided to you, which form your brief.

2.2. If you consider that you require any additional documents or materials in order to complete your work, please request such materials from us.

3. Your Opinion

3.1. Once you have reviewed the material in your brief, we request that you provide a written report addressing the questions set out in Annexure B to this letter.

3.2. In answering the questions outlined at Annexure B please provide detailed reasons for your opinions, including the facts or assumptions that affect your reasoning and conclusions.

4. Preparation of Your Report

4.1. We would be grateful if you would set out the answers to the questions at Annexure B in a written report, having regard to the requirements set out in the Practice Note.

4.2. After you have had the opportunity to consider the questions at Annexure B, as well as the materials listed in Annexure A, we would be grateful if you could advise of any material not currently in your brief which you require to respond to any of the Annexure B questions.

If you have any questions, please do not hesitate contact me [redacted]

Yours faithfully,

Brett Spiegel
Principal Lawyer
Phi Finney McDonald

Encl.

ANNEXURE A

Index to Brief

Tab No.	Date	Description of document(s) / category
A	**EXPERT REPORT**	
A1.	3 August 2023	Expert Report of Mr Stuart Bettington

ANNEXURE B

Amendments to expert report arising from expert conclave

1. Please provide amendments to the following in your expert report:

    a. Boigu flood levels and HAT levels, and the corresponding tables;

    b. Boigu island mapping to account for the revised Boigu flood levels;

    c. Tables containing ARI events and figures containing ARI plotting; and

    d. HAT levels in table 4.

Basis of statements in your expert report

2. Please explain the basis for the following statements made in your expert report dated 3 August 2023:

    a. section 2.2.2, the opinions in the first paragraph, and table 4 including the 'observation' column;

    b. sections 2.3.3 and 4.1.2, the basis on which the Township Inundation Event water levels were calculated and the township inundation maps (figures 20, 21, 22, 23), including the statement that the township inundation event was "defined based on visual assessment of the flood mapping";

    c. section 4.2.1, the underlying facts and assumptions for the flood maps (Figures 12-23, 48-51, 53-56) including how the data sources were used to generate ground levels;

    d. section 3.1.1, the sentence "It is recognized that the extensive lengths of exposed beach rock is an indication of abnormal morphologic conditions";

    e. section 3.1.2.2, the opinion that the community on Mer is one of the most vulnerable of the volcanic islands with most of the assets located on the flats;

    f. section 4.1.4 regarding climate change impacts in 2050;

    g. section 4.2.4 regarding climate change impacts in 2100;

    h. section 5.1.3 regarding mangrove and coral health;

    i. section 5.3.1 the sentences "The barriers do leak which means that some water does enter the community during high events"; "Even though water levels on Boigu are 0.5m higher to AHD than those on Saibai the elevation and shape of the Saibai community (low, long and narrow) and a comparatively lower crest has meant that the flood protection on Saibai experience more leakage issues than Boigu"; and "Flood barriers that exist on Iama are largely ineffective today".

    j. sections 5.3.2 and 5.3.3, the conclusions about the effectiveness of seawalls in 2050 and 2100.

Change of Opinion

3. We understand that you wish to change your opinion in paragraph 5.5.1 of your expert report dated 3 August 2023. To the extent you consider that appropriate, please set out that change.