FLANAGAN CONSULTING GROUP
Trusted Advisor to Northern Australia

Ports North

CAIRNS SHIPPING DEVELOPMENT PROJECT

Revised Draft Environmental Impact Statement

APPENDIX AL: Assessment of Storm Tide Risk at Tingira Street, Portsmith Report (2017)

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Our Ref: atc: L.B22604.002.Desktop Assessment.docx

31 March 2017

Flanagan Consulting Group
C/o Via Email-

Attention: Mr Pat Flanagan

Dear Pat,

RE: DESKTOP ASSESSMENT OF STORM TIDE RISK AT TINGIRA ST PORTSMITH

The Cairns Shipping Development project are planning to place stiff clays in two sub-areas within the Dredge Material Placement Area (DMPA) at the Port Land located at the end of Tingira St Portsmith (the Site), as presented in Attachment 1.

BMT WBM has undertaken a desktop assessment of the Storm Tide Flood Risk at the Port Land, with regards to placing stiff clays within the two DMPA locations, including the local overland flow paths within the Site. To allow the storm tide risks associated with the Site to be assessed, a review of storm surge assessments available to BMT WBM was undertaken. The storm surge review was based on the Cairns Regional Council's *Cairns Regional Storm Tide Inundation Study* (BMT WBM, January 2013).

Planning Scheme (2016)

The site is located outside the Flood and Inundation Hazard Overlay area as presented in Attachment 2, defined by Council and as such, the *Natural Hazards Policy* is not applicable in an assessment of the Site. However, a brief summary of the policy purposes and intent is provided below.

(1) The policies 'purpose' is to provide guidance and identify information Council may request for development within an identified natural hazard risk area.

(2) The intent of policy is to *avoid the risk and impacts of natural hazards on people and property.*

Cognisant of the planning scheme key purpose, a desktop review of storm surge and local internal drainage constraints was undertaken.

Topography

The Site's topography is presented in Figure 1 based upon 2008 LiDAR data, and levels typically vary from of 2.5mAHD to 4.0mAHD with a discrete area on the eastern side of Tingira St (i.e. northern DMPA) at a level of 1.5m AHD. The Tingira Street access road divides the Site between east and west. The road elevation typically varies from 1.75m AHD to 2.1m AHD. There are two sag points within the road and these are marked on Figure 1.

The southern DMPA is proposed on land that has existing ground levels in the range of 2.1m AHD to 4.0m AHD. The northern DMPA is located on the land with a level at 1.5m AHD.

Flooding Review

Storm Surge Flooding Review

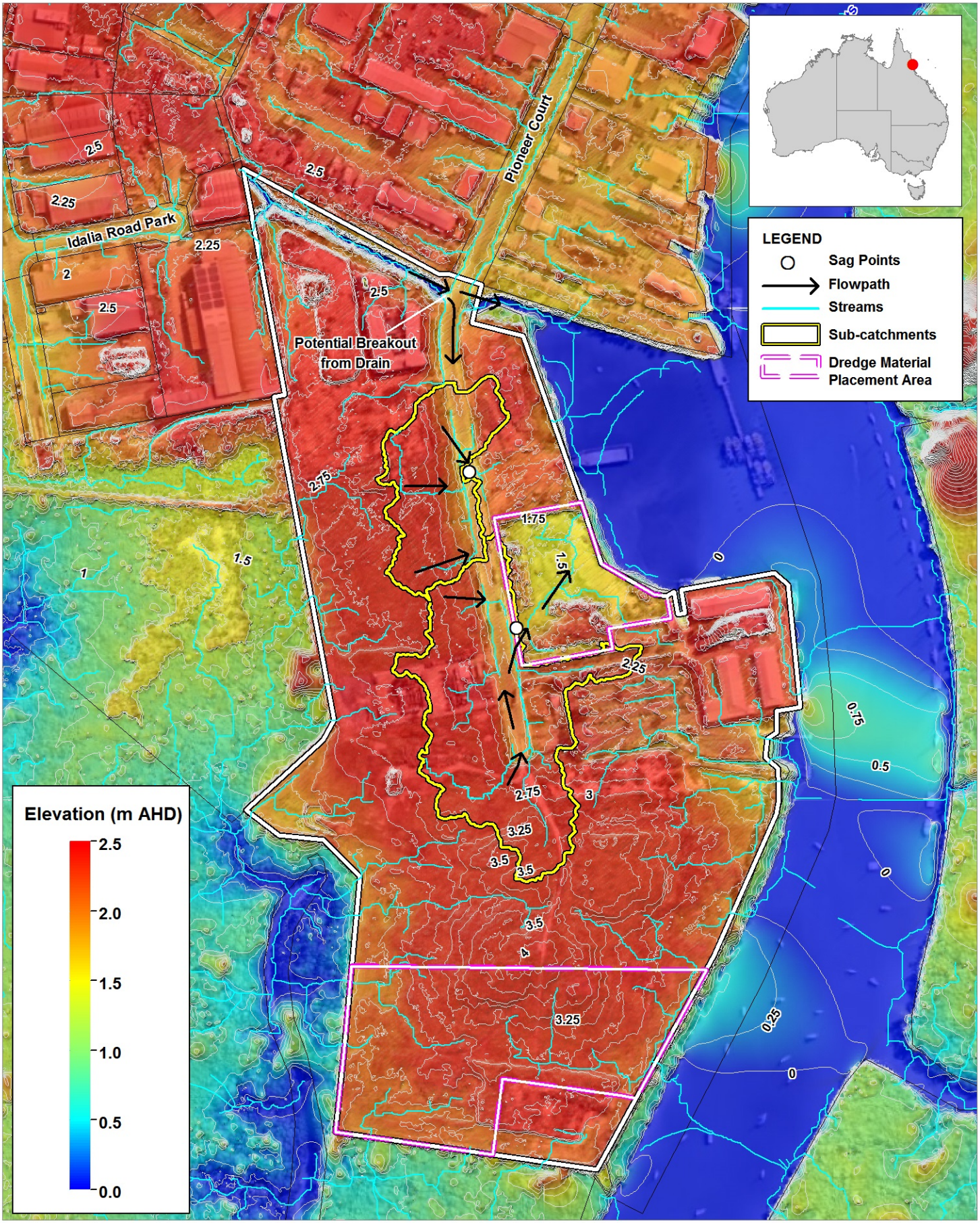
The storm surge review was based upon the Cairns Regional Storm Tide Inundation Study completed by BMT WBM for Council. The peak storm surge levels nominated in the report for the Site are provided in Table 1 and a depth map of the extent of inundation is provided in Figure 2, 3 and 4 for the 1%, 0.5% and 0.2% AEP events.

Table 1 Storm Surge Flood Levels

Estimated Annual Exceedance Period (AEP) Level (excluding Wave Setup - m AHD)						
Scenario	1%	0.5%	0.2%	0.1%	0.01%	PME
Current	1.99	2.24	2.65	3.02	4.11	8.44
2100 (Climate Change Planning +0.8m)	2.88	-	-	-	-	-

With reference to Table 1 and Figures 2, 3 and 4, the storm surge level will (i.e. without climate change) inundate the fringe of the Site in the 1% AEP and the existing low area adjacent to Queensland Government Maritime Safety site. Inundation is progressively increased in the 0.5% and 0.2% AEP with only portions within the centre of the Site above the storm surge level.

Based upon the review of storm surge levels, filling of the Site as proposed will not cause an adverse off-site flood impact with regards to Storm Tide inundation.



Title:

Site Topography

Figure: 1

Rev: A

N

0 100 200m

Approx.Scale

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Filepath: I:\B22604.g.nc_Tinira St Portsmith\DRG\ESG_001_170321_Topo Map.wor

Inundation Depth (m)

- 0.0 to 0.5
- 0.5 to 1.0
- 1.0 to 1.5
- 1.5 to 2.0
- 2.0 to 2.5
- 2.5 to 3.0
- 3.0 to 3.5
- 3.5 to 4.0
- 4.0 to 4.5
- 4.5 to 5.0
- Greater than 5.0
- Trinity Inlet

Inundation depths do not include any freeboard allowance to account for computational and/or physical uncertainties which may be in the order of 0.5m and up to 1m in the wave run-up zone

LEGEND

- Streams
- Site Boundary
- Dredge Material Placement Area

Comport Street

Aumuller Street

Ray Jones Drive

North Coast Railway

Tingira Street

Trinity Inlet

Admiralty Island

Based on or contains data provided by the State of Queensland (Department of Natural Resources and Mines, 2012). In consideration of the State permitting use of this data you acknowledge and agree that the State gives no warranty in relation to the data (including accuracy, reliability, completeness, currency or suitability) and accepts no liability (including without limitation, liability in negligence) for any loss, damage or costs (including consequential damage) relating to any use of the data. Data must not be used for direct marketing or be used in breach of the privacy laws.

Title:

Contemporary Storm Tide Inundation Including Wave Runup Effects: 1% AEP Event

Figure: 2

Rev: A

BMT WBM endeavours to ensure that the information provided in this map is correct at the time of publication. BMT WBM does not warrant, guarantee or make representations regarding the currency and accuracy of information contained in this map.

N

0 250 500

Approx.Scale

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Filepath: I:\B22604.g.nc_Tinira St Portsmith\DRG\COA_004_170323_Storm_Tide+Waves_100yr_Cairns.wor

Inundation Depth (m)

- 0.0 to 0.5
- 0.5 to 1.0
- 1.0 to 1.5
- 1.5 to 2.0
- 2.0 to 2.5
- 2.5 to 3.0
- 3.0 to 3.5
- 3.5 to 4.0
- 4.0 to 4.5
- 4.5 to 5.0
- Greater than 5.0
- Trinity Inlet

Inundation depths do not include any freeboard allowance to account for computational and/or physical uncertainties which may be in the order of 0.5m and up to 1m in the wave run-up zone

LEGEND

- Streams
- Site Boundary
- Dredge Material Placement Area

Comport Street

Aumuller Street

Ray Jones Drive

North Coast Railway

Tingira Street

Trinity Inlet

Admiralty Island

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Title:

Contemporary Storm Tide Inundation Including Wave Runup Effects: 0.5% AEP Event

Figure: 3

Rev: A

N

0 250 500

Approx.Scale

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Filepath: I:\B22604.g.nc_Tinira St Portsmith\DRG\COA_005_170323_Storm_Tide+Waves_200yr_Cairns.wor

Inundation Depth (m)

- 0.0 to 0.5
- 0.5 to 1.0
- 1.0 to 1.5
- 1.5 to 2.0
- 2.0 to 2.5
- 2.5 to 3.0
- 3.0 to 3.5
- 3.5 to 4.0
- 4.0 to 4.5
- 4.5 to 5.0
- Greater than 5.0
- Trinity Inlet

Inundation depths do not include any freeboard allowance to account for computational and/or physical uncertainties which may be in the order of 0.5m and up to 1m in the wave run-up zone

LEGEND

- Streams
- Site Boundary
- Dredge Material Placement Area

Comport Street

Aumuller Street

Ray Jones Drive

North Coast Railway

Tingira Street

Trinity Inlet

Admiralty Island

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Title:

Contemporary Storm Tide Inundation Including Wave Runup Effects: 0.2% AEP Event

Figure: 4

Rev: A

N

0 250 500

Approx.Scale

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Filepath: I:\B22604.g.nc_Tinira St Portsmith\DRG\COA_006_170323_Storm_Tide+Waves_500yr_Cairns.wor

Local Drainage Review

A desktop review of the local catchment contributing runoff to the Site was undertaken. As presented in the topography review (refer to Figure 1) there are two sag points located along Tingira Street. At these locations gully pits were visually identified (i.e. through aerial imagery) indicating the local drainage route.

Using the 2008 LiDAR survey elevation data, the local overland flow paths within the Site are presented in Figure 5 together with the DMPA areas. The review has indicated there is potential for an internal local overland flow path within the northern DMPA and consequently a drainage path should be provided within this area to prevent pondage on Tingira Street.

An important drainage feature is the channel located at the northern portion of the Site (refer to Figure 1). Detailed modelling of this flow path was not undertaken, however overtopping of the road could occur at this point. As depicted in Figure 1, overtopping flows from this drain may also need to be allowed for in consideration of the northern DMPA area to prevent flooding and pondage within the Site and adverse impacts.

Summary Advice

Based on our desktop assessment of the existing available information to BMT WBM, the Site is located outside of Council's Flood Hazard Area and consequently does not need to demonstrate compliance to Council's Code. However, the dominant flooding mechanism for the Site is from regional storm surge inundation and local runoff from either the Site and/or the drain located at the northern end of the Site. Council's overlay maps suggest that the Site is not affected by regional flooding.

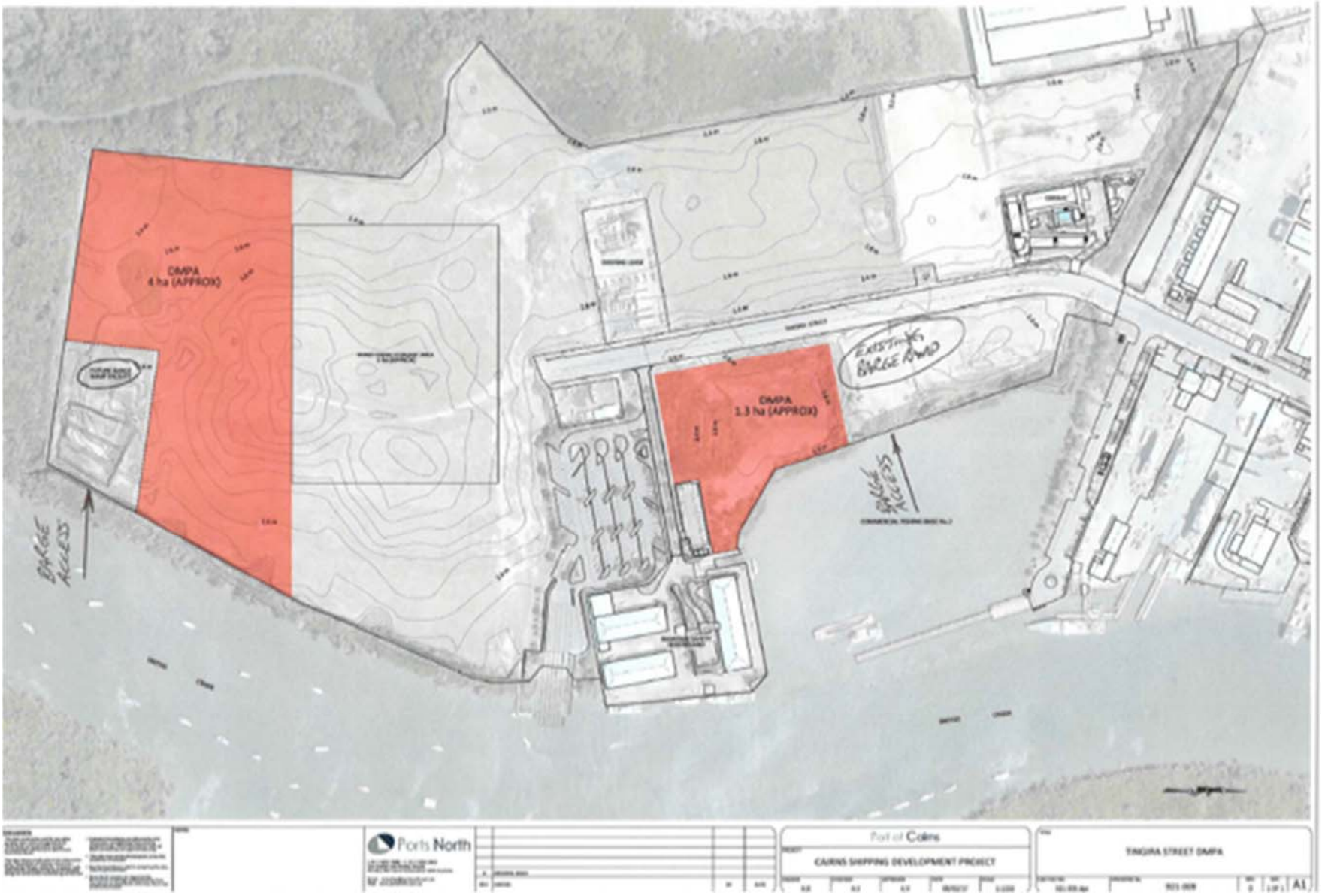
The DMPA areas will not have any adverse impact on storm surge flooding. The northern DMPA area will need to allow for an overland flow path to cater for local drainage and potentially overtopping flows from the northern drain to prevent pondage and adverse flood impacts.

The advice provided herein is based upon a desktop assessment of available information to BMT WBM in relation to storm surge and local drainage. Detailed local drainage investigations will ultimately be required for the Site to prevent local ponding and to avoid potential off-site impacts from the northern drain.

Yours Faithfully
BMT WBM PTY LTD

Anthony Charlesworth
Principal Engineer

Attachment 1 – Site Location and DMPA



Proposed DMPA Sites

Attachment 2 – Flood and Inundation Hazard Overlay

MAREEBA SHIRE COUNCIL

REDLYNCH

KANIMBLA

Precinct 3 - Sub-precinct Zone 1 - CBD & Environs

SITE

Precinct 3 - Sub-precinct Zone 2 - CBD & Environs

MOUNT SHERIDAN

EDMONTON

MOUNT PETER FLOOD PRECINCT REFER TO SHEET 3

GORDONVALE

KEY TO SHEETS

LEGEND

- Flood inundation trigger area
- Floodplain assessment trigger area
- Precinct Boundary
- Sub-precinct 2a - Low-medium hazard area
- Sub-precinct 2b - High-extreme hazard area

Disclaimer:

The Flood and inundation hazards overlay identifies trigger areas (flood and storm tide inundation areas) where modelling has been undertaken by Council or where identified by the State Government. The overlay does not represent mapping of a defined flood event and is provided to ensure that the risk of inundation is assessed and mitigated when development is proposed.

The Flood and inundation hazards overlay is not prepared for insurance eligibility determination purposes and is not suitable to determine whether an existing building is subject to flooding, nor does the overlay account for pre-existing localised drainage matters.

Cairns Regional Council

CAIRNSPLAN2016

One region, many communities

CAIRNS REGIONAL COUNCIL PLANNING SCHEME

FLOOD AND INUNDATION HAZARD OVERLAY

Date 01/03/2016

0 1,000 2,000 Metres

MAP No. OM-07B

Sheet 2 of 6