3 FLOODING ASSESSMENTS

It is understood that parts of the study area are subject to inundation during local catchment floods and regional floods when the water level in Wallis Lake is elevated. This section provides the results of flood inundation mapping work which has been completed for the site.

3.1 Forster/Tuncurry Floodplain Management Study

Detailed flooding assessments have been undertaken as part of a number of previous flood studies. Relevant information and findings included in the Forster/Tuncurry Floodplain Management Study are detailed below.

Overview

As stated in the Executive Summary of the Forster/Tuncurry Floodplain Management Study, "*Great Lakes Council sought to examine a range of floodplain management options for Forster and Tuncurry. These options were intended firstly, to protect the existing development as far as possible, and secondly, to ensure that any new development would be reasonably protected and would not create major adverse flood impacts on existing development. Council's design standard for the Forster/Tuncurry area is the 1% AEP (annual exceedance probability) flood.*

Hazard Definition

The Floodplain Management Study identified that about 1000 houses would be inundated above their floor levels by floodwaters in the 1% AEP event and that most of the flood liable properties would be in low hazard areas where flow velocities are low and evacuation could be undertaken without undue risk as the floodwaters rise. The locations within the study area that fall within the provisional high hazard category for the 1% AEP event are:

- Low lying areas near Beach Street and Wharf Street, Tuncurry - due to the depth of floodwaters; and
- Low lying areas across the Point Road peninsula, Tuncurry - due to the depth and velocity of floodwaters.

It is noted that the Site on The Lakes Way is not identified as a high hazard.

The Floodplain Management Study later identifies the site as a low hazard flood fringe area under existing conditions (i.e. without filling). Flood fringe areas are defined in the Floodplain Management Study as being areas that are neither floodways or flood storages.

Development Options and Flood Impacts

The Floodplain Management Study assessed various floodplain management options for their potential impacts on flooding, including development options involving land filling. One of the development options considered included Landfill on the western side of the Lakes Way, Forster (effectively covering the Site). The flood investigations concluded that filling of this land would not have a noticeable impact on flood behaviour in terms of increased flood levels and increased damages to existing development.

3.2 Flood Levels Assessed

In determining which flood events to assess for the site, consideration of localized catchment flows in combination with flooding events in Wallis Lake have not been considered. The main reason for this is that the site is of limited size (approximately 24ha as the site is effectively a self contained catchment) and is located immediately adjacent to Pipers Creek. The site is expected to have a limited time of concentrations (in the order of minutes to hours) whereas the time to peak flood levels for Wallis Lake are likely to be of the period of days. As such the peak effect of catchment flooding are unlikely to combine with the peak effects of site flooding.

Also, it is considered that flood velocities will remain low in the event of future site filling. As described in Section 3.1 as a low hazard flood fringe area and this is unlikely to change in the event of site filling.

Hence, the approach which has been taken has been to generate flood inundation mapping for the site has been to obtain the closest available flood heights to the site from the Forster/Tuncurry Floodplain Management Study (DLWC, 1998) and translate these across the site. Note, the 1% AEP flood height was verified by obtaining a Flood Level Certificate for the site (see Appendix A).

The following flood heights have been assessed at this stage:

- 5% AEP (20 year ARI flood height);
- 1% AEP (100 year ARI flood height); and
- Sea Level Rise flood height in combination with a 100 yr ARI flood event (400 and 900 mm).

Further flooding assessments may be required, although what has been provided is likely to be sufficient for the purposes of providing a preliminary assessment of the flood constraints of the site.

3.3 Survey Information

A digital elevation model (DEM) has been prepared for the site (see Figure 2-3). This DEM has been prepared by conversion of survey heights obtained by Lidbury, Summers and Whiteman in 2008.

There have been some issues with survey data for the site. Originally BMT WBM proposed to use LIDAR information which was captured for the region in 2008. However, due to ongoing concerns with the survey levels obtained with the new LIDAR and the existing State Survey Mark this information was not provided by Council, it also cast doubts over the accuracy of the Lidbury, Summers and Whiteman survey which may have been tied into the State Survey Mark datum.

To resolve this issue for the purposes of completing baseline assessments, Lidbury, Summers and Whiteman have resurveyed key controls and identified that their original survey is accurate. A written statement to this accord is provided in Appendix B.

3.4 Climate Change Considerations

There is no standard approach in the consideration of climate change and the impact on design flood conditions. However, the following assumptions are often adopted in current practice in assessing future design flood conditions (ref DECC guideline):

- Projected mean sea level rise of 0.91m (to year 2100). This is noted to be Great Lakes Council's adopted interim policy (Great Lakes Council, 2008); and
- Increased design rainfall intensity (catchment flooding) between 10% and 30%.

Even with a 30% increase in design rainfall intensity for the local catchment flooding condition for the development site, it is expected that dominant flooding mechanism in terms of maximum flood levels on the development site will remain flooding within Wallis Lake.

With an existing 1% AEP design flood level (lake flooding condition) of 2.28m AHD, the design level including the 0.91m sea level rise becomes 3.19m AHD. An intermediate depth of +0.40m has also been presented (i.e. 2.68m AHD).

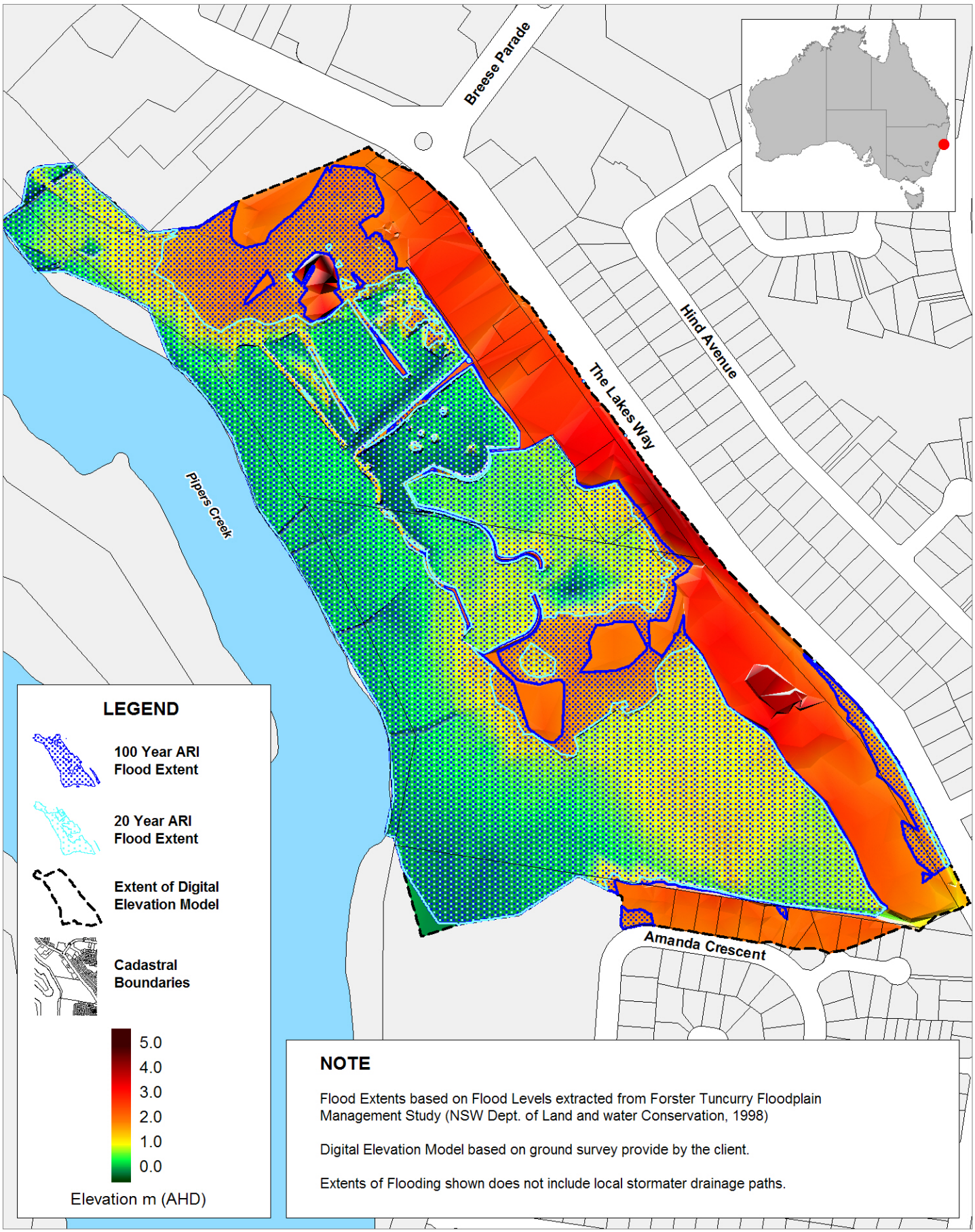
To address the effects of flooding across the site there are various design mechanisms which can be incorporated into the project. Options may include:

- Filling. Typically the site could be filled to the 1% AEP flood level and an additional 0.5m freeboard would generally be applied to the design. Therefore a level of 3.69m AHD would apply as the design planning level. A significant volume and height of fill would be required across the development site to accommodate these design levels.
- Raising the floor level of the buildings proposed. This would also be to a level of 3.69m AHD. Space under the development could potentially be used for locating infrastructure unlikely to be negatively impacted by flooding.
- Tanking of the building in combination with flood barriers to allow safe egress to and from the buildings. It is noted that design outcomes such as this have been recommended in other areas of NSW as an alternative to large scale filling of the site.

The preferred design option would hinge of many factors and will form a feature of the conceptual design / impact assessment of any future development to be located on the site.

3.5 Flood Results

The flood depth and inundation extent across the proposed development site for the 1% and 5% AEP (i.e. 20 yr and 100 yr ARI event) Wallis Lake flooding including the allowance for sea level rise is shown in 3.1. Climate change scenarios in combination with the 1%AEP flood are shown in Figure 3-2.



NOTE

Flood Extents based on Flood Levels extracted from Forster Tuncurry Floodplain Management Study (NSW Dept. of Land and water Conservation, 1998)

Digital Elevation Model based on ground survey provide by the client.

Extents of Flooding shown does not include local stormater drainage paths.

Title:

20 Year and 100 Year ARI Flood Extents

Figure: **3-1**

Rev: **A**

N

0 100 200m

Approx. Scale

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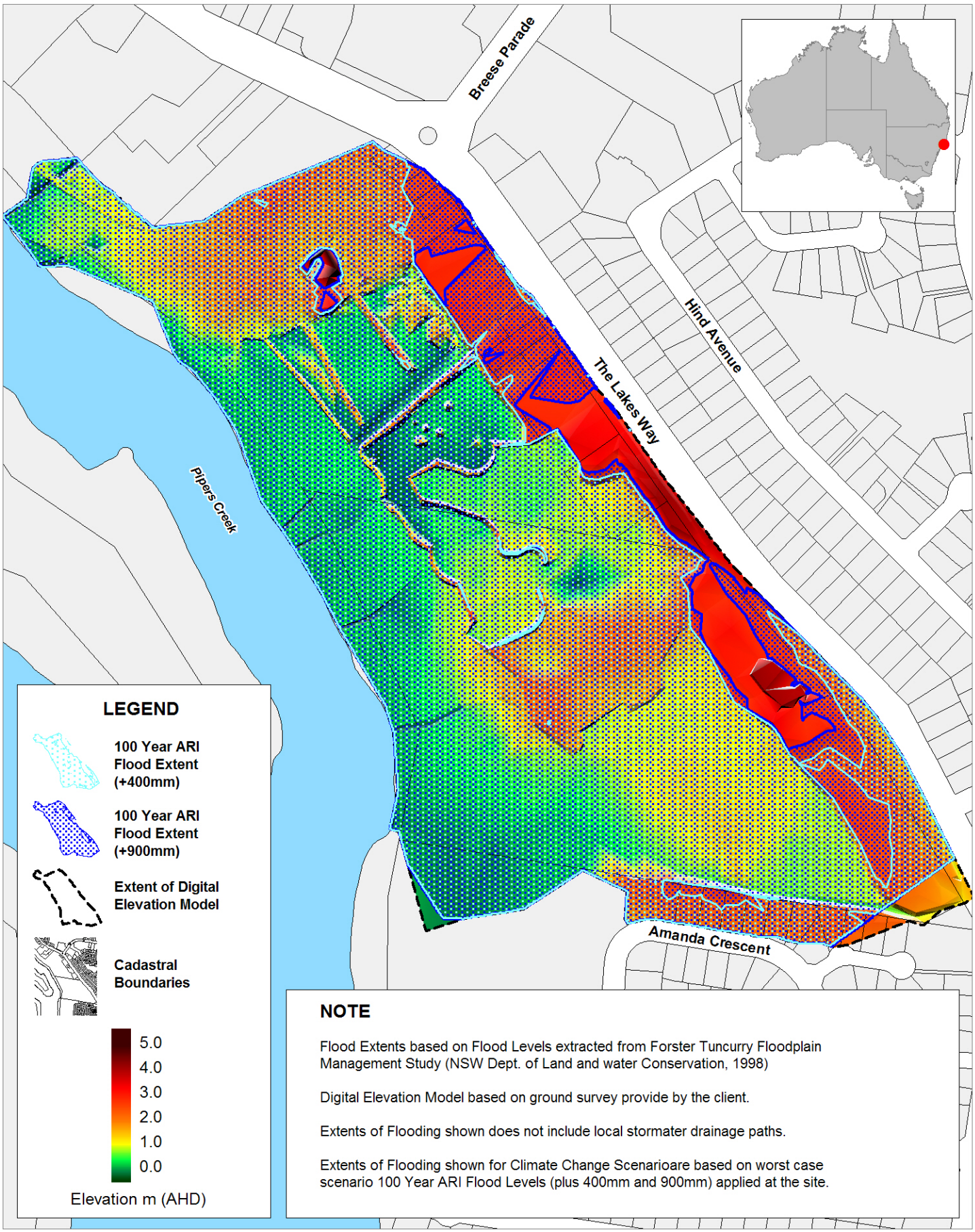
Filepath : I:\B17295_I_JLB Lakes Way Forster Stormwater DCC\DRG\FLD_001_090423 Q20_Q100 Flood Extents.WOR



NOTE

Flood Extents based on Flood Levels extracted from Forster Tuncurry Floodplain Management Study (NSW Dept. of Land and water Conservation, 1998)

Digital Elevation Model based on ground survey provide by the client.

Extents of Flooding shown does not include local stormater drainage paths.

Extents of Flooding shown for Climate Change Scenarioare based on worst case scenario 100 Year ARI Flood Levels (plus 400mm and 900mm) applied at the site.

Title:

100 Year ARI Flood Extent for Climate Change Scenarios (400mm and 900mm increase in Flood Levels)

Figure: **3-2**

Rev: **A**

N

0 100 200m

Approx. Scale

BMT WBM
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Filepath : I:\B17295_I_JLB Lakes Way Forster Stormwater DCC\DRG\FLD_002_090424 100yr ARI + 400_900 Flood Extents.WOR