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28 September 2018

Project Reference: 10064

PricewaterhouseCoopers
One International Towers Sydney
Watermans Quay, Barangaroo NSW 2000

Att: Jester Magpayo

Further to a request for further information made at a recent meeting with Coffs Harbour City Council, Health Infrastructure, Bonacci Group and the Project Manager we provide the following advice:

Item 1 - Groundwater

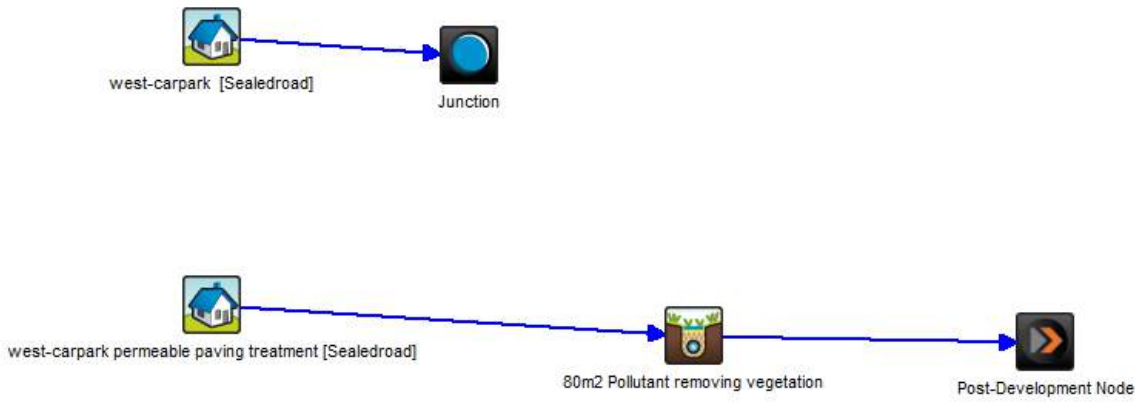
The level of the existing carpark, where the proposed lift core is located, is approximately RL 4.8m AHD. The bulk excavation level for the lift core is RL 2.65m AHD. This is a depth of approximately 2.15m. The Geotechnical report notes that groundwater was encountered at approximately 5.5m to 6m below the ground surface. This was noted to rise to between 1 to 3m (generally between 2m to 3m) below ground surface after a period of prolonged rainfall. If there is prolonged rainfall during excavation of the building, the lift core may be affected. It is expected that this area will need to be dewatered to remove the rainfall that ponds in this location (as it is the lowest point of the site). This dewatering will need to be in accordance with the Soil and Water Management Plan – it is not anticipated that large volumes of groundwater will need to be pumped, as the groundwater table will be at approximately the same level as the base of the lift core excavation only in the case of extensive rain (in which case the Soil and Water Management Plan will address disposal of water as noted above).

The piles are expected to be CFA grout injected – this technique injects grout under pressure through the hollow auger stem as it is removed. This precludes the need to extract water during piling operations.

Item 2 – Water Quality

Water quality impacts have been model using MUSIC software. The existing site consists of road pavement, carparking, some areas of landscaping and a paved helipad area situated on the western side which is predominantly pervious.

The proposed design introduces a new building layout over the existing road and carparking areas. The pollutant generation from proposed roof areas of the new building layout is significantly less than existing road pavement areas, therefore this is a significant improvement to the existing condition even without water quality treatments. It is not practical to provide the level of treatment rate required by Coffs Harbour City Council for a roof area which is already relatively clean particularly where it can be demonstrated that it is significantly better than the existing scenario in terms of water quality. On the contrary however, the area where Coffs Harbour City Council's level of treatment rate may be applicable would be the western carpark where existing pervious areas are converted into a carparking area. The treatment train for the western carpark involves treating the runoff from the carpark via 80m^2 of pervious area planted with pollutant removing vegetation at the south western corner. Additionally, the carpark area shall have permeable paving to further assist with infiltration and reduction in pollutants. A MUSIC model has been developed for the western carpark area to demonstrate that Coffs Harbour City Council's WSUD criteria are met. A screenshot of the model is shown:



The pollutant runoff from a 100% impervious western carpark is shown in Figure 1. The residual pollutant load from a 100% pervious west carpark (to model permeable paving), treated by 80m^2 of area planted with pollutant removing vegetation is shown in Figure 2. This reflects the proposed treatment train of permeable paving, swale and nutrient removing planting that will be provided. The percent reduction is therefore as follows:

	100% paved carpark	Carpark after application of permeable paving and pollutant removing vegetation	Percent Reduction	Council Reduction Target
TSS (Kg/yr)	1870	113	94%	80%
TP (Kg/yr)	2.95	0.374	87.3%	60%
TN (Kg/yr)	9.59	3.19	66.7%	45%

This shows that the treatment train provided for the western carpark meets Coffs Harbour City Council's pollutant reduction targets.

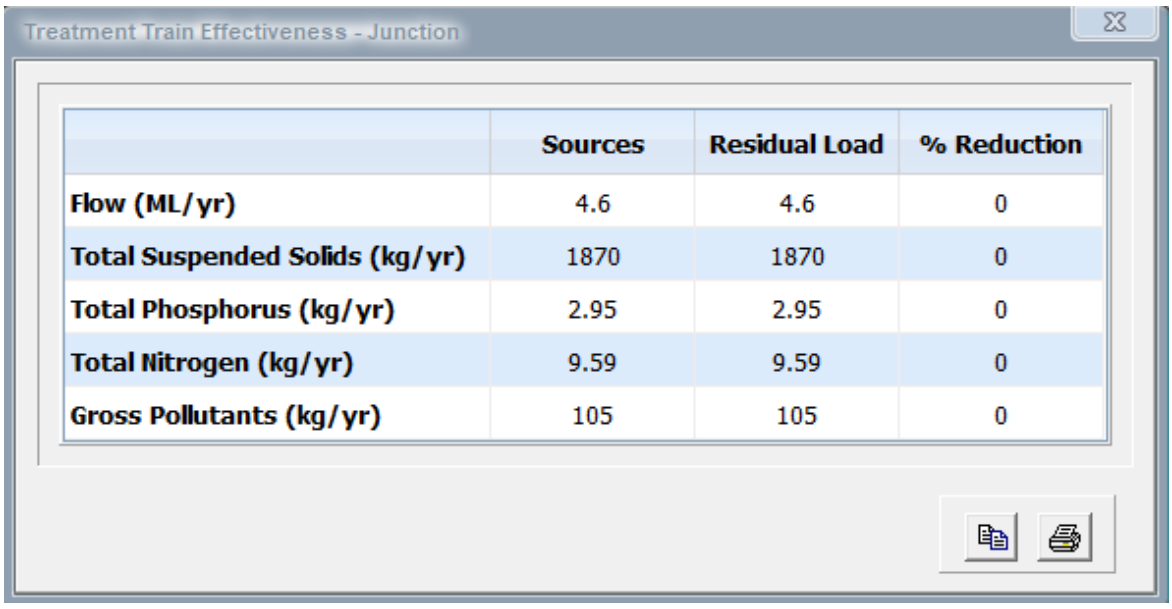


Figure 1 Pollutant from 100% impervious carpark

Treatment Train Effectiveness - Post-Development Node

	Sources	Residual Load	% Reduction
Flow (ML/yr)	2.29	1.85	19.3
Total Suspended Solids (kg/yr)	592	113	81
Total Phosphorus (kg/yr)	1.05	0.374	64.4
Total Nitrogen (kg/yr)	4.5	3.19	29.1
Gross Pollutants (kg/yr)	22	0	100

Figure 2 Pollutant from 100% pervious carpark after treatment

Item 3 Water Quantity

The proposed development has increased pervious area compared to the existing scenario. The development area ultimately draining to pit H1 (the existing pit in the depression adjacent to the large tree to the east of the proposed development) is approximately 1.775ha with nominally 33.2% and 35.3% pervious area in the existing and design case respectively. The catchment areas for the post-development and pre-development scenarios are shown in figures below.

Figure 3 Existing Development site catchment areas ultimately draining to pit H1 (existing pervious and impervious proportion)

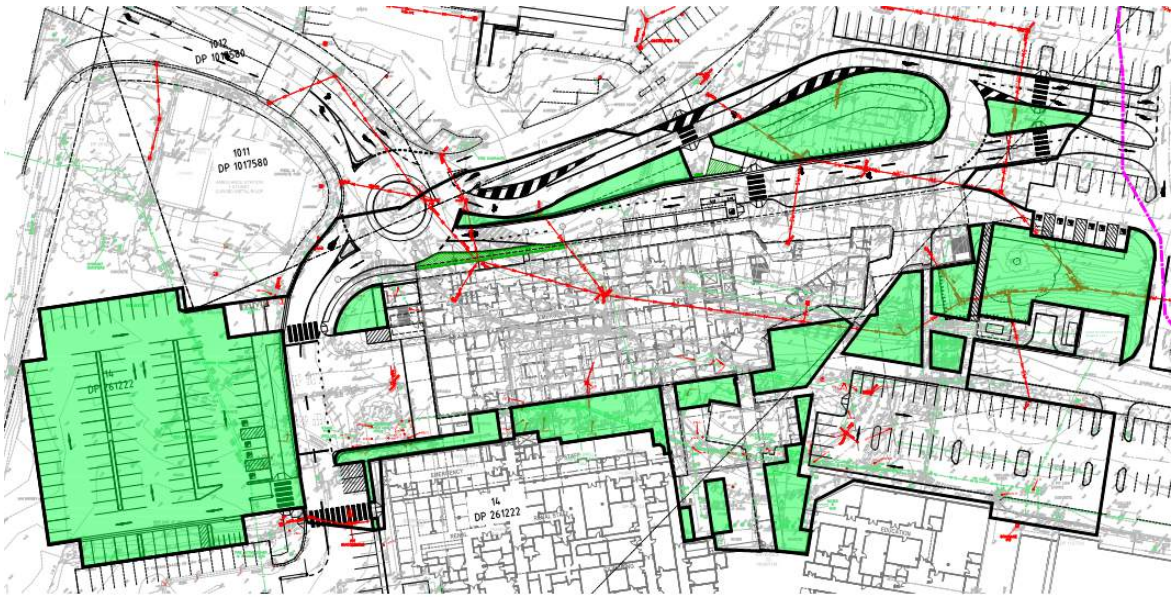


Figure 4 Proposed Development site catchment areas ultimately draining to pit H1 (proposed pervious and impervious proportion)

Post development runoff would be largely the same as existing, with a slight reduction due to the slight increase in pervious area for the proposed scenario. A broad level DRAINS model shows that in the 1% AEP event using ARR2016 rainfall, post and pre development flows are 1.73m^3/s and 1.74m^3/s respectively, a reduction in runoff of approximately 10L/s. This is consistent for the minor storm events. The flows for minor and major storms are summarized in table below:

Storm	Flows (existing) (m^3/s)	Flows (proposed) (m^3/s)
1% AEP	1.74	1.73
5% AEP	1.21	1.20
10% AEP	1.01	1.00

Yours Sincerely
For Bonacci Group (NSW) Pty Ltd

Stephen Naughton MIEAust CPEng NER
Associate Director

John Williams FIEAust NPER
Director

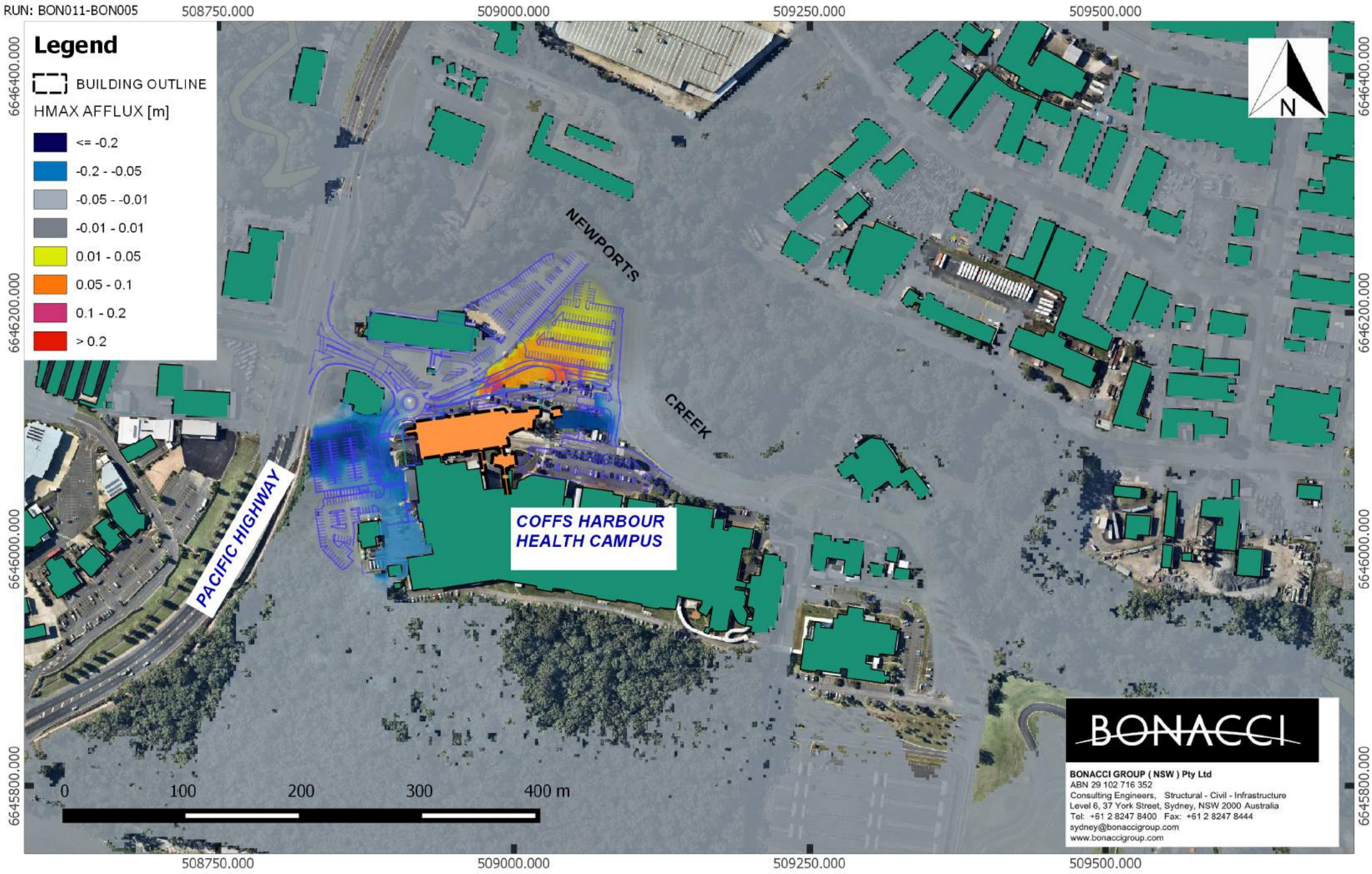


FIGURE 51: (BON011-BON005) MAX FLOOD HEIGHT (HMAX) AFFLUX FOR 1% AEP STORM EVENTS (CRITICAL STORM DURATION OF 9HR) DUE TO PROPOSED DEVELOPMENT OPT12C

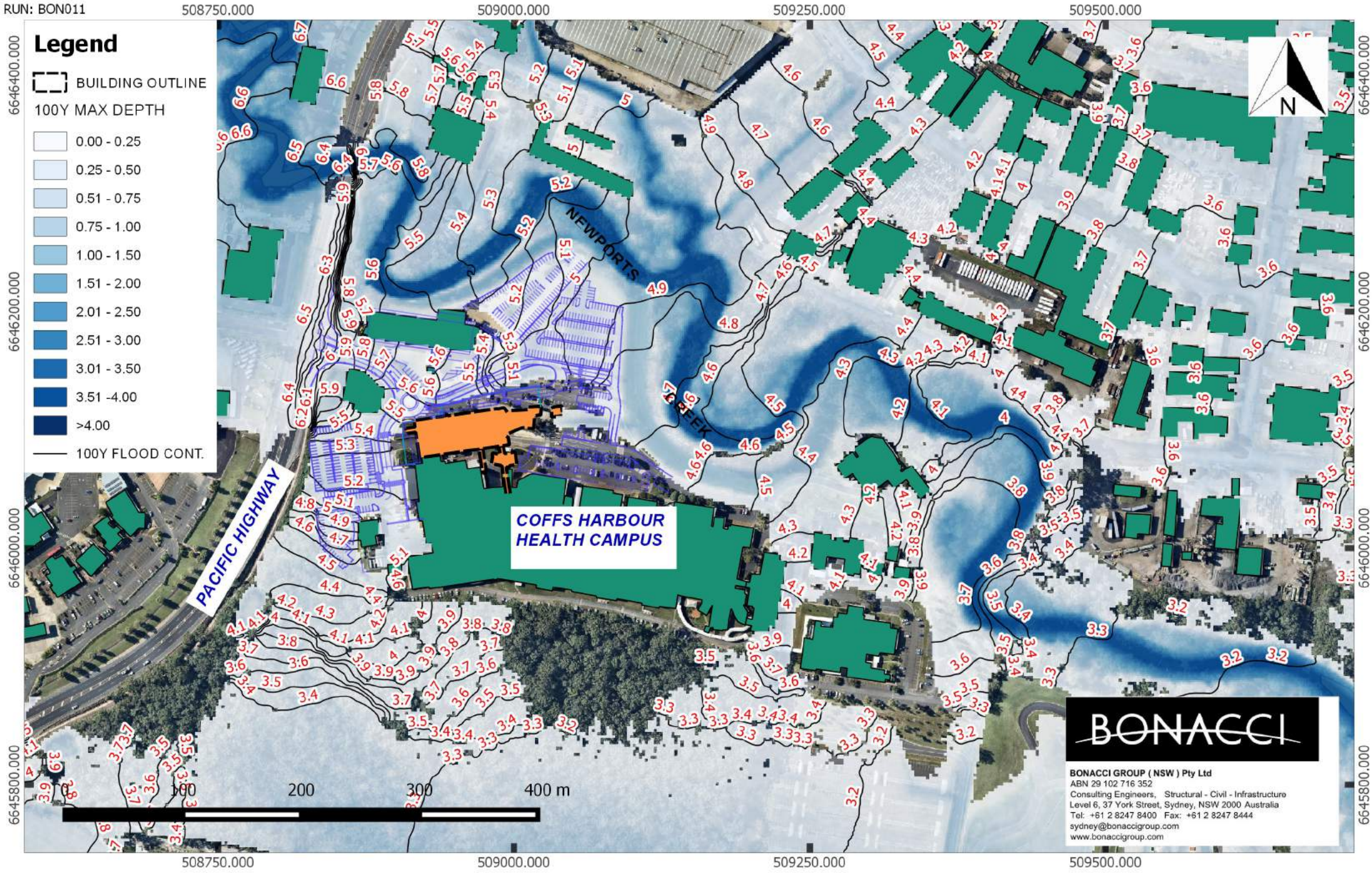


FIGURE 52: (BON011) MAX FLOOD DEPTH (DMAX) FOR 1% AEP STORM EVENTS (CRITICAL STORM DURATION OF 9HR) DUE TO PROPOSED DEVELOPMENT OPT12C

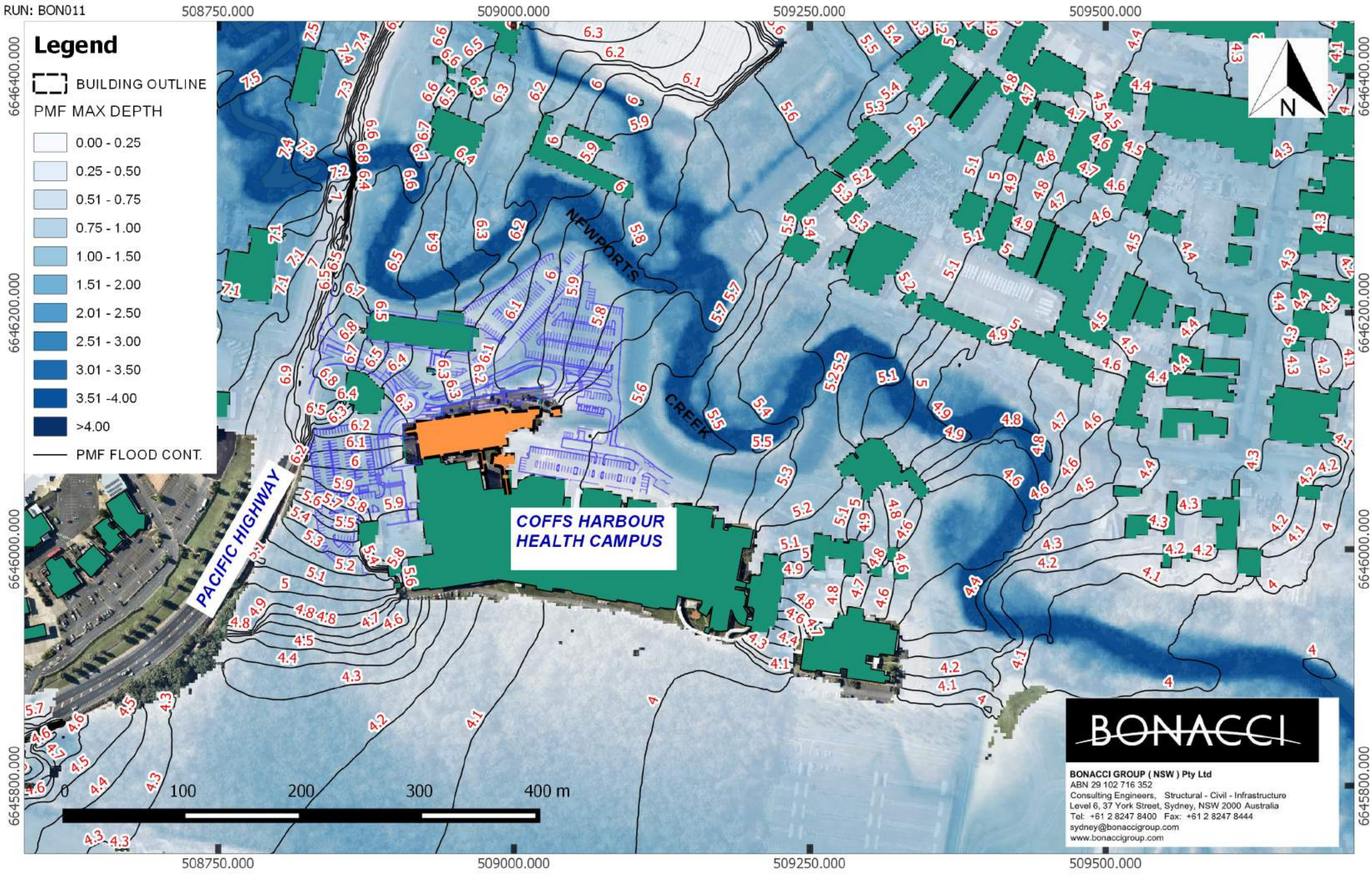


FIGURE 53: (BON011) MAX FLOOD DEPTH (DMAX) FOR PMF STORM EVENTS DUE TO PROPOSED DEVELOPMENT OPT12C

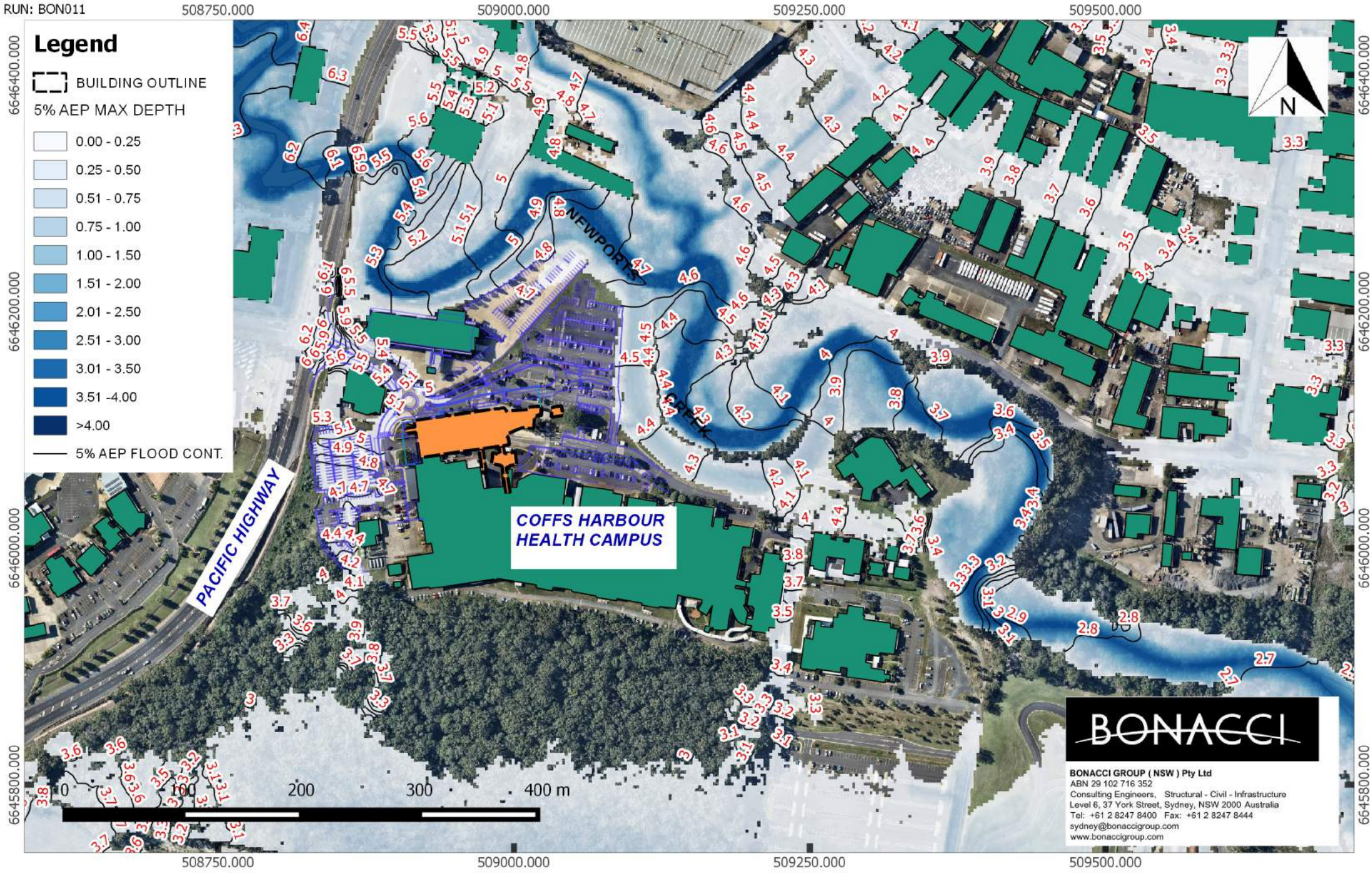


FIGURE 54: (BON011) MAX FLOOD DEPTH (DMAX) FOR 5% AEP STORM EVENT 6HR DURATION DUE TO PROPOSED DEVELOPMENT OPT12C