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Overland Flooding Report for Proposed Gosford Northside Private Hospital

Introduction

Development is proposed at the eastern side of the intersection of racecourse Road and Faunce Street West in North Gosford. The development proposed is a Private Hospital.

Previous submissions in support of the proposal have indicated the lack of mainstream flood affectation at the site. Now however Council is requesting an overland flow flood report for the site. The purpose of the overland flow flood report is to ensure that the site is not flood liable and that development of the site will not lead to flood impacts elsewhere.

The report does:

1. Describe briefly the modelling work done in order to define design flood liability at the subject site;
2. Define flood behaviour at the site and surrounds due to overland flow based on existing conditions;
3. Analyse the impact of the proposed development on 1% AEP flood behaviour; and finally
4. Provide some information to Council on the flood liability of site entrances and exits.

In proposing the scope of work that has been carried out Council's general concurrence was sought and obtained.

Methodology

Design flood levels for the 1% AEP and PMF events have been developed using a conservative method. This is as follows:

1. Design rainfall obtained from ARR87 (in case of 1% AEP) has been applied to a 2D TUFLOW model with ground levels informed by publicly available Lidar data. Note that both the two hour and 25 minute events were run. The 25 minute event was a good match for the two hour event which often is critical in SE Australia due to the temporal pattern used. The extent to which rainfall depth was applied is shown over the page in Image 1 which also shows contextual topography as well as the precise subject site in question (outlined in red). The area to which design rainfall was applied was exaggerated deliberately in order to be sure that no flowpaths which may impact the subject site were missed.
2. No losses were applied to rainfall in order to contribute towards the conservative estimate required;

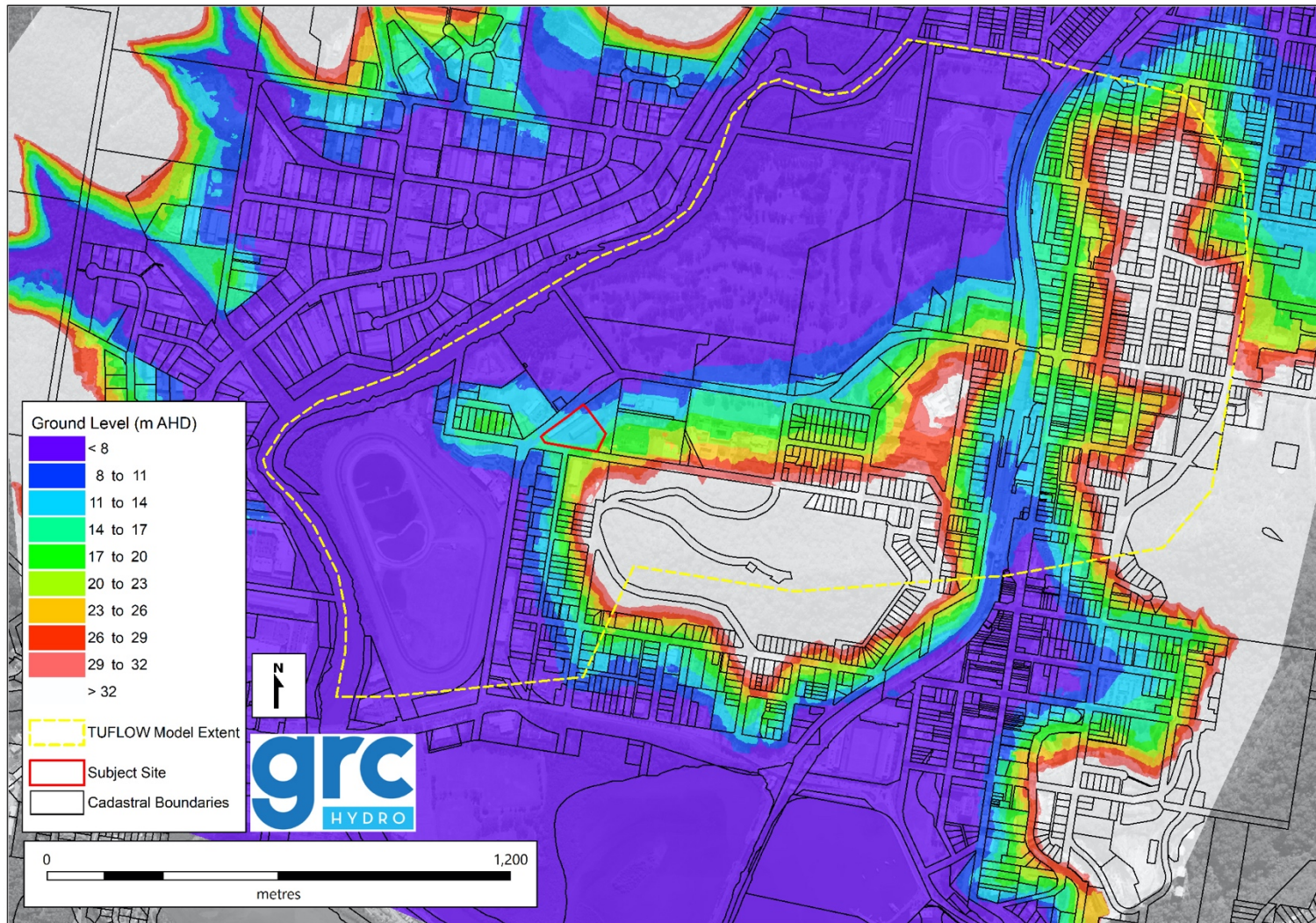


Image 1: Model extent, DEM and Subject Site

3. Existing buildings were digitised and nulled in the vicinity of the subject site -this again contributes to a conservative estimate
4. Drainage at the site was included in the model, with details of the drainage network provided by Warren Smith and Partners.
5. Drainage outside the site was not included. Council were contacted however such data is not readily available. Broadly the absence of pits and pipes will tend to again contribute to estimates being conservative.
6. The modelled ground elevations were based on publicly-available LiDAR from 2008. For the modelled 'proposed' case, the ground elevations were then amended at the site based on the proposed design.
7. The PMF was run for the 15 min only. This run provides a result which approximates the critical PMF such that the exposure of the site can be properly assessed for its flood liability in the most extreme of storm events. PMF assessment is applicable given the proposed use of the site.

Results

Figure 1 shows the 1% AEP flood depths and extent. Figure 1 also shows the location of multiple entrance and exits from the site (red dots). At these locations as per Table 1 below both 1% AEP and PMF flood depths are presented.

A feature of all locations is that 1% AEP depths are low (less than 0.1 m for most entrances which is negligible). A further feature is that PMF depths do not increase markedly despite the fact that a 1 in 10,000,000 year event is being considered. Broadly then the results in Figure 1 and Table 1 indicate a site that is for all intents and purposes unimpacted by overland flood flows.

Table 1: 1% AEP and PMF depths for locations as per Figure 1 attached

ID	Ground Levels (m AHD)	1% AEP	Probable Maximum Flood (PMF)
		Depths (m)	Depths (m)
1	11.36	0.33	0.35
2	11.71	0.02	0.03
3	13.88	0.02	0.03
4	15.15	0.02	0.04
5	15.71	0.03	0.14
6	14.96	0.00	0.00

The impact of the proposed development was assessed for the 1% AEP flood event. In terms of impact, none would be expected given that the site is currently fully impervious and unimpacted by overland flows as per Figure 1 and Table 1 above. The impact has been summarised by tabulating the 'existing' and 'proposed' peak flood level at four locations (points 7-10 on Figure 1) and calculating the difference or change in flood level, see Table 2. As shown in the table, there is negligible change in peak flood level, with a maximum increase of 0.005 m at point 9, less than the threshold indicated in Project 15 of ARR2019. Based on these results it is determined that the development will have no adverse impact on flooding.

Table 2: Existing and Proposed Flood Levels

ID	Ground Levels (m AHD)	1% AEP		PMF		1% AEP change in Levels (m)
		Existing Levels (m AHD)	Proposed Levels (m AHD)	Existing Levels (m AHD)	Proposed Levels (m AHD)	
7	7.77	8.06	8.03	8.34	8.30	-0.031
8	13.96	14.02	14.01	14.05	14.08	-0.005
9	18.85	18.95	18.96	19.03	19.03	0.005
10	19.52	19.70	19.70	19.81	19.81	0

As per Figure 1 the site is for all intents and purposes unimpacted by major overland flood flows as defined by Page 23 of the NSW Floodplain Development Manual. As such no impact would be expected.

The PMF event has been modelled owing to the proposed use of the site as a health care facility. Looking at the PMF results as per Table 1 it is clear that the limited catchment area which flows to the subject site means that even in the PMF flood affectation is marginal. This is indicated by the lack of change in flood depth at the reported locations.

Further looking at entrance locations on Figure 1 it can be seen for all entrance locations that 1% AEP flood flows at their peak would not impede access and egress.

To be sure of this GRC Have developed hazard maps for the 1% AEP and PMF events and these are presented below as Images 2 and 3. High hazard flow is shown in red, Low hazard flow is shown in blue. As can be seen in the 1% AEP event no entrance is impacted by high hazard flow. Even in the PMF event the majority of entrances are unimpacted by high hazard flows.

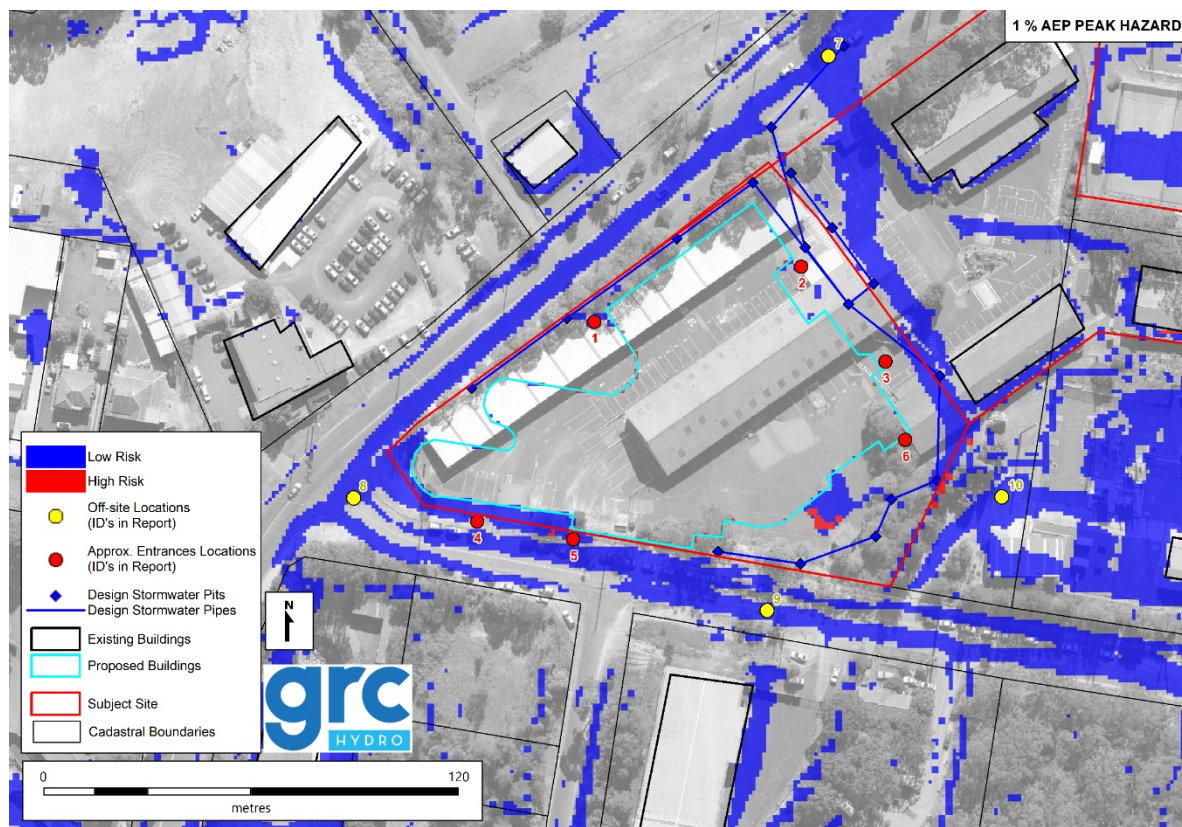


Image 2: 1% AEP Hazard Map as per FDM (NSW, 2005)

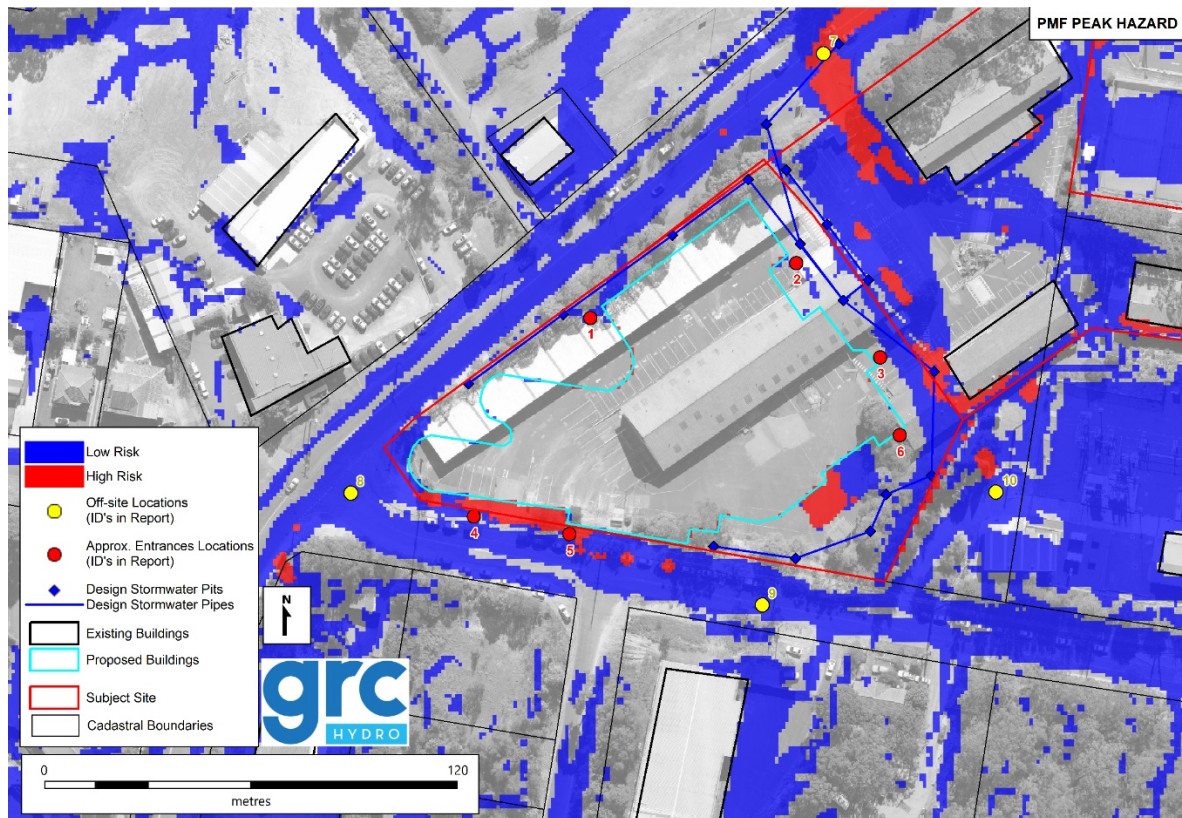


Image 3: PMF Hazard Map as per FDM (NSW, 2005)

Conclusions

Gosford City Council have asked that an overland flow flood assessment be carried out for the subject site. This report presents that work.

The subject site has a very limited catchment area and the overland flow flood modelling carried out and reported on herein does not identify any overland flow paths that flow through the site.

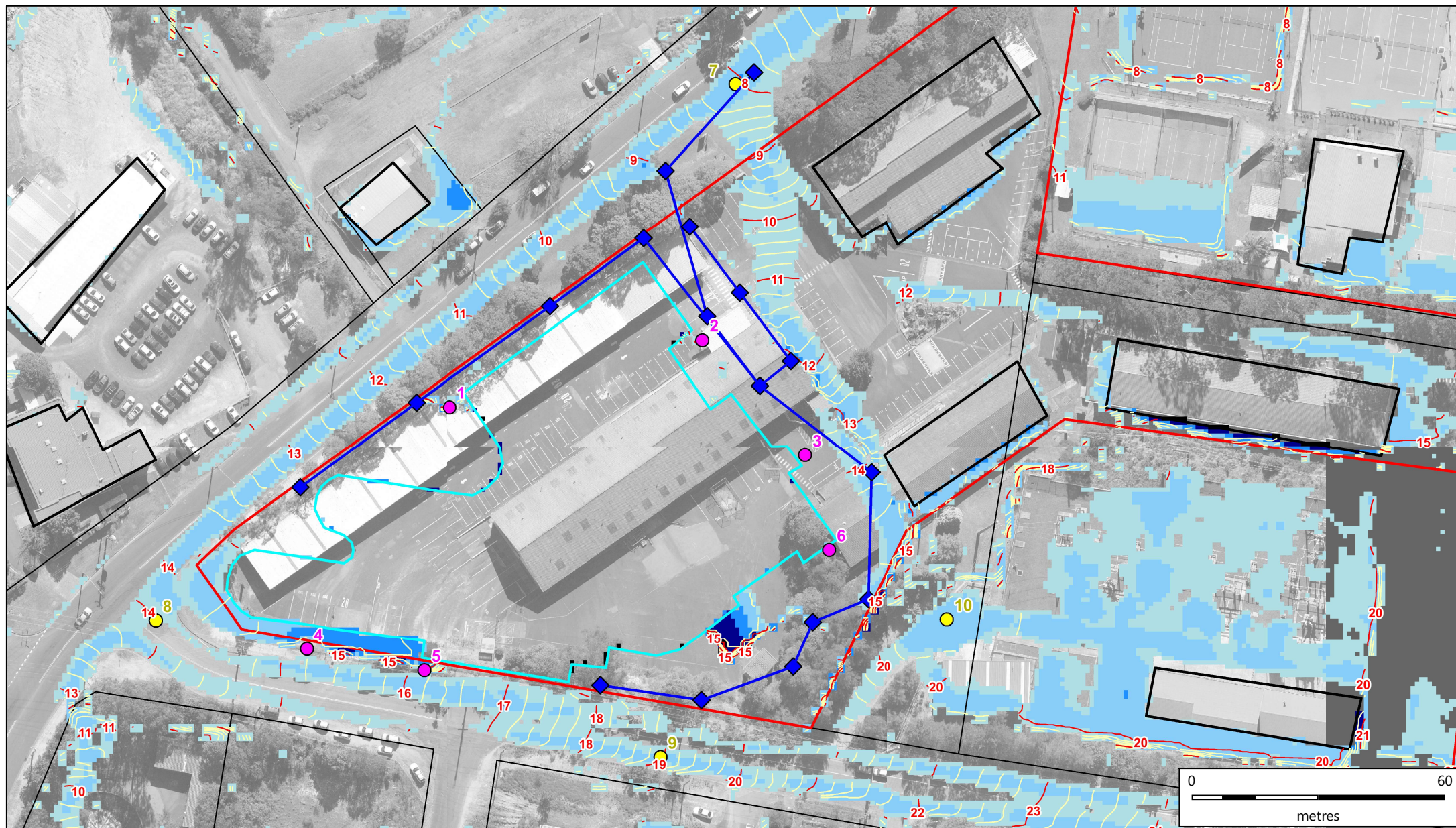
The tabulated flood impacts in Table 2 which shows no off-site impacts associated with the proposed development flows from the fact that as per Figure 1 the site is all but free of overland flow flooding.

Further Images 2 and 3 then indicate the general lack of hazard at entrance/exit locations for all events including the PMF.

If you require any further information, please do not hesitate to contact me on 0413 631 447.

Yours Sincerely

Steve Gray
Director



Flood Depths (m)

0.05 to 0.1
0.1 to 0.3
0.3 to 0.5
0.5 to 1
> 1

 Design Stormwater Pits
 Design Stormwater Pipes

 Off-site Locations
 (ID's in Report)

 Approx. Entrances Locations
 (ID's in Report)

 Major Flood Level Contours
 (Spacing = 1 m)

 Minor Flood Level Contours
 (Spacing = 0.2 m)

 Existing Buildings
 Proposed Buildings
 Subject Site
 Cadastral Boundaries



TITLE : 1% AEP Flood Depths & Levels - Proposed

PROJECT: Northside Private Hospital

PROJECT No. 210007

DATE: Mar 2021

SCALE: 1 : 1200

FIGURE No. 01