

Technical Memorandum

August 14, 2023

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From	Hamid Asgari/Nigel Bosworth	Project No.	12612700
Project Name	Blayney Hospital Multipurpose Service (MPS)		
Subject	Flood Study		

1. Introduction

Health Infrastructure (NSW Government Health Infrastructure) has engaged GHD to undertake a flooding investigation to support development of Blayney Hospital Multipurpose Service (MPS). Blayney township is located in the vicinity of Belubula River. Blayney Hospital located on the corner of Martha Street and Osman Street at Blayney, NSW. Figure 1 shows the location of proposed works.



Figure 1 Site location

This Technical Memorandum is provided as an interim output under our agreement with Health Infrastructure. It is provided to foster discussion in relation to technical matters associated with the project and should not be relied upon in any way.

1.1 Purpose of this Memorandum

This flood study memorandum has been prepared to present results of flood modelling to calculate inundation extent, flood depth and flood level during Probable Maximum Flood (PMF) within proposed Blayney Hospital. This flooding investigation has been undertaken to address State Emergency Service (SES) concern regarding flood immunity of proposed Blayney Hospital during PMF. The memo presents flood mapping for peak Probable Maximum Precipitation (PMP) rainfall events, in accordance with the methodology outlined in Australian Rainfall and Runoff 2019.

1.2 Scope and limitations

This technical memorandum has been prepared by GHD for Health Infrastructure. It is not prepared as, and is not represented to be, a deliverable suitable for reliance by any person for any purpose. It is not intended for circulation or incorporation into other documents. The matters discussed in this memorandum are limited to those specifically detailed in the memorandum and are subject to any limitations or assumptions specially set out.

Accessibility of documents

If this Technical Memorandum is required to be accessible in any other format this can be provided by GHD upon request and at an additional cost if necessary.

2. Hydrology assessment

Hydrological model outputs from catchments draining to the site, have been obtained from Blayney Shire Council as part of the existing flood model for the town of Blayney. These flows, generated using the XP-RAFS hydrologic modelling software, have been incorporated within the flood model as inflow hydrographs into the two-dimensional hydraulic model. The hydrological model boundary and subcatchments obtained from Blayney Shire Council are shown in Figure 2.

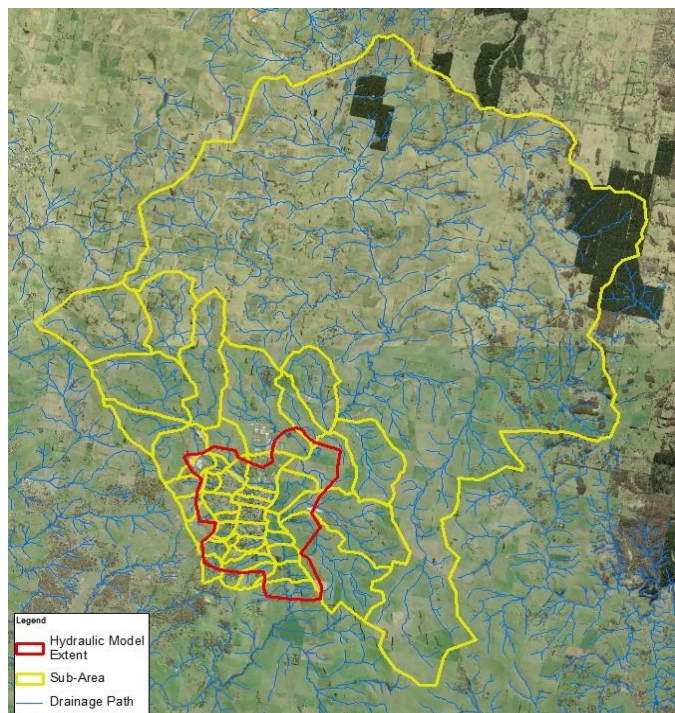


Figure 2 Hydrological model boundary (source: Blayney Shire Council)

Local flows within hydraulic model boundary have also been adopted based on provided local hydrographs during PMF design flood events. Total catchment area upstream of Blayney township identified for this study is approximately 160 km². GHD have not had access to this hydrologic model (XP-RAFTS) and have made no modifications to the flow rates or inflow locations within the Council model provided.

3. Flood assessment

3.1 TUFLOW model

A two-dimensional hydraulic model (TUFLOW Build: 2013-12-AA) has been supplied by Blayney Shire Council for the catchments draining to the proposed study site. Topographic data has been sourced from “BlayneyTown2009_1m_AveSpliced_AsciiGridexport.txt” file. Critical storm durations in the Council model for the PMF were the 2 hour, 1 hour, 30 minute and 15 minute events.

A base cell size of 6.0 metres has been used for the hydraulic model extent during PMF events. The provided TUFLOW model has been run by GHD to examine performance of provided model components and compare the results with previous outputs.

3.2 Updated TUFLOW model

The two-dimensional hydraulic model has been re-built by GHD for the purposes of this flooding investigation using the contemporary version of TUFLOW (Build: 2020-10-AF). This re-build has been to incorporate updated features of TUFLOW, updated topographic and design data, and to provide higher resolution flood mapping at the hospital site. Model components including extents and attributed data have been adopted from provided model by Blayney Shire Council.

Site survey has been incorporated into the modelling (drawing number of “223032-01C-DS01-DS04.dwg”, revision C, dated 8/05/2023) undertaken by Premise has been incorporated into updated model. Design earthworks and building layouts have been provided by Jacobs dated 26/07/2023 and incorporated into the TUFLOW model design scenario.

A Quadtree approach with nesting levels of 3 and 4, resulting in local cell size of 1.5 metre and 0.75 metre has been added to refine topographic data resolution at the location of proposed works. Existing condition and various post development scenarios have been developed using updated TUFLOW hydraulic model to assess immunity of proposed hospital and impact of proposed works on flood characteristics during PMF design flood events.

3.2.1 Roughness values

Surface roughness values for the existing condition has been adopted from provided TUFLOW model by Blayney Shire Council. Adopted Manning’s “n” values for the study area is presented in Table 1 below.

Table 1 Adopted Manning’s “n” values

Surface Type	Adopted Manning’s “n”
Existing Roads and proposed pavement	0.015
Buildings	1
Urban (including fences)	0.2
Sparse Vegetation, Rail	0.05
Dense Vegetation	0.12
Creeks	0.05
Industrial	0.03
Short grass, pastures and proposed batters	0.035

Surface Type	Adopted Manning's "n"
Wetlands	0.12
Heavy Veg_2	0.1
Vegetated Drains	0.05
Concrete Channel	0.02

The adopted Manning's "n" values for existing condition are presented in Figure 3.

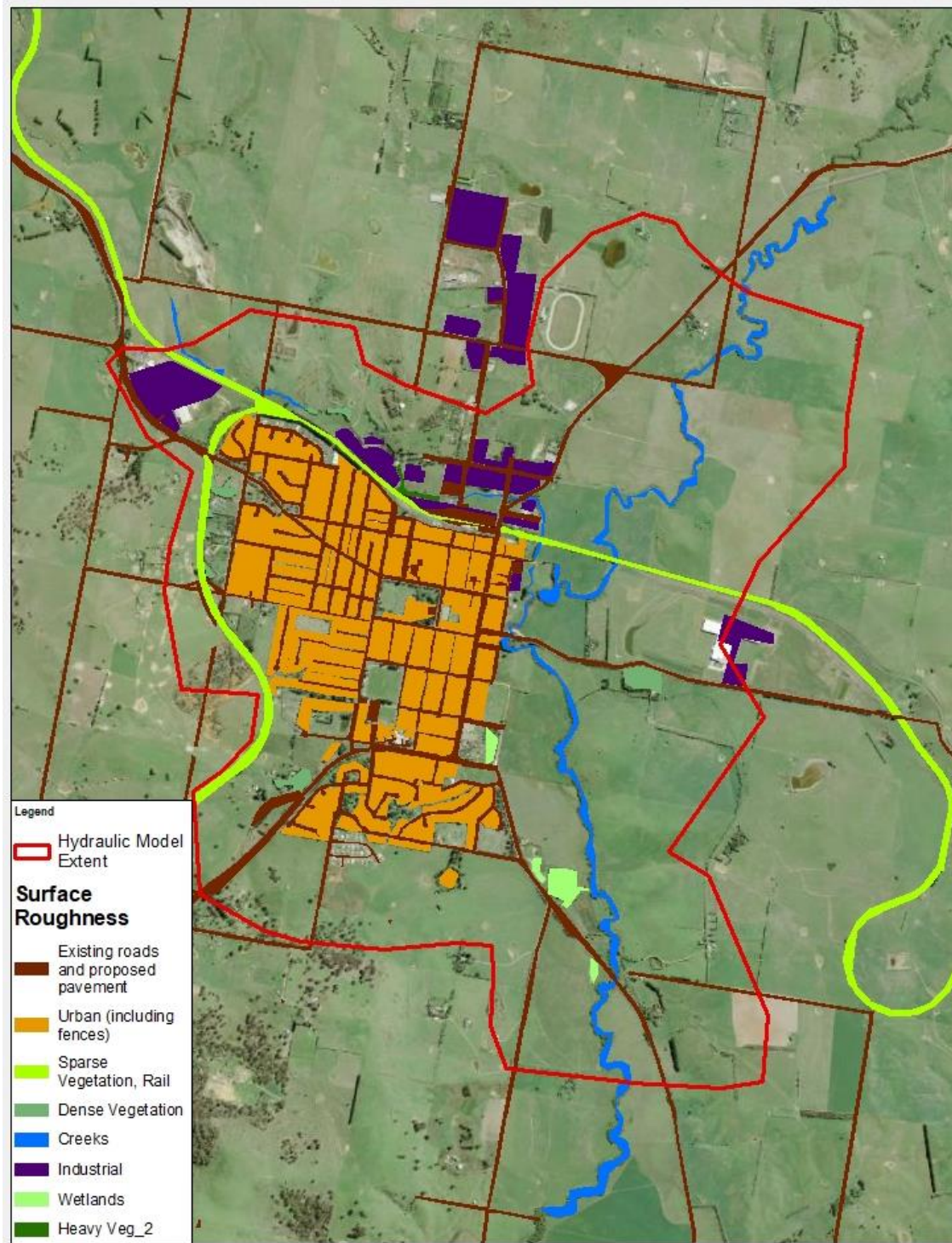


Figure 3 Manning's "n" values

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3.3 Flooding results

The results of the flood modelling investigation for PMF design flood events are presented in Appendix A. Inundation extent, flood depth, flood level and peak velocity for existing and design conditions have been presented in mapping. Change in flood depth due to proposed works during PMF design flood events has also been investigated and presented in Appendix A.

3.3.1 Existing condition

Existing site conditions have been simulated with updated TUFLOW model (Build:2020-10-AF) using topographic data and the survey as described in Section 3.2. The results of flood modelling for existing condition presented in Figures 1 and 2 indicates that Blayney township is primarily affected by riverine flooding from Belubula River and overland flooding due to large inflows contributing from upstream catchments during PMF events. The site is inundated due to overland flooding during PMF design flood events. A large overland flow contributes to the site from upstream western side. A maximum flood depth of up to 0.63 metres has been modelled to occur on northern and northwestern side of the site adjacent to Queen Street. Maximum flood depth in southwestern side of the site is calculated to be up to 0.55 metres adjacent to Martha Street.

3.3.2 Proposed condition

Post development condition has been modelled using updated TUFLOW model (Build: 2020-10-AF) as described in Section 3.2. A proposed wall extending from northwestern side around the site towards southeastern corner of the site with a movable flood gate installed on the ambulance entrance road (southern boundary of the hospital site) has been included in the design (refer to Jacobs drawings) providing flood immunity during PMF events. The results of flood modelling for post development condition presented in Figures 3 and 4, indicates that proposed buildings are not inundated during PMF events.

A long section of the water level at 0.2 metre offset from the wall has been plotted and is presented in Appendix B.

3.3.3 Change in flood depth

The results of flood modelling for design condition presented in Figure 5 indicates that proposed works increases flood depth up to 0.56 metres at No 4, Oldham Place, Blayney. An increase in flood depth of up to 0.35 metres on northwestern side of the site has been simulated at Lee Roshana Care (Aged care facility) at No1, Queen Street, Blayney during PMF events. Flood depth raises up to 0.07 metres at No 7, and up to 0.05 metres at No 5, Queen Street, Blayney.

The increase in flood depth at the southern section of the site adjacent to Martha Street is contained within Lot boundaries raises up to 1.75 metres during PMF events. A maximum increase in flood depth of up to 0.23 metres has been modelled to occur outside of eastern side of the lot at Osamn Street. An increase in flood depth of up to 0.12 metres is modelled to occur within property boundaries at No 4, and up to 0.06 metres at No 6, Osman Street Blayney. There is also an increase in flood depth of up to 0.11 metres on Northeastern side No 2, Osman Street, Blayney.

Regards



Nigel Bosworth

Technical Director – Hydrology, Stormwater & Flooding



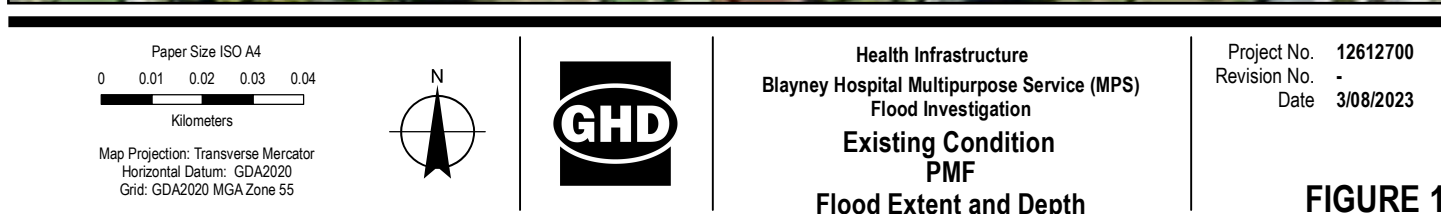
Hamid Asgari

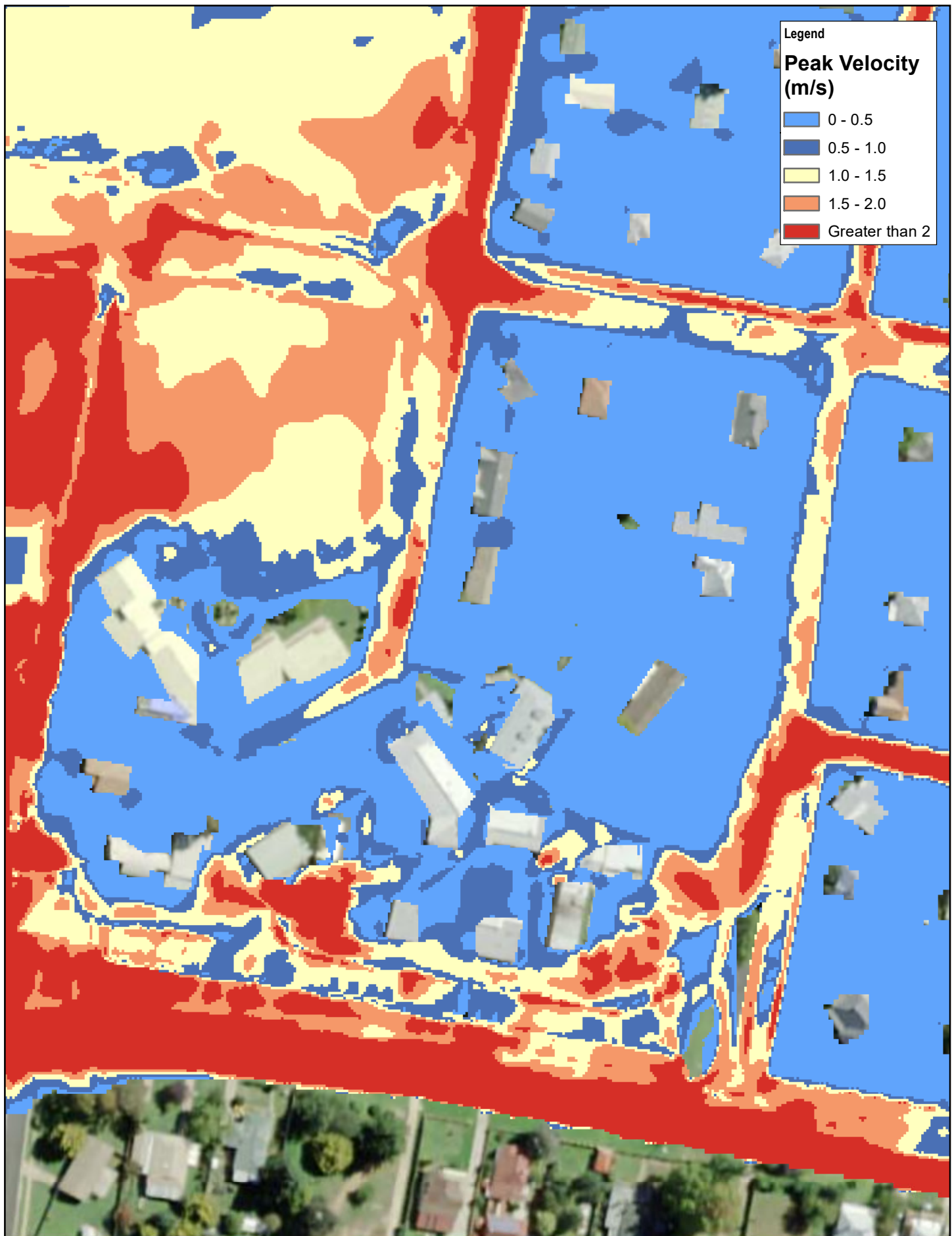
Water Resources Engineer

Attachments

Attachment 1

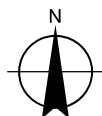
Figures





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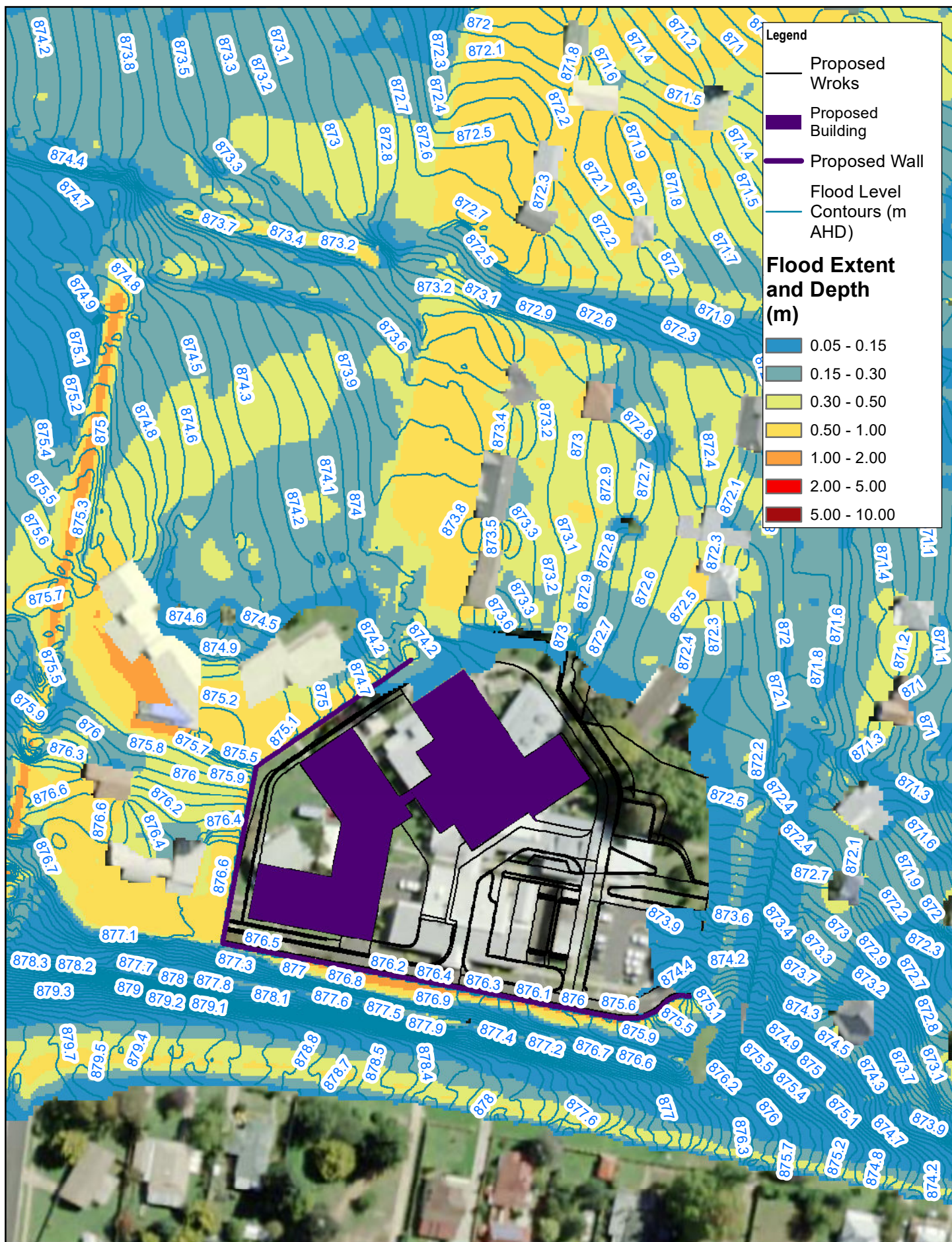
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Grid: GDA2020 MGA Zone 55



Health Infrastructure
Blayney Hospital Multipurpose Service (MPS)
Flood Investigation
Existing Condition
PMF
Peak Velocity

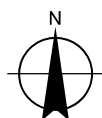
Project No. 12612700
Revision No. -
Date 3/08/2023

FIGURE 2



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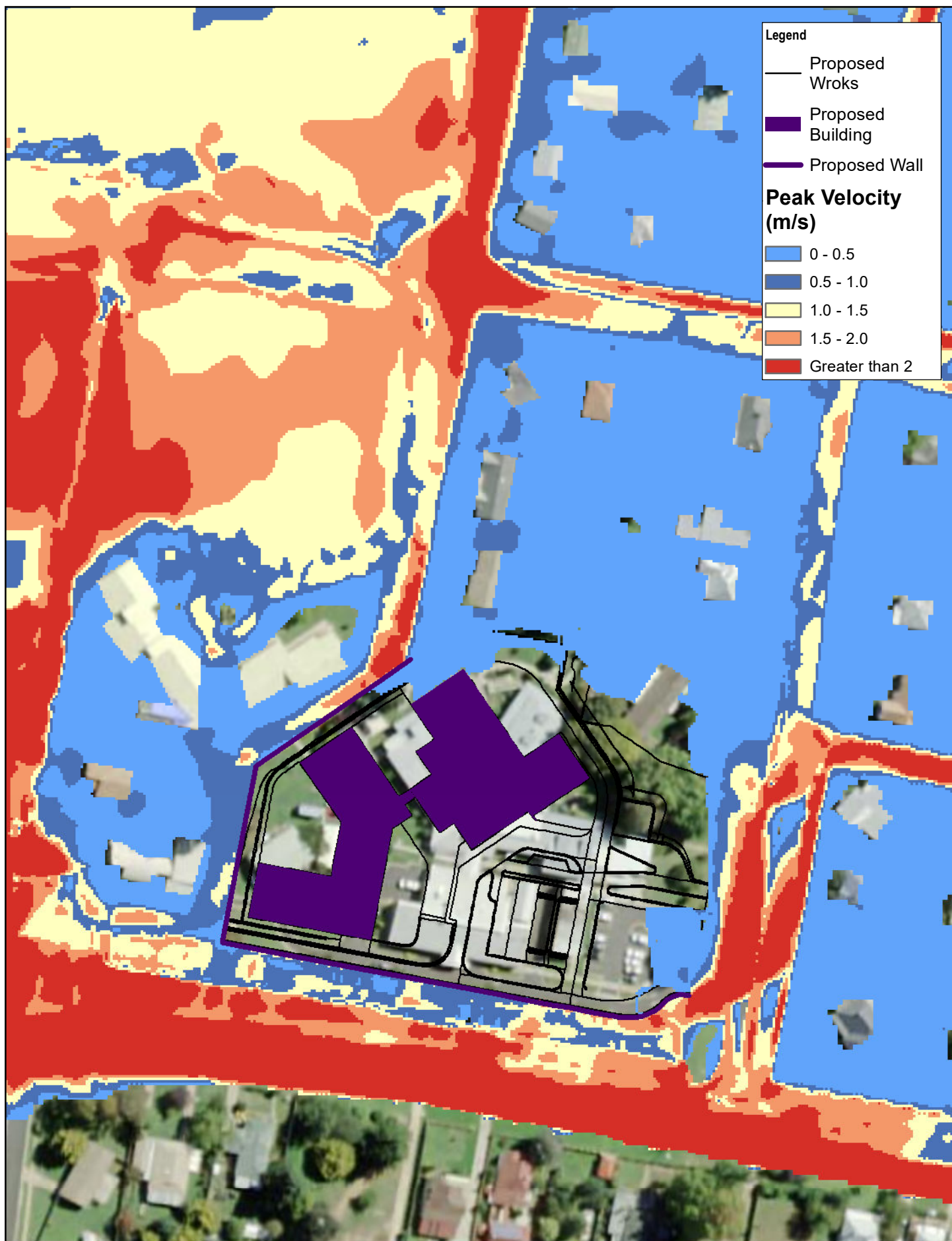
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Health Infrastructure
Blayney Hospital Multipurpose Service (MPS)
Flood Investigation
**Proposed Condition
PMF
Flood Extent and Depth**

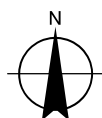
Project No. 12612700
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FIGURE 3



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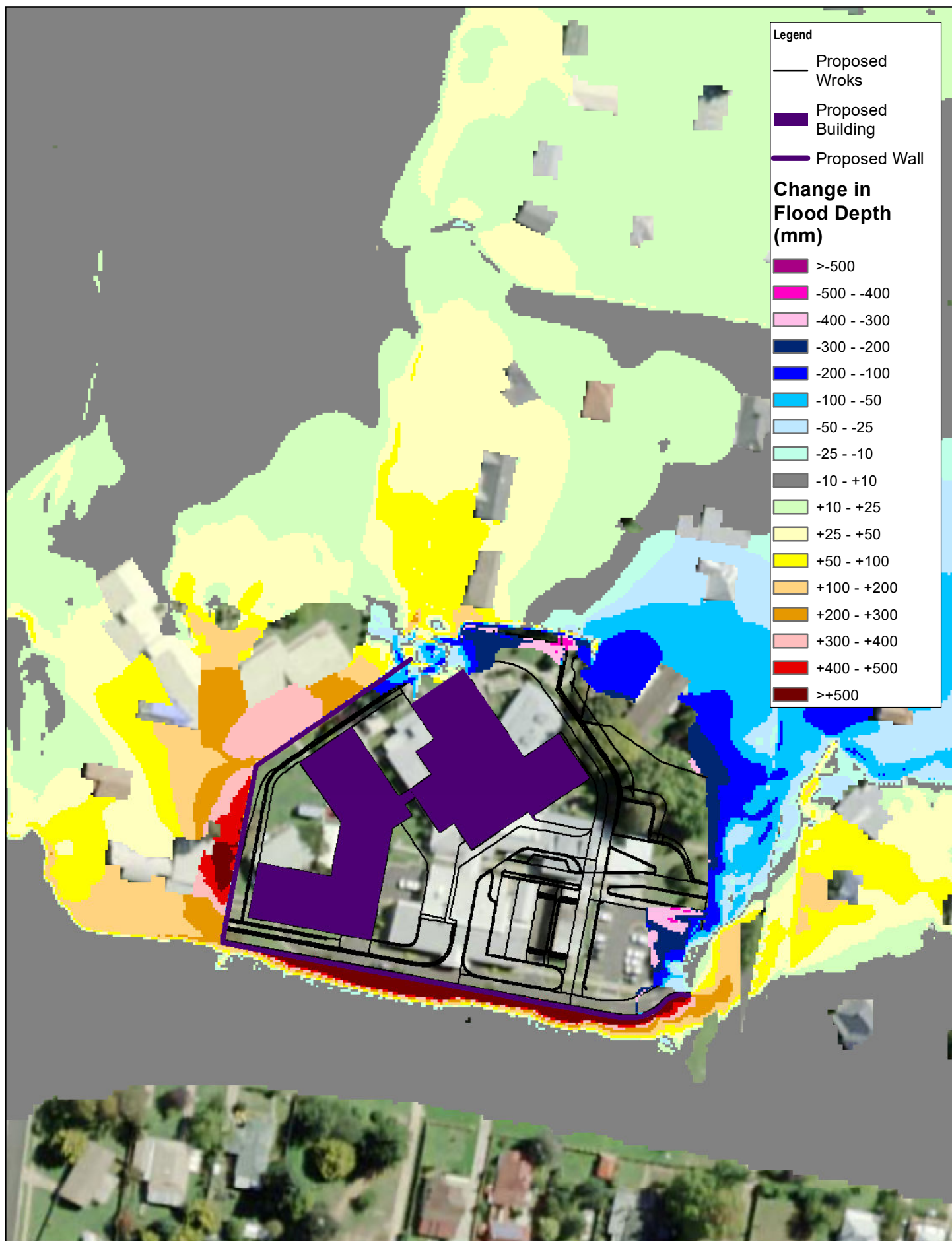
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Health Infrastructure
Blayney Hospital Multipurpose Service (MPS)
Flood Investigation
Proposed Condition
PMF
Peak Velocity

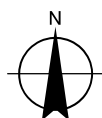
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FIGURE 4



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 Kilometers

Map Projection: Transverse Mercator
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Health Infrastructure
 Blayney Hospital Multipurpose Service (MPS)
 Flood Investigation
Proposed Condition
PMF
Change in Flood Depth

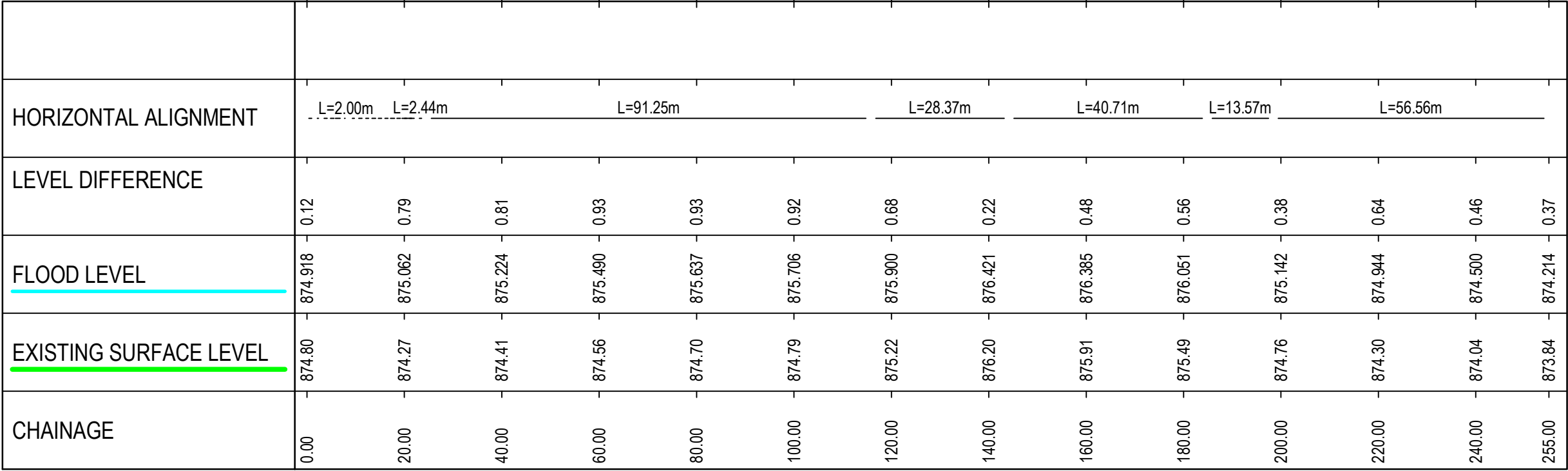
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FIGURE 5

Attachment 2

Long Section

DATUM RL. 872.00



LONGITUDINAL SECTION - MC01

HORZ 1:1000 VERT 1:100

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Rev	Description	Checked	Approved Date
Author	Drafting Check		
Designer AS	Design Check		



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Project No.
12612700

Client

Project

Status

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Drawing Title

BLAYNEY HOSPITAL MULTIPURPOSE
SERVICE - FLOOD INVESTIGATION
LONGITUDINAL SECTION (MC01)

12612700-DRG-001

Size

A3

Rev

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