Bankstown Golf Club
Seniors Living Development
Flood Study and Flood Risk Management Study
21107 – February 2021

siteplus

engineering . landscape . design . management . surveying

SENIORS LIVING DEVELOPMENT FLOOD STUDY AND RISK MANAGEMENT STUDY
BANKSTOWN GOLF CLUB

PREPARED FOR

Bankstown Golf Club

PREPARED BY

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TABLE OF CONTENTS **Page No.**

EXECUTIVE SUMMARY 3

1. INTRODUCTION 4

1.1. Preliminary 4
1.1.1. Site Plus Engagement 4
1.1.2. Scope of Work 4
1.2. Liaison with Council 4
1.3. Subject Land 4
1.4. Site Features 5

2. PREVIOUS FLOOD REPORTS 6

2.1. Brewsher Consulting Pty Ltd, Georges River, Floodplain Risk Management Study and Plan, 2004 6
2.2. BMT WBM Pty Ltd, Milperra Catchment, Flood Study Update 2015 6

3. HYDRAULIC ANALYSIS 8

3.1. Existing Site Hydraulic Features and TUFLOW Model 8
3.2. Proposed Site Hydraulic Features 8
3.2.1. Hydraulic Roughness 8
3.3. Flood Modelling Results 11
3.3.1. Existing 11
3.3.2. Proposed 11

4. FLOODPLAIN RISK MANAGEMENT 12

4.1. DCP Objective Assessment 12
4.2. Land Use Category 13
4.3. Flood Risk Precinct 14
4.4. DCP Section 3 Controls - Objectives 14
4.5. DCP Section 3 Controls – Performance Criteria 16
4.6. Site Fencing Requirements 18
4.7. Floor Level 18
4.8. Building Components 19
4.9. Structural Soundness 19
4.10. Flood Effects 19
4.11. Carparking and Driveway Access 20
4.12. Flood Evacuation 20
4.13. Management and Design 20

5. CONCLUSION 21

APPENDICES

APPENDIX A: Site Survey
APPENDIX B: Existing Flood Study Results
APPENDIX C: Proposed Flood Study Results
APPENDIX D: Flood Impact Assessment

LIST OF FIGURES

Figure 1-1 Locality Map.....5
Figure 2-1 BMT WBM Milperra Catchment 2017 Provisional Flood Risk Precinct map 7
Figure 3-1 Land use Patch.....9
Figure 3-2 Proposed Site Topography and structures 10

LIST OF TABLES

Table 5-1 Flood and Floor Level Summary.....18

EXECUTIVE SUMMARY

On behalf of Bankstown Golf Club, Site Plus has prepared a Flood study and Floodplain Risk Management Report for the proposed Seniors Living Development on the golf club site. The development site is located in the low-risk flood fringe area of the Georges River catchment.

This report reviews and responds to the requirements of the NSW Floodplain development Manual 2005 and Bankstown's Development Control Plan (DCP) 2015 Part B12 Flood Risk Management. The NSW Floodplain Development Manual sets out the NSW flood prone land policy and recognises that flood-prone land is a valuable resource that should not be sterilised by unnecessarily precluding development.

The proposal consists of four main buildings, with retirement living units with green space between the buildings and basement parking for residents and on grade parking proposed for visitors.

This report considers the development's impact on adjoining Flooding, along with addressing the requirements of Flood Risk Management.

Siteplus attained Bankstown Council's Flood TUFLOW Model conducted by BMT WBM dated October 2015 for the Local Milperra Catchment. The proposed development was input into the model to assess the flooding impacts. The results indicated that the proposed buildings are outside both the receiving floodwater of the Georges River and the .

To meet the requirements of Bankstown Council's DCP part B12 Flood Risk Management, the results from the Milperra Catchment Flood Study conducted by BMT WBM dated October 2015 have been adopted. Using the results from the local flood study all habitable ground floor levels are proposed above the 100yr with 500mm freeboard and the local PMF flood level. The flood study results indicate that in the 100yr storm event the development has no adverse impacts on adjoining private properties.

In summary, the proposed development can be supported for the following reasons:

- Developing the site as proposed manages the flood constraints and reduces flood impacts on the nearby private properties.
- The proposal includes providing Habitable floors levels above the 100yr ARI and PMF flood levels to ensure the free flow of floodwater through and around the site.
- Basement carpark entry levels are also a minimum of 500mm above the 100 year and PMF flood level.

Each point has been discussed at length within the body of the report.

1. INTRODUCTION

1.1. Preliminary

1.1.1. Site Plus Engagement

Siteplus, has been commissioned by Bankstown Golf Club to prepare a Flood Study and Flood Risk Management Report to address the requirements of the NSW Floodplain development Manual 2005 and Canterbury Bankstown City Councils requirements in relation to the proposed Seniors living development.

1.1.2. Scope of Work

To meet the requirements of Canterbury Bankstown City Council and the NSW floodplain development Manual 2005, Site Plus has determined that the report needs to address the following:

- Discuss the site location and negligible impact of the development on the surrounding drainage infrastructure.
- Run the local Milperra Catchment Council TUFLOW model to assess the current flooding impacts on the site
- Integrate the proposed development into the 2D TUFLOW model to assess the developments impact on future flood behaviour surrounding the site;
- Evaluate the site in terms of Bankstown City Council's Floodplain Risk Requirements; and the NSW Floodplain Development Manual 2005; and
- Prepare a report that summarises the findings of our analysis.

1.2. Liaison with Council

Siteplus engineers have received from Council the Milperra Catchment Council TUFLOW model to form a baseline for the flood modelling. The TUFLOW model was adopted by Council and was prepared by BMT WBM in October 2015.

1.3. Subject Land

The subject site is located over the existing golf club buildings carpark and associates auxiliary structures of Bankstown Golf Course. The Site has frontage to Bullecourt Lane and Ashford Avenue. Ashford Avenue is currently the primary entry for the golf course.

1.4. Site Features

The subject site is a 1.6ha portion of Bankstown Golf Club. The existing site contains existing buildings, bitumen carparking, and grassed golf course area.

Figure 1-1 Locality Map

2. PREVIOUS FLOOD REPORTS

2.1. Brewsher Consulting Pty Ltd, Georges River, Floodplain Risk Management Study and Plan, 2004

The Brewsher study conducted in 2004 covers the entire Georges River Catchment being 960km^2. Covering the top of the catchment in Southern Campbelltown through to Botany Bay. The study is a board bush approach using a 1D MIKE 11 model with cross sections at approximately every 300m.

The study also assumes that the entire catchment receives the same rainfall intensity in a given storm event, coupled with extreme wave run-up and very high tides. This is highly unlikely to occur across such a large catchment and makes the results extremely conservative.

Section 6.1.3 of the flood study reiterates the conservative nature of the flood study as it states *"the MIKE-11 results are appropriate for use with flood damage estimates, but should not be used when specifying minimum floor levels or related development controls. Reference should always be made to the flood level results in the adopted flood study reports"*.

Based on this statement above the Council commissioned BMT WBM Pty Ltd flood study conducted in 2015 has been the basis of the flooding analysis for the site.

2.2. BMT WBM Pty Ltd, Milperra Catchment, Flood Study Update 2015

A 2D TUFLOW model was developed for Council for the Milperra Catchment. The model has been commissioned by Council in 2015 and the results show the site as being flood affected by overland flow and backwater from the Georges River.

This model has been given to Siteplus on a data share arrangement and forms the basis for all of the flood modelling for the site. Siteplus has integrated the development into the council model to form an impact assessment for the site and surrounding catchment. The changes made to the council model are only the proposed materials, proposed pit and pipe network, proposed channels and topography for the site.

The Milperra Catchment BMT WBM study identifies the location of the proposed buildings as being within the low and medium risk flood precinct.

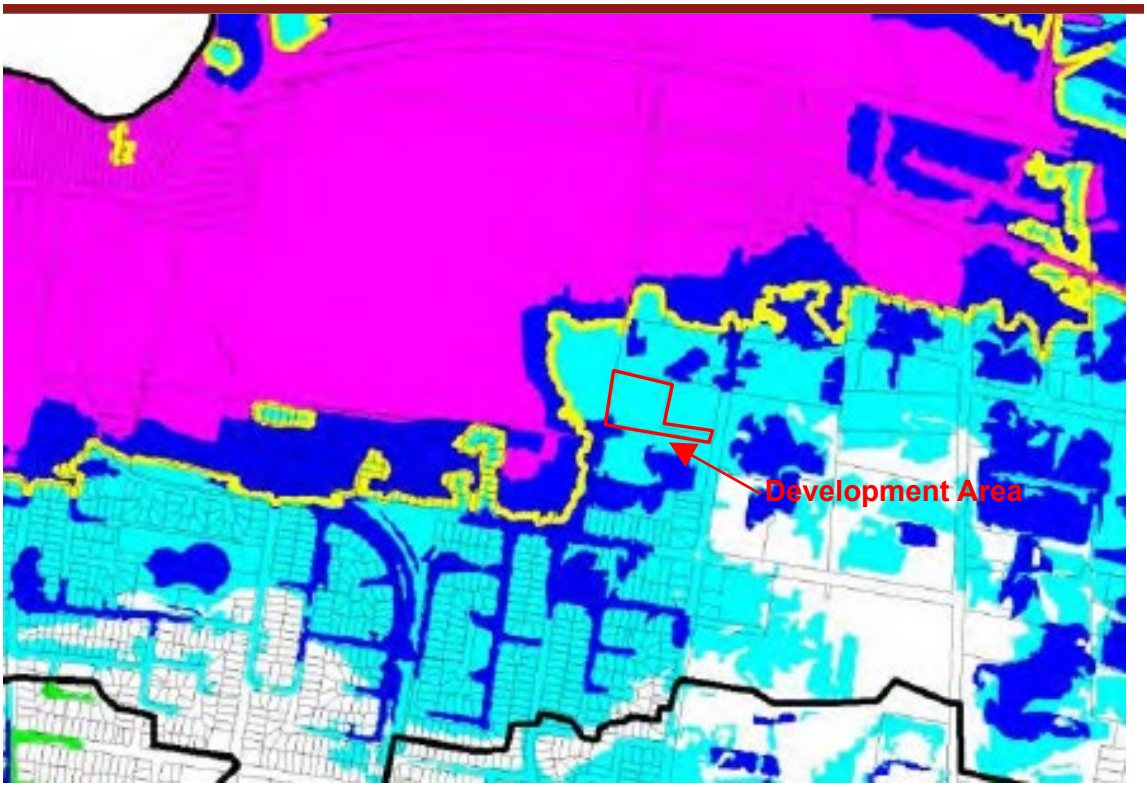


Figure 2-1 BMT WBM Milperra Catchment 2017 Provisional Flood Risk Precinct map

3. HYDRAULIC ANALYSIS

3.1. Existing Site Hydraulic Features and TUFLOW Model

Once the Council TUFLOW model was received a model run of all the existing site conditions was undertaken to form a baseline for the flood assessment of the proposed development. None of Councils TUFLOW model parameters have been changed to assess the development.

The only modifications to the model were topographical and land uses as shown in Figure 3-1 and proposed structures and terrain shown in Figure 3-2.

The existing model contains all the of the existing site features including the southern open channel and existing buildings.

The 50% pit blockage scenario was used for the flood assessment as discussed within Section 4.4 of the BMT WBM Milperra Catchment Flood Modelling Report.

3.2. Proposed Site Hydraulic Features

To better manage the flow of floodwaters through the site, the proposed site has been regraded south to reduce impacts on the adjoining properties. The site to remove a trapped low point in the northern corner.

3.2.1. Hydraulic Roughness

The proposed development land uses were input into the TUFLOW model to model the proposed site. The hydraulic roughness file from the council study was adopted with a patch on the subject site for the development scenario. The patch is shown within Figure 3-1.

Title:
Land Use Delination - Patch

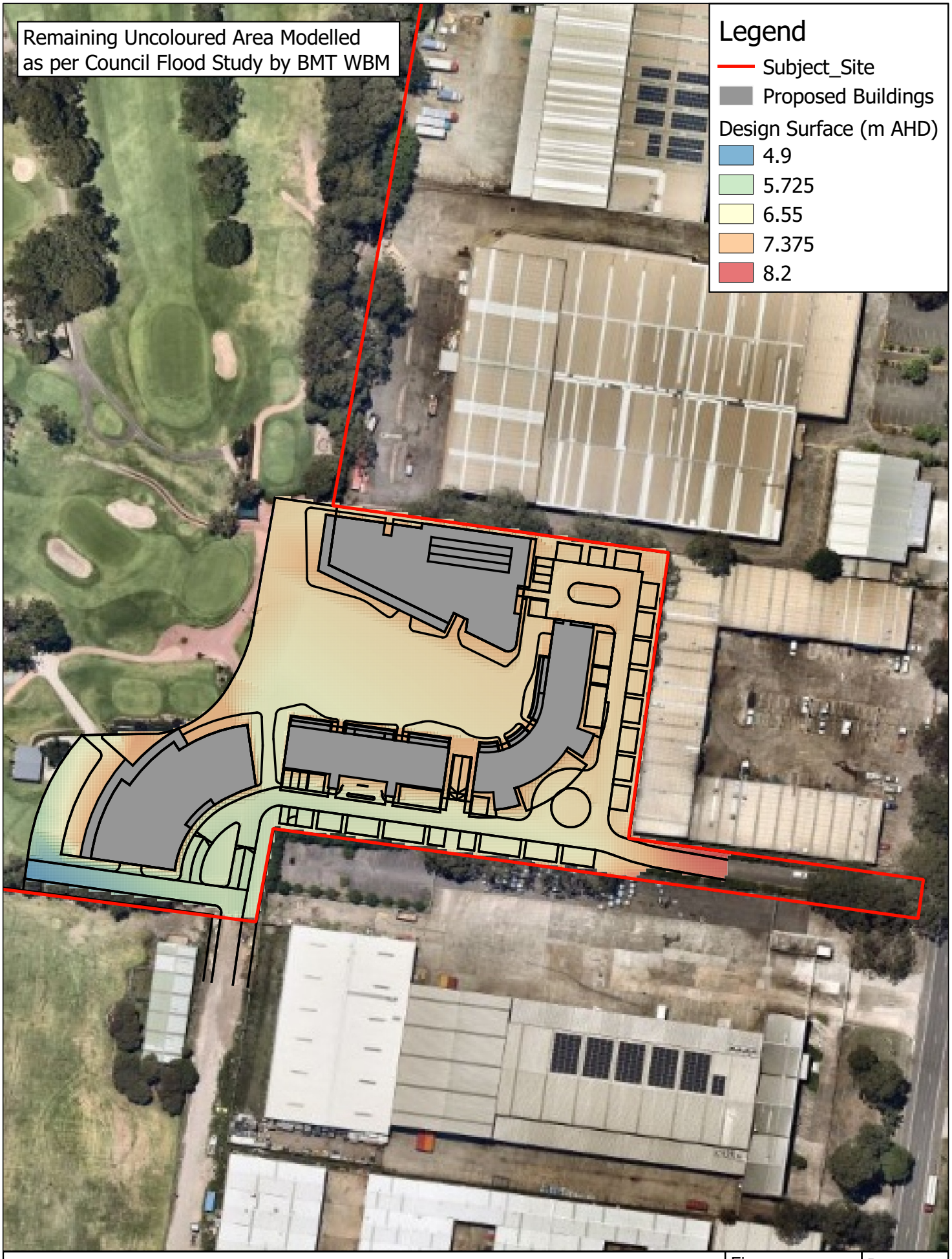
Figure: **3-1**

Rev: **A**

N

20 0 20 40 60 m

siteplus



Title:
Proposed Development Modification

Figure: **3-2**

Rev: **A**

N

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siteplus

3.3. Flood Modelling Results

3.3.1. Existing

Modelling the current existing site illustrates that in the location of the proposed buildings only local flooding from the upstream neighbouring properties impacts the site.

Regional flooding from the Georges River does not impact the development extents. Only sheet flow from the roof areas and impervious carpark.

All results indicate that the flood water is low hazard as per the NSW Floodplain Development Manual, apart from a small number of cells within the southern open channel along the. The medium risk cells straddle the boundary as shown in Appendix B.

3.3.2. Proposed

Modelling the proposed development shows floodwaters enter the site from Ashford Avenue and the adjoining northern and eastern properties. Flood waters pass through the site and between the buildings into a southern drainage channel as shown in Appendix C.

The site has been regraded to fall in a south westerly direction to direct flow into an existing open channel along the southern boundary. This shows to reduce the flood waters on the neighbouring northern and eastern properties.

The impact assessment in Appendix D shows that the proposed development results in no impacts to private property in regard to increasing flood levels.

4. FLOODPLAIN RISK MANAGEMENT

The following section of the report address the requirements of Part B12 Flood Risk Management in the Bankstown Development Control Plan 2015.

Seniors Housing is classed as a sensitive use under the DCP which for flood affected sites is potentially classed as an unsuitable' land use.

However, as demonstrated below the proposed development is suitable as it complies with the objects and performance criteria of the Part B12 of Council's DCP. All the proposed flood controls reduce the flood risk to a manageable level.

4.1. DCP Objective Assessment

Objective (a)

"To reduce the risk to human life and damage to property caused by flooding through controlling development on land affected by potential floods."

The proposed development will not increase the risk to human life and property damage by the following:

- The proposed habitable floor levels are above both the 100yr ARI plus freeboard and the PMF flood event.
- All structures below the PMF flood level are flood compatible and will be able to withstand the forces of floodwaters. This ensure that occupants will be safe during all flood events and the buildings will not incur structural damage during major storm events.

Objective (b)

"To apply a "merit–based approach" to all development decisions which takes account of social, economic and environmental as well as flooding considerations in accordance with the principles contained in the NSW Floodplain Development Manual (FDM)."

The merit-based approach within this assessment considers social, economic and environmental considerations. The NSW floodplain development manual is to ensure that floodplains are developed in a safe manner and not sterilise floodplains for development.

The development will provide seniors housing for the local area in a location that contains the facilities required for an aging population and has close proximity to arterial road and transport facilities.

Objective (c)

"To control development and other activity within each of the individual floodplains within the City of Bankstown having regard to the characteristics and level of information available for each of the floodplains."

The information available for the flood assessment of this development are up to date and based on a council approved flood study conducted in 2015. The Council and this impact assessment use the latest modelling techniques and best information available. Ensuring that the best information is available for decision making.

Objective (d)

"To assess applications for development on land that could be flood affected in accordance with the principles included in the FDM, issued by the State Government."

This report uses the Floodplain Development Manual (FDM), principles and techniques to assess the development in terms of flooding. Section 5 of this report addresses all the required parameters as per the FDM.

4.2. Land Use Category

Senior housing is classed as a sensitive use and the nursing home is classed as a critical use as per Schedule 2 of Council's DCP Part B12. However, the proposed developments meets the objectives of the DCP by:

- Providing floor levels 0.5m above the 100yr and PMF flood levels.
- Constructing buildings outside the extents of floodwaters and debris.
- Not impacting the surrounding floodwaters by provision of site re-grading.
- Having a safe low flood hazard vehicular evacuation route east via Ashford with a maximum depth of 0.215m during the 100yr flood event and 0.39m maximum depth in the PMF event.
- Development of a detailed site evacuation plan where trained 24hr onsite staff can implement the plan, to ensure occupants remain safe during all flood events including the PMF.

The Site has been assessed under a residential a land use category under Schedule 3 of Council's DCP Part B12 to confirm that the proposal meets all of Council's flooding concerns.

4.3. Flood Risk Precinct

The subject development area is mapped as being within the low, and medium flood risk precincts in map of Part B12 of the DCP. However, Appendix F of Council's Milperra Catchment flood study shows the site contains both medium and low flood risk precincts.

Due to the site containing floodwaters during the 100yr flood event the site has been assessed as medium flood risk for a Residential Land use. The following assessment is a criteria-based assessment as outlined in Section 2 and Section 3 of Part B12 of Councils DCP.

4.4. DCP Section 3 Controls - Objectives

Objective (a)

"To require developments with high sensitivity to flood risk to be designed so that they are subject to minimal risk."

Details outlined within this report reduce flood risk to an acceptable level by:

- Providing floor levels 0.5m above the 100yr and PMF flood levels.
- Constructing buildings able to withstand the forces of floodwaters and debris.
- Not impacting the surrounding floodwaters by provision of site re-grading and subfloor screens.
- Having a safe low flood hazard vehicular evacuation route. As shown in the flood mapping, Appendix C of this report.

Objective (b)

"To allow development with a lower sensitivity to the flood hazard to be located within the floodplain, provided the risk of harm and damage to property is minimised."

The seniors living development proposal will have a strict onsite management system and specially designed buildings to ensure that both risk of harm to occupants and damage to property in negligible in terms of flooding.

Objective (c)

"To minimise the intensification of the High Flood Risk Precinct or floodway, and if possible, allow for their conversion to natural waterway corridors."

The subject site is located above the extents of the Georges River floodplain and is subject to overland flooding in the 100yr and the PMF event. The development has no egress into the high-risk flood precinct and is above all high risk areas. The site is not in a floodway and no natural waterways exist within the site.

Objective (d)

"To ensure design and siting controls required to address the flood hazard do not result in unreasonable social, economic or environmental impacts upon the amenity or ecology of an area."

This report illustrates that no adverse impacts in terms of flooding will occur surround the site (see section 5.10 and Appendix D). The site has been designed to allow free flow of floodwaters through the site. Thereby minimising economic impacts such as damage to buildings and social impacts by locating habitable levels above the PMF flood level. No environmental impact will result from the development as it's located outside of any water course or riparian zone.

Objective (e)

"To minimise the risk to life by ensuring the provision of reliable access from areas affected by flooding."

Safe vehicle evacuation is achievable from the development east to Ashford Avenue during the 100yr ARI and PMF flood event (maximum depth 0.23m). This allows evacuation in emergencies away from flood waters.
Please refer to the Site specific Flood Emergency Response Plan by Molino Stewart for further evacuation information supporting this development.

Objective (f)

"To minimise the damage to property (including motor vehicles) arising from flooding."

Sections 4.8, 4.9 and 4.11 of this report illustrate how any damage to both buildings and private vehicles within the carparks will not be impacted by floodwaters.

Objective (g)

"To ensure the proposed development does not expose existing development to increased risks associated with flooding."

The impact assessment within Appendix D of this report illustrates no impacts to the surrounding development.

4.5. DCP Section 3 Controls – Performance Criteria

Performance Criteria (a)

"The proposed development should not result in any significant increase in risk to human life, or in a significant increase in economic or social costs as a result of flooding."

The proposed development reduces risk to human life and economic and social costs by:

- Providing floor levels 0.5m above the 100yr and PMF flood levels.
- Constructing buildings able to withstand the forces of floodwaters and debris.
- Not impacting the surrounding floodwaters by provision of site re-grading and subfloor screens.
- Having a safe low flood hazard vehicular evacuation route.
- Development of a detailed site flood evacuation plan.

Performance Criteria (b)

"The proposal should only be permitted where effective warning time and reliable access is available to an area free of risk from flooding, consistent with any relevant Flood Plan or flood evacuation strategy."

The Georges River Floodplain Risk Management Study and Plan, 2004 (being the regional flood study) states that the MIKE-11 results should not be used for specifying minimum floor levels or related development controls and reference should always be made to the flood level results in the adopted flood study reports. We have therefore focused our analysis a on the local flooding modelling from BMT WBM Milperra Catchment Flood Study 2015 which is the model issued to Siteplus for development assessment by Council.

Refer to the Site specific Flood Emergency Response Plan by Molino Stewart for further details.

Performance Criteria (c)

"Development should not significantly increase the potential for damage or risk other properties either individually or in combination with the cumulative impact of development that is likely to occur in the same floodplain."

Appendix D illustrates the impacts as a result of the development. All impacts occur within the subject site. Reductions also occur within the upstream residential areas as the drainage infrastructure increases flow conveyance through the site. As a result the development has a positive impact on flooding and can be supported in terms of flooding affects.

Performance Criteria (d)

"Motor vehicles are able to be relocated, undamaged, to an area with substantially less risk from flooding, within effective warning time."

Section 4.11 of this report addresses this performance criteria. The low hazard flood waters and low depth does not adversely impact the car parking areas and vehicles are able to relocate away from the site during all flood events. Due to the low depth of flooding vehicles will be able to safely travel off site to Ashford Avenue to relocate their vehicles offsite during either the 1:100 or PMF local storm event. Residents and staff will have basement carparks which have berm heights above the PMF level.

Performance Criteria (e)

"Procedures would be in place, if necessary, (such as warning systems, signage or evacuation drills) so that people are aware of the need to evacuate and relocate motor vehicles during a flood and are capable of identifying the appropriate evacuation route."

As discussed above all visitor at grade vehicles can safely leave the site during the PMF event. Occupants have basement car parking where the entry level (berm) is above the PMF level.

Please refer to the detailed Flood Emergency Response Plan prepared by Molino Stewart for further details.

Performance Criteria (f)

"To minimise the damage to property, including motor vehicles arising from flooding."

Sections 4.8, 4.9 and 4.11 of this report illustrate how any damage to both buildings and private vehicles within the carparks will not be impacted by floodwaters. Low hazard flood waters cover the building areas and car parking areas during the PMF which means that building have less risk of being damaged and vehicles will not become buoyant.

Performance Criteria (g)

"Development should not result in significant impacts upon the amenity of an area by way of unacceptable overshadowing of adjoining properties, privacy impacts (e.g. by unsympathetic house–raising) or by being incompatible with the streetscape or character of the locality."

The SEE prepared by DFP planning has addressed amenity and streetscape character.

4.6. Site Fencing Requirements

Open pool type site fences are to be located within the 100yr flood level plus 500mm freeboard.

4.7. Floor Level

All of the proposed buildings across the site have a floor level above 100year flood level plus 500mm freeboard. All Habitable floor levels are also above the PMF flood level.

All minimum floor levels are shown within Table 5-1 which summaries the proposed floor levels and the flood levels impacting the development.

Table 5-1 Flood and Floor Level Summary

Milperra Village Floor Level Summary Table			
Building	**Minimum Ground Floor Level (FPL)**	**100yr Flood Level**	**PMF Flood Level**
Building A and Golf Club	6.51	6.01	6.40
Building B	7.60	7.06	7.10
Building C	7.60	7.10	7.16
Building D	7.60	7.10	7.16

4.8. Building Components

All building components of the proposed buildings are to be flood compatible up to the PMF level. The proposed buildings are to be made with masonry or steel that is unaffected by submersion in flood waters.

4.9. Structural Soundness

All building components up to the PMF flood level are to be able to withstand the forces of floodwaters. This is to be factored into the structural design of the buildings at construction detailing stage.

4.10. Flood Effects

The proposed buildings ensure that the proposed development does not adversely impact the rest of the floodplain and surrounding development. Refer to the impact assessment in Appendix D which confirms no adverse impact.

4.11. Carparking and Driveway Access

All proposed staff and resident carparking areas are located within basement carparks with a berm height at the 100yr ARI level plus 500mmm freeboard. Only visitor parking is on grade is potentially flood affected. The results attained within this flood study show that the maximum depth of floodwaters in the visitor car parking low point adjacent to Bullecourt Lane is 0.23m deep with a velocity of 0.4m/s in the 100yr ARI. This results in vehicle not becoming buoyant during the 100yr flood event. This is based on Flood hazard category as outlined by Australian Emergency Management Institute in 2014.

There are no floodwaters present in Ashford Avenue along the access route during the 100yr flood event and 0.13m maximum depth in the PMF event. This allows vehicles to safely travel to and along Ashford Avenue during both events to evacuate to higher ground.

4.12. Flood Evacuation

A detailed flood evacuation plan has been developed for the site the flood evacuation plan has been developed in conjunction with Bankstown Golf Club and Molino Stewart. Refer to the Molino Stewart Flood Emergency Response Plan for further details.

4.13. Management and Design

This report indicates that no additional flood risk will occur as a result of the development. Measures are proposed to reduce the impact of flooding on and surrounding the site and reduce the flood risk to a low risk flood precinct.

5. CONCLUSION

The proposed Senior Living Development can be supported in terms of flooding and flood risk management for the following reasons:

- The proposed development will provide floor levels above the 100yr flood level plus freeboard and the PMF flood level.
- The development site has been re-graded to fall away from the neighbouring eastern and northern properties which shows to have a positive impact of flood levels for the surrounding site.

The following recommendation should be implemented to reduce the flood risk and flood impacts to an acceptable level:

- Re-grade the site to the southern existing open channel to reduce flood impacts on the neighbouring properties.
- Provide flood compatible materials for every building proposed up to the PMF levels across the site. Structural masonry or concrete components should be provided to withstand the forces of floodwaters up to the PMF levels.
- Developing a site flood and evacuation plan as part of the emergency management plan which is owned, practiced and implemented by the site's manager. The plan should focus on flood warning, evacuation notification and emergency response procedures for the site.

The depths of the floodwater onsite are shown on the within Appendences C and D.

APPENDIX A

Site Survey

MGA

T.N.

1°00' APPROX.

LEGEND

BENCH MARK	▲
COMMS PIT	COM
TELSTRA PIT	TEL
POWER POLE	PP
PIT WITH CONCRETE LID	CLID
PIT WITH METAL LID	MLID
GRATED INLET PIT	GIP
KERB INLET PIT	KIP
SEWER MANHOLE	SMH
STOP VALVE	SV
WATER METER	WM
FIRE HYDRANT	FH
WATER VALVE	WV
GAS METER	GM
GAS VALVE	GAS
VEHICLE CROSSING	(VC)
CAMERA	CCTV
FLAGPOLE	FP
GAS (DBYD)	G
TELSTRA (DBYD)	T
WATER (DBYD)	W
SEWER (DBYD)	S
ELECTRICITY (OVERHEAD)	P
STORMWATER PIPE	SW

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REFER TO NOTES AND LEGEND

0 15 2 3 30 45 60 75

SCALE 1: 750 @ A1

NOTES

1. THE BOUNDARIES HAVE NOT BEEN MARKED
2. ALL AREAS AND DIMENSIONS HAVE BEEN COMPILED FROM PLANS MADE AVAILABLE BY NSW LAND REGISTRY SERVICES AND ARE SUBJECT TO FINAL SURVEY
3. ORIGIN OF LEVELS ON A.H.D. IS TAKEN FROM SSM 181540 R.L. 9.08 (A.H.D.) IN ASHFORD AVENUE
4. CONTOUR INTERVAL 0.5 m
5. CONTOURS ARE INDICATIVE ONLY. ONLY SPOT LEVELS SHOULD BE USED FOR CALCULATIONS OF QUANTITIES WITH CAUTION
6. KERB LEVELS ARE TO THE TOP OF KERB UNLESS SHOWN OTHERWISE
7. FLOOR LEVELS SHOWN ARE THRESHOLD LEVELS. NO INVESTIGATION OF INTERNAL FLOOR LEVELS HAS BEEN UNDERTAKEN
8. NO INVESTIGATION OF UNDERGROUND SERVICES HAS BEEN MADE. SERVICES HAVE BEEN PLOTTED FROM RELEVANT AUTHORITIES INFORMATION AND HAVE NOT BEEN SURVEYED. ALL RELEVANT AUTHORITIES SHOULD BE NOTIFIED PRIOR TO ANY EXCAVATION ON OR NEAR THE SITE
9. 8/.4/7 DENOTES TREE SPREAD OF 8m, TRUNK DIAMETER OF 0.4m & APPROX HEIGHT OF 7m
10. SHOWS APPROXIMATE POSITION OF ROAD LINEMARKING AND IS INDICATIVE ONLY
11. BEARINGS SHOWN ARE MGA (MAP GRID OF AUSTRALIA) ADD APPROX. 1°00' FOR TRUE NORTH

EASEMENTS

(A) EASEMENT TO DRAIN WATER 2 WIDE (DP 614899)
(B) EASEMENT TO DRAIN WATER 1.25 WIDE (DP 614899)

Revision	Date	Description	Reference
D	00/00/00	-	00
C	00/00/00	-	00
B	00/00/00	-	00
A	00/00/00	-	00

THIS IS THE PLAN REFERRED TO IN MY LETTER DATED:

.....

Registered Surveyor NSW

LTS LOCKLEY
Registered Surveyors NSW
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810 Pacific Highway
Gordon NSW 2072
Locked Bag 5
Gordon NSW 2072
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F 02 9499 7760

Client BANKSTOWN GOLF CLUB

Drawing title
PLAN OF DETAIL AND LEVELS OVER LOT 612 IN DP 837981 AND PART OF LOT 13 IN DP 584447 KNOWN AS BANKSTOWN GOLF CLUB 70 ASHFORD AVE, MILPERRA

datum AHD
site Area N/A
LGA CANTERBURY-BANKSTOWN

reference number 50622 001DT
scale 1:750 @A1
date of survey 21/02/2019
SHEET 1 OF 6

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SEE SHEET 1 FOR LEGEND & NOTES

SCALE 1:200 @ A1

Revision	Date	Description	Reference
D	00/00/00	-	00
C	00/00/00	-	00
B	00/00/00	-	00
A	00/00/00	-	00

THIS IS THE PLAN REFERRED TO IN MY LETTER DATED:

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Client BANKSTOWN GOLF CLUB

Drawing title
PLAN OF DETAIL AND LEVELS OVER LOT 612 IN DP 837981 AND PART OF LOT 13 IN DP 584447 KNOWN AS BANKSTOWN GOLF CLUB 70 ASHFORD AVE, MILPERRA

datum AHD
site Area N/A
LGA CANTERBURY-BANKSTOWN
reference number 50622 001DT
scale 1:200 @A1
date of survey 21/02/2019
SHEET 2 OF 6

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SCALE 1:200 @ A1

Revision	Date	Description	Reference
D	00/00/00	-	00
C	00/00/00	-	00
B	00/00/00	-	00
A	00/00/00	-	00

THIS IS THE PLAN REFERRED TO IN MY LETTER DATED:

....
Registered Surveyor NSW

LTS LOCKLEY
Registered Surveyors NSW
www.ltsl.com.au

Suite 1, Level 1
810 Pacific Highway
Gordon NSW 2072
Locked Bag 5
Gordon NSW 2072
P 1300 587 000
F 02 9499 7760

Client BANKSTOWN GOLF CLUB

Drawing title
PLAN OF DETAIL AND LEVELS OVER LOT 612 IN DP 837981 AND PART OF LOT 13 IN DP 584447 KNOWN AS BANKSTOWN GOLF CLUB 70 ASHFORD AVE, MILPERRA

datum AHD
site Area N/A
LGA CANTERBURY-BANKSTOWN
reference number 50622 001DT
scale 1:200 @A1
date of survey 21/02/2019
SHEET 3 OF 6

DIAL BEFORE YOU DIG www.1100.com.au

SEE SHEET 1 FOR LEGEND & NOTES

SCALE 1:200 @ A1 (0 4 6 8 12 16 20)

Revision	Date	Description	Reference
D	00/00/00	-	00
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datum AHD

site Area N/A

LGA CANTERBURY-BANKSTOWN

reference number 50622 001DT

scale 1:200 @A1

date of survey 21/02/2019

SHEET 4 OF 6

DIAL BEFORE YOU DIG www.1100.com.au

SEE SHEET 1 FOR LEGEND & NOTES

SCALE 1: 200 @ A1 (0 4 6 8 12 16 20)

Revision	Date	Description	Reference
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datum AHD
reference number 50622 001DT
site Area N/A
scale 1:200 @A1
date of survey 21/02/2019
LGA CANTERBURY-BANKSTOWN
SHEET 5 OF 6

DIAL BEFORE YOU DIG
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SEE SHEET 1 FOR LEGEND & NOTES

SCALE 1: 200 @ A1

Revision	Date	Description	Reference
D	00/00/00	-	00
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datum AHD

reference number 50622 001DT

site Area N/A

scale 1:200 @A1

date of survey 21/02/2019

LGA CANTERBURY-BANKSTOWN

SHEET 6 OF 6

APPENDIX B

Existing Flood Model Results

Title:

Peak Flood Levels - Existing 100 Year ARI Event

N

25 0 25 50 75 100 m

Ref No: 21107_F07

Rev: A

Date: 04/02/21

siteplus

Legend

Subject Site

Peak Flood Levels (m A.H.D.)

- <= 4.75.0
- 4.75 - 5.0.0
- 5.0 - 5.25.0
- 5.25 - 5.5.0
- 5.5 - 5.75.0
- 5.75 - 6.0.0
- 6.0 - 6.25.0
- 6.25 - 6.5.0
- > 6.5.0

Title:

Peak Flood Levels - Existing PMF Event

N

25 0 25 50 75 100 m

Ref No: 21107_F08

Rev: A

Date: 04/02/21

siteplus

Title:

Peak Flood Depths - Existing 100 Year ARI Event

N

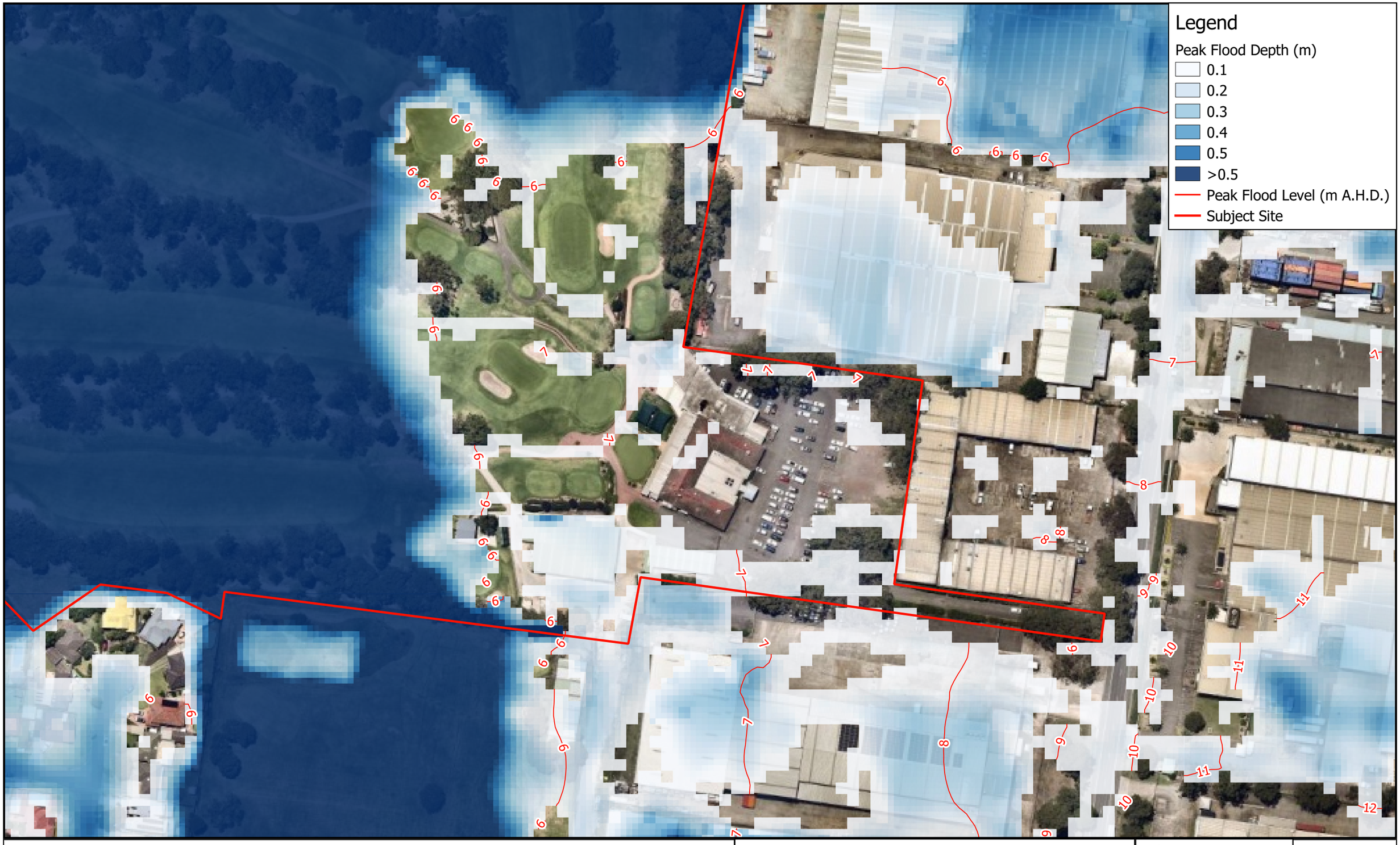
25 0 25 50 75 100 m

Ref No: 21107_F03

Rev: A

Date: 04/02/21

siteplus



Title:

Peak Flood Depths - Existing PMF Event

N

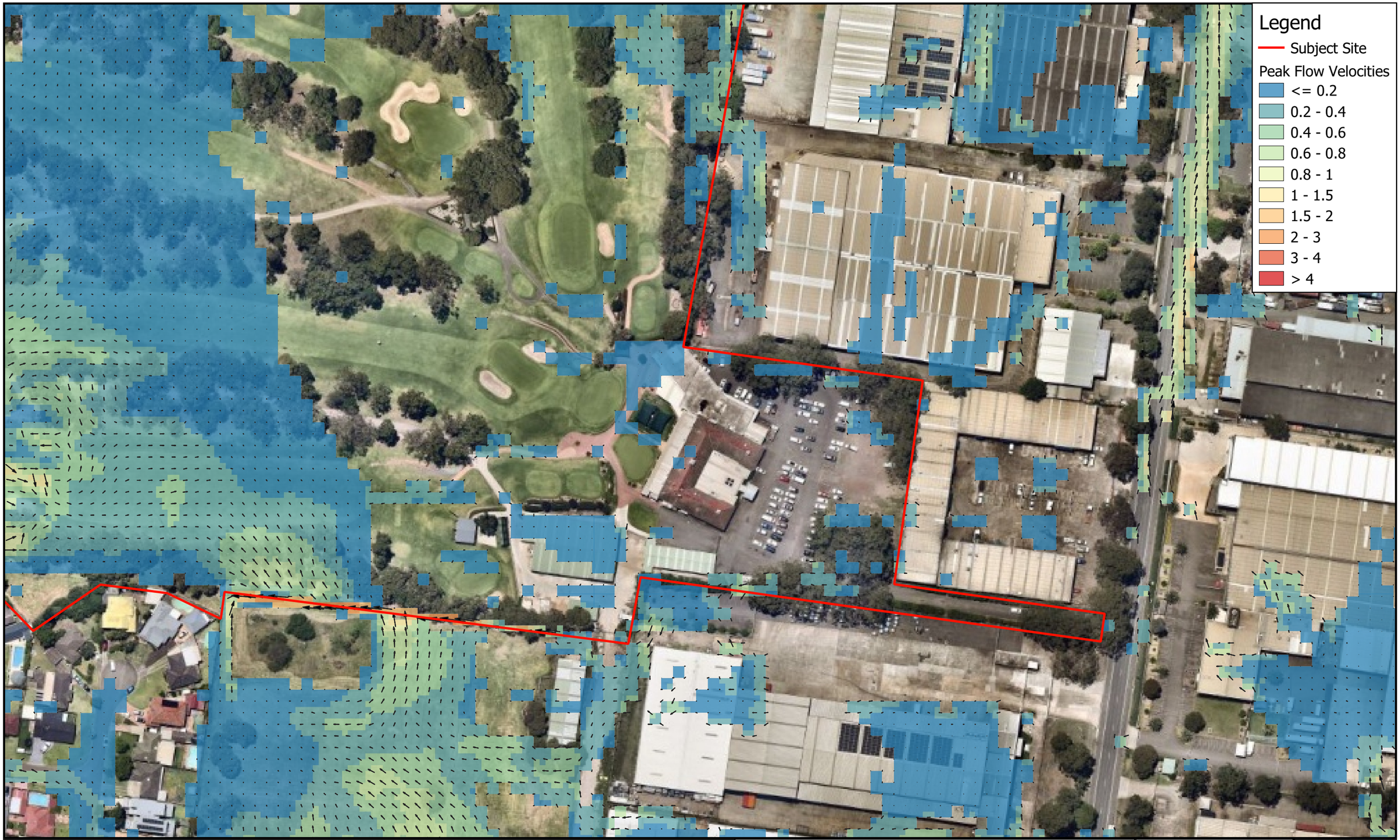
25 0 25 50 75 100 m

Ref No: 21107_F04

Rev: A

Date: 04/02/21

siteplus



Title:

Peak Flow Velocities - Existing 100 Year ARI Event

N

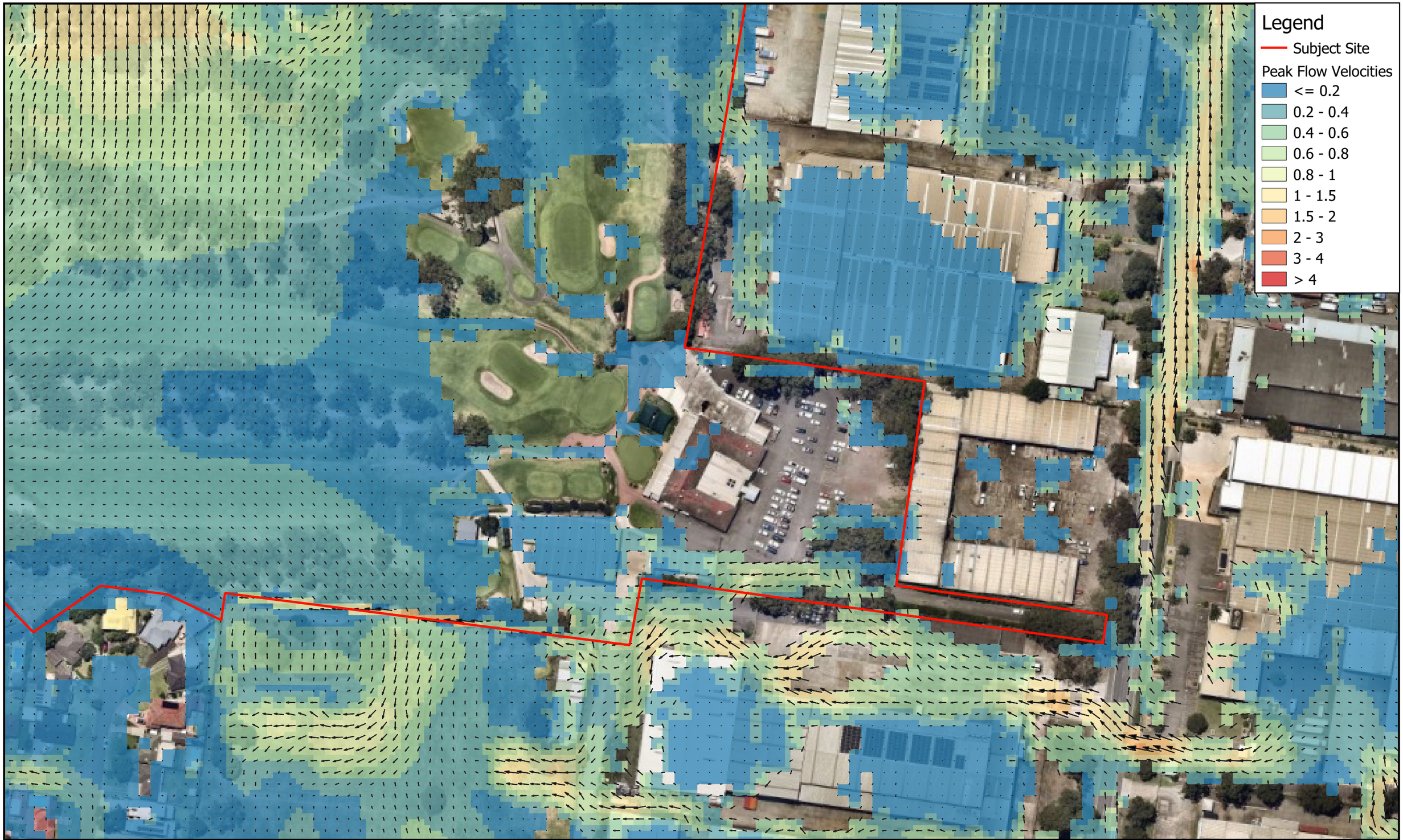
25 0 25 50 75 100 m

Ref No: 21107_F11

Rev: A

Date: 04/02/21

siteplus



Title:

Peak Flow Velocities - Existing PMF Event

N

25 0 25 50 75 100 m

Ref No: 21107_F12

Rev: A

Date: 04/02/21

siteplus

Title:

Flood Hazard Category - Existing 100 Year Event

N

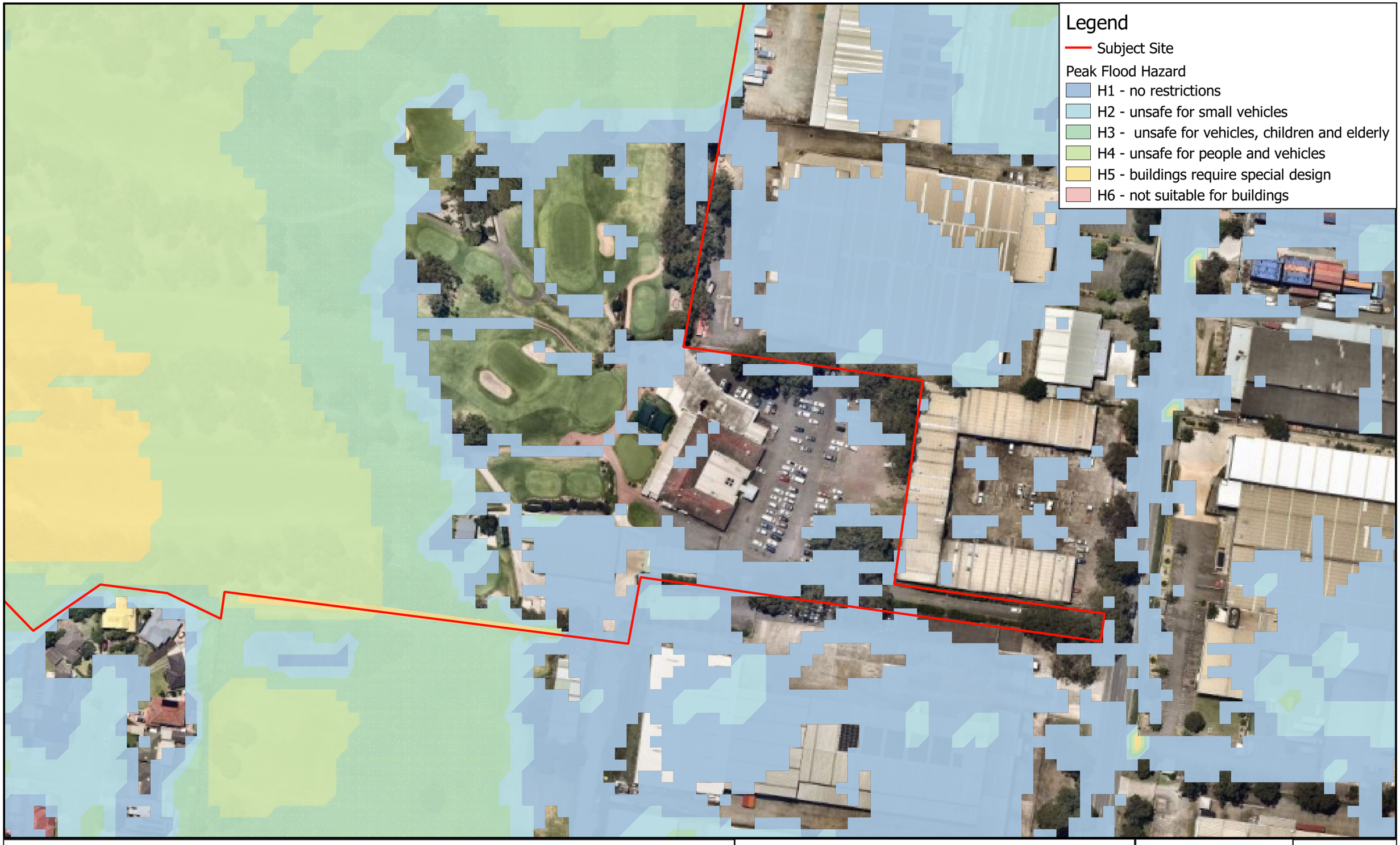
25 0 25 50 75 100 m

Ref No: 21107

Date: 04/02/21

Rev: A

siteplus



Title:

Flood Hazard Category - Existing PMF Event

N

25 0 25 50 75 100 m

Ref No: 21107

Rev: A

Date: 04/02/21

siteplus

APPENDIX C

Proposed Flood Model Results

Legend

BDY

Peak Flood Levels (m A.H.D.)

- <= 4.75.0
- 4.75 - 5.0.0
- 5.0 - 5.25.0
- 5.25 - 5.5.0
- 5.5 - 5.75.0
- 5.75 - 6.0.0
- 6.0 - 6.25.0
- 6.25 - 6.5.0
- > 6.5.0

Proposed Building

Proposed Building

Roads

Concrete

Buildings

Grass

Title:

Peak Flood Levels - Development 100 Year ARI Event

N

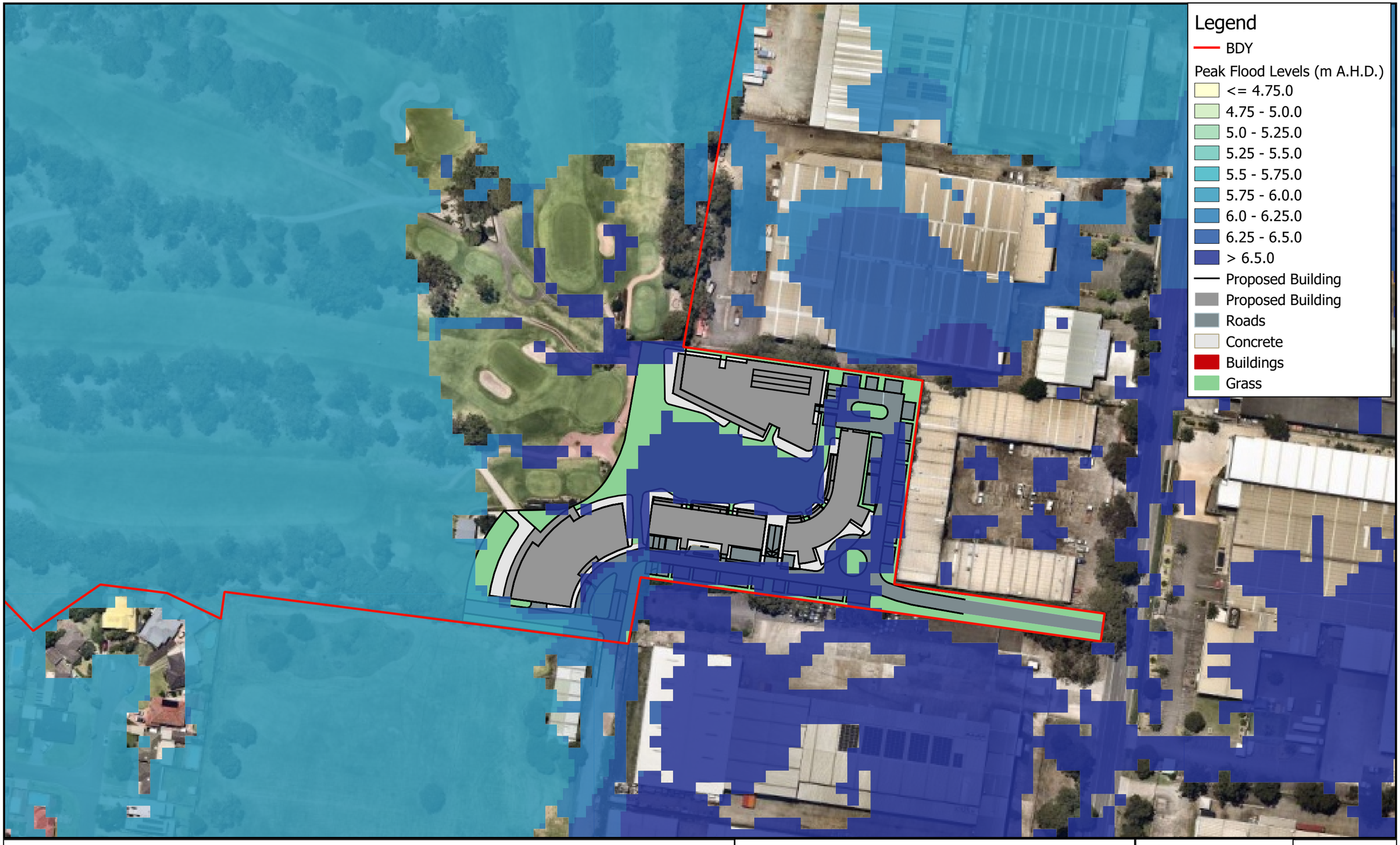
25 0 25 50 75 100 m

Ref No: 21107_F15

Rev: A

Date: 04/02/21

siteplus



Title: **Peak Flood Levels - Development PMF Event**

N

25 0 25 50 75 100 m

Ref No: **21107_F16**

Rev: **A**

Date: **04/02/21**

siteplus

Title:

Peak Flood Depths - Development 100 Year ARI Event

N

25 0 25 50 75 100 m

Ref No: 21107_F13

Rev: A

Date: 04/02/21

siteplus

Title:

Peak Flood Depths - Development PMF Event

N

25 0 25 50 75 100 m

Ref No: 21107_F14

Rev: A

Date: 04/02/21

siteplus

Title: **Peak Flow Velocities - 100 Year ARI Event**

N

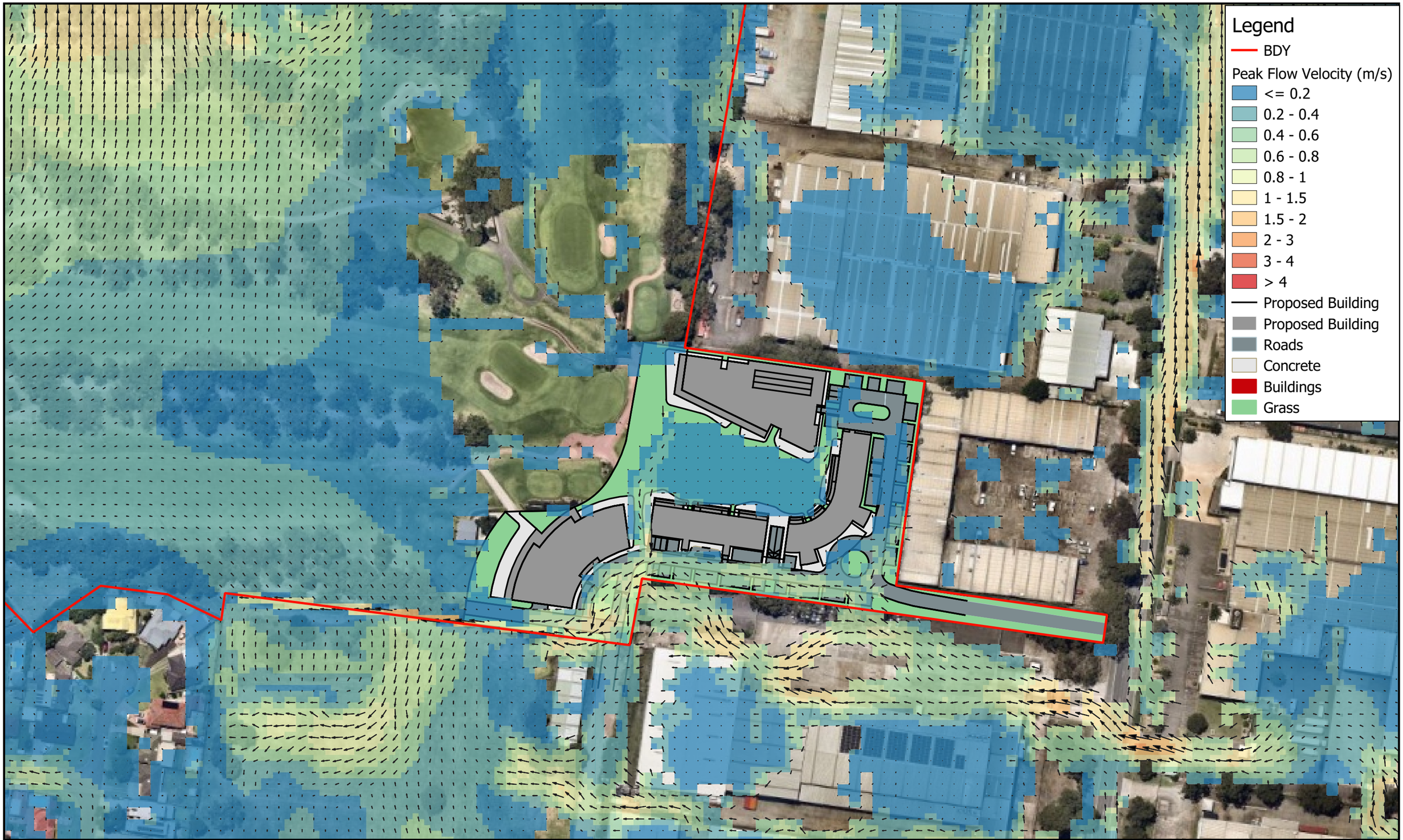
25 0 25 50 75 100 m

Ref No: **21107_F19**

Rev: **A**

Date: **04/02/21**

siteplus



Title: **Peak Flow Velocities - PMF Event**

N

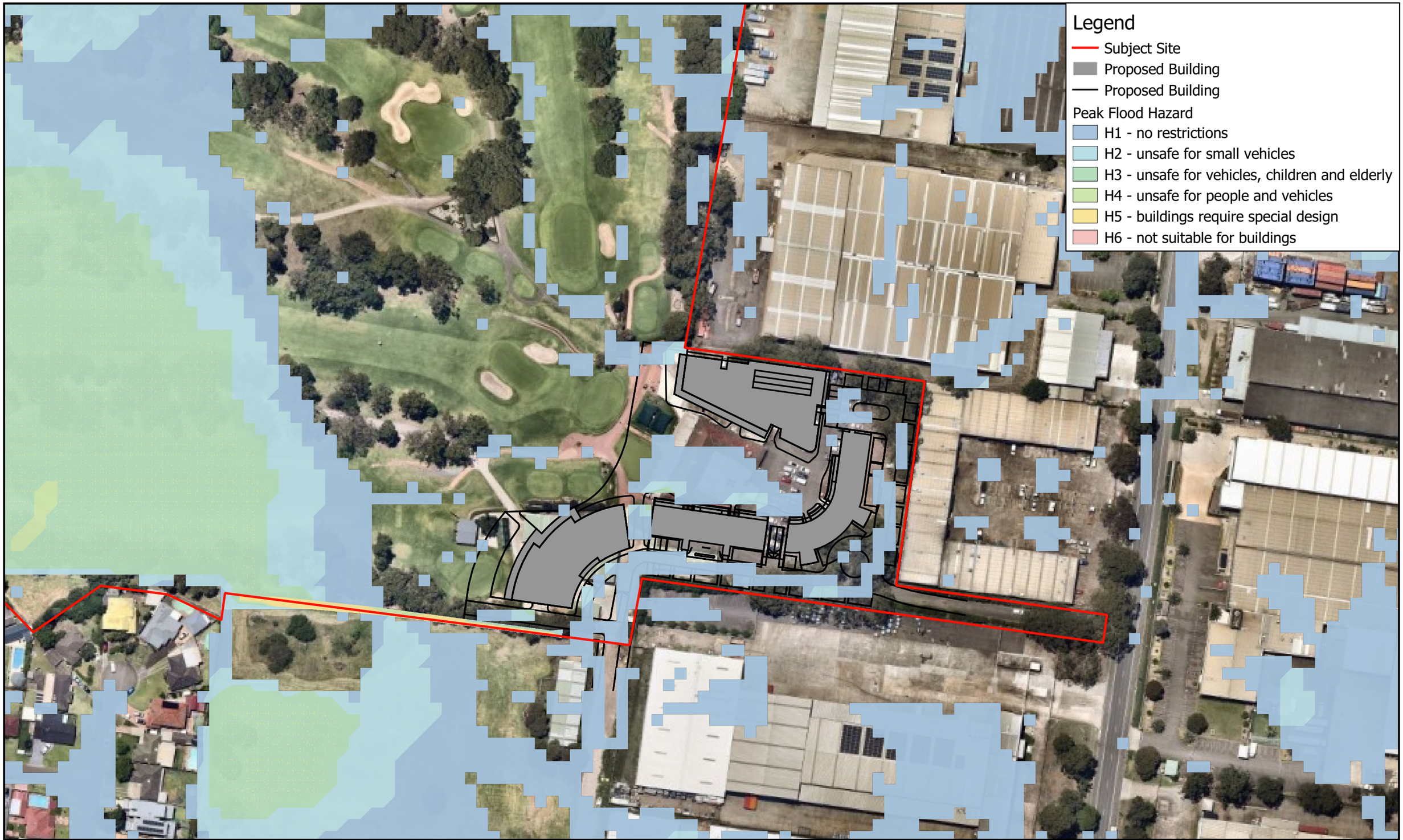
25 0 25 50 75 100 m

Ref No: **21107_F20**

Rev: **A**

Date: **04/02/21**

siteplus



Title:

Flood Hazard Category - Proposed 100 Year ARI Event

N

25 0 25 50 75 100 m

Ref No: **21107**

Rev: **A**

Date: **04/02/21**

siteplus

Title:

Flood Hazard Category - Proposed PMF Event

N

25 0 25 50 75 100 m

Ref No: **21107**

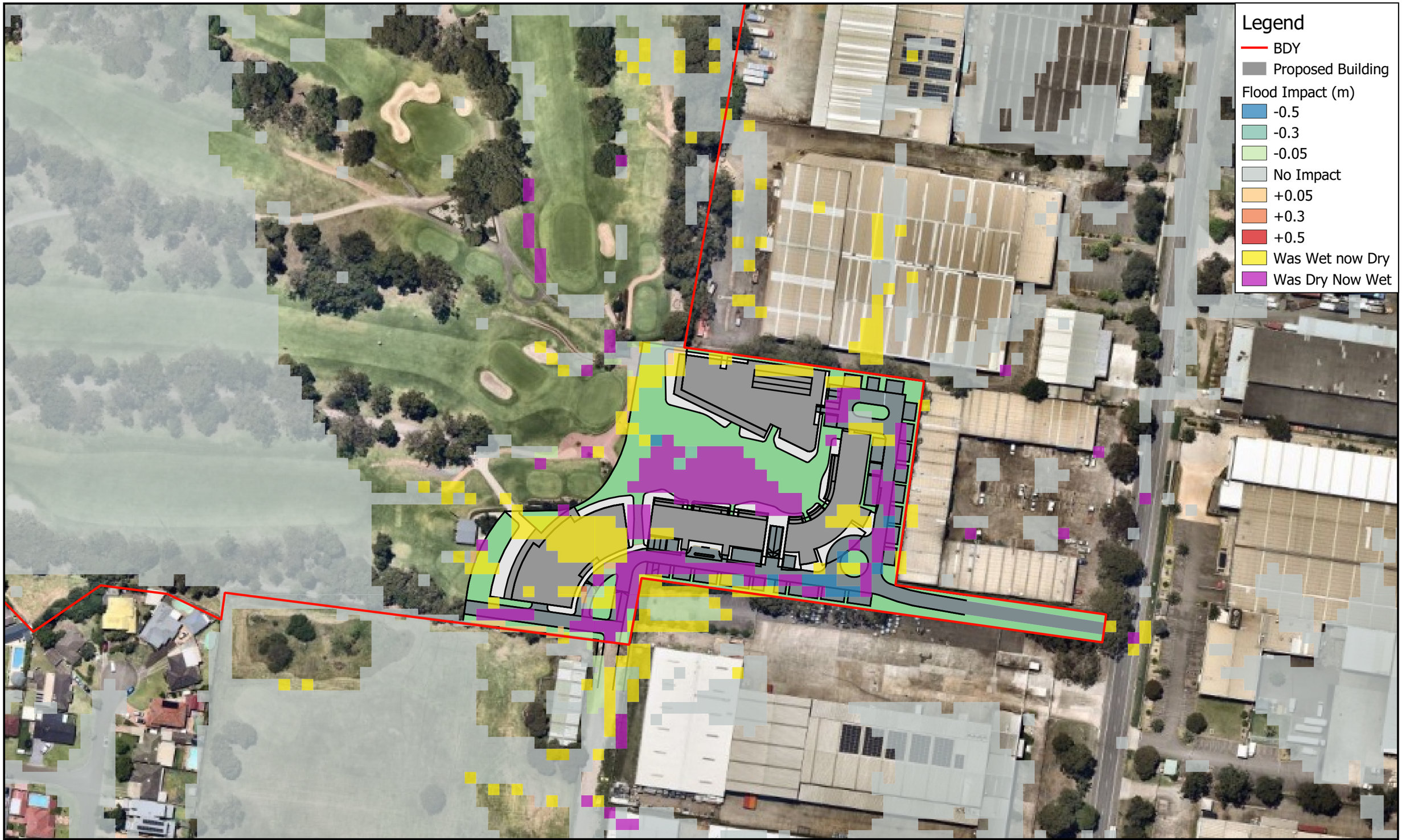
Rev: **A**

Date: **04/02/21**

siteplus

APPENDIX D

Flood Impact Assessment



Title:

100 Year ARI Event - Development Impacts

N

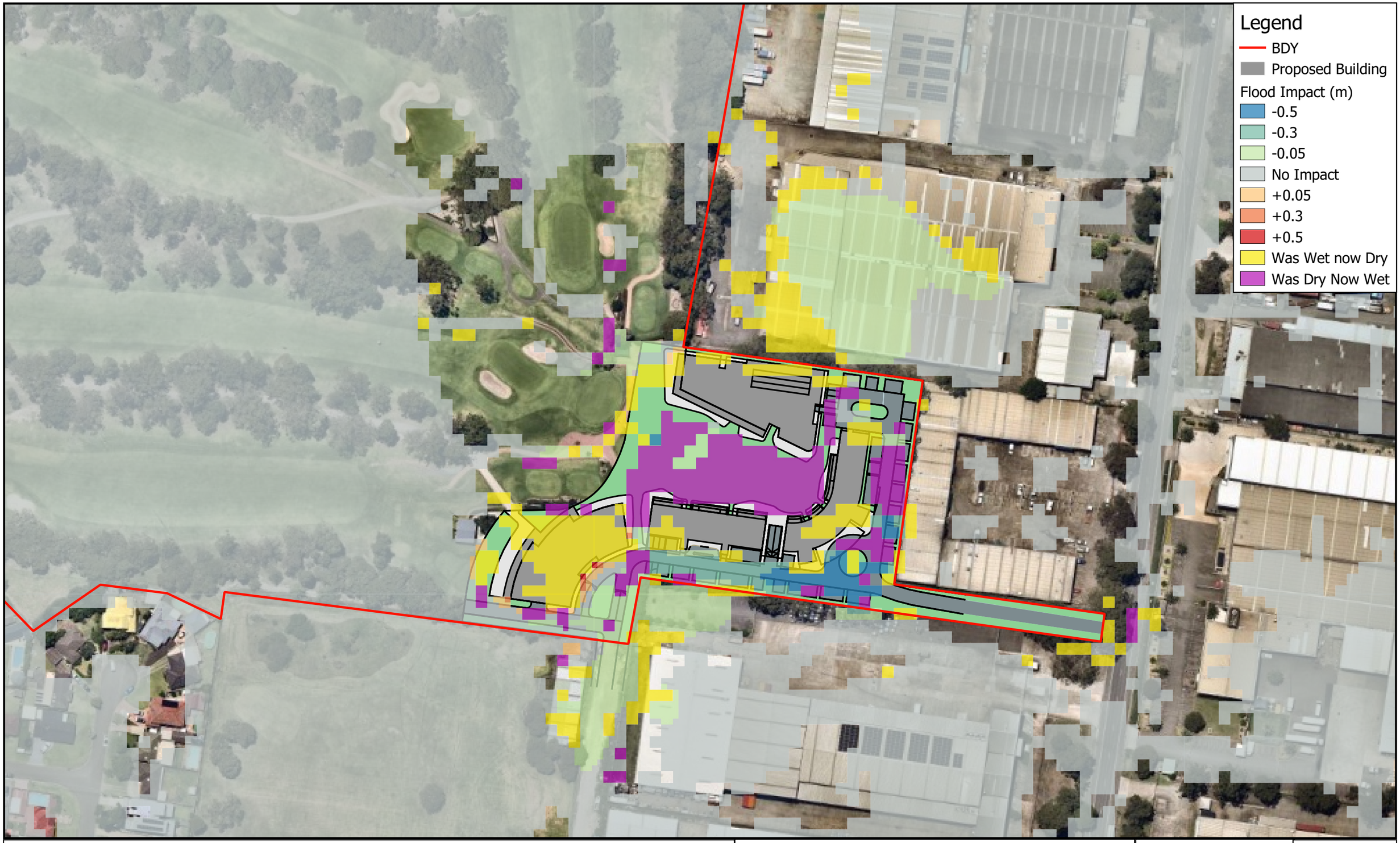
25 0 25 50 75 100 m

Ref No: **21107_F17**

Date: **04/02/21**

Rev: **A**

siteplus



Title:

PMF Event - Development Impacts

N

25 0 25 50 75 100 m

Ref No: 21107_F18

Rev: A

Date: 04/02/21

siteplus