NORTH SYDNEY LGA-WIDE FLOODPLAIN RISK MANAGEMENT STUDY AND PLAN

Final Report

November 2022

North Sydney LGA-wide Floodplain Risk Management Study and Plan – Final Report

Project	North Sydney Local Government Area Wide Floodplain Risk Management Study and Plan
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EXECUTIVE SUMMARY

The Floodplain Risk Management Program

North Sydney Council (Council) has, with the financial support of the NSW Government via the Floodplain Risk Management Program, commissioned GRC Hydro to undertake Floodplain Risk Management Studies and Plans for the North Sydney Local Government Area (LGA).

This study comprises stages 3 to 4 in the five-stage process outlined in the NSW Government's Floodplain Development Manual (FDM, 2005). These works include:

1. Data collection – collection of all applicable data to be used for the ensuing stages of the studies;
2. Flood Study – a comprehensive technical investigation of flood behaviour that provides the main technical foundation for the development of a robust floodplain risk management plan;
3. Floodplain Risk Management Study (FRMS) – assess the impacts of floods on the existing and future community and allows the identification of management measures to treat flood risk;
4. Floodplain Risk Management Plan (FRMP) – outlines a range of measures, for future implementation, to manage existing, future and residual flood risk effectively and efficiently; and
5. Plan Implementation – once the management plan is adopted, an implementation strategy (devised in Stage 4) is followed to stage components dependent on funding availability.

Following the completion of the Floodplain Risk Management Program, Council will begin implementing its recommended measures and will review the plan periodically.

Report Overview

This report describes the data collection, model update, community consultation undertaken to date, flood risk and mitigation measures assessment of the North Sydney LGA Floodplain Risk Management Studies and Plans (FRMS&P). The study, which has been undertaken by GRC Hydro on behalf of Council, follows on from the North Sydney LGA Flood Study completed in 2017. The FRMS&P investigates flood risk in the North Sydney LGA, and will inform Council's flood planning processes, and recommends flood risk mitigation measures in the Floodplain Risk Management Plan. The Plan is presented as a table in this executive summary. The report contains the following sections:

- Background – description of the study area, overview of existing flood behaviour, relevant policies and legislations;
- Data Collection and Review – description of the available data for use in the current study;
- Flood Model Update – description of the flood model update and results based on methodology prescribed by the Australian Rainfall and Runoff 2019 (ARR2019);
- Flood Risk Assessment – description of the LGA flood risk including flood hazard, flood function, flooding hotspots, economic impacts, flood warning and emergency response;
- Flood Risk Mitigation Measures – description of the approach to flood mitigation and assessment of options proposed for the LGA; and
- Community consultation undertaken during the project.

Mainstream and Overland Flooding

Flooding is often associated with inundation from large rivers; however, there are other ways that flooding can occur. The North Sydney LGA is primarily affected by two types of flooding; overland flow flooding and mainstream flooding. Overland flow flooding occurs when rainfall flows toward creeks and channels, while mainstream flooding occurs when large volumes of water in creeks and channels floods areas that are usually dry. The LGA has a number of steep creeks and stormwater channels that can flood, and around these are areas of overland flooding. With respect to overland flooding, shallow flooding that poses minimal risk to people and property and is drained using small drainage elements is referred to as local drainage and is not the focus of this study. Overland flooding that is drained by larger drainage infrastructure and has greater depths and flow rates is referred to as major drainage, and this is covered by this study. Understanding how flooding occurs and the risks it poses is not straightforward and to this end, this study presents a detailed analysis of how flooding occurs and then quantifies the different types of risk.

Flood Model Update

The current study has updated the modelling approach used in the 2017 Flood Study to be consistent with ARR2019, which has changed the design flood levels. The approach, which involves updates to the design rainfall, losses, temporal patterns and other model parameters, was confirmed with Council and the Department of Planning, Industry and Environment after preliminary modelling results showed issues with the adoption of Bureau of Meteorology (BOM) new design rainfall data. Following further investigation, it was decided that the intensity-frequency-duration (IFD) curves developed using the Sydney Observatory Hill's gauge data would be more appropriate for use in the current study. Description of the model review and update is presented in Section 4.

This report presents the updated flood behaviour for the LGA for a range of design events, which considers both mainstream and overland flow flooding. The peak flood levels are shown to be 0.1-0.2 m lower than those of the 2017 Flood Study for the 1% Annual Exceedance Probability (AEP) flood event. This can be attributed mainly to the use of more recent LiDAR dataset (dated 2013) as well as adopting the ARR2019 methodology in deriving the catchment hydrology for the models. Model verification was also undertaken to provide confidence in the updated modelling results.

Terminology for different sized floods

This report refers to design flood events throughout the document. Design flood events are determined by a computer model and have a specific probability of occurring, described by their Annual Exceedance Probability (AEP). The AEP is the likelihood of a flood of given size or larger occurring in a year. For example, a 20% AEP flood is a relatively small flood that has a 20% chance of occurring in a year, while a 1% AEP flood is a larger flood that has a 1%, or 1 in 100 chance of occurring.

In NSW, this terminology has replaced the language of a '1 in 100 year' or '1 in 5 year' flood, which tended to downplay the frequency of rare floods.

Flood Risk Assessment

An assessment of the North Sydney LGA flood behaviour has been carried out to determine specific areas of flood risk across a range of metrics, including flood hazard, flood function, the economic impacts of flooding and the flood warning available. The flood risk assessment found that:

- The main flooding mechanism for the LGA is overland flow flooding, with flooding hotspots generally found along the major overland flow paths;
- High hazard flows and floodway areas are generally confined to principal flow paths, with flood storage areas typically found upstream of obstructions such as railway or major road embankments;
- Due to the steep terrain and relatively short catchments, flooding in the LGA is best described as flash flooding, with high-intensity short-duration storms tending to cause severe widespread flooding;
- Since flooding in the LGA rises and falls quickly, there is lack of warning time (effectively zero) and preventative action such as evacuation may not be expected prior to a flood;
- Projected rainfall increase due to climate change will exacerbate flooding conditions in the LGA but sea level rise impact is minimal as most of the LGA is elevated well above ocean water level;
- The increased flood risk due to climate change does not require specific flood risk management measures and can be managed via management measures presented in this study, and;
- Several key routes and sensitive infrastructure are impacted by flooding as presented in Section 6.4.

Economic Impacts of Flooding

The economic impacts of flooding in the LGA are substantial, with the combined average annual damages (AAD) calculated to be $19.5 million covering both residential and non-residential properties in the entire LGA. Table 1 presents the breakdown of the AAD across the range of design flood events as well as the number of properties that would experience flooding in the yard and inundation above the lowest habitable floor level (e.g. garages and storage spaces have been excluded). The AAD has been used to compare the relative economic merits of various proposed flood mitigation measures as presented in Table 2.

Table 1: Combined Flood Damages for North Sydney LGA

Design Event (AEP*)	Number of Properties affected	Number of Properties affected above Floor Level	Flood Damages Total
20%	557	250	$50,040,000
10%	606	286	$57,492,600
5%	631	306	$62,722,800
2%	642	316	$66,072,900
1%	669	346	$72,492,400

Probable Maximum Flood	767	551	$120,634,200
Average Annual Damages (AAD)			$19,477,500

*'AEP' refers to Annual Exceedance Probability. See 'Terminology for different sized floods' on the previous page

The 767 properties which are flood affected in the PMF event constitute about 7% of the 10,800+ total properties found within the North Sydney LGA.

Flood Risk Mitigation Measures

A range of flood risk mitigation measures have been assessed for the LGA aimed at addressing hotspots, with support for measures also coming via consultation with Council and the community. The types of measures have been categorised as flood modification, property modification or response modification, in accordance with the NSW Floodplain Development Manual (2005). Flood modification measures (Section 6.9) have focused on upgrading the existing trunk drainage systems as well as various complementary measures such as detention basin implementation. Where appropriate, measures have been modelled using one or multiple design flood events. Property modification options (Section 6.7) include flood proofing, development of a Flood Planning Area (FPA) for the LGA, and inclusion of flood related policies in the Local Environment Plan (LEP) and Development Control Plan (DCP). Response modification measures (Section 6.8) include installation of flood signage, development of a local flood plan and requirement for site-specific flood emergency plans. A full list of assessed measures is set out in this report and the recommended measures are summarised in Table 2. The table is a summary of the Floodplain Risk Management Plan and Section 7 of this report constitutes the Plan.

Table 2: Floodplain Risk Management Plan for North Sydney LGA

Option and Report Reference	Description	Responsibility	Priority
PM-01 Inclusion of Flood Related Policy and FPA in the LEP	Install flood-related clauses in the LEP to provide a flood definition for the LGA and objectives for its management. Also provide definition of the FPA.	Council	High
PM-02 Adoption of Matrix-style Controls in DCP	Introduce matrix-style controls on development of flood-prone land considering both the level of flood risk and the type of development.	Council	High
PM-03 Flood Proofing	Consider permanent flood proofing methods for flood-prone lots/properties.	Property Owners	Medium
PM-04 Inclusion of Flood Risk Information on s10.7 Planning Certificates	Include relevant flood risk information on the s10.7 planning certificates to inform property owners of flood risk.	Council	Medium
RM-02 Local Flood Plan	Prepare a Local Flood Plan to detail flood risk within the LGA, responsibilities of relevant agencies, flood response and arrangements.	SES	High

Option and Report Reference	Description	Responsibility	Priority
RM-03 Requirement for Site Specific Flood Emergency Plans	Impose requirement for a site-specific Flood Emergency Plan on new developments in high hazard flooding areas, detailing responsibilities and evacuation planning.	Council	High
FM-S01 Trunk Upgrade in North Sydney CBD	Increase capacity of Sydney Water trunk system through North Sydney CBD to Milson Park and introduce new pits.	Council, Sydney Water and TfNSW	Low
FM-S03 Upgrade Kurraba Road Culvert	Upgrade Sydney Water culvert under the Kurraba Road/Clark Road intersection.	Council and Sydney Water	Medium
FM-S04 Bund at Forsyth Park	Construct bund or levee at Forsyth Park to impede upstream overland flows.	Council	Medium
FM-S05 Trunk Upgrade from Lindsay Street to Kurraba Road	Upgrade Council trunk system from Lindsay Street to the harbour outlet and introduce new pits.	Council	Low
FM-E01 Trunk Upgrade from Yeo Street to Bogota Avenue	Upgrade Council trunk system from Yeo Street to the harbour outlet and introduce new pits.	Council	Low
FM-W01 Trunk Upgrade from Bank Street to Waverton Park	Upgrade Sydney Water trunk system from Bank Street to Woolcott Street and introduce new pits.	Council and Sydney Water	Low
FM-W02 Carlyle Lane Drainage Upgrade	Upgrade Council drainage system from Carlyle Lane to Berrys Creek and enhance capacity of existing pits.	Council	Low
FM-N01 Trunk Upgrade from Albany Street to Flat Rock Creek	Upgrade Sydney Water and Council trunk system from Albany Street to Flat Rock Creek and introduce new pits.	Council and Sydney Water	Low
FM-N02 Bund at St Leonards Park	Construct bund or levee at St Leonards Park to impede upstream overland flows.	Council	High
FM-N03 Anzac Park Basin	Construct basin within Anzac Park to create additional flood storage.	Council and TfNSW	Low
FM-N05+N08 Trunk Upgrade from Anzac Park to Willoughby Creek and Warringa Road Drainage Upgrade	Upgrade Sydney Water trunk system from Anzac Park to Primrose Park, upgrade Warringa Road drainage system and introduce new pits.	Council, Sydney Water and TfNSW	Low

Option and Report Reference	Description	Responsibility	Priority
FM-N06 Reynolds Street Drainage Upgrade	Upgrade Council drainage system from Reynolds Street to the harbour outlet and introduce new pits.	Council	Low
FM-N07 Cooper Lane Drainage Upgrade	Upgrade Council drainage system from Belgrave Street to the harbour outlet and introduce new pits.	Council	Low
FM-N09 Cassins Avenue Drainage Upgrade	Upgrade Council drainage system from Cassins Avenue to St Leonards Park and introduce new pits.	Council	Medium
FM-N11 Cammeray Golf Club Basin	Construct basin adjacent to Warringa Road within Cammeray Golf Course to create additional flood storage.	Council	Medium

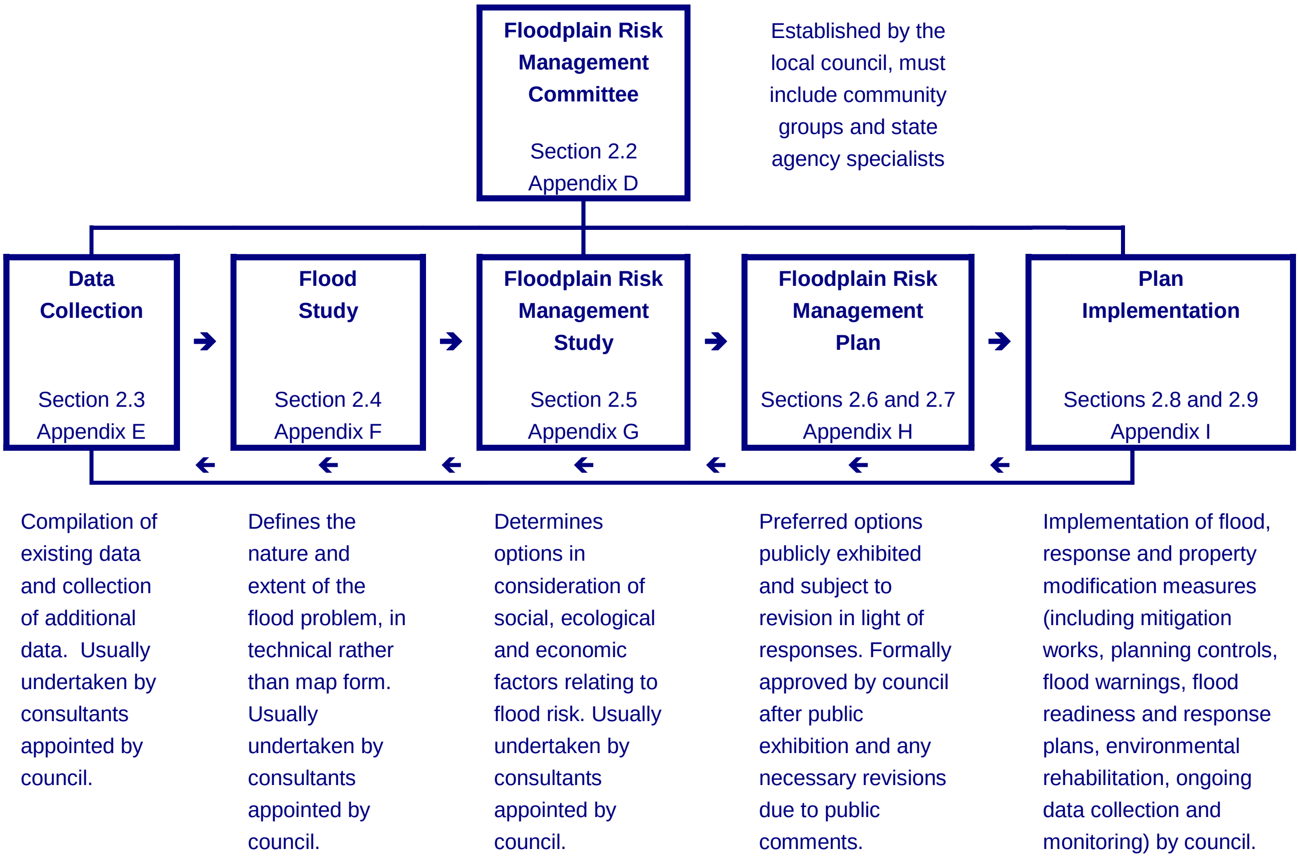
FOREWORD

The New South Wales (NSW) Government's Flood Prone Land Policy aims to reduce the impact of flooding and flood liability on individual owners and occupiers of flood prone property, and to reduce private and public losses resulting from floods.

Through the NSW Department of Planning, Industry and Environment (formerly NSW Office of Environment and Heritage (OEH)) and the NSW State Emergency Service (SES), the NSW Government provides specialist technical assistance to local government on all flooding, flood risk management, flood emergency management and land-use planning matters.

The Floodplain Development Manual (NSW Government, 2005) is provided to assist councils to meet their obligations through a five-stage process resulting in the preparation and implementation of floodplain risk management plans. Chart 1 presents the process for plan preparation and implementation.

Chart 1: The Floodplain Risk Management Process in New South Wales (FDM, 2005)



1. INTRODUCTION

This North Sydney LGA (Local Government Area)-wide Floodplain Risk Management Study and Plan (FRMS&P) has been undertaken by GRC Hydro Pty Ltd (GRC Hydro) on behalf of North Sydney Council (Council), following on from the North Sydney LGA Flood Study completed in February 2017. The FRMS&P updates the 2017 Flood Study considering the recommendations by the recently published Australian Rainfall and Runoff 2019 (ARR2019), re-evaluate flood risks in the LGA, inform Council flood planning processes, and recommend flood risk mitigation measures in the Floodplain Risk Management Plan.

1.1 The Floodplain Risk Management Program

Council has received financial support from the NSW Floodplain Management Program (FMP) managed by the NSW Department of Planning, Industry and Environment (DPIE) to undertake a flood investigation of the North Sydney LGA. To meet this objective, GRC Hydro have been engaged by Council to undertake the FRMS&P.

This study composes stages 3 and 4 of the five-stage process outlined in the NSW Government's Floodplain Development Manual (NSW Government, 2005). These works include:

- Floodplain Risk Management Study (FRMS) – which assesses the impacts of floods on the existing and future community and allows the identification of management measures to manage flood risk; and a
- Floodplain Risk Management Plan (FRMP) – that outlines a range of measures, for future implementation, to manage existing, future and residual flood risk effectively and efficiently.

Following the completion of the FRMP, the final stage of the floodplain management process will involve implementing the findings of the FRMP.

Further details of the floodplain risk management stages are outlined below.

Data Collection (completed as part of the 2017 Flood Study)

The collection and collation of data necessary for the completion of the flood and floodplain risk management studies is a fundamental part of the floodplain management process. It is typically begun at the outset of the study, but generally continues throughout the period of the project as data becomes available. The quality and quantity of available data is key to the success of a flood study and FRMS.

Flood Study (completed as part of the 2017 Flood Study)

A flood study is a comprehensive technical investigation of flood behaviour of the study area that provides the main technical foundation for the development of a robust floodplain risk management plan. It aims to provide an understanding of flood behaviour and consequences for a range for flood events. Information obtained in the data collection phase is used to assist in the development of hydrologic and hydraulic models which are calibrated and verified to provide confidence in the model results.

Floodplain Risk Management Study (current study)

A floodplain risk management study increases understanding of the impacts of floods on the existing and future community. It also allows testing and investigating practical, feasible and economic management measures to treat existing, future and residual risk. The floodplain risk management study provides a basis for informing the development of a floodplain risk management plan.

Floodplain Risk Management Plan (current study)

The floodplain risk management plan documents decisions on the management of flood risk into the future. The FRMP uses the findings of a floodplain risk management study, to outline a range of measures to manage existing, future and residual flood risk effectively and efficiently. This includes an itemised list of measures and prioritised implementation strategy.

1.2 Objectives

The objective of this FRMS&P is to improve understanding of flood behaviour and impacts within the North Sydney LGA, and better inform management of flood risk in the study area in consideration of the available information, relevant standards and guidelines. This study also provides a sound technical basis for any further flood risk management investigation in the area as well as allowing an increased understanding of the impacts of floods on existing and future community. It also allows testing and investigation of practical, feasible and economic management measures to treat existing and future risk so as to achieve a tolerable level of residual risk.

The FRMS provides a basis for informing the development of a FRMP which documents and conveys the decisions on the management of flood risk into the future. The FRMP outlines a range of measures to manage existing and future risk so as to achieve a tolerable level of residual risk effectively and efficiently. The FRMP includes a prioritised implementation strategy, proposed measures as well as how they will be implemented.

The overall project provides an understanding of, and information on, flood behaviour and associated risk to inform:

- Relevant government information systems;
- Government and strategic decision makers on flood risk;
- The community and key stakeholders on flood risk;
- Flood risk management planning for existing and future development;
- Emergency management planning for existing and future development, and strategic and development scale land-use planning to manage growth in flood risk;
- Selection of practical, feasible and economic measures for treatment of risk;
- Development of a floodplain risk management plan and prioritised implementation strategy;
- Providing a better understanding of the:
    - variation in flood behaviour, flood function, flood hazard and flood risk in the study area;
    - impacts and costs for a range of flood events or risks on existing and future community;
    - impacts of changes in development and climate on flood risk;

  - emergency response situation and limitations; and
  - effectiveness of current management measures.
- Facilitating information sharing on flood risk across government and with the community.

The study outputs can also inform decision making for investing in the floodplain; managing flood risk through prevention, preparedness, response and recovery activities; pricing insurance, and informing and educating the community on flood risk and response to floods. Each of these areas has different user groups with varied needs.

1.3 Project End Users

The key end-user groups that this study aims to support are identified in Table 3.

Table 3: Project End Users

Potential end user group
High-level strategic decision makers
Community
Flood risk management professionals
Engineers involved in designing, constructing and maintaining mitigation works
Emergency management planners
Land-use planners (strategic planning and planning controls)
Hydrologists and meteorologists involved in flood prediction and forecasting
Insurers
Emergency Services (SES, NSW Police, RFS, NSW Fire and Rescue)

2. BACKGROUND

2.1 Study Area

The Study Area is defined by the LGA boundary of North Sydney Council, as shown on Figure 1, with an area of 10.9 km^2. The study area is completely urbanised, with several commercial centres (broadly, North Sydney Central Business District (CBD), part of the St Leonards commercial centre, and Military Road shops) surrounded by medium to high density residential areas. Suburbs in the LGA include Cammeray, Cremorne, Cremorne Point, Crows Nest, Kirribilli, Kurraba Point, Lavender Bay, McMahons Point, Milsons Point, Neutral Bay, North Sydney, St Leonards, Waverton, and Wollstonecraft.

The LGA's location immediately north of the Sydney CBD and the Harbour Bridge and Tunnel leads it to function as a major thoroughfare for road and rail transport in Sydney. The arterial roads are the M1, bisecting the area north to south, as well as the Pacific Highway and Military Road. The North Shore Line is the main railway line, running generally north-south, while a second, smaller line runs from Waverton to Milsons Point, a remnant of the North Shore Line's terminus at Milsons Point prior to the Harbour Bridge opening.

The LGA's topography consists of a central ridge running east to west, sloping down to Sydney Harbour to the south, and Middle Harbour to the north. Sydney Harbour has several narrow inlets on its northern side, with seven steeply graded peninsulas on the southern side of the LGA, and two inlets on the Middle Harbour side, at Primrose Park and Tunks Park. This topography creates a large number of incised catchments flowing generally north or south, with 18 separate catchments as delineated by the 2017 Flood Study (average size of 0.6 km^2 or 60 hectares). The area's catchments and topography are shown on Figure 2.

The LGA had a population of 67,658 people in the 2016 census, with a median age of 37 years old (close to the national average). The personal median weekly income is $1,386, approximately twice the national average. Approximately three quarters of dwellings are apartments, with 14% townhouse/semi-detached and 10% freestanding. The most commonly spoken languages other than English are Mandarin and Cantonese, which approximately 6% of the population speak.

2.2 Historical Floods

Due to the steep terrain and relatively short catchments, flooding in North Sydney is best described as flash flooding. The high intensity short duration storms are the storms that tend to cause severe widespread flooding. This flooding comes on quickly and descends relatively fast after the storm eases.

As part of the 2017 Flood Study, various sources have been examined to gauge the flooding history in the study area, including Council's flood database, Sydney Water's flood database, newspaper articles and community consultation. From this, anecdotal evidence of past flooding was obtained. These sources, whilst described flooding which had occurred, often did not record the depth or level of flooding that is required to calibrate the flood model.

The anecdotal evidence from these flood databases and newspapers reported instances of flooding as having occurred in 1984, 1986, 1991 and 2010. These dates corresponded to high intensity rainfall recorded by rainfall gauges in the vicinity of the study area (WMAwater, 2017).

During the period of the current study, a significant storm occurred in the early morning of 28th November 2018 which resulted in widespread flooding across the North Sydney LGA[1]. In addition to reports on the news media, Council received numerous flooding photos and videos of the event provided by local residents. Subsequent community consultation undertaken as part of this study obtained further anecdotal evidence of the event as well as photos from the community confirming the flood impact of the storm on the study area.

2.3 Flood Mechanisms

The current study assesses two key flood mechanisms that can occur within the North Sydney LGA: overland flow flooding and mainstream flooding. Typically, these two mechanisms occur independently however they can also occur simultaneously.

Overland flow flooding occurs when rainfall in the vicinity of the LGA causes flooding as water flows toward the channels/creeks. This type of flooding is often referred to as "flash flooding" due to short warning times and is the most common within the study area. Typically, this type of flooding rises and recedes over a short period of time and the floodwaters are usually relatively shallow and fast moving. Several major overland flowpaths can be found in the study area which typically follow the natural low point of the local topography. Image 1 (left hand side) depicts this mechanism.

Mainstream flooding occurs from rising water on a defined watercourse causing the watercourse to break its banks, spread over the floodplain and inundate areas that are usually dry. Urban watercourses such as open channels/drains and natural creeks such as Willoughby Creek and Flat Rock Creek (both located north of the LGA) can cause flooding to adjacent low-lying areas. This mechanism typically occurs over a long period of time and typically results in deep, slow moving floodwaters. Image 1 (right hand side) depicts this mechanism. Flooding caused by ocean storm surge can also be categorised as mainstream flooding. Since most of the LGA is elevated well above ocean water level, flood risk due to mainstream ocean flooding is minimal and generally restricted to low-lying areas next to the harbour.

Image 1: Flood Mechanisms affecting North Sydney LGA

Oveland Flow Flooding

Mainstream Flooding

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[1] Analysis undertaken by GRC Hydro estimated the event to be around 5% to 2% AEP for the 1-hour storm burst at the North Sydney LGA region.

2.4 Policies, Legislation and Guidance

This study made use of several policies, legislation and guidance relevant to management of flood risk in the North Sydney LGA. These are summarised in the following sections.

2.4.1 Implemented Guidelines and References

Table 4 presents the guidelines, manuals and technical reference documents used for this study. These documents detail best practice in regard to management of flood risk. They cover both best practice about the technical assessment of flood behaviour and flood risk, and, more generally, who has responsibility for managing flood risk and how this management is best achieved in the study area.

2.4.2 Summary of Council Planning Policy and Manuals

2.4.2.1 North Sydney Local Environmental Plan (LEP) 2013

The Department of Planning Industry and Environment (DPIE) have developed a set of settled model clauses for use in LEPs, with a specific clause for flood affected land. At the time that the draft version of this Study and Plan was placed on public exhibition, the LEP did not contain the model clauses for flood affected land, due to the absence of past LGA-wide flood investigations prepared in accordance with the Floodplain Development Manual 2005.

However, on 14 July 2021, the model provisions relating to flooding were formally incorporated into the Standard Instrument Local Environmental Plan (SI LEP) Order. The first model provision (clause 5.21) is compulsory for inclusion in all council LEPs and effectively relates to development on land within a Flood Planning Area. The second model provision (clause 5.22) is optional and relates to development on land located between the Flood Planning Area and the Probable Maximum Flood.

The compulsory flooding clause was automatically incorporated into North Sydney LEP 2013 (clause 5.21) on 14 July 2021, the same day that the SI LEP Order was amended. The optional flooding clause (clause 5.22) was not adopted by Council as it had yet to complete its flood studies and there was no certainty that it would be required. Therefore, the optional model clause was not incorporated into NSLEP 2013. Despite its existence, clause 5.21 within NSLEP 2013 has remained inoperable since its commencement as Council did not have an adopted policy which identified a flood planning area.

As soon as Council adopts the finalised FRM Study and Plan, which specifically identifies a flood planning area for the LGA and flood related development controls, the application of clause 5.21 to NSLEP 2022 will come into force on the same day.

In addition, there is reference to the consideration of flooding patterns as a result of climate change for development in a "foreshore area" under Clause 6.9 to the LEP.

2.4.2.2 North Sydney Development Control Plan (DCP) 2013

The DCP contains provisions for stormwater management for residential, commercial and mixed used, non-residential development in the LGA (Sections 1.6.8, 2.6.7 and 3.5.7 respectively) with the following objectives:

- To mimic pre-development or natural drainage systems through the incorporation of WSUD (Water Sensitive Urban Design) on-site;

- To protect watersheds by minimising stormwater discharge and maximising stormwater quality; and
- To minimise off-site localised flooding or stormwater inundation.

Other relevant provisions related to stormwater management include:

- To demonstrate how runoff from the development site will be minimised and the quality of water leaving the site will be improved;
- As a minimum, post-development stormwater discharge rates should be less than pre-development stormwater discharge rates;
- On-site stormwater detention, including the use of grass swales and detention basins, should be pursued where practicable to minimise and filter stormwater runoff; and
- Impervious surfaces should be minimised.

No specific flood-related controls or restrictions were found in the DCP to manage flood risk that could potentially impact on development within the LGA, similar to the reason why there are an absence of flood related provisions within the LEP.

An overview of DCP controls in other Sydney LGAs is given below. City of Sydney and Mosman Council are similar to North Sydney in that they have fully-developed catchments with many separate areas that experience overland flooding.

- City of Sydney has a 'Interim Floodplain Management Policy' that is a standalone document, separate to its DCP. The policy sets minimum floor levels for a variety of development types in the LGA, including residential, commercial and critical facilities. Floor levels for habitable spaces are set at 1% AEP flood level plus 0.5 m freeboard, while basement car parks and critical facilities have a level of either the PMF or 1% AEP + 0.5 m, whichever is higher. The policy does not use a Flood Planning Area and applies to every lot in the LGA. Properties that experience negligible flooding are required to have their floor level 0.3 m above the ground. This means that in some cases properties with no flood liability are subject to flood planning controls, which can be contentious.
- Mosman Council has a 'Policy for Stormwater Management in Mosman'. While it is largely concerned with stormwater and does not contain objectives for floodplain management, the policy requires that "Properties with watercourses or natural flow paths and properties in low points shall provide overland flow paths designed to cope with the 1 in 100 ARI storm event, regardless if there is a pipe of adequate capacity draining the low point or creek or not". It appears to require that such properties have a minimum floor level of 0.3 m above the 1 in 100 ARI storm event.
- Willoughby Council have a Floodplain Management technical standard as part of their DCP. The policy applies to both mainstream and overland flow flooding. It includes description of types of overland flow flooding and states a flood study for a particular site is generally not required for "local drainage" overland flooding, a term also used in the NSW Floodplain Development Manual. This is useful in excluding properties with little to no flood risk, however, types of overland flooding can be difficult to differentiate. Flooding Planning Levels used are 1% AEP + 0.5 m for residential development as well as critical/sensitive uses, and 1% AEP + 0.3 m for non-habitable spaces in commercial developments.

- Lane Cove Council applies some controls related to flooding in their DCP's stormwater section. Controls include varying minimum floor levels based on the degree of risk (0.15 m above ground as a minimum, for nuisance drainage issues, then 1% AEP + 0.3 m for overland flow, but 1% AEP + 0.5 m if high flow rates or depths are present). A flood study is required as part of a development where a known issue is present.
- Other Councils in Sydney tend to cover larger areas and contain creeks or rivers that have relatively large floodplains. In such areas, areas of the floodplain contain widespread high hazard flow unsuited to most types of development, while areas further back from the creek can be safely developed. This has led to the development of a 'flood risk precincts' approach, where 'high, 'moderate' and 'low' precincts are mapped within the LGA and the minimum floor level and other controls vary depending on precinct. Councils that use this approach include Canada Bay, Northern Beaches, Blacktown and Canterbury-Bankstown.

Table 4: Relevant Guidelines and Reference Documents

Reference	Topic
Australian Emergency Management (AEM) Handbook Series, Managing the floodplain: A guide to best practice in flood risk management in Australia – AEM Handbook 7	Best practice
AEM Handbook 7, Technical flood risk management guideline – Flood Hazard	Flood hazard
AEM Handbook 7, Technical flood risk management guideline – Flood Emergency Response Classification of the Floodplain	Emergency response
AEM Handbook 7, Technical flood risk management guideline – Flood risk information to support land-use planning	Land use
AEM Handbook 7, Technical flood risk management guideline – Assessing options and service levels for treating existing risk	Mitigation options and service levels
AEM Handbook 6, National Strategy for Disaster Resilience – community engagement framework	Community engagement
Australian National Committee on Large Dams (ANCOLD) Guidelines	Dam safety
Australian Rainfall & Runoff 2019 (ARR2019) and Specific Project Reports	Best practice
Section 733 of the Local Government Act, 1993	Flood prone land policy
NSW Government's Floodplain Development Manual (2005)	Flood prone land policy and industry practice
SES requirements from floodplain risk management process	SES requirements
Practical consideration of climate change	Climate change
Coincidence of Coastal Inundation and Catchment Flooding	Coincidence

Reference	Topic
Floodway Definition	Floodway
Residential flood damage and supporting calculation spreadsheet	Flood damages

2.4.2.3 North Sydney Public Domain Style Manual and Design Codes 2018

This manual sets requirements for the style and design of infrastructure improvements in the LGA, with a focus on visual aesthetics. Recommendations can be found on the use of WSUD solutions to improve general stormwater quality and the use of Council's stormwater inlet pit with granite lintel to discharge runoff.

2.4.2.4 Infrastructure Specification Manual for Road works, Drainage and Miscellaneous Works 2018

This manual sets requirements for infrastructure works in the LGA with focus on the engineering specifications. In addition to materials that should be used for the drainage structures, standard drawings for different pit types and trench details are included.

2.4.3 Emergency Management Plans

2.4.3.1 Sydney Metropolitan Regional Emergency Management Plan 2017

The Sydney Metropolitan Regional Emergency Management Plan (EMPLAN) was prepared by the Sydney Metropolitan Regional Emergency Management Committee in compliance with the State Emergency & Rescue Management Act 1989. The plan sets out the emergency response arrangements for the Sydney metropolitan region, which encompasses nine LGAs including North Sydney. The plan refers to area-specific response being contained in the various local EMPLANs, including that for Mosman-North Sydney.

2.4.3.2 Mosman and North Sydney Local Emergency Management Plan 2017

The Mosman and North Sydney Local Emergency Management Plan (EMPLAN) was prepared by the Mosman and North Sydney Local Emergency Management Committee in compliance with the State Emergency & Rescue Management Act 1989. The plan sets out the emergency response arrangements for Mosman and North Sydney Council LGAs. The plan identified the NSW SES as the primary agency responsible for dealing with emergencies related to storm and flash flooding.

2.4.4 State and National Plans and Policies

Management of flood risk in the LGA is also guided by various state-wide and national policies related to floodplain management in Australia. These have been listed below, including their relevance to the current study:

- *Australian Rainfall and Runoff 2019* – This national guideline document is used for the estimation of design flood characteristics in Australia. It sets out hydrological data and procedures to be used for hydrological and hydraulic modelling of flooding in Australia.
- *NSW Environmental Planning and Assessment Act 1979* – Is the overarching state legislation for local legislation. The Act provides the framework for regulating and protecting the environment and controlling development. Pursuant to Section 9.1 of the EP&A Act, councils

have the responsibility to facilitate the implementation of the NSW Government's Flood Prone Land Policy. It specifies how councils' LEPs manage flooding.

- *NSW Flood Prone Land Policy* - aims to reduce the impact of flooding and flood liability on individual land owners and occupiers of flood prone property and to reduce private and public losses resulting from floods via economically positive methods where possible. The NSW Floodplain Development Manual supports the policy.
- *NSW Government's Floodplain Development Manual (2005)* – Defines the assessment of flood risk in NSW, including flood hazard, hydraulic categories and other variables. More broadly it sets out the objectives for floodplain development in the state, including description of types of mitigation measure. This manual guides councils in the development and implementation of local floodplain risk management plans to produce robust and effective floodplain risk management outcomes in accordance with the NSW Government's Flood Prone Land Policy.
- *State Environmental Planning Policy (Exempt and Complying Development Codes) (2008)* - are environmental planning tools used to address planning issues within NSW. In a flooding context, the SEPP for Exempt and Complying Development Codes 2008 is key for defining:
    - Exempt developments, where development can occur without the need for development consent; and
    - Complying development, where development must be carried out in accordance with a complying development certificate.

  The policy provides further information on where and development of flood-prone land should occur.

3. DATA COLLECTION AND REVIEW

3.1 Previous Studies

Several studies related to flooding in the North Sydney LGA have been undertaken. The most relevant to the current study is the North Sydney LGA Flood Study, prepared by WMAwater on behalf of Council, with the final report published February 2017. Other studies include catchment-level studies undertaken by Council or Sydney Water, or consultants on behalf of Council, and drainage/flooding assessment of the Sydney Metro tunnels and Victoria Cross station (currently under construction) in the LGA. The following sections summarise the previous studies.

3.1.1 North Sydney LGA Flood Study (WMAwater, 2017)

The study was undertaken by WMAwater, on behalf of Council, as part of Council's Floodplain Risk Management Program for the LGA. As per the NSW Floodplain Development Manual, the flood study covers the first and second stages in the program and prepares Council and the community for the current study, which covers the third and fourth stages of the program. The key outputs of the flood study were:

- Design flood information for a range of flood events, including basic information (peak flood depth, level and velocity) and processed outputs (provisional hydraulic hazard and hydraulic classification);
- A set of verified hydrologic and hydraulic models that cover overland and mainstream flooding across the LGA. These models, which used the DRAINS and WBNM software for the hydrologic assessment, and TUFLOW for the hydraulic model, were updated as part of the current study (see Section 4); and
- Establishment of consultation channels with the community and other stakeholders, that have raised awareness of the nature and location of flooding in the LGA, and of the flood study's function and relation to the current study.

Table 5 summarises the approach and results of the flood study.

3.1.2 Sydney Metro Flood Assessments

The Sydney Metro project involves construction of two new stations and twin rail tunnels in the LGA. Specifically, Stage 2 of the project entails a new rail line starting at Chatswood and finishing at Bankstown. The Chatswood to Sydenham section will have 15.5 km twin railway tunnels, of which around 3 km is in the study area. The LGA will have two stations, 'Victoria Cross' in the North Sydney CBD, and 'Crows Nest', approximately 500 m southeast of the existing St Leonards station. As a major infrastructure project, various technical studies have been developed for the project including flooding assessments. The following studies (relating to flooding) are publicly available:

- Sydney Metro City and Southwest, Victoria Cross Over Station Development, Flood assessment and stormwater management report (AECOM, 2018).

The report assessed the flood risk associated with a proposed multi-storey development above the proposed Victoria Cross station and recommended flood risk mitigation measures. The report used the model established in the 2017 flood study, with several adjustments to the modelling of the existing case. As an ongoing proposed development, the mitigation measures have not been included in the current study's definition of flood behaviour. Nevertheless, these measures were considered alongside other possible mitigation measures for the North Sydney CBD.

Table 5: Summary of 2017 Flood Study

Feature	Description	Relevance to FRMS&P (current study)
Data collection	The following data was collected for the study: • LiDAR data surveyed in 2008, TIN (triangulated irregular network) and DEM (digital elevation model) generated by the consultant. • Council GIS data including aerial photos, LEP layers, cadastral and road data. • Pit and pipe data provided by Sydney Water and Council. Open channel data from Sydney Water reports. • Bureau of Meteorology (BOM) design rainfall data, and rainfall data from 7 pluviometers and 64 daily read stations. • Various catchment studies within the LGA. • Questionnaire responses and newspaper description of historical floods.	More recent data for LiDAR, design rainfall, stormwater assets and aerial photos are available and were assessed for use in the current study (see Section 3.2).
Hydrologic Model	A DRAINS model was established for the study area, with 1231 subcatchments (average 1 ha each) with imperviousness and rainfall losses estimated for different land use types. Each subcatchment generated a hydrograph for each event, that was routed directly into the hydraulic model. A WBNM model was established for the 6.2 km^2 area outside the study area that discharges into Tunks Park (in the study area).	Hydrologic models were adopted for use in the current study and updated to use ARR2019 methodology (see Section 4.3).
Hydraulic Model	Four 1D/2D TUFLOW models were established, to model the LGA (divided into four sections) with improved model runtime. Inflows were from hydrologic models and downstream boundary was static ocean level. The stormwater network was included as a 1D model embedded in the model grid. Buildings were represented as impermeable barriers, while fences were not explicitly modelled. Due to absence of calibration data, the model was verified against unit flow rates from similar urban catchments, as	The overall hydraulic modelling approach was adopted for use in the current study. Areas of update are described in Section 4.4.

Feature	Description	Relevance to FRMS&P (current study)
	well as comparison to reported flooding locations, and previous stormwater studies.	
Design Flood Information	The following results were produced by the study: • Peak flood level, depth and flow for 20%, 10%, 5%, 2% and 1% AEP, and PMF (probable maximum flood). • Duration and depth of road flooding for the same design events. • Provisional hydraulic hazard and hydraulic classification for the 20%, 5% and 1% AEP, and PMF. • Preliminary Flood Emergency Response Classification of Communities. • Sensitivity of 1% AEP flood to climate change scenarios including rainfall increase and sea level rise. • Detailed description of flood behaviour for four flooding hotspots.	The current study updated the modelling approach using ARR2019 and produced new design flood information, which supersedes that produced by the flood study. The study also produced updated hydraulic hazard and hydraulic classification.
Community Consultation	The study involved distribution of a newsletter and questionnaire to residents and business owners, with 28,000 properties receiving the material and ~1,100 responding to the questionnaire. There were also a series of information sessions during the exhibition phase.	The current study continued the consultation process, albeit using a more targeted approach. See Section 5 for more detail.

3.1.3 Drainage and Catchment-level Studies

Several studies and assessments were undertaken prior to the flood study, for specific drainage or flooding-related issues in North Sydney LGA. These include five studies, all undertaken in 2002 by Sydney Water, for trunk drainage lines, using Rational Method inflows and a hydraulic grade line analysis. There are a further ten studies undertaken by or on behalf of Council, between 1990 and 1998, for various areas within the LGA. These studies are summarised in the flood study, and, having been used by the flood study in verification of the flood risk areas, do not have a direct bearing on the current study.

3.2 Model Build Data

The following sections discuss the availability of up-to-date information provided that was used to update the flood models developed as part of the 2017 Flood Study.

3.2.1 Rainfall Data

With the publication of ARR2019, updated IFD (Intensity-Frequency-Duration) data used to inform design rainfall depths is available from the BOM website (referred herein as the BOM 2016 IFD). Further, the temporal patterns, storm losses and pre-burst depths can be downloaded from the ARR Data Hub. This information was used in the current study and a copy is included in Appendix G.

3.2.2 LiDAR Data

Two sources of LiDAR data were used for the study: that used in the 2017 Flood Study, collected in 2008, and a newer survey from 2013. Both data sets were collected with LiDAR scanning from plane flyovers of the LGA. Details of the two data sets are given below:

- The capture date of the 2008 data is not known, while the 2013 data was captured from 10th to 24th of April 2013;
- Accuracy of the 2008 data is not known, with the 2017 Flood Study estimating it was a typical dataset, with +/- 0.15 m (for 70% of points) vertical accuracy on clear, hard ground, and +/- 0.75 m horizontal accuracy. The 2013 data has vertical accuracy of +/- 0.15 m and horizontal accuracy of 0.8 m; and
- Both datasets consist of a series of point elevations, which was used to develop the DEM. The TIN and DEM were created by WMAwater for the 2008 data, while the surveyor of the 2013 data (Land and Property Information) created the DEM for that data, with resolutions of 1 m, 5 m and 10 m.

In general, the most recent LiDAR is used for a flood investigation, as recent topographic changes in the catchment are not captured in older data. Section 4.4.1 further describes the differences in the two datasets.

3.2.3 Stormwater Network

The stormwater network data collected by the flood study was also utilised for the current study. The data, which consists of pit/pipe and open channel locations and specifications, is contained within the hydraulic model layers of the stormwater network (shown in Figure 3). Further, information on recent stormwater works was made available by Council primarily in the form of CAD drawings, specifically:

1. Work-As-Executed (WAE) stormwater drawings for stormwater rehabilitation works at several locations within the LGA, including:
    a. Riley Street, North Sydney;
    b. High/Hipwood Street, North Sydney;
    c. Aubin Street, Neutral Bay;
    d. Atchison Street, Crows Nest;
    e. Carabella Street, Kirribilli (between Peel Street and Holbrook Avenue);
    f. Carabella Street, Kirribilli (between Fitzroy Street and Parkes Street);

g. Holbrook Avenue, Kirribilli;
h. Peel Street, Kirribilli; and
i. Carlyle Lane, Wollstonecraft.

2. Updated stormwater pits and pipe location in the proximity of the Victoria Cross Station site as well as pipe relocation works resulted from the 177 Pacific Highway redevelopment as incorporated in the AECOM (2018) TUFLOW model.

3.2.4 Council GIS Data

The latest GIS (geographical information system) dataset from Council's database was provided at the commencement of this study. The dataset covers a range of GIS-related information including stormwater assets, building outlines, 2018 aerial photos, cadastre, road names and kerb locations. Whilst most of this information has been used to some degree during the development of the flood study, data such as the building outlines and 2018 aerials were used as a cross-check to verify that the representation of buildings in the flood models is current and accurate. New pits and pipes information from Council GIS database was also used to update the stormwater network represented in the hydraulic model.

3.2.5 Sydney Metro Model

The hydrologic and hydraulic models developed as part of the Sydney Metro study of the Victoria Cross Station (AECOM, 2018) were made available. It is not within the scope of this study to review the reliability of these models. The models provided are for both the pre-development and post-development scenarios. Nevertheless, useful elements from the models which reflect present day conditions such as the building outlines and existing stormwater network were adopted for use in the current study update. These elements have been updated by Sydney Metro as part of the flooding assessment to more accurately represent conditions around the development site.

3.3 Property Floor Level Survey

A property floor level survey was used to estimate buildings' level of exposure to the range of design flood events. The survey typically describes a property's lowest habitable floor level (e.g. excludes garages, ancillary storage spaces and the like), which is then compared to a flood level adjacent to the building, giving an estimate of the depth of flooding in each design event. For a flood study or FRMS, a floor level survey is collected for a subset of properties that are estimated to be affected by flooding. Properties outside of this subset are either not affected, or only affected in very rare floods (e.g. >1% AEP).

Currently, Council does not have detailed floor level data for all properties within the LGA and the 2017 Flood Study did not undertake a floor level survey. Therefore, a property floor level survey was undertaken as part of the current Study in late 2019. The floor level survey data was then used as input to the flood damages assessment (refer Section 6.3), which estimates cost of flooding at a per-property level as well as for the LGA[2].

[2] It is important to note that this dataset is not to be used for ascertaining the flood affectation of the individual property.

A subset of properties to be surveyed for floor levels was determined based on the following selection criteria and utilising the design flood results generated as part of the current study:

- Where building does not occupy significant portion of the lot, >10% of cadastral lot inundated by >150 mm flood depth in the 1% AEP event; and
- Where building does occupy significant portion of the lot, >300 mm flood depth found adjacent to the lot in the 1% AEP event.

The locations of the property survey set (894 properties) are shown in Appendix E. Following discussion with Council and DPIE on a suitable approach for the floor level survey, it was agreed that the property floor level is to be manually determined by estimating the floor height relative to the ground of the observable entrance most susceptible to floodwater ingress. Nearby physical features were used to aid the estimation of the ground to floor height, such as the number of bricks/steps to the floor level or the height of a nearby wall. If an entrance is located at the rear of the property and access is not possible to estimate the floor level, it was assumed that the floor level rear of the property is the same as the front. The floor level can be revised, if necessary, when property access is provided by the resident at a later date during the community consultation process. The ground level for each property was then determined using LiDAR data and the absolute floor level was calculated by adding the LiDAR ground level to the estimated height from ground to floor level.

3.4 Site Visit

Numerous site visits were undertaken throughout the study to familiarise staff with the catchment flooding hotspots as well as to conduct ground truthing to confirm overland flow paths. The site visits also allowed the identification of properties to be included in the Flood Planning Area (FPA) as presented in Section 6.7.1.1.

4. FLOOD STUDY REVIEW AND UPDATE

The Flood Study (WMAwater, 2017) established a series of hydrologic and hydraulic models, using DRAINS, WBNM and TUFLOW software. The North Sydney LGA was divided into four sections or quadrants, i.e. "North", "South", "East" and "West", with the models developed for each. In the absence of suitable data to calibrate or validate the models, the model results were instead verified using known flow estimates from similar urban catchments in the Sydney Metropolitan area as well as compared against known historical flood behaviour. The models were then used to produce design flood behaviour for the entire LGA. The hydraulic models contained relevant features including the topography, buildings, stormwater pits, pipes and open channels. Both overland flow and mainstream flooding (refer Section 2.3) have been modelled. Further information on the models is given in Table 5.

Following the data collection and review exercise (refer Section 3), the hydraulic and hydrologic models from the 2017 Flood Study were reviewed and updated to use the best available data and methodology prescribed by ARR2019. The changes made and the impact on design flood results are discussed in the following sections.

4.1 ARR2019 Methodology

The hydrologic and hydraulic models were updated to adopt ARR2019 methodology. ARR2019 is based on a series of research projects that aims to provide more accurate techniques for analysis of flood behaviour across Australia. Alongside the updated methods of analysis, it uses a dataset of rainfall and streamflow gauge data that is significantly expanded, spatially and temporally, from ARR87. A summary of the main changes in the ARR2019 methodology, compared to ARR87, is as follows:

- Design rainfall data (i.e. intensity-frequency-duration data) across Australia has been updated due to the availability of three more decades of data;
- Where previously a single temporal pattern was used for a particular design event and duration, now an ensemble of 10 temporal patterns is modelled per storm duration;
- Use of the pre-burst rainfall incorporated prior to the design storm burst;
- Update to the Initial and Continuing Loss values which better reflect local conditions; and
- Update to the calculation of the Aerial Reduction Factor (ARF) based on Australian conditions.

It is important to note that the methodology for determining the Probable Maximum Flood (PMF) has not changed with the release of ARR2019. As such, the approach to estimating the PMF based on the Generalised Short-Duration Method (GSDM) used in the 2017 Flood Study has also been adopted herein.

4.2 Design Rainfall

The updated design rainfall depths for various AEPs and durations were obtained from BOM and compared against those of ARR87. This is presented in Table 6. As shown in the table, BOM's 2016 design rainfall depths are generally lower than ARR87 across the storm durations. For the durations of 15 minute to 2 hours (critical storm duration range for the LGA), the total rainfall depths are generally lower by 1-20%. The most likely impact of this on the flood modelling is reduced flow volumes and also reduced peak flood levels.

Table 6: Comparison of ARR87, BOM 2016 and At-Site IFD Data

	5% AEP, total rainfall depth (mm)			2% AEP, total rainfall depth (mm)			1% AEP, total rainfall depth (mm)		
Duration	ARR87	BOM 2016	Obs. Hill	ARR87	BOM 2016	Obs. Hill	ARR87	BOM 2016	Obs. Hill
10 min	26.7	27	23.8	31.3	31.7	28.9	34.8	35.3	33.7
15 min	34.3	33.8	30.1	40	39.6	37.6	44.8	44.1	42.8
20 min	40.3	38.8	36.5	48	45.5	45.2	53.0	50.6	51.2
25 min	45.4	42.7	42.4	53.9	50.1	51.8	60.4	55.8	58.8
30 min	50	45.9	47.2	60	53.9	57.2	66.5	60	65.5
45 min	61.1	53.3	60.5	72.5	62.6	72.8	81	69.9	83
1 hour	69.5	58.9	70.4	83.4	69.2	84.8	92.8	77.4	96
1.5 hour	82.4	67.6	83.9	97.9	79.7	103.7	110	89.3	120.3
2 hour	92	74.8	94.1	109.6	88.4	116.6	123	99.2	135.6
3 hour	106.8	87.1	108.1	126.6	103	132.1	142.8	116	151.7
4.5 hour	123.8	103	123.5	147	122	149.3	164.7	138	170.1
6 hour	137.4	116	137	160.2	139	167.2	182.4	157	192.1
9 hour	159.3	140	160	189	168	188.2	211.5	190	208.7
12 hour	177.6	161	175	205.2	193	205.7	236.4	219	228.5

To confirm the accuracy of the IFD data, rainfall frequency analysis of historical pluviometer rain gauge data (also termed "at-site IFD analysis") was undertaken and compared to IFD curves provided by BOM. The analysis was undertaken for the pluviometer rain gauges closest to the North Sydney LGA catchments, i.e. Sydney Observatory Hill (ID: 066062 operated by BOM), Chatswood Bowling Club (ID: 566017 operated by Sydney Water) and Mosman (ID: 566027 operated by Sydney Water). The gauges have approximately 100, 50 and 30 years of continuous rainfall data respectively. Further details of these gauges are provided in Table 7. The gauge records were used to derive an Annual Maximum Series (AMS) of the highest rainfall for each duration in each year of record, and this AMS was then fitted with a Generalised Extreme Value (GEV) probability distribution using FLIKE software. The results of this assessment are presented in

Chart 2 to Chart 4, which provides IFD comparisons for each AEP (note that the Mosman gauge IFD is excluded from Chart 2 due to insufficient length of record to derive a reliable curve for the 1% AEP event).

Table 7: Rainfall Gauges Used in At-site IFD analysis

Gauges	Observatory Hill	Chatswood	Mosman
Station Number	66062	566017	566027
Operator	BOM	Sydney Water	Sydney Water
Years of record (daily)	160	112	115
Years of record (continuous)	102	56	28
Approx. distance to LGA centre	3.1 km	4.4 km	2.8 km

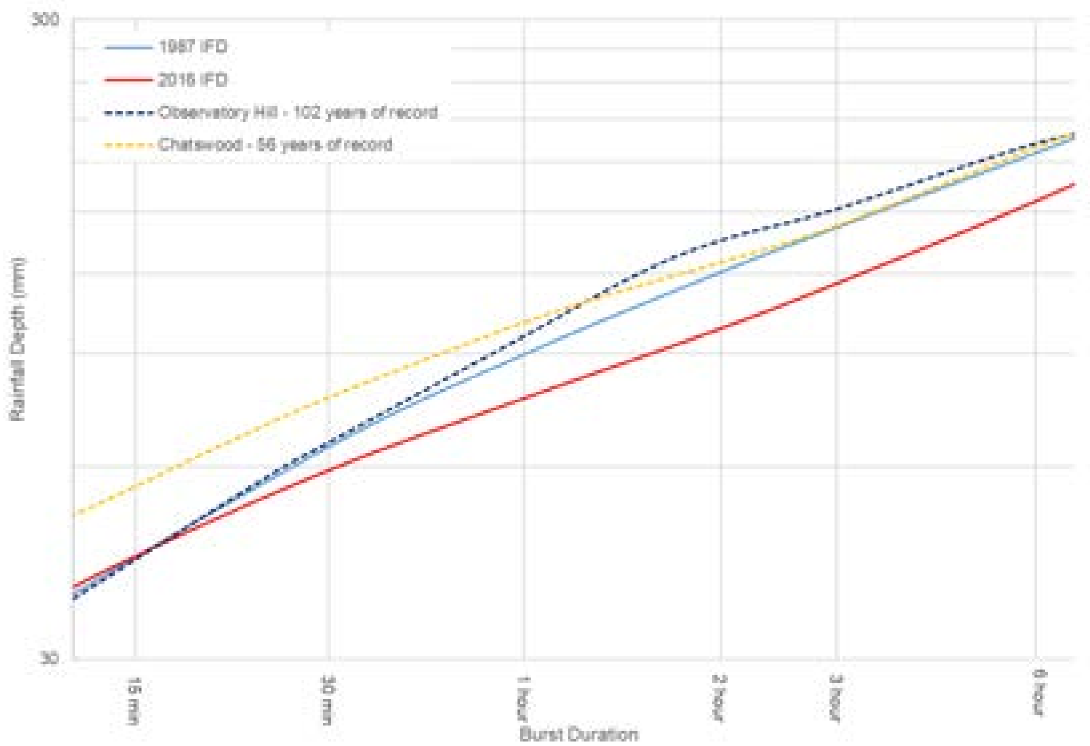


Chart 2: 1% AEP - BoM vs. At-site IFD for durations less than 6 hours

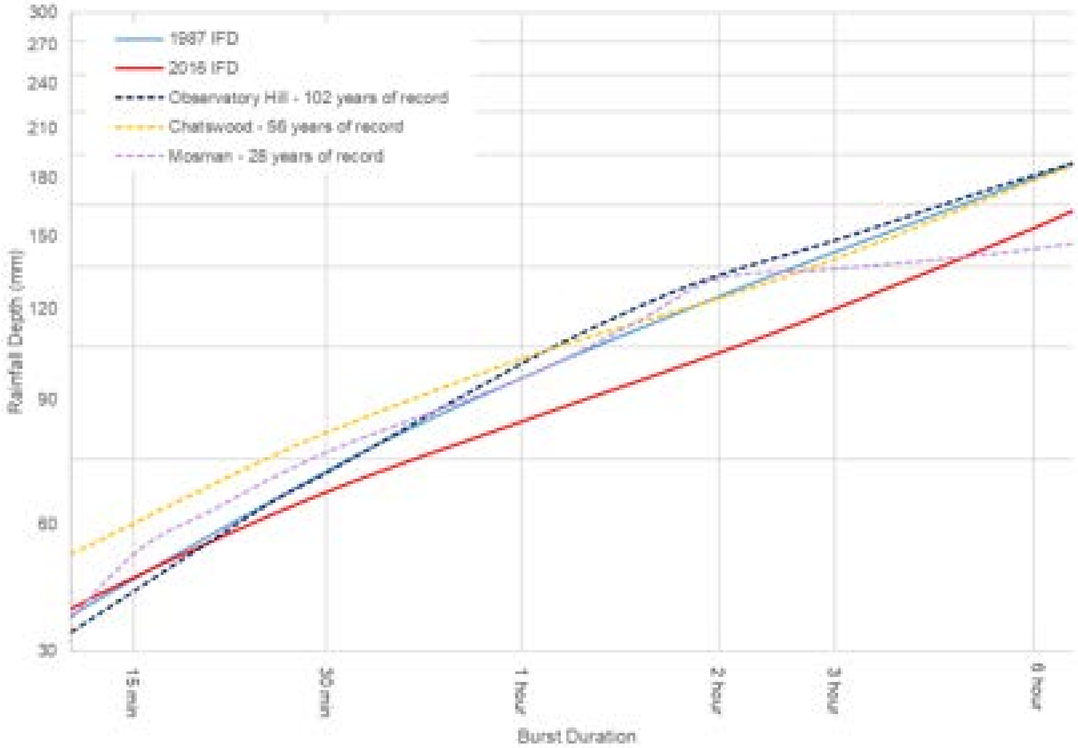


Chart 3: 2% AEP - BoM vs. At-site IFD for durations less than 6 hours

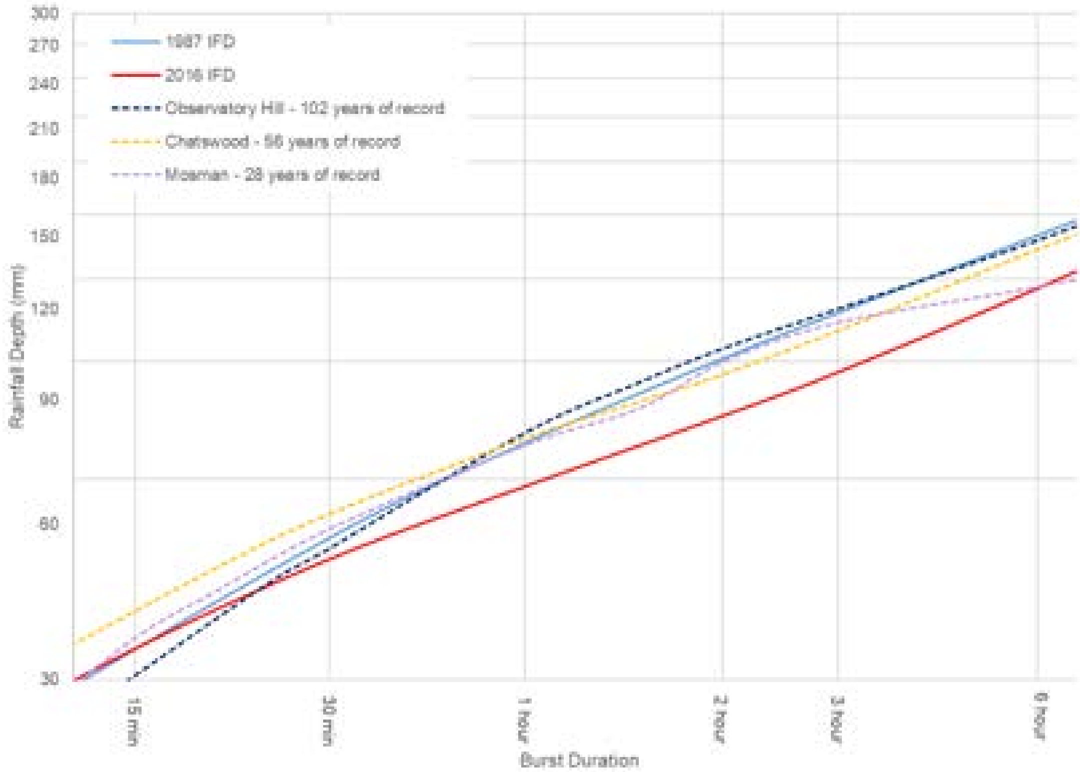


Chart 4: 5% AEP - BoM vs. At-site IFD for durations less than 6 hours

The results show a discrepancy between the at-site IFD data and BOM's 2016 IFD data. The following observations can be made based on the IFD charts:

- For most durations of interest, the three at-site IFDs return similar values to one another, and to the ARR87 IFD, while being markedly different to BOM's 2016 IFD. This indicates that there is not a discrepancy between a single gauge and the 2016 data, but rather, the 2016 data is the outlier;
- For very short durations, the at-site IFDs tend to diverge from one another and show sharper gradient than BOM's 2016 IFD. It is likely these features are caused by a) the gauge data increments, which are 6-minute increments for Observatory Hill and tipping bucket at Chatswood and Mosman, affecting the results; and b) BOM's 2016 IFD use of a scaling formula for sub-hourly durations. Regarding the latter, if the same scaling formula was applied to the at-site IFD, it would produce the same gradient as shown on BOM's 2016 IFD; and
- Of the five IFDs presented on each chart, the results do not indicate that any one IFD is 'correct'. They do, however, indicate that BOM's 2016 IFD is not representative of the three gauges nearest the study area. This is most pronounced for durations of 1-2 hours, which is around the critical duration of the catchments in North Sydney LGA. If one IFD was to be chosen, the Observatory Hill data has the greatest verisimilitude, as it has by far the longest record, and it generally conforms to the two other gauges.

A comparison of the derived at-site IFD for the Observatory Hill gauge with ARR87 and BOM's 2016 IFD is provided in Table 6. The long period of record at the Observatory Hill gauge provides high confidence in the at-site IFD data. In light of the described issues, the at-site IFD data derived from the Observatory Hill gauge were used in the subsequent flood modelling. This method is consistent with recent guidance by NSW OEH (2018) and represents a best practice approach. It also ensures that the design rainfall data is not significantly underestimated, which is likely to occur if BOM's 2016 IFD data is applied.

4.3 Update of Hydrologic Model

The DRAINS and WBNM hydrologic models developed for the LGA as part of the 2017 Flood Study were reviewed and updated. The sub-catchment delineation previously undertaken was retained. DRAINS was used for undertaking the hydrologic modelling for local catchments within the LGA, whilst WBNM was used for undertaking the hydrologic modelling for external catchments outside the LGA, i.e. upstream catchment area located to the north-west of the LGA. The previously used hydrologic model parameters were reviewed and updated as per ARR2019, with the changes outlined in Table 8.

Table 8: Updated Hydrologic Model Parameters

Hydrologic Model Parameters	2017 Flood Study	Current Study
ARR Methodology	ARR87	ARR2019
Model Setup	Catchment node per sub-catchment. No linkage or routing between the nodes. Runoff hydrograph generated for each sub-catchment was used as catchment flow input in the hydraulic model.	Catchment node per sub-catchment. All sub-catchments linked following the overland flow paths so that catchment flow can be routed to the downstream outlet (though without underground pipe routing). This setup allows critical duration analysis to be carried out in DRAINS to identify the most likely storm duration with the highest median peak discharge, thus minimising the number of runs required for the hydraulic modelling. Runoff hydrograph generated for each sub-catchment was also used as catchment flow input in the hydraulic model.
Impervious Surface Area	Division of catchment surface areas as either paved, supplementary or grassed areas. Estimation of impervious percentage was undertaken for each land-use category.	Use of the concept of Effective Impervious Area (EIA) as per ARR2019. The impervious percentage determined from the previous study was adopted as the Total Impervious Area (TIA) and a ratio of 60% was applied for EIA/TIA, in line with published values in ARR2019 and DRAINS User Manual (2018).
Rainfall Loss Model and Values	Paved/Impervious area (DRAINS and WBNM): Initial loss – 1.0 mm Grassed area (DRAINS): Initial loss – 5.0 mm and continuing loss based on Horton's infiltration equation which considers representative soil type (Type 3) and antecedent moisture condition (Type 3) Pervious area (WBNM): Initial loss – 10 mm and continuing loss of 2.5 mm/hr as per ARR87 recommendation for NSW catchments east of the dividing range	Effective Impervious Area (EIA) (DRAINS and WBNM): Initial loss – 1.0 mm Remaining Area which include both indirectly connected area and grassed/pervious area (DRAINS and WBNM): Initial loss – 19.6 mm, which is 70% of the rural initial loss obtained from ARR Data Hub and continuing loss of 1.6 mm/hr, in line with ARR2019 and DRAINS User Manual (2018) Application of pre-burst rainfall obtained from ARR Data Hub to derive initial loss for storm bursts

Hydrologic Model Parameters	2017 Flood Study	Current Study
Design Rainfall	ARR87 IFD Use of single temporal pattern for each duration Areal reduction factor not applied	At-site IFD based on Observatory Hill gauge Use of ensemble of 10 temporal patterns for each duration Areal reduction factor of 1 applied as per ARR2019 recommendation as majority of the catchments has area less than or equal to 1 km^2

Based on the ARR2019 methodology, the temporal pattern that is closest to generating the average in terms of peak flow was determined for each storm duration. An example of this is shown in Chart 5. A preliminary critical duration analysis was then undertaken for each of the hydrologic model, i.e. “North”, “South”, “East” and “West”, to identify possible storm durations which would yield the highest peak discharge for the catchment. This helped narrow down the number of simulation runs required for the hydraulic modelling (which has much longer run times) whilst acknowledging that the hydrologic models do not account for flood storage areas which can attenuate flows. A more detailed analysis of the critical storm duration was still required when undertaking the subsequent hydraulic modelling.

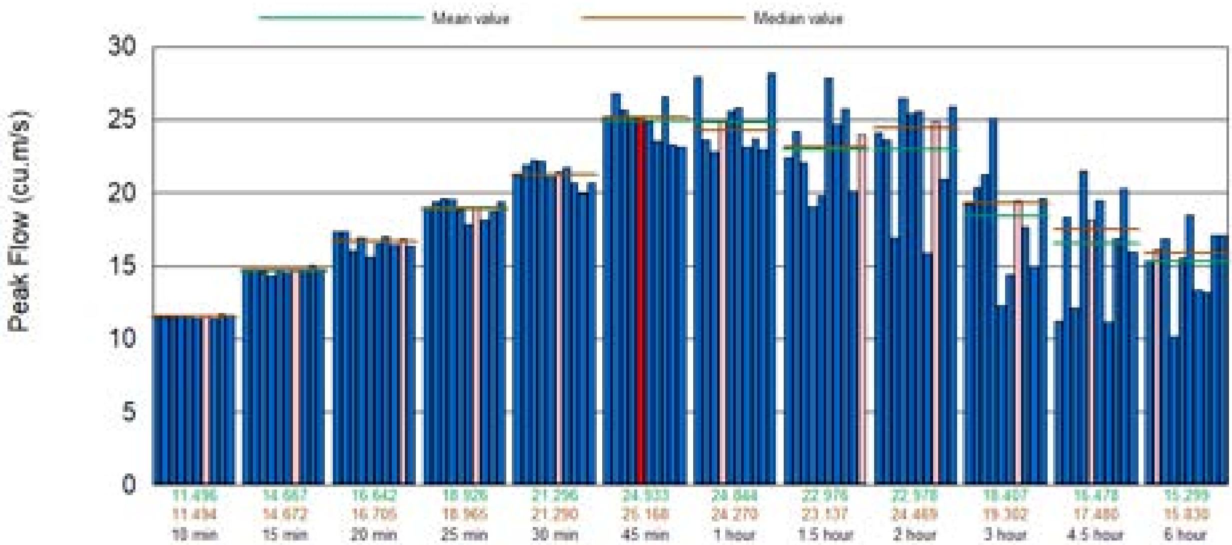


Chart 5: Plot of Anderson Park Outlet Peak Flows

4.4 Update of Hydraulic Model

The TUFLOW hydraulic models developed for the LGA as part of the 2017 Flood Study were reviewed and updated. Since the Flood Study was completed, various changes have occurred in the catchment that are relevant and necessitate an update of the flood models. Updated catchment data was also made available by Council and other stakeholders (refer Section 3.2). Hence the models were refined using this information and where gaps were present these have been filled. These changes were schematised in the hydraulic models, and their effect on flood behaviour was determined. Comparison of the updated model results with those from the 2017 Flood Study is presented in Section 4.5.

The following updates were introduced to the models and discussed in the following sections:

- Adopting hydrology developed based on the ARR2019 approach (refer Section 4.1) and using updated inflow hydrographs generated from the DRAINS model (refer Section 4.3);
- Incorporating the 2013 LiDAR data covering the North Sydney LGA as the new DEM;
- Updating stormwater pits and pipes network in the hydraulic model based on WAE drawings, information obtained from the Metro model and new pits and pipes information from Council GIS database;
- Adjusting the building outlines layer based on the latest Council GIS information and aerial photos;
- Introduction of blockage factors for hydraulic structures as per ARR2019; and
- Minor refinements to model schematisation following findings from site visits and ground truthing exercise.

Several model assumptions or parameters adopted in the 2017 Flood Study were retained such as the Manning's 'n' values, details relating to the stormwater pits, pipes and open channels (unless updated stormwater information is available), location of boundary conditions, omission of fencing and coincident flooding assumptions (i.e. local catchment vs ocean flood).

4.4.1 2013 LiDAR

LiDAR surveyed in 2013 is available for use (refer Section 3.2.2) and is likely to better represent recent topographical changes in the study area than the old LiDAR data used in the 2017 Flood Study. To assess the suitability of the 2013 LiDAR, the following steps were undertaken. Firstly, the two 1 m DEMs (2008 and 2013 LiDAR data) were compared for their representation of features across the LGA. Secondly, the hydraulic model was updated to use the new LiDAR, including adjusting stormwater pits and pipes where necessary. Thirdly, the results of the model with updated DEM were compared against those from the 2017 Flood Study (refer Section 4.5).

The two LiDAR datasets were compared via the 1 m DEM produced from each. The comparison gave the following results:

- Across hard surfaces, free of obstructions such as trees and buildings, the 2013 data is typically between 0.05 and 0.15 m lower than the 2008 data;
- In park areas, away from tree cover, the 2013 data is typically between 0.02 and 0.09 m lower than the 2008 data;

- For road sections with tree cover, the 2013 data is typically between 0.1 and 0.25 m lower than the 2008 data; and
- For the North Sydney CBD area, where tall buildings can obstruct the coverage, the 2013 data is typically 0.05 to 0.15 m lower than the 2008 data.

Image 2 presents topographic profiles from three typical areas in the LGA, with the chart showing the elevation data from the two datasets, and aerial photos showing the location of the profile.

The TUFLOW models were updated to incorporate the DEM based on the 2013 LiDAR. To facilitate the new terrain surface, the inverts of a few pits and pipes had to be adjusted, to avoid them being 'above' ground. This was achieved by setting the invert of the affected pit/pipes to the DEM ground level minus 600 mm (assumed cover depth) minus the pipe size, and then checking this lay between the upstream and downstream inverts. Where this was not achieved, the invert was calculated by assuming a grade of 0.5% or 1% to the downstream invert. Where neither method was possible, a reduced cover depth was used.

4.4.2 Stormwater Rehabilitation Works

WAE drawings were supplied for stormwater rehabilitation works recently undertaken in the LGA (refer Section 3.2.3). These drawings were used to schematise the stormwater pits and pipes network in the hydraulic models to reflect present day conditions.

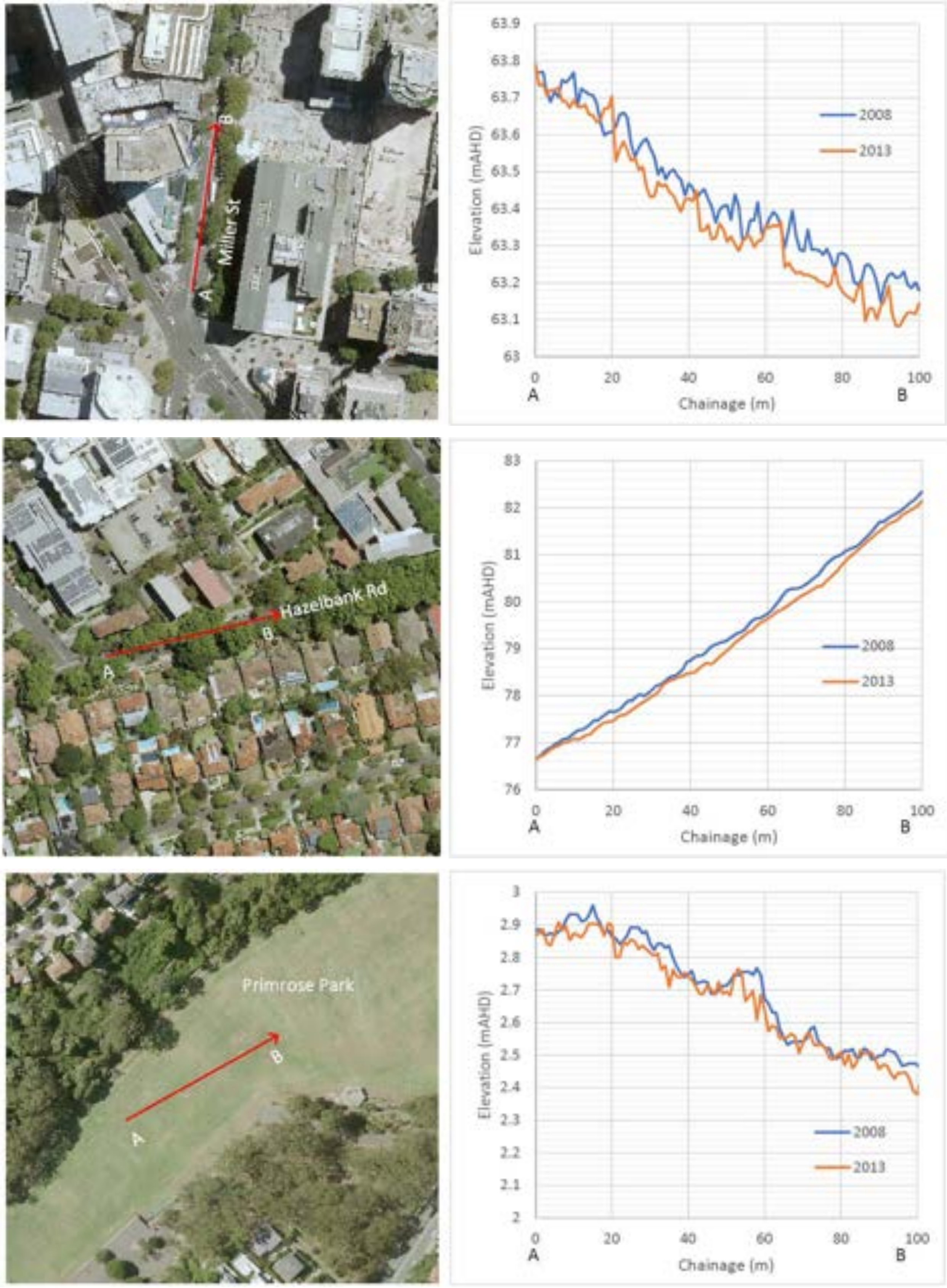
4.4.3 Sydney Metro Model

The Sydney Metro project has involved assessment of flooding in the North Sydney CBD, using the 2017 Flood Study hydrologic and hydraulic models. The modelling involved updating the 'existing' or base case in the vicinity of the proposed Victoria Cross station. The updated model was made available for the current study (refer Section 3.2.5), and the modelled elements incorporated in the current model updates are changes to the building outlines and existing stormwater network around the Sydney Metro site.

4.4.4 Building Outlines

Polygons of building outlines were used to define impermeable barriers in the hydraulic models. Building polygons were updated primarily in the North Sydney CBD area following the 2017 Flood Study and based on the Sydney Metro model updates, to improve the accuracy of overland flow paths through the area. In addition to this, a Council-supplied buildings polygon layer and the latest aerials were used to confirm buildings were correctly represented throughout the rest of the catchments (refer Section 3.2.4).

Image 2: Comparison of 2008 and 2013 LiDAR



4.4.5 Blockage Factors

The blockage assumptions adopted in the 2017 Flood Study were largely retained for the current study except for the blockage factors adopted for hydraulic structures such as road culverts. The hydraulic modelling undertaken for the Flood Study assumed no blockage of pipes, culverts and bridges greater than 450 mm in diameter. Like the Flood Study, stormwater pipes less than 450 mm in diameter were conservatively assumed to be completely blocked as part of the hydraulic modelling undertaken herein. The sensitivity of the model results to changes in blockage factors for pipes larger than 450mm is examined further in Section 4.9.

As per recommendations found in Book 6 Chapter 6 of ARR2019 on 'Blockage of Hydraulic Structures', the blockage factors for all road culverts within the LGA were revised. Assessment was carried out following the procedure outlined in ARR2019 to quantify the most likely blockage level and mechanism for a small bridge or culvert when impacted by sediment or debris laden floodwater, for a range of design flood events. Details of the assessment are provided in Appendix H and the blockage factors derived for the culverts affected are incorporated into the TUFLOW models.

4.4.6 Additional Model Refinements

Several other changes were introduced to the hydraulic models and the major ones are listed as follows. Some of the changes were prompted following site visits.

- Inclusion of pedestrian tunnel under Wollstonecraft train station (see Image 3);
- Inclusion of noise wall and concrete blocks adjacent to the Brook St/Warringah Freeway ramp intersection, installed by the RMS in 2013 (see Image 4);
- Conversion of pipe into an open drain for section between 75 and 77 Reynolds St, Cremorne;
- Incorporate footpath adjacent to 21 Burroway St, Neutral Bay; and
- Activate non-active pipes greater than 450 mm in diameter.

Image 3: Pedestrian Tunnel under Wollstonecraft Train Station

Image 4: Noise Wall Structure and Concrete Blocks adjacent to Warringah Freeway Ramp

4.5 Comparison to 2017 Flood Study Results

The design flood behaviour corresponding to the adopted modelling approach based on ARR2019 methodology and model changes was compared to the results from the 2017 Flood Study. The comparison was undertaken for the 1% AEP event, given its importance in Council's planning policy. Comparison is based on the peak flood levels taken at various locations in each of the four hydraulic models as shown in Figure 4. The results are presented in Table 9 to Table 12. A comparison of the flood extents is also provided in Figure 5 to Figure 8.

Table 9: Comparison of 1% AEP Peak Flood Levels – East Model

ID	Location (refer Figure 4)	2017 Flood Study Peak Flood Level (mAHD)	Current Study Peak Flood Level (mAHD)	Difference (m)
1	Yeo St	81.49	81.33	-0.17
2	Harrison St	76.60	76.42	-0.18
3	Bennett St	68.23	68.15	-0.09
4	Bertha St	58.83	58.61	-0.22
5	Burroway St	54.43	54.26	-0.18
6	Powell St	48.99	48.77	-0.22
7	Bannerman St	34.84	34.64	-0.20
8	Guthrie Ave	38.91	38.81	-0.09
9	Honda Rd	22.08	21.90	-0.18
10	Bogota Ave	18.12	18.03	-0.09
11	Hunts Lookout	15.54	14.56	-0.98*
12	Spofforth St	57.64	57.53	-0.11
Average				-0.23
Median				-0.18

* Significant decrease in peak flood level is a result of improved LiDAR definition for this heavily vegetated area

Table 10: Comparison of 1% AEP Peak Flood Levels – North Model

ID	Location (refer Figure 4)	2017 Flood Study Peak Flood Level (mAHD)	Current Study Peak Flood Level (mAHD)	Difference (m)
13	Military Rd	81.67	81.51	-0.16
14	Belgrave St	69.07	68.90	-0.17
15	Sutherland St	62.96	62.87	-0.09
16	Grasmere La	60.13	60.00	-0.13
17	Grasmere Rd	55.80	55.68	-0.12
18	Little Young St	32.06	31.99	-0.06
19	Brightmore St	45.56	45.47	-0.09
20	Brightmore Res	9.69	9.60	-0.09
21	Young St	9.43	9.37	-0.05
22	Primrose Pk	2.95	2.95	0.00
23	Ryries Pde	32.03	32.19	+0.17
24	Grafton St	41.98	41.76	-0.22
25	Park Av	45.05	44.96	-0.09
26	Cammeray Rd	52.13	51.99	-0.15
27	Warringa Rd	54.29	54.32	+0.02
28	Cammeray Av	67.50	67.40	-0.09
29	Anzac Pk	67.49	67.40	-0.09
30	Ernest St	67.49	67.40	-0.10
31	Miller St	75.84	75.46	-0.38
32	Rodborough Ave	77.83	77.30	-0.53
33	Carlow St	81.09	80.95	-0.14
34	West St	86.93	86.82	-0.11
35	Hamilton La	44.66	44.23	-0.43

ID	Location (refer Figure 4)	2017 Flood Study Peak Flood Level (mAHD)	Current Study Peak Flood Level (mAHD)	Difference (m)
36	Palmer St	59.27	59.20	-0.08
37	Brooke St	65.80	65.75	-0.05
38	Wheatlegh St	73.57	73.35	-0.22
39	Chandos St	74.24	74.09	-0.15
40	Willoughby Rd	77.46	77.32	-0.14
41	Hume La	78.35	78.16	-0.19
42	Atchison St	78.43	78.24	-0.20
43	Albany La	79.90	79.52	-0.38
44	Albany St	81.18	81.16	-0.02
Average				-0.14
Median				-0.12

Table 11: Comparison of 1% AEP Peak Flood Levels – West Model

ID	Location (refer Figure 4)	2017 Flood Study Peak Flood Level (mAHD)	Current Study Peak Flood Level (mAHD)	Difference (m)
45	Christie St	71.23	71.24	+0.01
46	Lithgow St	65.72	65.50	-0.22
47	Russell St	41.96	41.78	-0.18
48	Carlyle La	54.83	54.13	-0.70*
49	Belmont Av	46.98	47.35	+0.37
50	Newlands La	42.26	42.02	-0.25
51	Newlands St	67.05	66.79	-0.25
52	Hazelbank Rd	60.91	60.72	-0.19
53	Waverton Oval	4.11	4.06	-0.05
54	Woolcott St	27.62	27.47	-0.15
55	Euroka_St	30.49	30.22	-0.27
56	Ancrum_St	38.16	38.05	-0.11
57	Bank St	45.53	45.46	-0.07
Average				-0.16
Median				-0.18

* Significant decrease in peak flood level is a result of stormwater rehabilitation works undertaken along Carlyle Lane

Table 12: Comparison of 1% AEP Peak Flood Levels – South Model

ID	Location (refer Figure 4)	2017 Flood Study Peak Flood Level (mAHD)	Current Study Peak Flood Level (mAHD)	Difference (m)
58	Lavender St	36.74	36.60	-0.14
59	Miller St	63.45	63.26	-0.20
60	Pacific Hwy/Miller St Intersection	64.25	64.18	-0.07
61	Mount St	45.86	45.69	-0.17
62	Little Walker St	43.39	44.86	+1.47*
63	Pacific Hwy/Walker St Intersection	49.62	49.58	-0.05
64	Warringah Freeway/Tunnel Entrance	31.13	30.95	-0.17
65	Clark Rd	13.61	13.59	-0.02
66	Hipwood St	4.78	4.81	+0.02
67	Anderson Park Outlet	2.16	1.91	-0.24
68	Clark Rd/Kurraba Rd Intersection	3.35	3.25	-0.10
69	Warringah Freeway	45.03	44.92	-0.11
70	McLaren St	69.77	69.68	-0.09
71	Rawson St Channel	6.20	6.13	-0.06
72	Forsyth Park	26.22	26.15	-0.08
73	Kurraba Rd	20.96	21.05	+0.10
74	Aubin St	31.24	31.33	+0.09
75	Phillips St	41.56	41.23	-0.33
76	Kurraba Rd/Wycombe Rd Intersection	28.16	28.06	-0.11
77	Carabella St/Peel St Intersection	21.74	21.56	-0.18

ID	Location (refer Figure 4)	2017 Flood Study Peak Flood Level (mAHD)	Current Study Peak Flood Level (mAHD)	Difference (m)
78	Holbrook Ave	12.41	12.25	-0.16
		Average		-0.03
		Median		-0.10

* Significant increase in peak flood level is a result of revision made to the overland flow path/building obstruction as advised by Council

In summary, the revision of the flood models produced 1% AEP peak flood levels which are about 0.1-0.2m lower than those of the 2017 flood study. This can be attributed mainly to the use of the new LiDAR dataset as well as adopting the ARR2019 methodology in deriving the catchment hydrology for the models. For areas where there is significant increase or decrease in peak flood levels as a result of the model revision, this was further investigated and the causes were identified as follows (in addition to the aforementioned reasons):

- Improved terrain definition in the more recent LiDAR dataset particularly for heavily vegetated areas;
- Revision of overland flow paths following updates to the existing building footprints; and
- Flood improvements as a result of Council's stormwater rehabilitation works.

The comparison of the revised design flood results corresponding to the adopted modelling approach based on ARR2019 methodology and at-site IFD, against those of the 2017 Flood Study, also serves as a verification of the modelling work undertaken herein.

4.6 Further Verification

As part of the model verification process, the design flow estimates from the revised models were compared against those from the 2017 Flood Study as well as other similar urban catchments in the Sydney Metropolitan region. Typically, the unit flow rates calculated for the 1% AEP event range from 0.4 to 0.6 m^3/s/ha (WMAwater, 2017). For each model, a representative catchment was selected which should be located upstream of the flow path with minimal flow attenuation and the unit flow rates were determined. The results are provided in Table 13 for the locations shown in Image 5. Overall, the results show that the unit flow rates for the flood models herein are within the quoted range, hence providing confidence in model accuracy.

Table 13: Unit Flow Rates for the 1% AEP Event

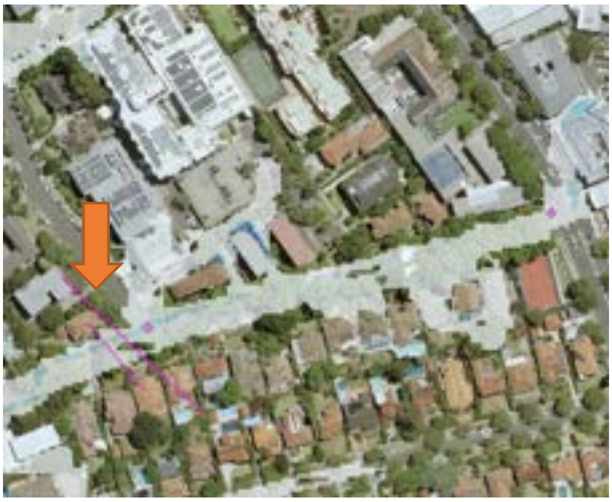
Flood Model	Selected Catchment Area (ha)	2017 Flood Model (ARR87)		Current Flood Model (ARR2019)	
		Peak Discharge (m3/s)	Unit Flow Rate (m3/s/ha)	Peak Discharge (m3/s)	Unit Flow Rate (m3/s/ha)
East	4.8	2.2	0.5	1.8	0.4
North	3.2	1.4	0.4	1.2	0.4
West	6.3	3.1	0.5	2.5	0.4
South	4.2	2.1	0.5	2.1	0.5

Image 5: Location for Deriving Unit Flow Rates

East – Harrison St

North – Sutherland St

West – Hazelbank Rd



South – Lindsay St

4.7 Design Flood Results

The flood models revised herein were used to re-estimate the full range of design flood behaviour for the study area. The design flood results define the area's flood liability and are one of the key inputs in describing the area's flood risk. The 1% AEP event in particular will be used to guide residential and commercial development as per Council's and NSW Government's policies. The PMF was also modelled which describes the largest possible flood event and its spatial extent defines the area's floodplain.

Based on the ARR2019 methodology, each design event consists of consideration of multiple storm durations and an ensemble of temporal patterns per storm duration. The critical storm for each duration was selected based on the temporal pattern that produced the median peak flood level in the hydraulic model. This is calculated using a grid analysis of the peak flood level grids and the grid that is closest, across all grid cells, to the median flood level grid. Critical duration assessment was then undertaken by generating a maximum envelope grid using the median peak flood level grid for each duration modelled for each AEP event and the storm duration which yields the highest peak flood levels for majority of the catchment was deemed the critical event. A summary of the critical durations for each model is outlined in Table 14.

Table 14: Critical duration assessment

Flood Model	Event	2017 Flood Study (ARR87)	Current Study (ARR2019 using at-site IFD) * TP = temporal pattern no
East	PMF	15 minute	
	1% AEP	25 minute	45 minute (TP09)
	2% AEP	25 minute	45 minute (TP09)
	5% AEP	25 minute	1 hour (TP10)
	10% AEP	25 minute	1 hour (TP10)
	20% AEP	25 minute	45 minute (TP03)
North	PMF	15 minute, 1 hour, 2hour (envelope)	
	1% AEP	1 hour	45 minute (TP02), 1.5 hour (TP08) (envelope)
	2% AEP	1 hour	1.5 hour (TP01)
	5% AEP	1 hour	1 hour (TP10)
	10% AEP	1 hour	1 hour (TP10)
	20% AEP	1 hour	1 hour (TP08)

Flood Model	Event	2017 Flood Study (ARR87)	Current Study (ARR2019 using at-site IFD) * TP = temporal pattern no
West	PMF	15 minute, 30 minute, 2 hour (envelope)	
	1% AEP	1 hour	45 minute (TP03), 2 hour (TP02) (envelope)
	2% AEP	1 hour	1 hour (TP08)
	5% AEP	1 hour	1 hour (TP10)
	10% AEP	1 hour	1 hour (TP03)
	20% AEP	1 hour	45 minute (TP08)
South	PMF	15 minute, 1 hour (envelope)	
	1% AEP	2 hour	45 minute (TP02), 1 hour (TP05) (envelope)
	2% AEP	2 hour	45 minute (TP09), 1 hour (TP05) (envelope)
	5% AEP	2 hour	1 hour (TP10)
	10% AEP	2 hour	1 hour (TP10)
	20% AEP	2 hour	45 minute (TP03)

The revised design flood results are presented in the output formats tabulated in Table 15. These results will supersede the 2017 Flood Study results upon adoption of the FRMS. The 5% and 1% AEP peak flood levels and depths for the locations shown in Figure 4 are provided in Table 16 to Table 19, with the results for the remainder events provided in Appendix B.

Table 15: Design Flood Results Output

Outputs	Design Events	Figures/Tables
Peak Flood Depths	20%, 10%, 5%, 2%, 1% AEP and PMF	Figure 9 to Figure 14 Table 16 to Table 19 (5% and 1% AEP only) Table B 5 to Table B 8
Peak Flood Levels	20%, 10%, 5%, 2%, 1% AEP and PMF	Figure 9 to Figure 14 Table 16 to Table 19 (5% and 1% AEP only) Table B 1 to Table B 4

Outputs	Design Events	Figures/Tables
Peak Flood Extents	20%, 10%, 5%, 2%, 1% AEP and PMF	Figure 9 to Figure 14
Peak Flood Velocities	20%, 10%, 5%, 2%, 1% AEP and PMF	Figure 15 to Figure 20
Peak Flows	20%, 10%, 5%, 2%, 1% AEP and PMF	Table B 9 to Table B 12
Flood Hazard	20%, 5%, 1% AEP and PMF	Figure 21 to Figure 24
Flood Function (Hydraulic Categories)	20%, 5%, 1% AEP and PMF	Figure 25 to Figure 28

Table 16: 5% and 1% AEP Design Flood Levels and Depths – East Model

ID	Location (refer Figure 4)	Suburb	5% AEP Peak Flood Level (mAHD)	5% AEP Peak Flood Depth (m)	1% AEP Peak Flood Level (mAHD)	1% AEP Peak Flood Depth (m)
1	Yeo St	Cremorne	81.32	0.02	81.33	0.03
2	Harrison St	Cremorne	76.40	0.17	76.42	0.19
3	Bennett St	Neutral Bay	68.11	0.16	68.15	0.19
4	Bertha St	Cremorne	58.58	0.12	58.61	0.14
5	Burroway St	Neutral Bay	54.23	0.11	54.26	0.13
6	Powell St	Neutral Bay	48.75	0.26	48.77	0.28
7	Bannerman St	Cremorne	34.60	0.46	34.64	0.50
8	Guthrie Ave	Cremorne	38.80	0.08	38.81	0.09
9	Honda Rd	Kurraba Point	21.75	0.40	21.90	0.54
10	Bogota Ave	Kurraba Point	17.94	0.46	18.03	0.54
11	Hunts Lookout	Cremorne Point	14.56	0.08	14.56	0.08
12	Spofforth St	Cremorne	57.47	0.34	57.53	0.40

Table 17: 5% and 1% AEP Design Flood Levels and Depths – North Model

ID	Location (refer Figure 4)	Suburb	5% AEP Peak Flood Level (mAHD)	5% AEP Peak Flood Depth (m)	1% AEP Peak Flood Level (mAHD)	1% AEP Peak Flood Depth (m)
13	Military Rd	Neutral Bay	81.48	0.40	81.51	0.44
14	Belgrave St	Cremorne	68.84	0.56	68.90	0.62
15	Sutherland St	Cremorne	62.75	0.50	62.87	0.62
16	Grasmere La	Cremorne	59.91	0.60	60.00	0.68
17	Grasmere Rd	Cremorne	55.63	0.48	55.68	0.52
18	Little Young St	Cremorne	31.91	0.56	31.99	0.64
19	Brightmore St	Cremorne	45.38	0.53	45.47	0.62
20	Brightmore Res	Cremorne	9.39	2.93	9.60	3.14
21	Young St	Cremorne	9.14	0.38	9.37	0.62
22	Primrose Pk	Cremorne	2.89	0.55	2.95	0.61
23	Ryries Pde	Cremorne	32.11	0.26	32.19	0.34
24	Grafton St	Cremorne	41.70	0.48	41.76	0.55
25	Park Av	Cremorne	44.87	0.43	44.96	0.52
26	Cammeray Rd	Cammeray	51.92	0.47	51.99	0.53

ID	Location (refer Figure 4)	Suburb	5% AEP Peak Flood Level (mAHD)	5% AEP Peak Flood Depth (m)	1% AEP Peak Flood Level (mAHD)	1% AEP Peak Flood Depth (m)
27	Warringa Rd	Cammeray	54.27	0.75	54.32	0.80
28	Cammeray Av	Cammeray	66.11	1.59	67.40	2.88
29	Anzac Pk	Cammeray	66.11	2.35	67.40	3.64
30	Ernest St	Cammeray	66.96	0.35	67.40	0.78
31	Miller St	Cammeray	75.38	0.25	75.46	0.33
32	Rodborough Ave	Crows Nest	77.05	0.59	77.30	0.84
33	Carlow St	North Sydney	80.91	0.21	80.95	0.26
34	West St	North Sydney	86.79	0.34	86.82	0.38
35	Hamilton La	Cammeray	44.13	0.41	44.23	0.51
36	Palmer St	Cammeray	59.08	0.48	59.20	0.59
37	Brooke St	Crows Nest	65.71	0.17	65.75	0.21
38	Wheatlegh St	Crows Nest	73.25	0.80	73.35	0.89
39	Chandos St	Naremburn	74.04	0.31	74.09	0.36
40	Willoughby Rd	Crows Nest	77.25	0.40	77.32	0.47
41	Hume La	Crows Nest	78.05	1.76	78.16	1.87

ID	Location (refer Figure 4)	Suburb	5% AEP Peak Flood Level (mAHD)	5% AEP Peak Flood Depth (m)	1% AEP Peak Flood Level (mAHD)	1% AEP Peak Flood Depth (m)
42	Atchison St	Crows Nest	78.09	0.95	78.24	1.09
43	Albany La	Crows Nest	79.43	0.20	79.52	0.29
44	Albany St	Crows Nest	81.02	0.57	81.16	0.71

Table 18: 5% and 1% AEP Design Flood Levels and Depths – West Model

ID	Location (refer Figure 4)	Suburb	5% AEP Peak Flood Level (mAHD)	5% AEP Peak Flood Depth (m)	1% AEP Peak Flood Level (mAHD)	1% AEP Peak Flood Depth (m)
45	Christie St	Wollstonecraft	71.20	0.07	71.24	0.11
46	Lithgow St	Wollstonecraft	65.44	0.53	65.50	0.58
47	Russell St	Wollstonecraft	41.74	0.63	41.78	0.68
48	Carlyle La	Wollstonecraft	53.30	0.95	54.13	1.77
49	Belmont Av	Wollstonecraft	46.63	2.57	47.35	3.30
50	Newlands La	Wollstonecraft	41.33	0.82	42.02	1.51
51	Newlands St	Wollstonecraft	66.72	0.59	66.79	0.67
52	Hazelbank Rd	Wollstonecraft	60.68	0.28	60.72	0.31
53	Waverton Oval	Waverton	4.02	0.10	4.06	0.14
54	Woolcott St	Waverton	27.30	1.36	27.47	1.53
55	Euroka_St	Waverton	30.14	0.49	30.22	0.57
56	Ancrum_St	Waverton	37.95	0.39	38.05	0.49
57	Bank St	North Sydney	45.38	0.45	45.46	0.53

Table 19: 5% and 1% AEP Design Flood Levels and Depths – South Model

ID	Location (refer Figure 4)	Suburb	5% AEP Peak Flood Level (mAHD)	5% AEP Peak Flood Depth (m)	1% AEP Peak Flood Level (mAHD)	1% AEP Peak Flood Depth (m)
58	Lavender St	North Sydney	36.59	0.01	36.60	0.03
59	Miller St	North Sydney	63.20	0.30	63.26	0.36
60	Pacific Hwy/Miller St Intersection	North Sydney	64.17	0.07	64.18	0.08
61	Mount St	North Sydney	45.65	0.05	45.69	0.08
62	Little Walker St	North Sydney	44.25	1.43	44.86	2.03
63	Pacific Hwy/Walker St Intersection	North Sydney	49.57	0.00	49.58	0.00
64	Warringah Freeway/Tunnel Entrance	North Sydney	30.36	0.44	30.95	1.04
65	Clark Rd	North Sydney	13.55	0.15	13.59	0.19
66	Hipwood St	Kirribilli	4.76	0.23	4.81	0.28
67	Anderson Park Outlet	Neutral Bay	1.53	0.41	1.91	0.79
68	Clark Rd/Kurraba Rd Intersection	Neutral Bay	3.11	0.32	3.25	0.46
69	Warringah Freeway	North Sydney	44.91	0.10	44.92	0.11

ID	Location (refer Figure 4)	Suburb	5% AEP Peak Flood Level (mAHD)	5% AEP Peak Flood Depth (m)	1% AEP Peak Flood Level (mAHD)	1% AEP Peak Flood Depth (m)
70	McLaren St	North Sydney	69.67	0.06	69.68	0.07
71	Rawson St Channel	Neutral Bay	5.89	1.01	6.13	1.23
72	Forsyth Park	Neutral Bay	26.12	0.11	26.15	0.13
73	Kurraba Rd	Neutral Bay	21.02	0.14	21.05	0.17
74	Aubin St	Neutral Bay	31.30	0.45	31.33	0.48
75	Phillips St	Neutral Bay	41.21	0.30	41.23	0.32
76	Kurraba Rd/Wycombe Rd Intersection	Kurraba Point	28.05	0.01	28.06	0.02
77	Carabella St/Peel St Intersection	Kirribilli	21.55	0.06	21.56	0.07
78	Holbrook Ave	Kirribilli	12.23	0.02	12.25	0.03

4.8 Climate Change

The design flood results were used to assess the impact of climate change on flood producing rainfall, and by extension, flooding itself. The assessment used the IPCC (Intergovernmental Panel on Climate Change) greenhouse gas concentration scenarios and subsequent modelling estimating each scenario's effect on rare rainfall events. There are four IPCC greenhouse gas concentration projections named RCP 2.5, 4.5, 6.0 and 8.5, with the RCP 2.5 being the most optimistic and 8.5 the least optimistic. The ARR2019 methodology recommends the use of RCP 4.5 and 8.5 scenarios, and their projected increase in precipitation intensity were obtained from the ARR Data Hub and shown in Table 20 for the 2090 estimate.

Table 20: Climate Change Factors – Percentage Increase in Rainfall Intensity in 2090

Year	RCP 4.5	RCP 8.5
2090	+9.1 %	+18.6%

This indicates that, for example, under a relatively low emissions scenario (RCP 4.5), rainfall intensity will increase by 9.1% in North Sydney by 2090. The significance of this percentage is measured by comparing it to the range of design flood events. The results of this assessment are shown in Table 21, which lists the total rainfall depth for the 5%, 2% and 1% AEP events (for the typical critical duration of the LGA, i.e. 45 minutes) and then compares those events with the increased rainfall caused by two emissions scenarios – RCP 4.5 and RCP 8.5.

Table 21: Comparison between Design Rainfall and Projected Climate Change Rainfall Intensity

AEP	Total Rainfall Depth (mm)		
	At-site IFD 45 minutes	2090 RCP 4.5 +9.10%	2090 RCP 8.5 +18.60%
5%	60.5	66.0	71.8
2%	72.8	79.4	86.3
1%	83	90.6	98.4

The table shows that, overall, the 2% AEP floods will increase to a magnitude close to the 1% AEP event, under both emissions scenarios. Likewise, the 5% AEP floods will increase to a magnitude close to the 2% AEP event. In other words, a 1% AEP flood, which previously occurred every 100 years on average, will happen twice as often, or once every 50 years on average, under a RCP 4.5 or 8.5 greenhouse gas scenario.

The impact of these changes on peak flood levels was determined by comparing the 2% and 1% AEP events with details provided in Appendix C. A summary of the results is provided in Table 22. It was found that for some locations, the increase in the 2% AEP peak flood levels based on the RCP 8.5 emission scenario in particular would result in flood levels matching the present day 1% AEP event. Two example locations are shown below to further explain how climate change will affect flooding. Note that increased rainfall will worsen flooding at all locations in the LGA that currently experience flooding, and the examples below could be taken at any such area.

Image 6: Carlyle Lane/Russell Street – 1% AEP existing flooding with climate change explanation

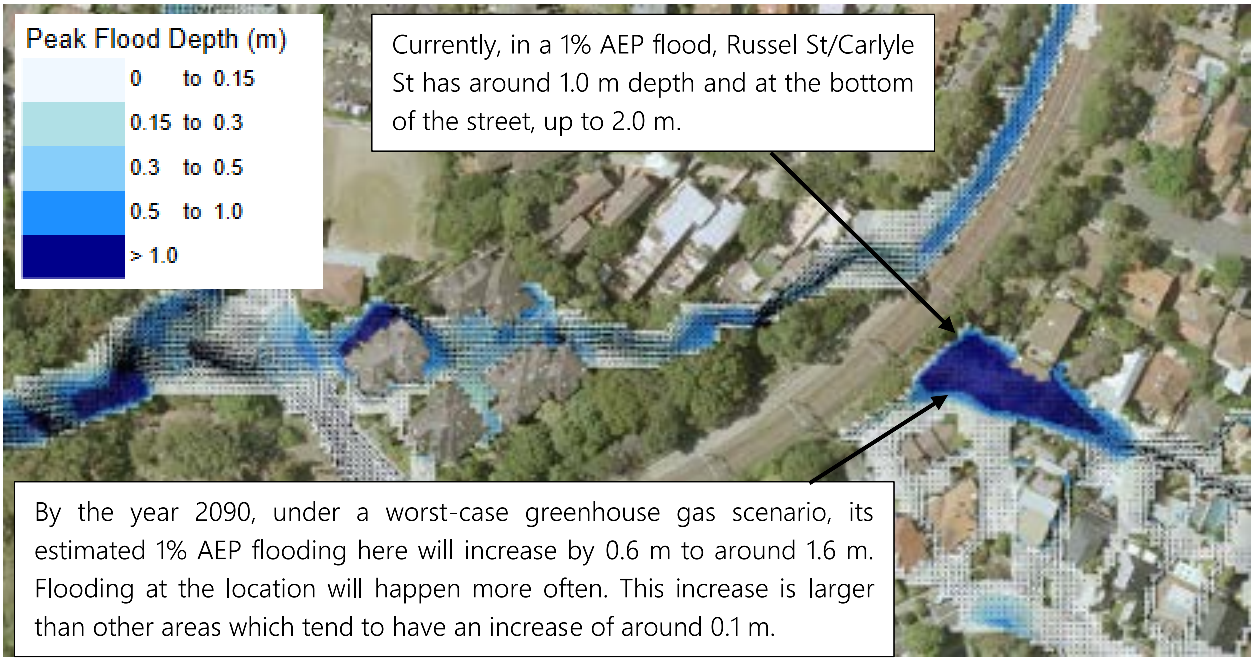
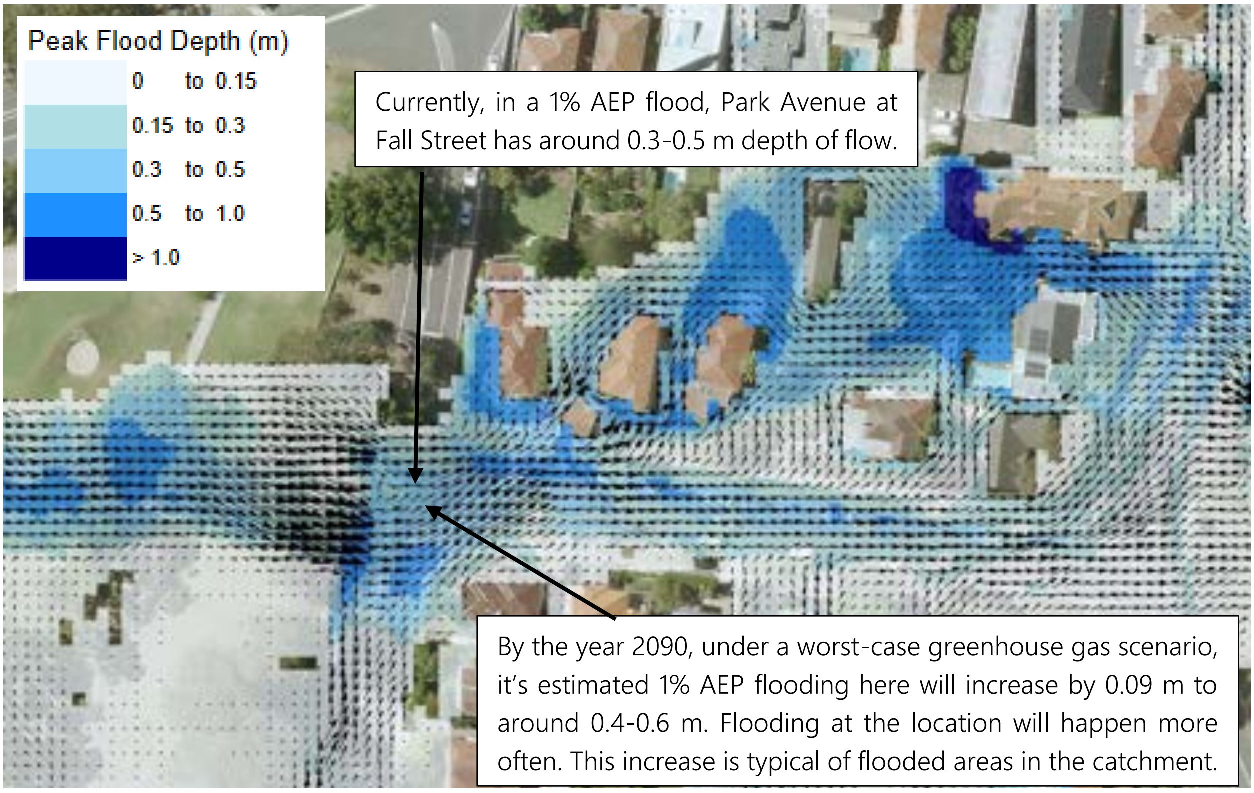


Image 7: Park Avenue, Cammeray - 1% AEP existing flooding with climate change explanation



With regards to sea level rise, DPIE (formerly Office of Environment and Heritage (OEH) and prior to that, Department of Environment, Climate Change and Water (DECCW)) provided guidelines which set the benchmarks for a projected rise in sea level of 0.4 m by 2050 and 0.9 m by 2100 as derived by IPCC and CSIRO (DECCW, 2010). The sensitivity of the design flood results to sea level rise was also assessed herein for the 2100 scenario. A summary of the results is provided in Table 22 with details provided in Appendix C.

Table 22: Average Changes to Peak Flood Levels (m) under Projected Climate Change Scenarios

Model	1% AEP				2% AEP			
	RCP 4.5 Scenario	RCP 8.5 Scenario	RCP 4.5 Scenario with Sea Level Rise (2100)	RCP 8.5 Scenario with Sea Level Rise (2100)	RCP 4.5 Scenario	RCP 8.5 Scenario	RCP 4.5 Scenario with Sea Level Rise (2100)	RCP 8.5 Scenario with Sea Level Rise (2100)
East	+0.01	+0.03	+0.01	+0.03	+0.01	+0.03	+0.01	+0.03
North	+0.06	+0.13	+0.06	+0.13	+0.05	+0.10	+0.05	+0.10
West	+0.08	+0.16	+0.08	+0.16	+0.07	+0.15	+0.07	+0.15
South	+0.05	+0.09	+0.06	+0.10	+0.04	+0.08	+0.06	+0.10

From Table 22, the peak flood level increase for both the 2% and 1% AEP events under the RCP 4.5 scenario is in the order of 0.1 m, and up to 0.2 m under the RCP 8.5 scenario. There is minimal difference for the results when sea level rise is considered, and this is to be expected since most of the LGA is elevated well above ocean water level. Thus, increased flood risk due to sea level rise is generally restricted to low-lying areas next to the harbour such as Anderson Park in Neutral Bay.

4.8.1 Managing Increased Flood Risk due to Climate Change

As described in the previous section and presented in detail in Appendix C, climate change will increase the frequency and severity of flooding in the LGA, due to the expected increases in the intensity of rainfall events that cause flooding. There are also some locations where sea level rise will slightly increase flood risk. The analysis shows that in the large majority of locations, depths of flooding will increase by around 0.1 m, under a long term planning horizon of 2090, with a worst-case greenhouse gas concentration.

The relatively small magnitude of this 0.1 m increase means that increased flood risk due to climate change, while significant, does not require specific risk management measures. Naturally, climate change is a result of greenhouse gas emissions in Australia and abroad and climate risk can certainly be mitigated by reducing these emissions to zero, in accordance with IPCC recommendations. However, it remains that measures that will manage and reduce existing flood risk in the LGA, as detailed in Section 6.6 of this report, are sufficient to also manage flood risk associated with climate change.

4.9 Sensitivity Analysis

This section describes the sensitivity of the model results to changes in model parameters. In hydraulic modelling, each model parameter is estimated based on the available data, guidance and knowledge of the catchment. Sensitivity analysis quantifies assumptions made, by measuring their effect on model flood behaviour. Large changes in flood behaviour indicate parameters that the model is sensitive to. For the current study, sensitivity analysis was undertaken for the rainfall losses, hydraulic roughness (Manning's 'n') and pipe blockage factors.

The model sensitivity is tested by varying each parameter within a reasonable estimate range, and then assessing the output from the hydraulic model to determine the change in peak flood level results for each scenario. This analysis has been undertaken for the 1% AEP event. Table 23 presents the results of the sensitivity analysis with further details provided in Appendix D.

Table 23: Average Changes to 1% AEP Peak Flood Levels (m) for Sensitivity Analysis Scenarios

Model	Rainfall Loss -20%	Rainfall Loss +20%	Manning's 'n' -20%	Manning's 'n' +20%	Pipe Blockage +20%	Pipe Blockage +50%
East	0.00	0.00	0.00	0.00	+0.01	+0.02
North	+0.01	-0.01	-0.01	+0.01	+0.06	+0.16
West	+0.02	-0.01	-0.02	+0.03	+0.07	+0.23
South	+0.01	-0.02	0.00	0.00	+0.01	+0.02

The sensitivity analysis results show that the model results are generally insensitive to the rainfall losses and hydraulic roughness, whilst more sensitive to the pipe blockage factors whereby the 1% AEP peak flood levels increase is in the order of 0.1 m based on a blockage factor of 20% and 0.2 m for a blockage factor of 50%. It is important to note that stormwater pipes less than 450 mm in diameter were fully blocked as part of the hydraulic modelling undertaken herein (see Section 4.4.5).

4.10 Flood Function

Flood Function (also known as Hydraulic Categories) refers to the classification of floodwaters into three categories: flow conveyance, flood storage and flood fringe. These categories help to describe the nature of flooding across the floodplain and aid planning when assessing developable areas. According to the Australian Emergency Management Handbook 7, these three categories can be defined as:

- Flow Conveyance/Floodway – the areas where a significant proportion of the floodwaters flow and typically align with defined channels. If these areas are blocked or developed, there will be significant redistribution of flow and increased flood levels across the floodplain. Generally, flow conveyance areas have deep and/or fast-moving floodwaters;

- Flood Storage – areas where, during a flood, a significant proportion of floodwaters extend into, water is stored and then recedes after a flood. Significant filling or development in these areas may increase flood levels nearby; and
- Flood Fringe – areas that make up the remainder of the flood extent. Development in these areas are unlikely to alter flood behaviour in the surrounding area.

There is no prescribed methodology for deriving each category and as such categorisation is typically determined based on experience and knowledge of the study area.

For the current study, the flood function classifications have been undertaken in accordance with the findings of Howells et al (2003), who defined these categories based on the depth and velocity of flood waters. This is also in line with the approach previously adopted by the 2017 Flood Study. For the technical calculation of these classifications in the North Sydney LGA the following was adopted:

- Flow Conveyance/Floodway – areas where:
  - the velocity-depth product > 0.25 m^2/s and peak velocity >0.25 m/s
    or
  - peak velocity > 1 m/s and peak depth > 0.15 m
- Flood Storage - areas outside the Flow Conveyance where depths exceed 0.5 m
- Flood Fringe – areas outside of Flow Conveyance where depths are less than 0.5 m

Figure 25 to Figure 28 present the Flood Function for the 20%, 5%, 1% AEP and PMF events.

Following review of the design flood behaviour of the study area, it was found that since the majority of the areas are dominated by shallow overland flow, the difference in peak flood level across the design storms modelled is not significant and generally in the order of 0.1 m. Further, high hazard flows and floodway areas are generally confined to principal flow paths within the study area. Limited areas of flood storage were found, and these areas are localised and typically found upstream of obstructions to flow path such as upstream of railway or major road embankments. The flow conveyance/floodway areas were critical in identifying properties to be included in the Flood Planning Area.

4.11 Flood Hazard

Flood hazard is defined as the threat that flooding will pose to human activity. For the 2017 Flood Study, the hazard categories were determined in accordance with Appendix L of the NSW Floodplain Development Manual (2005). As part of the current study, the hazard categories were revised based on the Australian Emergency Management Handbook 7 guideline as per OEH's recommendation, which considers the threat to types of people (children, adult) and activity (pedestrian, vehicle and within a building). The flood hazard categories from this guideline are presented in Image 8.

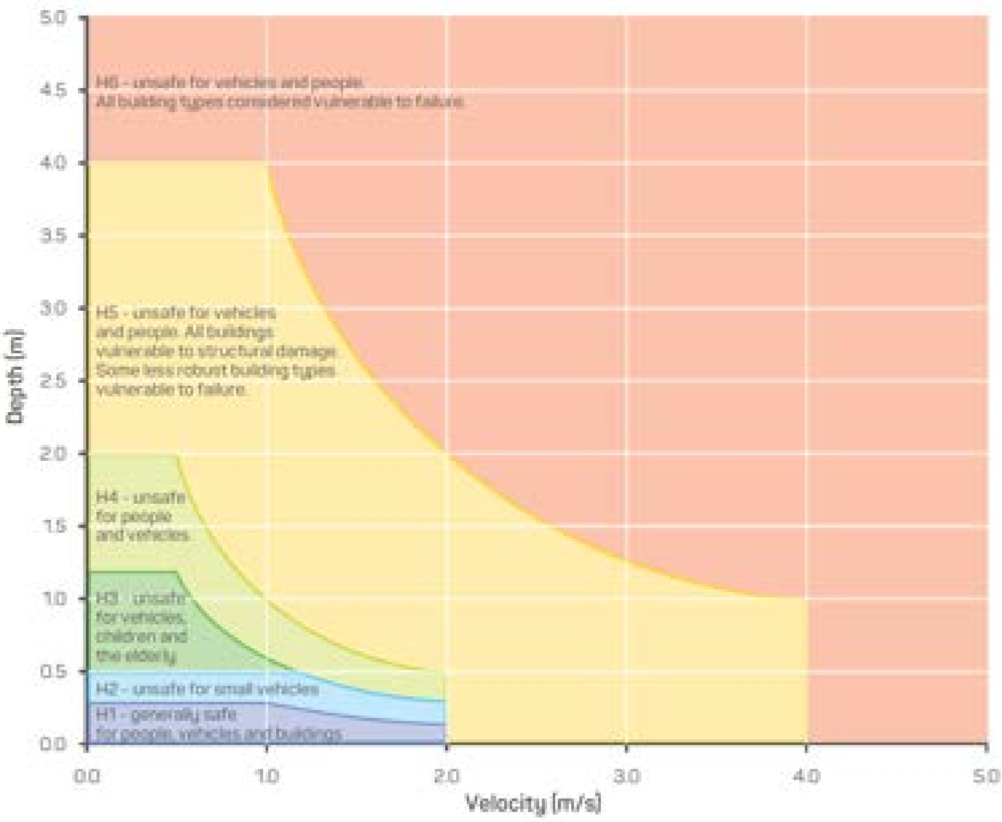
The chart divides a flood event into six categories of hazard, specifically:

- H1 – Generally safe for people, vehicles and buildings (corresponding to very shallow and slow flow);
- H2 – Unsafe for small vehicles;
- H3 – Unsafe for vehicles, children and the elderly;
- H4 – Unsafe for people and vehicles;

- H5 – Unsafe for vehicles and people. All buildings vulnerable to structural damage. Some less robust building types vulnerable to failure; and
- H6 – Unsafe for vehicles and people. All building types considered vulnerable to failure (corresponding to very deep and fast flow).

Figure 21 to Figure 24 present the Flood Hazard for the 20%, 5%, 1% AEP and PMF events.

Image 8: Flood Hazard Curves based on AEM Handbook 7



Generally, it was found that high hazard areas (above H3 hazard) correspond to the flow conveyance/floodway areas with fast flowing floodwaters as well as flood storage areas with significant depths of floodwaters. For the latter, these are usually areas upstream of railway or major road embankments which include (and not limited to) Anzac Park and Harry Howard Reserve, as well as topographic low points such as Brightmore Reserve, Tunks Park, and Primrose Park.

In addition to utilising the flood hazard curves, the following factors were also considered herein that would influence the vulnerability of communities to flood hazard:

- Effective warning time available to respond to a flood event;
- Rate of rise of floodwaters; and
- Isolation from safety during flood.

These are discussed further in Section 6.4.

5. COMMUNITY CONSULTATION

Community consultation formed an integral part in completing Stages 1 and 2 to the North Sydney Wide Flood Study project. Following on from this approach, community consultation was undertaken during the Study to inform residents about the current Study, gather further information on flooding as well as potential flood mitigation measures, identify community concerns, and, most importantly, develop and maintain community confidence and collaboration in the Study results.

Following the inception of the Study, Council provided information on the floodplain risk management process on their website. A newsletter and questionnaire were then distributed to selected residents in October 2019 to inform residents of the Study and request feedback on potential mitigation measures. The results of the survey are documented in the following section.

A draft of this report was placed on public exhibition in June and July 2022. The report was updated and finalised following the public exhibition period.

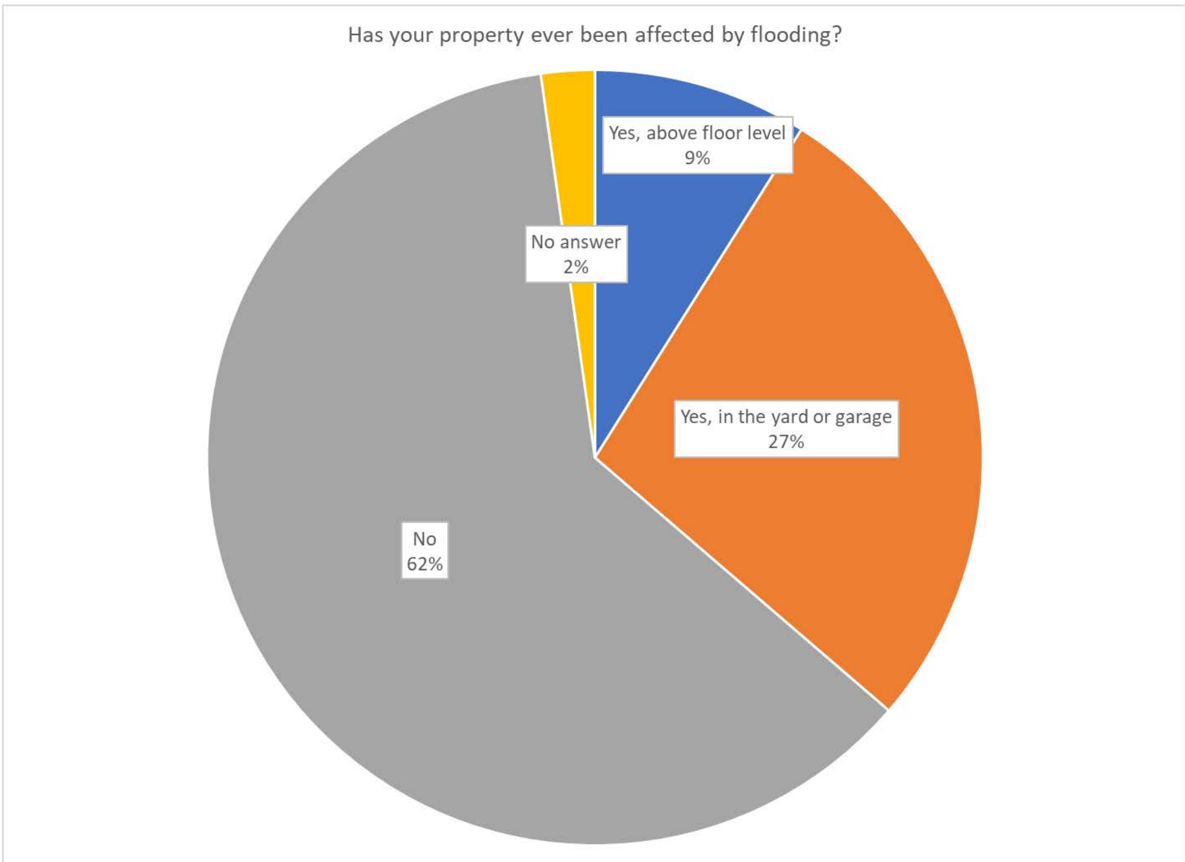
5.1 Newsletter and Questionnaire

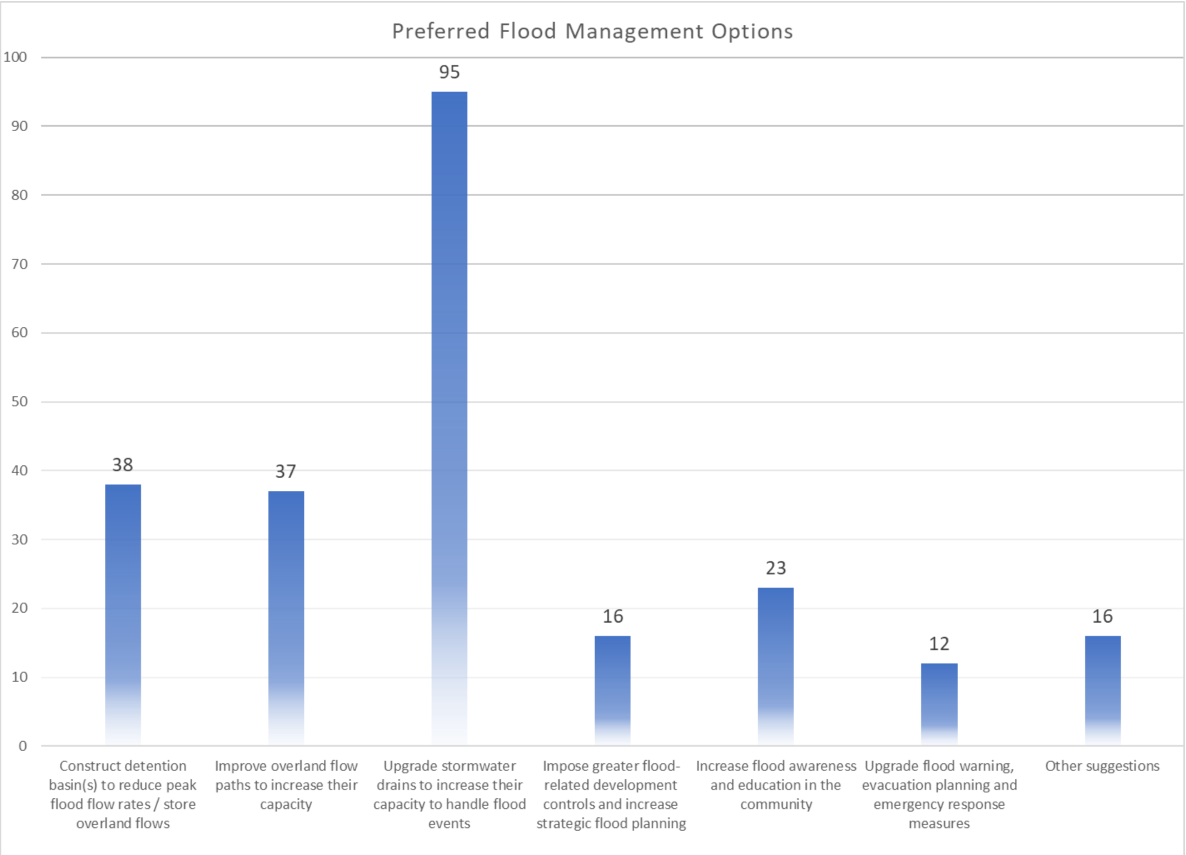
A newsletter and questionnaire were sent out in October 2019 to inform residents of the study and request feedback on potential mitigation measures. The mailout consisted of a 2-page newsletter and 2-page questionnaire, a copy of which is provided in Appendix F. The newsletter and questionnaire were distributed to residents located in areas identified as in the general vicinity of flood affectation (approximately 3,000+ properties). Community members who did not receive a questionnaire were still able to participate in the questionnaire via Council's website, which contained the same newsletter information and a link to an online version of the questionnaire.

A total of 179 responses were received from the selected residents, which amount to about 5% response rate. A summary of the survey results is shown in Chart 6. Approximately 27% of respondents indicated that they had experienced flooding in their yard or garage, while 9% of respondents had experienced over floor flooding of habitable floor levels. These results highlight that there is a general awareness of flooding within the LGA and the potential for flooding to impact on properties.

The questionnaire outlined a range of flood mitigation measures to manage flood risk and asked community members to select their preferred measures. A large majority of the respondents favoured upgrade of existing stormwater drains to alleviate flood risk within the study area (95 respondents). Other popular measures include construction of detention basin(s) which can help with reducing peak discharge as well as enhancing conveyance capacity of existing overland flow paths (38 and 37 respondents respectively). Support for non-structural measures was comparatively low. Consideration of these community preferences has been taken into account when deriving and assessing potential flood mitigation measures herein (see Section 6.10.2).

Chart 6: Questionnaire Results





5.2 Public Exhibition

Public exhibition of the draft study and plan was held in June and July 2022. The exhibition period was aimed at informing residents and other stakeholders of the draft study and plan and inviting feedback, which could then be incorporated into the final report. The following consultation activities were used during the exhibition period:

- Public notices including notification of the information sessions;
- A website with an overview of the study and plan, a link to the draft report, a booking system for the information sessions and a feedback form;
- Information sessions on two nights that were held remotely, where GRC Hydro made a presentation summarising the study, and then questions from residents were answered; and,
- Residents who requested in-person meetings were met with by GRC Hydro and a Council representative

A number of residents filled out the online survey or emailed questions and feedback regarding the study. 91 residents responded in total, with the majority of responses being in relation to the Flood Planning Area. Each resident who had questions or requested more information was then emailed (and met in person, where requested) with a map showing flooding in the vicinity of their lot, and other information. Table 24 presents an overview of the common concerns, and information provided by GRC Hydro/Council.

Table 24: Common concerns raised during public exhibition

Concern	Information provided by GRC Hydro and Council
Very high rainfall in 2022 had not caused flooding at the property, indicating the study was not accurate	Sydney has experienced a record wet period in 2022. As part of this, heavy rainfall has occurred over periods of several days, leading to flooding of large creeks and rivers. North Sydney, in contrast, needs heavy rainfall over 1-2 hours and this has not occurred in 2022 in the area.
The property has experienced shallow flow but it is generally minor and does not warrant including the property in the Flood Planning Area	Such flow is likely to be overland flow in a small flood event such as a 20% or 10% AEP event. The Flood Planning Area is the main tool available to ensure such cases do not become a flood risk issue, e.g., a new floor built level with backyard. We also note that the FPA is looking at risk in a 1% AEP flood, which has not occurred in recent times in North Sydney.
Concerned that Council should undertake works such as drainage upgrades, to fix the flooding issue, rather than using a Flood Planning Area.	Council are continually maintaining and upgrading stormwater infrastructure. In most areas, however, even if very large pipes were built, there would still be an overland flowpath in a 1% AEP event. Council has responsibility to ensure development does not increase flood risk, while undertaking structural works in parallel. The Floodplain Risk Management Plan in this report recommends this approach.
The property should not be included in the Flood Planning Area as while there is	The location of any house or similar is not considered when mapping the flood planning area. The FPA is a

a low point where flow may occur, the house or apartment building is well above that level and has no risk of flooding.	measure to ensure future development, which can potentially be anywhere on a lot, does not increase flood risk. Some properties in the Flood Planning Area may be very steep and have negligible flood risk at the house itself.
Inclusion in the Flood Planning Area will significantly increase insurance premiums, and also impact the value of the property	Insurers have stated they typically do not use a Flood Planning Area. Insurers undertake their own studies of flood risk. Regarding both insurance and property value, the information presented in the study showing maps of flood affectation has been publicly available online for the last 5 years.

Based on further site visits during the public exhibition, and information provided by residents, lots were removed from the Flood Planning Area in seven locations. At these locations it was determined that the properties did not experience floodway flow, or were adjacent to a flooding issue (the two FPA criteria). The updated Flood Planning Area is shown on Figure 31.

6.FLOODPLAIN RISK MANAGEMENT STUDY

6.1 Overview

The following Floodplain Risk Management Study (FRMS) draws on the revised design flood results (see Section 4.7) to identify, assess and compare various flood risk management mitigation options and opportunities aimed at improving the existing flood situation in the North Sydney LGA. An approach has been undertaken which assesses the flood impacts and economic impacts of management options. Based on this work an implementation Plan has then been devised. This FRMS provides key information for Council, the SES and the community for effectively managing and mitigating flood risk within the LGA.

The following sections utilise information on existing flood conditions at the LGA to:

- Identify flooding hotspots (see Section 6.2);
- Ascertain the economic impact of existing flooding in the LGA (see Section 6.3);
- Determine the existing flood warning times along key evacuation routes (see Section 6.4);
- Assess the vulnerability of sensitive land use and public infrastructure (see Section 6.4);
- Develop the flood emergency response classifications (see Section 6.5); and
- Assess feasibility of mitigation options in reducing flood risk at hotspots (see Section 6.9).

6.2 Flooding Hotspots

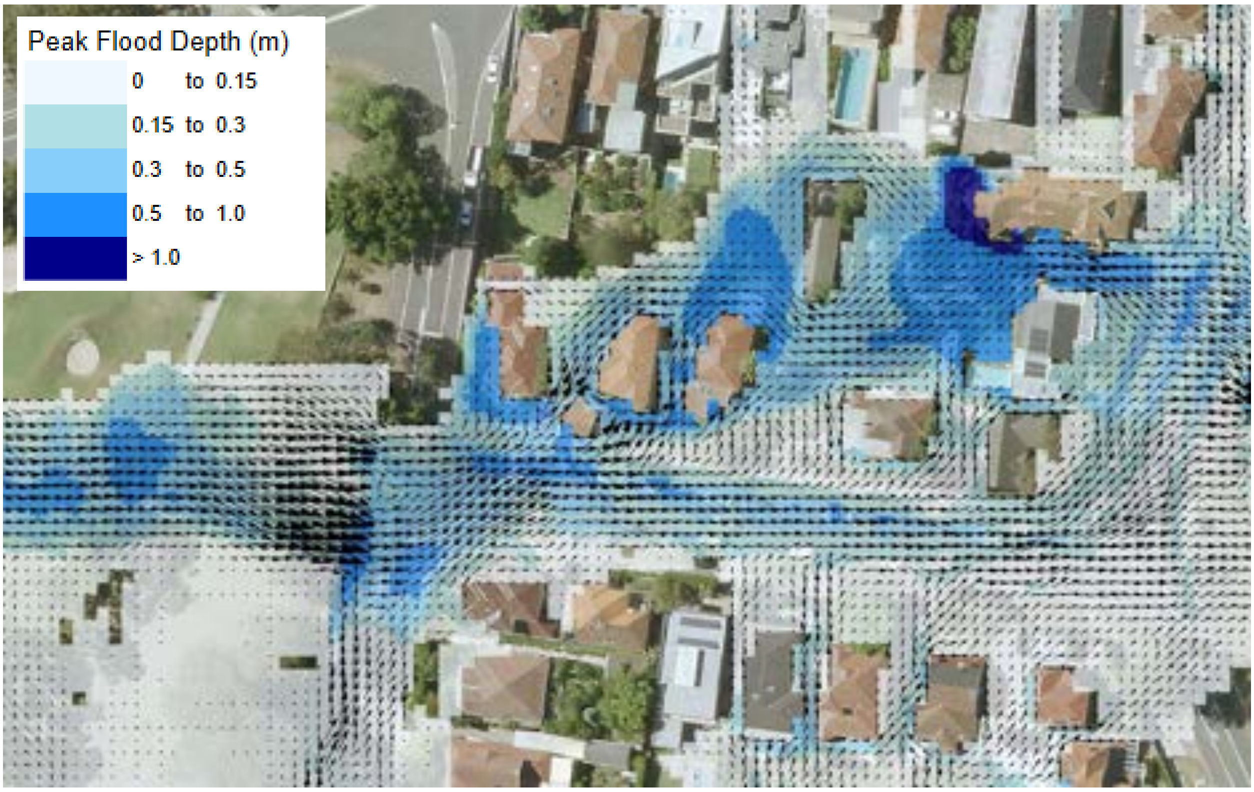
Flooding hotspots refer to areas that are particularly flood affected and/or affected by hazardous flooding. Several hotspot areas were identified during the 2017 Flood Study and have been reassessed in the current study using the updated flood modelling results. The following sections discuss the flood mechanisms affecting key hotspots which were identified based on the modelling work undertaken herein.

6.2.1 Creek Lane, Cammeray

Creek Lane is located at what was the former Willoughby Creek flow path and is subject to significant flood affectation as shown in Image 9. The flow path originates as far upstream as North Sydney and flows in excess of the underground trunk capacity traverse overland from the Cammeray Golf Club through Creek Lane and discharge to the harbour via Primrose Park. The 1% AEP flows through the area are shown to be of 'H4' hazard category (refer Figure 23), thus unsafe for people and vehicles.

Mitigation measures, i.e. FM-N05+N08 and FM-N11 (see Section 6.9), consider upgrading the trunk capacity under Creek Lane and storing some of the upstream catchment runoff.

Image 9: Hot Spot – Creek Lane – 1% AEP Design Flood Behaviour

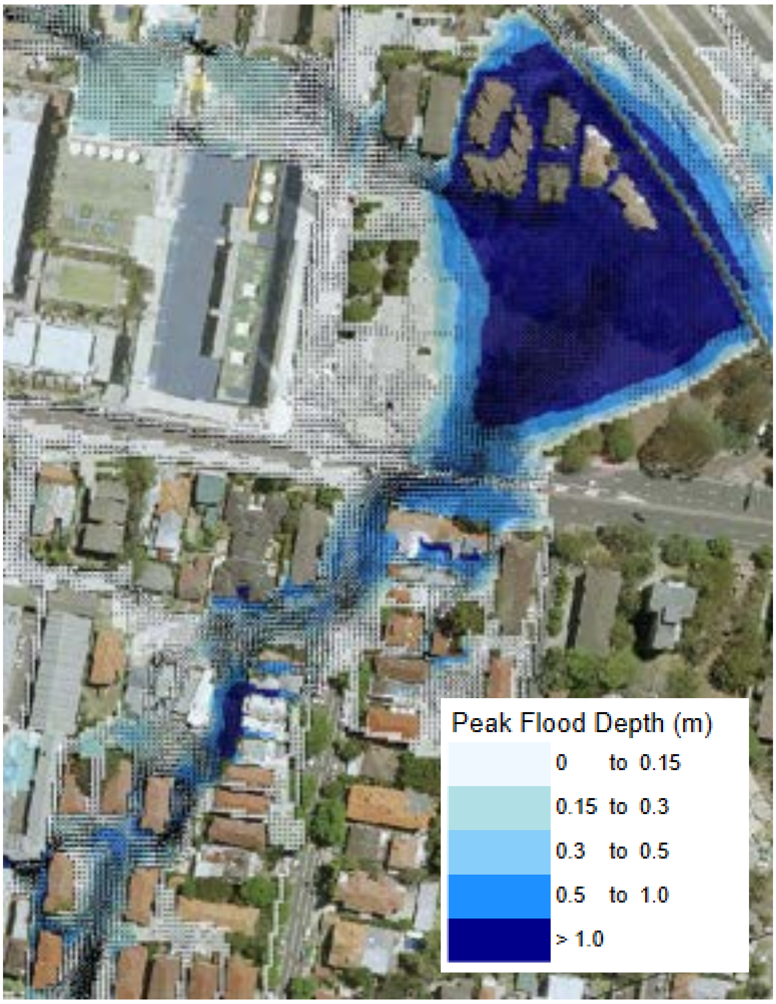


6.2.2 Lytton Street/Anzac Park, Cammeray

Properties adjacent to Lytton Street and Anzac Park were subjected to historical floods. Whilst the issue affecting the Lytton Street properties mainly pertains to conveyance of high hazard flows, flooding at Anzac Park is mainly caused by the obstruction to overland flows posed by the Warringah Freeway, with the underground trunk system providing the only relief to discharge floodwaters. Significant flood depths in excess of 1 m can be expected for the properties adjacent to Anzac Park for the 1% AEP event as shown in Image 10.

Mitigation measures, i.e. FM-N02, FM-N03, and FM-N05+N08 (see Section 6.9), consider storing some of the upstream catchment runoff, augmenting the storage available in Anzac Park and upgrading the trunk capacity under Warringah Freeway.

Image 10: Hot Spot – Lytton Street/Anzac Park – 1% AEP Design Flood Behaviour

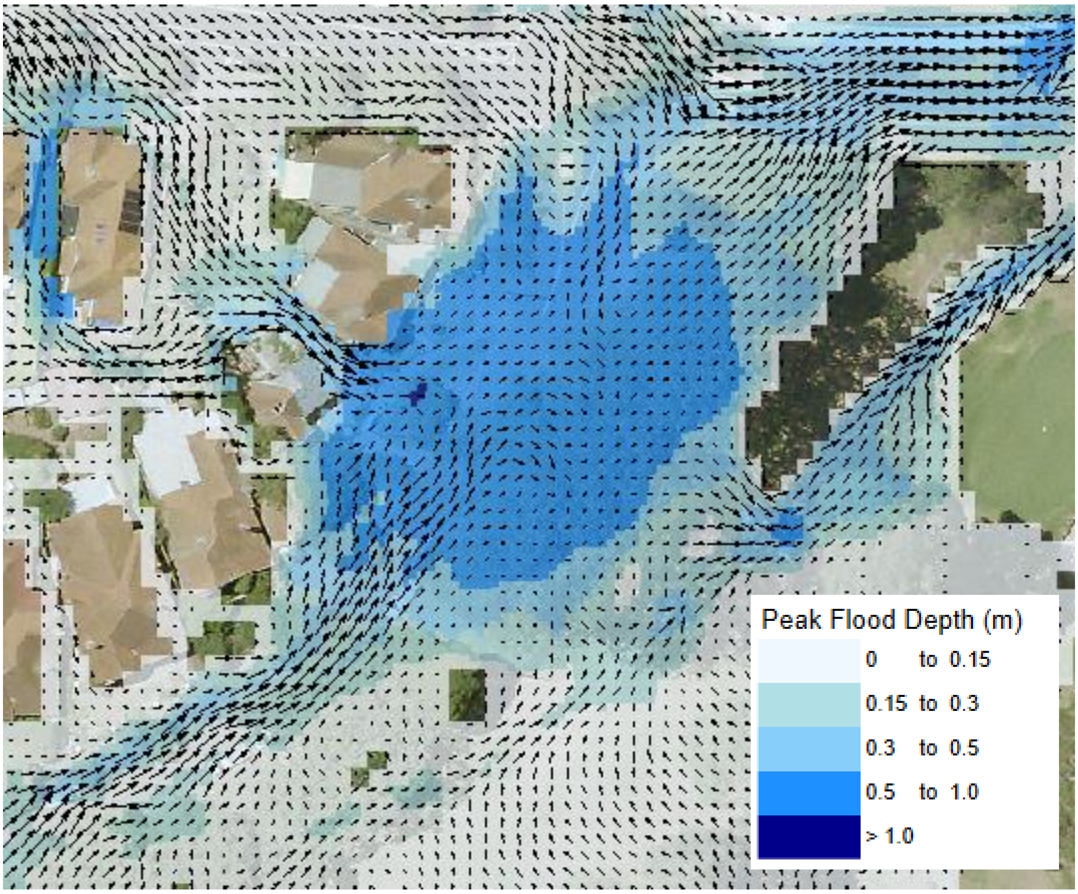


6.2.3 Warringa Road, Cammeray

Located between the two hotspots as described in Sections 6.2.1 and 6.2.2, the Warringa Road low point collects runoff from the western part of Cammeray Golf Course as well as Amherst Street. Referring to Image 11, significant flood depths of up to 1 m can be expected at this location for the 1% AEP event. Flows in excess of the local drainage capacity and storage offered by the low point subsequently overtop into Cammeray Golf Course before flowing eastward towards Creek Lane.

Mitigation measures, i.e. FM-N05+N08 and FM-N11 (see Section 6.9), consider augmenting the existing stormwater pits and pipes at this location and providing a basin within the Cammeray Golf Course.

Image 11: Hot Spot – Warringa Road – 1% AEP Design Flood Behaviour



6.2.4 Benelong Lane, Cremorne

Benelong Lane serves as a major overland flow path for the catchment which extends upstream to Military Road. Overland flows from upstream catchments enter this laneway from Grasmere Road before eventually discharging to Brightmore Reserve on the downstream end as shown in Image 12. The 1% AEP flow is shown to be of 'H5' category (refer Figure 23), thus unsafe for vehicles and people as well as may cause structural damage to buildings.

Mitigation measure, i.e. FM-N07 (see Section 6.9), considers upgrading the trunk drainage through this location to alleviate some of the existing flood risk.

Image 12: Hot Spot – Benelong Lane – 1% AEP Design Flood Behaviour

6.2.5 Cooper Lane, Cremorne

Cooper Lane is located upstream of Benelong Lane (refer Section 6.2.4) and also serves as a major overland flow path for the same catchment which extends upstream to Military Road. The topographic lowest point for this area is located between Cooper Lane and Young Street as shown in Image 13. The existing stormwater system along Cooper Lane serves to capture some of the runoff prior to it reaching the low point located at the rear of existing properties.

Mitigation measure, i.e. FM-N07 (see Section 6.9), considers introducing additional pits along Cooper Lane and upgrading the drainage system located at the low point.

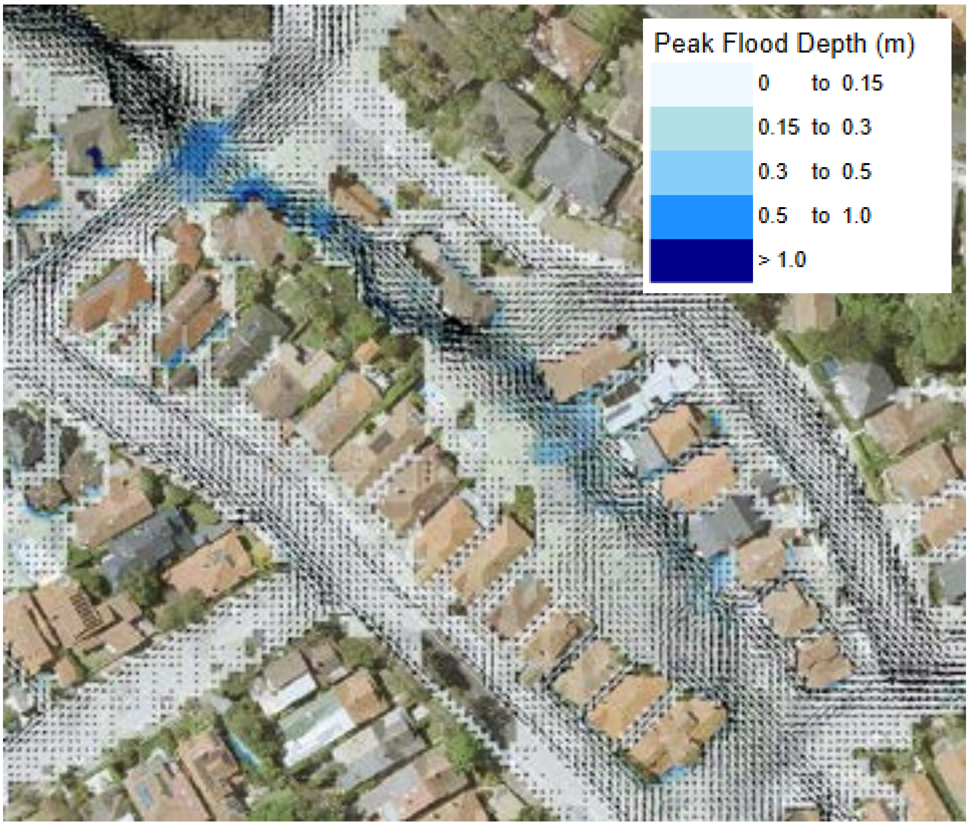
Image 13: Hot Spot – Cooper Lane – 1% AEP Design Flood Behaviour

6.2.6 Reynolds Street, Cremorne

An overland flow path is found traversing Reynolds Street via the low point between Benelong Road and Levick Street before discharging towards the direction of Brightmore Reserve, as shown in Image 14. Historically, overland flows have been observed to overtop the Reynolds Street footpath and enter the rear of the properties downstream of Reynolds Street. Peak flood velocity in excess of 2 m/s can be found at this location in the 1% AEP event (refer Figure 19).

Mitigation measure, i.e. FM-N06 (see Section 6.9), considers introducing additional pits on Reynolds Street as well as augmenting the existing drainage capacity at this location.

Image 14: Hot Spot – Reynolds Street – 1% AEP Design Flood Behaviour

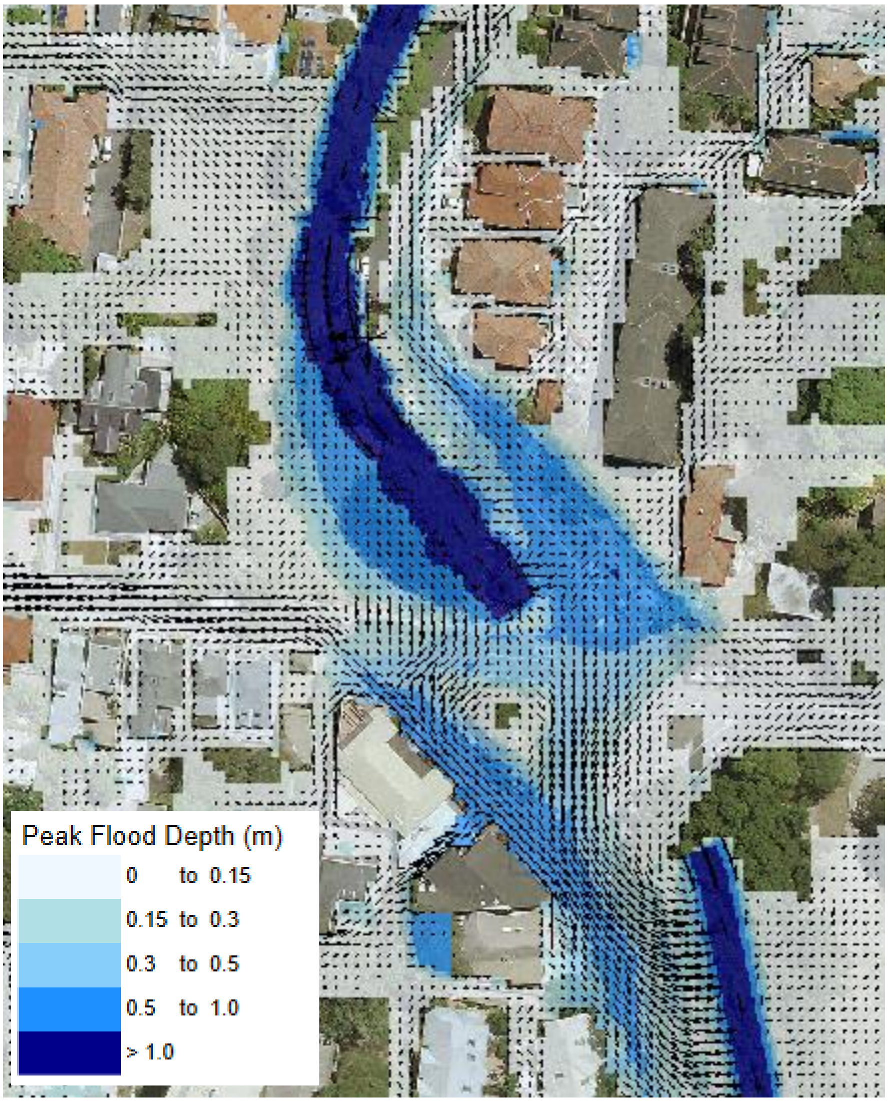


6.2.7 Kurraba Road/Clark Road, Neutral Bay

The Kurraba Road and Clark Road intersection has been subject to flooding in the past. It serves as a choke point for the open channel which conveys flows from the upstream catchment. Downstream of the road culvert, channel flows eventually discharge to the harbour approximately 400m south of the intersection. Once the culvert under the road intersection reaches capacity, floodwaters start to overtop the channel into the adjacent park to the west as well as Rawson Street to the east before subsequently inundating the row of shops fronting the intersection, as shown in Image 15. Peak flood depths up to 1 m can be found on the surrounding roads in the 1% AEP event. Further, due to the proximity of this location to the harbour, the open channel and road culvert are subject to tidal influence which can limit the effectiveness of proposed future structure upgrades.

A range of mitigation measures were considered to alleviate flooding at this hotspot including FM-S02, FM-S03, and FM-S04 (see Section 6.9), which consider storing some of the upstream catchment runoff and upgrading the road culvert under the intersection.

Image 15: Hot Spot – Kurraba Road/Clark Road – 1% AEP Design Flood Behaviour



6.2.8 Bank Street/Ancrum Street, North Sydney

A major overland flow path traverses through this hotspot following the topographic low point located between existing buildings as shown in Image 16. There is a Sydney Water trunk with capacity limited to frequent storm events which alignment roughly follows the overland flow path. High hazard flows can be expected for the 1% AEP event which are driven by high flow velocities in excess of 2 m/s (refer Figure 19). The downstream discharge point of the flow path is at the rail underpass on Euroka Street.

Limited mitigation measures can be considered for this hotspot other than augmenting the existing trunk capacity, i.e. FM-W01 (see Section 6.9).

Image 16: Hot Spot – Bank Street/Ancrum Street – 1% AEP Design Flood Behaviour

6.2.9 Cassins Lane, North Sydney

An overland flow path exists which flows in the westward direction from West Street entering into Cassins Lane and Cassins Avenue, impacting on Marist College as shown in Image 17. An inlet is installed in front of the college, though for rare events such as the 1% AEP floodwaters would overwhelm the drainage system and enter the college compound, resulting in peak flood depths up to 0.5 m.

Mitigation measure, i.e. FM-N09 (see Section 6.9), considers introducing additional pits as well as augmenting the existing drainage capacity located under the college and its surrounds.

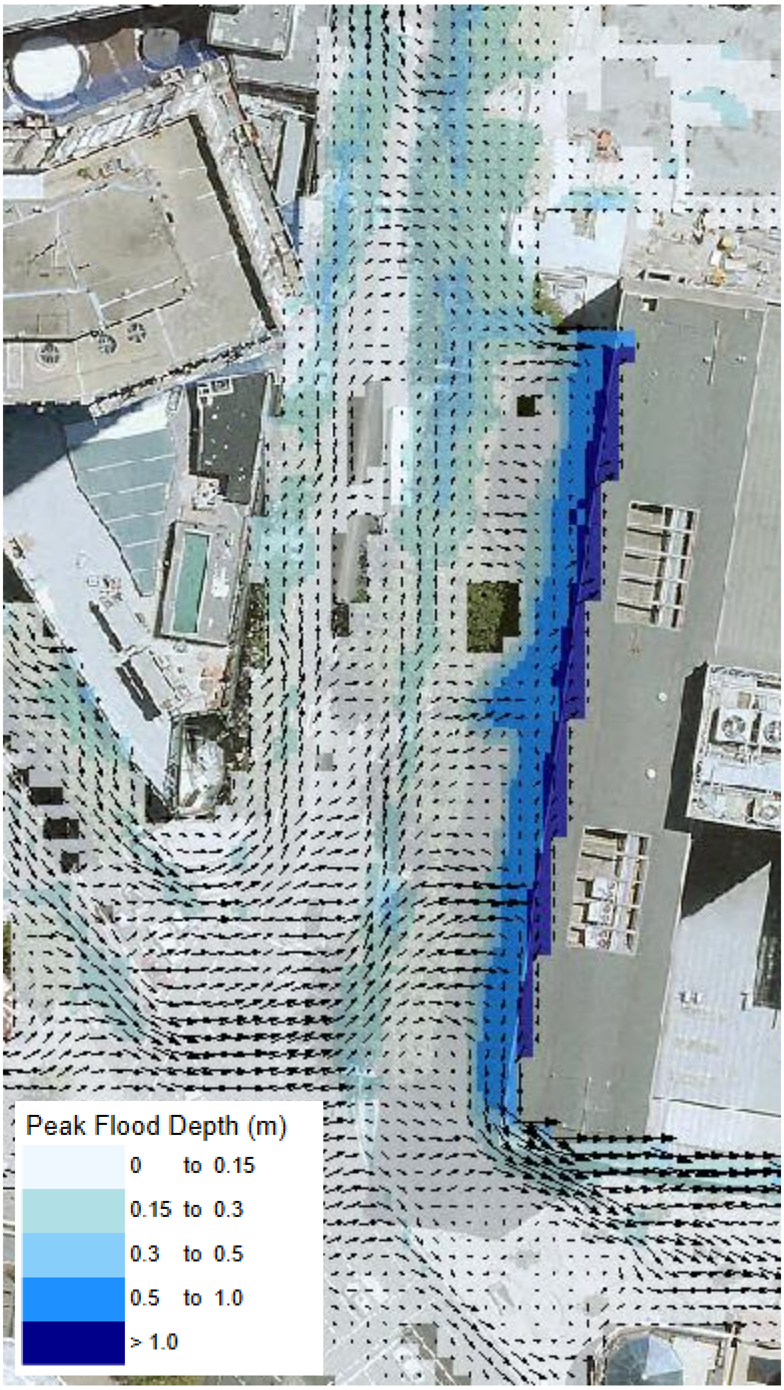
Image 17: Hot Spot – Cassins Lane – 1% AEP Design Flood Behaviour

6.2.10Miller Street, North Sydney

A trapped depression is found on Miller Street for the area shown in Image 18 with floodwaters found to overtop the kerb and footpath for storm events including the 1% AEP. Historically, flooding is known to impact on commercial property located downstream (east of Miller Street) when the existing drainage system reaches capacity. Significant drainage works are currently being undertaken for the Sydney Metro site located to the north which should alleviate the existing flood conditions to some degree.

Mitigation measure, FM-S01 (see Section 6.9), considers a large-scale Sydney Water trunk upgrade through the North Sydney CBD which would also alleviate flood risk for this hotspot.

Image 18: Hot Spot – Miller Street – 1% AEP Design Flood Behaviour



6.2.11 Carlyle Lane/Russell Street, Wollstonecraft

The railway embankment presents a major obstruction to the overland flow path discharging westward along Carlyle Lane, as shown in Image 19. Peak flood depths in excess of 1 m can be expected at the lowest point of Carlyle Lane for the 1% AEP event. Council has undertaken drainage improvement works along Carlyle Lane to help alleviate stormwater/flooding issues though the existing drainage system downstream is a constraint in allowing more floodwaters to be discharged to Berrys Creek. Downstream of the railway embankment, another overland flow path originating from north of River Road also discharges to Berrys Creek after traversing through some residential properties. There is a depression on Russell Street which can trap floodwaters in excess of 0.5 m in the 1% AEP event.

Mitigation measure, i.e. FM-W02 (see Section 6.9), considers introducing additional pits as well as augmenting the existing drainage capacity from Carlyle Lane to Berrys Creek under the railway embankment.

Image 19: Hot Spot – Carlyle Lane/Russell Street – 1% AEP Design Flood Behaviour

6.3 Economic Impact of Flooding

A flood damages assessment is used to quantitively assess the impacts of flooding on the community. Generally, a flood damages assessment aggregates the following:

- Direct costs to individual properties such as structural damages or damage to contents;
- Indirect costs to individual properties such as clean-up, disposal or loss of income; and
- Cost of damage to infrastructure.

The flood damages assessment for the current study utilised guidance for estimating residential flood damages from DPIE (formerly OEH/DECC). This guideline (DECC, 2007) uses the depth of flooding above ground and floor level to estimate the variation of damage to structures and yards. There is, however, no prescribed methodology for calculating commercial flood damages provided by the OEH guideline. Thus, the damage curves developed by the Flood Hazard Research Centre (FHRC, 2013) were adopted herein and this is discussed further in Section 6.3.2.

The flood damages assessment described herein was carried out for the 894 surveyed properties (refer Section 3.3), 819 of which are residential, 7 are public facilities and the remaining 68 properties are commercial/retail. Floor levels and ground levels for each property were compared to the design flood levels at the same location. Based on this comparison, a site-specific level of flood affectation was derived. This informs the flood damages calculation whereby a monetary value was applied to each property based on the depth of flooding over a range of design flood events.

For the purposes of the assessment herein, the public facilities were grouped with the residential property set as they generally have lodging facilities and are also located adjacent to the residential areas.

6.3.1 Residential Properties

6.3.1.1 Residential Property Inundation

The level of flood affectation for the residential properties and public facilities was derived by comparing design flood levels to ground and floor level estimates. The dataset consisted of 826 properties (819 residential properties and 7 public facilities). This process identified the flood event, with respect to probability, that first inundates each property over ground and floor level respectively.

Table 25 quantifies the number of residential properties affected in each design flood event. The results show that many of the surveyed properties, despite being subject to inundation of the yard, are not necessarily flooded above floor level.

Table 25: Residential Property Flood Affection

Design Event (AEP)	Number of Properties affected	Number of Properties affected above Floor Level
20%	501	216
10%	546	247
5%	569	266
2%	579	272
1%	604	299
PMF	701	491

6.3.1.1 Residential Flood Damages

The residential flood damage estimates provide a monetary value of flood damages for each residential property for a range of design flood events. A key outcome of this assessment is the Average Annual Damage (AAD). The AAD is equal to the total damage caused by all floods over a long period of time divided by the number of years in that period (FDM, 2005). The AAD is primarily used during a Floodplain Risk Management Study and Plan (FRMS&P) to compare the relative economic merits of various proposed flood mitigation measures, which is discussed further in Section 6.10.2.

A residential AAD of $11.5 million was calculated for the North Sydney LGA, based on the damages curves provided in the spreadsheet developed by OEH (DECC, 2007) and shown in Chart 7. Table 26 presents the AAD and the total residential flood damages per design event.

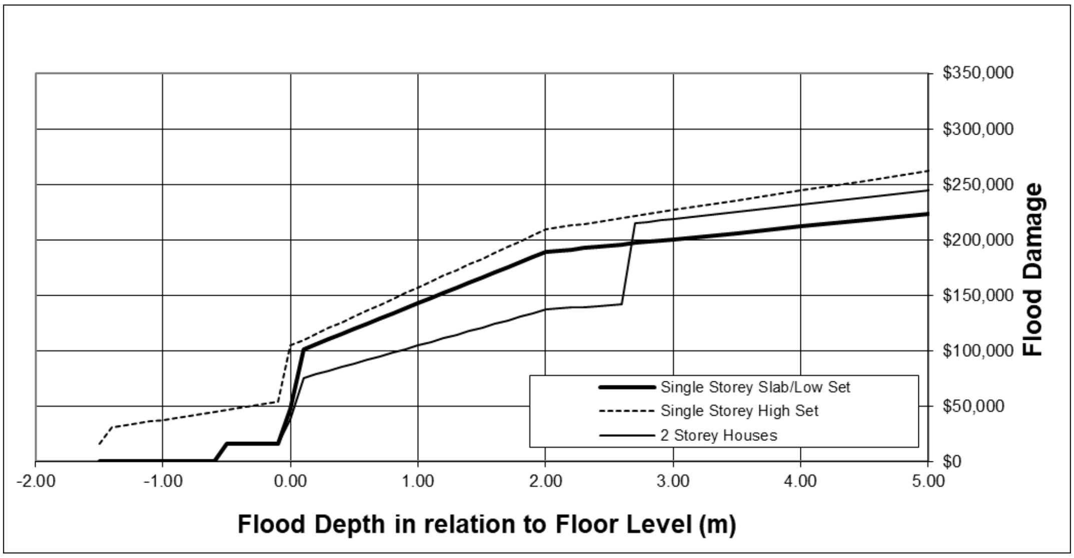


Chart 7: Residential Flood Damages Curves

Table 26: Residential Flood Damages

Design Event (AEP)	Flood Damages Total	Flood Damage per property
20%	$29,597,400	$59,100
10%	$34,249,100	$62,800
5%	$37,301,500	$65,600
2%	$38,271,500	$66,100
1%	$41,507,500	$68,800
PMF	$71,529,500	$102,100
Average Annual Damages (AAD)		$11,517,900

6.3.2 Commercial Properties

The calculation of tangible commercial flood damages on a large scale can be highly varied. Commercial flood damages are dependent on factors such as:

- The nature of business undertaken at the property. For example, a business which has a quick turnaround of produce (or limited stock), such as a florist, is likely to suffer a smaller economic loss due to flooding than a business with highly valuable stock and a slower turnaround time, such as an electronics store;
- The floor space of a commercial property can be related to the amount of stock stored on site and therefore the amount of stock vulnerable to flooding;
- The duration of inundation of a commercial property and extent of damages can directly affect the length of time that the business may be closed; and
- The level of flood awareness/preparedness such as the amount of flood warning and ability to move vulnerable stock can affect the level of flood damage experienced.

To further complicate the calculation of commercial flood damages, a change of occupancy of the property can greatly change the economic flood damage experienced due to the potential change in the nature of business at the property.

There is no prescribed methodology for calculating commercial flood damages provided by the OEH guideline (DECC, 2007). Thus, the damage curves developed by the FHRC (2013) were adapted for the commercial flood damages assessment herein.

The Flood and Coastal Erosion Risk Management – A Manual for Economic Appraisal (FHRC, 2013) produced by the FHRC at Middlesex University in the United Kingdom developed non-residential flood damages curves based on observed flood damages from the early 2000's. These curves provide a contemporary evaluation of the damage to non-residential building and contents. The current study has adopted a typical non-residential flood damage relationship between depth of inundation and damage per square metre of floor space from this Manual and applied it for commercial properties in the North Sydney LGA. This flood damages curve was adjusted to account for the exchange rate from British pound sterling to Australian dollars and inflation from 2013 to present. The curve is shown in Chart 8 with the 'Indicative' curve adopted for all commercial properties without basement. For commercial properties with basement, the 'Indicative' curve was adopted for over floor flooding and the 'High' curve was applied for inundation depth below floor level to account for the substantial damages to basement and its contents generally observed for this LGA. The floor space of each commercial property in the LGA was individually calculated and the flood damages curve was adjusted accordingly.

While the methodology described above provides only an indicative commercial AAD estimate, this estimate is considered fit for purpose in the comparative assessment of flood mitigation measures and the relative cost benefit presented in Section 6.9.

6.3.2.1 Commercial Property Inundation

The level of flood affectation for the commercial properties was derived by comparing design flood levels to ground and floor level estimates. The dataset consisted of 68 commercial properties. This process identified the flood event, with respect to probability, that first inundates each property over ground and floor level respectively.

Table 27 quantifies the number of commercial properties affected in each design flood event.

Table 27: Commercial Property Flood Affection

Design Event (AEP)	Number of Properties affected	Number of Properties affected above Floor Level
20%	56	34
10%	60	39
5%	62	40
2%	63	44
1%	65	47
PMF	66	60

6.3.2.2 Commercial Flood Damages

The commercial flood damage estimates provide a monetary value of flood damages for each commercial property for a range of design flood events. The AAD derived was used to compare the relative economic merits of various proposed flood mitigation measures, which is discussed further in Section 6.10.2.

A commercial AAD close to $8 million was calculated for the North Sydney LGA, based on the damage curves developed by FHRC (2013) and shown in Chart 8. Table 28 presents the AAD and the total commercial flood damages per design event.

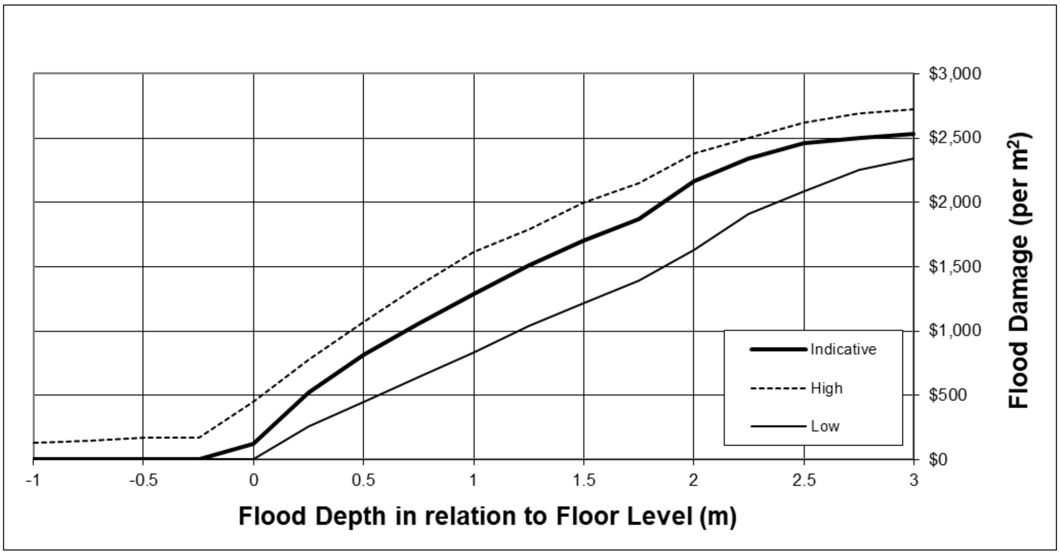


Chart 8: Commercial Flood Damages Curves

Table 28: Commercial Flood Damages

Design Event (AEP)	Flood Damages Total	Flood Damage per property
20%	$20,442,700	$365,100
10%	$23,243,500	$387,400
5%	$25,421,400	$410,100
2%	$27,801,500	$441,300
1%	$30,984,900	$476,700
PMF	$49,104,700	$744,100
Average Annual Damages (AAD)		$7,959,700

6.3.3 Combined Flood Damages

Following the derivation of the residential and commercial AAD as described in Sections 6.3.1.1 and 6.3.2.2, the combined AAD for the North Sydney LGA was determined for the various design flood events and tabulated in Table 29. The number of properties that would experience flooding on the yard as well as inundation above floor level was also provided. A combined AAD of $19.5 million was calculated and this value was used to compare the relative economic merits of various proposed flood mitigation measures, which is discussed further in Section 6.10.2.

Table 29: Combined Flood Damages

Design Event (AEP)	Number of Properties affected	Number of Properties affected above Floor Level	Flood Damages Total
20%	557	250	$50,040,000
10%	606	286	$57,492,600
5%	631	306	$62,722,800
2%	642	316	$66,072,900
1%	669	346	$72,492,400
PMF	767	551	$120,634,200
Average Annual Damages (AAD)			$19,477,500

6.4 Community Flood Risk

The safety of the community during flood events is a key concern for floodplain management. An assessment of the existing flood risk to the community has been undertaken to identify critical locations and access routes that are vulnerable to flooding and would benefit from consideration when assessing floodplain risk management measures (see Section 6.8).

The following sections have identified flooded locations such as key evacuation routes (see Section 6.4.1), sensitive land use areas (see Section 6.4.2) and critical infrastructure/public facilities (see Section 6.4.3).

6.4.1 Risk to Evacuation Routes

The availability of safe vehicular evacuation routes from flood prone areas can have a significant influence on the safety of the community. ARR2019 advises that small vehicles can withstand flood depths of up to 0.3 m before beginning to float in still water and will float in much shallower water as flood velocities increase. Given these figures, an analysis of key evacuation routes has been undertaken for the North Sydney LGA. This analysis has assessed the existing flood liability of these routes for consideration in the assessment of floodplain risk management measures.

Analysis of the flood emergency response classifications (see Section 6.5) indicated key locations in the study area that are isolated or severely impacted in various flood magnitudes. These areas are located primarily along the major overland flow paths. A detailed analysis of the evacuation routes for these areas was undertaken based on the hazard category defined in Section 4.11. This analysis assessed a range of flood magnitudes using the design flood results to determine the flood liability of each route. Based on the hazard classification as per the Australian Emergency Management

Handbook 7, road with 'H2' category flooding is considered unsafe for small vehicles but remains trafficable for large vehicles like 4WD and trucks. Road with 'H3' category flooding and above is not trafficable as vehicles will become unstable. The analysis results are presented in Table 30 to Table 33.

Table 30: Flood Affectation of Key Routes based on Hazard – East Model

ID	Location (refer Figure 29)	20% AEP	10% AEP	5% AEP	2% AEP	1% AEP	PMF
E01	Bannerman St - Between Murdoch St and Shellcove Rd	H1	H1	H1	H2	H3	H5
E02	Bennett St - Between Murdoch St and Wycombe Rd	H1	H1	H1	H1	H1	H5
E03	Bertha Rd - Between Murdoch St and Burroway St	H1	H1	H1	H1	H2	H5
E04	Bogota Av - Between Murdoch St and Honda Rd	H3	H5	H5	H6	H6	H6
E05	Harrison St - Between Rangers Rd and Wycombe Rd	H1	H1	H1	H1	H1	H2
E06	Honda Rd - Between Bogota Av and Shellcove Rd	H1	H2	H5	H5	H5	H6
E07	Yeo St - Between Rangers Rd and Barry La	H1	H1	H1	H1	H1	H1
E08	Rangers Rd - Between Spofforth St and Murdoch St	H1	H1	H1	H1	H1	H5
E09	Spofforth St - Between Military Rd and Florence St	H1	H1	H1	H3	H5	H5
E10	Spofforth St - Between Boyle St and Kareela La	H2	H5	H5	H5	H5	H6

Table 31: Flood Affectation of Key Routes based on Hazard – North Model

ID	Location (refer Figure 29)	20% AEP	10% AEP	5% AEP	2% AEP	1% AEP	PMF
N01	Falcon St - Between Rodborough Ave and Lytton St	H1	H1	H1	H1	H2	H5

ID	Location (refer Figure 29)	20% AEP	10% AEP	5% AEP	2% AEP	1% AEP	PMF
N02	Atchison St – between Oxley St and Willoughby Rd	H2	H3	H3	H3	H3	H5
N03	Belgrave St - Between Young St and Cooper La	H1	H1	H1	H1	H1	H5
N04	Brightmore St	H2	H3	H3	H3	H3	H6
N05	Brook St	H1	H1	H1	H1	H1	H5
N06	Cammeray Rd / Amherst St - Between Bellevue St and Grafton St	H1	H3	H5	H5	H5	H6
N07	Chandos St near Willoughby Rd	H1	H5	H5	H5	H5	H6
N08	Cooper La - Between Grosvenor La and Belgrave St	H1	H1	H1	H1	H5	H6
N09	Ernest St - Between Warringah Fwy and Miller St	H3	H3	H5	H5	H5	H6
N10	Grafton St - Between Cammeray Rd and Fall St	H1	H2	H3	H3	H5	H6
N11	Grasmere Rd - Between Young St and Benelong Rd	H1	H4	H5	H5	H5	H6
N12	Miller St - Between Ernest St and Falcon St	H1	H1	H1	H1	H2	H5
N13	Palmer St near Armstrong St	H1	H5	H5	H5	H5	H6
N14	Park Ave - Between Cammeray Rd and Sutherland St	H3	H4	H4	H4	H5	H6
N15	Reynolds St - Between Benelong Rd and Levick St	H1	H5	H5	H5	H5	H6
N16	Waters Rd - Between Belgrave St and Winnie St	H1	H1	H1	H1	H1	H5
N17	West St - Between Hayberry St and Holtermann St	H1	H1	H2	H2	H5	H5
N18	Young St - Between Little Young St and Wonga Rd	H1	H1	H1	H4	H4	H5

Table 32: Flood Affectation of Key Routes based on Hazard – West Model

ID	Location (refer Figure 29)	20% AEP	10% AEP	5% AEP	2% AEP	1% AEP	PMF
W01	Bay Rd near Crows Nest Rd	H1	H5	H5	H5	H5	H6
W02	Crows Nest Rd	H1	H3	H5	H5	H5	H6
W03	Euroka St / Union St - Between Bank St and Euroka La	H1	H2	H4	H5	H5	H6
W04	Hazelbank Rd - Between Pacific Hwy and Ivy St	H5	H5	H5	H5	H5	H6
W05	Lithgow St - Between River Rd and Oxley St	H2	H2	H2	H2	H3	H5
W06	Meadow La - Between Shirley Rd and Rocklands Rd	H2	H3	H3	H4	H5	H6
W07	River Rd - Between Eastview St and Russell St	H3	H3	H3	H3	H3	H5
W08	Rocklands Rd near Gillies St	H1	H1	H1	H1	H3	H6
W09	Woolcott St - Between Euroka St and Larkin St	H3	H5	H5	H5	H5	H6

Table 33: Flood Affectation of Key Routes based on Hazard – South Model

ID	Location (refer Figure 29)	20% AEP	10% AEP	5% AEP	2% AEP	1% AEP	PMF
S01	Angelo St - Between Berry St and McLaren St	H1	H1	H1	H1	H5	H6
S02	Aubin St	H1	H1	H1	H1	H1	H6
S03	Clark Rd - Between McDougall St and High St	H1	H1	H1	H1	H1	H6

ID	Location (refer Figure 29)	20% AEP	10% AEP	5% AEP	2% AEP	1% AEP	PMF
S04	Clark Rd - Between Margaret St and Kurraba Rd	H2	H2	H3	H4	H5	H6
S05	Eaton St - Between Nook La and Montpeller St	H1	H1	H5	H5	H5	H6
S06	Falcon St - Between Military Rd and Merlin St	H1	H1	H1	H1	H1	H2
S07	High St - Between Little Alfred St and Hipwood St	H1	H1	H1	H1	H1	H5
S08	Hipwood St - Between McDougall St and High St	H1	H1	H1	H1	H1	H6
S09	Kurraba Rd - Between Neutral St and Holdsworth St	H1	H1	H2	H2	H3	H5
S10	Kurraba Rd	H1	H1	H1	H1	H5	H5
S11	Lower Wycombe Rd	H1	H5	H5	H5	H5	H6
S12	Manns Avenue	H1	H5	H5	H5	H5	H6
S13	Military Rd - Between Falcon St and Park Av	H1	H1	H1	H1	H1	H1
S14	Miller St - Between Pacific Hwy and McLaren St	H1	H1	H1	H1	H1	H5
S15	Mount St - Between Pacific Hwy and Arthur St	H1	H1	H5	H5	H5	H6
S16	Pacific Hwy - Between McLaren St and High St	H1	H1	H1	H1	H3	H5
S17	Phillips St	H1	H1	H1	H1	H1	H5
S18	Rawson St - Between Kurraba Rd and Darley St	H1	H2	H3	H3	H3	H6
S19	Walker St - Between Pacific Hwy and Berry St	H1	H1	H1	H1	H1	H6

The results show that several routes become impassable for the rarer events such as the 1% AEP and PMF, hence evacuation is not possible and a 'shelter-in-place' policy would be more appropriate for the affected properties. Key routes located at the upstream catchment divide, i.e. Military Road and Falcon Street, are generally trafficable and not flood-affected during major flood events.

Analysis of the rate of rise of flood level was also undertaken and the results are presented in Chart 9 and Chart 10 for selected key routes which experience flooding representative of the LGA, i.e. Kurraba Rd/Clark Rd Intersection (ID: S04) and Miller St (ID: S14). The charts show a relatively short time to peak flood level for the various critical storm events, i.e. generally less than 1 hour, which confirms the dominating catchment flood behaviour is flash flooding. This indicates the lack of warning time available for residents in the LGA to evacuate on the road during a flood event.

Chart 9: Rate of Rise of Flood Level on Kurraba Rd/Clark Rd Intersection based on Critical Events

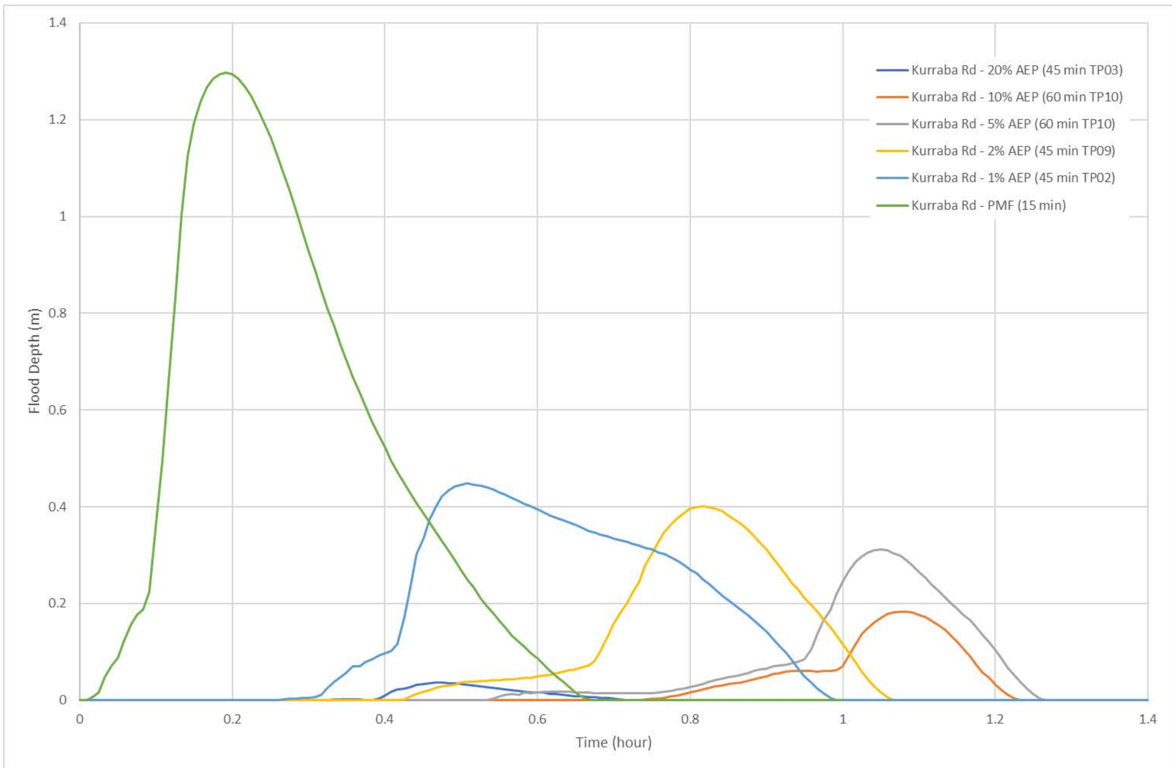
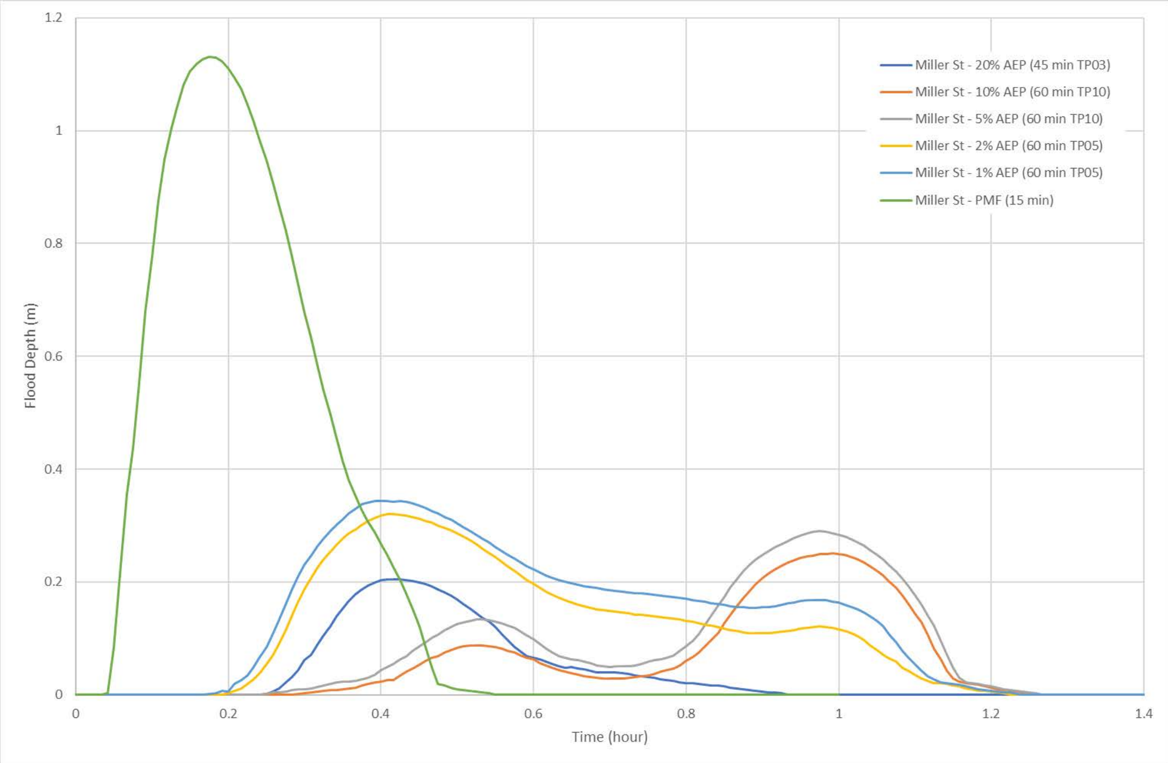


Chart 10: Rate of Rise of Flood Level on Miller St Depression based on Critical Events



6.4.2 Risk to Sensitive Land Use

The current study has assessed the flood liability of sensitive infrastructure such as hospitals, education facilities and aged care facilities.

An assessment of the flood affectation of medical facilities found that these are located outside of the PMF flood extent (see Table 34).

Table 34: Flood Affectation at Medical Facilities

Medical Facility	Location	Flooded
Mater Hospital	25 Rocklands Road, North Sydney	Not flooded
Crows Nest Day Hospital	1/22 Clarke Street, Crows Nest	Not flooded

Table 35 presents the flood affection of the aged care facilities within the LGA. Some are flooded in the PMF event and it is important that these facilities have an effective flood plan in place.

Table 35: Flood Affectation at Aged Care Facilities

Aged Care Facility	Location	Flooded
Lansdowne Gardens	11 Manns Avenue, Neutral Bay	Flooded and access issues in PMF
Lansdowne Gardens	58 Wycombe Road, Neutral Bay	Not flooded
James Milson Village	4 Clark Road, North Sydney	Flooded and access issues in PMF

Aged Care Facility	Location	Flooded
Bougainvillea Strata Retirement Village	7-17 Waters Road, Neutral Bay	Not flooded

Table 36 and Table 37 present the flood affectation at early learning facilities and educational facilities respectively within the North Sydney LGA. Typically, these locations are not flooded or first experience flooding in the PMF event. Of note are the SDN North Sydney Children's Education and Care Centre and North Sydney Family Day Care which can experience significant flood depths and high hazard flows in rare events and an effective flood plan is necessary at those locations.

Table 36: Flood Affectation at Early Learning Facilities

Early Learning Facility	Location	Flooded
KU Greenwood Children's Centre	Corner Blue Street & Pacific Highway, North Sydney	Not flooded
Greenwood Childcare Centre	36 Blue Street, North Sydney	Not flooded
Guthrie Child Care Centre	25 Shirley Road, Wollstonecraft	Not flooded
Guardian Childcare & Education Walker Street	141 Walker Street, North Sydney	Not flooded
Goodstart Early Learning North Sydney – Berry Street	3/20 Berry Street, North Sydney	Affected by PMF overland flow
Crows Nest Kindergarten	82 Hayberry Street, Crows Nest	Not flooded
Active Kids Group Cremorne	37 Murdoch Street, Cremorne	Not flooded
SDN North Sydney Children's Education and Care Centre	8 Rodborough Avenue, Crows Nest	Flooded and access issues in PMF
Only About Children Cremorne	15-19 Parraween Street, Cremorne	Not flooded
North Sydney Family Day Care	96 Bank Street, North Sydney	Flooded and access issues in PMF
Toybox Early Learning	1/75 Miller Street, North Sydney	Not flooded
Only About Children North Sydney	65 Berry Street, North Sydney	Affected by PMF overland flow
Neutral Bay Kindergarten	29A Waters Road, Cremorne	Not flooded
Goodstart Early Learning North Sydney - West Street	8 West Street, North Sydney	Not flooded
Neutral Bay Pre-School	77 Shellcove Road, Neutral Bay	Affected by PMF overland flow
St Thomas North Sydney Preschool	McLaren St, North Sydney	Not flooded
Happy Kids Family Day Care (Cammeray)	6 Massey St, Cammeray	Partially flooded in PMF
KU Cammeray Preschool	22 Warwick Avenue, Cammeray	Not flooded

Table 37: Flood Affectation at Educational Facilities

Education Facility	Location	Flooded
Cammeraygal High School	192 Pacific Highway, Wollstonecraft	Not flooded
Anzac Park Public School	2 Anzac Avenue, Cammeray	Partially flooded in PMF
Cameragal Montessori School	Corner Walker & Lavender Street, Lavender Bay	Not flooded
Cameragal Montessori School	12 Miller Street, North Sydney	Affected by PMF overland flow
Cameragal Montessori School	1/181 Blues Point Road, North Sydney	Affected by PMF overland flow
Shore School	Blue Street, North Sydney	Partially affected by PMF overland flow
Shore Preparatory School	22 Edward Street, North Sydney	Affected by PMF overland flow
North Sydney Public School	Bay Road, Waverton	Not flooded
Neutral Bay Public School	Ben Boyd Road, Neutral Bay	Not flooded
Cammeray Public School	Palmer Street, Cammeray	Not flooded
St Mary's Catholic Primary School	40 Ridge Street, North Sydney	Not flooded
Marist College North Shore	270 Miller Street, North Sydney	Flooded and access issues in PMF
Wenona School	176 Walker Street, North Sydney	Affected by PMF overland flow
Loreto Kirribilli	85 Carabella Street, Kirribilli	Partially affected by PMF overland flow
Redlands Junior Campus	2 Allister Street, Cremorne	Affected by PMF overland flow
The Margaret Roberts Preparatory School	2 Allister Street, Cremorne	Affected by PMF overland flow
St Aloysius' College	47 Upper Pitt Street, Kirribilli	Affected by PMF overland flow
St Aloysius' College Junior School	29 Burton Street, Kirribilli	Not flooded

Education Facility	Location	Flooded
Redlands	272 Military Road, Cremorne	Not flooded
Cammeraygal High School, West Street Campus	149 West Street, Crows Nest	Affected by PMF overland flow
Monte Sant' Angelo Mercy College	128 Miller Street, North Sydney	Not flooded

6.4.3 Risk to Critical Infrastructure/Public Facilities

Flood damage to critical infrastructure and public facilities can significantly contribute to the total costs of a flood event as well as disturbing the day-to-day operations of the community. Given this, Table 38 presents the flood affectation of critical infrastructure and public facilities within the LGA. Of note are the Forsyth Park Community Centre and Ausgrid Crows Nest Zone Substation, both of which are subject to inundation in the PMF flood event. The majority of the other community centres are not flood affected in the PMF and would serve as suitable locations for evacuation centres during a major flood event.

Table 38: Flood Affectation to Critical Infrastructure/Public Facilities

Infrastructure	Location	Flooded
Forsyth Park Community Centre	2B Montpelier Street, Neutral Bay	Flooded in PMF
McMahons Point Community Centre	165 Blues Point Road, McMahons Point	Affected by PMF overland flow
North Sydney Community Centre	220 Miller Street, North Sydney	Partially affected by PMF overland flow
Crows Nest Centre	2 Ernest Place, Crows Nest	Not flooded
Fred Hutley Hall	200 Miller Street, North Sydney	Not flooded
Neutral Bay Community Centre	190-192 Military Road, Neutral Bay	Not flooded
Kirribilli Neighbourhood Centre	16-18 Fitzroy Street, Kirribilli	Not flooded
SES – North Sydney Unit	10 Balls Head Drive, Waverton	Not flooded
Electrical Substations		
Ausgrid Crows Nest Zone Substation	23 Albany Street, Crows Nest	Flooded in PMF
North Sydney Zone Substation	3 Ward Street, North Sydney	Affected by PMF overland flow

6.5 Flood Emergency Response

Flood Emergency Response pertains to a set of classifications that advise how a community is affected by flooding and informs the decision-making process during a flood event. These classifications consider the full range of flood behaviour up to the PMF event. Factors such as isolation, evacuation routes, effective warning times, the rate of rise of floodwaters and the duration of isolation are considered when determining the classification.

In the current study, Flood Emergency Response classifications have been undertaken in accordance with the Australian Emergency Management Handbook 7 and detailed in Table 39.

Table 39: Flood Emergency Response Classifications

Primary Classification	Secondary Classification	Tertiary Classification
Flooded (F) The area is flooded in the PMF	Isolated (I) Isolated from community evacuation facilities by floodwater and/or impossible terrain as waters rise during events up to the PMF. Likely to lose services during a flood.	Submerged (FIS) Where all land in isolate area will be fully submerged in PMF after becoming isolated.
		Elevated (FIE) Where there is a substantial amount of land in isolated areas elevated above the PMF.
	Exit Route (E) Areas that are not isolated in the PMF and have an exit route to community evacuation facilities.	Overland Escape (FEO) Evacuation from the area relies upon overland escape routes that rise out of the floodplain
		Rising Road (FER) Evacuation routes from the area follow roads that rise out of the floodplain.
Not Flooded	Indirect Consequence (NIC) Areas that are not flooded but may lose services.	
	Flood Free Areas that are not flood affected or indirectly affected by flooding.	

Emergency response classifications typically pertain to areas impeded by mainstream flooding where there are significant warning times allowing for preventative action to be taken. In areas predominantly affected by overland and flash flooding, such as the North Sydney LGA, preventative action cannot be undertaken due to a lack of flood warning time (effectively zero). In the event of flooding, generally, residents are safest indoors and should avoid walking or driving in flood waters. Therefore, in the North Sydney LGA, emergency response classifications will be most useful for agencies, such as the SES, as a response to the aftermath of a flood.

Figure 29 presents the emergency response classifications based on Table 39 for the North Sydney LGA. Much of the LGA was found to be Flood Free, Indirect Consequence (NIC) or Flooded with a Rising Road Exit Route (FER). Along the main overland flow paths, there are generally areas of Flooded, Isolated and Submerged (FIS) or areas with an Overland Escape Exit Route (FEO).

In areas of FEO, road access would not be possible for the duration of the flood event however access can be achieved overland (i.e. on foot). Due to the short duration of these events (for much of the catchment – peak duration will be measured in minutes), residents in these areas would generally be safest waiting for floodwaters to recede before exiting their properties.

In areas of FIS, road access would be cut prior to properties being inundated by floodwaters. The flooding hotspots discussed in Section 6.2 are located within areas classified as FIS.

The Flood Emergency Response classifications herein are derived for the PMF flood event only. Due to the flash flood nature of the catchment the event magnitude is unknown at the time of the event. If those responding to a flood used Emergency Response classifications derived for a smaller event than that which is occurring, these classifications may be incorrect. A key example of this is the classification of Flooded, Isolated, Elevated (FIE) and Flooded, Isolated, Submerged (FIS). The classifications derived for a smaller event may define areas as FIE meaning that they lose flood access however they are not inundated. In larger events however, these FIE areas may become inundated meaning that their classification changes to FIS and as such their affectation is more severe. Thus, given the flash flood nature of the catchment and the unknown event magnitude, it is precautionary to only use the PMF emergency response classifications.

6.6 Floodplain Risk Management Measures

6.6.1 Overview

Assessment of flood risk mitigation measures is one of the key outputs of the current study, along with assessment of the LGA flood risk. Flood risk mitigation measures are broadly defined as interventions that Council and other stakeholders can implement that will reduce, or otherwise manage, the risk of flooding in the study area. There is a wide range of measures that can be used to manage flood risk, from large-scale drainage works to non-structural interventions (e.g. planning control for new development). To determine which are best suited to a particular area, the range of measures is considered and evaluated against the nature of the flood risk. Measures that are considered to have potential to reduce flood risk are then investigated further, including hydraulic and/or hydrologic modelling if appropriate. The investigation then determines whether a measure is feasible and ranks the feasible measures for implementation priority. The recommended measures are summarised in the Floodplain Risk Management Plan (FRMP), including timing, responsibility and indicative costing.

Mitigation measures are chosen from three categories set out in the NSW Floodplain Development Manual (2005), as follows:

1. Property Modification Measures are those that modify existing properties to manage their flood risk. This includes planning-related measures such as setting minimum floor levels and zoning based on a locality's flood risk. They also include raising of floor levels, and in cases of high flood risk, voluntary purchase schemes.
2. Response Modification Measures are those that improve the ability of people to plan for and react to flood events. They often involve emergency services and can be targeted at different phases of a flood, e.g. preparation, response and recovery.
3. Flood Modification Measures are those that change the depth, level, flow or velocity of floodwaters, via structural measures. They are often used to exclude flow from an area (e.g. a levee bank) or to reduce the peak flow (e.g. detention basin).

All measures will have different effects for different sizes of flood. For example, measures that give benefit in the 10% AEP flood may have negligible benefit in the 1% AEP event.

Table 40 gives an overview of typical measures in each category and their advantages and disadvantages, based on the NSW Floodplain Development Manual (2005).

Table 40: Overview of typical mitigation measure types

	Measure	Areas of Application	Advantages	Disadvantages
Property Modification	Land-use Planning	Can be used in any area of development on flood-prone land but is particularly effective where new areas of development are planned.	In areas of new development, can avoid large-scale flood risk by incorporating flood risk mitigation into the development process.	Limited use when development is not planned as controls or zoning are not enforced. In such cases the measure will only be effective in the long term. Stringent controls on development may not be accepted by community.
	Voluntary Purchase	Where residential properties are exposed to high hazard flow that poses risk to life or high financial cost.	Can significantly reduce flood risk by removing people from high risk flooding.	Expensive relative to other options and requires consent of each residence.
	Voluntary Floor Raising	Where properties are exposed to low hazard and localised flow that can be avoided with higher floor levels.	Can significantly reduce cost of flooding in an area by reducing above-floor flooding. Avoids relocation of people.	Generally only suitable for low hazard flow. Not all construction types are suitable for raising, and state government funding is only available for residential properties that meet certain criteria.
	Flood Access	Where isolation during a flood event is considered hazardous.	Can reduce risk to life by provision of access routes out of a flooded area.	Does not reduce damage to built assets. Limited to areas with isolation and access issues.
Response Modification	Flood Education, community readiness	Where a community's knowledge of flooding can be improved in order to reduce their flood risk.	Can equip community with best response/recovery plan for flooding, often cost-effective.	Hard to ensure 100% of community is reached, limited benefit in particularly high hazard areas.
	Flood Prediction and Warning	Where rainfall and flooding in a catchment can be forecast or	Can be used to initiate complete evacuation or other preparation measures.	Limited use in small catchments, warnings may be misinterpreted, does not reduce risk to fixed assets (e.g. houses).

	Measure	Areas of Application	Advantages	Disadvantages
		measured and warning sent to downstream areas.		
	Recovery Planning	Where recovery from a flood can be significantly improved.	Designate responsibilities between agencies involved including Council, SES, community and insurers.	Focuses on the aftermath of a flood event so generally used in conjunction with other measures.
Flood Modification	Flood Mitigation Dams	Where a larger creek or river has available land to detain flood flow.	Can completely remove instance of common floods.	Often severe environmental impacts, requires large areas of land.
	Retarding Basins	Where an overland flowpath or small creek can be detained before it enters an urban area.	Reduces the flood peak and therefore flood levels in urban areas.	Requires large area of land, can be hazardous during a flood if a multi-use space.
	Levees	Where a creek or river can be blocked from a developed area.	Can protect against a range of floods, can be straightforward design and construction.	Level of protection often overestimated, can be overtopped and fail. Often impacts properties outside the levee.
	Bypass Floodways	Where there is land available with suitable topography to create a bypass channel for a creek or river.	Can reduce flooding in an urban area by diverting flow during a flood.	Requires large area of land and only suited to some floodplain topographies. May impact areas downstream.
	Channel Modifications	Where a creek or river is particularly constricted or otherwise inefficient in conveying floodwaters.	Can reduce peak flood level by improving conveyance along a section of channel.	Often significant impacts on environment and natural amenity. May impact areas downstream.

As described previously, all measures have the common disadvantage of having limited benefit in extreme floods, or in floods larger than their design event. Similarly, all measures must be maintained, either physically in the case of built measures, or renewed and updated in the case of flood education, planning controls and other interventions.

Property modification measures are presented in Section 6.7, response modification measures are presented in Sections 6.8 whilst flood modification options are presented in Section 6.9.

6.7 Property Modification Measures

Property Modification (PM) measures are those that modify existing properties, or future development in the area, to manage the area's flood risk. These measures tend to be either interventions for specific properties with high flood risk, such as house raising or voluntary purchase (few if any suitable examples in the LGA), or broader policy changes that gradually reduce flood risk as development occurs (more applicable to this LGA).

6.7.1 Inclusion of Flood Related Policy in the LEP (PM-01)

Having identified that a significant number of properties are affected by flooding, clause 5.21 to the LEP will come into force upon the adoption of the finalised version of this Study and Plan. Consideration should also be given to determine if the optional model clause 5.22 under the Standard Instrument LEP and associated flood maps should be incorporated into the LEP via the planning proposal process. This will assist in clearly establishing those properties which are at risk of flooding to consider additional matters when they are to be redeveloped and ensure that risks to future habitants are prevented or minimised. Optionally this could also include more specific controls for sensitive and/or critical uses that occur anywhere within the PMF extent. The LEP would therefore set the tone and the inclusion of standard language defining the lots/properties flood related development controls may apply to is of great benefit to Council as they seek to manage flood risk moving forward. Typically included with the LEP is the definition of the Flood Planning Area (FPA) and Flood Planning Level (FPL) which are discussed further in the following sections.

6.7.1.1 Flood Planning Area

The Flood Planning Area (FPA) identifies those properties that are subject to flood related development controls. The FPA is a key planning tool for managing and mitigating flood risk in an LGA.

The process of deriving the FPA varies depending on the dominant flood mechanism in a study area, with a different approach generally used for areas of mainstream flooding compared to areas of overland flow flooding. The Floodplain Development Manual (2005) recommends the FPA be derived from the 1% AEP flood level plus 0.5 m freeboard level, whereby the area of land below this level is subject to flood related development controls. For the North Sydney LGA, which is affected primarily by overland flow flooding, the 1% AEP flood level plus 0.5 m freeboard is generally much higher than the PMF level. Hence, adopting this level criterion for defining the FPA will result in an extent much larger than the PMF, and risk imposing flood-related planning controls on properties which are not subject to flood risk. Therefore, an alternative method to establish the FPA is proposed.

The initial criteria adopted for the FPA for the North Sydney LGA were based on what was typically used in other Sydney Metropolitan LGAs:

- Property lots with inundation depth greater than or equal to 0.15 m covering more than 10% of the cadastral lot; and
- Where the building extent covers most/all of the cadastral lot, property lots with inundation depth greater than or equal to 0.3 m adjacent to the cadastral lot.

Using the aforementioned criteria, a preliminary set of properties were identified using the 1% AEP design flood results and their flood affectation was verified during a ground truthing exercise carried out in late 2019. Following the site visit, further understanding was gained on the different flood mechanisms which can affect the individual properties within the LGA and the FPA criteria were refined accordingly. The refined criteria, which utilise the floodways/flow conveyance areas identified in Section 4.10, were discussed with Council and DPIE prior to adoption for the current study. The FPA was then developed based on two refined criteria, which replace the original two criteria described above. The refined criteria are:

- Category A (514 properties): Located on/in the proximity of an identified/designated floodway; and
- Category B (208 properties): Located on/adjacent to a localised flood with significant flood depth or flow (that is not part of the identified/designated floodway).

The properties which form the FPA are shown in Figure 31.

6.7.1.2 Flood Planning Level

The Flood Planning Level (FPL) is generally used to set minimum building floor levels for new developments, in addition to defining the FPA extent. As discussed in Section 6.7.1.1, whilst an FPL based on the 1% AEP flood level plus 0.5 m freeboard is suitable for mainstream flooding, its application to the North Sydney LGA would be onerous particularly for areas affected solely by overland flow flooding.

While the 1% AEP flood level could be adopted as the baseline for setting the FPL, the freeboard for areas affected by overland flow flooding can be reduced based on the land use type, e.g. lower freeboard for commercial properties could be applied due to lesser flood risk to life when compared to habitable residential properties. The FPL should therefore be defined according to the different land use type within the LGA and incorporated as part of Council's controls including the LEP and DCP. For properties not included as part of the FPA, it may be necessary to enforce a nominal level above surrounding ground for new developments especially those with underground basements. This is done to reduce exposure of the new developments to potential local drainage or stormwater issues which are not the subject of the study herein.

Recommendation: The inclusion of flood related policy in the LEP as well as the adoption of the FPA and FPL are recommended as actions in the Floodplain Risk Management Plan.

6.7.2 Adoption of Matrix-style Development Control Plan (PM-02)

Council's Development Control Plan (DCP) is designed to support the implementation of Council's LEP and typically contains more detailed controls. It is recommended that the DCP be amended to incorporate controls relating to the development of flood-prone land that consider both the level of flood risk and the type of development. A planning matrix consisting of controls for the different development types and flood risk precincts is commonly adopted by numerous NSW councils. The flood-related controls in such DCPs typically address the following matters:

- Floor level or FPL;
- Building components and materials;
- Structural soundness;
- Flood affectation (this includes controls that ensure development does not direct flow to neighbouring lots, or worsen flooding for others in any other way);
- Evacuation or property access; and
- Management and design.

Recommendation: The adoption of a matrix-style planning controls in Council's DCP is recommended as an action in the Floodplain Risk Management Plan.

6.7.3 Voluntary Purchase

In a situation where it is impractical or uneconomical to mitigate high hazard flooding from properties, it may be necessary to acquire the affected properties and undertake demolition to remove them from the floodplain. This would remove residents from the high-risk areas and restore the hydraulic capacity of the floodplain. The purchase of such properties should be at an equitable price and only where voluntarily offered. Generally, voluntary purchase has minimal impacts on the environmental though this scheme can have significant economic and social costs.

Recommendation: This option is not supported in the Floodplain Risk Management Plan as there is no existing property within the LGA which is subject to extreme risk of flooding or loss of life. Further, such a scheme would be costly for this LGA and is not warranted given that more cost-effective flood mitigation options are available.

6.7.4 Voluntary Floor Raising

This measure can be undertaken to raise habitable floor levels and eliminate above floor flooding for affected properties. It is suitable mainly for timber or non-brick single storey buildings and for properties generally located in low hazard areas. The building structure must be able to withstand loadings from floodwaters and debris. Even though the raised building provides safe refuge to residents during a flood event, the risk to life remains present should residents choose to exit the building or a medical emergency occurring during the flood event. For properties located in high hazard areas, rare floods could still cause inundation of the building should the floor levels not be sufficiently raised.

Recommendation: The option is not considered in the Floodplain Risk Management Plan as most properties within the LGA are of slab-on-ground construction and the shallow nature of overland flow flooding means comparatively cost-effective measures such as flood proofing are available.

6.7.5 Flood Proofing (PM-03)

Flood proofing can be undertaken to seal all building entry points such as doors and windows from floodwaters. Both temporary and permanent flood proofing methods are available with the temporary ones being sandbags, portable flood barriers, whilst permanent ones being flood gates, sealing of gaps between brick works and electrical wiring insulation. This measure is generally less expensive compared to other property modification measures and causes less disruption. The effective deployment of temporary flood proofing measures would rely on the experience and knowledge of the user as well as sufficient warning time before the onset of flooding. As the LGA experiences mainly flash flooding, this is generally not possible.

Recommendation: Permanent flood proofing measures are considered as an option in the Floodplain Risk Management Plan.

6.7.6 Property Modifications

Modifications can be made to flood-affected properties either to manage overland flows through the property or strengthening the building to provide shelter and reduce flood risk to the residents. For the former, this can be in the form of adjustment to walls and fences within the property or provision of an easement to maintain continuity of overland flow paths. This, however, may have knock on effects on neighbouring properties which may prompt adjustment on neighbouring properties as well. In terms of building strengthening, this is undertaken to provide a structurally stable refuge for residents. Both measures, nevertheless, cannot be mandated by Council nor can Council or the State Government provide funding for these modifications. As such, any decision to employ these measures would be up to the individual property owners.

Recommendation: The option is not considered in the Floodplain Risk Management Plan as the benefits are generally localised and as such implementation of the scheme is problematic.

6.7.7 Inclusion of Flood Risk Information on s10.7 (2) & (5) Planning Certificates (PM-04)

Planning Certificates outline the relevant planning information that applies to a particular parcel of land on the date that the Certificated was issued. These Certificates are required to accompany any contract of sale of any registered parcel of land pursuant to the provisions of the Conveyancing Act, 1919 and the Conveyancing (Sale of Land) Regulation 2010.

If requested, councils are required to prepare a Planning Certificate under s.10.7 of the Environmental Planning and Assessment (EP&A) Act, 1979. There are two types of Planning Certificates:

Section 10.7(2) Planning Certificate (Basic):

Contains basic information to satisfy the requirements identified under Schedule 2 to the Environmental Planning and Assessment Regulation 2021. In particular, clause 9 to Schedule 2 prescribes the following flooding information to be provided:

9Flood related development controls

(1) If the land or part of the land is within the flood planning area and *subject to flood related development controls.*

(2) If the land or part of the land is between the flood planning area and the probable maximum flood and subject to flood related development controls.

(3) *In this section—*

flood planning area has the same meaning as in the Floodplain Development Manual.

Floodplain Development Manual means the Floodplain Development Manual (ISBN 0 7347 5476 0) published by the NSW Government in April 2005.

probable maximum flood has the same meaning as in the Floodplain Development Manual.

Section 10.7(2)&(5) Planning Certificate (Full):

Contains all information provided within a Basic Planning Certificate and any additional information that a council is of the opinion that should be provide in relation to the property.

For instance, a Full Planning Certificate may include information pertaining to the specific flood related controls that apply to the land to which the Certificate relates. The following types of information could be included:

- Design flood levels/depths specific to the property for the 5% AEP, 1% AEP and PMF events;
- Flood hazard;
- Hydraulic categorisation (e.g. floodway); and
- Associated flood mapping for the above items.

It is noted that some councils may upon request provide a "Flood Information Certificate", which only identifies flood related information applying to a particular property. This Flood Information Certificate is separate to a Planning Certificate. Where a Flood information Certificate is issued, the Council generally does not include any additional flood information on a full Planning Certificate. Due to the evolving nature of flooding impacts, resulting from changes to the built form, it is preferable to provide detailed flood information in a separate standalone Certificate, as the information presented is of a very technical nature and specific responses are required for each individual property. It also enables council to better recoup fees for services

It is recommended that to better inform stakeholders of a property's flood risk, that Council incorporate the required flooding information on both types of Planning Certificates based on the final outcomes of this Study and Plan as required under Section 10.7(2) of the EP&A Act. This could include an additional statement directing the applicant of the Planning Certificate to obtain a Flood Information Certificate for detailed information pertaining to flooding.

Alternatively, where a Full Planning Certificate under s.10.7 of the EP&A Act is requested, some or all of the previously addressed matters above could be provided within the Planning Certificate.

Once Council has a final adopted version of the Floodplain Risk Management Study and Plan, the prescribed questions under s.10.7(2) of the EP&A Act will be answered on the Planning Certificate.

These matters will only be incorporated on a Planning Certificate once this Study and Plan have been adopted in final form by Council. Despite this, Council will include an advisory note on its Full Planning Certificate information advising of the public exhibition of the Study and Plan.

Recommendation: Inclusion of relevant flood risk information on the Planning Certificates once the final version of the Floodplain Risk Management Plan is adopted by Council. In addition, that once publicly exhibited for comment, that a notation be included on all Planning Certificates that a Study and Plan are available for comment.

6.8 Response Modification Measures

Owing to the flash flood nature of flooding within the LGA, Response Modification (RM) measures have limited use in flood risk management for this study area. Simply put, flooding happens irregularly, and without any effective warning. For most if not all impacted properties the idea that a response can be planned and implemented is not realistic. The exception may be for road crossings throughout the LGA impacted by overland flow, buildings in lower catchment areas frequented by the public that are subject to high levels of flood hazard and basements (e.g. car parks) that have persistent and hazardous flooding problems.

6.8.1 Flood Prediction and Warning

BOM provides flood forecasting and warning services suited mainly for mainstream riverine flooding rather than flash flooding which is more common in the North Sydney LGA. The services may be of some benefit in alerting residents of potential flooding though there is little time to develop reliable flood warnings and also limited time for effective dissemination and response to the flood warnings. The BOM services include:

- Weather forecast – which may indicate the likelihood of heavy rain with often more than 24 hours' notice;
- Flood Watch – will typically provide +24 hours' notice of potential flooding;
- Severe Weather Warning – typically issued when heavy rain and/or flash flooding are forecast; and
- Severe Thunderstorm Warning – generally provide between 0.5 to 2 hours' notice of impending severe storms.

Recommendation: The difficulty in predicting flash flooding and lack of warning time available for the catchment means that the provision of an effective flood warning service is not possible, hence this option is <u>not considered</u> in the Floodplain Risk Management Plan.

6.8.2 Education and Flood Awareness

The community readiness in responding to a flood event is correlated to awareness of flood occurrence and issues within their neighbourhood. The residents in the North Sydney LGA have a certain level of flood awareness due to recent experience with the November 2018 storm event that caused widespread flooding, as evident from the questionnaire responses (see Section 5.1). Nevertheless, community awareness will generally decline over time and this is usually addressed by implementing a community awareness programme that runs over a period.

Given the lack of frequency of flooding, its transitory nature and the overall lack of consequence associated with it for the community in this LGA (whilst acknowledging there will be private losses), keeping flooding at the forefront of community awareness is unrealistic and perhaps also unwarranted given the level of flood risk in the catchment.

Recommendation: Community education and raising flood awareness among the residents are deemed unrealistic and unwarranted, hence this option is not considered in the Floodplain Risk Management Plan.

6.8.3 Flood Signage (RM-01)

For areas with flood liability issues especially road crossings, specific actions such as the installation of flood signage may prove of use in reminding people of existing flood issues and how best to respond to them. On flood-prone roads and locations, a warning sign and a depth marker is often used to warn vehicles and pedestrians of dangerous flooding. They are used particularly in regional areas where a creek may completely submerge a section of road when the cross-drainage is exceeded. Recent research has found that while such signage is important given the high number of fatalities due to vehicles crossing flooded roads, signage is often ineffective at persuading motorists to turn around, especially if it is static signage that does not change the warning when a flood is occurring.

In North Sydney there are a number of flood-affected roads where vehicles are likely to enter hazardous floodwaters during a flood. Overall, upgraded cross-drainage and general awareness is recommended for such locations, over warning signage. Signage in the LGA would have to be static, as there is robust advance warning of flooding occurring in the area, and as such vehicles are likely to ignore the signage as in virtually all instances it will be perceived as warning against a non-existent risk. In addition, the primary risk that signage would be aimed at, which is risk to life, is largely not present in North Sydney and is more applicable to larger creeks and rivers in other areas of Sydney and NSW.

Recommendation: Proposal for the installation of flood signage at the appropriate locations is not included in the Floodplain Risk Management Plan.

6.8.4 Local Flood Plan (RM-02)

As discussed in Section 2.4.3, the Mosman and North Sydney Local Emergency Management Plan (EMPLAN) sets out the emergency response arrangements for the North Sydney LGA. The plan identified the NSW SES as the primary agency responsible for dealing with emergencies related to storm and flash flooding. The characteristics of the LGA flood behaviour, however, do not lend themselves to a managed flood response as there is lack of effective warning time and flooding would be distributed across the LGA. Hence, the SES response would be ad-hoc or demand based.

No local Flood Plan is currently available for the North Sydney LGA and the development of such a plan in conjunction with the SES to complement the EMPLAN would be useful. The Plan should include the following as a minimum:

- Purposes and authority of the plan;
- Responsibilities of the SES Local Controller, other officers, agencies and local organisations;

- Description of the local catchment flood behaviour, hotspots of flooding and its consequences (as per Section 6.2);
- List of key emergency egress routes and their trafficability during a flood event (as per Section 6.4.1);
- List of vulnerable facilities and sensitive infrastructure (as per Sections 6.4.2 and 6.4.3); and
- List of suitable evacuation centres which are flood free and accessible by road (as per Section 6.4.3).

Recommendation: Preparation of a local Flood Plan to complement the EMPLAN is considered in the Floodplain Risk Management Plan. The Plan will include description of the responsibilities of SES and other local agencies as well as provide details of flood-related arrangements.

6.8.5 Requirement for Site Specific Flood Emergency Plans (RM-03)

This measure involves requiring a Flood Emergency Plan to form part of a development application for any lot in a high hazard area. The Plan will ensure that development in these areas includes planning for evacuation if required (including access routes) and other preparation (e.g. responsibilities and warning systems).

Such a plan should only be required as a risk mitigation measure where the lot has significant areas of high hazard (e.g. H3 to H6 flow) or evacuation constraints (e.g. not flooded but isolated).

Recommendation: Requirement for a site-specific Flood Emergency Plan imposed on new developments in high hazard flooding areas is considered in the Floodplain Risk Management Plan. The Plan will include description of responsibilities of individuals or building management as well as planning for evacuation if required.

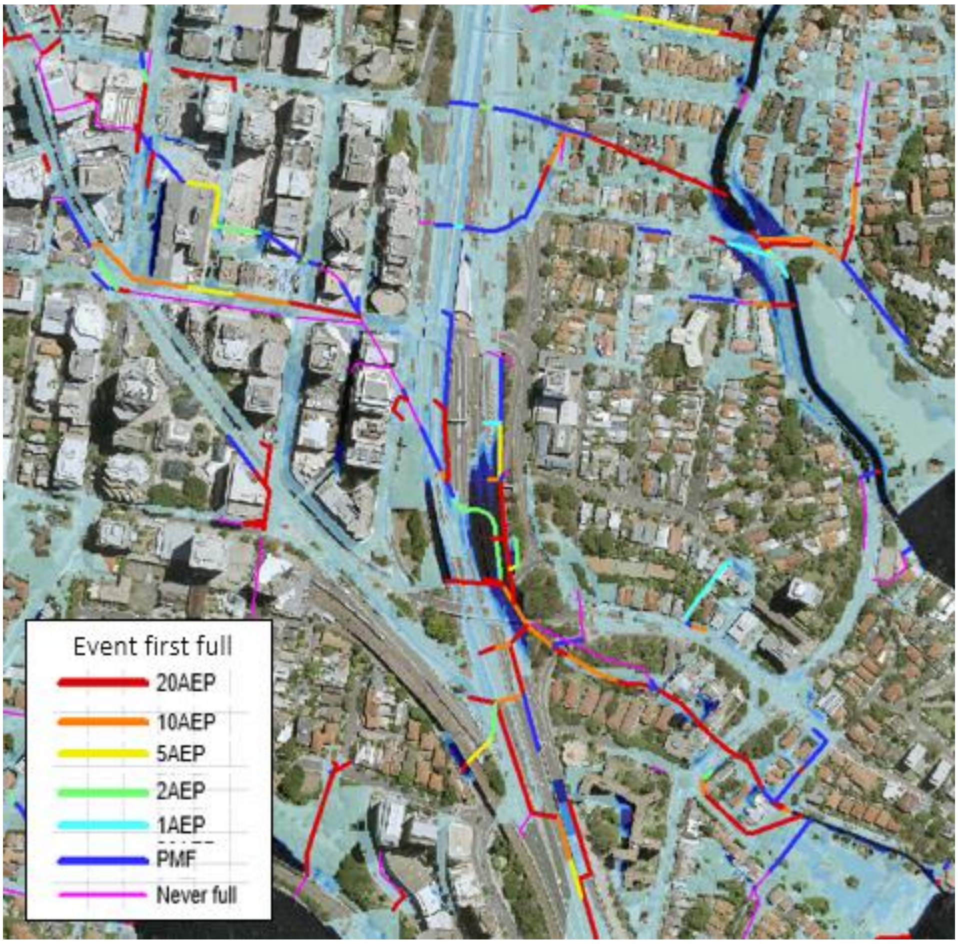
6.9 Flood Modification Measures

Flood Modification (FM) measures were developed based on assessment of the LGA flood risk and flooding hotspots, with support for measures also coming via consultation with Council and the community. As the catchment is highly urbanised and fully developed, suitable measures are limited to costly and disruptive drainage upgrades or repurposing of park lands for flood storage or attenuation of overland flows. The measures proposed herein are categorised into different implementation time horizons: short term (within the next 10 years), medium term (within the next 20 years) and long term (over 20 years).

6.9.1 Trunk Upgrade in North Sydney CBD (FM-S01)

This mitigation measure consists of increasing the capacity of the Sydney Water trunk from North Sydney CBD, through the M1 freeway, all the way to the Milson Park open channel. Model analysis of these systems found that the existing trunk has capacity as shown in Image 20. When the underground trunk reaches capacity, upstream catchment flows are conveyed above ground contributing to flood affectation around the North Sydney CBD area. The proposed upgrade introduces new pits and an additional 1.2 to 1.5 m diameter trunk line to convey more flows and the sensitivity of the surface flood behaviour to these changes was assessed.

Image 20: North Sydney CBD Sydney Water Trunk Capacity



The option was assessed using the TUFLOW model for the 1% and 5% AEP events. The location of the proposed upgrade works and the impact on the 1% AEP flood level is shown in Image 21.

Image 21: North Sydney CBD Sydney Water Trunk Upgrade (FM-S01) - 1% AEP Impact

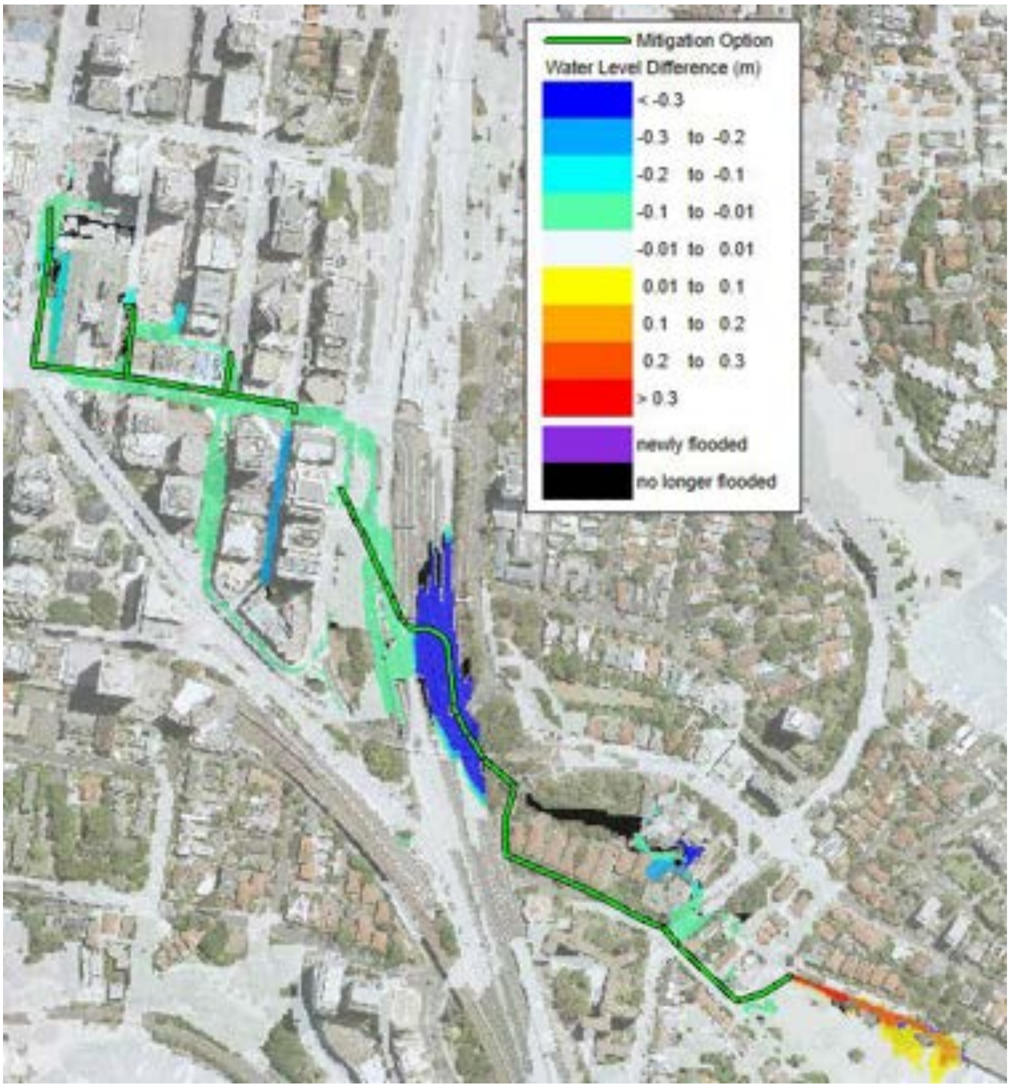


Image 21 shows that upgrading the trunk capacity has a beneficial effect on flood affectation, with areas in proximity to the trunk upgrade experiencing the most reduction in peak flood level. Peak flow in the trunk increases from 8.5 m^3/s under existing conditions to 13.5 m^3/s at the discharge point at Milson Park. The increased trunk flow results in a decrease in flood level of up to 0.27 m at Little Walker Street and up to 0.12 m at Miller Street, and an increase of up to 0.32 m in the open channel at Milson Park. The increase does not affect any properties adjacent to the park.

The option would be beneficial to road access since the inundation depth of key routes would be reduced. Several flood-affected properties would also benefit from the reduction in flood levels. If this option is adopted, further refinements can be made to the alignment of the proposed trunk upgrade and pits locations. The option has technical and administrative constraints that would need to be addressed in the planning stages. The drainage system has multiple owners (primarily Council and Sydney Water) and an agreement would need to be reached with all stakeholders, for funding, design and construction of the works. Technically, there would be significant difficulty in crossing the freeway and micro-tunnelling may be required, which is significantly more expensive than more conventional techniques. Furthermore, design and construction of sections of pipe in the CBD area would likely encounter significant issues relating to the high density of underground utilities in the area.

Recommendation: This option is recommended as a long-term measure in the Floodplain Risk Management Plan due to the significant benefit in flood level reduction achieved along the trunk alignment.

6.9.2 Bund at Warringa Park (FM-S02)

This mitigation measure consists of constructing a bund or wall structure adjacent to the open channel next to Rawson Street to prevent floodwaters from overtopping onto the Kurraba Road/Clark Road Intersection once the culvert underneath reaches capacity. There would be increased floodwaters retained within the open channel as well as on Warringa Park. This option is designed to alleviate flooding at the intersection as well as reduce flood-affectation for the commercial properties fronting the intersection. Care was taken in the hydraulic modelling to prevent floodwaters from either spilling onto Rawson Street further upstream or inundating properties located on the unprotected side of the channel.

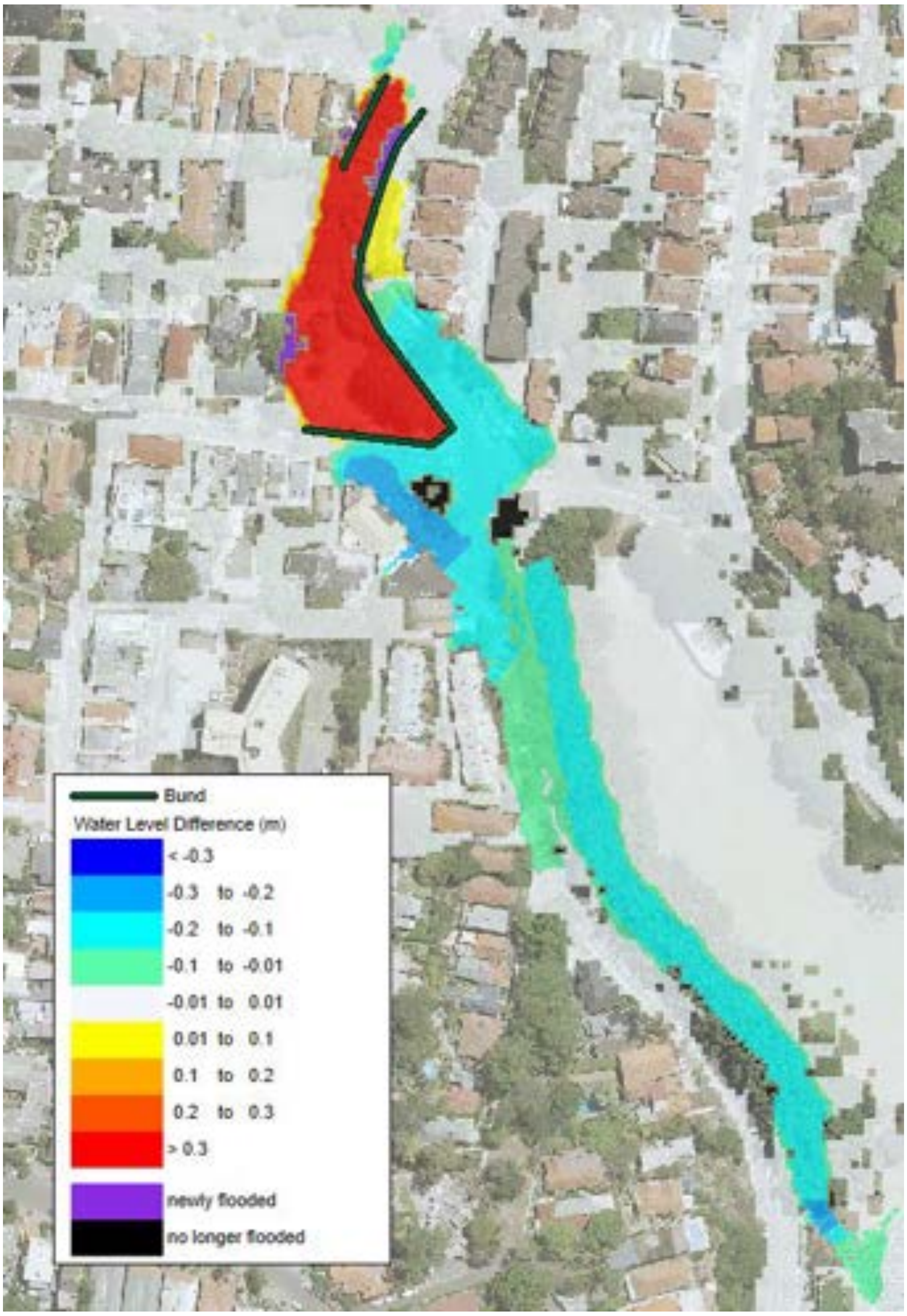
Constructing the bund or wall is technically feasible since the available land is Council owned and disruption to public should be minimal. The bund would have to be well maintained to ensure structural integrity and stability.

The option was assessed using the TUFLOW model for the 1% and 5% AEP events. The location of the bund/wall alignment and the impact on the 1% AEP flood level are shown in Image 22. Initial model runs had the bund/wall extended to 40 Kurraba Road on one end and mid-way between the Kurraba Road/Clark Road Intersection and the Rawson Street/Darley Street Intersection on the other end. The model results show that floodwaters would spill further upstream onto Rawson Street where the bund/wall terminates due to the increased peak flood levels on the channel. This causes adverse flood impacts on Rawson Street residential properties. Subsequent modelling runs had the bund/wall extending to the Rawson Street/Darley Street Intersection as shown in Image 22 with the top of bund/wall roughly matching the road elevation. Bunding is also required for the other side of the channel adjacent to 39 Darley Street as the increased peak flood levels resulted in floodwaters encroaching onto that property.

The aforementioned bund/wall design would improve flood-affectation downstream in the 1% AEP event with a peak flood level decrease of up to 0.25 m (see Image 22). However, adverse flood impacts can be found for residential properties on Rawson Street due to floodwaters spilling over the bund as well as for 39 Darley Street where the new bund/wall prevents overland flow from entering the channel. The increase in the 1% AEP peak flood levels at these locations is 0.05 m and 0.39 m respectively. It can be seen that this measure would benefit some properties at the expense of other properties and therefore this option was not pursued further.

Recommendation: This option is not recommended as a measure in the Floodplain Risk Management Plan due to the adverse impacts caused on surrounding properties despite benefits for the Kurraba Road retail shops.

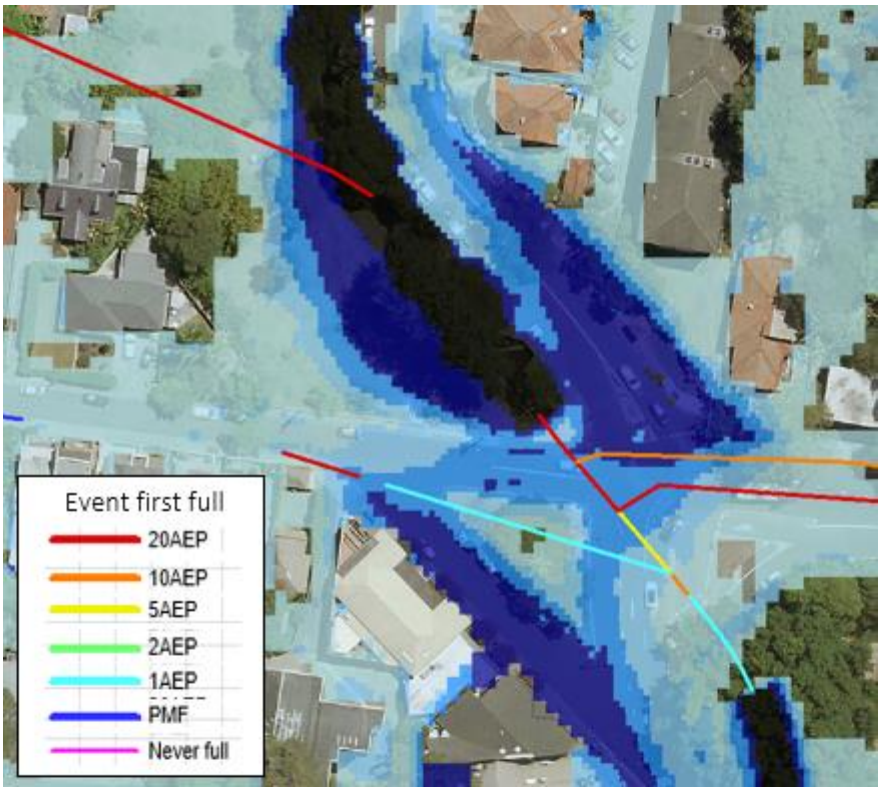
Image 22: Bund at Warringa Park (FM-S02) - 1% AEP Impact



6.9.3 Upgrade Kurraba Road Culvert (FM-S03)

This mitigation measure consists of upgrading the Sydney Water culvert under the Kurraba Road/Clark Road Intersection to alleviate the backwater effect caused by this 'choke point' as shown in Image 23. Further investigation found that the upstream section of 35 m length has a cross-sectional area smaller than the remaining section of the culvert. Hence the proposed culvert upgrade involves upsizing the smaller culvert section to provide extra conveyance capacity under the intersection.

Image 23: Kurraba Road Culvert Capacity

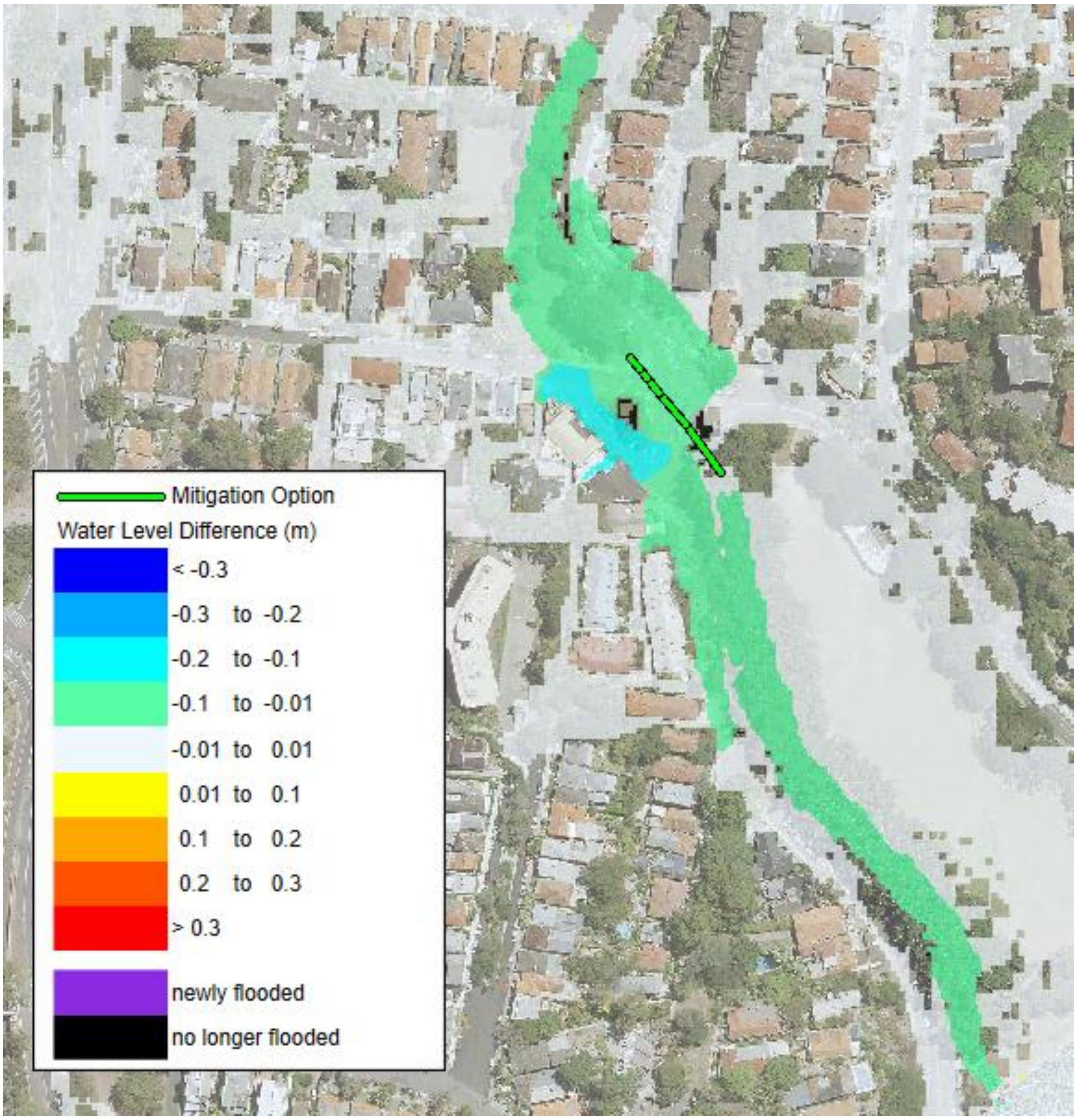


The option was assessed using the TUFLOW model for the 1% and 5% AEP events. The location of the proposed culvert upgrade and the impact on the 1% AEP flood level is shown in Image 24. The results show that increasing the culvert capacity has a beneficial effect on flood affectation for the Kurraba Road/Clark Road Intersection and its surrounds, with the retail shops fronting the intersection experiencing the most reduction in peak flood level. The culvert peak flow increases from 12.8 m^3/s under existing conditions to 16.2 m^3/s as it discharges to the open channel adjacent to Anderson Park. The increased culvert flow results in a flood level decrease of up to 0.07 m at the Kurraba Road/Clark Road Intersection and 0.13 m for the road in front of the retail shops. This improves the flood affectation for these properties.

The option would be beneficial to road access since the inundation depth of the intersection and the Kurraba Road thoroughfare would be reduced. If this option is adopted, there is potential for disruption to local traffic since the road would need to be closed to install the new culvert.

Recommendation: This option is recommended as a medium-term measure in the Floodplain Risk Management Plan due to the benefit in flood level reduction for the Kurraba Road/Clark Road Intersection and adjacent properties.

Image 24: Kurraba Road Culvert Upgrade (FM-S03) - 1% AEP Impact

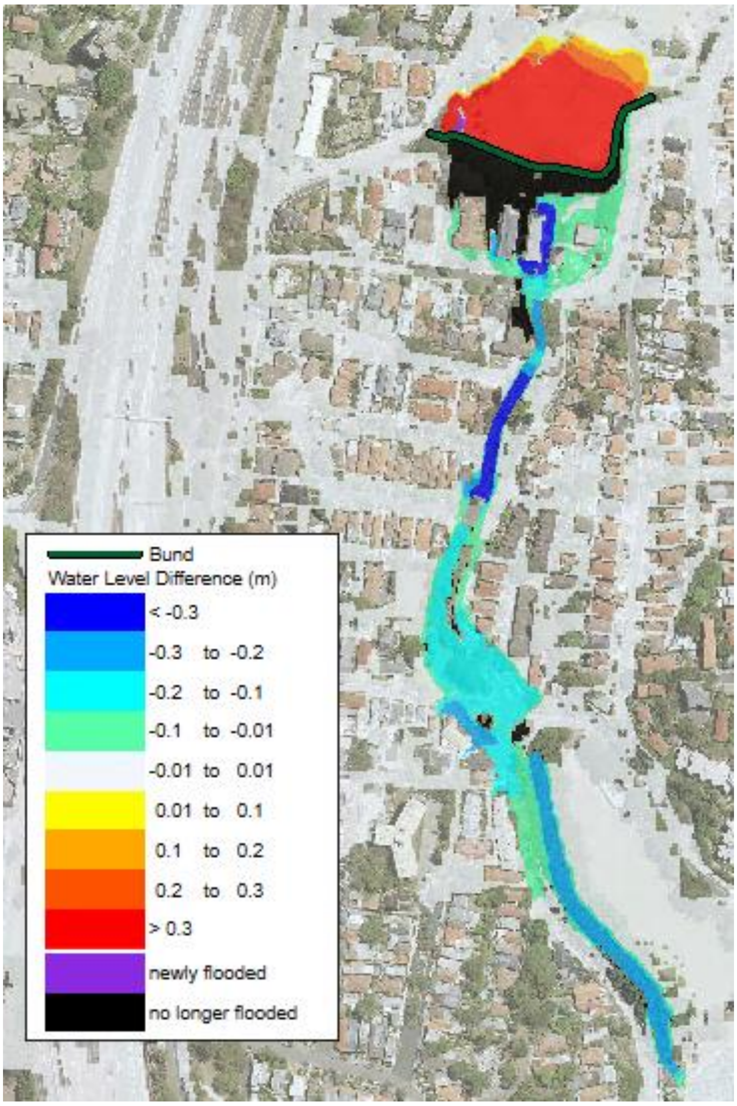


6.9.4 Bund at Forsyth Park (FM-S04)

This mitigation measure consists of constructing a bund or levee along the southern edge of Forsyth Park to stop upstream overland flows from spilling and impacting on residential properties downstream. As part of this option, Forsyth Park is converted effectively into a retarding basin to maximise floodwater retention, though an outlet can be installed to permit gradual discharge of flows once the main flood event has passed. The proposed basin volume is about 8,000 m^3 with the bund/levee averaging 1.4 m in height and up to 2.5 m height at the highest point (without freeboard) to withhold flood volume up to the 1% AEP event. Constructing the bund/levee is technically feasible since the available land is Council owned and disruption to public should be minimal. The bund/levee would have to be well maintained to ensure structural integrity and stability.

The option was assessed using the TUFLOW model for the 1% and 5% AEP events. The location of the bund/levee alignment and the impact on the 1% AEP flood level are shown in Image 25. The bund/levee would improve flood-affectation downstream in the 1% AEP event with a peak flood level decrease of up to 0.40 m along the open channel adjacent to Rawson Street and up to 0.14 m for the Kurraba Road/Clark Road Intersection as shown in Image 25. Increase in peak flood levels occurs within the Forsyth Park basin for the 1% AEP event as a result of attenuation of overland flows but does not adversely impact on any existing properties. If this option is pursued, it would be necessary to install signs within Forsyth Park to inform the community about the dual usage of the park as a flood mitigation basin during a storm event.

Image 25: Bund at Forsyth Park (FM-S04) – 1% AEP Impact

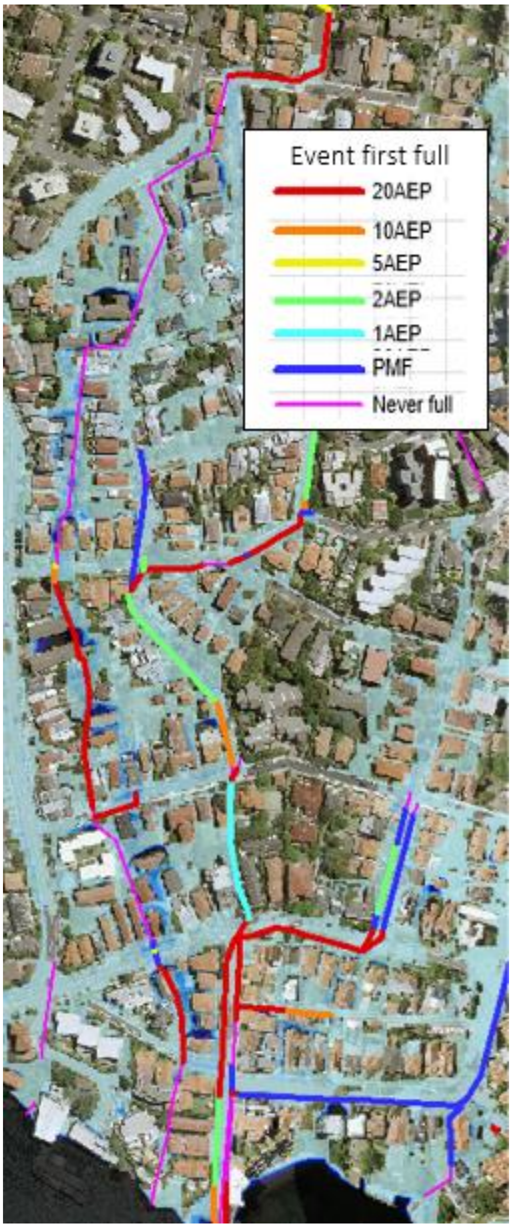


Recommendation: The option is recommended as a short-term measure in the Floodplain Risk Management Plan due to the significant reduction in peak flood levels for downstream properties and roads.

6.9.5 Trunk Upgrade from Lindsay Street to Kurraba Road (FM-S05)

This mitigation measure consists of increasing the capacity of Council's trunk system from Lindsay Street, through Kurraba Road, all the way to the harbour. Model analysis of these systems found that the existing trunk has capacity as shown in Image 26. When the underground trunk reaches capacity, upstream catchment flows are conveyed above ground forming a major overland flow path and inundating residential properties. The sensitivity of the surface flood behaviour to the capacity of the trunk was assessed by doubling its capacity from Lindsay Street to the harbour as well as introducing additional pits to capture more overland flows.

Image 26: Trunk Capacity from Lindsay Street to Kurraba Road



The option was assessed using the TUFLOW model for the 1% and 5% AEP events. The location of the proposed trunk upgrade works and the impact on the 1% AEP flood level is shown in Image 27.

Image 27: Trunk Upgrade from Lindsay Street to Kurraba Road (FM-S05) – 1% AEP Impact

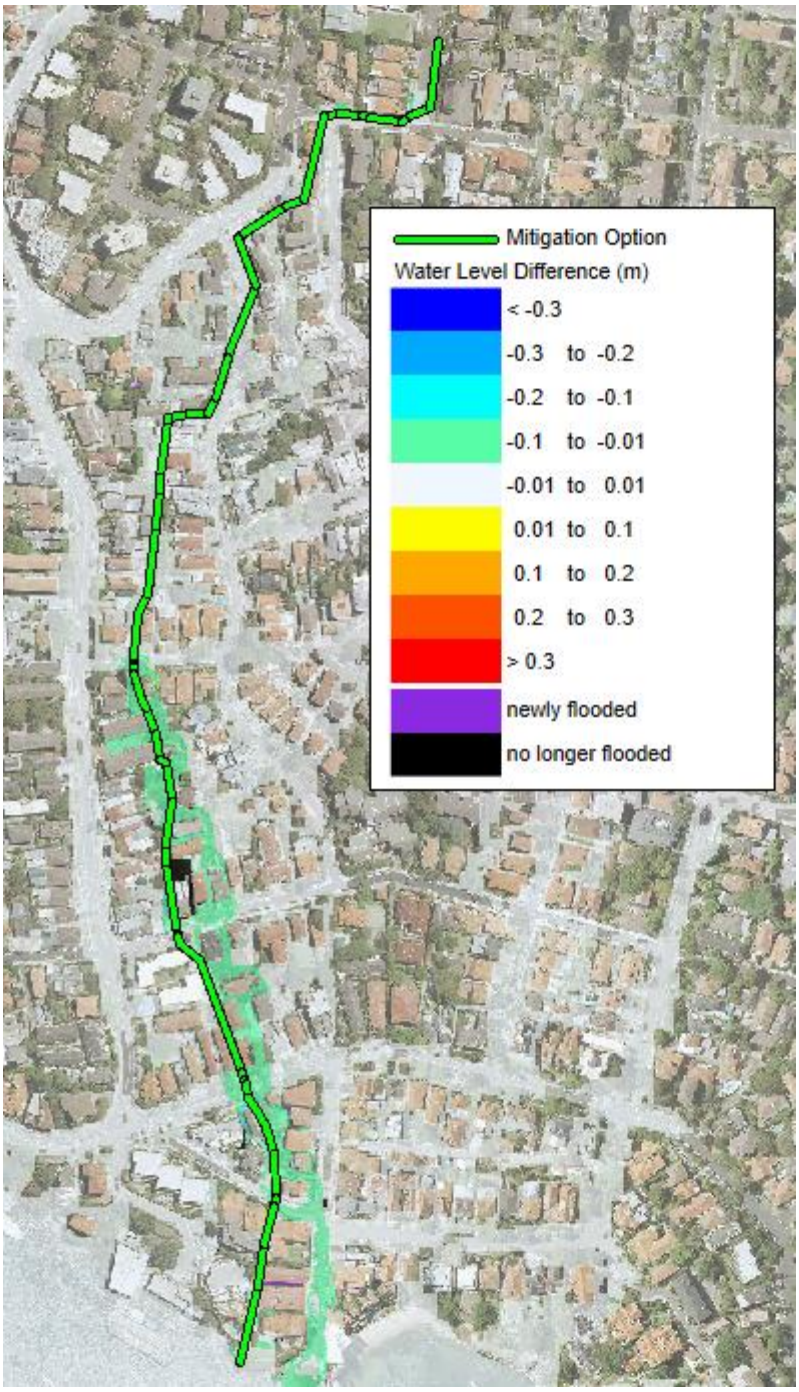


Image 27 shows that upgrading the trunk capacity has limited benefit for properties located upstream of the catchment due to the steep gradient and trunk system not running at full capacity. The reduction in the 1% AEP peak flood levels only become more pronounced as the trunk approaches the harbour, with areas in proximity to the trunk upgrade experiencing the most reduction in peak flood level. Peak flow in the trunk increases from 1.7 m^3/s under existing conditions to 2.8 m^3/s at the harbour outlet. The increased trunk flow results in a decrease in flood level of up to 0.10 m on Phillips Street, 0.12 m on Aubin Street and 0.15 m on Kurraba Road.

The option would be beneficial to road access since the inundation depth of key routes would be reduced. Several flood-affected properties would also benefit from the reduction in flood levels. If this option is adopted, further refinements can be made to the alignment of the proposed trunk upgrade and pits locations.

Recommendation: The option is recommended as a long-term measure in the Floodplain Risk Management Plan due to the benefit in flood level reduction achieved along the trunk alignment.

6.9.6 Trunk Upgrade from Yeo Street to Bogota Avenue (FM-E01)

This mitigation measure consists of increasing the capacity of Council's trunk system from Yeo Street, through Bogota Avenue to the harbour. Model analysis of these systems found that the existing trunk has capacity as shown in Image 28. When the underground trunk reaches capacity, upstream catchment flows are conveyed above ground forming a major overland flow path and inundating residential properties. The sensitivity of the surface flood behaviour to the capacity of the trunk was assessed by doubling its capacity from Yeo Street to Bannerman Street, tripling its capacity from Bannerman Street to harbour, and introducing additional pits to capture more overland flows.

Image 28: Trunk Capacity from Yeo Street to Bogota Avenue

The option was assessed using the TUFLOW model for the 1% and 5% AEP events. The location of the proposed trunk upgrade works and the impact on the 1% AEP flood level is shown in Image 29.

Image 29: Trunk Upgrade from Yeo Street to Bogota Avenue (FM-E01) – 1% AEP Impact

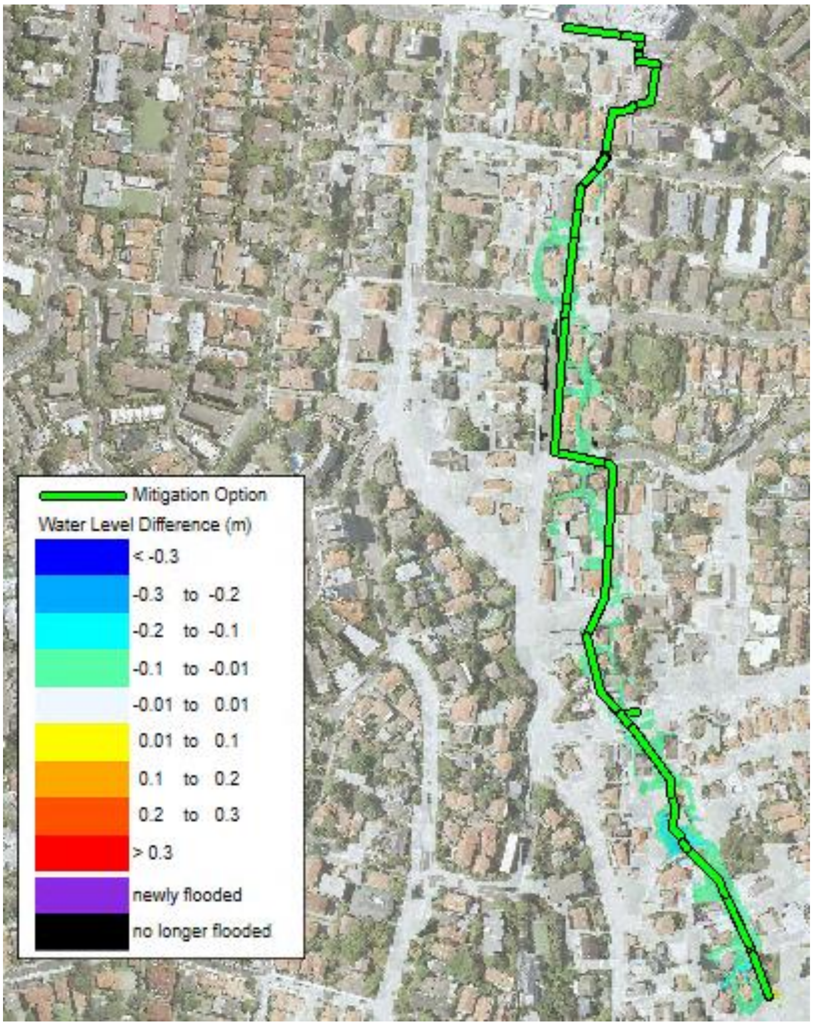


Image 29 shows that upgrading the trunk capacity has limited benefit for properties located upstream of the catchment due to the steep gradient and trunk system not running at full capacity. The reduction in the 1% AEP peak flood levels only become more pronounced as the trunk approaches the harbour, with areas in proximity to the trunk upgrade experiencing the most reduction in peak flood level. Peak flow in the trunk increases from 6.9 m^3/s under existing conditions to 9.7 m^3/s at the harbour outlet. The increased trunk flow results in a decrease in flood level of up to 0.1 m on Bennett Street, 0.07 m on Bannerman Street and 0.1 m on Bogota Avenue.

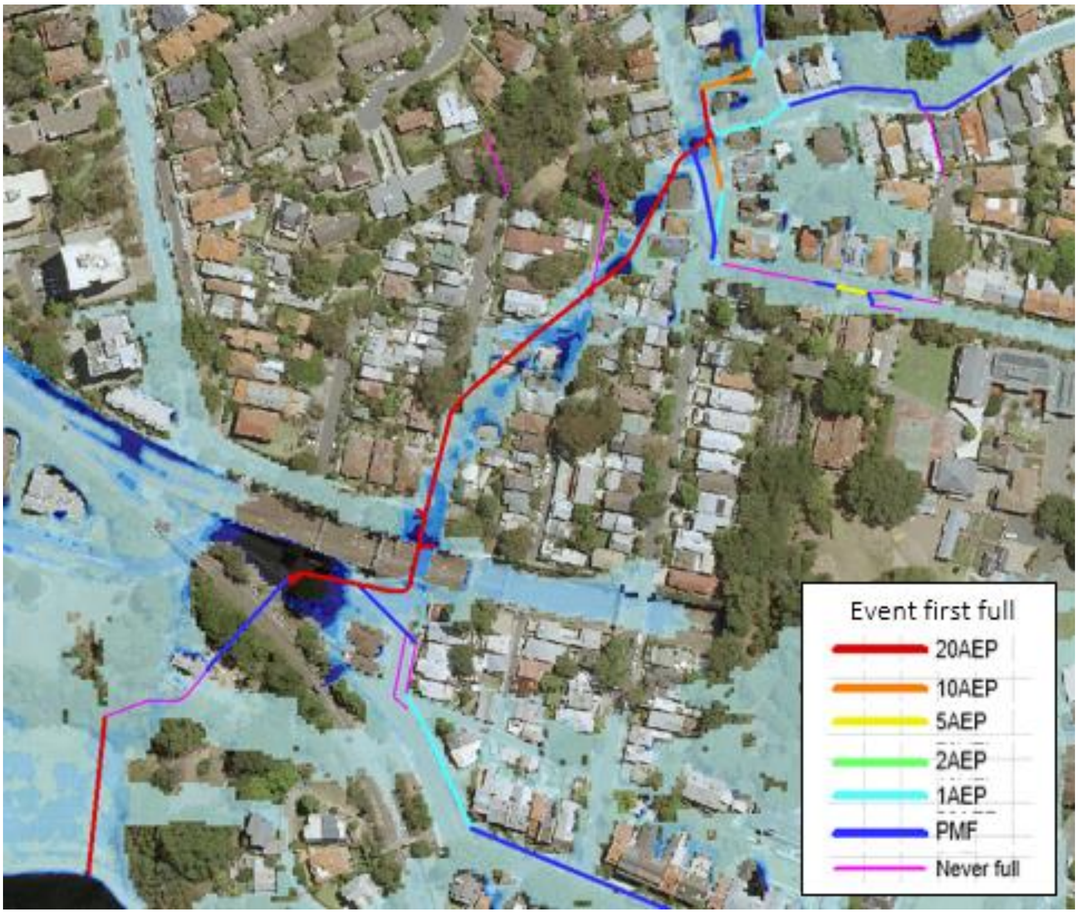
The option would be beneficial to road access since the inundation depth of key routes would be reduced. Several flood-affected properties would also benefit from the reduction in flood levels. If this option is adopted, further refinements can be made to the alignment of the proposed trunk upgrade and pits locations. In sections where the upgrade passes through private property, this would present a significant technical constraint for the design and construction of the pipe system. Wherever possible the upgrade would be placed along the roadways, parallel to the existing system.

Recommendation: The option is recommended as a long-term measure in the Floodplain Risk Management Plan due to the benefit in flood level reduction achieved along the trunk alignment.

6.9.7 Trunk Upgrade from Bank Street to Waverton Park (FM-W01)

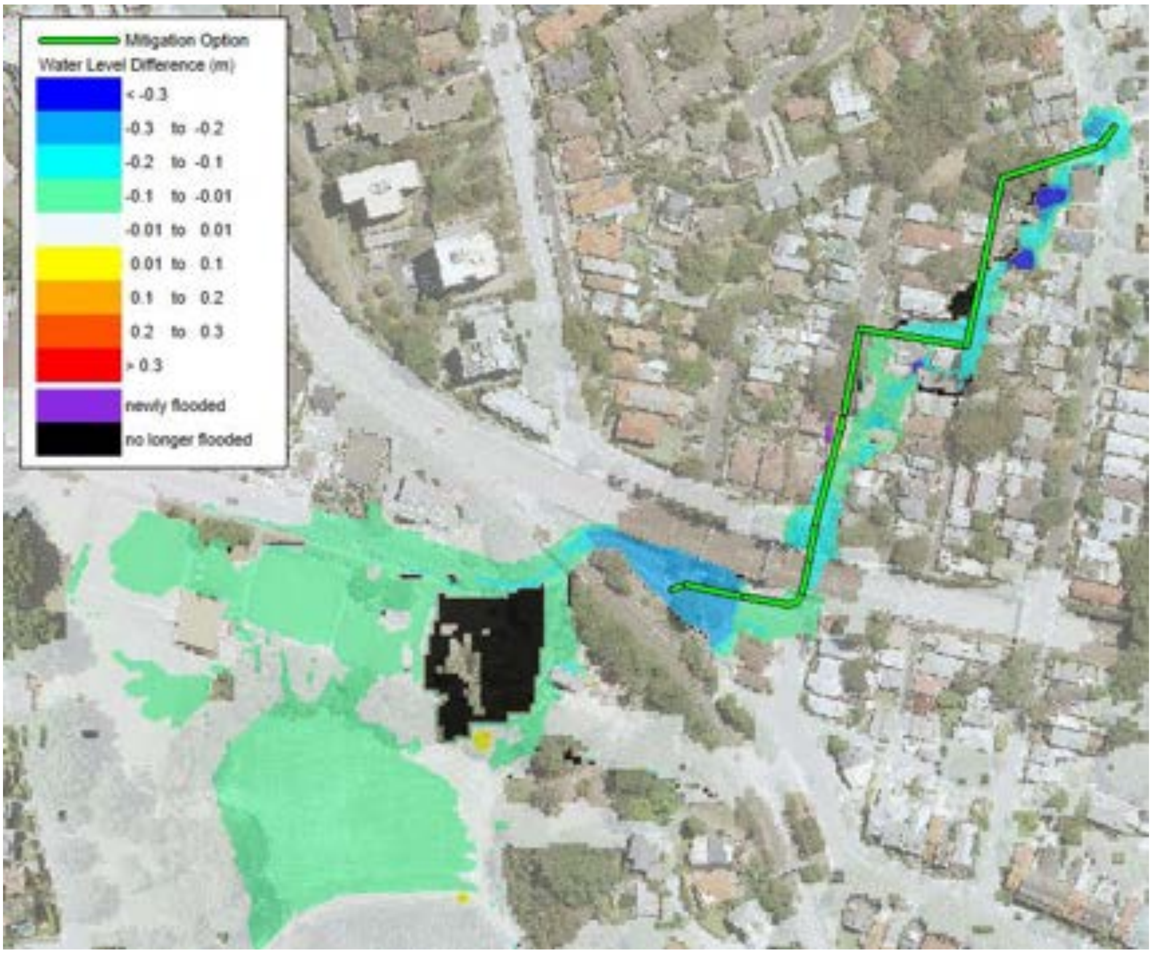
This mitigation measure consists of increasing the capacity of Sydney Water trunk system from Bank Street, through Euroka Street to Woolcott Street. Model analysis of these systems found that the existing trunk has capacity as shown in Image 30. As the trunk system reaches capacity between Bank Street and Euroka Street in particular, floodwaters are conveyed above ground forming a major overland flow path and inundating residential properties. The proposed upgrade introduces new pits and an additional 1.0 m diameter trunk line to convey more flows for the section between Bank Street and Euroka Street, as well as doubling the existing trunk capacity from Euroka Street to Woolcott Street. Downstream of Woolcott Street the trunk system has capacity in excess of the 1% AEP (except for the outlet), thus an upgrade is not required for that section. The sensitivity of the surface flood behaviour to these changes was assessed herein.

Image 30: Trunk Capacity from Bank Street to Waverton Park



The option was assessed using the TUFLOW model for the 1% and 5% AEP events. The location of the proposed trunk upgrade works and the impact on the 1% AEP flood level is shown in Image 31.

Image 31: Trunk Upgrade from Bank Street to Waverton Park (FM-W01) – 1% AEP Impact



The results show that upgrading the trunk capacity is most beneficial for properties located in proximity to the trunk alignment. With peak flow in the trunk increases from 4.0 m^3/s under existing conditions to 6.9 m^3/s at the end of the upgraded section, the peak flood levels decrease by up to 0.23 m on Bank Street, 0.33 m on Ancrum Street and 0.18 m on Euroka Street. Some localised adverse impacts are found downstream whereby the increased trunk conveyance attenuated local runoff entering the system. This is to be expected and can be addressed at a later stage either by enhancing the trunk system further or introducing separate pit inlets to capture local runoff that feeds into the trunk.

The option proposed herein would be beneficial to road access since the inundation depth of key routes would be reduced. Several flood-affected properties would also benefit from the reduction in flood levels. If this option is adopted, further refinements can be made to the alignment of the proposed trunk upgrade and pits locations. In sections where the upgrade passes through private property, this would present a significant technical constraint for the design and construction of the pipe system. Wherever possible the upgrade would be placed along the roadways, parallel to the existing system.

Recommendation: The option is <u>recommended</u> as a long-term measure in the Floodplain Risk Management Plan due to the benefit in flood level reduction achieved along the trunk alignment.

6.9.8 Carlyle Lane Drainage Upgrade (FM-W02)

This mitigation measure consists of upgrading the drainage system servicing Carlyle Lane which subsequently traverses under the railway embankment and Russell Street before discharging to Berrys Creek to the west. The proposed option would alleviate the flooding issue occurring on Carlyle Lane caused by the railway embankment obstructing overland flows, as well as reducing flood levels on Russell Street. The proposed drainage upgrade involves upsizing the 0.75 and 0.9 m diameter pipes from Carlyle Lane to Russell Street to a rectangular box culvert of 1.8 m x 0.9 m while leaving the railway culvert intact, as well as introducing additional pits to capture more overland flows.

The option was assessed using the TUFLOW model for the 1% and 5% AEP events. The location of the proposed drainage upgrade and the impact on the 1% AEP flood level is shown in Image 32.

Image 32: Carlyle Lane Drainage Upgrade (FM-W02) – 1% AEP Impact

The results show that enhancing the proposed drainage line capacity has a beneficial effect on flood affectation for the Carlyle Lane properties as well as properties downstream of the railway embankment. Peak flow in the drainage pipe increases from 1.6 m^3/s under existing conditions to 7.0 m^3/s as it discharges to Berrys Creek. The increased pipe flow results in a decrease in flood level of up to 1.31 m at Carlyle Lane and 0.19 m for Russell Street. This improves the flood affectation for adjacent residential properties. Slight increase in the peak flood levels of generally 0.1 m is experienced downstream at Berrys Creek for the 1% AEP event though this does not adversely impact on any properties.

The option would be beneficial to road access since the inundation depth of the Russell Street thoroughfare would be reduced. If this option is adopted, there is potential for disruption to local traffic since the road would need to be closed to install the new box culverts. In sections where the upgrade passes through private property, this would present a significant technical constraint for the design and construction of the pipe system. Wherever possible the upgrade would be placed along the roadways, parallel to the existing system.

Recommendation: The option is recommended as a medium-term measure in the Floodplain Risk Management Plan due to the benefit in flood level reduction achieved along the upgraded drainage alignment.

6.9.9 Trunk Upgrade from Albany Street to Flat Rock Creek (FM-N01)

This mitigation measure consists of increasing the capacity of Council and Sydney Water trunk system from Albany Street, through Chandos Street, Brook Street, all the way to the discharge point at Flat Rock Creek. Model analysis of these systems found that the existing trunk has capacity as shown in Image 33. When the underground trunk reaches capacity, upstream catchment flows are conveyed above ground forming a major overland flow path and inundating residential properties. The sensitivity of the surface flood behaviour to the capacity of the trunk was assessed by introducing new 1.35 m diameter pipes from Albany Street to Palmer Street, doubling the capacity of existing pipes from Palmer Street to Hamilton Reserve, and introducing additional pits to capture more overland flows.

Image 33: Trunk Capacity from Albany Street to Flat Rock Creek

The option was assessed using the TUFLOW model for the 1% and 5% AEP events. The location of the proposed trunk upgrade works and the impact on the 1% AEP flood level is shown in Image 34.

Image 34: Trunk Upgrade from Albany Street to Flat Rock Creek (FM-N01) – 1% AEP Impact

The results show that upgrading the trunk capacity is most beneficial for properties located in proximity to the trunk alignment. With peak flow in the trunk increases from 7.1 m^3/s under existing conditions to 13.5 m^3/s at the Flat Rock Creek discharge point, the 1% AEP peak flood levels decrease by up to 0.28 m on Atchison Street, 0.15 m on Chandos Street and 0.16 m on Palmer Street. Slight increase in the 1% AEP peak flood levels of up to 0.24 m is experienced downstream though this does not adversely impact on any properties.

The option would be beneficial to road access since the inundation depth of key routes would be reduced. Several flood-affected properties would also benefit from the reduction in flood levels. If this option is adopted, further refinements can be made to the alignment of the proposed trunk upgrade and pits locations.

Recommendation: The option is recommended as a long-term measure in the Floodplain Risk Management Plan due to the benefit in flood level reduction achieved along the trunk alignment.

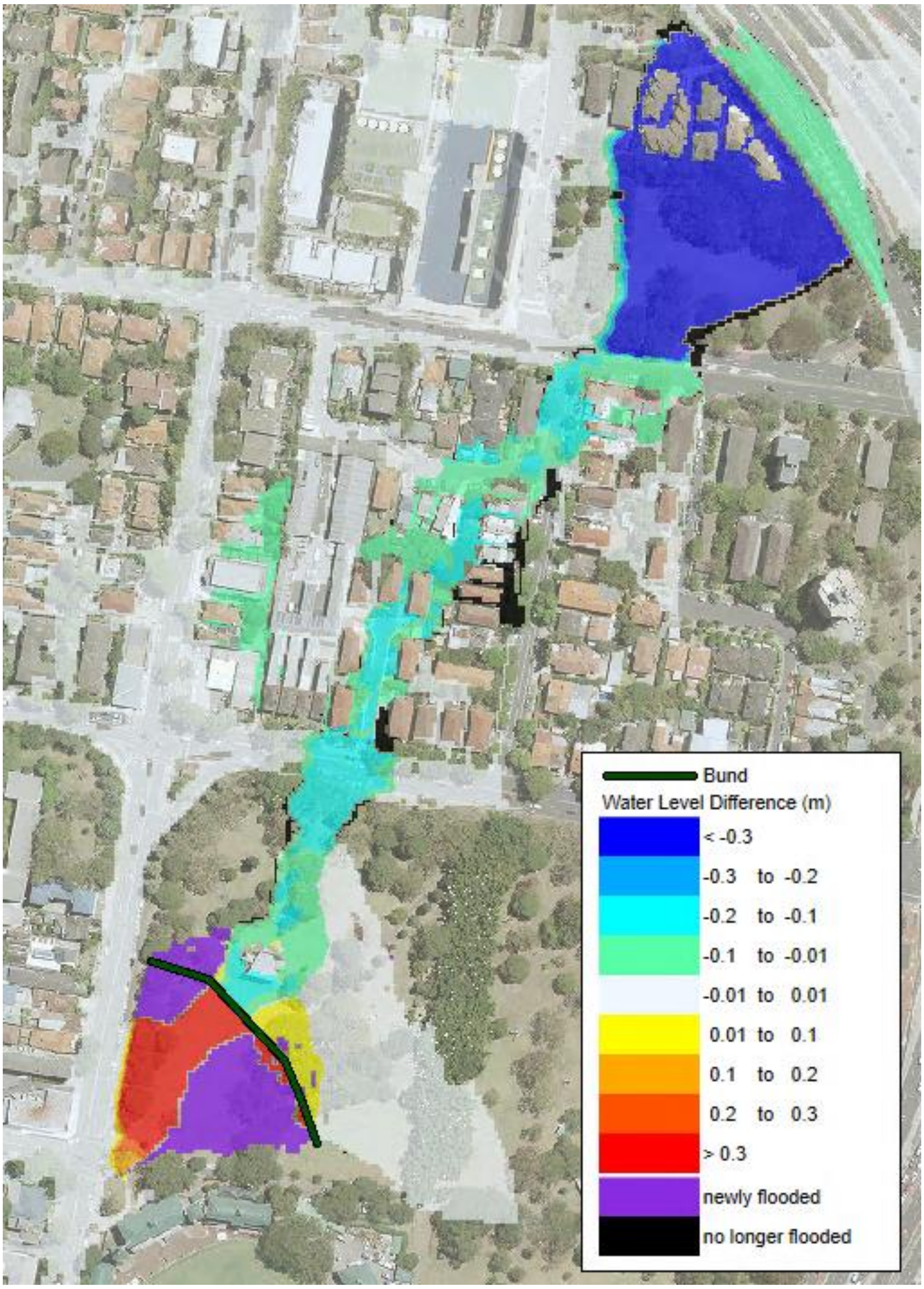
6.9.10 Bund at St Leonards Park (FM-N02)

This mitigation measure consists of constructing a bund or levee within St Leonards Park to stop upstream overland flows originating west of Miller Street from impacting on residential properties further downstream. As part of this option, the south-western portion of St Leonards Park is converted effectively into a retarding basin to maximise floodwater retention, though an outlet can be installed to permit gradual discharge of flows once the main flood event has passed. The proposed basin volume is approximately 9,100 m^3, with the bund/levee height averaging 1.8 m with a maximum height of 3.0 m (without freeboard). Constructing the bund/levee is technically feasible since the available land is Council owned and disruption to public should be minimal. The bund/levee would have to be well maintained to ensure structural integrity and stability.

The option was assessed using the TUFLOW model for the 1% and 5% AEP events. The location of the bund/levee alignment and the impact on the 1% AEP flood level are shown in Image 35. The bund/levee would improve flood-affectation downstream in the 1% AEP event with a peak flood level decrease of up to 0.18 m on Falcon Street, 0.15 m on Lytton Street, 0.16 m on Ernest Street and substantial drop in the Anzac Park peak flood levels by up to 0.42 m. Increase in peak flood levels occurs within the St Leonards Park basin as a result of attenuation of overland flows but does not adversely impact on Miller Street or any existing properties. If this option is pursued, it would be necessary to install signs within St Leonards Park to inform the community about the dual usage of the park as a flood mitigation basin during a storm event.

Recommendation: The option is <u>recommended</u> as a short-term measure in the Floodplain Risk Management Plan due to the significant reduction in peak flood levels for downstream properties and roads.

Image 35: Bund at St Leonards Park (FM-N02) – 1% AEP Impact

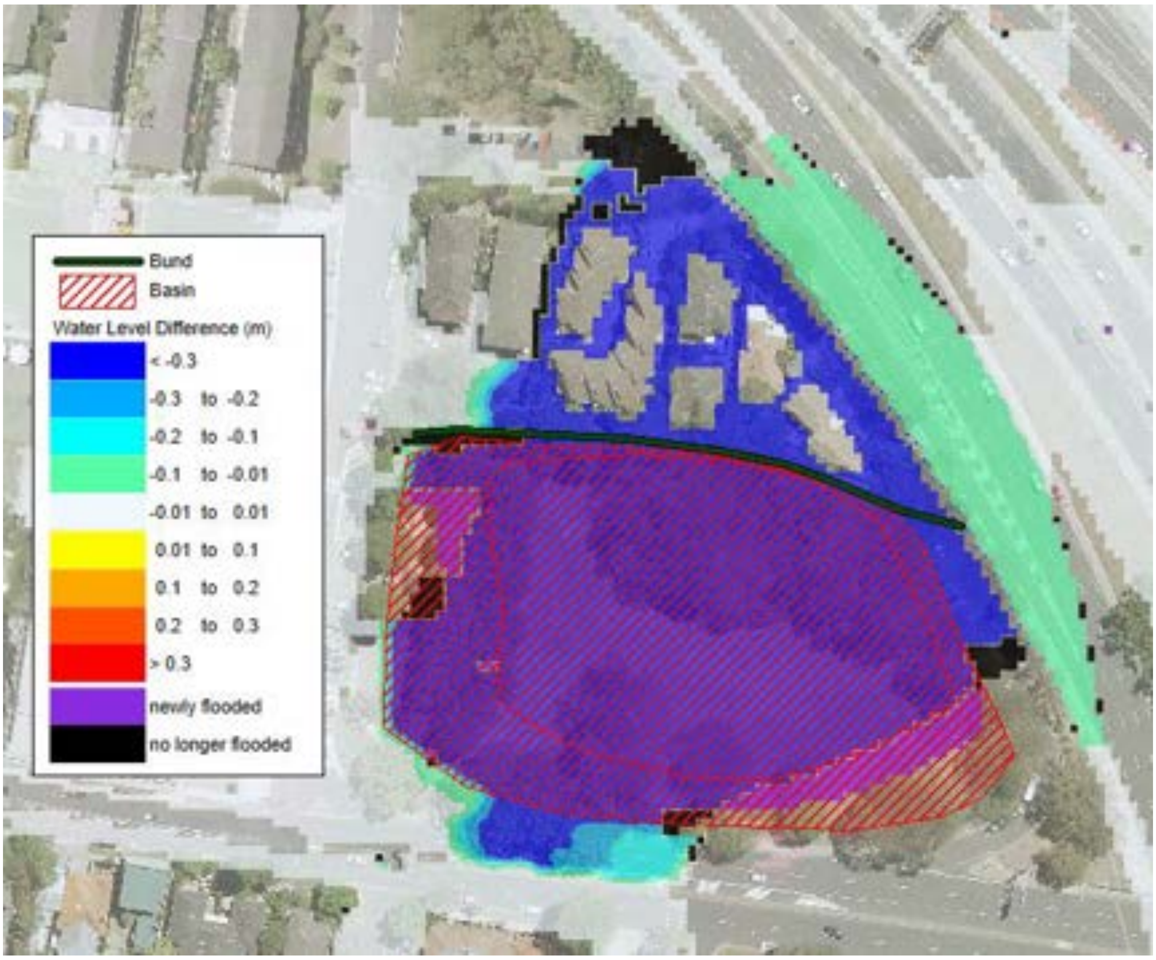


6.9.11 Anzac Park Basin (FM-N03)

This mitigation measure consists of excavating a retarding basin within Anzac Park to create additional storage for floodwaters obstructed behind the noise walls of Warringah Freeway. The basin, with a proposed volume of 22,600 m^3, would provide ample storage to accommodate floodwaters and alleviate impacts of flooding on the Cammeray Avenue properties. An outlet can be installed at the basin to permit gradual discharge of flows once the main flood event has passed.

Constructing the basin may be difficult due to the large volume of earthworks involved as well as the presence of trees and utilities that need to be relocated.

Image 36: Anzac Park Basin (FM-N03) – 1% AEP Impact



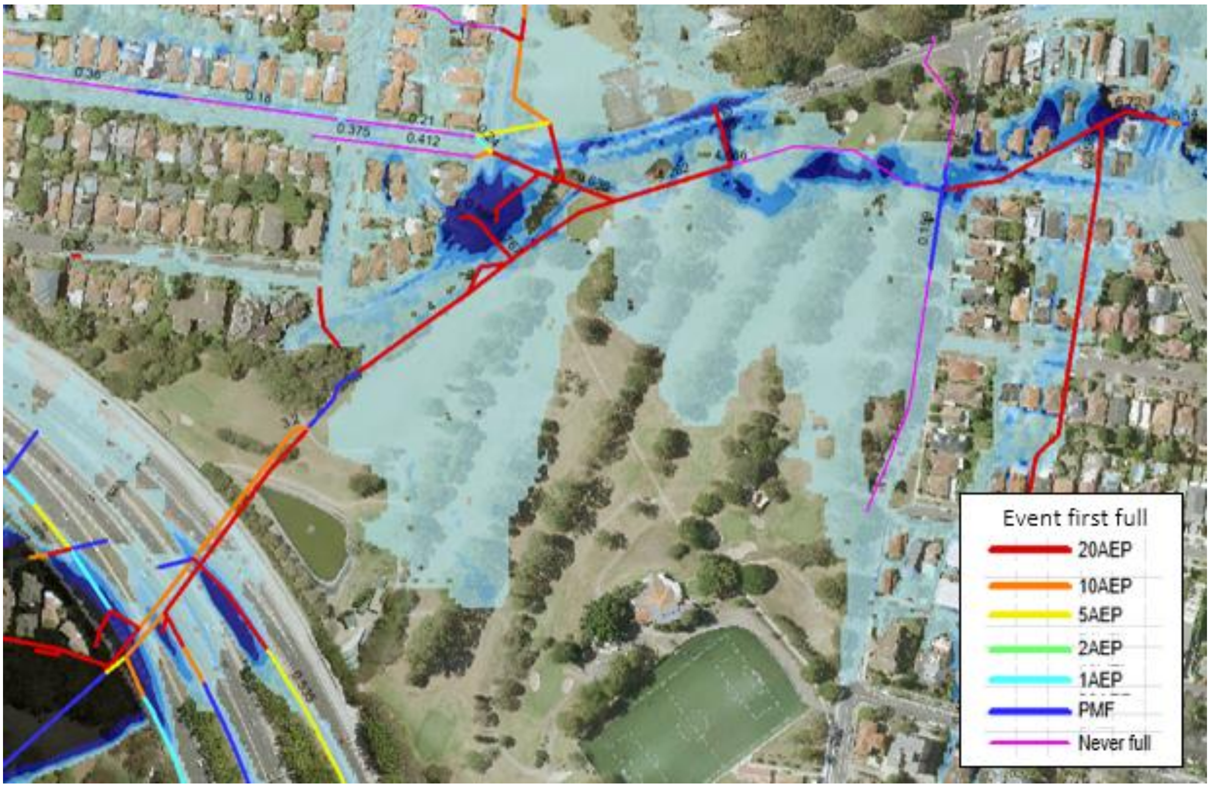
The option was assessed using the TUFLOW model for the 1% and 5% AEP events. The basin extent and the impact on the 1% AEP flood level are shown in Image 36. The basin would improve flood-affectation for adjacent properties in the 1% AEP event with a peak flood level decrease of up to 1.0 m on Cammeray Avenue and 0.75 m within Anzac Park itself. No adverse flood impact can be found elsewhere. If this option is pursued, it would be necessary to install signs within Anzac Park to inform the community about the dual usage of the park as a flood mitigation basin during a storm event.

Recommendation: The option is recommended as a medium-term measure in the Floodplain Risk Management Plan due to the significant reduction in peak flood levels for properties and roads adjacent to the park.

6.9.12 Trunk Upgrade from Anzac Park to Willoughby Creek and Warringa Road Drainage Upgrade (FM-N05+N08)

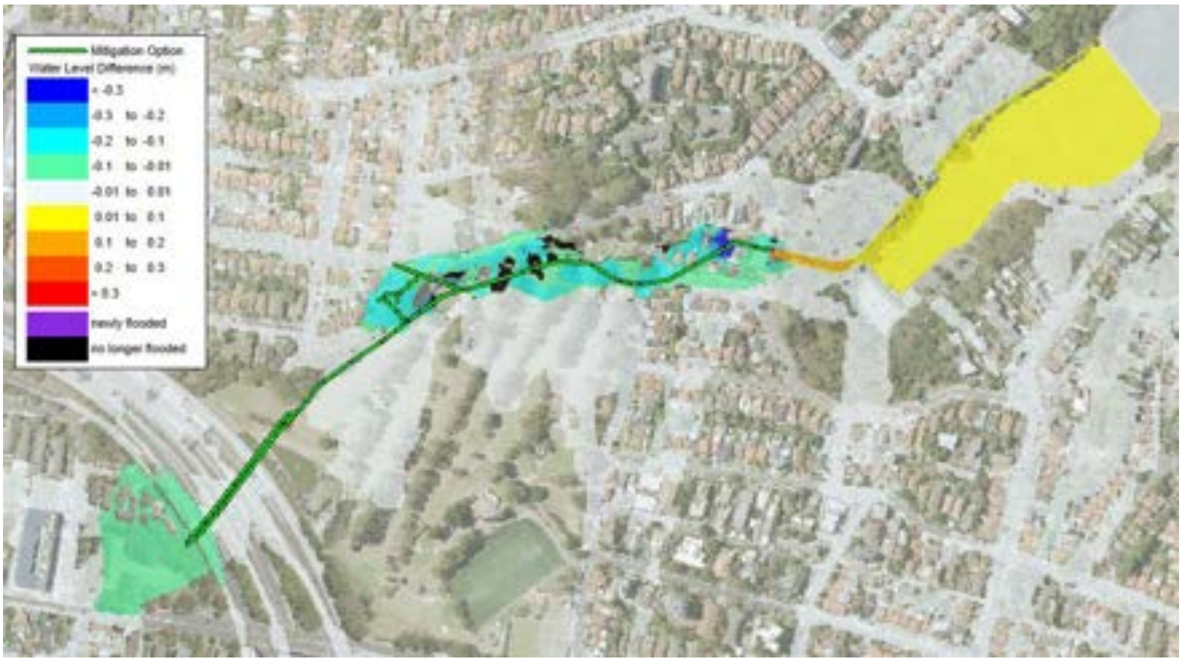
This mitigation measure consists of increasing the capacity of Sydney Water trunk system from Anzac Park, through Warringah Freeway all the way to the Willoughby Creek discharge point at Primrose Park. The Warringa Road drainage system servicing the trapped low point is also proposed to be upgraded and integrated with this option. Model analysis of these systems found that the existing trunk has capacity as shown in Image 37. When the underground trunk reaches capacity, flows in excess of the trunk capacity are conveyed above ground forming a major overland flow path and inundating residential properties downstream. The sensitivity of the surface flood behaviour to the capacity of the trunk was assessed by further enhancing its capacity using 3.6 m x 1.6 m and 4.2 m x 1.6 m box culverts, as well as upgrading the Warringa Road drainage by doubling the pipe capacity to accommodate more flows.

Image 37: Trunk Capacity from Anzac Park to Willoughby Creek



The option was assessed using the TUFLOW model for the 1% and 5% AEP events. The location of the proposed trunk/drainage upgrade works and the impact on the 1% AEP flood level is shown in Image 38.

Image 38: Trunk Upgrade from Anzac Park to Willoughby Creek and Warringa Road Drainage Upgrade (FM-N05+N08) – 1% AEP Impact



The results show that upgrading the trunk capacity is most beneficial for properties located in proximity to the trunk alignment. With peak flow in the trunk increases from 19.1 m^3/s under existing conditions to 27.9 m^3/s at the Primrose Park discharge point, the 1% AEP peak flood levels decrease by up to 0.04 m on Anzac Park, 0.11 m on Warringa Road and 0.33 m on Creek Lane. Slight increase in the 1% AEP peak flood levels of around 0.1 m is experienced downstream at Primrose Park though this does not adversely impact on any properties.

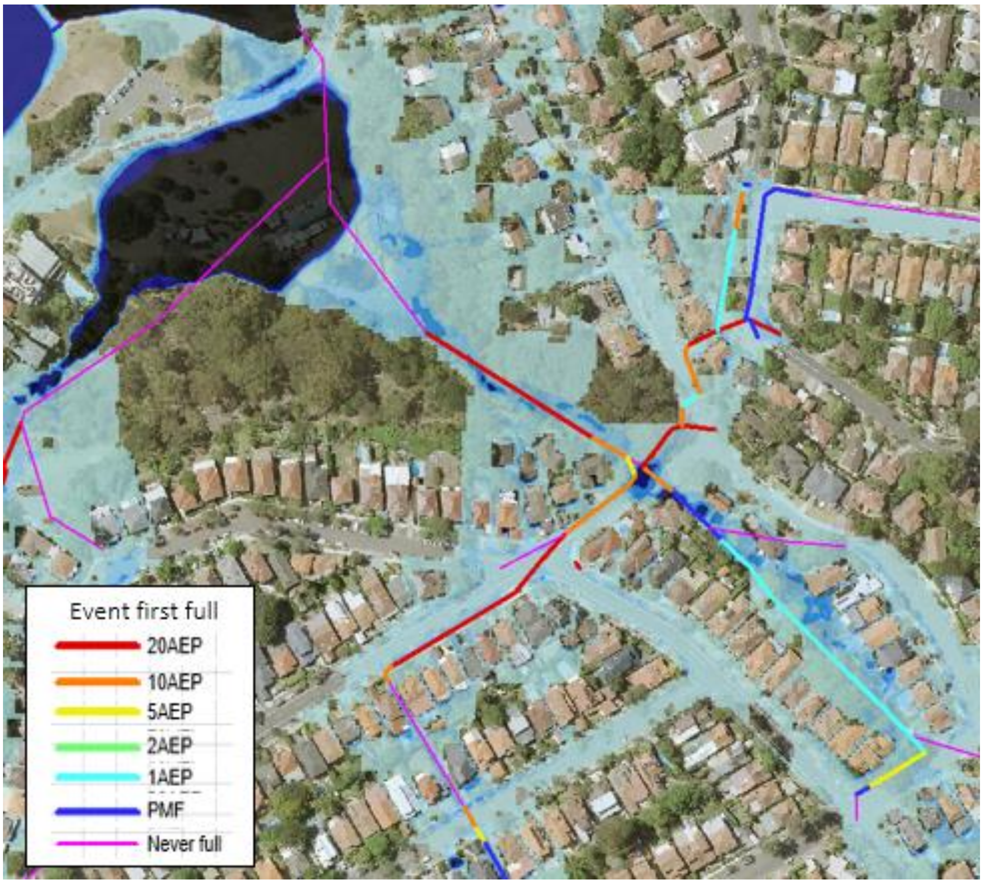
The option would be beneficial to road access since the inundation depth of key routes would be reduced. Several flood-affected properties would also benefit from the reduction in flood levels. If this option is adopted, further refinements can be made to the alignment of the proposed trunk upgrade and pits locations. In sections where the upgrade passes through private property, this would present a significant technical constraint for the design and construction of the pipe system. Wherever possible the upgrade would be placed along the roadways, parallel to the existing system.

Recommendation: The option is recommended as a long-term measure in the Floodplain Risk Management Plan due to the benefit in flood level reduction achieved along the upgraded trunk alignment.

6.9.13Reynolds Street Drainage Upgrade (FM-N06)

This mitigation measure consists of increasing the capacity of the Council trunk system from Reynolds Street, through Brightmore Reserve to the harbour outlet at Primrose Park. Model analysis of these systems found that the existing trunk has capacity as shown Image 39. When the underground trunk reaches capacity, upstream catchment flows are conveyed above ground forming a major overland flow path and inundating residential properties. The proposed drainage upgrade involves doubling the trunk capacity up to Brightmore Reserve and removing any 'choke points' (i.e. reduced pipe size compared to upstream), as well as introducing new pits to capture more overland flows. The sensitivity of the surface flood behaviour to these changes was assessed.

Image 39: Reynolds Street Drainage Capacity



The option was assessed using the TUFLOW model for the 1% and 5% AEP events. The location of the proposed trunk upgrade works and the impact on the 1% AEP flood level is shown Image 40.

Image 40: Reynolds Street Drainage Upgrade (FM-N06) – 1% AEP Impact

Image 40 shows that upgrading the trunk capacity is most beneficial for properties located in proximity to the trunk alignment. With peak flow in the trunk increases from 12.1 m^3/s under existing conditions to 15.8 m^3/s at the Primrose Park outlet, the 1% AEP peak flood levels decrease by up to 0.13 m on Brightmore Street, and 0.15 m on Wonga Road.

The option would be beneficial to road access since the inundation depth of key routes would be reduced. Several flood-affected properties would also benefit from the reduction in flood levels. If this option is adopted, further refinements can be made to the alignment of the proposed trunk upgrade and pits locations. In sections where the upgrade passes through private property, this would present a significant technical constraint for the design and construction of the pipe system. Wherever possible the upgrade would be placed along the roadways, parallel to the existing system.

Council's Bushcare group has provided initial feedback on the option and its benefits and constraints. These include:

- The option will likely benefit the remnant bushland in the area that currently experiences periodic severe erosion due to overland flow, and damage to the bushland infrastructure.

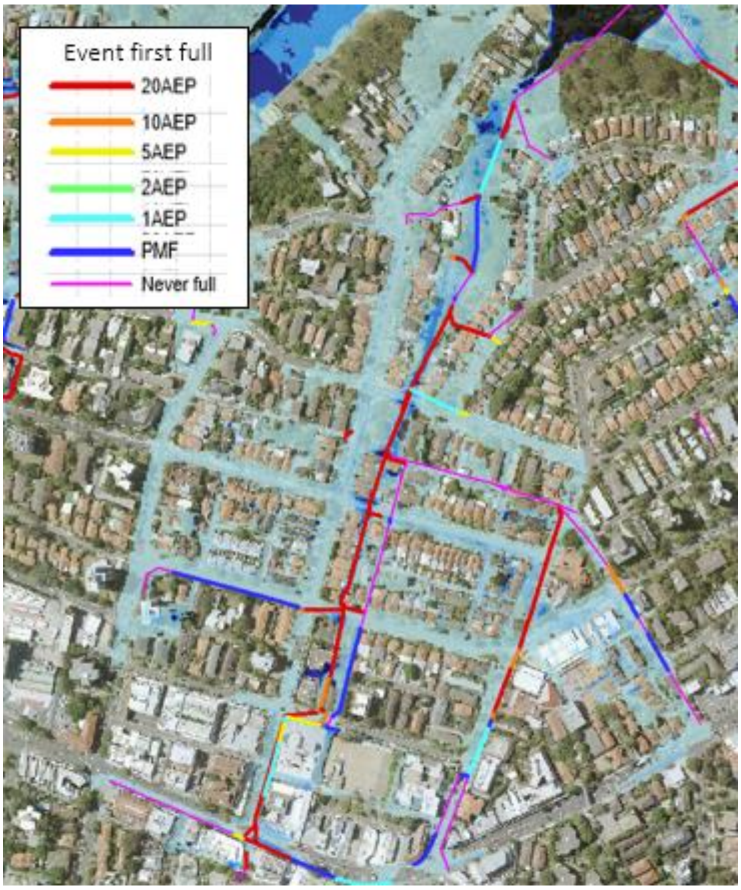
- The option would require comprehensive environmental impact assessment to determine the range of potential environmental impacts and suitable mitigation measures for each. This includes potential impacts on flora and fauna in the area, including any threatened species. One area of particular concern is the microbat population that uses parts of the existing drainage as a permanent habitat and breeding area.

Recommendation: The option is recommended as a long-term measure in the Floodplain Risk Management Plan due to the benefit in flood level reduction achieved along the trunk alignment.

6.9.14 Cooper Lane Drainage Upgrade (FM-N07)

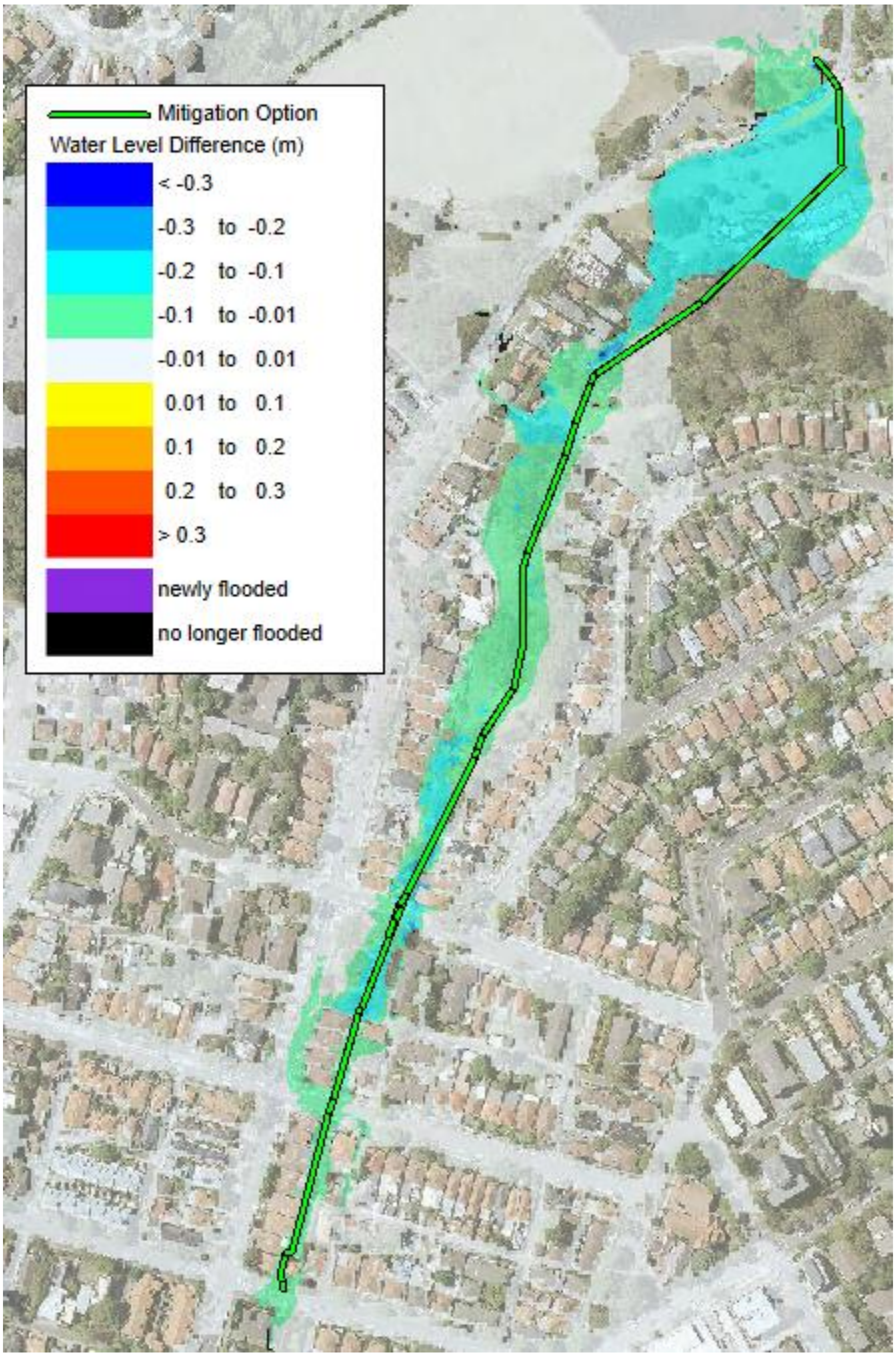
This mitigation measure consists of increasing the capacity of the Council trunk system from Belgrave Street, through Benelong Lane, Brightmore Reserve, all the way to the discharge point at Primrose Park. Model analysis of these systems found that the existing trunk has capacity as shown in Image 41. When the underground trunk reaches capacity, upstream catchment flows are conveyed above ground forming a major overland flow path and inundating residential properties. The proposed drainage upgrade involves doubling the trunk capacity, upsizing pipes at Grasmere Reserve to maintain a consistent pipe diameter, as well as introducing additional pits to capture more overland flows. The sensitivity of the surface flood behaviour to these changes was assessed.

Image 41: Cooper Lane Drainage Capacity



The option was assessed using the TUFLOW model for the 1% and 5% AEP events. The location of the proposed trunk upgrade works and the impact on the 1% AEP flood level is shown in Image 42.

Image 42: Cooper Lane Drainage Upgrade (FM-N07) – 1% AEP Impact



The results show that upgrading the trunk capacity is most beneficial for properties located in proximity to the trunk alignment. With peak flow in the trunk increases from 12.3 m^3/s under existing conditions to 17.3m^3/s at the Primrose Park harbour outlet, the 1% AEP peak flood levels decrease by up to 0.05 m on Sutherland Street, 0.22 m on Grasmere Road and 0.21 m on Wonga Road.

The option would be beneficial to road access since the inundation depth of key routes would be reduced. Several flood-affected properties would also benefit from the reduction in flood levels. If this option is adopted, further refinements can be made to the alignment of the proposed trunk upgrade and pits locations. In sections where the upgrade passes through private property or bushland, this would present a significant technical constraint for the design and construction of the pipe system. Wherever possible the upgrade would be placed along the roadways, parallel to the existing system. For this option, it may also be possible to utilise recent pipe upgrades undertaken by Council from Cooper Lane.

Recommendation: The option is recommended as a long-term measure in the Floodplain Risk Management Plan due to the benefit in flood level reduction achieved along the upgraded trunk alignment.

6.9.15 Cassins Avenue Drainage Upgrade (FM-N09)

This mitigation measure consists of upgrading the drainage system at Cassins Avenue and Carlow Street up to Miller Street. The proposed option would alleviate the flooding issue occurring in the immediate surrounds of the North Shore Marist College. The proposed drainage upgrade involves doubling the pipe capacity to provide extra conveyance capacity as well as introducing additional pits to capture more overland flows.

The option was assessed using the TUFLOW model for the 1% and 5% AEP events. The location of the proposed drainage upgrade and the impact on the 1% AEP flood level is shown in Image 43.

Image 43: Cassins Avenue Drainage Upgrade (FM-N09) – 1% AEP Impact

Image 43 shows that enhancing the proposed drainage line capacity has a beneficial effect on flood affectation for the Cassins Avenue properties as well as Marist College. The peak flow increases from 0.3 m^3/s under existing conditions to 0.6 m^3/s at the Miller Street drainage pipeline, which is relatively minimal as the extra pipe capacity is mainly used as storage for the additional flows. Peak flood level decrease of up to 0.09 m at Cassins Avenue and 0.10 m at Carlow Street occurs as a result of the upgrade for the 1% AEP event. This improves the flood affectation for adjacent residential properties.

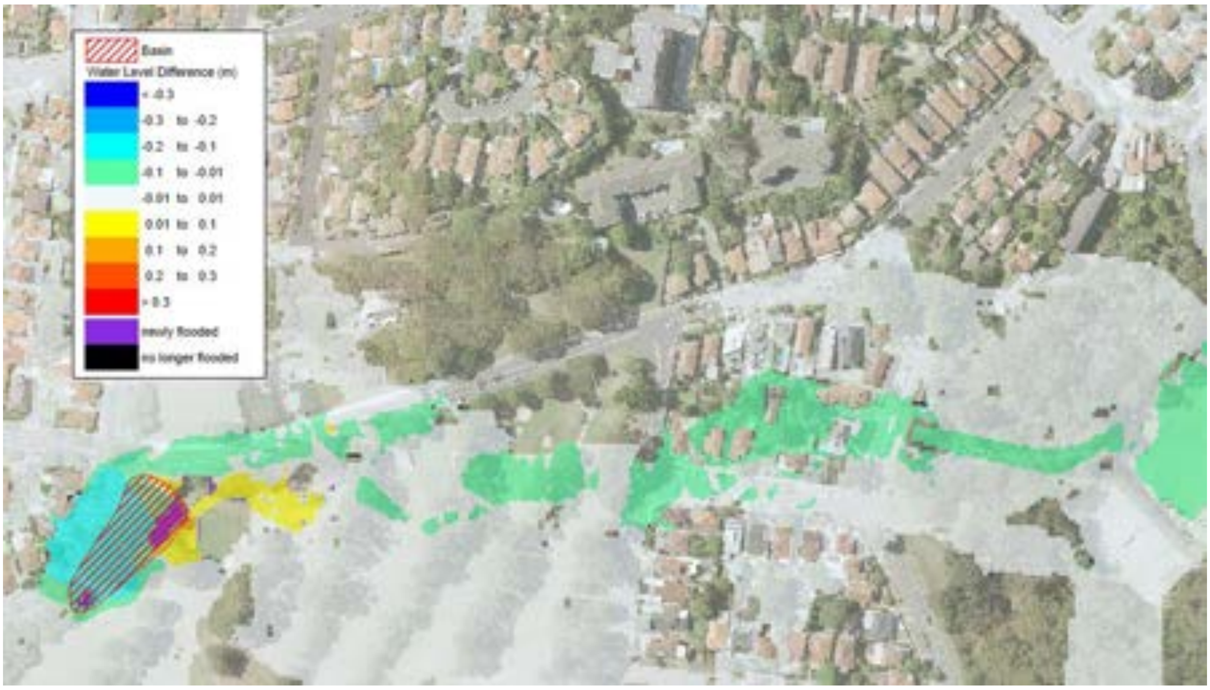
The option would help alleviate flood risk for Marist College and the surrounding properties. If this option is adopted, there is potential for disruption to local traffic since the road would need to be closed to install the new pipes. Sections of the upgrade beneath the school would be technically difficult, and may only be feasible as part of redevelopment of the school grounds (if that occurs).

Recommendation: The option is recommended as a medium-term measure in the Floodplain Risk Management Plan due to the benefit in flood level reduction for Marist College and the surrounding properties.

6.9.16 Cammeray Golf Club Basin (FM-N11)

This mitigation measure consists of excavating a retarding basin adjacent to Warringa Road within Cammeray Golf Club to create additional storage for floodwaters and to reduce overland flows discharging downstream. The basin, with a proposed volume of 2,500m^3, would provide storage to maximise floodwater retention and alleviate impacts of flooding primarily for the Warringa Road properties. Reduced overland flows would also reduce peak flood levels further downstream at Creek Lane, east of the golf course. An outlet can be installed at the basin to permit gradual discharge of flows once the main flood event has passed. Constructing the basin may be difficult due to the presence of trees and utilities that need to be relocated.

Image 44: Cammeray Golf Club Basin (FM-N11) – 1% AEP Impact



The option was assessed using the TUFLOW model for the 1% and 5% AEP events. The basin extent and the impact on the 1% AEP flood level are shown in Image 44. The basin would improve flood-affectation for the Warringa Road properties in the 1% AEP event with a peak flood level decrease of up to 0.12 m on Warringa Road. Reduction in peak flood levels is also experienced downstream on Creek Lane of up to 0.05 m. If this option is pursued, it would be necessary to install signs near the basin to inform the public about the dual usage of this land as a flood mitigation basin during a storm event.

Recommendation: The option is recommended as a medium-term measure in the Floodplain Risk Management Plan due to the benefit in flood level reduction for properties on Warringa Road and Creek Lane.

6.10 Assessment of Flood Risk Management Measures

This section assesses the various flood modification, property modification and response modification measures with the view to identifying those measures that are both feasible and will significantly reduce flood risk.

For the flood modification measures, the cost effectiveness of each measure was determined based on the benefit/cost (B/C) approach, whereby the reduction in the flood damages as a result of implementing the measure was compared against the cost of implementation.

6.10.1 Benefit/Cost Ratio of Measures

Preliminary cost estimates of each measure were calculated using Rawlinsons' Australian Construction Handbook (2020), with the details provided in Appendix J. Some costs were not factored in the calculation including the ongoing costs of maintaining the proposed works (assumed to form part of Council's annual budget) and costs associated with land and property acquisition. More accurate estimates should be obtained during subsequent design phase once a particular option is adopted for implementation. A summary of the costing of the recommended flood mitigation measures is presented in Table 41, along with the reduction of flood damages based on a net present worth calculated over a design structure life of 50 years with a 7% discount factor applied. The performance of each option was ascertained by comparing against the base case (i.e. existing conditions).

The results show that most of the trunk/drainage upgrade options have b/c ratio of less than 1, thus the cost of implementation outweighs the economic benefit gained from the reduction in flood damages. Both options that involve construction of a bund/levee, i.e. FM-S04 and FM-N02, have a b/c ratio of greater than 1. This can be attributed to the comparatively low cost owing to the lack of excavation work required unlike the trunk/drainage upgrade options.

Table 41: Cost/Benefit Ratio of Recommended Flood Mitigation Measures

Ref	Measures	Implementation Time Horizon	AAD	NPV of Damage	Option Cost	Option Benefit Relative to Base	Benefit/Cost Ratio
-	Base Case	-	$19,477,440	$287,619,429	-	-	-
FM-S01	Trunk Upgrade in North Sydney CBD	Long-term	$19,055,166	$281,383,800	$10,083,000	$6,235,629	0.62
FM-S03	Upgrade Kurraba Road Culvert	Medium-term	$19,470,378	$287,515,147	$371,000	$104,282	0.28
FM-S04	Bund at Forsyth Park	Short-term	$19,449,604	$287,208,384	$292,000	$411,045	1.41
FM-S05	Trunk Upgrade from Lindsay Street to Kurraba Road	Long-term	$19,460,483	$287,369,034	$2,452,000	$250,395	0.10
FM-E01	Trunk Upgrade from Yeo Street to Bogota Avenue	Long-term	$19,372,139	$286,064,477	$3,803,000	$1,554,952	0.41
FM-W01	Trunk Upgrade from Bank Street to Waverton Park	Long-term	$19,383,120	$286,226,629	$2,247,000	$1,392,800	0.62
FM-W02	Carlyle Lane Drainage Upgrade	Medium-term	$19,460,195	$287,364,775	$3,482,000	$254,654	0.07
FM-N01	Trunk Upgrade from Albany Street to Flat Rock Creek	Long-term	$18,857,510	$278,465,044	$8,866,000	$9,154,385	1.03
FM-N02	Bund at St Leonards Park	Short-term	$19,198,140	$283,495,072	$418,000	$4,124,357	9.87
FM-N03	Anzac Park Basin	Medium-term	$19,275,338	$284,635,030	$9,988,000	$2,984,399	0.30

Ref	Measures	Implementation Time Horizon	AAD	NPV of Damage	Option Cost	Option Benefit Relative to Base	Benefit/Cost Ratio
FM-N05+N08	Trunk Upgrade from Anzac Park to Willoughby Creek and Warringa Road Drainage Upgrade	Long-term	$19,265,423	$284,488,617	$16,359,000	$3,130,812	0.19
FM-N06	Reynolds Street Drainage Upgrade	Long-term	$19,347,622	$285,702,435	$4,041,000	$1,916,994	0.47
FM-N07	Cooper Lane Drainage Upgrade	Long-term	$19,282,088	$284,734,707	$6,068,000	$2,884,722	0.48
FM-N09	Cassins Avenue Drainage Upgrade	Medium-term	$19,346,861	$285,691,199	$2,021,000	$1,928,230	0.95
FM-N11	Cammeray Golf Club Basin	Medium-term	$19,301,714	$285,024,516	$1,351,000	$2,594,913	1.92

6.10.2 Multi-criteria Matrix Assessment

To compare the relative advantages and disadvantages of each recommended option, the measures were scored based on a multi-criteria matrix assessment. This enables options to be prioritised and is a useful tool for decision-makers and other stakeholders. It should be noted that scoring and ranking is only used for an indicative comparison and is not intended to act as a final verdict on the options. Also note that the scoring and ranking may be updated following the public exhibition period, especially in regard to community acceptance.

The results of the analysis are presented in Table 42. Each criterion corresponds to a column and has been scored between -3 (lowest score), 0 (neutral) and 3 (highest score).

The table shows that the highest ranked measures are the inclusion of flood-related policy provisions within Council's LEP (PM-01) and installation of flood signage (RM-01). These measures have widespread benefit to property flooding and generally straightforward to implement, while having no significant drawbacks. Other high scoring measures are adoption of matrix-style planning controls in the DCP (PM-02), requirement for site-specific Flood Emergency Plans for new developments (RM-03) and provision of a bund or levee at St Leonards Park to attenuate overland flows (FM-N02). With the FM-N02 option, there is significant benefit to be gained from reducing flows and peak flood levels for flood-affected properties located downstream of the bund.

The results of the assessment were used to inform the Plan outlined in the executive summary of this document, including the priority of each recommended measure.

Table 42: Multi-criteria Assessment of Measures

Reference	Report Section	Mitigation Measure	Impact on Road Flooding	Impact on Property Flooding	Impact on Risk to Life	Technical Feasibility	Community Acceptance	Economic Value	Cost and Available Funding	Environmental Impact	Impact on SES	Political Feasibility	Total Score	Rank
Property Modification Measures (Section 6.7)														
PM-01	6.7.1	Inclusion of Flood Related Policy and FPA in the LEP	0	3	1	3	2	3	0	0	2	2	16	1=
PM-02	6.7.2	Adoption of Matrix-style Controls in DCP	0	3	1	2	2	2	0	0	1	2	13	3=
PM-03	6.7.5	Flood Proofing	0	2	1	1	2	1	-1	0	1	1	8	7=
PM-04	6.7.7	Inclusion of Flood Risk Information on s10.7 Planning Certificates	0	1	1	2	0	2	0	0	1	1	8	7=
Response Modification Measures (Section 6.8)														
RM-01	6.8.3	Flood Signage	0	0	2	3	3	1	1	0	3	3	16	1=
RM-02	6.8.4	Local Flood Plan	0	0	1	2	2	0	2	0	1	2	10	6
RM-03	6.8.5	Requirement for Site Specific Flood Emergency Plans	0	0	2	2	2	1	2	0	2	2	13	3=

Reference	Report Section	Mitigation Measure	Impact on Road Flooding	Impact on Property Flooding	Impact on Risk to Life	Technical Feasibility	Community Acceptance	Economic Value	Cost and Available Funding	Environmental Impact	Impact on SES	Political Feasibility	Total Score	Rank
Flood Modification Measures (Section 6.9)														
FM-S01	6.9.1	Trunk Upgrade in North Sydney CBD	2	3	2	-3	2	0	-3	-1	0	-2	0	15
FM-S03	6.9.3	Upgrade Kurraba Road Culvert	1	1	1	-1	2	-1	0	0	0	2	5	10
FM-S04	6.9.4	Bund at Forsyth Park	1	1	1	1	1	1	0	-1	0	1	6	9
FM-S05	6.9.5	Trunk Upgrade from Lindsay Street to Kurraba Road	1	1	1	-3	2	-2	-2	0	0	-2	-4	20=
FM-E01	6.9.6	Trunk Upgrade from Yeo Street to Bogota Avenue	1	2	1	-3	2	-1	-2	0	0	-2	-2	17=
FM-W01	6.9.7	Trunk Upgrade from Bank Street to Waverton Park	2	2	2	-3	2	0	-2	0	0	-2	1	12=
FM-W02	6.9.8	Carlyle Lane Drainage Upgrade	2	1	1	-2	2	-3	-2	-1	0	-2	-4	20=
FM-N01	6.9.9	Trunk Upgrade from Albany Street to Flat Rock Creek	2	3	2	-3	2	1	-3	-1	0	-2	1	12=
FM-N02	6.9.10	Bund at St Leonards Park	2	2	2	1	1	3	0	-1	0	1	11	5
FM-N03	6.9.11	Anzac Park Basin	2	2	2	-1	-1	-1	-3	-2	0	-2	-4	20=

Reference	Report Section	Mitigation Measure	Impact on Road Flooding	Impact on Property Flooding	Impact on Risk to Life	Technical Feasibility	Community Acceptance	Economic Value	Cost and Available Funding	Environmental Impact	Impact on SES	Political Feasibility	Total Score	Rank
FM-N05+N08	6.9.12	Trunk Upgrade from Anzac Park to Willoughby Creek and Warringa Road Drainage Upgrade	2	2	2	-3	2	-2	-3	-1	0	-2	-3	19
FM-N06	6.9.13	Reynolds Street Drainage Upgrade	2	2	2	-3	2	-1	-2	-1	0	-2	-1	16
FM-N07	6.9.14	Cooper Lane Drainage Upgrade	2	2	2	-3	2	-1	-3	-1	0	-2	-2	17=
FM-N09	6.9.15	Cassins Avenue Drainage Upgrade	1	2	1	-1	2	0	-2	0	0	-1	2	11
FM-N11	6.9.16	Cammeray Golf Club Basin	2	2	2	-1	-1	2	-2	-2	0	-1	1	12=

7. FLOODPLAIN RISK MANAGEMENT PLAN

This Floodplain Risk Management Plan is the final output of the analysis presented in Sections 6.6 to 6.10 of this report, which assessed a range of flood mitigation options for North Sydney LGA. The Plan contains the measures that have significant benefit to the area and are recommended to be implemented. Each measure has an assigned responsibility (either Council, property owners, or the SES) and a priority. The Plan is presented as a separate section to provide Council and other stakeholders with a summary of the recommendations put forward. The same table is presented in the executive summary of this report.

In the table below, high priority measures are those that should be implemented in the short term, while low priority measures are recommended for implementation in the long term. The distinction has been made because several structural measures involve large-scale construction activities, that are very expensive and are likely to be highly disruptive to the community. These measures are therefore recorded in the Plan for when other activities may make them relatively feasible, for example, Sydney Water replacing or repairing their stormwater assets.

Table 43: Floodplain Risk Management Plan for North Sydney LGA

Option and Report Reference	Description	Responsibility	Priority
PM-01 Inclusion of Flood Related Policy and FPA in the LEP	Install flood-related clauses in the LEP to provide a flood definition for the LGA and objectives for its management. Also provide definition of the FPA.	Council	High
PM-02 Adoption of Matrix-style Controls in DCP	Introduce matrix-style controls on development of flood-prone land considering both the level of flood risk and the type of development.	Council	High
PM-03 Flood Proofing	Consider permanent flood proofing methods for flood-prone lots/properties.	Property Owners	Medium
PM-04 Inclusion of Flood Risk Information on s10.7 Planning Certificates	Include relevant flood risk information on the s10.7 planning certificates to inform property owners of flood risk.	Council	Medium
RM-02 Local Flood Plan	Prepare a Local Flood Plan to detail flood risk within the LGA, responsibilities of relevant agencies, flood response and arrangements.	SES	High
RM-03 Requirement for Site Specific Flood Emergency Plans	Impose requirement for a site-specific Flood Emergency Plan on new developments in high hazard flooding areas, detailing responsibilities and evacuation planning.	Council	High

Option and Report Reference	Description	Responsibility	Priority
FM-S01 Trunk Upgrade in North Sydney CBD	Increase capacity of Sydney Water trunk system through North Sydney CBD to Milson Park and introduce new pits.	Council, Sydney Water and TfNSW	Low
FM-S03 Upgrade Kurraba Road Culvert	Upgrade Sydney Water culvert under the Kurraba Road/Clark Road intersection.	Council, Sydney Water	Medium
FM-S04 Bund at Forsyth Park	Construct bund or levee at Forsyth Park to impede upstream overland flows.	Council	Medium
FM-S05 Trunk Upgrade from Lindsay Street to Kurraba Road	Upgrade Council trunk system from Lindsay Street to the harbour outlet and introduce new pits.	Council	Low
FM-E01 Trunk Upgrade from Yeo Street to Bogota Avenue	Upgrade Council trunk system from Yeo Street to the harbour outlet and introduce new pits.	Council	Low
FM-W01 Trunk Upgrade from Bank Street to Waverton Park	Upgrade Sydney Water trunk system from Bank Street to Woolcott Street and introduce new pits.	Council, Sydney Water	Low
FM-W02 Carlyle Lane Drainage Upgrade	Upgrade Council drainage system from Carlyle Lane to Berrys Creek and enhance capacity of existing pits.	Council	Low
FM-N01 Trunk Upgrade from Albany Street to Flat Rock Creek	Upgrade Sydney Water and Council trunk system from Albany Street to Flat Rock Creek and introduce new pits.	Council, Sydney Water	Low
FM-N02 Bund at St Leonards Park	Construct bund or levee at St Leonards Park to impede upstream overland flows.	Council	High
FM-N03 Anzac Park Basin	Construct basin within Anzac Park to create additional flood storage.	Council, TfNSW	Low
FM-N05+N08 Trunk Upgrade from Anzac Park to Willoughby Creek and Warringa Road Drainage Upgrade	Upgrade Sydney Water trunk system from Anzac Park to Primrose Park, upgrade Warringa Road drainage system and introduce new pits.	Council, Sydney Water and TfNSW	Low
FM-N06 Reynolds Street Drainage Upgrade	Upgrade Council drainage system from Reynolds Street to the harbour outlet and introduce new pits.	Council	Low

Option and Report Reference	Description	Responsibility	Priority
FM-N07 Cooper Lane Drainage Upgrade	Upgrade Council drainage system from Belgrave Street to the harbour outlet and introduce new pits.	Council	Low
FM-N09 Cassins Avenue Drainage Upgrade	Upgrade Council drainage system from Cassins Avenue to St Leonards Park and introduce new pits.	Council	Medium
FM-N11 Cammeray Golf Club Basin	Construct basin adjacent to Warringa Road within Cammeray Golf Course to create additional flood storage.	Council	Medium

8.REFERENCES

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9. FIGURES

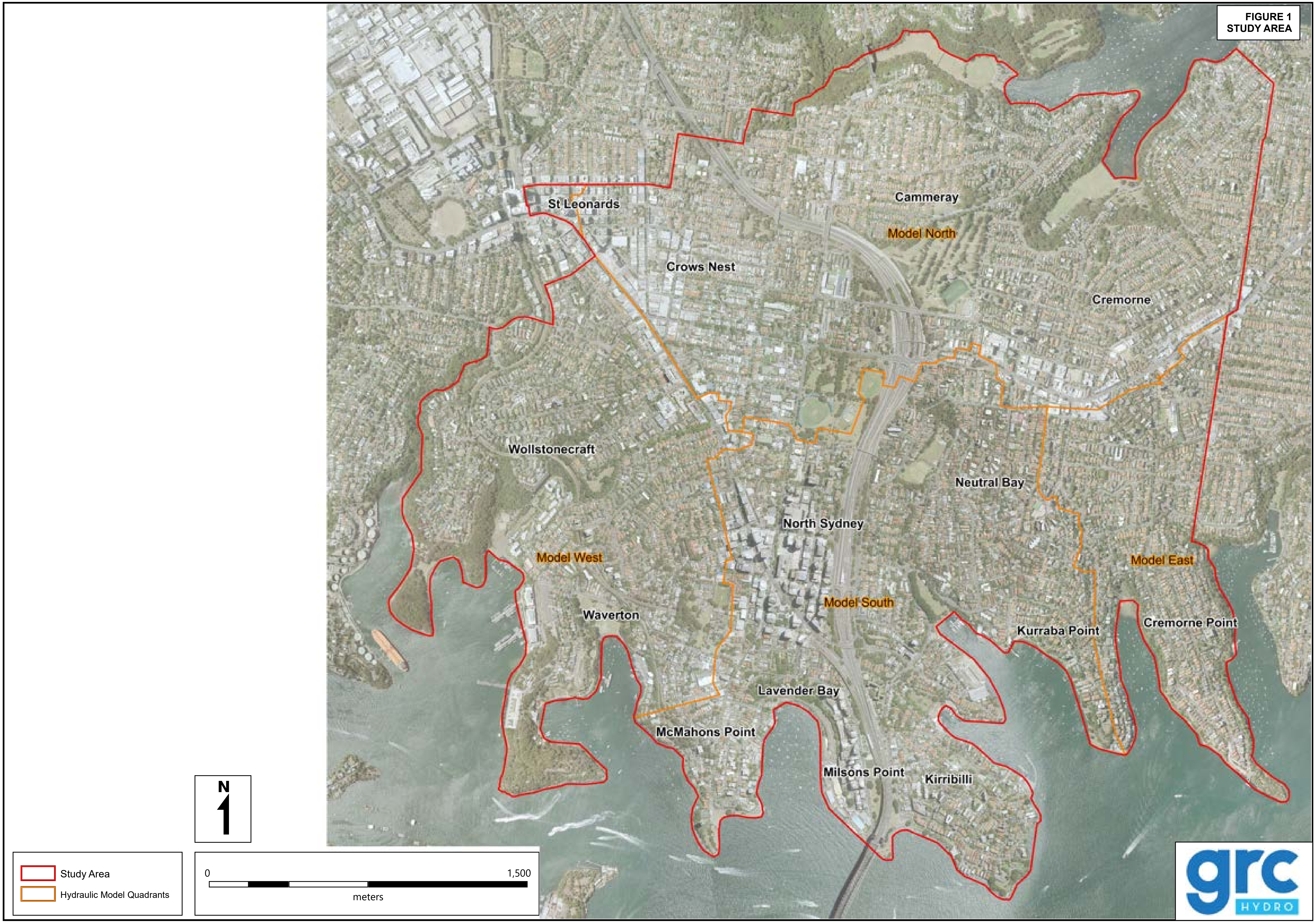
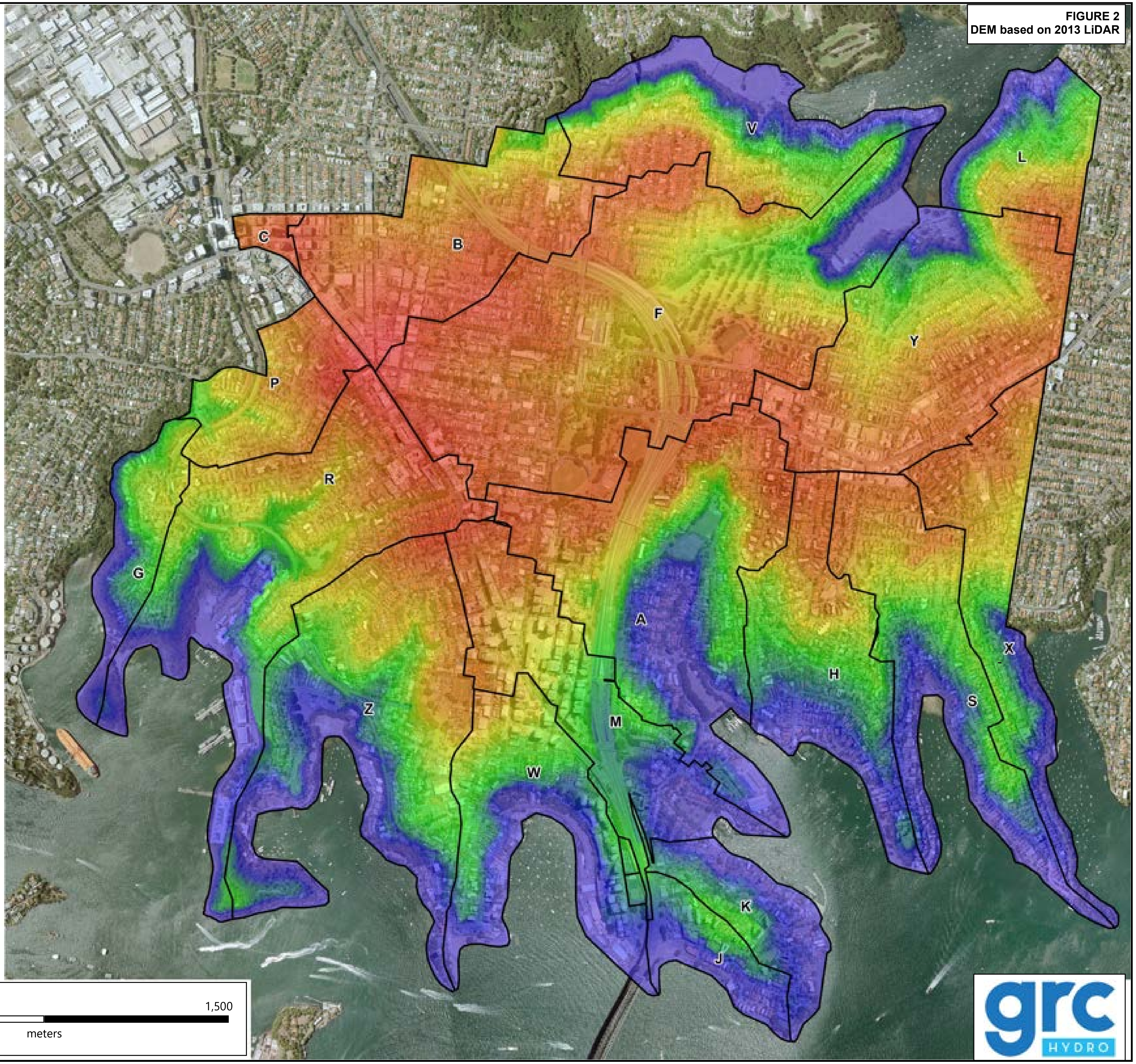


FIGURE 1
STUDY AREA

FIGURE 2
DEM based on 2013 LiDAR



Label	Catchment Name
F	FALL STREET
Z	BERRYS BAY
R	ROCKLANDS ROAD
M	MILSON PARK
H	HAYES STREET
A	ANDERSON PARK
Y	YOUNG STREET
W	WALKER STREET
B	BROOK STREET
G	GORE COVE
C	CHRISTIE STREET
X	MOSMAN BAY
S	SHELL COVE
J	JEFFREYS STREET WHARF
K	KIRRIBILLI
L	LONG BAY
V	VERNON STREET
P	SMOOTHEY PARK

Ground Level (mAHD)

- 0 to 10
- 10 to 20
- 20 to 30
- 30 to 40
- 40 to 50
- 50 to 60
- 60 to 70
- 70 to 80
- 80 to 90
- 90 to 100

Subcatchments

N

0 1,500
meters

grc HYDRO

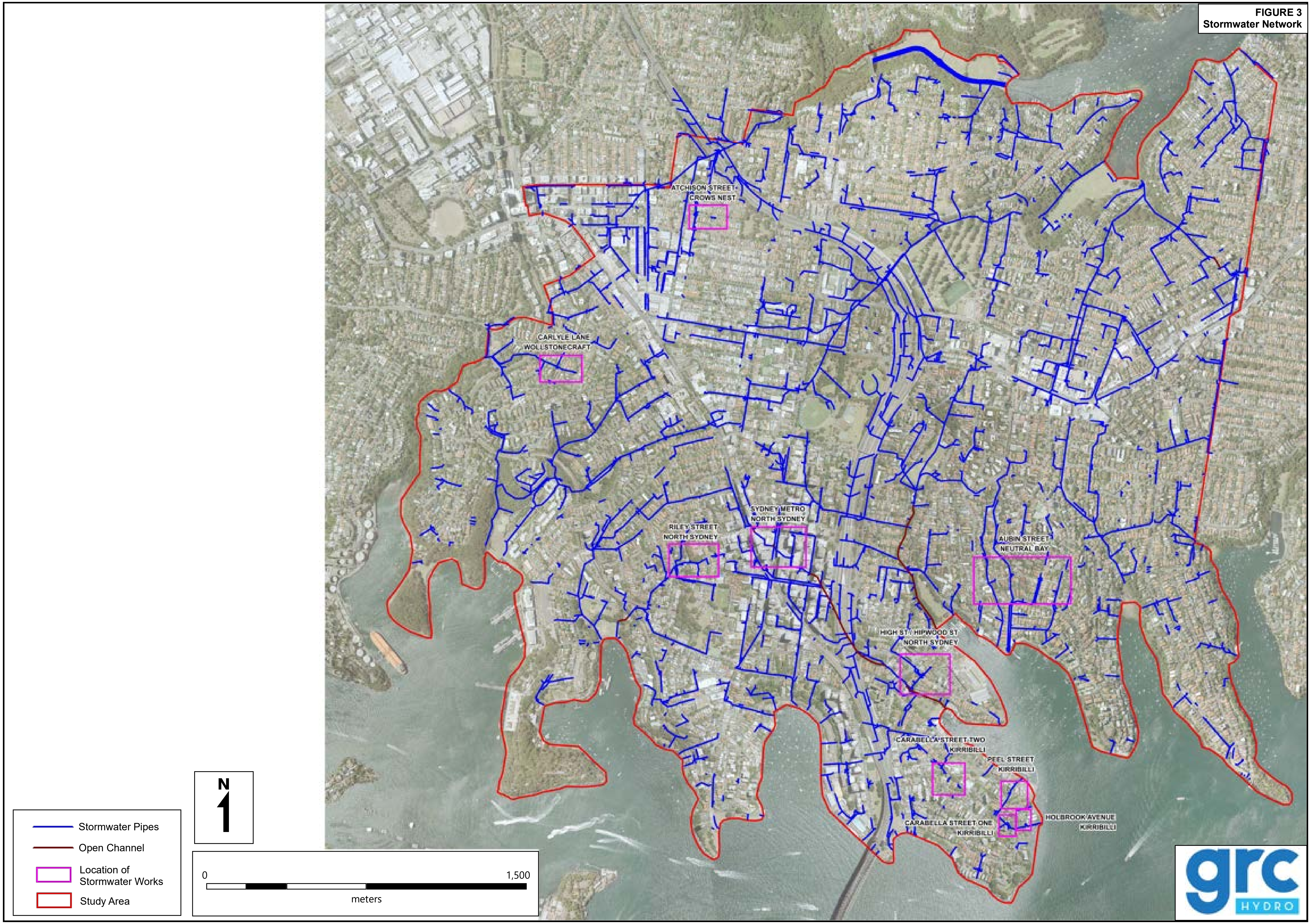
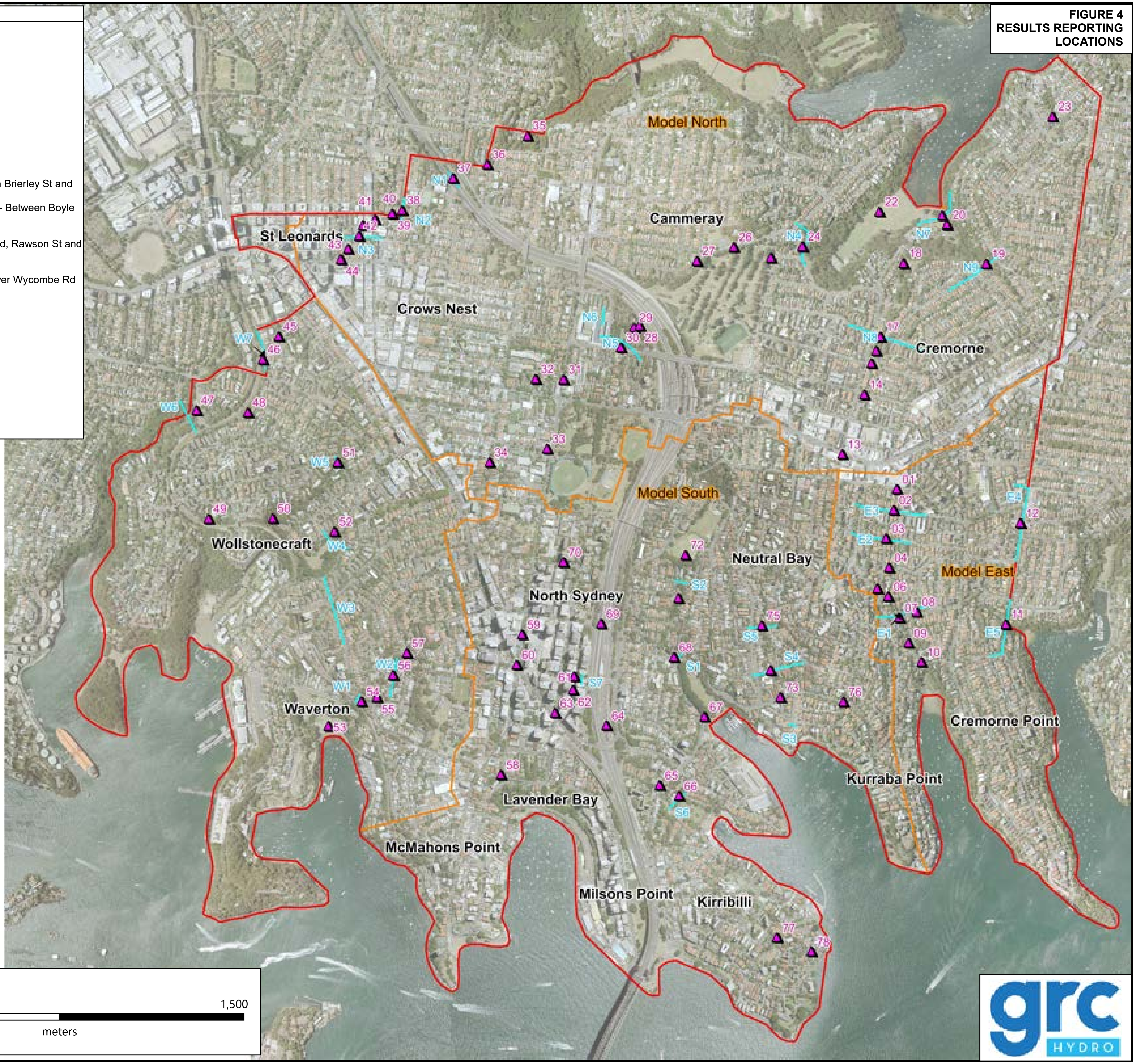


FIGURE 3
Stormwater Network

FIGURE 4
RESULTS REPORTING LOCATIONS

ID	Location
1	Yeo St
2	Harrison St
3	Bennett St
4	Bertha St
5	Burroway Cnr
6	Powell St
7	Bannerman St
8	Guthrie Ave
9	Honda Rd
10	Bogota Ave
11	Hunts Lookout
12	Spofforth St
13	Military Rd
14	Belgrave St
15	Sutherland St
16	Grasmere La
17	Grasmere Rd
18	Little Young St
19	Brightmore St
20	Brightmore Res
21	Young St
22	Primrose Pk
23	Ryries Pde
24	Grafton St
25	Park Ave
26	Cammeray Rd
27	Warringa Rd
28	Cammerray Ave
29	Aznac Pk
30	Ernest St
31	Miller St
32	Rodborough Ave
33	Carlow St
34	West St
35	Hamilton La
36	Palmer St
37	Brooke St
38	Wheatlegh St
39	Chandos St
40	Willoughby Rd
41	Hume La
42	Atchison St
43	Albany La
44	Albany St
45	Christie St
46	Lithgow St
47	Russell St
48	Carlyle La
49	Belmont Av
50	Newlands La
51	Newlands St
52	Hazelbank Rd
53	Waverton Oval
54	Woolcott St
55	Euroka St
56	Ancrum St
57	Bank St
58	Lavender St
59	Miller St
60	Pacific Hwy / Miller St Intersection
61	Mount St
62	Little Walker St
63	Pacific Hwy / Walker St Intersection
64	Warringah Freeway / Tunnel Entrance
65	Clark Rd
66	Hipwood St
67	Anderson Park Outlet
68	Clark Rd / Kurraba Rd Intersection
69	Warringah Freeway
70	McLaren St
71	Rawson St Channel
72	Forsyth Park
73	Kurraba Rd
74	Aubin St
75	Philips St
76	Kurraba Rd / Wycombe Rd Intersection
77	Carabella St / Peel St Intersection
78	Holbrook Ave

ID	Location
N1	Brooke St
N2	Wheatleigh St
N3	Atchison St
N4	Grafton St
N5	Ernest St
N6	Anzac Ave
N7	Young St
N8	Grasmere Rd
N9	Brightmore St
E1	Bannerman St
E2	Bennet St
E3	Harrison St
E4	Spofforth St - Between Brierley St and Florence St
E5	Lower Spofforth Walk - Between Boyle St and Hodgson Ave
S1	Intersection of Clark Rd, Rawson St and Kurraba Rd
S2	Eaton St
S3	Cnr Hayes St and Lower Wycombe Rd
S4	Aubin St
S5	Phillips St
S6	Hipwood St
S7	Mount St
W1	Woolcott St
W2	Ancrum St
W3	Carr St
W4	Brennan Park
W5	Newlands St
W6	Russel St
W7	Lithgow St



N

flow reporting locations
Study Area
Hydraulic Model Quadrants
Comparison Points

0 1,500
meters

grc HYDRO

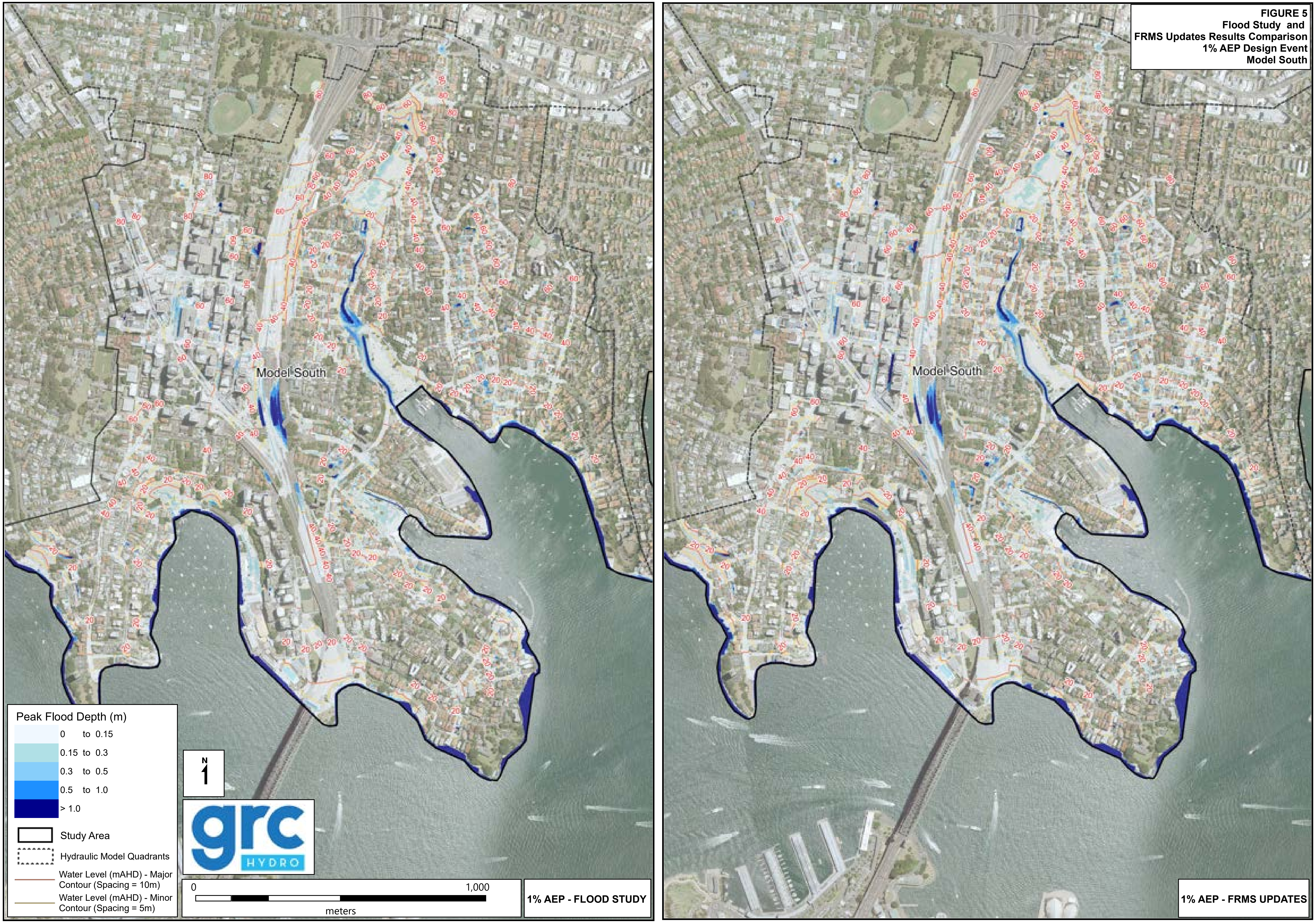


FIGURE 5
Flood Study and
FRMS Updates Results Comparison
1% AEP Design Event
Model South

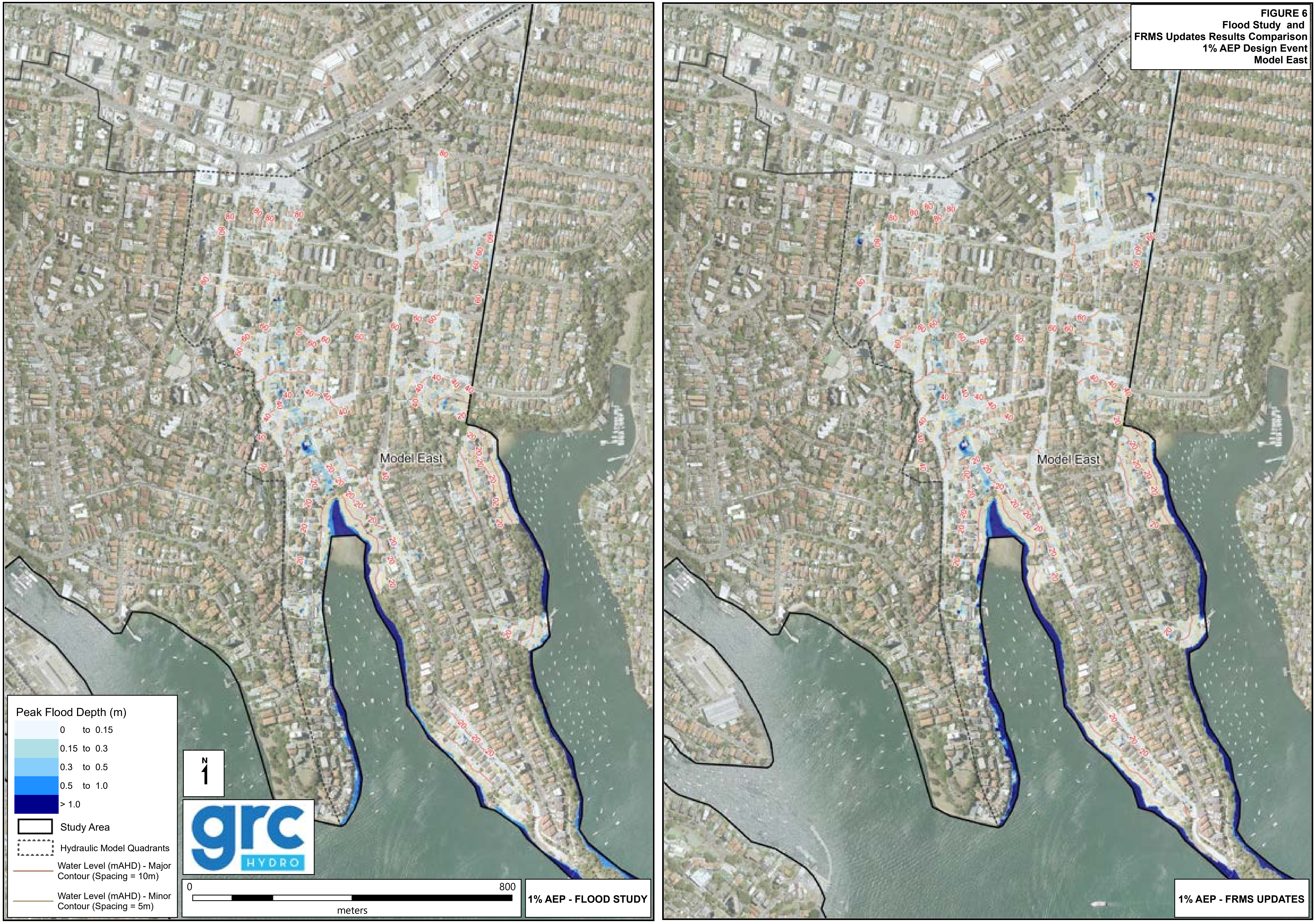


FIGURE 6
Flood Study and
FRMS Updates Results Comparison
1% AEP Design Event
Model East
Model East
Model East
Peak Flood Depth (m)
0 to 0.15
0.15 to 0.3
0.3 to 0.5
0.5 to 1.0
> 1.0
Study Area
Hydraulic Model Quadrants
Water Level (mAHD) - Major Contour (Spacing = 10m)
Water Level (mAHD) - Minor Contour (Spacing = 5m)
N
grc HYDRO
0
800
meters
1% AEP - FLOOD STUDY
1% AEP - FRMS UPDATES

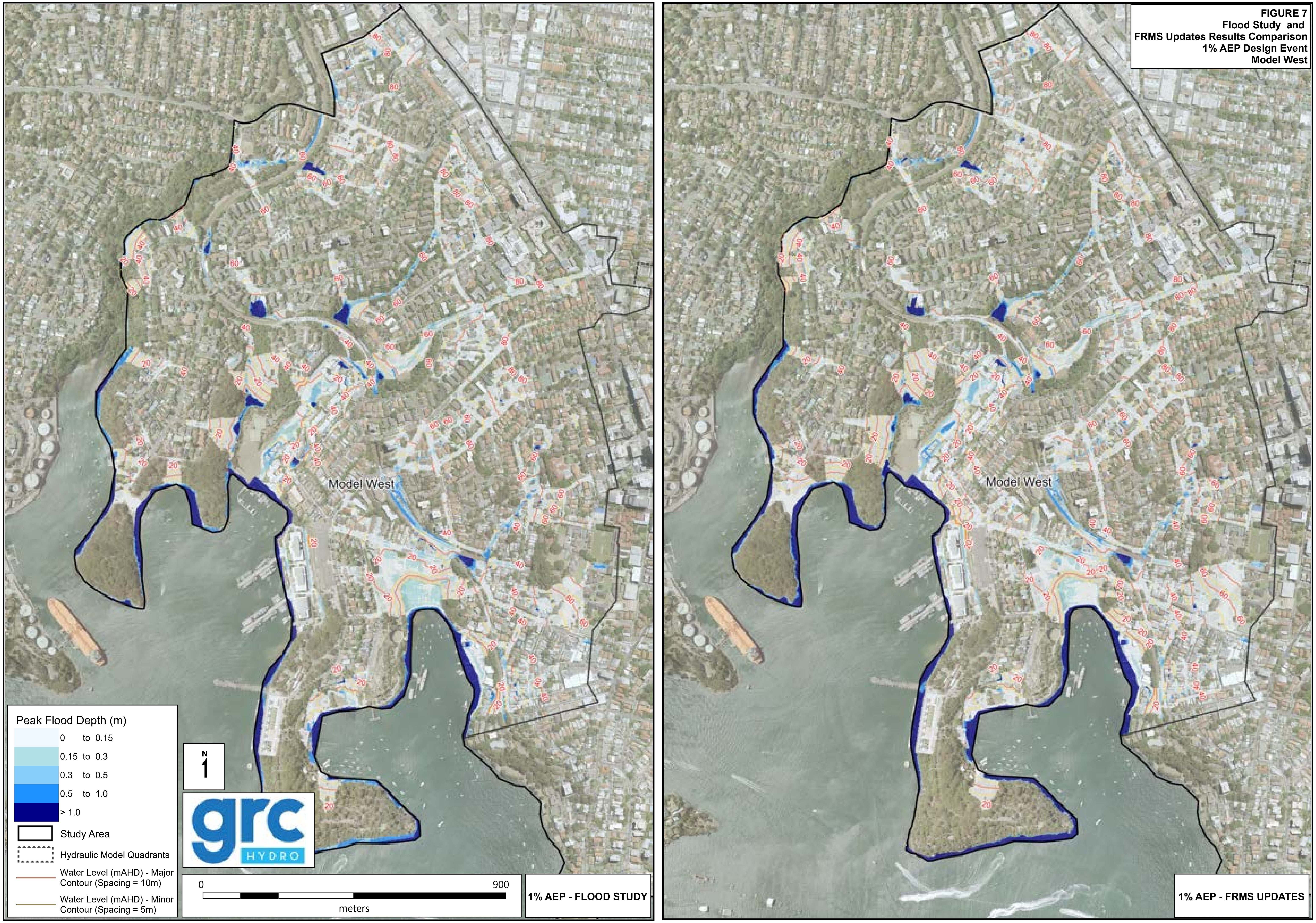


FIGURE 7
Flood Study and
FRMS Updates Results Comparison
1% AEP Design Event
Model West
Model West
Peak Flood Depth (m)
0 to 0.15
0.15 to 0.3
0.3 to 0.5
0.5 to 1.0
> 1.0
Study Area
Hydraulic Model Quadrants
Water Level (mAHD) - Major Contour (Spacing = 10m)
Water Level (mAHD) - Minor Contour (Spacing = 5m)
N
grc HYDRO
0
900
meters
1% AEP - FLOOD STUDY
1% AEP - FRMS UPDATES

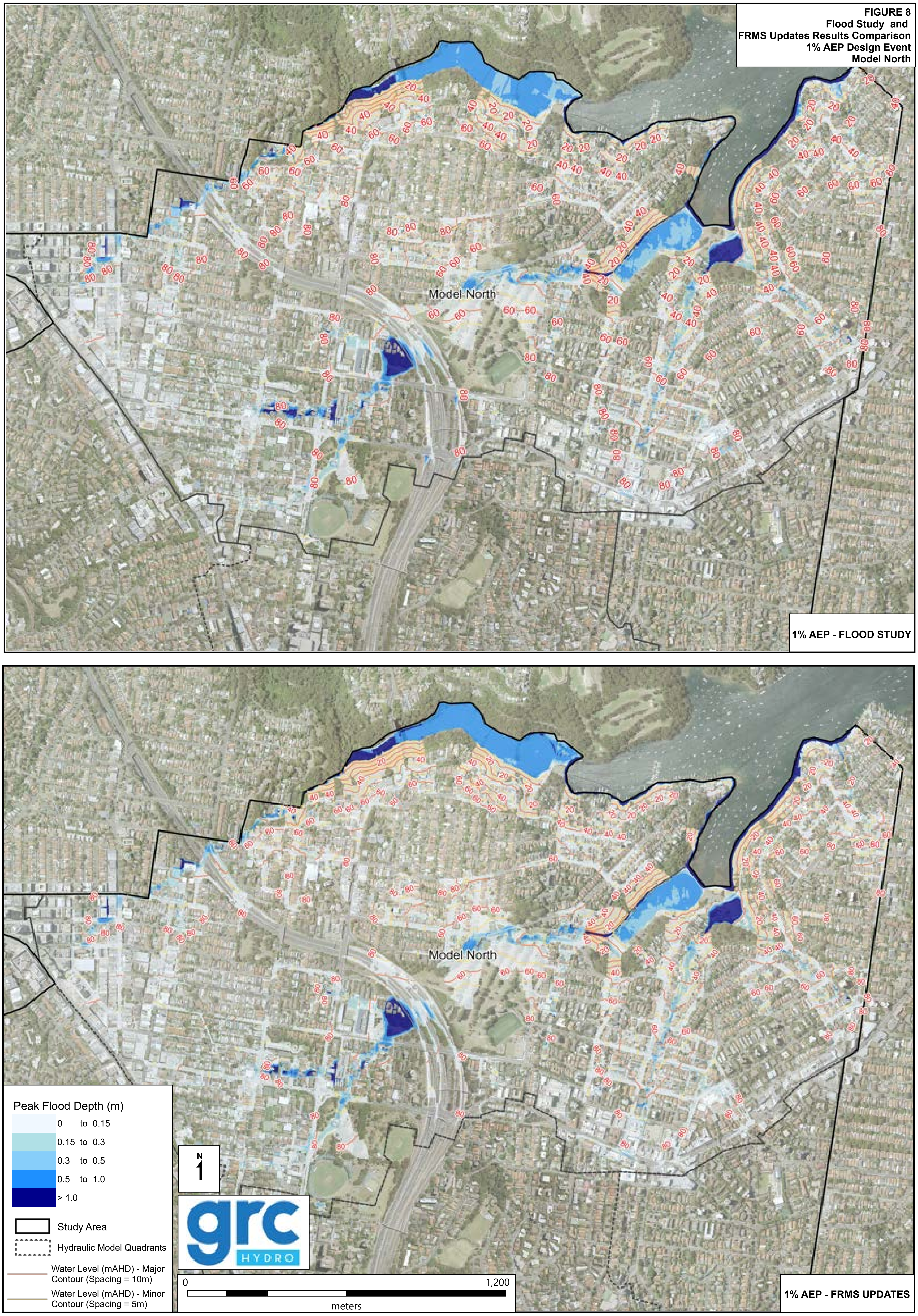


FIGURE 8
Flood Study and
FRMS Updates Results Comparison
1% AEP Design Event
Model North
Model North
1% AEP - FLOOD STUDY
Model North
Peak Flood Depth (m)
0 to 0.15
0.15 to 0.3
0.3 to 0.5
0.5 to 1.0
> 1.0
Study Area
Hydraulic Model Quadrants
Water Level (mAHD) - Major Contour (Spacing = 10m)
Water Level (mAHD) - Minor Contour (Spacing = 5m)
N
grc
HYDRO
0
1,200
meters
1% AEP - FRMS UPDATES

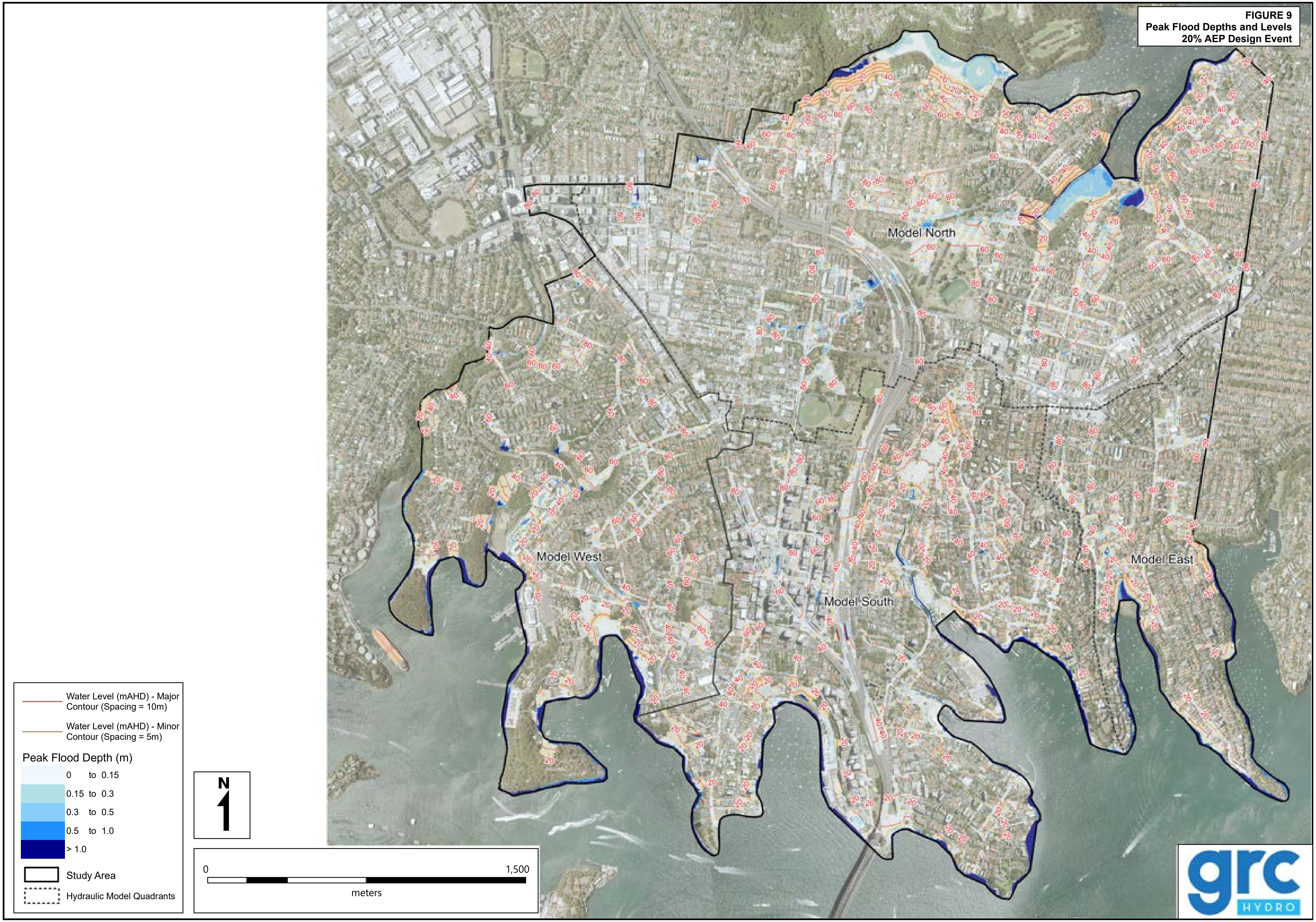
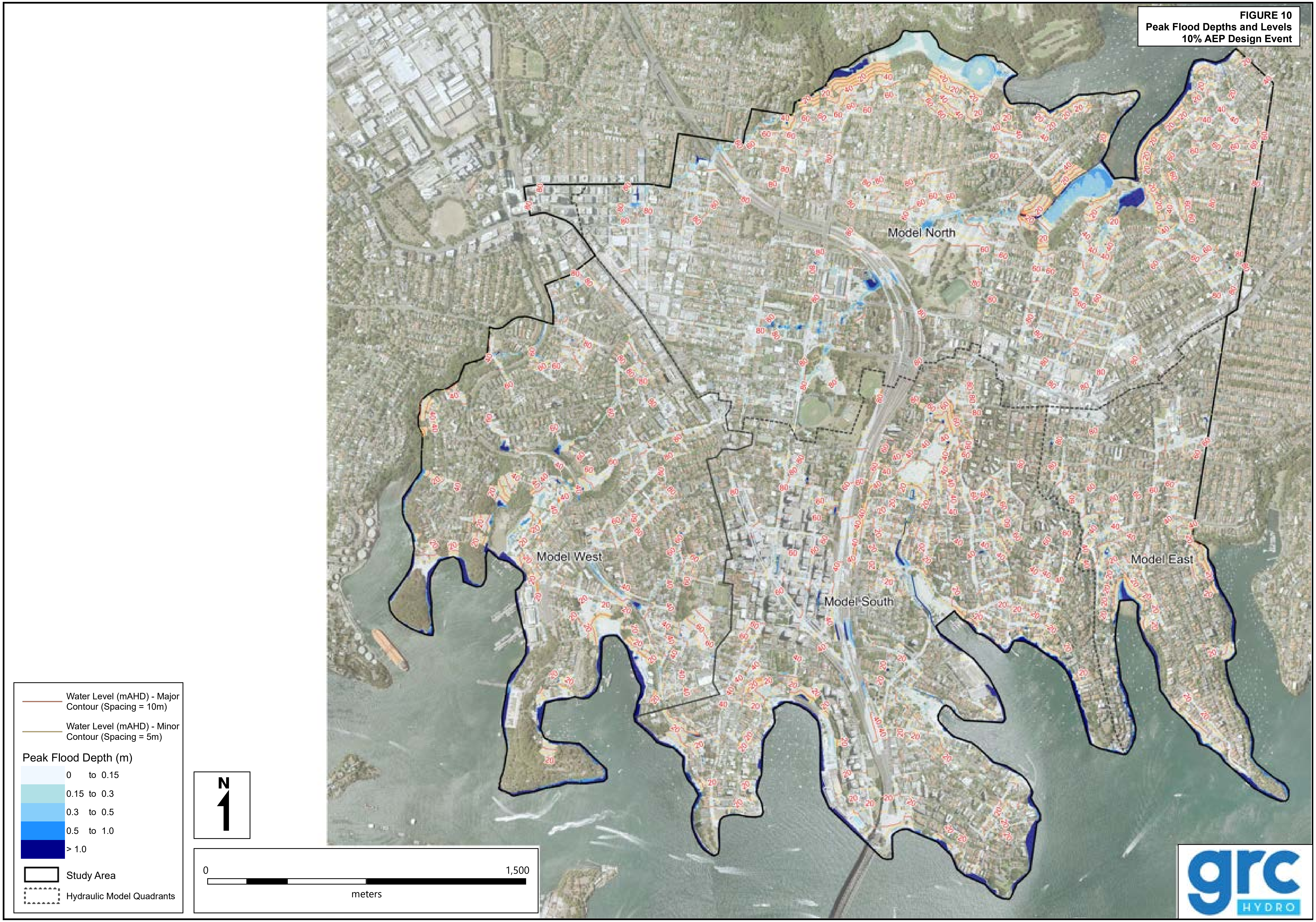


FIGURE 9
Peak Flood Depths and Levels
20% AEP Design Event
Model North
Model West
Model South
Model East
Water Level (mAHD) - Major Contour (Spacing = 10m)
Water Level (mAHD) - Minor Contour (Spacing = 5m)
Peak Flood Depth (m)
0 to 0.15
0.15 to 0.3
0.3 to 0.5
0.5 to 1.0
> 1.0
Study Area
Hydraulic Model Quadrants
N
0
1,500
meters
grc
HYDRO

FIGURE 10
Peak Flood Depths and Levels
10% AEP Design Event



grc HYDRO

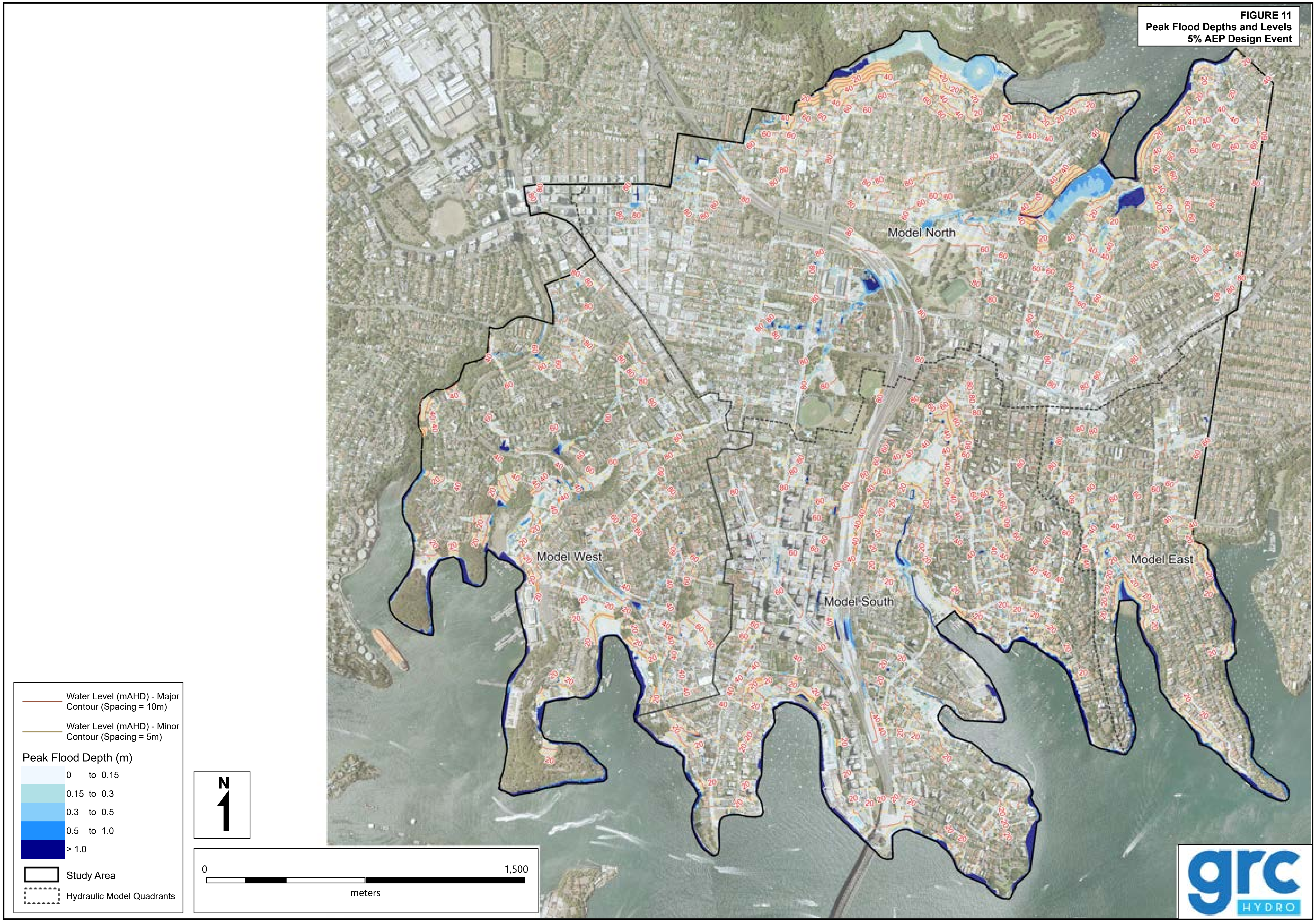


FIGURE 11
Peak Flood Depths and Levels
5% AEP Design Event

FIGURE 12
Peak Flood Depths and Levels
2% AEP Design Event

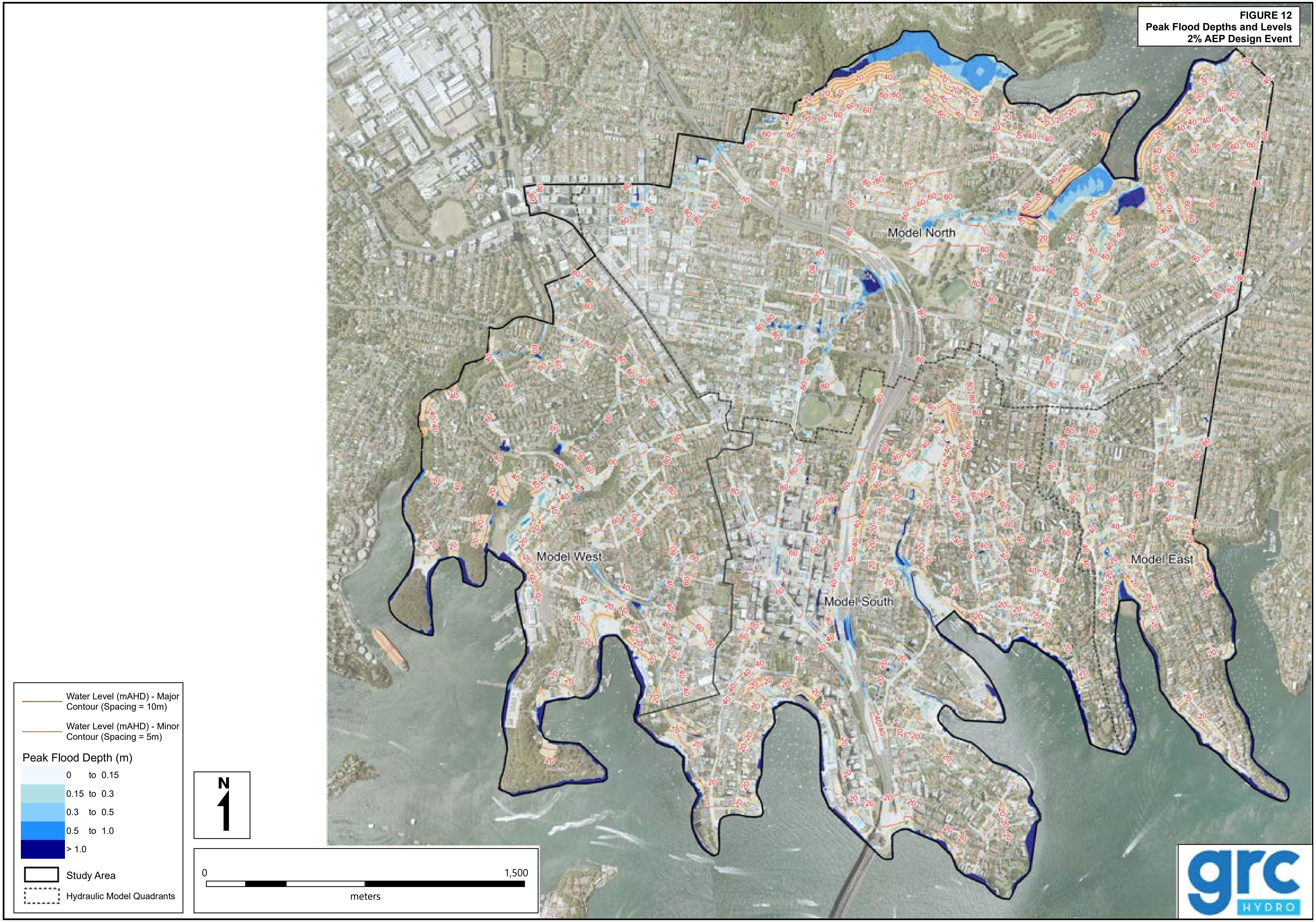


FIGURE 13
Peak Flood Depths and Levels
1% AEP Design Event

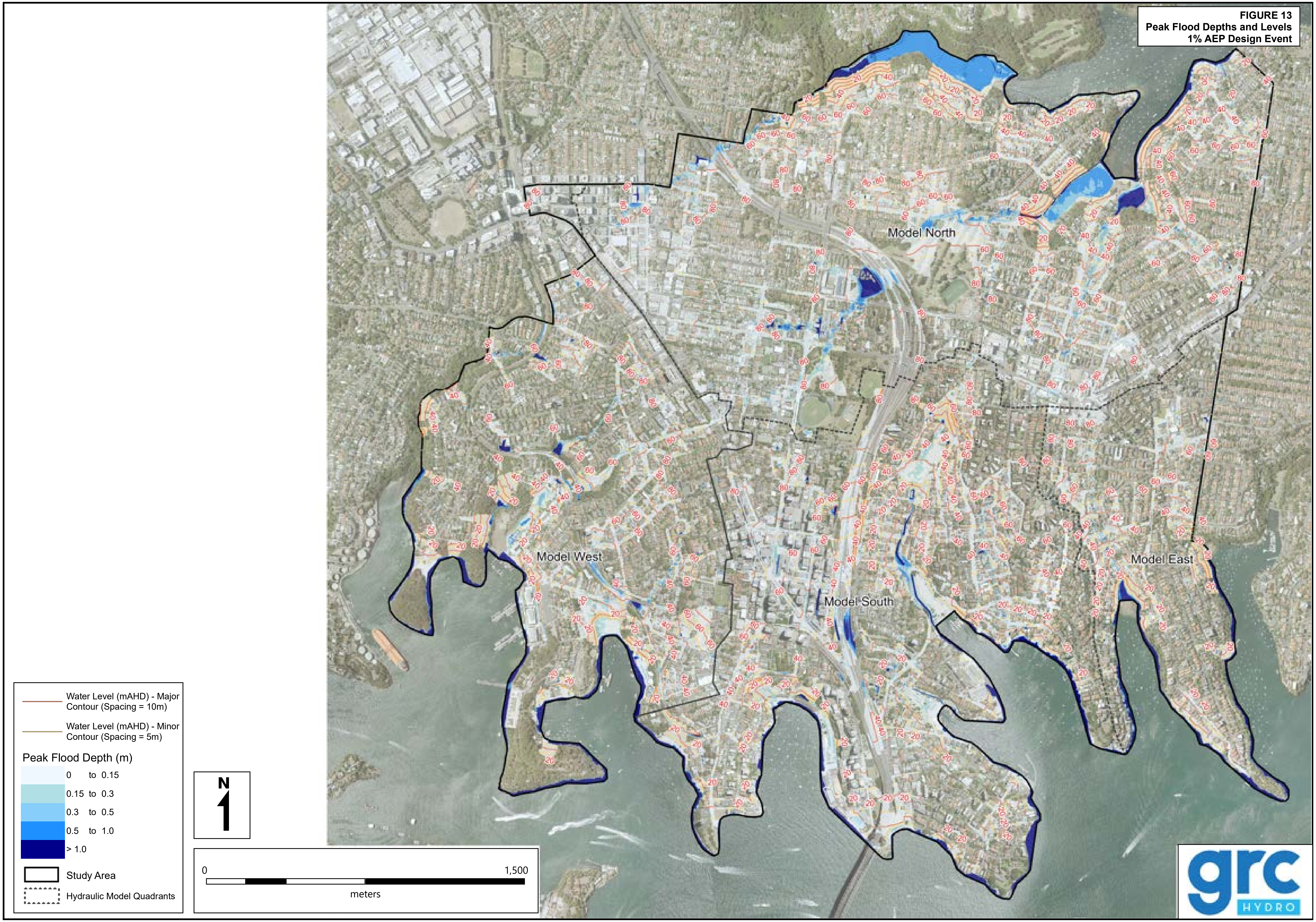
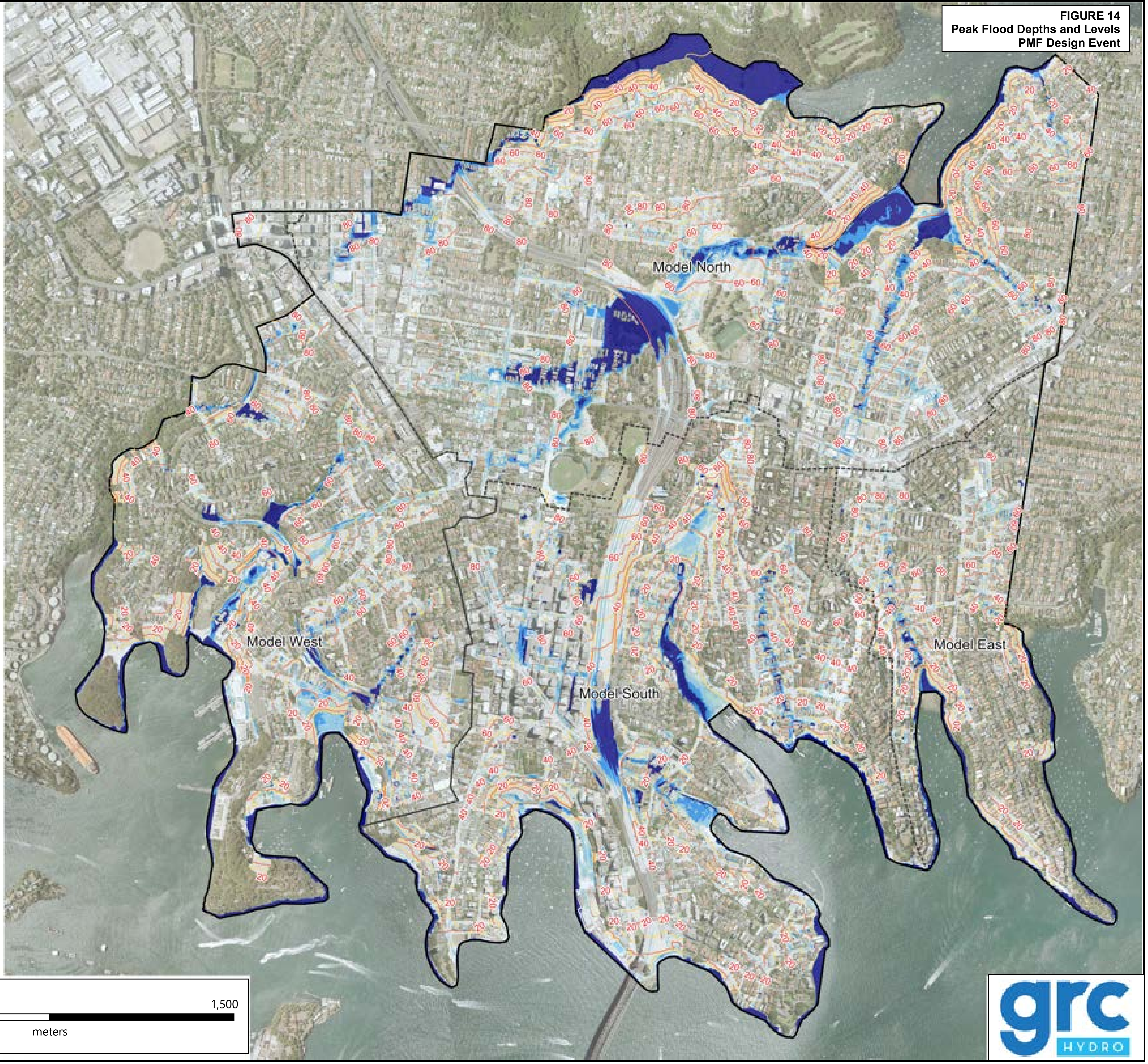


FIGURE 14
Peak Flood Depths and Levels
PMF Design Event



Water Level (mAHD) - Major Contour (Spacing = 10m)

Water Level (mAHD) - Minor Contour (Spacing = 5m)

Peak Flood Depth (m)

- 0 to 0.15
- 0.15 to 0.3
- 0.3 to 0.5
- 0.5 to 1.0
- > 1.0

Study Area

Hydraulic Model Quadrants

N

0 1,500
meters

grc HYDRO

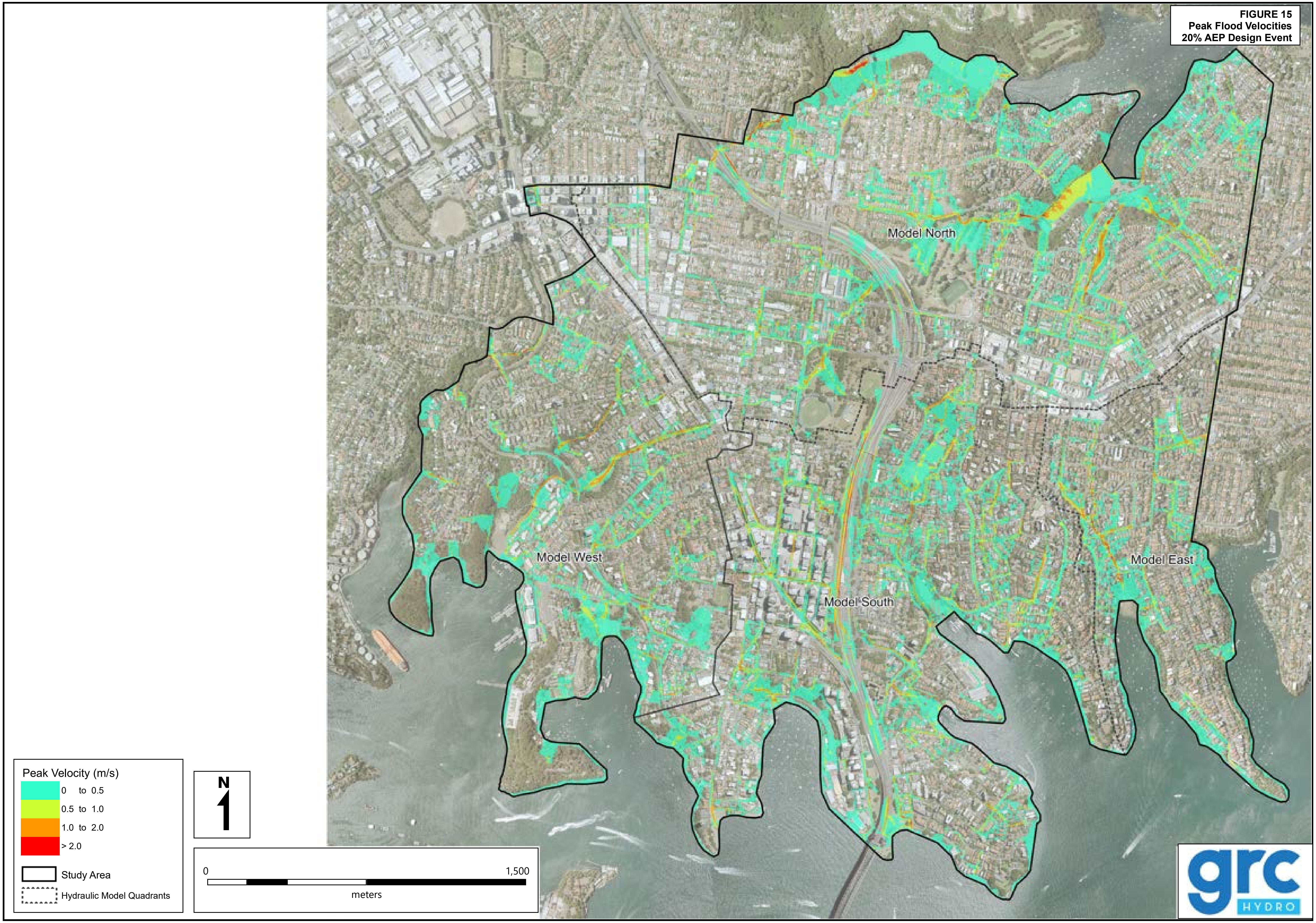
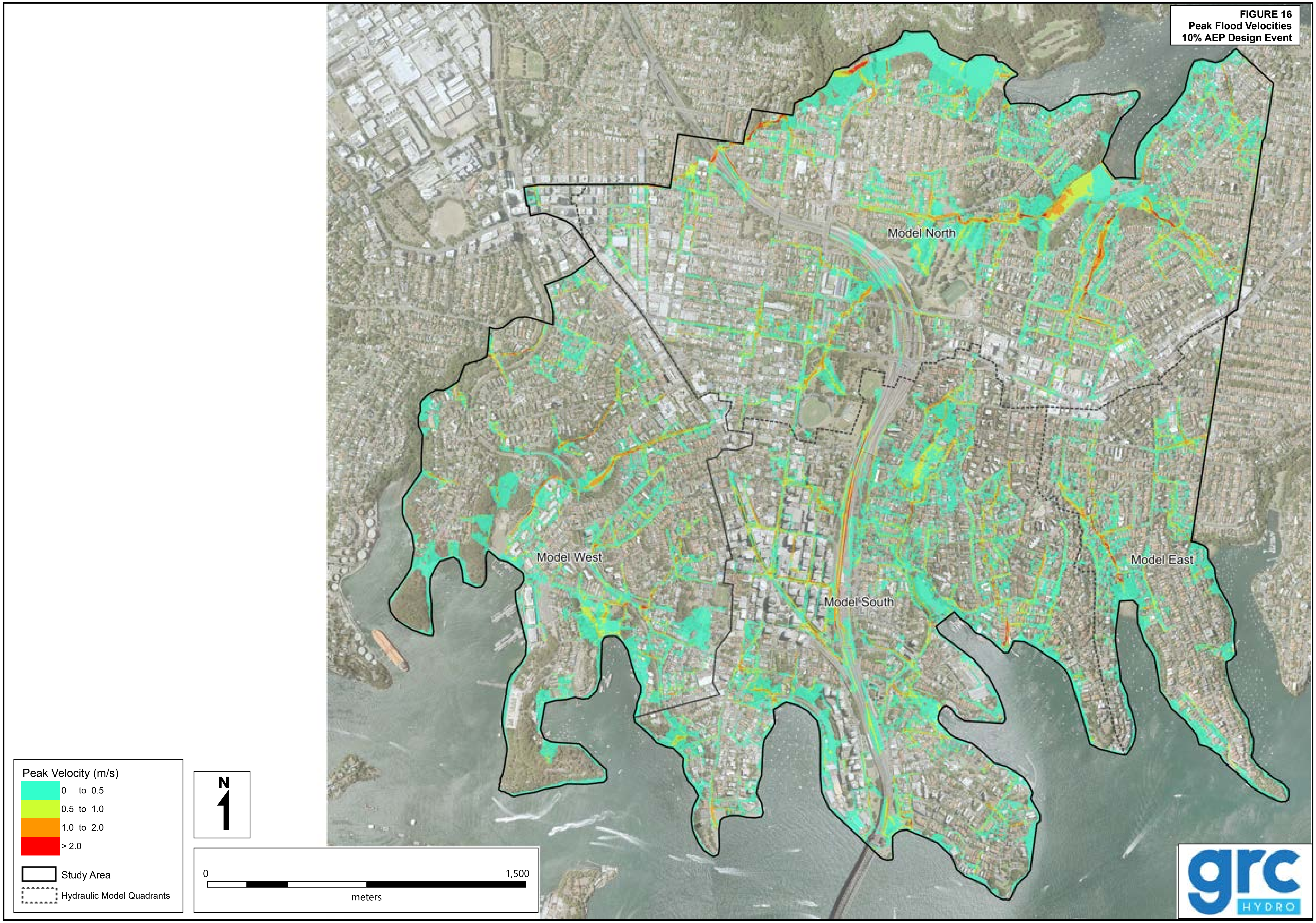


FIGURE 15
Peak Flood Velocities
20% AEP Design Event

FIGURE 16
Peak Flood Velocities
10% AEP Design Event



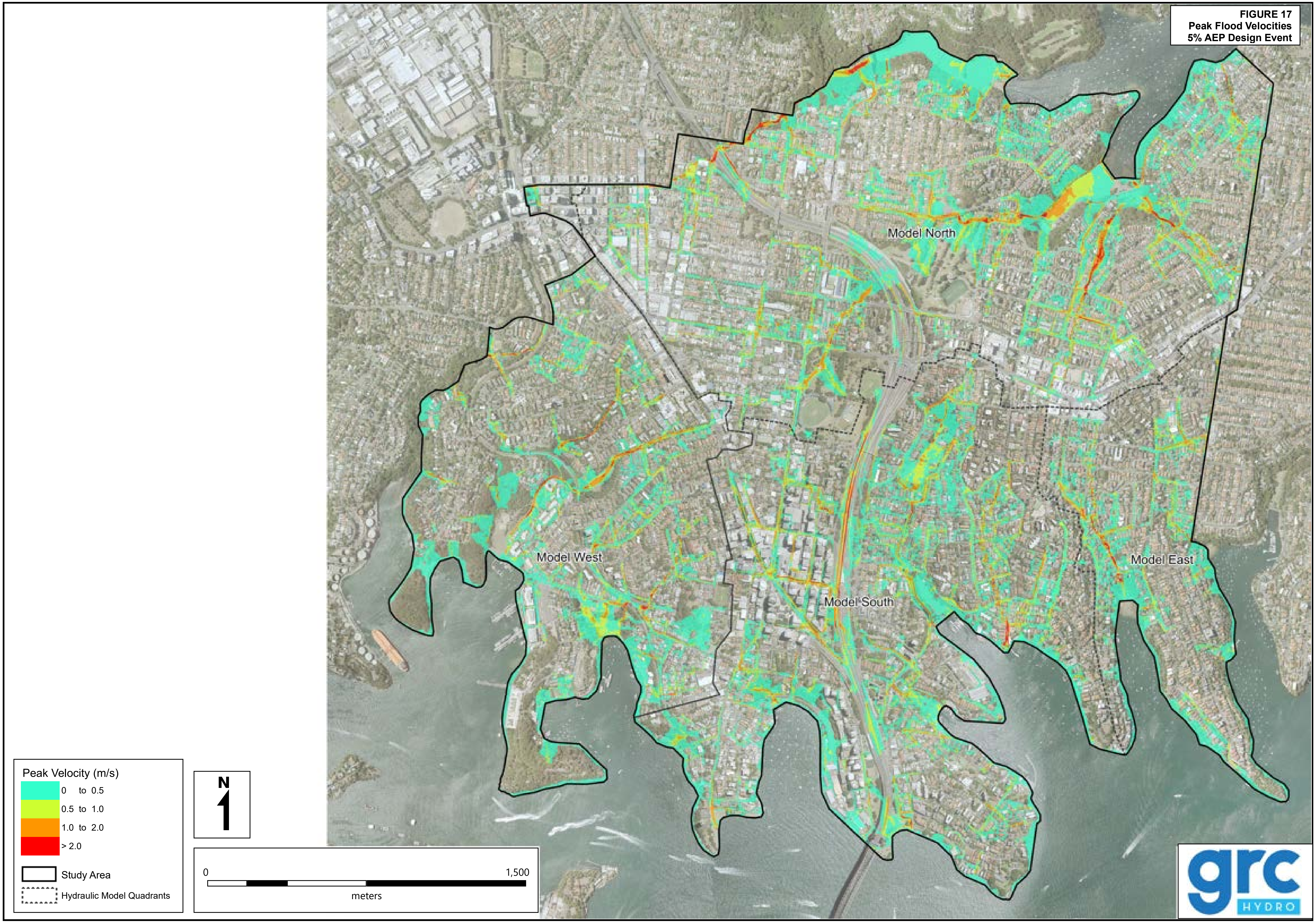
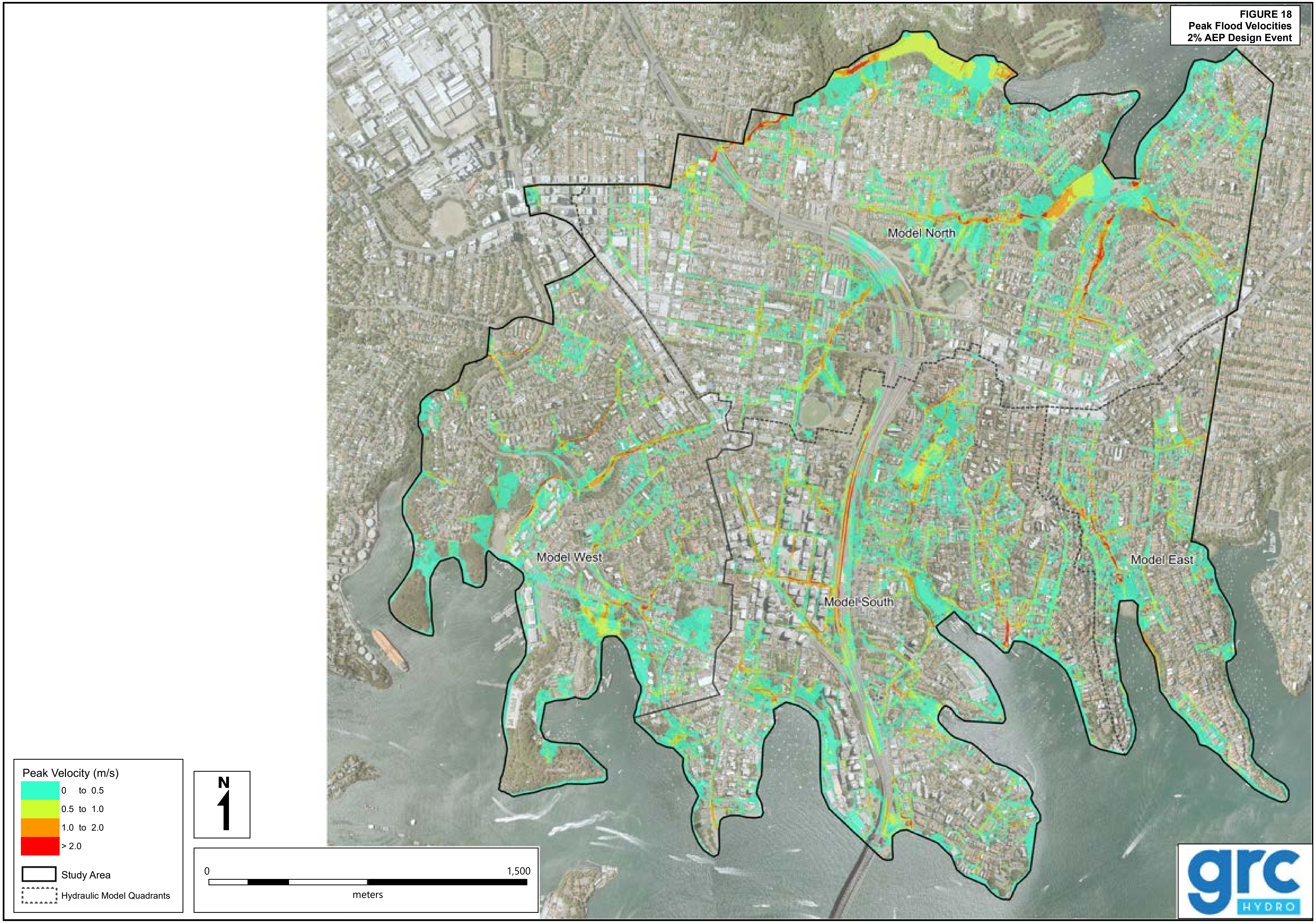


FIGURE 17
Peak Flood Velocities
5% AEP Design Event
Model North
Model West
Model South
Model East
Peak Velocity (m/s)
0 to 0.5
0.5 to 1.0
1.0 to 2.0
> 2.0
Study Area
Hydraulic Model Quadrants
N
0
1,500
meters
grc
HYDRO

FIGURE 18
Peak Flood Velocities
2% AEP Design Event



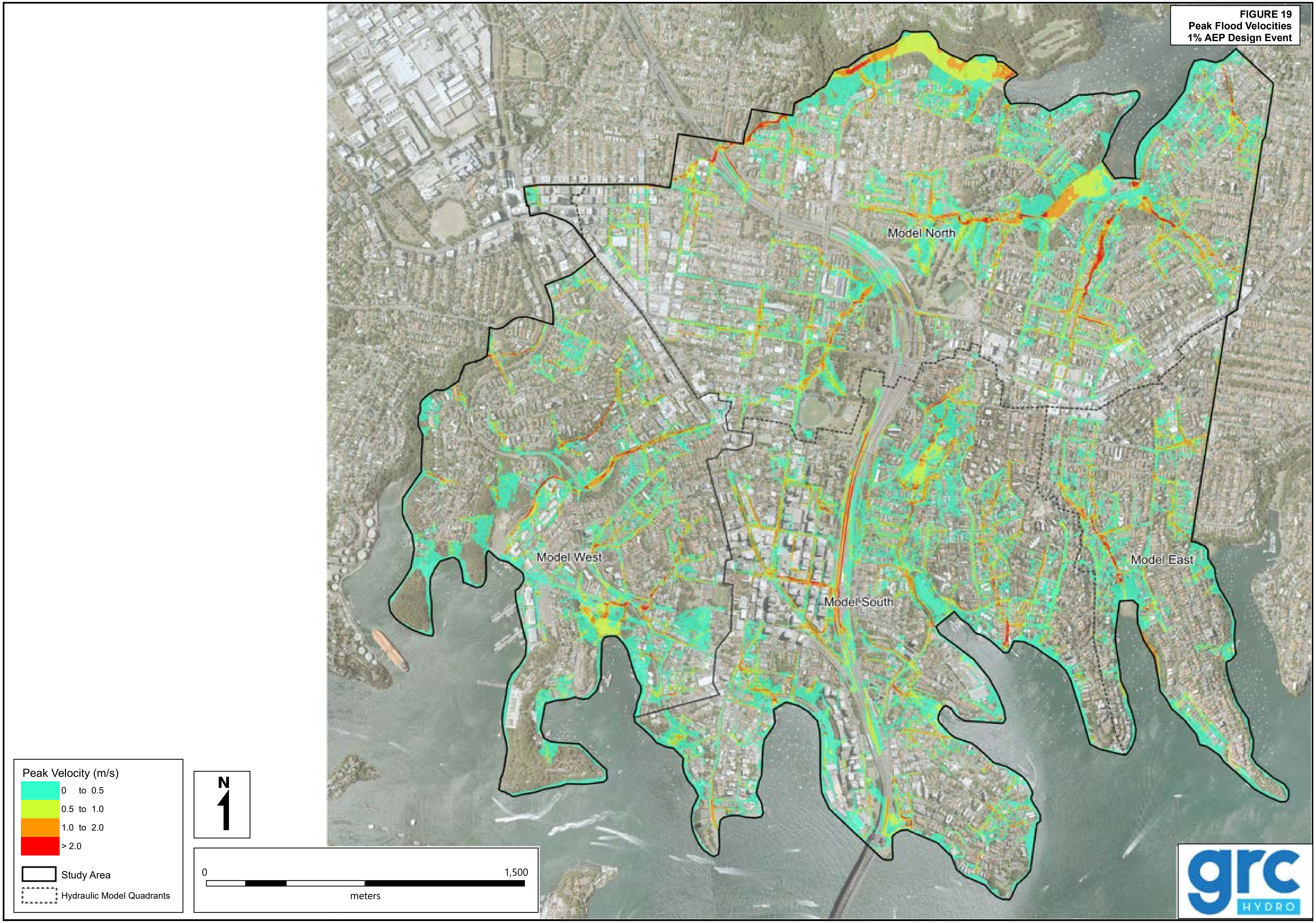
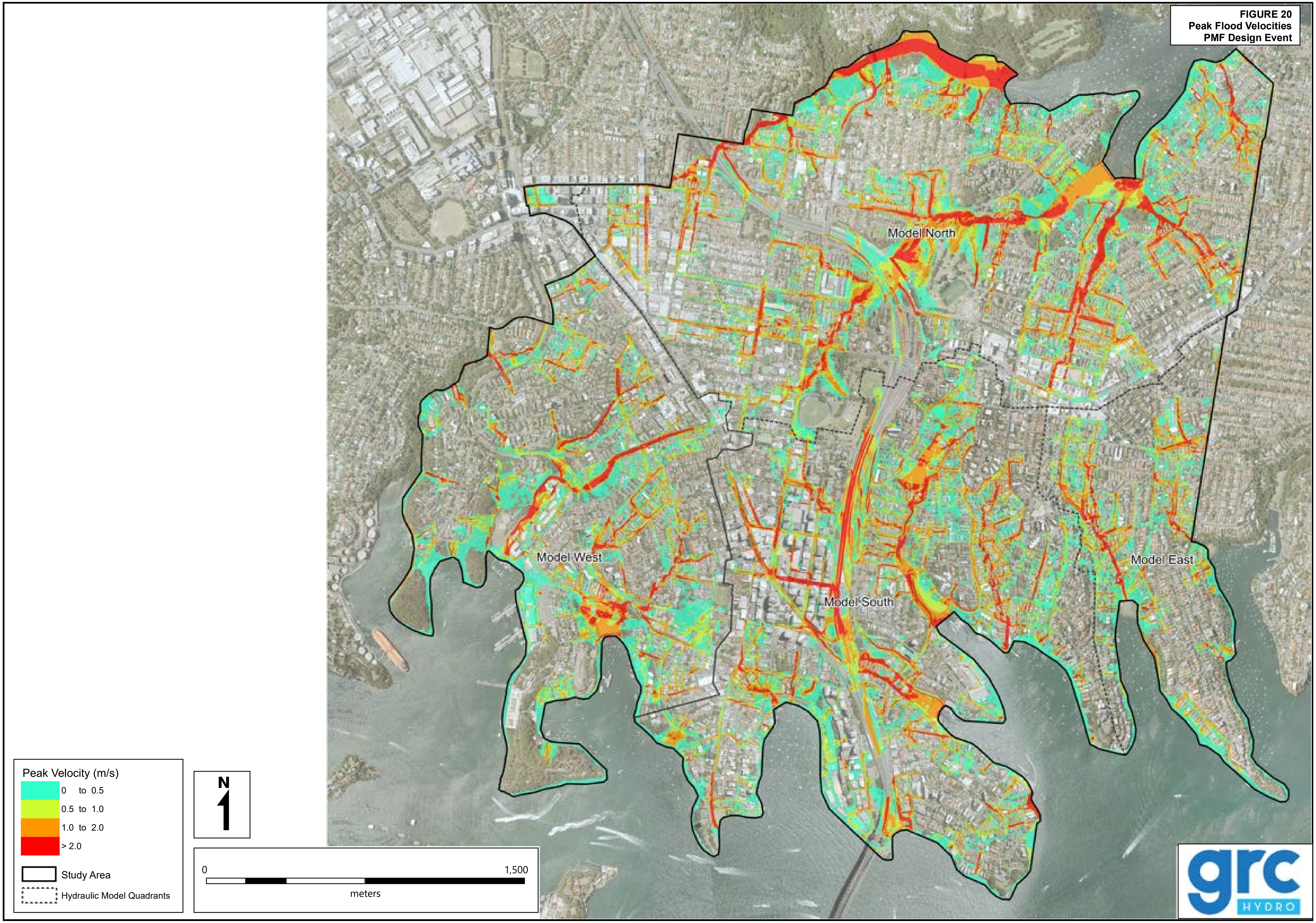


FIGURE 19
Peak Flood Velocities
1% AEP Design Event
Model North
Model West
Model South
Model East
Peak Velocity (m/s)
0 to 0.5
0.5 to 1.0
1.0 to 2.0
> 2.0
Study Area
Hydraulic Model Quadrants
N
0
1,500
meters

FIGURE 20
Peak Flood Velocities
PMF Design Event



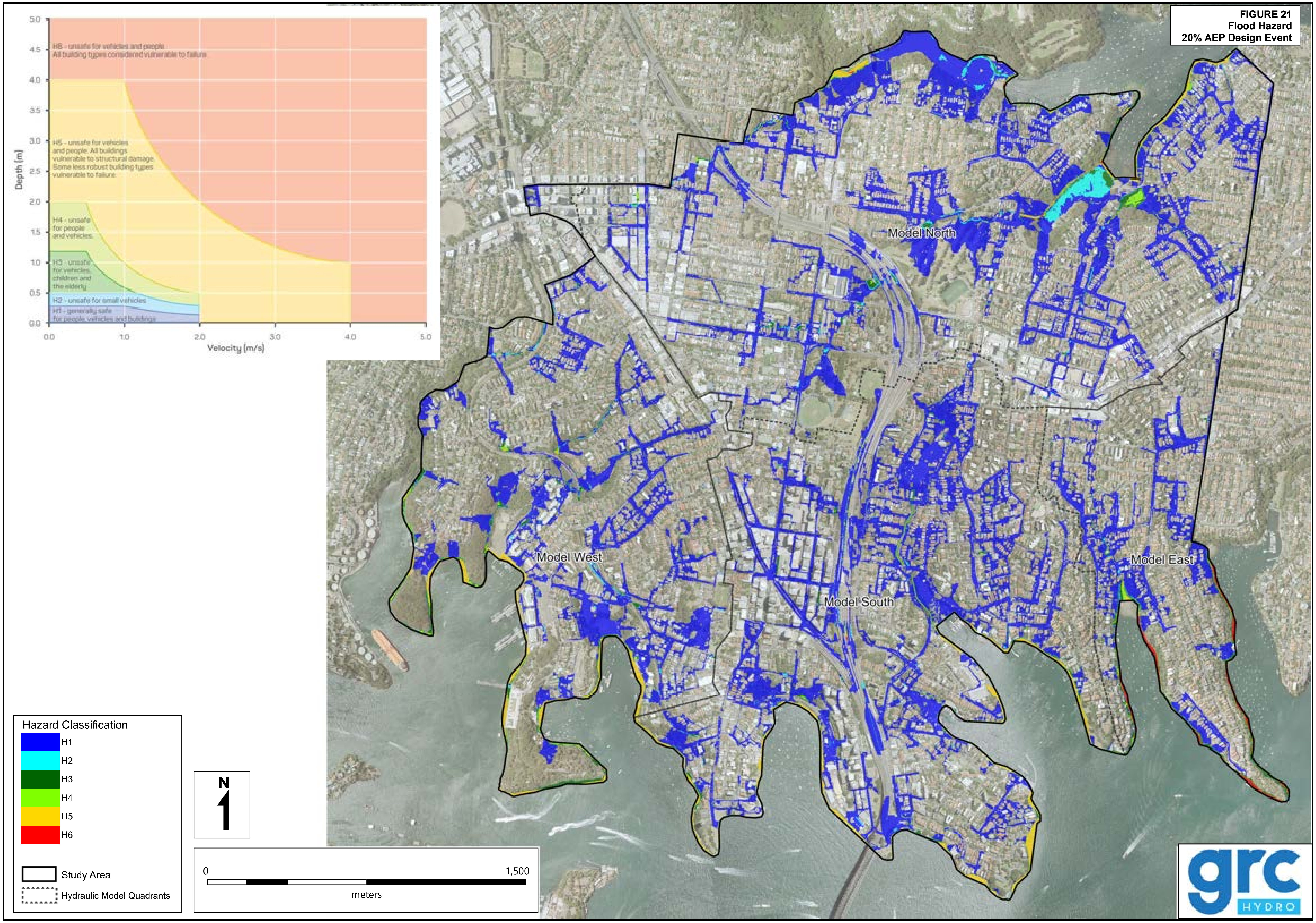
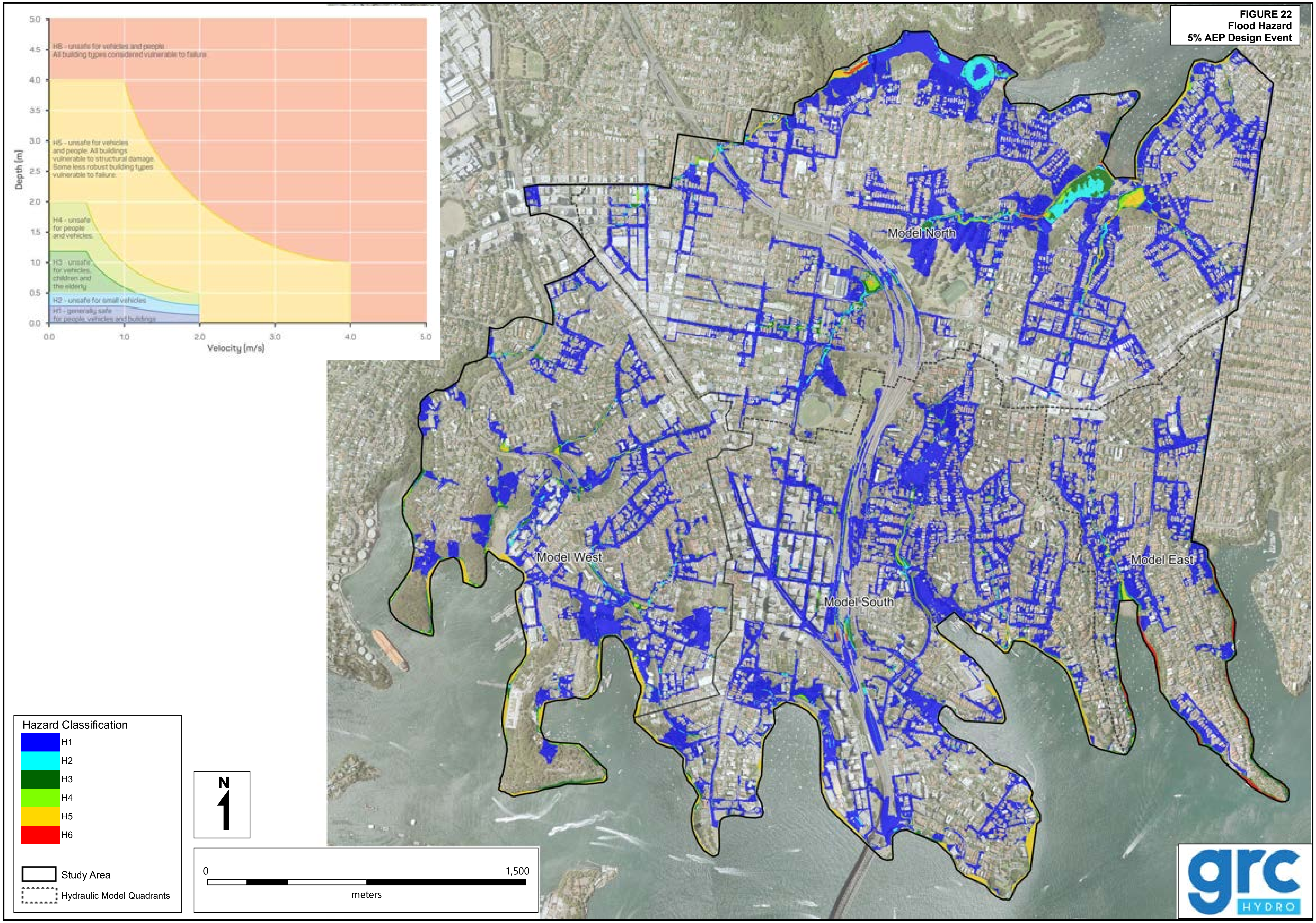


FIGURE 21
Flood Hazard
20% AEP Design Event
H6 - unsafe for vehicles and people
All building types considered vulnerable to failure
H5 - unsafe for vehicles and people. All buildings vulnerable to structural damage. Some less robust building types vulnerable to failure.
H4 - unsafe for people and vehicles.
H3 - unsafe for vehicles, children and the elderly
H2 - unsafe for small vehicles
H1 - generally safe for people, vehicles and buildings
Depth (m)
Velocity (m/s)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
4.5
5.0
Model North
Model West
Model South
Model East
Hazard Classification
H1
H2
H3
H4
H5
H6
Study Area
Hydraulic Model Quadrants
N
0
1,500
meters
grc
HYDRO

FIGURE 22
Flood Hazard
5% AEP Design Event



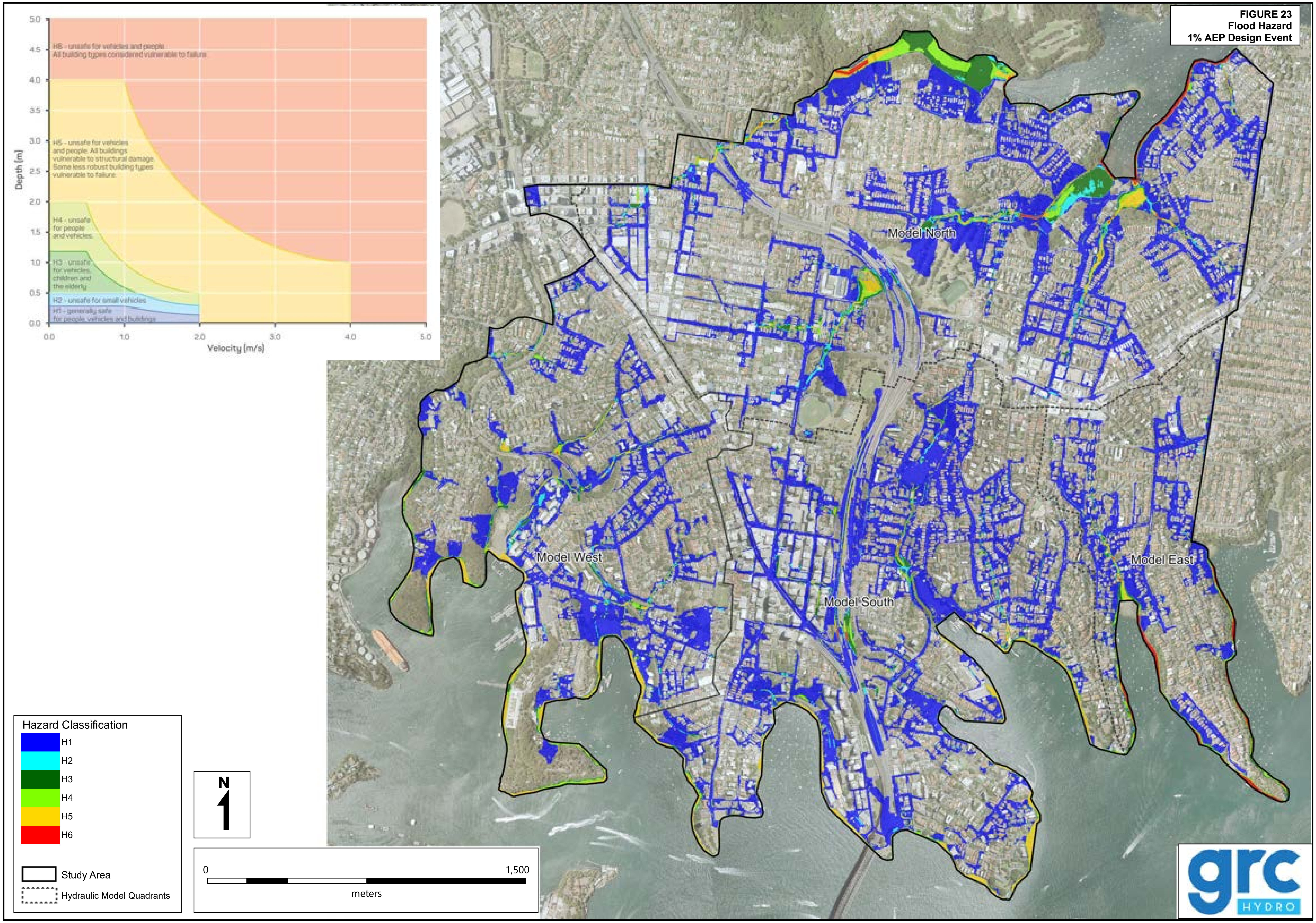


FIGURE 23
Flood Hazard
1% AEP Design Event
Depth (m)
Velocity (m/s)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
4.5
5.0
H6 - unsafe for vehicles and people.
All building types considered vulnerable to failure.
H5 - unsafe for vehicles and people. All buildings vulnerable to structural damage. Some less robust building types vulnerable to failure.
H4 - unsafe for people and vehicles.
H3 - unsafe for vehicles, children and the elderly
H2 - unsafe for small vehicles
H1 - generally safe for people, vehicles and buildings
Model North
Model West
Model South
Model East
Hazard Classification
H1
H2
H3
H4
H5
H6
Study Area
Hydraulic Model Quadrants
N
0
1,500
meters

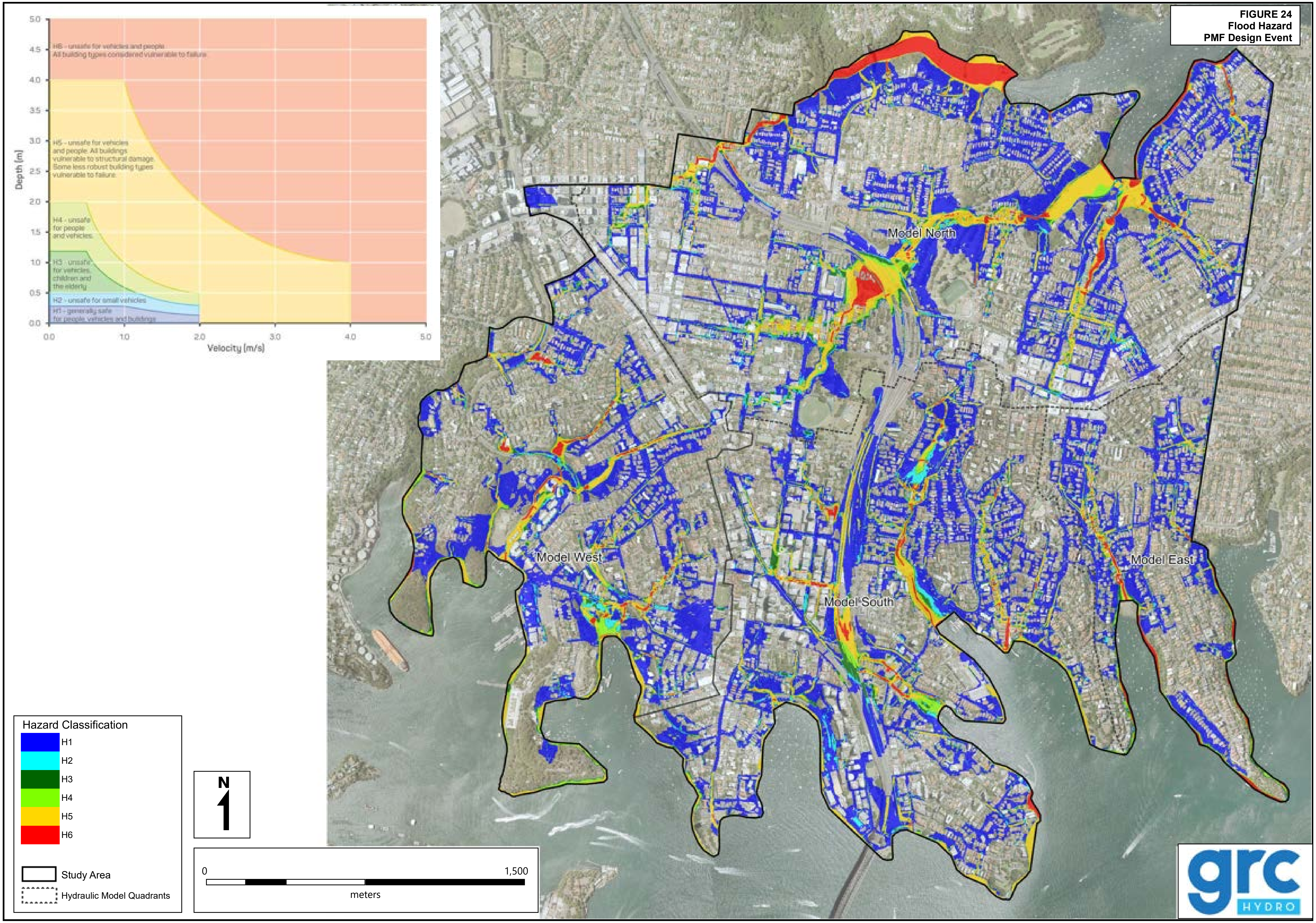


FIGURE 24
Flood Hazard
PMF Design Event

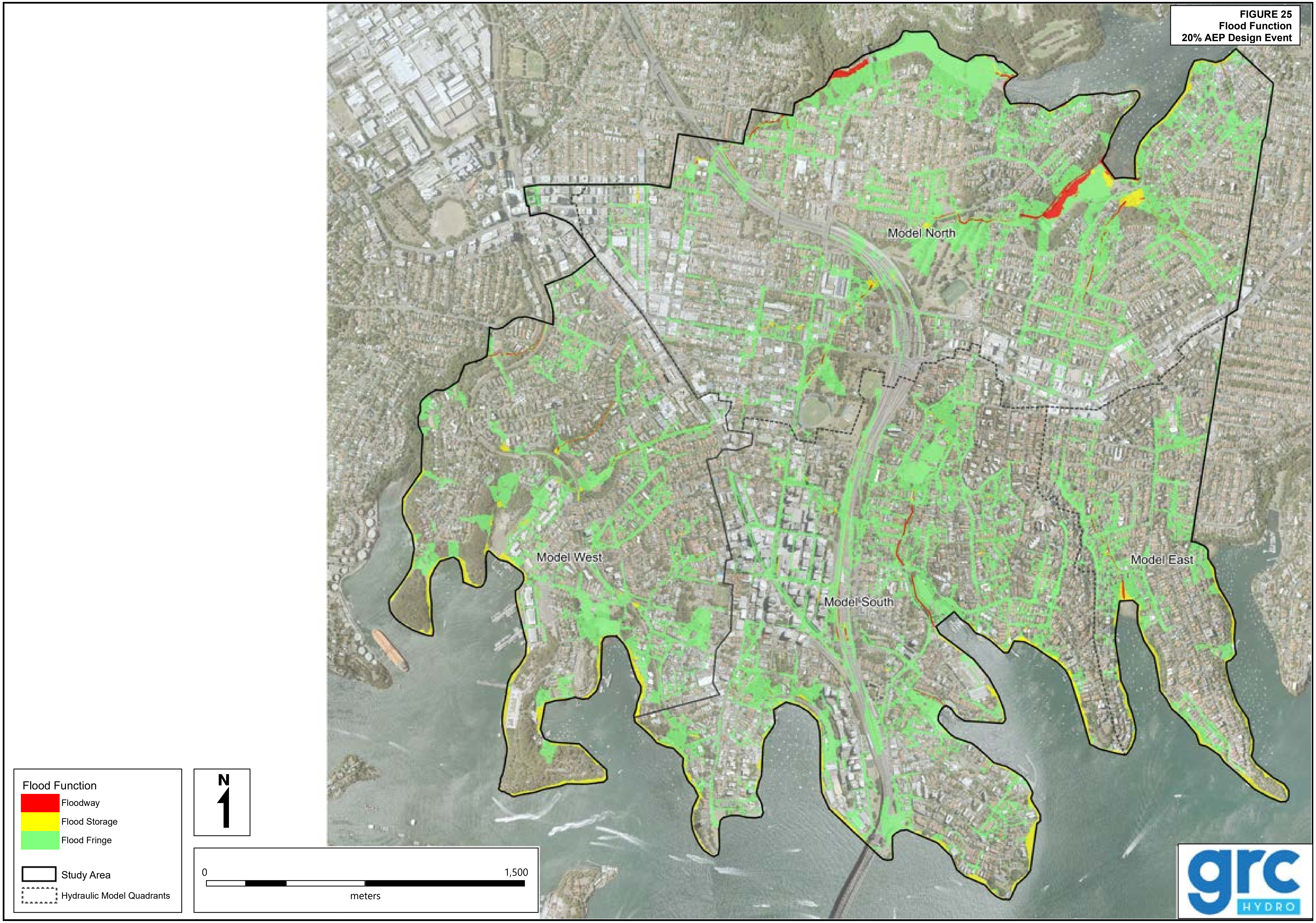
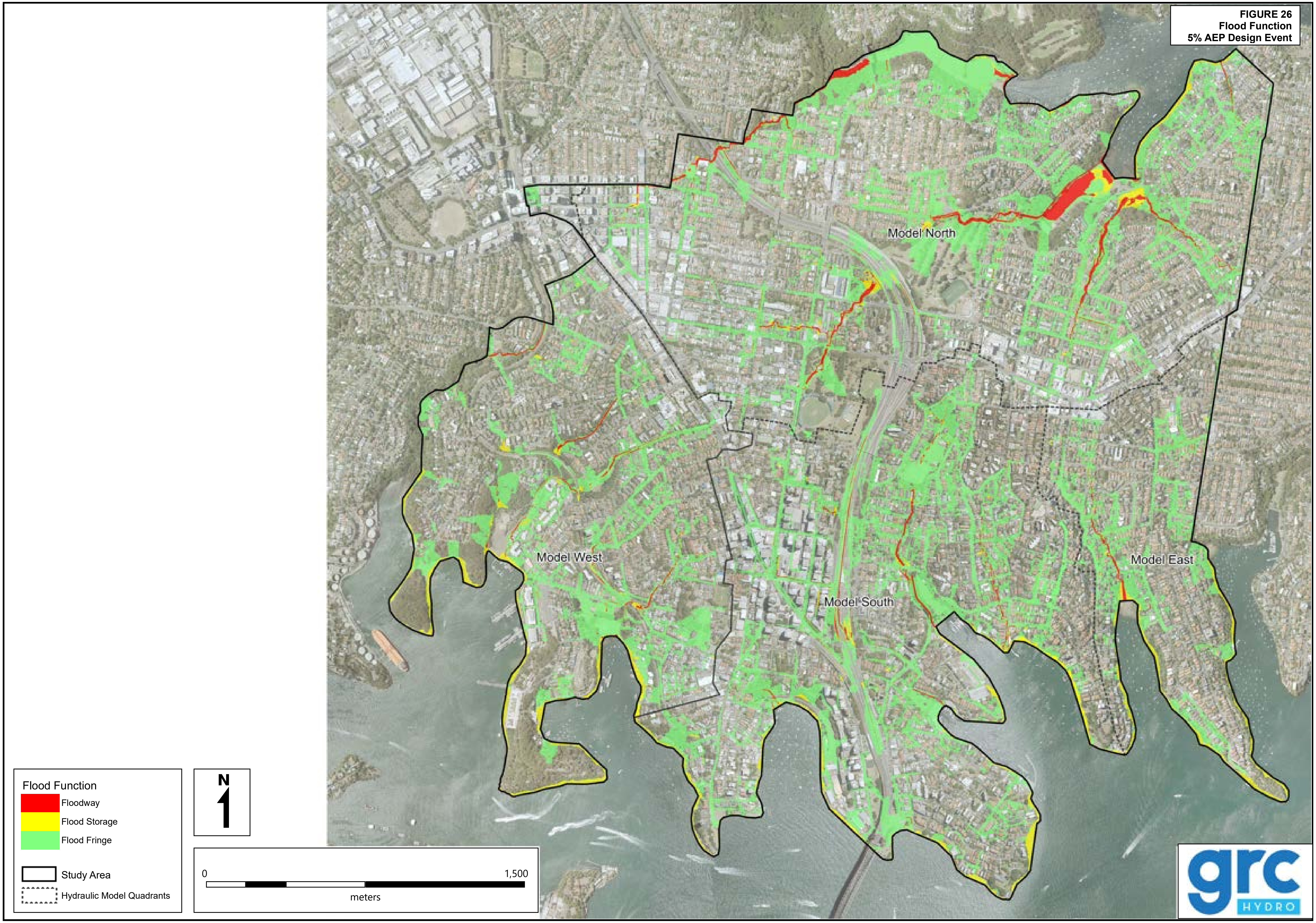


FIGURE 25
Flood Function
20% AEP Design Event
Model North
Model West
Model South
Model East
Flood Function
Floodway
Flood Storage
Flood Fringe
Study Area
Hydraulic Model Quadrants
N
0
1,500
meters
grc
HYDRO

FIGURE 26
Flood Function
5% AEP Design Event



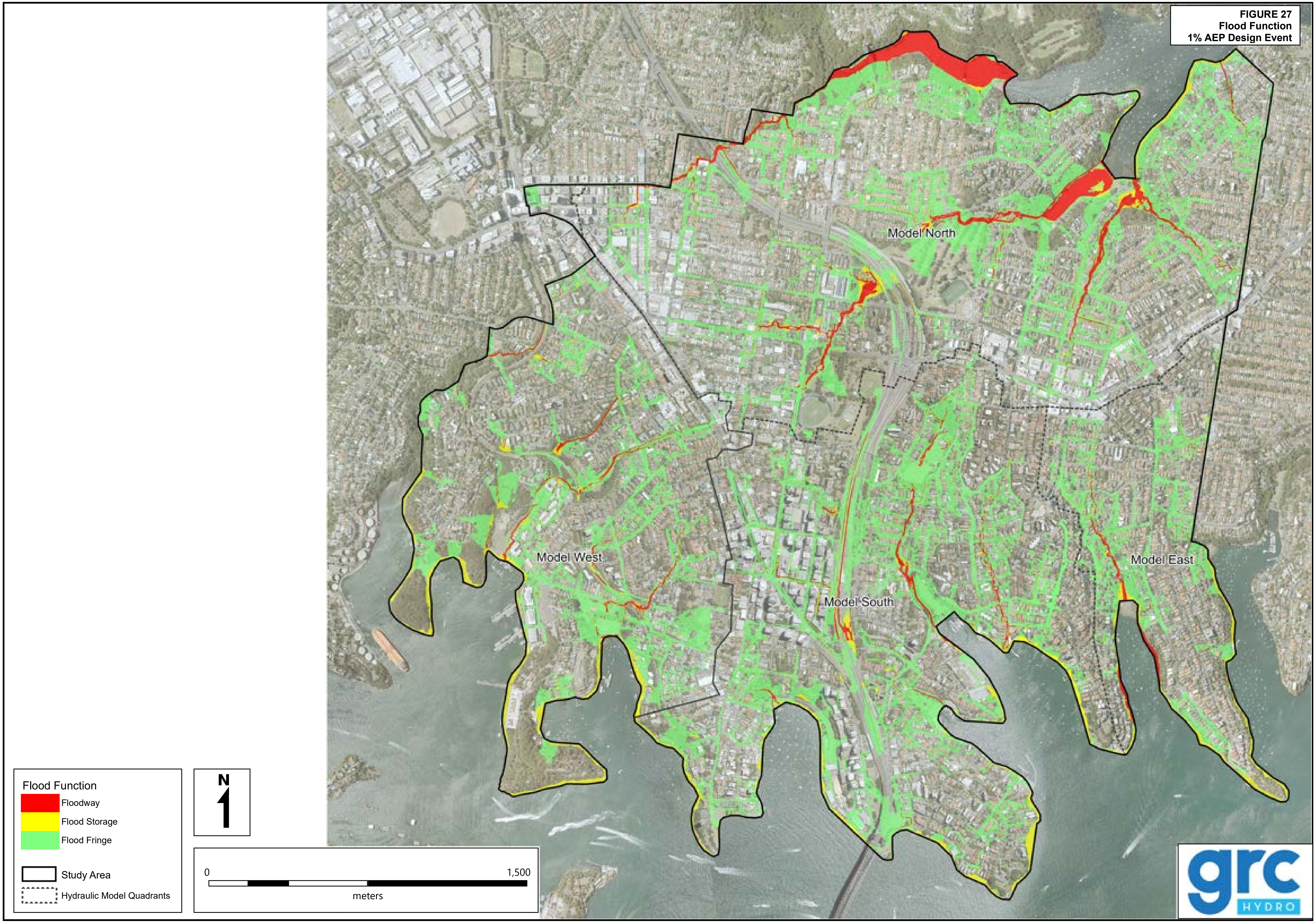


FIGURE 27
Flood Function
1% AEP Design Event

FIGURE 28
Flood Function
PMF Design Event

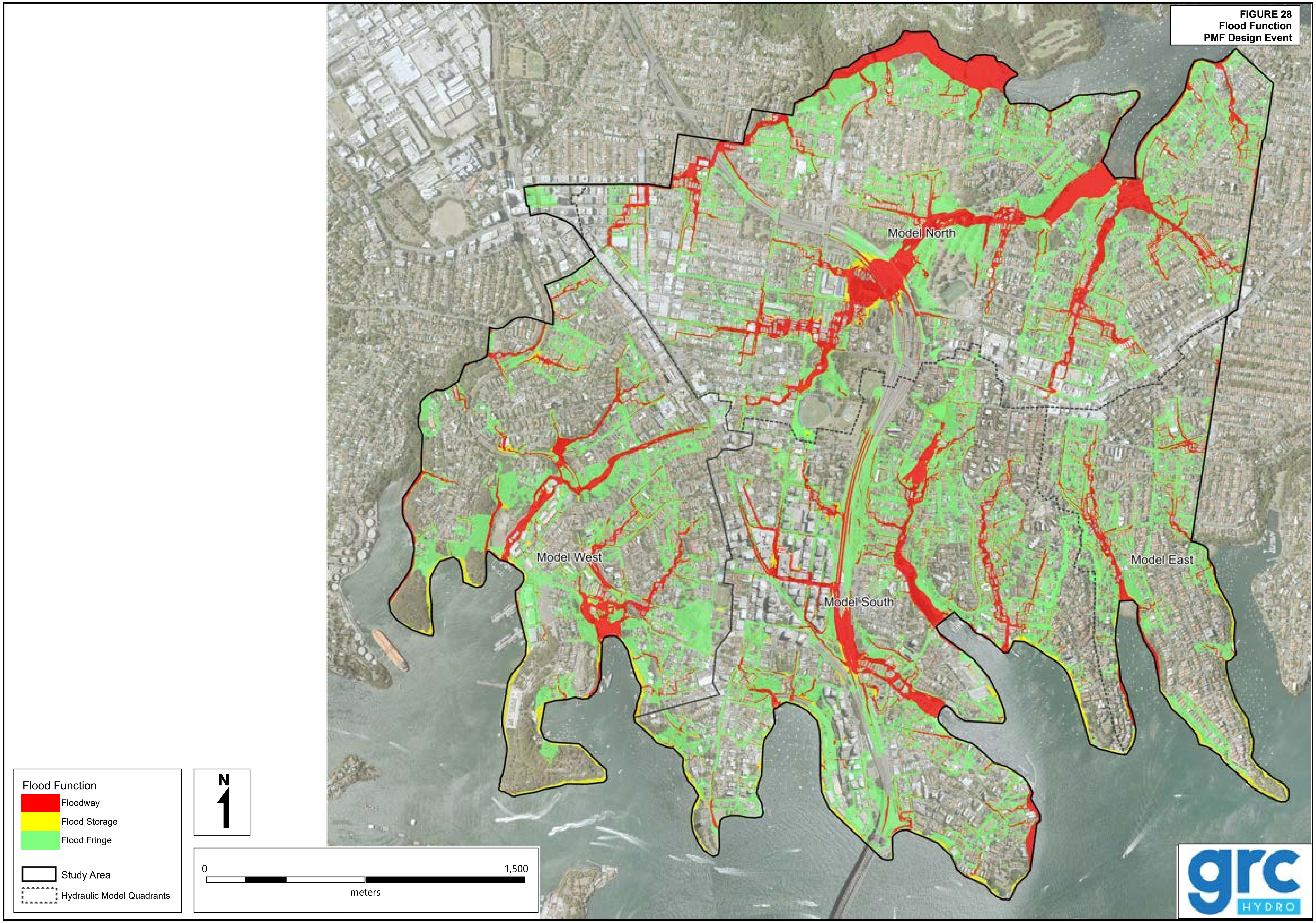
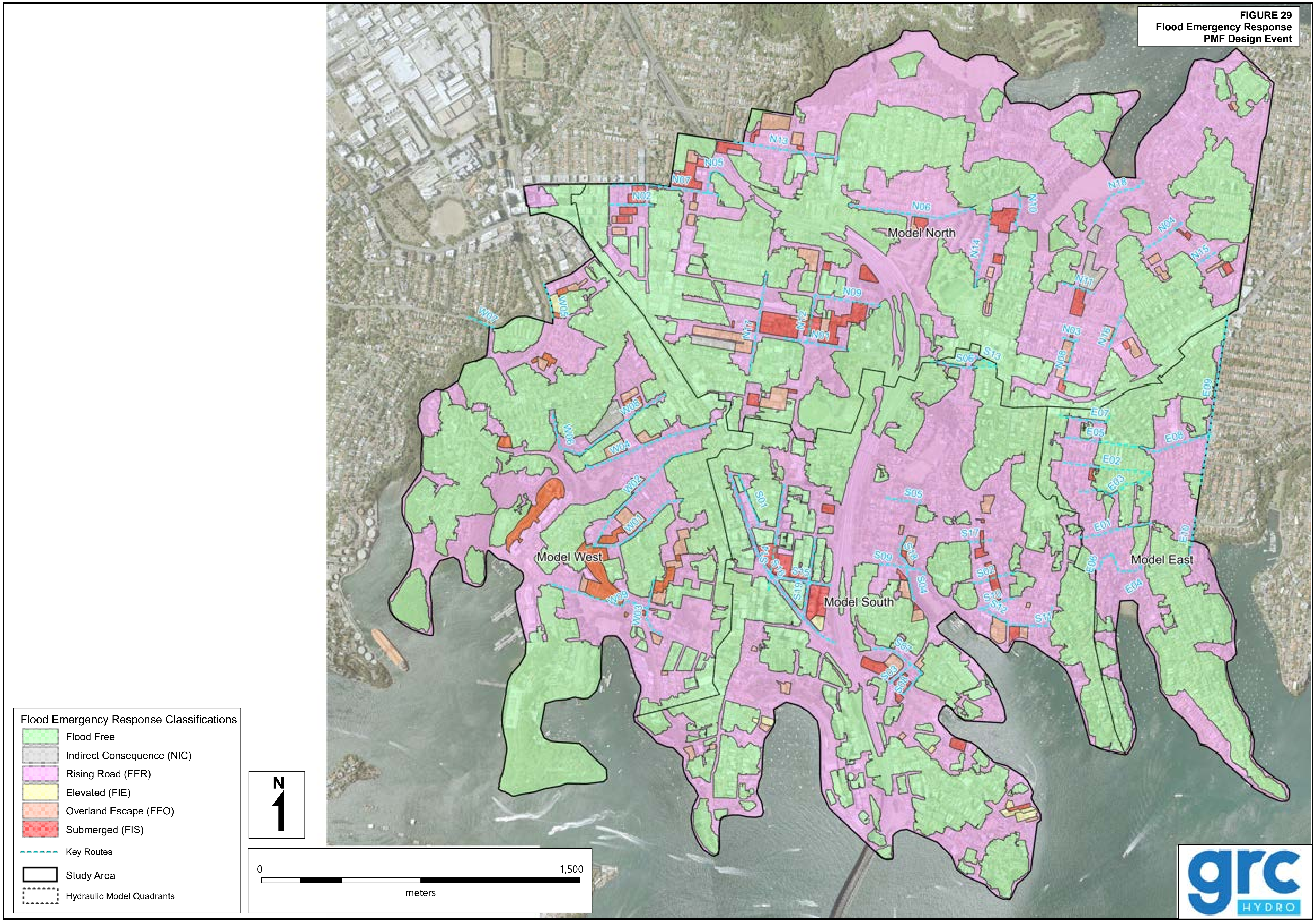


FIGURE 29
Flood Emergency Response
PMF Design Event



grc HYDRO

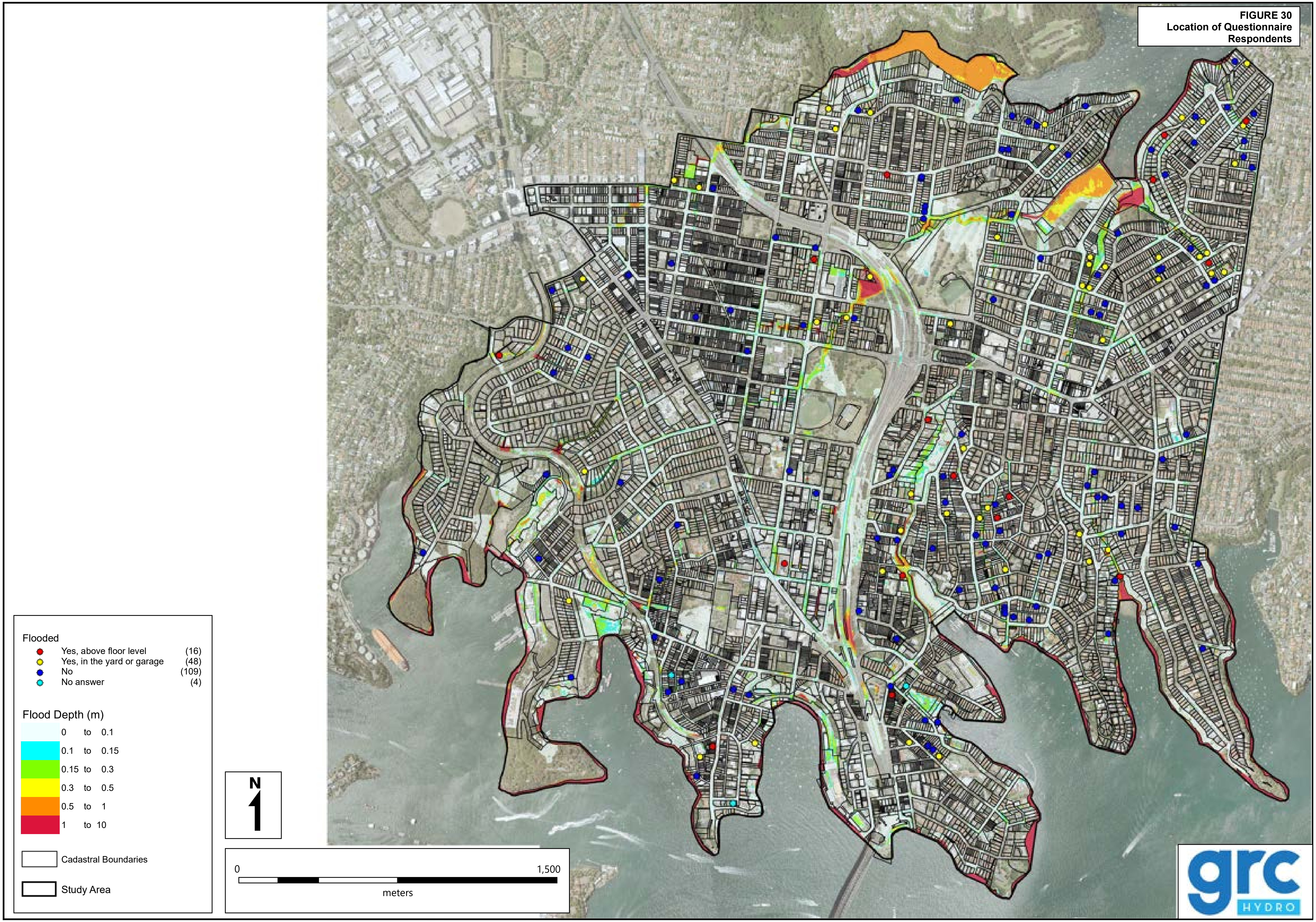


FIGURE 30
Location of Questionnaire Respondents


Figure 31 - A
Draft Flood Planning Area
0
750
metres
Floodway
Tagged Properties
Category A (626)
Category B (211)
Flood Depth (m)
0 to 0.1
0.1 to 0.3
> 0.3
Cadastral Boundaries
Study Area
N

Figure 31 - B
Draft Flood Planning Area

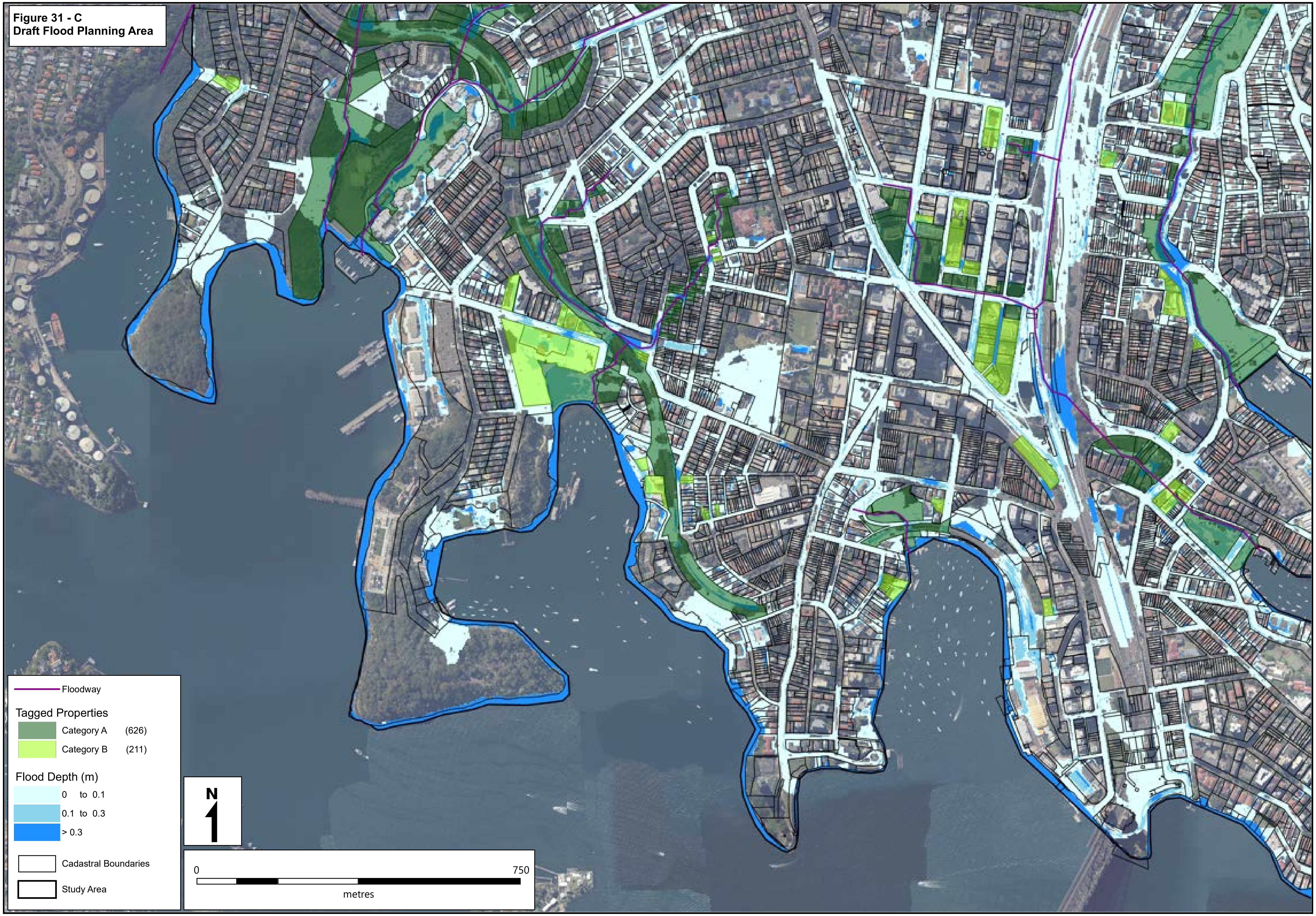


Figure 31 - C
Draft Flood Planning Area
Floodway
Tagged Properties
Category A (626)
Category B (211)
Flood Depth (m)
0 to 0.1
0.1 to 0.3
> 0.3
Cadastral Boundaries
Study Area
N
0
750
metres

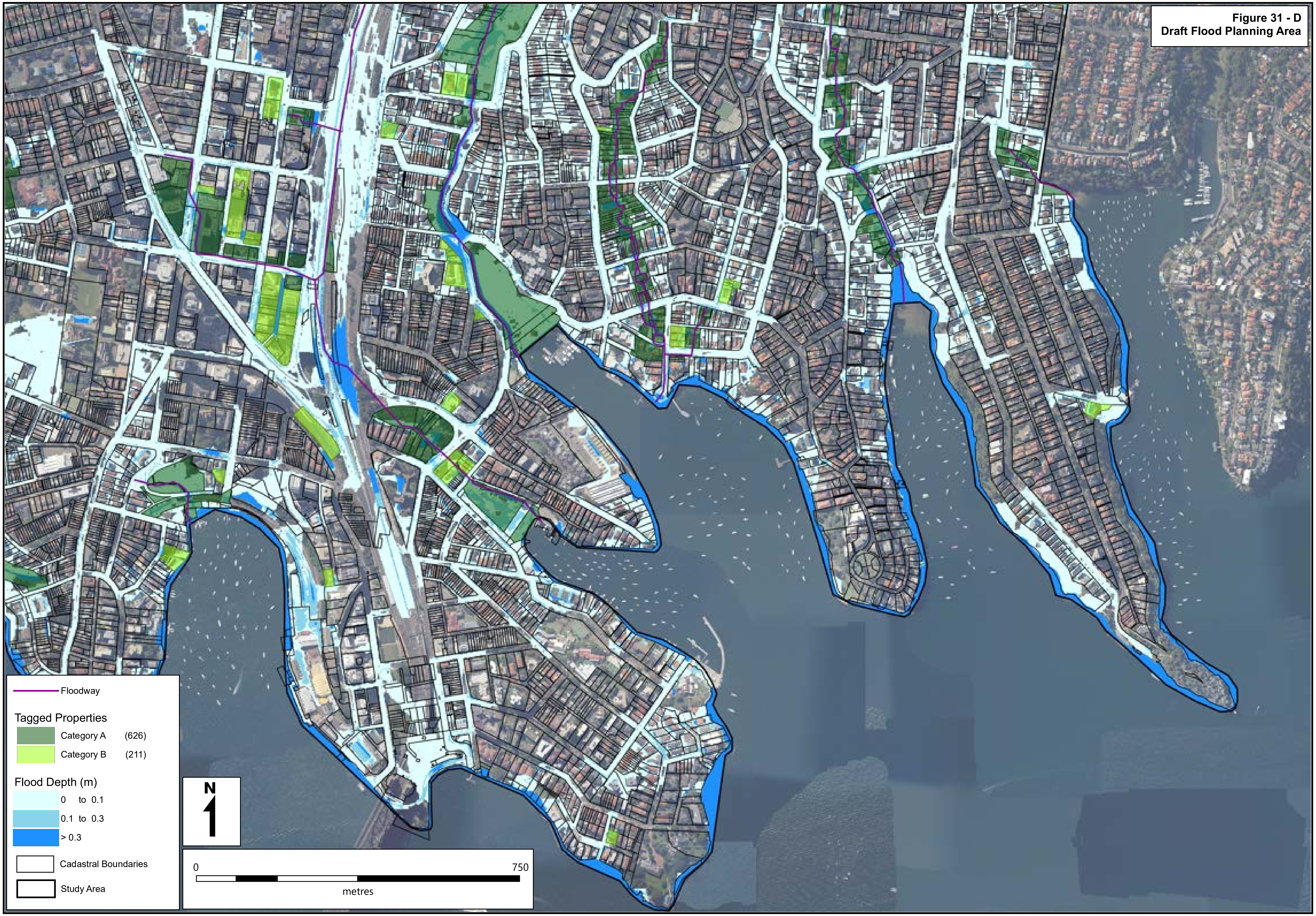
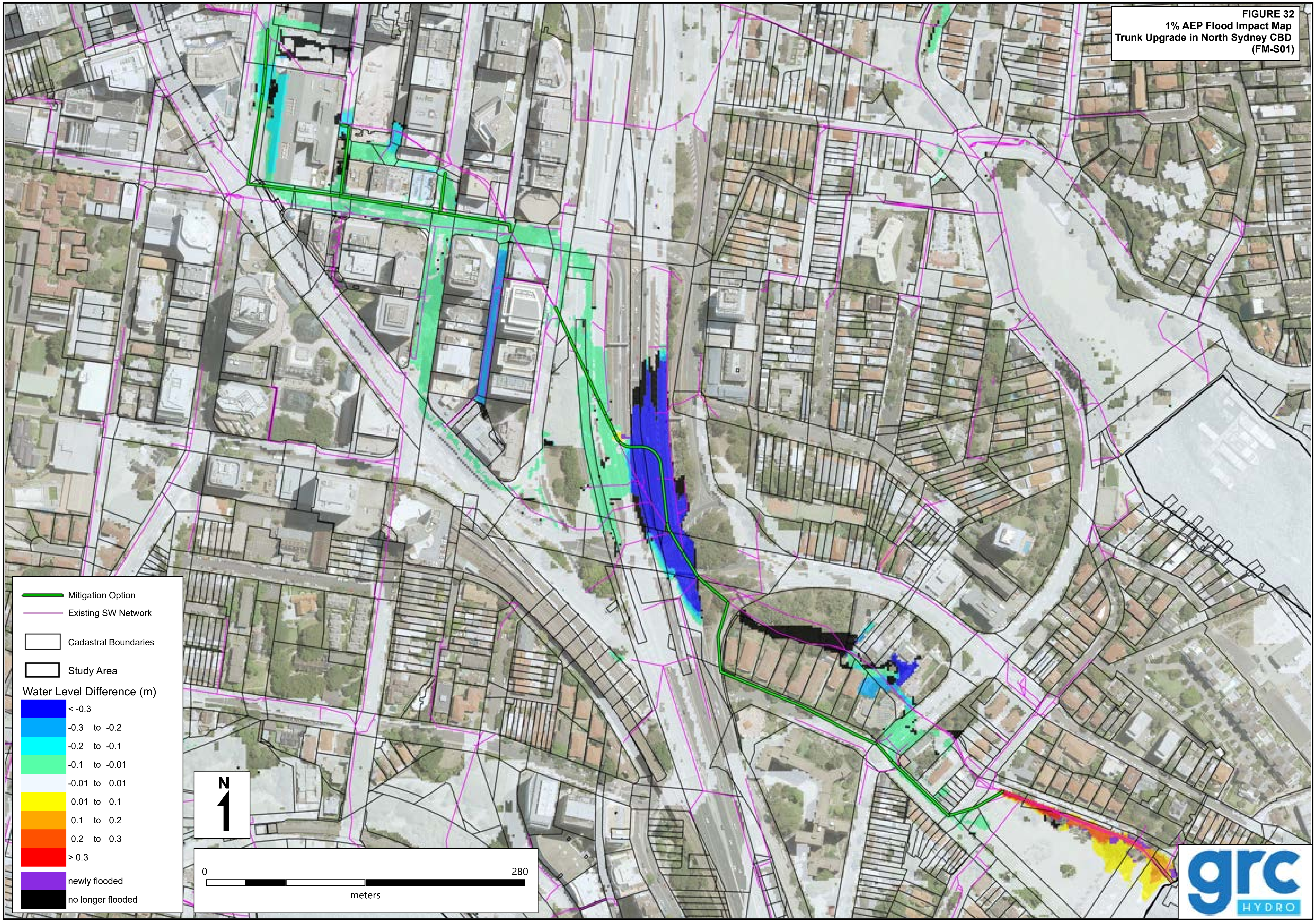


Figure 31 - D
Draft Flood Planning Area
Floodway
Tagged Properties
Category A (626)
Category B (211)
Flood Depth (m)
0 to 0.1
0.1 to 0.3
> 0.3
Cadastral Boundaries
Study Area
N
0
750
metres

FIGURE 32
1% AEP Flood Impact Map
Trunk Upgrade in North Sydney CBD
(FM-S01)



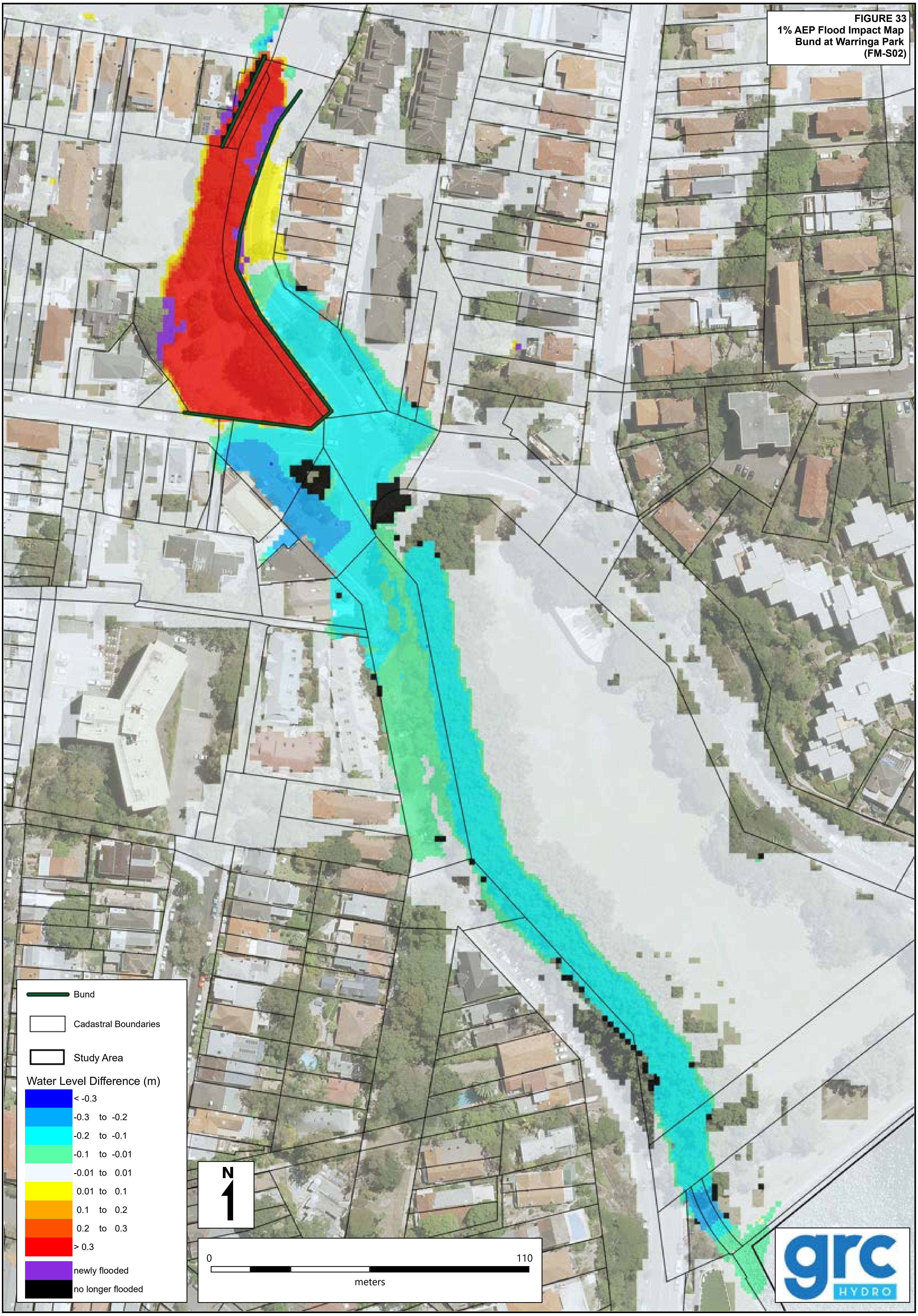
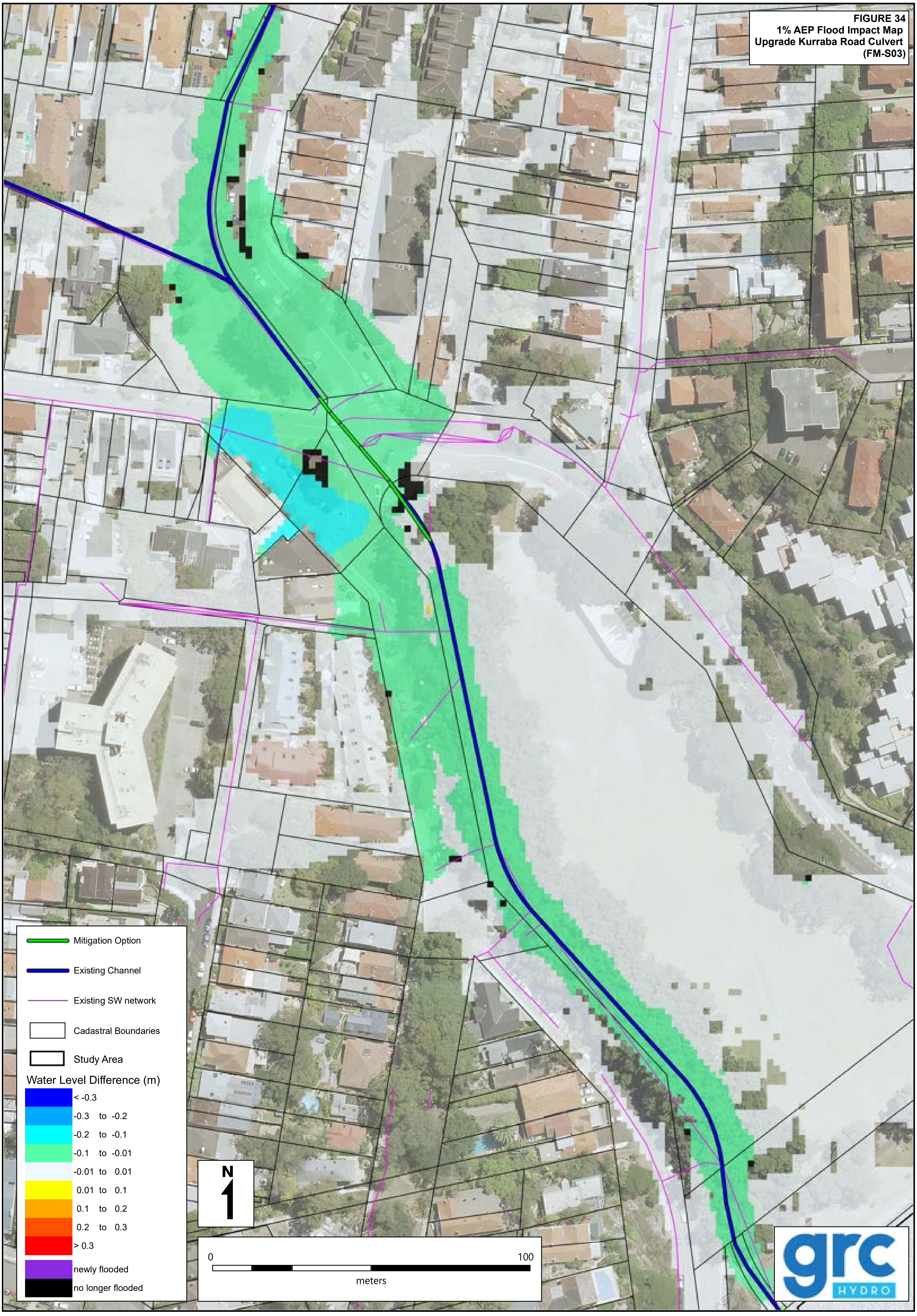


FIGURE 33
1% AEP Flood Impact Map
Bund at Warringa Park
(FM-S02)
Bund
Cadastral Boundaries
Study Area
Water Level Difference (m)
< -0.3
-0.3 to -0.2
-0.2 to -0.1
-0.1 to -0.01
-0.01 to 0.01
0.01 to 0.1
0.1 to 0.2
0.2 to 0.3
> 0.3
newly flooded
no longer flooded
N
0
110
meters
grc
HYDRO

FIGURE 34
1% AEP Flood Impact Map
Upgrade Kurraba Road Culvert
(FM-S03)



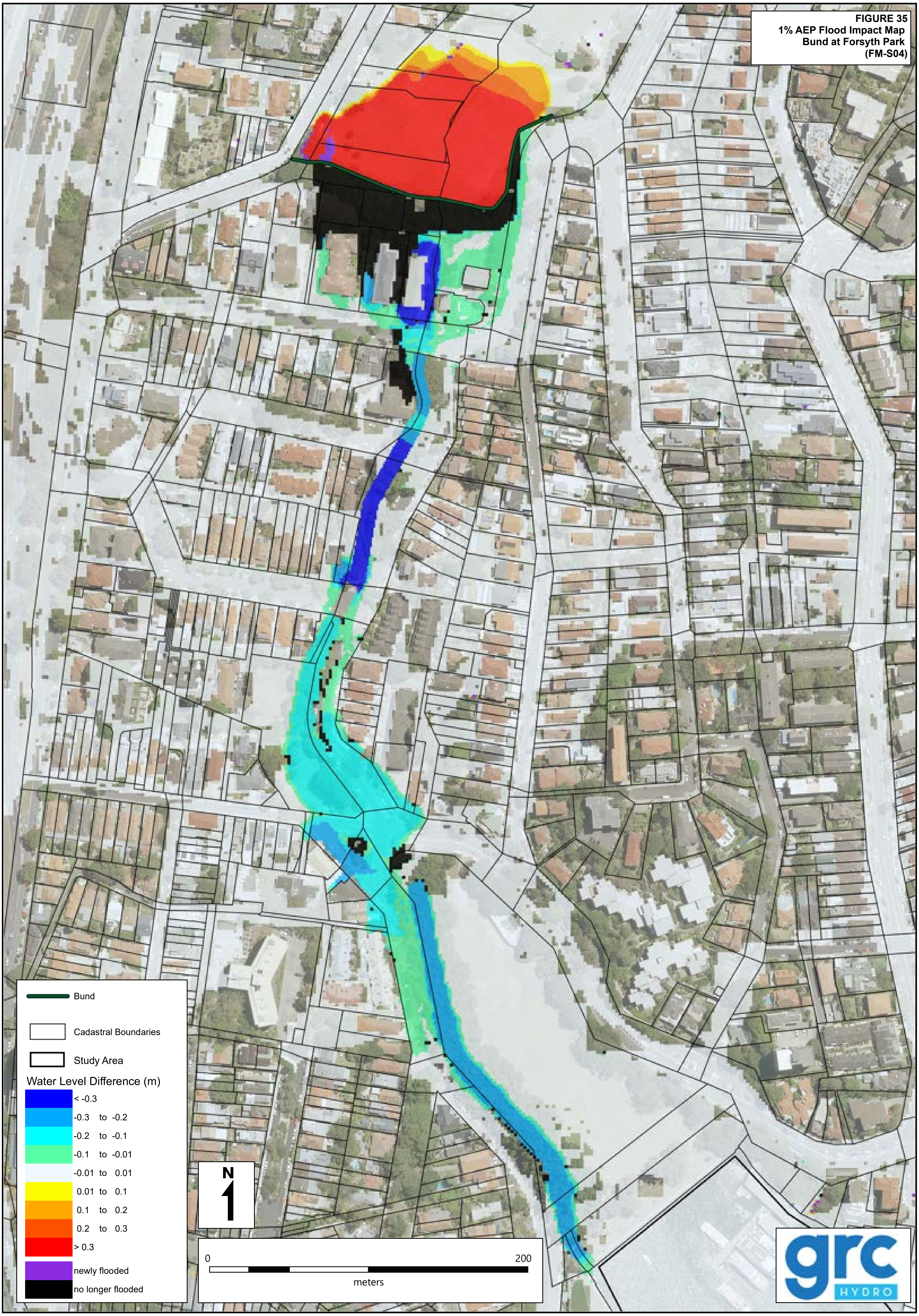
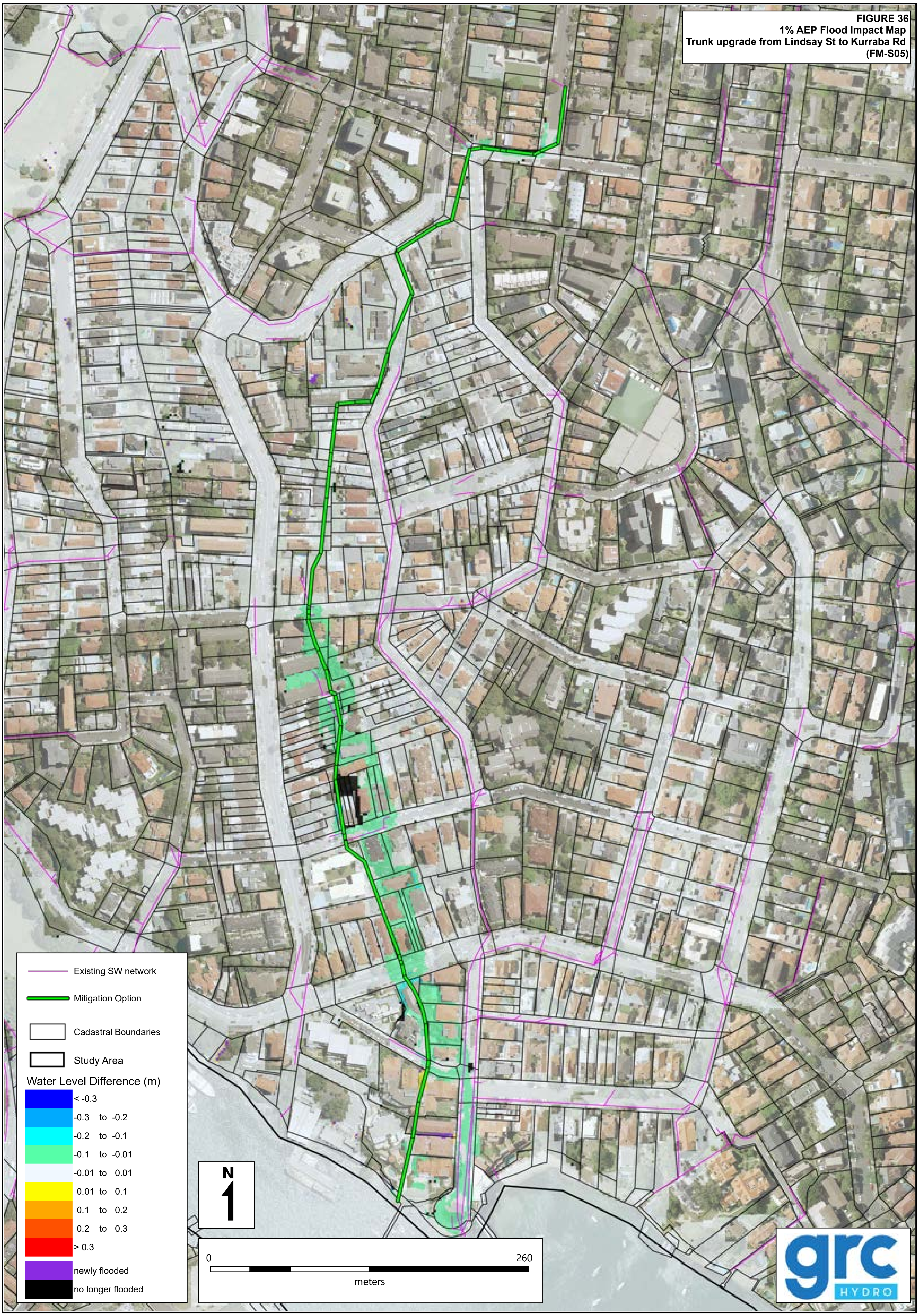


FIGURE 35
1% AEP Flood Impact Map
Bund at Forsyth Park
(FM-S04)
Bund
Cadastral Boundaries
Study Area
Water Level Difference (m)
< -0.3
-0.3 to -0.2
-0.2 to -0.1
-0.1 to -0.01
-0.01 to 0.01
0.01 to 0.1
0.1 to 0.2
0.2 to 0.3
> 0.3
newly flooded
no longer flooded
N
0
200
meters
grc
HYDRO

FIGURE 36
1% AEP Flood Impact Map
Trunk upgrade from Lindsay St to Kurraba Rd
(FM-S05)



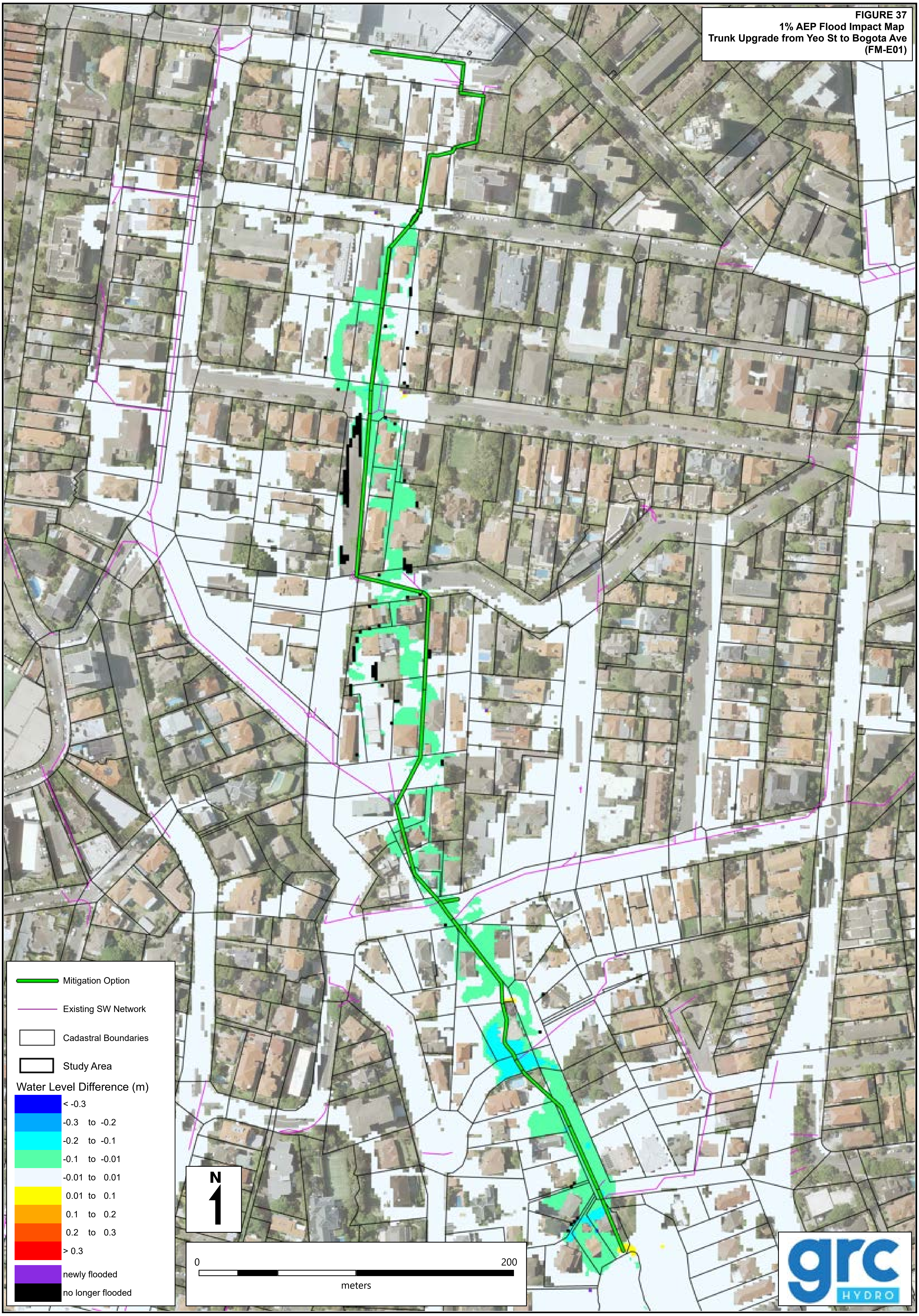


FIGURE 37
1% AEP Flood Impact Map
Trunk Upgrade from Yeo St to Bogota Ave
(FM-E01)

FIGURE 38
1% AEP Flood Impact Map
Trunk Upgrade from Bank St to Waverton Park
(FM-W01)

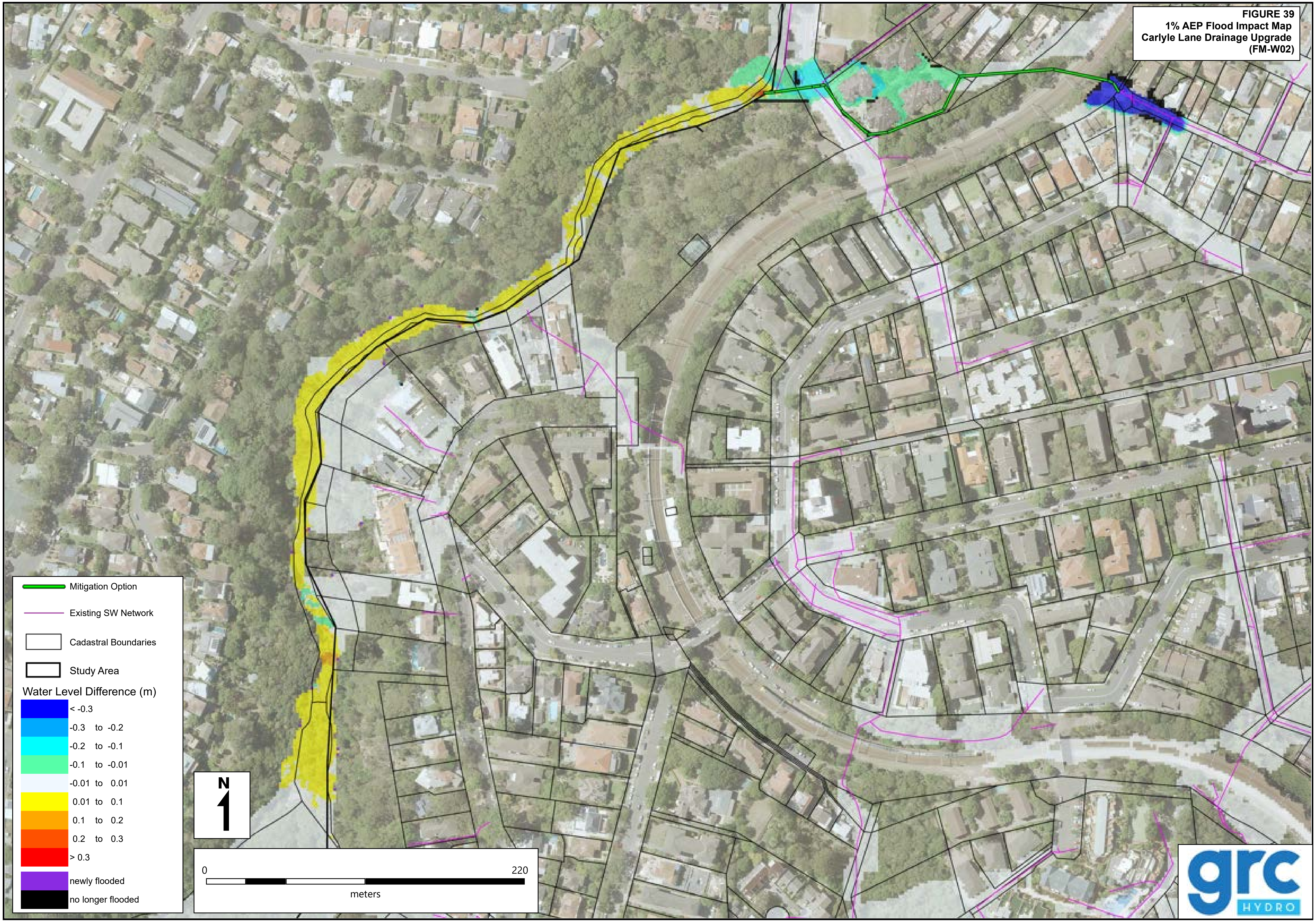


FIGURE 39
1% AEP Flood Impact Map
Carlyle Lane Drainage Upgrade
(FM-W02)
Mitigation Option
Existing SW Network
Cadastral Boundaries
Study Area
Water Level Difference (m)
< -0.3
-0.3 to -0.2
-0.2 to -0.1
-0.1 to -0.01
-0.01 to 0.01
0.01 to 0.1
0.1 to 0.2
0.2 to 0.3
> 0.3
newly flooded
no longer flooded
N
0
220
meters
grc
HYDRO

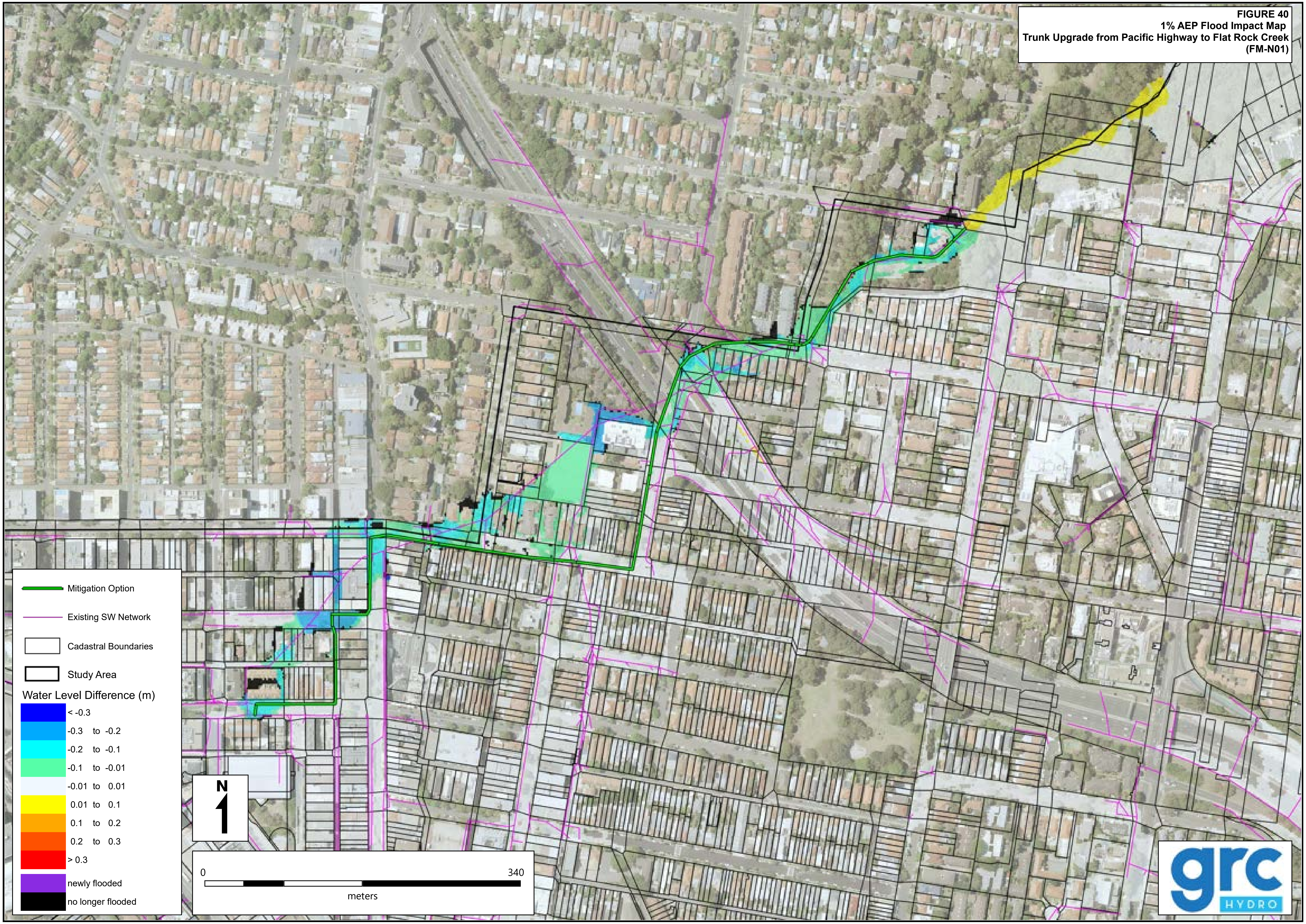


FIGURE 40
1% AEP Flood Impact Map
Trunk Upgrade from Pacific Highway to Flat Rock Creek
(FM-N01)
Mitigation Option
Existing SW Network
Cadastral Boundaries
Study Area
Water Level Difference (m)
< -0.3
-0.3 to -0.2
-0.2 to -0.1
-0.1 to -0.01
-0.01 to 0.01
0.01 to 0.1
0.1 to 0.2
0.2 to 0.3
> 0.3
newly flooded
no longer flooded
N
0
340
meters
grc
HYDRO

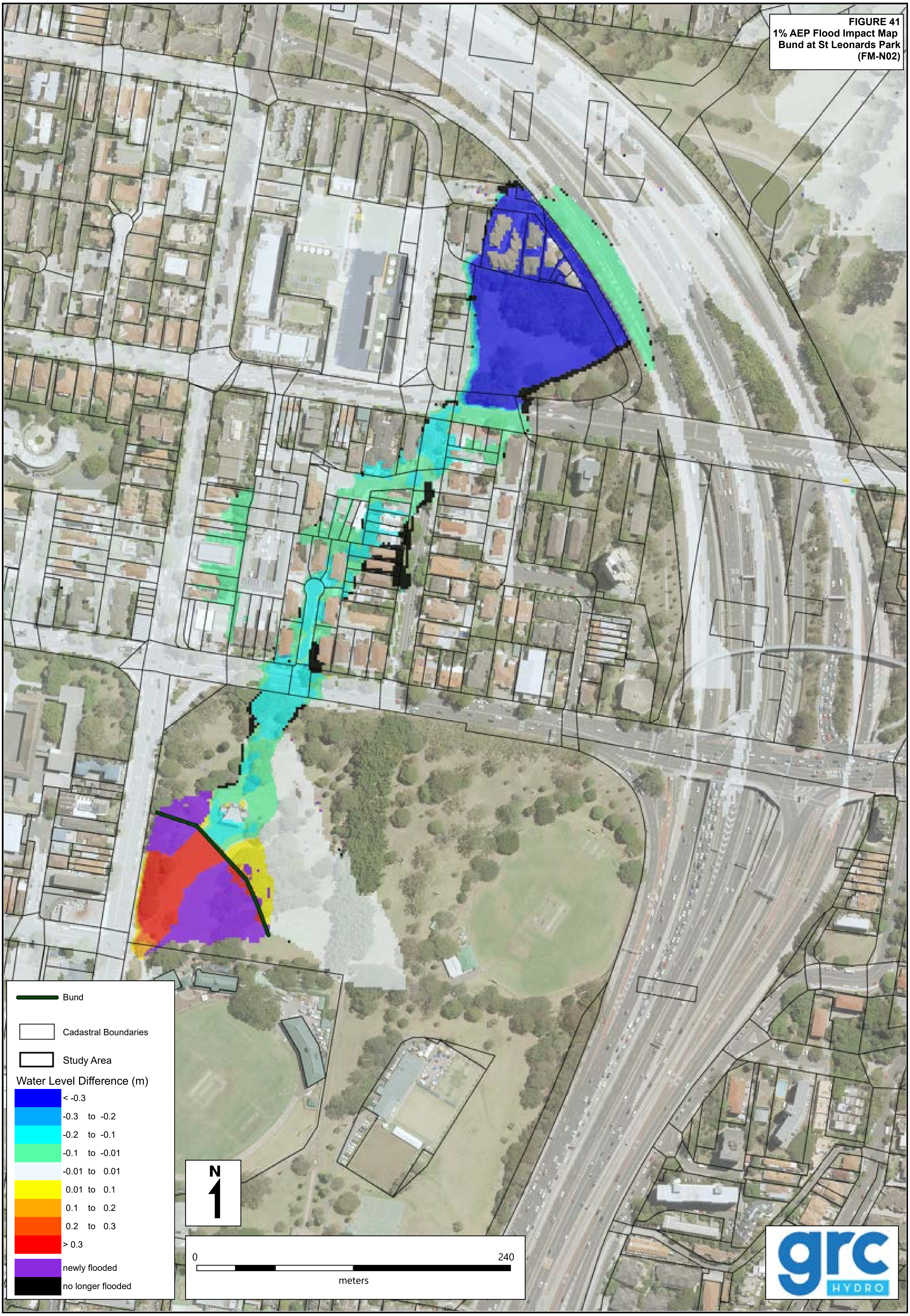


FIGURE 41
1% AEP Flood Impact Map
Bund at St Leonards Park
(FM-N02)

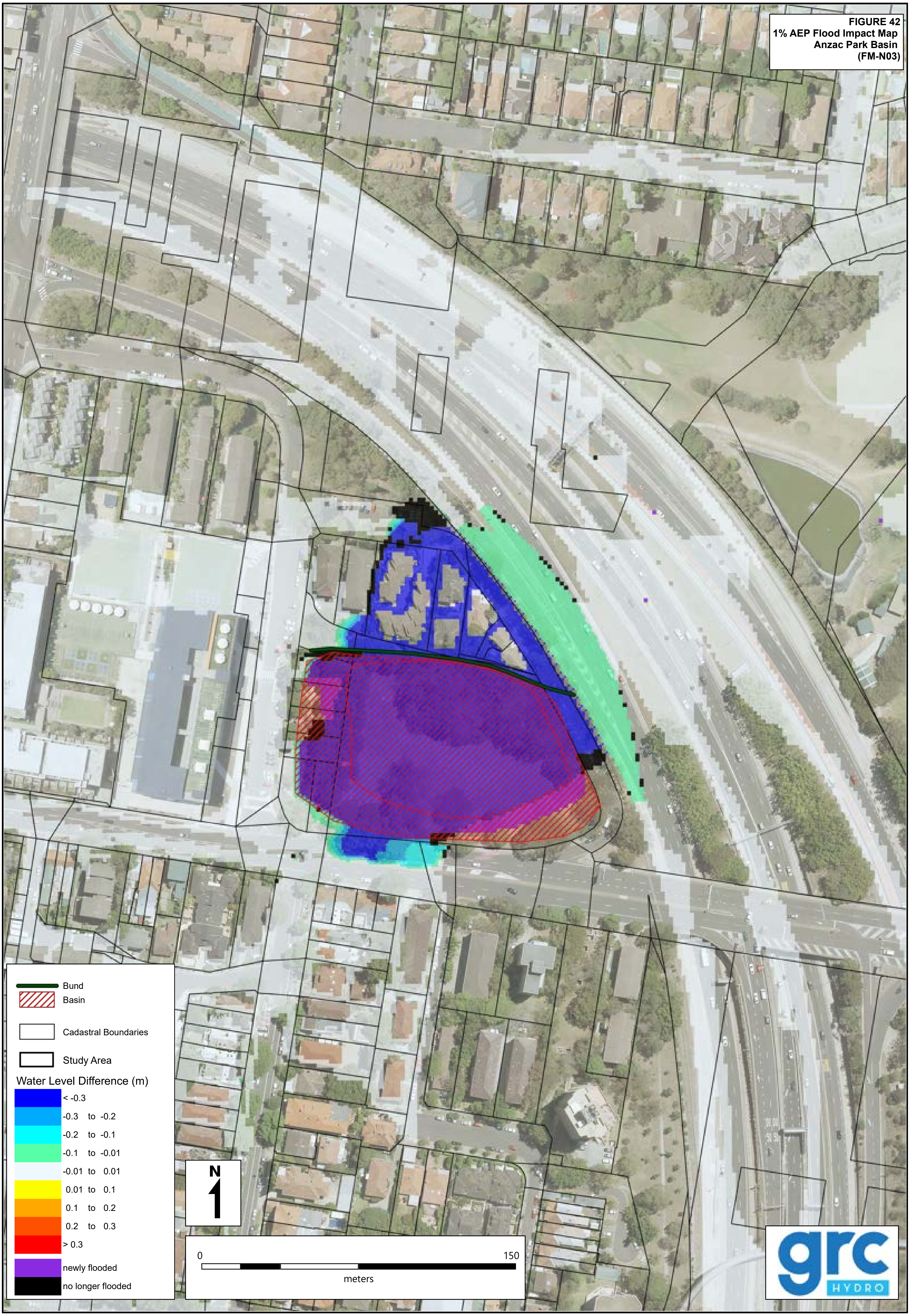


FIGURE 42
1% AEP Flood Impact Map
Anzac Park Basin
(FM-N03)
Bund
Basin
Cadastral Boundaries
Study Area
Water Level Difference (m)
< -0.3
-0.3 to -0.2
-0.2 to -0.1
-0.1 to -0.01
-0.01 to 0.01
0.01 to 0.1
0.1 to 0.2
0.2 to 0.3
> 0.3
newly flooded
no longer flooded
N
0
150
meters
grc
HYDRO

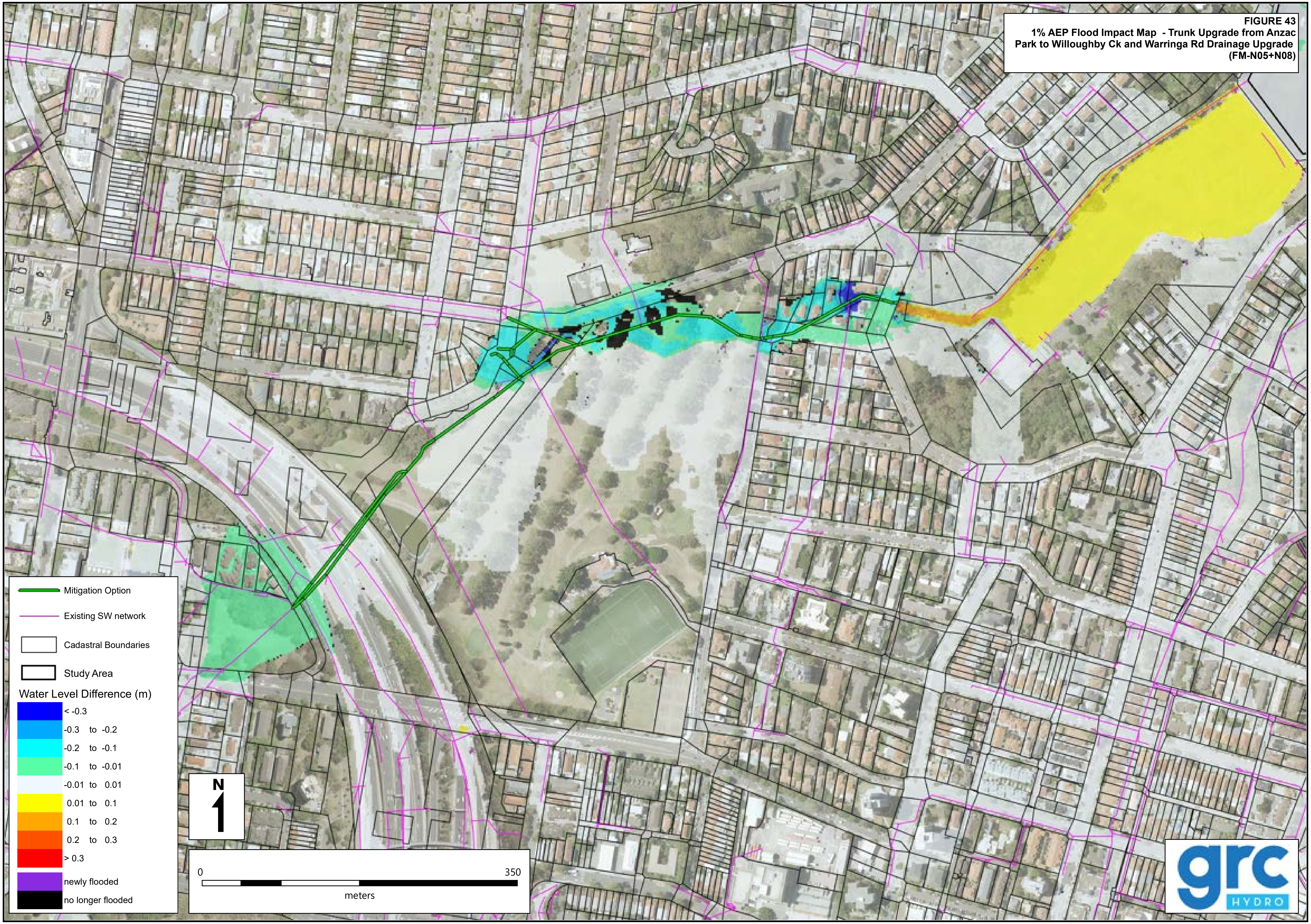


FIGURE 43
1% AEP Flood Impact Map - Trunk Upgrade from Anzac Park to Willoughby Ck and Warringa Rd Drainage Upgrade (FM-N05+N08)


FIGURE 44
1% AEP Flood Impact Map
Reynolds Street Drainage Update
(FM-N06)
Mitigation Option
Existing SW network
Cadastral Boundaries
Study Area
Water Level Difference (m)
< -0.3
-0.3 to -0.2
-0.2 to -0.1
-0.1 to -0.01
-0.01 to 0.01
0.01 to 0.1
0.1 to 0.2
0.2 to 0.3
> 0.3
newly flooded
no longer flooded
N
0
150
meters
grc
HYDRO

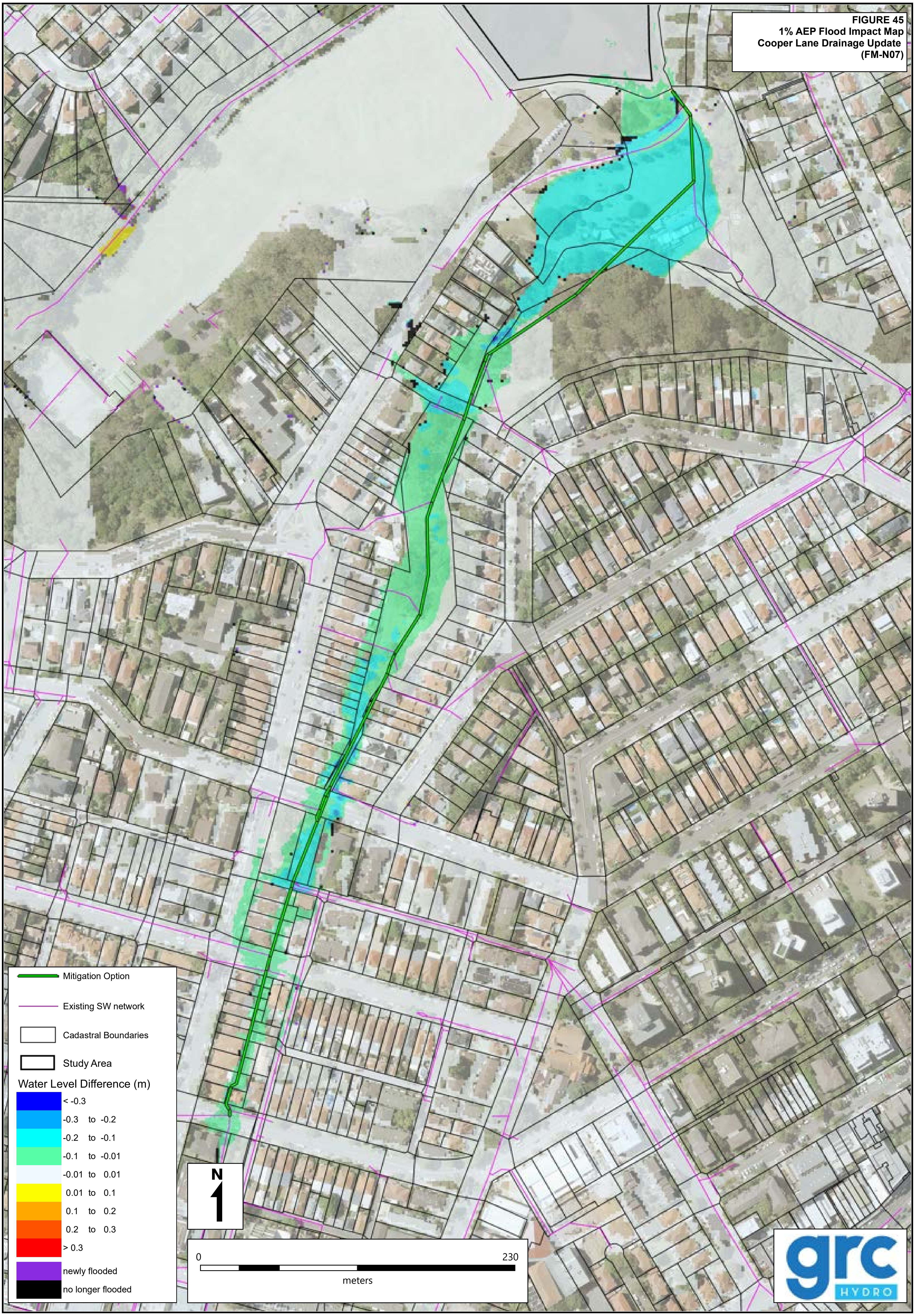


FIGURE 45
1% AEP Flood Impact Map
Cooper Lane Drainage Update
(FM-N07)
Mitigation Option
Existing SW network
Cadastral Boundaries
Study Area
Water Level Difference (m)
< -0.3
-0.3 to -0.2
-0.2 to -0.1
-0.1 to -0.01
-0.01 to 0.01
0.01 to 0.1
0.1 to 0.2
0.2 to 0.3
> 0.3
newly flooded
no longer flooded
N
0
230
meters
grc
HYDRO


FIGURE 46
1% AEP Flood Impact Map
Cassins Avenue Drainage Update
(FM-N09)
Mitigation Option
Existing SW network
Cadastral Boundaries
Study Area
Water Level Difference (m)
< -0.3
-0.3 to -0.2
-0.2 to -0.1
-0.1 to -0.01
-0.01 to 0.01
0.01 to 0.1
0.1 to 0.2
0.2 to 0.3
> 0.3
newly flooded
no longer flooded
N
0
100
meters
grc
HYDRO

FIGURE 47
1% AEP Flood Impact Map
Cammeray Golf Club Basin
(FM-N11)

APPENDIX A – GLOSSARY

Glossary of Key Terminology (From NSW Floodplain Development Manual, 2005)

annual exceedance probability (AEP)	the chance of a flood of a given or larger size occurring in any one year, usually expressed as a percentage. E.g., if a peak flood discharge of 500 m3/s has an AEP of 5%, it means that there is a 5% chance (that is one-in-20 chance) of a 500 m3/s or larger events occurring in any one year (see ARI). (see Table A 1, Appendix A)
Australian Height Datum (AHD)	a common national surface level datum approximately corresponding to mean sea level.
average annual damage (AAD)	depending on its size (or severity), each flood will cause a different amount of flood damage to a flood prone area. AAD is the average damage per year that would occur in a nominated development situation from flooding over a very long period of time.
average recurrence interval (ARI)	the long-term average number of years between the occurrence of a flood as big as or larger than the selected event. For example, floods with a discharge as great as or greater than the 20 year ARI flood event will occur on average once every 20 years. ARI is another way of expressing the likelihood of occurrence of a flood event.
catchment	the land area draining through the mainstream, as well as tributary streams, to a particular site. It always relates to an area above a specific location.
consent authority	the council, government agency or person having the function to determine a development application for land use under the EP&A Act. The consent authority is most often the council, however legislation or an EPI may specify a Minister or public authority (other than a council), or the Director General of DIPNR, as having the function to determine an application.
development	is defined in Part 4 of the EP&A Act infill development: refers to the development of vacant blocks of land that are generally surrounded by developed properties and is permissible under the current zoning of the land. Conditions such as minimum floor levels may be imposed on infill development new development: refers to development of a completely different nature to that associated with the former land use. E.g., the urban subdivision of an area previously used for rural purposes. New developments involve re-zoning and typically require major extensions of existing urban services, such as roads, water supply, sewerage and electric power. redevelopment: refers to rebuilding in an area. E.g., as urban areas age, it may become necessary to demolish and reconstruct buildings on a

relatively large scale. Redevelopment generally does not require either re-zoning or major extensions to urban services.

disaster plan (DISPLAN)	a step by step sequence of previously agreed roles, responsibilities, functions, actions and management arrangements for the conduct of a single or series of connected emergency operations, with the object of ensuring the coordinated response by all agencies having responsibilities and functions in emergencies.
discharge	the rate of flow of water measured in terms of volume per unit time, for example, cubic metres per second (m3/s). Discharge is different from the speed or velocity of flow, which is a measure of how fast the water is moving for example, metres per second (m/s).
effective warning time	the time available after receiving advice of an impending flood and before the floodwaters prevent appropriate flood response actions being undertaken. The effective warning time is typically used to move farm equipment, move stock, raise furniture, evacuate people and transport their possessions.
emergency management	a range of measures to manage risks to communities and the environment. In the flood context it may include measures to prevent, prepare for, respond to and recover from flooding.
flash flooding	flooding which is sudden and unexpected. It is often caused by sudden local or nearby heavy rainfall. Often defined as flooding which peaks within six hours of the causative rain.
flood	relatively high stream flow which overtops the natural or artificial banks in any part of a stream, river, estuary, lake or dam, and/or local overland flooding associated with major drainage (refer Section C6) before entering a watercourse, and/or coastal inundation resulting from super-elevated sea levels and/or waves overtopping coastline defences excluding tsunami.
flood awareness	Awareness is an appreciation of the likely effects of flooding and a knowledge of the relevant flood warning, response and evacuation procedures.
flood education	flood education seeks to provide information to raise awareness of the flood problem so as to enable individuals to understand how to manage themselves and their property in response to flood warnings and in a flood event. It invokes a state of flood readiness.
flood fringe areas	the remaining area of flood prone land after floodway and flood storage areas have been defined.
flood liable land	is synonymous with flood prone land (i.e.) land susceptible to flooding by the PMF event. Note that the term flood liable land covers the whole floodplain, not just that part below the FPL (see flood planning area).

flood mitigation standard	the average recurrence interval of the flood, selected as part of the floodplain risk management process that forms the basis for physical works to modify the impacts of flooding.
floodplain	area of land which is subject to inundation by floods up to and including the probable maximum flood event, that is, flood prone land.
floodplain risk management options	the measures that might be feasible for the management of a particular area of the floodplain. Preparation of a floodplain risk management plan requires a detailed evaluation of floodplain risk management options.
floodplain risk management plan	a management plan developed in accordance with the principles and guidelines in this manual. Usually includes both written and diagrammatic information describing how particular areas of flood prone land are to be used and managed to achieve defined objectives.
flood plan (local)	A sub-plan of a disaster plan that deals specifically with flooding. They can exist at state, division and local levels. Local flood plans are prepared under the leadership of the SES.
flood planning area	the area of land below the FPL and thus subject to flood related development controls. The concept of flood planning area generally supersedes the "flood liable land" concept in the 1986 Manual.
flood planning levels (FPLs)	are the combinations of flood levels (derived from significant historical flood events or floods of specific AEPs) and freeboards selected for floodplain risk management purposes, as determined in management studies and incorporated in management plans. FPLs supersede the "standard flood event" in the 1986 manual.
flood proofing	a combination of measures incorporated in the design, construction and alteration of individual buildings or structures subject to flooding, to reduce or eliminate flood damages.
flood prone land	land susceptible to flooding by the PMF event. Flood prone land is synonymous with flood liable land.
flood readiness	Readiness is an ability to react within the effective warning time.
flood risk	potential danger to personal safety and potential damage to property resulting from flooding. The degree of risk varies with circumstances across the full range of floods. Flood risk in this manual is divided into 3 types, existing, future and continuing risks. They are described below: existing flood risk: the risk a community is exposed to as a result of its location on the floodplain. future flood risk: the risk a community may be exposed to as a result of new development on the floodplain. continuing flood risk: the risk a community is exposed to after floodplain risk management measures have been implemented. For a town

protected by levees, the continuing flood risk is the consequences of the levees being overtopped. For an area without any floodplain risk management measures, the continuing flood risk is simply the existence of its flood exposure.

flood storage areas — those parts of the floodplain that are important for the temporary storage of floodwaters during the passage of a flood. The extent and behaviour of flood storage areas may change with flood severity, and loss of flood storage can increase the severity of flood impacts by reducing natural flood attenuation. Hence, it is necessary to investigate a range of flood sizes before defining flood storage areas.

floodway areas — those areas of the floodplain where a significant discharge of water occurs during floods. They are often aligned with naturally defined channels. Floodways are areas that, even if only partially blocked, would cause a significant redistribution of flood flow, or a significant increase in flood levels.

freeboard — provides reasonable certainty that the risk exposure selected in deciding on a particular flood chosen as the basis for the FPL is actually provided. It is a factor of safety typically used in relation to the setting of floor levels, levee crest levels, etc. (See Section K5). Freeboard is included in the flood planning level.

habitable room — in a residential situation: a living or working area, such as a lounge room, dining room, rumpus room, kitchen, bedroom or workroom.

in an industrial or commercial situation: an area used for offices or to store valuable possessions susceptible to flood damage in the event of a flood.

hazard — a source of potential harm or a situation with a potential to cause loss. In relation to this manual the hazard is flooding which has the potential to cause damage to the community.

hydraulics — term given to the study of water flow in waterways; in particular, the evaluation of flow parameters such as water level and velocity.

hydrograph — a graph which shows how the discharge or stage/flood level at any particular location varies with time during a flood.

hydrology — term given to the study of the rainfall and runoff process; in particular, the evaluation of peak flows, flow volumes and the derivation of hydrographs for a range of floods.

local overland flooding — inundation by local runoff rather than overbank discharge from a stream, river, estuary, lake or dam.

local drainage — smaller scale problems in urban areas. They are outside the definition of major drainage in this glossary.

mainstream flooding	inundation of normally dry land occurring when water overflows the natural or artificial banks of a stream, river, estuary, lake or dam.
major drainage	councils have discretion in determining whether urban drainage problems are associated with major or local drainage. For the purposes of this manual major drainage involves: • the floodplains of original watercourses (which may now be piped, channelised or diverted), or sloping areas where overland flows develop along alternative paths once system capacity is exceeded; and/or • water depths generally in excess of 0.3m (in the major system design storm as defined in the current version of Australian Rainfall and Runoff). These conditions may result in danger to personal safety and property damage to both premises and vehicles; and/or • major overland flowpaths through developed areas outside of defined drainage reserves; and/or • the potential to affect a number of buildings along the major flow path.
mathematical/computer models	the mathematical representation of the physical processes involved in runoff generation and stream flow. These models are often run on computers due to the complexity of the mathematical relationships between runoff, stream flow and the distribution of flows across the floodplain.
merit approach	the merit approach weighs social, economic, ecological and cultural impacts of land use options for different flood prone areas together with flood damage, hazard and behaviour implications, and environmental protection and well being of the State's rivers and floodplains. The merit approach operates at two levels. At the strategic level it allows for the consideration of social, economic, ecological, cultural and flooding issues to determine strategies for the management of future flood risk which are formulated into council plans, policy, and EPIs. At a site specific level, it involves consideration of the best way of conditioning development allowable under the floodplain risk management plan, local flood risk management policy and EPIs.
minor, moderate and major flooding	both the SES and the BoM use the following definitions in flood warnings to give a general indication of the types of problems expected with a flood: <u>minor flooding:</u> causes inconvenience such as closing of minor roads and the submergence of low level bridges. The lower limit of this class of flooding on the reference gauge is the initial flood level at which landholders and townspeople begin to be flooded. <u>moderate flooding:</u> low-lying areas are inundated requiring removal of stock and/or evacuation of some houses. Main traffic routes may be covered.

	major flooding: appreciable urban areas are flooded and/or extensive rural areas are flooded. Properties, villages and towns can be isolated.
modification measures	measures that modify either the flood, the property or the response to flooding.
peak discharge	the maximum discharge occurring during a flood event.
probable maximum flood (PMF)	the PMF is the largest flood that could conceivably occur at a particular location, usually estimated from probable maximum precipitation, and where applicable, snow melt, coupled with the worst flood producing catchment conditions. Generally, it is not physically or economically possible to provide complete protection against this event. The PMF defines the extent of flood prone land, that is, the floodplain. The extent, nature and potential consequences of flooding associated with a range of events rarer than the flood used for designing mitigation works and controlling development, up to and including the PMF event should be addressed in a floodplain risk management study.
probable maximum precipitation (PMP)	the PMP is the greatest depth of precipitation for a given duration meteorologically possible over a given size storm area at a particular location at a particular time of the year, with no allowance made for long-term climatic trends (World Meteorological Organisation, 1986). It is the primary input to PMF estimation.
probability	a statistical measure of the expected chance of flooding (see AEP).
risk	chance of something happening that will have an impact. It is measured in terms of consequences and likelihood. In the context of the manual it is the likelihood of consequences arising from the interaction of floods, communities and the environment.
runoff	the amount of rainfall which actually ends up as streamflow, also known as rainfall excess.
stage	equivalent to water level (both measured with reference to a specified datum).
stage hydrograph	a graph that shows how the water level at a particular location changes with time during a flood. It must be referenced to a particular datum.
survey plan	a plan prepared by a registered surveyor.
water surface profile	a graph showing the flood stage at any given location along a watercourse at a particular time.

Table A 1: ARR 2019 Preferred Terminology

Frequency Descriptor	EY	AEP (%)	AEP (1 in x)	ARI
Very Frequent	12			
	6	99.75	1.002	0.17
	4	98.17	1.02	0.25
	3	95.02	1.05	0.33
	2	86.47	1.16	0.5
	1	63.21	1.58	1
Frequent	0.69	50	2	1.44
	0.5	39.35	2.54	2
	0.22	20	5	4.48
	0.2	18.13	5.52	5
	0.11	10	10	9.49
Rare	0.05	5	20	20
	0.02	2	50	50
	0.01	1	100	100
Very Rare	0.005	0.5	200	200
	0.002	0.2	500	500
	0.001	0.1	1000	1000
	0.0005	0.05	2000	2000
Extreme	0.0002	0.02	5000	5000
			↓	
			PMP/ PMPDF	

APPENDIX B – UPDATED DESIGN FLOOD RESULTS

Table B 1: Design Peak Flood Levels (mAHD) – East Model

ID	Location (refer Figure 4)	Suburb	20% AEP	10% AEP	5% AEP	2% AEP	1% AEP	PMF
1	Yeo St	Cremorne	81.3	81.3	81.3	81.3	81.3	81.4
2	Harrison St	Cremorne	76.4	76.4	76.4	76.4	76.4	76.6
3	Bennett St	Neutral Bay	68.1	68.1	68.1	68.1	68.1	68.4
4	Bertha St	Cremorne	58.6	58.6	58.6	58.6	58.6	58.8
5	Burroway St	Neutral Bay	54.2	54.2	54.2	54.2	54.3	54.4
6	Powell St	Neutral Bay	48.7	48.7	48.8	48.8	48.8	49.0
7	Bannerman St	Cremorne	34.5	34.6	34.6	34.6	34.6	35.0
8	Guthrie Ave	Cremorne	38.8	38.8	38.8	38.8	38.8	39.0
9	Honda Rd	Kurraba Point	21.6	21.7	21.8	21.8	21.9	23.0
10	Bogota Ave	Kurraba Point	17.8	17.9	17.9	18.0	18.0	18.8
11	Hunts Lookout	Cremorne Point	14.6	14.6	14.6	14.6	14.6	14.7
12	Spofforth St	Cremorne	57.4	57.4	57.5	57.5	57.5	57.9

Table B 2: Design Peak Flood Levels (mAHD) – North Model

ID	Location (refer Figure 4)	Suburb	20% AEP	10% AEP	5% AEP	2% AEP	1% AEP	PMF
13	Military Rd	Neutral Bay	81.4	81.5	81.5	81.5	81.5	81.7
14	Belgrave St	Cremorne	68.7	68.8	68.8	68.9	68.9	69.2
15	Sutherland St	Cremorne	62.5	62.7	62.8	62.8	62.9	63.7
16	Grasmere La	Cremorne	59.8	59.9	59.9	59.9	60.0	60.7
17	Grasmere Rd	Cremorne	55.5	55.6	55.6	55.6	55.7	56.2
18	Little Young St	Cremorne	31.8	31.9	31.9	31.9	32.0	32.5
19	Brightmore St	Cremorne	45.2	45.3	45.4	45.4	45.5	46.1
20	Brightmore Res	Cremorne	8.4	9.0	9.4	9.6	9.6	10.4
21	Young St	Cremorne	9.0	9.0	9.1	9.4	9.4	10.1
22	Primrose Pk	Cremorne	2.8	2.8	2.9	2.9	2.9	3.5
23	Ryries Pde	Cremorne	32.0	32.1	32.1	32.1	32.2	32.5
24	Grafton St	Cremorne	41.5	41.6	41.7	41.7	41.8	42.4
25	Park Av	Cremorne	44.6	44.8	44.9	44.9	45.0	45.7
26	Cammeray Rd	Cammeray	51.7	51.8	51.9	51.9	52.0	52.4

ID	Location (refer Figure 4)	Suburb	20% AEP	10% AEP	5% AEP	2% AEP	1% AEP	PMF
27	Warringa Rd	Cammeray	54.1	54.2	54.3	54.3	54.3	54.9
28	Cammeray Av	Cammeray	65.1	65.6	66.1	66.5	67.4	71.3
29	Anzac Pk	Cammeray	65.1	65.6	66.1	66.5	67.4	71.3
30	Ernest St	Cammeray	66.9	66.9	67.0	67.0	67.4	71.3
31	Miller St	Cammeray	75.3	75.3	75.4	75.4	75.5	76.8
32	Rodborough Ave	Crows Nest	76.7	76.9	77.0	77.1	77.3	79.0
33	Carlow St	North Sydney	80.8	80.9	80.9	80.9	81.0	81.3
34	West St	North Sydney	86.7	86.8	86.8	86.8	86.8	87.1
35	Hamilton La	Cammeray	43.9	44.0	44.1	44.2	44.2	44.7
36	Palmer St	Cammeray	58.6	58.9	59.1	59.1	59.2	59.7
37	Brooke St	Crows Nest	65.6	65.7	65.7	65.7	65.8	66.2
38	Wheatlegh St	Crows Nest	73.1	73.2	73.3	73.3	73.3	74.2
39	Chandos St	Naremburn	73.9	74.0	74.0	74.0	74.1	74.5
40	Willoughby Rd	Crows Nest	77.1	77.2	77.3	77.3	77.3	77.8
41	Hume La	Crows Nest	77.9	78.0	78.0	78.1	78.2	78.9

ID	Location (refer Figure 4)	Suburb	20% AEP	10% AEP	5% AEP	2% AEP	1% AEP	PMF
42	Atchison St	Crows Nest	77.9	78.0	78.1	78.1	78.2	79.0
43	Albany La	Crows Nest	79.3	79.4	79.4	79.4	79.5	80.2
44	Albany St	Crows Nest	80.6	80.8	81.0	81.0	81.2	81.8

Table B 3: Design Peak Flood Levels (mAHD) – West Model

ID	Location (refer Figure 4)	Suburb	20% AEP	10% AEP	5% AEP	2% AEP	1% AEP	PMF
45	Christie St	Wollstonecraft	71.2	71.2	71.2	71.2	71.2	71.8
46	Lithgow St	Wollstonecraft	65.4	65.4	65.4	65.4	65.5	65.9
47	Russell St	Wollstonecraft	41.7	41.7	41.7	41.7	41.8	42.1
48	Carlyle La	Wollstonecraft	52.7	52.9	53.3	53.5	54.1	60.2
49	Belmont Av	Wollstonecraft	46.0	46.3	46.6	46.8	47.4	49.5
50	Newlands La	Wollstonecraft	40.6	41.0	41.3	41.6	42.0	45.7
51	Newlands St	Wollstonecraft	66.6	66.7	66.7	66.7	66.8	67.6
52	Hazelbank Rd	Wollstonecraft	60.6	60.6	60.7	60.7	60.7	61.0
53	Waverton Oval	Waverton	4.0	4.0	4.0	4.0	4.1	4.4
54	Woolcott St	Waverton	26.7	27.2	27.3	27.4	27.5	28.6
55	Euroka_St	Waverton	29.8	30.0	30.1	30.2	30.2	31.8
56	Ancrum_St	Waverton	37.7	37.9	37.9	38.0	38.1	38.7
57	Bank St	North Sydney	45.2	45.3	45.4	45.4	45.5	46.1

Table B 4: Design Peak Flood Levels (mAHD) – South Model

ID	Location (refer Figure 4)	Suburb	20% AEP	10% AEP	5% AEP	2% AEP	1% AEP	PMF
58	Lavender St	North Sydney	36.6	36.6	36.6	36.6	36.6	36.7
59	Miller St	North Sydney	63.1	63.2	63.2	63.2	63.3	64.0
60	Pacific Hwy/Miller St Intersection	North Sydney	64.1	64.2	64.2	64.2	64.2	64.3
61	Mount St	North Sydney	45.6	45.6	45.6	45.7	45.7	46.0
62	Little Walker St	North Sydney	43.7	44.0	44.3	44.6	44.9	46.0
63	Pacific Hwy/Walker St Intersection	North Sydney	49.6	49.6	49.6	49.6	49.6	49.6
64	Warringah Freeway/Tunnel Entrance	North Sydney	29.9	30.1	30.4	30.6	31.0	33.2
65	Clark Rd	North Sydney	13.5	13.5	13.6	13.6	13.6	14.2
66	Hipwood St	Kirribilli	4.7	4.7	4.8	4.8	4.8	5.3
67	Anderson Park Outlet	Neutral Bay	1.3	1.3	1.5	1.8	1.9	3.3
68	Clark Rd/Kurraba Rd Intersection	Neutral Bay	2.8	3.0	3.1	3.2	3.3	4.1
69	Warringah Freeway	North Sydney	44.9	44.9	44.9	44.9	44.9	45.0

ID	Location (refer Figure 4)	Suburb	20% AEP	10% AEP	5% AEP	2% AEP	1% AEP	PMF
70	McLaren St	North Sydney	69.7	69.7	69.7	69.7	69.7	69.7
71	Rawson St Channel	Neutral Bay	5.3	5.4	5.9	6.0	6.1	8.0
72	Forsyth Park	Neutral Bay	26.1	26.1	26.1	26.1	26.1	26.3
73	Kurraba Rd	Neutral Bay	20.9	21.0	21.0	21.0	21.1	21.3
74	Aubin St	Neutral Bay	31.2	31.3	31.3	31.3	31.3	31.6
75	Phillips St	Neutral Bay	41.1	41.2	41.2	41.2	41.2	41.7
76	Kurraba Rd/Wycombe Rd Intersection	Kurraba Point	28.0	28.0	28.1	28.1	28.1	28.1
77	Carabella St/Peel St Intersection	Kirribilli	21.5	21.5	21.5	21.6	21.6	21.7
78	Holbrook Ave	Kirribilli	12.2	12.2	12.2	12.2	12.2	12.4

Table B 5: Design Peak Flood Depths (m) – East Model

ID	Location (refer Figure 4)	Suburb	20% AEP	10% AEP	5% AEP	2% AEP	1% AEP	PMF
1	Yeo St	Cremorne	0.0	0.0	0.0	0.0	0.0	0.1
2	Harrison St	Cremorne	0.1	0.2	0.2	0.2	0.2	0.4
3	Bennett St	Neutral Bay	0.1	0.1	0.2	0.2	0.2	0.5
4	Bertha St	Cremorne	0.1	0.1	0.1	0.1	0.1	0.4
5	Burroway St	Neutral Bay	0.1	0.1	0.1	0.1	0.1	0.2
6	Powell St	Neutral Bay	0.2	0.2	0.3	0.3	0.3	0.5
7	Bannerman St	Cremorne	0.4	0.4	0.5	0.5	0.5	0.8
8	Guthrie Ave	Cremorne	0.1	0.1	0.1	0.1	0.1	0.3
9	Honda Rd	Kurraba Point	0.2	0.3	0.4	0.5	0.5	1.6
10	Bogota Ave	Kurraba Point	0.4	0.4	0.5	0.5	0.5	1.3
11	Hunts Lookout	Cremorne Point	0.1	0.1	0.1	0.1	0.1	0.2
12	Spofforth St	Cremorne	0.3	0.3	0.3	0.4	0.4	0.8

Table B 6: Design Peak Flood Depths (m) – North Model

ID	Location (refer Figure 4)	Suburb	20% AEP	10% AEP	5% AEP	2% AEP	1% AEP	PMF
13	Military Rd	Neutral Bay	0.3	0.4	0.4	0.4	0.4	0.6
14	Belgrave St	Cremorne	0.4	0.5	0.6	0.6	0.6	0.9
15	Sutherland St	Cremorne	0.2	0.4	0.5	0.5	0.6	1.4
16	Grasmere La	Cremorne	0.5	0.5	0.6	0.6	0.7	1.3
17	Grasmere Rd	Cremorne	0.4	0.5	0.5	0.5	0.5	1.1
18	Little Young St	Cremorne	0.4	0.5	0.6	0.6	0.6	1.2
19	Brightmore St	Cremorne	0.4	0.5	0.5	0.5	0.6	1.3
20	Brightmore Res	Cremorne	2.0	2.5	2.9	3.1	3.1	3.9
21	Young St	Cremorne	0.2	0.2	0.4	0.6	0.6	1.3
22	Primrose Pk	Cremorne	0.5	0.5	0.6	0.6	0.6	1.2
23	Ryries Pde	Cremorne	0.1	0.2	0.3	0.3	0.3	0.6
24	Grafton St	Cremorne	0.3	0.4	0.5	0.5	0.5	1.2
25	Park Av	Cremorne	0.2	0.3	0.4	0.4	0.5	1.3
26	Cammeray Rd	Cammeray	0.3	0.4	0.5	0.5	0.5	1.0

ID	Location (refer Figure 4)	Suburb	20% AEP	10% AEP	5% AEP	2% AEP	1% AEP	PMF
27	Warringa Rd	Cammeray	0.6	0.7	0.7	0.8	0.8	1.4
28	Cammeray Av	Cammeray	0.5	1.1	1.6	2.0	2.9	6.8
29	Anzac Pk	Cammeray	1.3	1.8	2.4	2.8	3.6	7.6
30	Ernest St	Cammeray	0.2	0.3	0.3	0.4	0.8	4.7
31	Miller St	Cammeray	0.2	0.2	0.3	0.3	0.3	1.6
32	Rodborough Ave	Crows Nest	0.3	0.4	0.6	0.6	0.8	2.5
33	Carlow St	North Sydney	0.1	0.2	0.2	0.2	0.3	0.6
34	West St	North Sydney	0.3	0.3	0.3	0.3	0.4	0.7
35	Hamilton La	Cammeray	0.2	0.3	0.4	0.4	0.5	1.0
36	Palmer St	Cammeray	0.1	0.3	0.5	0.5	0.6	1.1
37	Brooke St	Crows Nest	0.1	0.1	0.2	0.2	0.2	0.7
38	Wheatlegh St	Crows Nest	0.6	0.7	0.8	0.8	0.9	1.7
39	Chandos St	Naremburn	0.2	0.3	0.3	0.3	0.4	0.8
40	Willoughby Rd	Crows Nest	0.2	0.3	0.4	0.4	0.5	1.0
41	Hume La	Crows Nest	1.6	1.7	1.8	1.8	1.9	2.6

ID	Location (refer Figure 4)	Suburb	20% AEP	10% AEP	5% AEP	2% AEP	1% AEP	PMF
42	Atchison St	Crows Nest	0.7	0.9	1.0	1.0	1.1	1.9
43	Albany La	Crows Nest	0.0	0.2	0.2	0.2	0.3	1.0
44	Albany St	Crows Nest	0.2	0.4	0.6	0.6	0.7	1.3

Table B 7: Design Peak Flood Depths (m) – West Model

ID	Location (refer Figure 4)	Suburb	20% AEP	10% AEP	5% AEP	2% AEP	1% AEP	PMF
45	Christie St	Wollstonecraft	0.0	0.1	0.1	0.1	0.1	0.7
46	Lithgow St	Wollstonecraft	0.4	0.5	0.5	0.5	0.6	1.0
47	Russell St	Wollstonecraft	0.6	0.6	0.6	0.6	0.7	1.0
48	Carlyle La	Wollstonecraft	0.3	0.5	0.9	1.2	1.8	7.9
49	Belmont Av	Wollstonecraft	1.9	2.2	2.6	2.8	3.3	5.5
50	Newlands La	Wollstonecraft	0.1	0.5	0.8	1.1	1.5	5.2
51	Newlands St	Wollstonecraft	0.5	0.5	0.6	0.6	0.7	1.4
52	Hazelbank Rd	Wollstonecraft	0.2	0.2	0.3	0.3	0.3	0.6
53	Waverton Oval	Waverton	0.1	0.1	0.1	0.1	0.1	0.5
54	Woolcott St	Waverton	0.8	1.2	1.4	1.4	1.5	2.7
55	Euroka_St	Waverton	0.2	0.4	0.5	0.5	0.6	2.2
56	Ancrum_St	Waverton	0.2	0.3	0.4	0.4	0.5	1.1
57	Bank St	North Sydney	0.3	0.4	0.4	0.4	0.5	1.2

Table B 8: Design Peak Flood Depths (m) – South Model

ID	Location (refer Figure 4)	Suburb	20% AEP	10% AEP	5% AEP	2% AEP	1% AEP	PMF
58	Lavender St	North Sydney	0.0	0.0	0.0	0.0	0.0	0.1
59	Miller St	North Sydney	0.2	0.3	0.3	0.3	0.4	1.1
60	Pacific Hwy/Miller St Intersection	North Sydney	0.0	0.1	0.1	0.1	0.1	0.2
61	Mount St	North Sydney	0.0	0.0	0.1	0.1	0.1	0.3
62	Little Walker St	North Sydney	0.9	1.2	1.4	1.7	2.0	3.2
63	Pacific Hwy/Walker St Intersection	North Sydney	0.0	0.0	0.0	0.0	0.0	0.0
64	Warringah Freeway/Tunnel Entrance	North Sydney	0.0	0.2	0.4	0.7	1.0	3.3
65	Clark Rd	North Sydney	0.1	0.1	0.1	0.2	0.2	0.8
66	Hipwood St	Kirribilli	0.2	0.2	0.2	0.3	0.3	0.8
67	Anderson Park Outlet	Neutral Bay	0.3	0.3	0.4	0.6	0.8	2.2
68	Clark Rd/Kurraba Rd Intersection	Neutral Bay	0.0	0.2	0.3	0.4	0.5	1.3
69	Warringah Freeway	North Sydney	0.1	0.1	0.1	0.1	0.1	0.2

ID	Location (refer Figure 4)	Suburb	20% AEP	10% AEP	5% AEP	2% AEP	1% AEP	PMF
70	McLaren St	North Sydney	0.0	0.1	0.1	0.1	0.1	0.1
71	Rawson St Channel	Neutral Bay	0.4	0.6	1.0	1.1	1.2	2.9
72	Forsyth Park	Neutral Bay	0.1	0.1	0.1	0.1	0.1	0.3
73	Kurraba Rd	Neutral Bay	0.1	0.1	0.1	0.2	0.2	0.4
74	Aubin St	Neutral Bay	0.3	0.4	0.4	0.5	0.5	0.8
75	Phillips St	Neutral Bay	0.2	0.3	0.3	0.3	0.3	0.8
76	Kurraba Rd/Wycombe Rd Intersection	Kurraba Point	0.0	0.0	0.0	0.0	0.0	0.1
77	Carabella St/Peel St Intersection	Kirribilli	0.1	0.1	0.1	0.1	0.1	0.2
78	Holbrook Ave	Kirribilli	0.0	0.0	0.0	0.0	0.0	0.1

Table B 9: Design Peak Flows (m³/s) – East Model

ID	Location (refer Figure 4)	20% AEP	10% AEP	5% AEP	2% AEP	1% AEP	PMF
E1	Bannerman St	2.6	3.3	4.0	4.6	5.6	33.2
E2	Bennet St	1.1	1.4	1.8	2.1	2.5	18.0
E3	Harrison St	0.8	1.1	1.4	1.6	1.8	10.4
E4	Spofforth St - Between Brierley St and Florence St	2.0	2.6	3.2	3.7	4.5	23.6
E5	Lower Spofforth Walk - Between Boyle St and Hodgson Ave	1.5	1.9	2.3	2.7	3.2	22.4

Table B 10: Design Peak Flows (m^3/s) – North Model

ID	Location (refer Figure 4)	20% AEP	10% AEP	5% AEP	2% AEP	1% AEP	PMF
N1	Brooke Street	1.8	4.7	7.2	7.9	10.5	73.0
N2	Wheatleigh Street	0.3	0.2	0.2	0.2	0.2	0.2
N3	Atchison Street	1.2	2.4	3.2	3.2	4.8	29.6
N4	Grafton Street	3.3	7.8	12.0	13.2	17.3	100.8
N5	Ernest Street	2.4	4.9	7.7	8.6	12.4	57.4
N6	Anzac Avenue	0.9	1.6	2.0	2.0	3.0	18.9
N7	Young Street	0.3	0.5	2.8	13.7	14.5	145.9
N8	Grasmere Road	3.1	5.9	8.0	8.5	11.9	74.4
N9	Brightmore Street	2.4	4.1	5.3	5.2	7.9	49.5

Table B 11: Design Peak Flows (m^3/s) – West Model

ID	Location (refer Figure 4)	20% AEP	10% AEP	5% AEP	2% AEP	1% AEP	PMF
W1	Woolcott St	0.1	1.4	2.7	3.4	4.9	36.6
W2	Ancrum St	0.6	1.7	2.9	3.0	4.5	29.3
W3	Carr St	1.2	1.9	2.4	2.7	3.4	20.4
W4	Brennan Park	2.0	2.5	3.6	3.6	4.9	26.7
W5	Newlands St	1.5	2.0	2.9	3.0	4.2	24.5
W6	Russel St	9.9	13.3	14.6	17.3	20.3	94.2
W7	Lithgow St	1.5	2.0	2.7	2.8	3.7	19.6

Table B 12: Design Peak Flows (m^3/s) – South Model

ID	Location (refer Figure 4)	20% AEP	10% AEP	5% AEP	2% AEP	1% AEP	PMF
S1	Intersection of Clark Rd, Rawson St and Kurraba Rd	0.0	1.0	2.8	4.8	6.3	72.0
S2	Eaton St	1.3	3.2	4.9	6.2	7.8	54.5
S3	Cnr Hayes St and Lower Wycombe Rd	1.8	3.4	5.0	6.4	6.7	37.4
S4	Aubin St	1.0	2.8	3.8	4.8	5.3	35.8
S5	Phillips St	1.3	2.2	2.8	3.4	3.7	24.4
S6	Hipwood Street	0.9	1.4	1.7	2.1	2.6	52.9
S7	Mount St	0.7	1.2	1.8	2.3	3.0	32.2

APPENDIX C – CLIMATE CHANGE RESULTS

Table C 1: Difference in Peak Flood Levels for Climate Change Scenarios (m) – East Model

ID	Location (refer Figure 4)	1% AEP					2% AEP				
		Base Case (mAHD)	RCP 4.5 Scenario	RCP 8.5 Scenario	RCP 4.5 Scenario with Sea Level Rise (2100)	RCP 8.5 Scenario with Sea Level Rise (2100)	Base Case (mAHD)	RCP 4.5 Scenario	RCP 8.5 Scenario	RCP 4.5 Scenario with Sea Level Rise (2100)	RCP 8.5 Scenario with Sea Level Rise (2100)
1	Yeo St	81.33	0.00	0.00	0.00	0.00	81.32	0.00	0.00	0.00	0.00
2	Harrison St	76.42	0.01	0.02	0.01	0.02	76.41	0.01	0.01	0.01	0.01
3	Bennett St	68.15	0.01	0.03	0.01	0.03	68.13	0.01	0.02	0.01	0.02
4	Bertha St	58.61	0.01	0.01	0.01	0.01	58.60	0.01	0.01	0.01	0.01
5	Burroway St	54.26	0.01	0.01	0.01	0.01	54.25	0.01	0.01	0.01	0.01
6	Powell St	48.77	0.01	0.02	0.01	0.02	48.76	0.01	0.01	0.01	0.01
7	Bannerman St	34.64	0.02	0.03	0.02	0.03	34.62	0.01	0.03	0.01	0.03
8	Guthrie Ave	38.81	0.00	0.01	0.00	0.01	38.81	0.01	0.01	0.01	0.01
9	Honda Rd	21.90	0.05	0.10	0.05	0.10	21.82	0.05	0.10	0.05	0.10
10	Bogota Ave	18.03	0.03	0.07	0.03	0.07	17.98	0.03	0.06	0.03	0.06

ID	Location (refer Figure 4)	1% AEP					2% AEP				
		Base Case (mAHD)	RCP 4.5 Scenario	RCP 8.5 Scenario	RCP 4.5 Scenario with Sea Level Rise (2100)	RCP 8.5 Scenario with Sea Level Rise (2100)	Base Case (mAHD)	RCP 4.5 Scenario	RCP 8.5 Scenario	RCP 4.5 Scenario with Sea Level Rise (2100)	RCP 8.5 Scenario with Sea Level Rise (2100)
11	Hunts Lookout	14.56	0.00	0.00	0.00	0.00	14.56	0.00	0.00	0.00	0.00
12	Spofforth St	57.53	0.02	0.04	0.02	0.04	57.50	0.02	0.04	0.02	0.04
	Average		+0.01	+0.03	+0.01	+0.03		+0.01	+0.03	+0.01	+0.03

Table C 2: Difference in Peak Flood Levels for Climate Change Scenarios (m) – North Model

ID	Location (refer Figure 4)	1% AEP					2% AEP				
		Base Case (mAHD)	RCP 4.5 Scenario	RCP 8.5 Scenario	RCP 4.5 Scenario with Sea Level Rise (2100)	RCP 8.5 Scenario with Sea Level Rise (2100)	Base Case (mAHD)	RCP 4.5 Scenario	RCP 8.5 Scenario	RCP 4.5 Scenario with Sea Level Rise (2100)	RCP 8.5 Scenario with Sea Level Rise (2100)
13	Military Rd	81.51	0.01	0.02	0.01	0.02	81.48	0.01	0.02	0.01	0.02
14	Belgrave St	68.90	0.02	0.04	0.02	0.04	68.85	0.02	0.03	0.02	0.03
15	Sutherland St	62.87	0.05	0.10	0.05	0.10	62.76	0.04	0.07	0.04	0.07
16	Grasmere La	60.00	0.03	0.07	0.03	0.07	59.92	0.02	0.05	0.02	0.05
17	Grasmere Rd	55.68	0.02	0.05	0.02	0.05	55.64	0.01	0.03	0.01	0.03
18	Little Young St	31.99	0.04	0.08	0.04	0.08	31.92	0.03	0.05	0.03	0.05
19	Brightmore St	45.47	0.04	0.07	0.04	0.07	45.38	0.03	0.05	0.03	0.05
20	Brightmore Res	9.60	0.06	0.11	0.06	0.11	9.59	0.03	0.06	0.03	0.06
21	Young St	9.37	0.07	0.14	0.07	0.14	9.37	0.04	0.07	0.04	0.07
22	Primrose Pk	2.95	0.03	0.06	0.03	0.06	2.91	0.02	0.05	0.02	0.04
23	Ryries Pde	32.19	0.02	0.04	0.02	0.04	32.11	0.02	0.04	0.02	0.04
24	Grafton St	41.76	0.03	0.06	0.03	0.06	41.71	0.03	0.05	0.03	0.05

ID	Location (refer Figure 4)	1% AEP					2% AEP				
		Base Case (mAHD)	RCP 4.5 Scenario	RCP 8.5 Scenario	RCP 4.5 Scenario with Sea Level Rise (2100)	RCP 8.5 Scenario with Sea Level Rise (2100)	Base Case (mAHD)	RCP 4.5 Scenario	RCP 8.5 Scenario	RCP 4.5 Scenario with Sea Level Rise (2100)	RCP 8.5 Scenario with Sea Level Rise (2100)
25	Park Av	44.96	0.05	0.09	0.05	0.09	44.89	0.04	0.08	0.04	0.08
26	Cammeray Rd	51.99	0.01	0.02	0.01	0.02	51.94	0.03	0.05	0.03	0.05
27	Warringa Rd	54.32	0.03	0.06	0.03	0.06	54.27	0.02	0.04	0.02	0.04
28	Cammeray Av	67.40	0.33	0.68	0.33	0.68	66.53	0.37	0.72	0.37	0.72
29	Anzac Pk	67.40	0.33	0.68	0.33	0.68	66.53	0.37	0.72	0.37	0.72
30	Ernest St	67.40	0.33	0.68	0.33	0.68	66.98	0.02	0.27	0.02	0.27
31	Miller St	75.46	0.02	0.04	0.02	0.04	75.39	0.02	0.04	0.02	0.04
32	Rodborough Ave	77.30	0.08	0.16	0.08	0.16	77.06	0.07	0.13	0.07	0.13
33	Carlow St	80.95	0.02	0.04	0.02	0.04	80.91	0.01	0.03	0.01	0.03
34	West St	86.82	0.01	0.03	0.01	0.03	86.78	0.01	0.02	0.01	0.02
35	Hamilton La	44.23	0.03	0.08	0.03	0.08	44.17	0.04	0.07	0.04	0.07
36	Palmer St	59.20	0.04	0.08	0.04	0.08	59.12	0.05	0.08	0.05	0.08

ID	Location (refer Figure 4)	1% AEP					2% AEP				
		Base Case (mAHD)	RCP 4.5 Scenario	RCP 8.5 Scenario	RCP 4.5 Scenario with Sea Level Rise (2100)	RCP 8.5 Scenario with Sea Level Rise (2100)	Base Case (mAHD)	RCP 4.5 Scenario	RCP 8.5 Scenario	RCP 4.5 Scenario with Sea Level Rise (2100)	RCP 8.5 Scenario with Sea Level Rise (2100)
37	Brooke St	65.75	0.02	0.04	0.02	0.04	65.72	0.01	0.03	0.01	0.03
38	Wheatlegh St	73.35	0.05	0.10	0.05	0.10	73.28	0.03	0.06	0.03	0.06
39	Chandos St	74.09	0.03	0.05	0.03	0.05	74.04	0.01	0.03	0.01	0.03
40	Willoughby Rd	77.32	0.03	0.06	0.03	0.06	77.26	0.02	0.04	0.02	0.04
41	Hume La	78.16	0.04	0.08	0.04	0.08	78.05	0.03	0.07	0.03	0.07
42	Atchison St	78.24	0.06	0.10	0.06	0.10	78.10	0.04	0.08	0.04	0.08
43	Albany La	79.52	0.04	0.08	0.04	0.08	79.43	0.02	0.04	0.02	0.04
44	Albany St	81.16	0.04	0.07	0.04	0.07	81.01	0.05	0.09	0.05	0.09
	Average		+0.06	+0.13	+0.06	+0.13		+0.05	+0.10	+0.05	+0.10

Table C 3: Difference in Peak Flood Levels for Climate Change Scenarios (m) – West Model

ID	Location (refer Figure 4)	1% AEP					2% AEP				
		Base Case (mAHD)	RCP 4.5 Scenario	RCP 8.5 Scenario	RCP 4.5 Scenario with Sea Level Rise (2100)	RCP 8.5 Scenario with Sea Level Rise (2100)	Base Case (mAHD)	RCP 4.5 Scenario	RCP 8.5 Scenario	RCP 4.5 Scenario with Sea Level Rise (2100)	RCP 8.5 Scenario with Sea Level Rise (2100)
45	Christie St	71.24	0.02	0.05	0.02	0.05	71.20	0.01	0.02	0.01	0.02
46	Lithgow St	65.50	0.02	0.04	0.02	0.04	65.45	0.02	0.03	0.02	0.03
47	Russell St	41.78	0.01	0.03	0.01	0.03	41.75	0.01	0.03	0.01	0.03
48	Carlyle La	54.13	0.31	0.63	0.31	0.63	53.53	0.29	0.61	0.29	0.61
49	Belmont Av	47.35	0.16	0.33	0.16	0.33	46.81	0.17	0.34	0.17	0.34
50	Newlands La	42.02	0.26	0.53	0.26	0.53	41.60	0.26	0.51	0.26	0.51
51	Newlands St	66.79	0.04	0.07	0.04	0.07	66.72	0.02	0.04	0.02	0.04
52	Hazelbank Rd	60.72	0.01	0.02	0.01	0.02	60.68	0.01	0.02	0.01	0.02
53	Waverton Oval	4.06	0.01	0.03	0.01	0.03	4.04	0.01	0.03	0.01	0.03
54	Woolcott St	27.47	0.06	0.13	0.06	0.13	27.36	0.06	0.11	0.06	0.11
55	Euroka_St	30.22	0.06	0.13	0.06	0.13	30.17	0.02	0.04	0.02	0.04
56	Ancrum_St	38.05	0.04	0.08	0.04	0.08	37.95	0.03	0.06	0.03	0.06

ID	Location (refer Figure 4)	1% AEP					2% AEP				
		Base Case (mAHD)	RCP 4.5 Scenario	RCP 8.5 Scenario	RCP 4.5 Scenario with Sea Level Rise (2100)	RCP 8.5 Scenario with Sea Level Rise (2100)	Base Case (mAHD)	RCP 4.5 Scenario	RCP 8.5 Scenario	RCP 4.5 Scenario with Sea Level Rise (2100)	RCP 8.5 Scenario with Sea Level Rise (2100)
57	Bank St	45.46	0.03	0.06	0.03	0.06	45.38	0.03	0.05	0.03	0.05
	Average		+0.08	+0.16	+0.08	+0.16		+0.07	+0.15	+0.07	+0.15

Table C 4: Difference in Peak Flood Levels for Climate Change Scenarios (m) – South Model

ID	Location (refer Figure 4)	1% AEP					2% AEP				
		Base Case (mAHD)	RCP 4.5 Scenario	RCP 8.5 Scenario	RCP 4.5 Scenario with Sea Level Rise (2100)	RCP 8.5 Scenario with Sea Level Rise (2100)	Base Case (mAHD)	RCP 4.5 Scenario	RCP 8.5 Scenario	RCP 4.5 Scenario with Sea Level Rise (2100)	RCP 8.5 Scenario with Sea Level Rise (2100)
58	Lavender St	36.60	0.00	0.01	0.00	0.01	36.60	0.00	0.00	0.00	0.00
59	Miller St	63.26	0.02	0.05	0.02	0.05	63.23	0.02	0.04	0.02	0.04
60	Pacific Hwy/Miller St Intersection	64.18	0.00	0.01	0.00	0.01	64.18	0.00	0.01	0.00	0.01
61	Mount St	45.69	0.01	0.02	0.01	0.02	45.67	0.01	0.03	0.01	0.03
62	Little Walker St	44.86	0.23	0.45	0.23	0.45	44.55	0.22	0.45	0.22	0.45
63	Pacific Hwy/Walker St Intersection	49.58	0.00	0.00	0.00	0.00	49.57	0.00	0.00	0.00	0.00
64	Warringah Freeway/Tunnel Entrance	30.95	0.27	0.52	0.27	0.52	30.58	0.25	0.49	0.25	0.49
65	Clark Rd	13.59	0.01	0.02	0.01	0.02	13.57	0.01	0.02	0.01	0.02
66	Hipwood St	4.81	0.02	0.03	0.02	0.03	4.78	0.02	0.04	0.02	0.04

ID	Location (refer Figure 4)	1% AEP					2% AEP				
		Base Case (mAHD)	RCP 4.5 Scenario	RCP 8.5 Scenario	RCP 4.5 Scenario with Sea Level Rise (2100)	RCP 8.5 Scenario with Sea Level Rise (2100)	Base Case (mAHD)	RCP 4.5 Scenario	RCP 8.5 Scenario	RCP 4.5 Scenario with Sea Level Rise (2100)	RCP 8.5 Scenario with Sea Level Rise (2100)
67	Anderson Park Outlet	1.91	0.15	0.27	0.45	0.47	1.75	0.13	0.25	0.59	0.60
68	Clark Rd/Kurraba Rd Intersection	3.25	0.05	0.10	0.08	0.13	3.20	0.04	0.08	0.06	0.10
69	Warringah Freeway	44.92	0.00	0.01	0.00	0.01	44.92	0.01	0.01	0.01	0.01
70	McLaren St	69.68	0.01	0.01	0.01	0.01	69.68	0.00	0.01	0.00	0.01
71	Rawson St Channel	6.13	0.09	0.17	0.09	0.17	6.01	0.00	0.10	0.00	0.10
72	Forsyth Park	26.15	0.01	0.02	0.01	0.02	26.13	0.01	0.02	0.01	0.02
73	Kurraba Rd	21.05	0.01	0.03	0.01	0.03	21.04	0.01	0.02	0.01	0.02
74	Aubin St	31.33	0.02	0.04	0.02	0.04	31.32	0.02	0.03	0.02	0.03
75	Phillips St	41.23	0.02	0.02	0.02	0.02	41.23	0.01	0.02	0.01	0.02
76	Kurraba Rd/Wycombe Rd Intersection	28.06	0.00	0.00	0.00	0.00	28.06	0.00	0.00	0.00	0.00

ID	Location (refer Figure 4)	1% AEP					2% AEP				
		Base Case (mAHD)	RCP 4.5 Scenario	RCP 8.5 Scenario	RCP 4.5 Scenario with Sea Level Rise (2100)	RCP 8.5 Scenario with Sea Level Rise (2100)	Base Case (mAHD)	RCP 4.5 Scenario	RCP 8.5 Scenario	RCP 4.5 Scenario with Sea Level Rise (2100)	RCP 8.5 Scenario with Sea Level Rise (2100)
77	Carabella St/Peel St Intersection	21.56	0.00	0.01	0.00	0.01	21.55	0.00	0.01	0.00	0.01
78	Holbrook Ave	12.25	0.01	0.01	0.01	0.01	12.24	0.01	0.01	0.01	0.01
	Average		+0.05	+0.09	+0.06	+0.10		+0.04	+0.08	+0.06	+0.10

APPENDIX D – SENSITIVITY ANALYSIS RESULTS

Table D 1: Difference in Peak Flood Levels for Sensitivity Analysis Scenarios (m) – East Model

ID	Location (refer Figure 4)	1% AEP						
		Base Case (mAHD)	Rainfall Loss -20%	Rainfall Loss +20%	Manning's 'n' -20%	Manning's 'n' +20%	Pipe Blockage +20%	Pipe Blockage +50%
1	Yeo St	81.33	0.00	0.00	0.00	0.00	0.00	0.00
2	Harrison St	76.42	0.00	0.00	0.00	0.00	0.00	0.01
3	Bennett St	68.15	0.00	0.00	0.00	0.00	0.01	0.03
4	Bertha St	58.61	0.00	0.00	-0.01	0.01	0.00	0.01
5	Burroway St	54.26	0.00	0.00	0.00	0.00	0.00	0.00
6	Powell St	48.77	0.00	0.00	0.00	0.00	0.00	0.01
7	Bannerman St	34.64	0.00	0.00	-0.01	0.00	0.01	0.03
8	Guthrie Ave	38.81	0.00	0.00	-0.01	0.01	0.00	0.00
9	Honda Rd	21.90	0.00	0.00	0.02	-0.01	0.03	0.10
10	Bogota Ave	18.03	0.00	0.00	-0.01	0.00	0.03	0.08
11	Hunts Lookout	14.56	0.00	0.00	0.00	0.01	0.00	0.00

ID	Location (refer Figure 4)	1% AEP						
		Base Case (mAHD)	Rainfall Loss -20%	Rainfall Loss +20%	Manning's 'n' -20%	Manning's 'n' +20%	Pipe Blockage +20%	Pipe Blockage +50%
12	Spofforth St	57.53	0.00	0.00	-0.01	0.00	0.01	0.02
	Average		0.00	0.00	0.00	0.00	+0.01	+0.02

Table D 2: Difference in Peak Flood Levels for Sensitivity Analysis Scenarios (m) – North Model

ID	Location (refer Figure 4)	1% AEP						
		Base Case (mAHD)	Rainfall Loss -20%	Rainfall Loss +20%	Manning's 'n' -20%	Manning's 'n' +20%	Pipe Blockage +20%	Pipe Blockage +50%
13	Military Rd	81.51	0.00	0.00	-0.01	0.00	0.00	0.01
14	Belgrave St	68.90	0.01	-0.01	0.00	0.00	0.01	0.03
15	Sutherland St	62.87	0.01	-0.02	0.01	0.00	0.04	0.10
16	Grasmere La	60.00	0.01	-0.01	-0.01	0.01	0.02	0.04
17	Grasmere Rd	55.68	0.01	0.00	-0.02	0.02	0.01	0.02
18	Little Young St	31.99	0.01	-0.01	-0.03	0.02	0.01	0.04
19	Brightmore St	45.47	0.01	-0.01	0.00	0.01	0.02	0.06
20	Brightmore Res	9.60	0.02	-0.01	0.01	0.00	0.03	0.08
21	Young St	9.37	0.02	-0.01	0.00	0.00	0.04	0.09
22	Primrose Pk	2.95	0.01	-0.01	-0.04	0.03	-0.02	-0.05
23	Ryries Pde	32.19	0.00	-0.01	-0.01	0.00	0.01	0.04
24	Grafton St	41.76	0.01	-0.01	0.01	0.00	0.01	0.03
25	Park Av	44.96	0.02	-0.01	0.02	0.00	0.01	0.03

ID	Location (refer Figure 4)	1% AEP						
		Base Case (mAHD)	Rainfall Loss -20%	Rainfall Loss +20%	Manning's 'n' -20%	Manning's 'n' +20%	Pipe Blockage +20%	Pipe Blockage +50%
26	Cammeray Rd	51.99	0.00	0.00	-0.01	0.01	0.00	0.01
27	Warringa Rd	54.32	0.01	-0.01	-0.02	0.02	0.01	0.01
28	Cammeray Av	67.40	0.02	-0.01	0.01	0.01	0.46	1.25
29	Anzac Pk	67.40	0.02	-0.02	0.01	0.01	0.46	1.25
30	Ernest St	67.40	0.02	-0.01	0.01	0.01	0.46	1.26
31	Miller St	75.46	0.00	-0.01	-0.01	-0.01	0.02	0.04
32	Rodborough Ave	77.30	0.03	-0.03	-0.03	0.00	0.05	0.12
33	Carlow St	80.95	0.01	-0.01	-0.01	0.01	0.00	0.00
34	West St	86.82	0.00	0.00	0.00	0.01	0.01	0.03
35	Hamilton La	44.23	0.00	0.00	0.01	-0.01	0.02	0.05
36	Palmer St	59.20	0.00	0.00	-0.03	0.01	0.02	0.06
37	Brooke St	65.75	0.00	0.00	-0.01	0.05	0.01	0.02
38	Wheatlegh St	73.35	0.01	0.00	-0.01	0.01	0.02	0.05

ID	Location (refer Figure 4)	1% AEP						
		Base Case (mAHD)	Rainfall Loss -20%	Rainfall Loss +20%	Manning's 'n' -20%	Manning's 'n' +20%	Pipe Blockage +20%	Pipe Blockage +50%
39	Chandos St	74.09	0.01	-0.01	-0.02	0.02	0.01	0.03
40	Willoughby Rd	77.32	0.01	-0.01	0.01	0.00	0.01	0.04
41	Hume La	78.16	0.01	-0.01	-0.01	0.01	0.02	0.05
42	Atchison St	78.24	0.02	-0.02	-0.01	0.01	0.03	0.07
43	Albany La	79.52	0.01	-0.01	-0.04	0.03	0.03	0.08
44	Albany St	81.16	0.01	-0.01	-0.03	0.02	0.04	0.12
	Average		+0.01	-0.01	-0.01	+0.01	+0.06	+0.16

Table D 3: Difference in Peak Flood Levels for Sensitivity Analysis Scenarios (m) – West Model

ID	Location (refer Figure 4)	1% AEP						
		Base Case (mAHD)	Rainfall Loss -20%	Rainfall Loss +20%	Manning's 'n' -20%	Manning's 'n' +20%	Pipe Blockage +20%	Pipe Blockage +50%
45	Christie St	71.24	0.01	-0.01	-0.01	0.01	0.01	0.07
46	Lithgow St	65.50	0.00	-0.01	-0.02	0.02	0.00	0.00
47	Russell St	41.78	0.00	0.00	0.00	-0.01	0.00	-0.02
48	Carlyle La	54.13	0.11	-0.06	-0.10	0.22	0.53	1.51
49	Belmont Av	47.35	0.01	-0.01	0.01	0.00	0.00	0.00
50	Newlands La	42.02	0.06	-0.01	0.01	0.01	0.23	1.08
51	Newlands St	66.79	0.01	-0.01	-0.01	0.01	0.02	0.04
52	Hazelbank Rd	60.72	0.00	0.00	-0.01	0.00	0.00	0.01
53	Waverton Oval	4.06	0.00	0.00	-0.02	0.01	0.01	0.01
54	Woolcott St	27.47	0.02	0.00	-0.01	0.01	0.03	0.08
55	Euroka_St	30.22	0.02	-0.02	-0.03	0.02	0.03	0.07
56	Ancrum_St	38.05	0.02	-0.02	-0.04	0.02	0.03	0.06
57	Bank St	45.46	0.01	-0.01	-0.01	0.00	0.02	0.05

ID	Location (refer Figure 4)	1% AEP						
		Base Case (mAHD)	Rainfall Loss -20%	Rainfall Loss +20%	Manning's 'n' -20%	Manning's 'n' +20%	Pipe Blockage +20%	Pipe Blockage +50%
	Average		+0.02	-0.01	-0.02	+0.03	+0.07	+0.23

Table D 4: Difference in Peak Flood Levels for Sensitivity Analysis Scenarios (m) – South Model

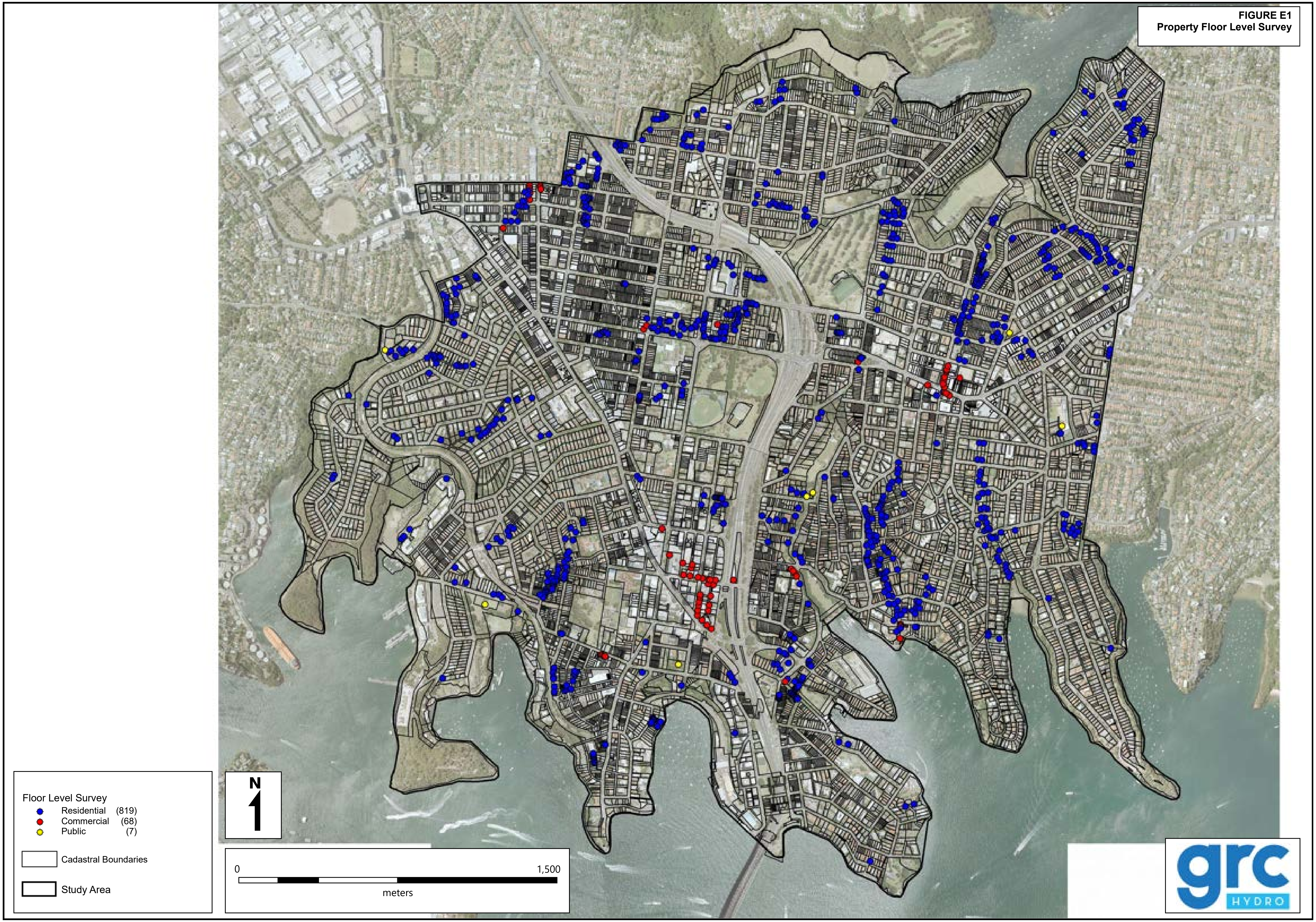
ID	Location (refer Figure 4)	1% AEP						
		Base Case (mAHD)	Rainfall Loss -20%	Rainfall Loss +20%	Manning's 'n' -20%	Manning's 'n' +20%	Pipe Blockage +20%	Pipe Blockage +50%
58	Lavender St	36.60	0.00	0.00	0.00	0.00	0.00	0.00
59	Miller St	63.26	0.01	-0.01	0.00	0.00	0.01	0.04
60	Pacific Hwy/Miller St Intersection	64.18	0.00	0.00	0.00	0.00	0.00	0.00
61	Mount St	45.69	0.00	-0.01	0.00	0.01	0.01	0.02
62	Little Walker St	44.86	0.07	-0.07	-0.01	0.00	0.08	0.29
63	Pacific Hwy/Walker St Intersection	49.58	0.00	0.00	0.00	0.00	0.00	0.00
64	Warringah Freeway/Tunnel Entrance	30.95	0.07	-0.07	-0.08	0.06	0.01	0.07
65	Clark Rd	13.59	0.00	0.00	0.02	-0.02	0.03	0.05
66	Hipwood St	4.81	0.00	-0.01	0.00	0.00	0.00	0.05
67	Anderson Park Outlet	1.91	0.04	-0.05	0.07	-0.22	-0.03	-0.10

ID	Location (refer Figure 4)	1% AEP						
		Base Case (mAHD)	Rainfall Loss -20%	Rainfall Loss +20%	Manning's 'n' -20%	Manning's 'n' +20%	Pipe Blockage +20%	Pipe Blockage +50%
68	Clark Rd/Kurraba Rd Intersection	3.25	0.01	-0.02	-0.01	0.01	-0.01	-0.04
69	Warringah Freeway	44.92	0.00	0.00	0.02	-0.01	0.00	0.01
70	McLaren St	69.68	0.00	0.00	0.00	0.00	0.00	0.01
71	Rawson St Channel	6.13	-0.05	-0.13	-0.02	0.02	-0.02	-0.08
72	Forsyth Park	26.15	0.00	0.00	-0.01	0.01	0.00	0.00
73	Kurraba Rd	21.05	0.00	-0.01	0.01	0.00	0.00	0.02
74	Aubin St	31.33	0.01	-0.01	0.01	0.00	0.01	0.03
75	Phillips St	41.23	0.00	-0.01	0.00	0.01	0.00	0.01
76	Kurraba Rd/Wycombe Rd Intersection	28.06	0.00	0.00	0.00	0.00	0.00	0.00
77	Carabella St/Peel St Intersection	21.56	0.00	0.00	-0.01	0.01	0.00	0.00
78	Holbrook Ave	12.25	0.00	0.00	-0.01	0.00	0.01	0.01

ID	Location (refer Figure 4)	1% AEP						
		Base Case (mAHD)	Rainfall Loss -20%	Rainfall Loss +20%	Manning's 'n' -20%	Manning's 'n' +20%	Pipe Blockage +20%	Pipe Blockage +50%
	Average		+0.01	-0.02	0.00	0.00	+0.01	+0.02

APPENDIX E – PROPERTY FLOOD LEVEL SURVEY

FIGURE E1
Property Floor Level Survey



APPENDIX F – NEWSLETTER AND QUESTIONNAIRE

Have Your Say on Flooding in Your Area

North Sydney LGA Floodplain Risk Management Study and Plan

North Sydney LGA Floodplain Risk Management Study & Plan

On behalf of North Sydney Council, GRC Hydro are undertaking the North Sydney Local Government Area (LGA) Floodplain Risk Management Study & Plan. We would like to hear your experiences of flooding to better understand how flooding occurs in your area and what measures may improve the current flood situation.

This study and plan will identify and recommend appropriate actions to manage flooding in your LGA. This study will be used by Council to manage flood risks in your area.

What is the Floodplain Risk Management Program?

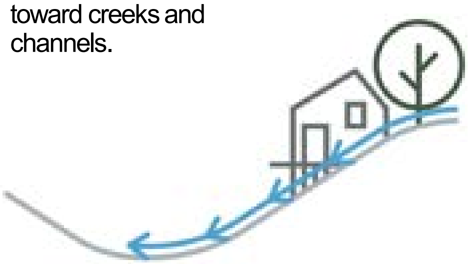
The Floodplain Risk Management Program, managed by the NSW Government, helps Councils make informed decisions about managing flood risk, implementing management plans to reduce flood risk and to provide essential information to the SES to deal with flood emergencies.

This program consists of five stages and the current study will undertake the third and fourth stages of this process; Floodplain Risk Management Study and Floodplain Risk Management Plan. This follows on from the flood study completed by Council in 2017.

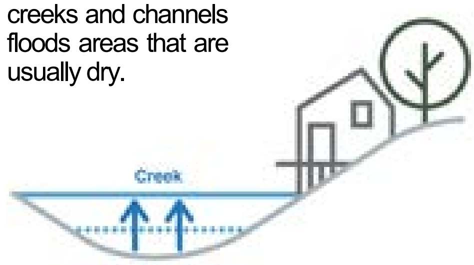
What is Flooding?

Flooding is often associated with inundation from large rivers; however, there are other ways that flooding can occur. The North Sydney LGA is primarily affected by two types of flooding; overland flow flooding and mainstream flooding.

<u>Overland flow flooding</u> occurs when rainfall flows toward creeks and channels.



<u>Mainstream flooding</u> occurs when large volumes of water in creeks and channels floods areas that are usually dry.



What is a floodplain risk management study and plan?

A Floodplain Risk Management Study and Plan draws on the results of a Flood Study to identify, assess and compare various flood risk management options. It provides information and tools to assess the flood impacts of different management options and provides a plan for the implementation of the preferred options.

A FRMS&P draws on the results of the flood study to identify, assess and compare various flood risk management options. These options are aimed at improving the existing flood situation in the LGA. The FRMS&P provides information and tools to allow considered assessment of flood impacts of management options and provides a strategic plan for their implementation. Management options are typically categorised as property modification measures, response modification measures and flood modification measures.

Have Your Say on Flooding in Your Area

North Sydney LGA Floodplain Risk Management Study and Plan

What is a FRMS&P used for?

A Floodplain Risk Management Study and Plan provides key information for Council, the SES and the community for effectively managing and mitigating flood risk.

For Council, FRMS&P's are a planning tool for future development in the LGA and implementing flood mitigation measures for existing development areas. Examples of applications for Council include:

- Identification and assessment of floodplain risk management measures for existing development areas aimed at reducing social, environmental and economic loss of flooding on development and the community; and
- Examination of Council's local flood risk management policies, strategies and planning instruments.

Information from the FRMS&P will assist the SES in its evacuation and logistics planning. The outcomes of the study will provide the SES with:

- a clear description of flood behaviour in the study area for a full range of flood events;
- a description of flood warning times for the LGA; and
- identification of critical evacuation issues in the LGA such as locations where road access is cut and the warning time before road access is cut.

The Study Area

The North Sydney Local Government Area covers an 11 square kilometre area with a topographic ridge running east to west sloping down toward Sydney Harbour to the south and Middle Harbour in the north. The topography creates a large number of steep catchments flowing generally north or south. The study area is shown in the map below, which shows the LGA boundary in purple along with suburbs and major roads.

Why your feedback is important

GRC Hydro will be identifying areas that are significantly flood affected and assessing flood modification measures to relieve the flood risk at these locations. This involves using computer models developed in the North Sydney LGA Flood Study to assess flood mitigation measures. Community input and knowledge of measures that might mitigate flooding in the LGA is invaluable to this study.

How can you help us?

Your feedback is important in helping us get a complete picture of the community's knowledge of flood behaviour and mitigation in your LGA. There are a variety of ways you can share your experiences and knowledge with us.

01. Fill out the questionnaire included with this letter and email it to northsydney@grchydro.com.au.

02. Fill out the questionnaire online by going to the website listed below or using your smartphone to navigate to the questionnaire using the QR code below.

QRCode: | Website: grchydro.com.au/northsydney

e information, please do not hesitate to contact the representatives nominated at the bottom of this page.

What happens next?

GRC Hydro will assess flood modification measures and produce a draft FRMS&P report for Council. It will be on Public Exhibition in early 2020.

Who can we contact?

If you have any further questions regarding the study or any further flood information/photos please attach them to your questionnaire or contact the following representatives.

Nathan Cheah
Associate, GRC Hydro
northsydney@grchydro.com.au
02 9030 0342

Jim Moore
Engineering Project Manager, North Sydney Council
Floodstudy@northsydney.nsw.gov.au
02 9936 8100

Please return your questionnaire by 25th October 2019 to ensure that it is counted.

Have Your Say on Flooding in Your Area

North Sydney LGA Floodplain Risk Management Study and Plan Questionnaire

Contact Details

Name ______________________________

Address: ______________________________

Phone Number: ______________________________

Email: ______________________________

Can we contact you for more information? ◯ Yes ◯ No

Your Property

What building type is your property?

◯ Residential (House/Terrace) ◯ Residential (Apartment)

◯ Commercial

Business Name:

How long have you lived or worked at this property? ____ Years

Has your property ever been affected by flooding?

◯ Yes, above the floor level ◯ Yes, in the yard or garage ◯ No

If yes, could you please provide more information in the space below or attached to this questionnaire. Information such as dates and photos of flooding are very helpful.

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Overland Flow Flooding

Are you aware of flooding from overland flow in the North Sydney Local Government Area?

◯ Yes ◯ No

If yes, could you please provide more information in the space below or attached to this questionnaire. Information such as dates and photos of flooding are very helpful.

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Have Your Say on Flooding in Your Area

North Sydney LGA Floodplain Risk Management Study and Plan Questionnaire

Flood Management Options

The current study is assessing a range of measures aimed at managing the current flood risk. The study is looking for input from residents to better understand local preferences for floodplain management.

Which of the following options do you prefer for managing flood risk? (tick one or multiple boxes based on preference)

- ○ Construct detention basin(s) to reduce peak flood flow rates / store overland flows
- ○ Improve overland flow paths to increase their capacity
- ○ Upgrade stormwater drains to increase their capacity to handle flood events
- ○ Impose greater flood-related development controls and increase strategic flood planning
- ○ Increase flood awareness and education in the community
- ○ Upgrade flood warning, evacuation planning and emergency response measures
- ○ Other suggestions (describe below)

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Other Comments

If you have other comments which could assist us in the development of the North Sydney LGA Floodplain Risk Management Study & Plan, please write them in the space below.

____

____

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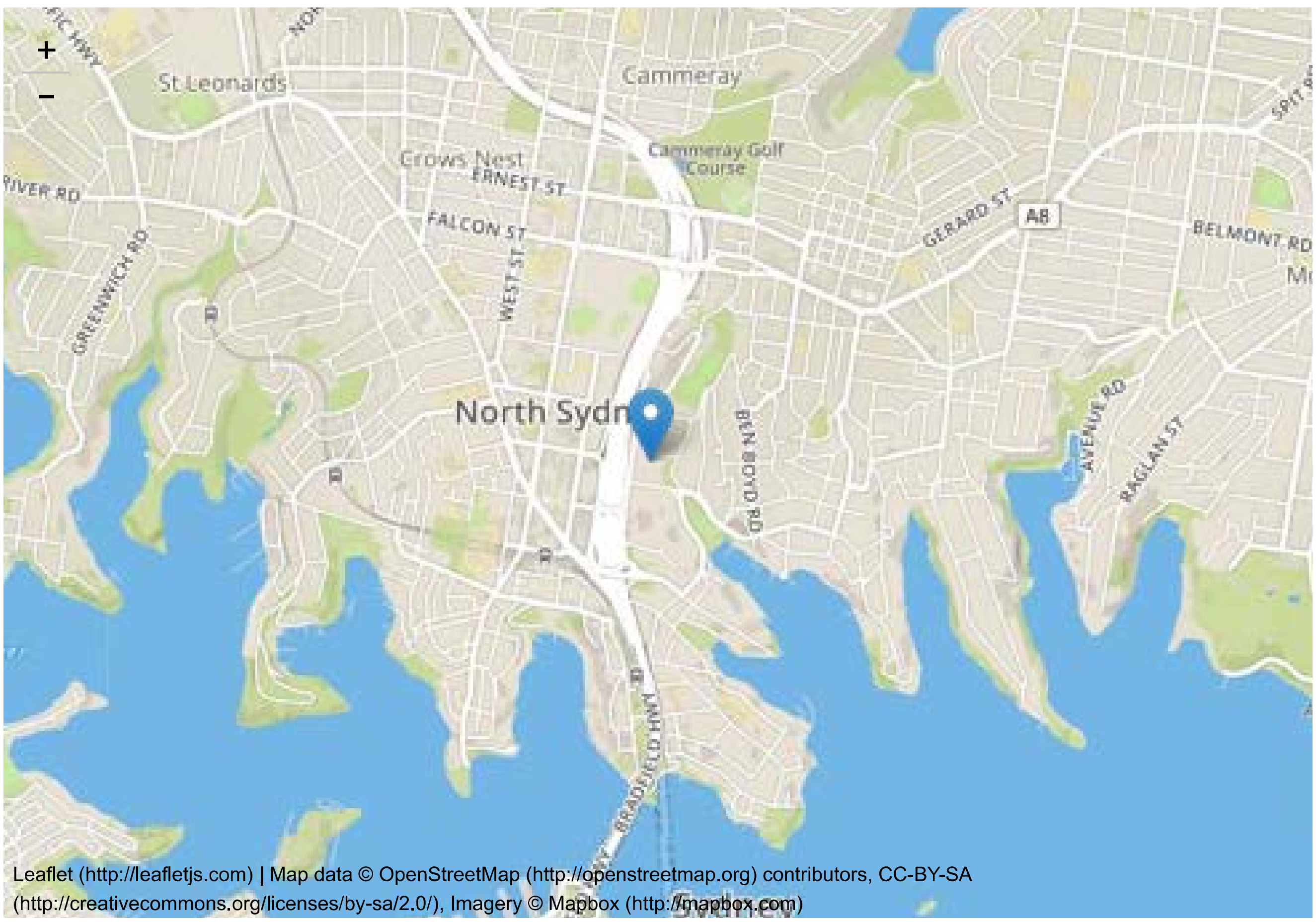
Please return your questionnaire by 25th October 2019 to ensure that it is counted.
If your information does not fit in the space provided, please email it to **northsydney@grchydro.com.au**

APPENDIX G – ARR DATAHUB

Australian Rainfall & Runoff Data Hub - Results

Input Data

Longitude	151.213
Latitude	-33.837
Selected Regions (clear)	
River Region	show
ARF Parameters	show
Storm Losses	show
Temporal Patterns	show
Areal Temporal Patterns	show
Interim Climate Change Factors	show



Region Information

Data Category	**Region**

Data Category	Region
River Region	Sydney Coast-Georges River
ARF Parameters	SE Coast
Temporal Patterns	East Coast South

Data

River Region

division	South East Coast (NSW)
rivregnum	13
River Region	Sydney Coast-Georges River

Layer Info

Time Accessed	07 September 2018 03:26PM
Version	2016_v1

ARF Parameters

Long Duration ARF

$$ARF = Min\left\{1, \left[1 - a\left(Area^{b} - c\log_{10}Duration\right)Duration^{-d} + eArea^{f}Duration^{g}\left(0.3 + \log_{10}AEP\right) + h10^{iArea\frac{Duration}{1440}}\left(0.3 + \log_{10}AEP\right)\right]\right\}$$

Zone	a	b	c	d	e	f	g	h	i
SE Coast	0.06	0.361	0.0	0.317	8.11e-05	0.651	0.0	0.0	0.0

Short Duration ARF

$$ARF = Min\left[1, 1 - 0.287\left(Area^{0.265} - 0.439\log_{10}(Duration)\right).Duration^{-0.36} + 2.26 \text{ x } 10^{-3} \text{ x } Area^{0.226}.Duration^{0.125}\left(0.3 + \log_{10}(AEP)\right) + 0.0141 \text{ x } Area^{0.213} \text{ x } 10^{-0.021\frac{(Duration-180)^2}{1440}}\left(0.3 + \log_{10}(AEP)\right)\right]$$

Layer Info

Time Accessed	07 September 2018 03:26PM
Version	2016_v1

Storm Losses

Note: Burst Loss = Storm Loss - Preburst

Note: These losses are only for rural use and are **NOT FOR USE** in urban areas

id	17135.0
Storm Initial Losses (mm)	28.0
Storm Continuing Losses (mm/h)	1.6

Layer Info

Time Accessed	07 September 2018 03:26PM
Version	2016_v1

Temporal Patterns | Download (.zip) (./temporal_patterns/tp/ECsouth.zip)

code	ECsouth
Label	East Coast South

Layer Info

Time Accessed	07 September 2018 03:26PM
Version	2016_v2

Areal Temporal Patterns | Download (.zip) (./temporal_patterns/areal/Areal_ECsouth.zip)

code	ECsouth
arealabel	East Coast South

Layer Info

Time Accessed	07 September 2018 03:26PM
Version	2016_v2

BOM IFD Depths

Click here (http://www.bom.gov.au/water/designRainfalls/revised-ifd/?year=2016&coordinate_type=dd&latitude=-33.8375&longitude=151.2125&sdmin=true&sdhr=true&sdday=true&user_label=) to obtain the IFD depths for catchment centroid from the BoM website

No data	No data found at this location!

Layer Info

Time Accessed	07 September 2018 03:26PM

Median Preburst Depths and Ratios

Values are of the format depth (ratio) with depth in mm

min (h)\AEP(%)	50	20	10	5	2	1
60 (1.0)	11.0 (0.335)	7.7 (0.177)	5.6 (0.109)	3.5 (0.060)	2.1 (0.030)	1.0 (0.013)
90 (1.5)	14.0 (0.372)	9.5 (0.189)	6.5 (0.110)	3.6 (0.053)	2.1 (0.027)	1.0 (0.011)
120 (2.0)	9.3 (0.223)	7.7 (0.139)	6.6 (0.102)	5.6 (0.075)	4.2 (0.048)	3.2 (0.032)
180 (3.0)	6.8 (0.140)	6.5 (0.101)	6.3 (0.084)	6.2 (0.071)	6.9 (0.067)	7.4 (0.064)
360 (6.0)	11.1 (0.175)	17.9 (0.211)	22.3 (0.223)	26.6 (0.229)	18.9 (0.136)	13.0 (0.083)
720 (12.0)	4.8 (0.056)	11.6 (0.101)	16.2 (0.117)	20.5 (0.127)	26.1 (0.135)	30.3 (0.139)
1080 (18.0)	3.7 (0.036)	8.2 (0.059)	11.2 (0.067)	14.1 (0.072)	22.2 (0.094)	28.3 (0.106)
1440 (24.0)	0.8 (0.007)	6.3 (0.039)	9.9 (0.052)	13.3 (0.060)	21.1 (0.078)	26.9 (0.088)
2160 (36.0)	0.0 (0.000)	2.9 (0.016)	4.9 (0.021)	6.7 (0.025)	9.4 (0.029)	11.5 (0.032)
2880 (48.0)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	2.0 (0.006)	3.5 (0.009)
4320 (72.0)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	1.2 (0.003)	2.2 (0.005)

Layer Info

Time Accessed	07 September 2018 03:26PM
Version	2018_v1

Note	Preburst interpolation methods for catchment wide preburst has been slightly altered. Point values remain unchanged.

10% Preburst Depths

min (h)\AEP(%)	50	20	10	5	2	1
60 (1.0)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)
90 (1.5)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)
120 (2.0)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)
180 (3.0)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)
360 (6.0)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)
720 (12.0)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)
1080 (18.0)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)
1440 (24.0)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)
2160 (36.0)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)
2880 (48.0)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)
4320 (72.0)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)

Layer Info

Time Accessed	07 September 2018 03:26PM
Version	2018_v1
Note	Preburst interpolation methods for catchment wide preburst has been slightly altered. Point values remain unchanged.

25% Preburst Depths

min (h)\AEP(%)	50	20	10	5	2	1
60 (1.0)	0.4 (0.011)	0.2 (0.005)	0.1 (0.002)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)
90 (1.5)	0.9 (0.023)	0.5 (0.010)	0.2 (0.004)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)
120 (2.0)	0.1 (0.003)	0.1 (0.001)	0.0 (0.001)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)
180 (3.0)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)
360 (6.0)	0.1 (0.002)	0.5 (0.006)	0.8 (0.008)	1.0 (0.009)	0.4 (0.003)	0.0 (0.000)
720 (12.0)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)
1080 (18.0)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	1.2 (0.005)	2.2 (0.008)
1440 (24.0)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.4 (0.002)	0.7 (0.002)
2160 (36.0)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)
2880 (48.0)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)
4320 (72.0)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)

Layer Info

Time Accessed	07 September 2018 03:26PM
Version	2018_v1
Note	Preburst interpolation methods for catchment wide preburst has been slightly altered. Point values remain unchanged.

75% Preburst Depths

min (h)\AEP(%)	50	20	10	5	2	1
60 (1.0)	40.2 (1.232)	37.9 (0.869)	36.4 (0.710)	34.9 (0.593)	28.4 (0.410)	23.5 (0.303)
90 (1.5)	46.8 (1.244)	39.7 (0.793)	35.1 (0.596)	30.6 (0.453)	27.8 (0.349)	25.7 (0.288)
120 (2.0)	42.0 (1.011)	37.7 (0.680)	34.8 (0.534)	32.0 (0.428)	35.9 (0.406)	38.7 (0.391)
180 (3.0)	48.1 (0.999)	45.5 (0.710)	43.8 (0.581)	42.2 (0.485)	57.0 (0.553)	68.1 (0.587)
360 (6.0)	44.0 (0.696)	60.5 (0.714)	71.4 (0.712)	81.9 (0.703)	86.5 (0.623)	90.0 (0.574)
720 (12.0)	24.6 (0.289)	37.3 (0.324)	45.8 (0.333)	53.9 (0.335)	67.0 (0.347)	76.8 (0.351)
1080 (18.0)	23.8 (0.235)	38.2 (0.275)	47.7 (0.286)	56.9 (0.290)	71.4 (0.304)	82.2 (0.309)
1440 (24.0)	12.3 (0.107)	31.6 (0.200)	44.4 (0.233)	56.7 (0.253)	67.1 (0.249)	74.8 (0.245)
2160 (36.0)	7.1 (0.052)	21.4 (0.113)	30.9 (0.136)	40.0 (0.150)	51.5 (0.160)	60.1 (0.165)
2880 (48.0)	2.8 (0.018)	7.6 (0.036)	10.7 (0.042)	13.8 (0.046)	25.1 (0.070)	33.7 (0.083)
4320 (72.0)	0.0 (0.000)	1.6 (0.007)	2.6 (0.009)	3.6 (0.011)	20.9 (0.051)	33.8 (0.074)

Layer Info

Time Accessed	07 September 2018 03:26PM
Version	2018_v1
Note	Preburst interpolation methods for catchment wide preburst has been slightly altered. Point values remain unchanged.

90% Preburst Depths

min (h)\AEP(%)	50	20	10	5	2	1
60 (1.0)	91.6 (2.805)	94.8 (2.172)	96.9 (1.890)	98.9 (1.680)	103.6 (1.496)	107.1 (1.383)
90 (1.5)	108.2 (2.877)	105.2 (2.100)	103.3 (1.754)	101.4 (1.499)	113.6 (1.425)	122.8 (1.375)
120 (2.0)	89.3 (2.146)	94.6 (1.709)	98.1 (1.508)	101.5 (1.356)	108.2 (1.224)	113.2 (1.142)
180 (3.0)	92.3 (1.916)	102.2 (1.594)	108.8 (1.441)	115.1 (1.322)	126.6 (1.227)	135.2 (1.165)
360 (6.0)	84.9 (1.344)	106.8 (1.261)	121.3 (1.209)	135.2 (1.161)	158.1 (1.139)	175.3 (1.118)
720 (12.0)	50.6 (0.596)	78.2 (0.678)	96.5 (0.700)	114.0 (0.707)	133.6 (0.692)	148.3 (0.678)
1080 (18.0)	53.6 (0.528)	81.4 (0.585)	99.9 (0.599)	117.5 (0.600)	138.3 (0.588)	153.9 (0.577)
1440 (24.0)	40.6 (0.354)	67.3 (0.425)	84.9 (0.446)	101.9 (0.455)	118.4 (0.440)	130.7 (0.428)
2160 (36.0)	31.4 (0.232)	52.3 (0.277)	66.1 (0.291)	79.3 (0.297)	100.0 (0.312)	115.6 (0.318)
2880 (48.0)	19.9 (0.132)	43.6 (0.207)	59.3 (0.234)	74.4 (0.250)	91.0 (0.254)	103.5 (0.256)
4320 (72.0)	9.5 (0.055)	21.4 (0.089)	29.3 (0.101)	36.9 (0.109)	62.7 (0.155)	82.0 (0.180)

Layer Info

Time Accessed	07 September 2018 03:26PM
Version	2018_v1
Note	Preburst interpolation methods for catchment wide preburst has been slightly altered. Point values remain unchanged.

Interim Climate Change Factors

Values are of the format temperature increase in degrees Celcius (% increase in rainfall)

	RCP 4.5	RCP6	**RCP 8.5**
2030	**0.892 (4.5%)**	0.775 (3.9%)	**0.979 (4.9%)**
2040	**1.121 (5.6%)**	1.002 (5.0%)	**1.351 (6.8%)**
2050	**1.334 (6.7%)**	1.28 (6.4%)	**1.765 (8.8%)**
2060	**1.522 (7.6%)**	1.527 (7.6%)	**2.23 (11.2%)**
2070	**1.659 (8.3%)**	1.745 (8.7%)	**2.741 (13.7%)**
2080	**1.78 (8.9%)**	1.999 (10.0%)	**3.249 (16.2%)**
2090	**1.825 (9.1%)**	2.271 (11.4%)	**3.727 (18.6%)**

Layer Info

Time Accessed	07 September 2018 03:26PM
Version	2016_v1
Note	ARR recommends the use of RCP4.5 and RCP 8.5 values

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APPENDIX H – HYDRAULIC STRUCTURE BLOCKAGES

BLOCKAGE ASSESSMENT FORM ARR2016

STRUCTURE: Anderson Park Channel Outlet – Culvert at Darley St

OPENING WIDTH: 1.829m (W) x 1.829m (H)

DEBRIS TYPE / MATERIAL / L_{10} / SOURCE AREA

Debris Type/Material	L_{10}	Source Area	How Assessed
Urban	1.5 m	Urban debris that could fit through gaps of fence	Aerial/Google Maps & Street View
Floating	1.5 m	Tree branches and sticks falling into channel from trees adjacent – fenced and thick growth	Aerial/Google Maps & Street View
Non-floating	Silt and Gravel	From Willow Tree Park and road surface	Aerial/Google Maps & Street View

DEBRIS AVAILABILITY (HML) – *for the selected debris type/size and its source area*

Availability	Typical Source Area Characteristics	Notes
High	• *Dense forest, thick vegetation, extensive canopy, difficult to walk through with considerable fallen limbs, leaves and high levels of floor litter.* • *Streams with boulder/cobble beds and steep bed slopes and banks showing signs of substantial past bed/bank movements.* • *Arid areas, where loose vegetation and exposed loose soils occur and vegetation is sparse.* • *Urban areas that are not well maintained and/or old paling fences, sheds, cars and/or stored loose material etc., are present on the floodplain close to the water course.*	
Medium	• *State forest areas with clear understory, grazing land with stands of trees* • *Source areas generally falling between the High and Low categories.*	Floating: Potential for tree logs to fall in
Low	• *Well maintained rural lands and paddocks, with minimal outbuildings* • *Streams with moderate to flat slopes and stable beds and banks.* • *Arid areas where vegetation is deep rooted and soils resistant to scour* • *Urban areas that are well maintained with limited debris present in the source area.*	Urban: Limited debris from surrounding (well maintained) Non-floating: Relatively stable channel

DEBRIS MOBILITY (HML) - *for the selected debris type/size and its source area*

Mobility	Typical Source Area Characteristics	Notes
High	• *Steep source area with fast response times and high annual rainfall and/or storm intensities and/or source areas subject to high rainfall intensities with sparse vegetation cover.* • *Receiving streams that frequently overtop their banks.* • *Main debris source areas close to streams*	
Medium	• *Source areas generally falling between the High and Low categories.*	Urban: fast urban catchment response, good vegetation cover Floating: fast urban catchment response, good vegetation cover

		Non-floating: fast urban catchment response, good vegetation cover
Low	• *Low rainfall intensities and large, flat source areas.* • *Receiving streams that Infrequently overtop their banks.* • *Main source areas well away from streams*	

DEBRIS TRANSPORTABILITY (HML) - *for the selected debris type/size and stream characteristics*

Transportability	Typical Transporting Stream Characteristics	Notes
High	• *Steep bed slopes (> 3%).and/or high stream velocity (V>2.5m/sec)* • *Deep stream relative to vertical debris dimension (D>0.5L_{10})* • *Wide streams relative to horizontal debris dimension. (W>L_{10})* • *Streams relatively straight and free of constrictions/snag points.* • *High temporal variability in maximum stream flows*	Urban: Relative deep and wide channel and velocity >2.5m/s Floating: Relative deep and wide channel and velocity >2.5m/s Non-floating: Relative deep and wide channel and velocity >2.5m/s
Medium	• *Streams generally falling between High and Low categories*	
Low	• *Flat bed slopes (< 1%).and/or low stream velocity (V<1m/sec)* • *Shallow stream relative to vertical debris dimension (D<0.5L10)* • *Narrow streams relative to horizontal debris dimension. (W<L10)* • *Streams meander with frequent constrictions/snag points.* • *Low temporal variability in maximum stream flows*	

SITE BASED DEBRIS POTENTIAL 1%AEP (HML) - *for the selected debris type/size arriving at the site*

Debris Potential	Combinations of the Above (any order)	Notes
High	*HHH or HHM*	
Medium	*MMM or HML or HMM or HLL*	LMH MMH LMH
Low	*LLL or MML or MLL*	

AEP ADJUSTED SITE DEBRIS POTENTIAL (HML) - *for the selected debris type/size*

Event AEP	At Site 1% AEP Debris Potential			AEP Adjusted at Site Debris Potential		
	High	Medium	Low			
AEP > 5% (frequent)	*Medium*	*Low*	*Low*	Low	Low	Low
AEP 5% - AEP 0.5%	*High*	*Medium*	*Low*	Medium	Medium	Medium
AEP < 0.5%	*High*	*High*	*Medium*	High	High	High

MOST LIKELY DESIGN INLET BLOCKAGE LEVEL (B_{DES}%) *for the selected debris type/size*

Control Dimension Inlet Width W (m)	At Site 1% AEP Debris Potential		
	High	Medium	Low
W < L_{10}	*100%*	*50%*	*25%*
W ≥ L_{10} ≤ 3L_{10}	*20%*	*10%*	*0%*
W > 3L_{10}	*10%*	*0%*	*0%*

Event AEP	Bdes% Floating
AEP > 5% (frequent)	*0%*
AEP 5% - AEP 0.5%	*10%*
AEP < 0.5%	*20%*

Note: W=1.83m ≥ L_{10} ≤ 3L_{10}

LIKELIHOOD OF SEDIMENT BEING DEPOSITED IN WATERWAY (HML)

Peak Velocity through Structure (m/s)	Particle Type				
	Clay/Silt	Sand	Gravel	Cobbles	Boulders
>= 3	*L*	*L*	*L*	*L*	*M*
1.0 to 3	*L*	*L*	*L*	*M*	*M*
0.5 to 1	*L*	*L*	*L*	*M*	*H*
0.1 to 0.5	*L*	*L*	*M*	*H*	*H*
< 0.1	*L*	*M*	*H*	*H*	*H*

Note: V>3m/s

MOST LIKELY DEPOSITIONAL BLOCKAGE LEVELS – B_{DES}%

Likelihood that deposition will occur	AEP Adjusted Debris Potential		
	High	Medium	Low
High	*100%*	*60%*	*25%*
Medium	*60%*	*40%*	*15%*
Low	*25%*	*15%*	*0%*

Event AEP	Bdes% Non-Floating
AEP > 5% (frequent)	*0%*
AEP 5% - AEP 0.5%	*15%*
AEP < 0.5%	*25%*

ESTIMATED BLOCKAGE LEVELS – B_{DES}%

Event AEP	Bdes% Floating	Bdes% Non-Floating	Bdes% Final
AEP > 5% (frequent)	*0%*	*0%*	*0%*
AEP 5% - AEP 0.5%	*10%*	*15%*	*15%*
AEP < 0.5%	*20%*	*25%*	*25%*

BLOCKAGE ASSESSMENT FORM ARR2016

STRUCTURE: Anderson Park Channel Outlet – Culvert at Kurraba Rd

OPENING WIDTH: 3.048m (W) x 1.676m (H)

DEBRIS TYPE / MATERIAL / L_{10} / SOURCE AREA

Debris Type/Material	L_{10}	Source Area	How Assessed
Urban	1.5 m	Urban debris that could fit through gaps of fence	Aerial/Google Maps & Street View
Floating	0.5 m	Tree branches and sticks falling into channel from trees adjacent – well fenced	Aerial/Google Maps & Street View
Non-floating	Silt and Sand	From Warringa Park and road surface	Aerial/Google Maps & Street View

DEBRIS AVAILABILITY (HML) – *for the selected debris type/size and its source area*

Availability	Typical Source Area Characteristics	Notes
High	• *Dense forest, thick vegetation, extensive canopy, difficult to walk through with considerable fallen limbs, leaves and high levels of floor litter.* • *Streams with boulder/cobble beds and steep bed slopes and banks showing signs of substantial past bed/bank movements.* • *Arid areas, where loose vegetation and exposed loose soils occur and vegetation is sparse.* • *Urban areas that are not well maintained and/or old paling fences, sheds, cars and/or stored loose material etc., are present on the floodplain close to the water course.*	
Medium	• *State forest areas with clear understory, grazing land with stands of trees* • *Source areas generally falling between the High and Low categories.*	
Low	• *Well maintained rural lands and paddocks, with minimal outbuildings* • *Streams with moderate to flat slopes and stable beds and banks.* • *Arid areas where vegetation is deep rooted and soils resistant to scour* • *Urban areas that are well maintained with limited debris present in the source area.*	Urban: Limited debris from surrounding (well maintained) Floating: Well fenced to stop tree logs from falling in Non-floating: Formalised concrete channel

DEBRIS MOBILITY (HML) - *for the selected debris type/size and its source area*

Mobility	Typical Source Area Characteristics	Notes
High	• *Steep source area with fast response times and high annual rainfall and/or storm intensities and/or source areas subject to high rainfall intensities with sparse vegetation cover.* • *Receiving streams that frequently overtop their banks.* • *Main debris source areas close to streams*	
Medium	• *Source areas generally falling between the High and Low categories.*	Urban: fast urban catchment response, good vegetation cover Floating: fast urban catchment response, good vegetation cover

		Non-floating: fast urban catchment response, good vegetation cover
Low	• *Low rainfall intensities and large, flat source areas.* • *Receiving streams that Infrequently overtop their banks.* • *Main source areas well away from streams*	

DEBRIS TRANSPORTABILITY (HML) - *for the selected debris type/size and stream characteristics*

Transportability	Typical Transporting Stream Characteristics	Notes
High	• *Steep bed slopes (> 3%).and/or high stream velocity (V>2.5m/sec)* • *Deep stream relative to vertical debris dimension (D>0.5L_{10})* • *Wide streams relative to horizontal debris dimension. (W>L_{10})* • *Streams relatively straight and free of constrictions/snag points.* • *High temporal variability in maximum stream flows*	
Medium	• *Streams generally falling between High and Low categories*	Urban: Relative deep and wide channel but velocity between 1-2m/s Floating: Relative deep and wide channel but velocity between 1-2m/s Non-floating: Relative deep and wide channel but velocity between 1-2m/s
Low	• *Flat bed slopes (< 1%).and/or low stream velocity (V<1m/sec)* • *Shallow stream relative to vertical debris dimension (D<0.5L10)* • *Narrow streams relative to horizontal debris dimension. (W<L10)* • *Streams meander with frequent constrictions/snag points.* • *Low temporal variability in maximum stream flows*	

SITE BASED DEBRIS POTENTIAL 1%AEP (HML) - *for the selected debris type/size arriving at the site*

Debris Potential	Combinations of the Above (any order)	Notes
High	*HHH or HHM*	
Medium	*MMM or HML or HMM or HLL*	
Low	*LLL or MML or MLL*	LMM LMM LMM

AEP ADJUSTED SITE DEBRIS POTENTIAL (HML) - *for the selected debris type/size*

Event AEP	At Site 1% AEP Debris Potential			AEP Adjusted at Site Debris Potential		
	High	Medium	Low			
AEP > 5% (frequent)	*Medium*	*Low*	*Low*	Low	Low	Low
AEP 5% - AEP 0.5%	*High*	*Medium*	*Low*	Low	Low	Low
AEP < 0.5%	*High*	*High*	*Medium*	Medium	Medium	Medium

MOST LIKELY DESIGN INLET BLOCKAGE LEVEL (B_{DES}%) *for the selected debris type/size*

Control Dimension Inlet Width W (m)	At Site 1% AEP Debris Potential		
	High	Medium	Low
W < L_{10}	*100%*	*50%*	*25%*

Event AEP	Bdes% Floating
AEP > 5% (frequent)	*0%*

W ≥ L_{10} ≤ $3L_{10}$	*20%*	*10%*	*0%*
W > $3L_{10}$	*10%*	*0%*	*0%*

AEP 5% - AEP 0.5%	*0%*
AEP < 0.5%	*10%*

Note: W (Urban - Conservative)=3.05m ≥ L_{10} ≤ $3L_{10}$

LIKELIHOOD OF SEDIMENT BEING DEPOSITED IN WATERWAY (HML)

Peak Velocity through Structure (m/s)	Particle Type				
	Clay/Silt	Sand	Gravel	Cobbles	Boulders
>= 3	*L*	*L*	*L*	*L*	*M*
1.0 to 3	*L*	*L*	*L*	*M*	*M*
0.5 to 1	*L*	*L*	*L*	*M*	*H*
0.1 to 0.5	*L*	*L*	*M*	*H*	*H*
< 0.1	*L*	*M*	*H*	*H*	*H*

Note: V>3m/s

MOST LIKELY DEPOSITIONAL BLOCKAGE LEVELS – B_{DES}%

Likelihood that deposition will occur	AEP Adjusted Debris Potential		
	High	Medium	Low
High	*100%*	*60%*	*25%*
Medium	*60%*	*40%*	*15%*
Low	*25%*	*15%*	*0%*

Event AEP	Bdes% Non-Floating
AEP > 5% (frequent)	*0%*
AEP 5% - AEP 0.5%	*0%*
AEP < 0.5%	*15%*

ESTIMATED BLOCKAGE LEVELS – B_{DES}%

Event AEP	Bdes% Floating	Bdes% Non-Floating	Bdes% Final
AEP > 5% (frequent)	*0%*	*0%*	*0%*
AEP 5% - AEP 0.5%	*0%*	*0%*	*0%*
AEP < 0.5%	*10%*	*15%*	*15%*

BLOCKAGE ASSESSMENT FORM ARR2016

STRUCTURE: Reynolds St Drain Outlet

OPENING WIDTH: 0.55m (W) x 1.05m (H)

DEBRIS TYPE / MATERIAL / L_{10} / SOURCE AREA

Debris Type/Material	L_{10}	Source Area	How Assessed
Urban	0.5 m	Urban debris that could fit through gaps of fence	Aerial/Google Maps & Street View
Floating	0.5 m	Tree branches and sticks falling into drain from trees adjacent – fenced and lawn	Aerial/Google Maps & Street View
Non-floating	Silt and Gravel	From road surface	Aerial/Google Maps & Street View

DEBRIS AVAILABILITY (HML) – *for the selected debris type/size and its source area*

Availability	Typical Source Area Characteristics	Notes
High	• *Dense forest, thick vegetation, extensive canopy, difficult to walk through with considerable fallen limbs, leaves and high levels of floor litter.* • *Streams with boulder/cobble beds and steep bed slopes and banks showing signs of substantial past bed/bank movements.* • *Arid areas, where loose vegetation and exposed loose soils occur and vegetation is sparse.* • *Urban areas that are not well maintained and/or old paling fences, sheds, cars and/or stored loose material etc., are present on the floodplain close to the water course.*	
Medium	• *State forest areas with clear understory, grazing land with stands of trees* • *Source areas generally falling between the High and Low categories.*	
Low	• *Well maintained rural lands and paddocks, with minimal outbuildings* • *Streams with moderate to flat slopes and stable beds and banks.* • *Arid areas where vegetation is deep rooted and soils resistant to scour* • *Urban areas that are well maintained with limited debris present in the source area.*	Urban: Limited debris from surrounding (well maintained) Floating: Potential for tree branches to fall in Non-floating: Relatively stable drain

DEBRIS MOBILITY (HML) - *for the selected debris type/size and its source area*

Mobility	Typical Source Area Characteristics	Notes
High	• *Steep source area with fast response times and high annual rainfall and/or storm intensities and/or source areas subject to high rainfall intensities with sparse vegetation cover.* • *Receiving streams that frequently overtop their banks.* • *Main debris source areas close to streams*	
Medium	• *Source areas generally falling between the High and Low categories.*	Urban: fast urban catchment response, good vegetation cover Floating: fast urban catchment response, good vegetation cover

		Non-floating: fast urban catchment response, good vegetation cover
Low	• *Low rainfall intensities and large, flat source areas.* • *Receiving streams that Infrequently overtop their banks.* • *Main source areas well away from streams*	

DEBRIS TRANSPORTABILITY (HML) - *for the selected debris type/size and stream characteristics*

Transportability	Typical Transporting Stream Characteristics	Notes
High	• *Steep bed slopes (> 3%).and/or high stream velocity (V>2.5m/sec)* • *Deep stream relative to vertical debris dimension ($D>0.5L_{10}$)* • *Wide streams relative to horizontal debris dimension. ($W>L_{10}$)* • *Streams relatively straight and free of constrictions/snag points.* • *High temporal variability in maximum stream flows*	
Medium	• *Streams generally falling between High and Low categories*	Urban: Shallow and narrow drain. Velocity close to 2.5m/s Floating: Shallow and narrow drain. Velocity close to 2.5m/s Non-floating: Shallow and narrow drain. Velocity close to 2.5m/s
Low	• *Flat bed slopes (< 1%).and/or low stream velocity (V<1m/sec)* • *Shallow stream relative to vertical debris dimension (D<0.5L10)* • *Narrow streams relative to horizontal debris dimension. (W<L10)* • *Streams meander with frequent constrictions/snag points.* • *Low temporal variability in maximum stream flows*	

SITE BASED DEBRIS POTENTIAL 1%AEP (HML) - *for the selected debris type/size arriving at the site*

Debris Potential	Combinations of the Above (any order)	Notes
High	*HHH or HHM*	
Medium	*MMM or HML or HMM or HLL*	
Low	*LLL or MML or MLL*	LMM LMM LMM

AEP ADJUSTED SITE DEBRIS POTENTIAL (HML) - *for the selected debris type/size*

Event AEP	At Site 1% AEP Debris Potential			AEP Adjusted at Site Debris Potential		
	High	Medium	Low			
AEP > 5% (frequent)	*Medium*	*Low*	*Low*	Low	Low	Low
AEP 5% - AEP 0.5%	*High*	*Medium*	*Low*	Low	Low	Low
AEP < 0.5%	*High*	*High*	*Medium*	Medium	Medium	Medium

MOST LIKELY DESIGN INLET BLOCKAGE LEVEL (B_{DES}%) *for the selected debris type/size*

Control Dimension Inlet Width W (m)	At Site 1% AEP Debris Potential		
	High	Medium	Low
$W < L_{10}$	*100%*	*50%*	*25%*
$W \geq L_{10} \leq 3L_{10}$	*20%*	*10%*	*0%*
$W > 3L_{10}$	*10%*	*0%*	*0%*

Event AEP	Bdes% Floating
AEP > 5% (frequent)	*0%*
AEP 5% - AEP 0.5%	*0%*
AEP < 0.5%	*10%*

Note: $W=0.55m \geq L_{10} \leq 3L_{10}$

LIKELIHOOD OF SEDIMENT BEING DEPOSITED IN WATERWAY (HML)

Peak Velocity through Structure (m/s)	Particle Type				
	Clay/Silt	Sand	Gravel	Cobbles	Boulders
>= 3	*L*	*L*	*L*	*L*	*M*
1.0 to 3	*L*	*L*	*L*	*M*	*M*
0.5 to 1	*L*	*L*	*L*	*M*	*H*
0.1 to 0.5	*L*	*L*	*M*	*H*	*H*
< 0.1	*L*	*M*	*H*	*H*	*H*

Note: V~2.4m/s

MOST LIKELY DEPOSITIONAL BLOCKAGE LEVELS – B_{DES}%

Likelihood that deposition will occur	AEP Adjusted Debris Potential		
	High	Medium	Low
High	*100%*	*60%*	*25%*
Medium	*60%*	*40%*	*15%*
Low	*25%*	*15%*	*0%*

Event AEP	Bdes% Non-Floating
AEP > 5% (frequent)	*0%*
AEP 5% - AEP 0.5%	*0%*
AEP < 0.5%	*15%*

ESTIMATED BLOCKAGE LEVELS – B_{DES}%

Event AEP	Bdes% Floating	Bdes% Non-Floating	Bdes% Final
AEP > 5% (frequent)	*0%*	*0%*	*0%*
AEP 5% - AEP 0.5%	*0%*	*0%*	*0%*
AEP < 0.5%	*10%*	*15%*	*15%*

BLOCKAGE ASSESSMENT FORM ARR2016

STRUCTURE: Tunks Park Box Culverts

OPENING WIDTH: 3.07m (W) x 2.15m (H) x 6

DEBRIS TYPE / MATERIAL / L_{10} / SOURCE AREA

Debris Type/Material	L_{10}	Source Area	How Assessed
Urban	-	Significant distance away from nearest urban area	Aerial
Floating	3-4 m	Tree logs from forest reserve	Aerial/Google Maps & Street View
Non-floating	Gravel and silt	Upstream creek bed	Aerial/Google Maps & Street View

DEBRIS AVAILABILITY (HML) – *for the selected debris type/size and its source area*

Availability	Typical Source Area Characteristics	Notes
High	• *Dense forest, thick vegetation, extensive canopy, difficult to walk through with considerable fallen limbs, leaves and high levels of floor litter.* • *Streams with boulder/cobble beds and steep bed slopes and banks showing signs of substantial past bed/bank movements.* • *Arid areas, where loose vegetation and exposed loose soils occur and vegetation is sparse.* • *Urban areas that are not well maintained and/or old paling fences, sheds, cars and/or stored loose material etc., are present on the floodplain close to the water course.*	Floating: forest reserve upstream
Medium	• *State forest areas with clear understory, grazing land with stands of trees* • *Source areas generally falling between the High and Low categories.*	
Low	• *Well maintained rural lands and paddocks, with minimal outbuildings* • *Streams with moderate to flat slopes and stable beds and banks.* • *Arid areas where vegetation is deep rooted and soils resistant to scour* • *Urban areas that are well maintained with limited debris present in the source area.*	Non-floating: relatively stable creek bed

DEBRIS MOBILITY (HML) - *for the selected debris type/size and its source area*

Mobility	Typical Source Area Characteristics	Notes
High	• *Steep source area with fast response times and high annual rainfall and/or storm intensities and/or source areas subject to high rainfall intensities with sparse vegetation cover.* • *Receiving streams that frequently overtop their banks.* • *Main debris source areas close to streams*	
Medium	• *Source areas generally falling between the High and Low categories.*	Floating: relatively steep slope and fast urban catchment response, dense vegetation cover Non-floating: gravels found along creek, dense vegetation cover

Low	• *Low rainfall intensities and large, flat source areas.* • *Receiving streams that Infrequently overtop their banks.* • *Main source areas well away from streams*	

DEBRIS TRANSPORTABILITY (HML) - *for the selected debris type/size and stream characteristics*

Transportability	Typical Transporting Stream Characteristics	Notes
High	• *Steep bed slopes (> 3%).and/or high stream velocity (V>2.5m/sec)* • *Deep stream relative to vertical debris dimension (D>0.5L_{10})* • *Wide streams relative to horizontal debris dimension. (W>L_{10})* • *Streams relatively straight and free of constrictions/snag points.* • *High temporal variability in maximum stream flows*	Floating: steep slopes and high stream velocity, deep and wide stream Non-floating: steep slopes and high stream velocity, deep and wide stream
Medium	• *Streams generally falling between High and Low categories*	
Low	• *Flat bed slopes (< 1%).and/or low stream velocity (V<1m/sec)* • *Shallow stream relative to vertical debris dimension (D<0.5L10)* • *Narrow streams relative to horizontal debris dimension. (W<L10)* • *Streams meander with frequent constrictions/snag points.* • *Low temporal variability in maximum stream flows*	

SITE BASED DEBRIS POTENTIAL 1%AEP (HML) - *for the selected debris type/size arriving at the site*

Debris Potential	Combinations of the Above (any order)	Notes
High	*HHH or HHM*	HMH
Medium	*MMM or HML or HMM or HLL*	LMH
Low	*LLL or MML or MLL*	

AEP ADJUSTED SITE DEBRIS POTENTIAL (HML) - *for the selected debris type/size*

Event AEP	At Site 1% AEP Debris Potential			AEP Adjusted at Site Debris Potential	
	High	Medium	Low		
AEP > 5% (frequent)	*Medium*	*Low*	*Low*	Medium	Low
AEP 5% - AEP 0.5%	*High*	*Medium*	*Low*	High	Medium
AEP < 0.5%	*High*	*High*	*Medium*	High	High

MOST LIKELY DESIGN INLET BLOCKAGE LEVEL (B_{DES}%) *for the selected debris type/size*

Control Dimension Inlet Width W (m)	At Site 1% AEP Debris Potential		
	High	Medium	Low
W < L_{10}	*100%*	*50%*	*25%*
W ≥ L_{10} ≤ 3L_{10}	*20%*	*10%*	*0%*
W > 3L_{10}	*10%*	*0%*	*0%*

Event AEP	Bdes% Floating
AEP > 5% (frequent)	*10%*
AEP 5% - AEP 0.5%	*20%*
AEP < 0.5%	*20%*

Note: W=3.07m ≥ L_{10} ≤ 3L_{10}

LIKELIHOOD OF SEDIMENT BEING DEPOSITED IN WATERWAY (HML)

Peak Velocity through Structure (m/s)	Particle Type				
	Clay/Silt	Sand	Gravel	Cobbles	Boulders
>= 3	*L*	*L*	*L*	*L*	*M*
1.0 to 3	*L*	*L*	*L*	*M*	*M*
0.5 to 1	*L*	*L*	*L*	*M*	*H*

0.1 to 0.5	*L*	*L*	*M*	*H*	*H*
< 0.1	*L*	*M*	*H*	*H*	*H*

Note: V>3.5m/s

MOST LIKELY DEPOSITIONAL BLOCKAGE LEVELS – B_{DES}%

Likelihood that deposition will occur	AEP Adjusted Debris Potential		
	High	Medium	Low
High	*100%*	*60%*	*25%*
Medium	*60%*	*40%*	*15%*
Low	*25%*	*15%*	*0%*

Event AEP	Bdes% Non-Floating
AEP > 5% (frequent)	*0%*
AEP 5% - AEP 0.5%	*15%*
AEP < 0.5%	*25%*

ESTIMATED BLOCKAGE LEVELS – B_{DES}%

Event AEP	Bdes% Floating	Bdes% Non-Floating	Bdes% Final
AEP > 5% (frequent)	*10%*	*0%*	*10%*
AEP 5% - AEP 0.5%	*20%*	*15%*	*20%*
AEP < 0.5%	*20%*	*25%*	*25%*

APPENDIX I – FLOOD DAMAGES CALCULATION

Residential Flood Damage Calculations

AEP	0.001%	1.0%	2.0%	5%	10%	20%	50%

Project Name	North Sydney FRMSP
Job Number	180040
Case Description	Flood Damages
Freeboard necessary to give desired protection	0 m

Floods Assessed
ARI Yrs
100000 PMF
100
50
20
10
5

Assume Damage is zero at what AEP: 2 year

Residential Type		
	1	Single Storey High Set
	2	Slab on Ground
	3	Two Storey
	4	Vacant

ID or Survey No.	Street Name	Street Address	CADID	Plan Label	Suburb	Raisable Yes/No	Floor Level m AHD	"Protection Level" (Floor Level less Freeboard) m AHD	Ground Level m AHD	Type of Res 1-4	Flood Level at Property, m AHD for each AEP flood: PMF	1.00%	2.00%	5.00%	10.00%	20.00%
NS_24	Euroka St	55	104390867	DP867961	Waverton	No	36.62	36.62	36.62	2	36.79	36.69	36.68	36.68	36.67	0.00
NS_116	Sutherland St	51	102209572	DP33208	Cremorne	No	63.21	63.21	63.16	2	63.62	63.13	63.13	63.13	63.13	63.12
NS_93	Waters Rd	48	103685204	DP851844	Cremorne	No	74.99	74.99	74.54	2	75.03	74.85	74.82	74.82	74.81	74.77
NS_47	Reynolds St	38	102204574	DP901082	Cremorne	No	67.61	67.61	67.41	2	68.06	67.73	67.68	67.69	67.64	67.61
NS_70	Levick St	4	102204924	DP102964	Cremorne	No	59.34	59.34	59.24	2	59.29	59.07	58.57	58.57	58.56	58.51
NS_1	Bay Road	53-55	102158592	SP17489	Waverton	No	46.32	46.32	46.17	2	47.44	46.65	46.58	46.57	46.51	46.43
NS_139	Young St	95	102204351	DP626950	Cremorne	No	48.07	48.07	47.07	1	47.41	47.01	47.00	47.00	46.95	46.93
NS_873	Rowlison Parade	16	102154104	DP533204	Cammeray	No	23.44	23.44	23.34	2	24.43	23.93	23.90	23.90	23.89	23.88
NS_208	Lambert St	1	153664929	SP75612	Cammeray	No	50.29	50.29	50.19	2	50.28	50.24	50.23	50.23	50.23	50.19
NS_162	Rocklands Ave	16	154465666	SP77387	Wollstonecraf	No	56.40	56.40	53.40	1	53.86	53.45	53.44	53.43	53.44	53.44
NS_117	Young St	37	104374645	DP1029838	Cremorne	No	67.22	67.22	66.72	2	68.95	67.15	66.99	66.97	66.84	66.67
NS_25	Euroka St	35	102158808	DP703972	Waverton	No	31.88	31.88	31.73	2	32.38	32.08	32.03	32.03	31.99	31.90
NS_185	Hipwood St	14	102163162	DP104249	Kirribilli	No	5.40	5.40	5.30	2	5.68	5.38	5.37	5.36	5.35	5.34
NS_94	Sutherland St	83	103685205	DP851844	Cremorne	No	73.02	73.02	72.92	2	73.07	72.99	72.95	72.95	72.94	72.92
NS_71	Levick St	6	102204923	DP102964	Cremorne	No	57.90	57.90	57.75	2	57.89	57.65	57.64	57.64	57.49	57.49
NS_48	Reynolds St	36	100106616	DP955396	Cremorne	No	66.94	66.94	66.84	2	67.17	66.95	66.95	66.95	66.94	66.93
NS_2	Bay Rd	49-51	102158594	SP30685	Waverton	No	47.36	47.36	47.21	2	47.28	47.22	47.22	47.22	47.21	0.00
NS_140	Young St	97	102204352	DP310742	Cremorne	No	47.36	47.36	46.36	1	46.55	46.44	46.41	46.41	46.39	46.38
NS_209	Lambert St	5	160329081	SP14089	Cammeray	No	46.07	46.07	44.07	1	44.11	43.98	43.98	43.98	43.98	0.00
NS_118	Sutherland St	60	102209684	DP736777	Cremorne	No	62.46	62.46	62.36	2	63.23	62.81	62.76	62.76	62.53	0.00
NS_26	Euroka St	33	102158807	DP900046	Waverton	No	32.71	32.71	31.71	1	32.03	31.77	31.72	31.71	31.66	31.62
NS_95	Sutherland St	81	102209757	DP76942	Cremorne	No	72.79	72.79	72.29	2	72.64	72.49	72.46	72.47	72.45	72.42
NS_874	Phillips St	5	102160734	DP901078	Neutral Bay	No	40.89	40.89	40.69	2	41.58	0.00	0.00	0.00	0.00	0.00
NS_163	Rocklands Rd	18 (21)	102158635	SP20239	Wollstonecraf	No	57.81	57.81	56.01	1	56.02	55.32	55.31	55.31	0.00	0.00
NS_72	Levick St	8	102204922	DP102964	Cremorne	No	56.44	56.44	56.24	2	56.66	56.56	56.54	56.54	56.53	56.53
NS_49	Illiliwa St	25	102204575	DP937086	Cremorne	No	62.94	62.94	62.74	2	63.58	63.41	63.40	63.37	63.36	63.36
NS_3	Bay Rd	47	102158704	SP51044	Waverton	No	51.51	51.51	51.01	2	51.06	50.84	50.81	50.81	0.00	0.00
NS_119	Young St	56	102209574	SP62250	Cremorne	No	65.79	65.79	65.69	2	66.01	65.87	65.84	65.84	65.83	65.81
NS_27	Euroka St	31	102158806	DP900046	Waverton	No	32.97	32.97	31.97	1	31.96	31.65	31.62	31.61	31.58	0.00
NS_141	Young St	99	102204353	DP310742	Cremorne	No	46.91	46.91	45.11	1	45.55	45.35	45.33	45.33	45.32	45.29
NS_186	Hipwood St	16	102163163	DP104249	Kirribilli	No	5.85	5.85	5.65	2	6.12	5.95	5.93	5.92	5.91	5.89
NS_277	Ben Boyd Rd	39	102160703	DP33304	Neutral Bay	No	37.14	37.14	37.04	2	37.22	37.05	37.04	0.00	0.00	0.00
NS_323	Eaton St	22	102160242	SP56658	Neutral Bay	No	17.32	17.32	17.32	2	17.88	17.53	17.52	17.51	17.51	17.48
NS_254	Undercliff St	16	102160736	DP107472	Neutral Bay	No	40.69	40.69	40.59	2	40.84	40.69	40.69	40.68	40.68	40.66
NS_300	Hayes St	10	102160827	SP15111	Neutral Bay	No	16.73	16.73	16.63	2	17.29	16.86	16.83	16.82	16.80	16.80
NS_367	Powell St	1	102210834	SP17917	Neutral Bay	No	43.53	43.53	43.43	2	43.74	43.60	43.59	43.59	43.58	43.57
NS_231	Undercliff St	60	102160754	DP21192	Neutral Bay	No	48.86	48.86	48.81	2	49.53	49.51	49.51	49.51	49.51	49.50
NS_36	Woolcott St	34	102158578	SP10632	Waverton	No	27.01	27.01	24.01	1	0.00	0.00	0.00	0.00	0.00	0.00
NS_389	Fernhurst Ave	8	102204792	DP18381	Cremorne	No	56.84	56.84	56.54	2	57.49	57.33	57.30	57.30	57.29	57.25
NS_210	Lambert St	3	159213551	DP1118265	Cammeray	No	48.76	48.76	46.76	1	46.75	46.73	46.73	46.73	46.73	0.00
NS_28	Euroka St	29	102158805	DP900015	Waverton	No	31.81	31.81	30.81	1	31.76	30.59	30.59	30.59	30.57	30.54
NS_120	Young St	53	102209589	DP37334	Cremorne	No	62.59	62.59	62.49	2	62.97	62.67	62.63	62.62	62.58	0.00
NS_875	Macpherson Stree	96A	102204836	DP787551	Cremorne	No	53.51	53.51	53.51	2	53.48	53.39	53.39	53.39	53.38	53.37
NS_164	Rocklands Rd	20	102158636	SP2527	Wollstonecraf	No	67.00	67.00	61.00	1	0.00	0.00	0.00	0.00	0.00	0.00
NS_433	Rangers Rd	57	102209872	DP731455	Cremorne	No	70.99	70.99	70.99	2	71.23	0.00	0.00	0.00	0.00	0.00
NS_477	Walker St	179	104735735	SP64615	North Sydney	No	54.44	54.44	54.14	2	54.99	54.37	54.35	54.33	54.30	54.26
NS_96	Gerard St	9	102209820	DP81061	Cremorne	No	77.14	77.14	77.14	2	77.39	77.24	77.22	77.22	77.21	77.19
NS_499	Miller St	284	102157717	DP312439	North Sydney	No	82.25	82.25	82.15	2	82.38	82.05	82.00	82.00	0.00	0.00
NS_73	Levick St	10	102204921	DP10545	Cremorne	No	54.61	54.61	54.46	2	55.76	55.59	55.58	55.58	55.57	55.55
NS_29	Euroka St	27	102158804	DP900015	Waverton	No	31.54	31.54	30.54	1	31.82	30.26	30.23	30.24	30.21	30.16
NS_121	Young St	55	102209590	DP37334	Cremorne	No	62.19	62.19	62.04	2	62.28	62.07	62.05	62.05	62.02	0.00
NS_4	Carr St	49A	102158703	DP346199	Waverton	No	51.29	51.29	51.19	2	51.21	51.06	51.05	51.05	51.04	51.03
NS_13	Ancrum St	47	102158986	DP701962	Waverton	No	39.91	39.91	38.91	1	39.54	39.21	39.15	39.14	39.07	38.99
NS_411	Grasmere Lane	2	102156038	DP78839	Cremorne	No	62.43	62.43	62.03	2	62.60	62.26	62.21	62.21	62.18	62.15
NS_521	Boronia St	5	102156610	SP21701	Wollstonecraf	No	49.54	49.54	49.44	2	47.80	0.00	0.00	0.00	0.00	0.00
NS_50	Illiliwa St	23	102204509	DP937676	Cremorne	No	62.34	62.34	62.14	2	62.24	62.03	61.98	61.99	61.98	0.00
NS_142	Young St	101	102204354	DP310742	Cremorne	No	46.22	46.22	45.22	1	45.18	0.00	0.00	0.00	0.00	0.00
NS_187	Hipwood St	18	102163164	DP104249	Kirribilli	No	6.66	6.66	6.56	2	6.39	0.00	0.00	0.00	0.00	0.00
NS_609	Alexander St	167	102154775	DP502236	Crows Nest	No	76.60	76.60	76.50	2	76.69	76.48	76.36	76.36	76.34	76.31
NS_741	Falcon St	140	102157689	SP15802	Crows Nest	No	79.91	79.91	79.76	2	80.72	79.75	79.74	79.74	79.74	79.70
NS_324	Eaton St	26-28	102160248	SP12271	Neutral Bay	No	16.41	16.41	14.41	1	15.16	14.70	14.69	14.67	14.64	14.59
NS_543	Nicholson St	10	102154230	DP385256	Wollstonecraf	No	80.01	80.01	79.91	2	80.51	80.14	80.10	80.11	80.08	80.07
NS_278	Ben Boyd Rd	37	102160704	DP33304	Neutral Bay	No	37.18	37.18	37.08	2	37.04	37.01	0.00	0.00	0.00	0.00
NS_37	Woolcott St	38	102158579	SP52220	Waverton	No	23.11	23.11	22.51	1	22.44	22.40	22.40	22.40	22.40	22.40
NS_30	Euroka St	25	102158803	DP439776	Waverton	No	31.12	31.12	30.62	2	31.85	30.25	30.20	30.18	30.08	29.97
NS_565	High St	55	102164306	DP540282	North Sydney	No	22.17	22.17	20.17	1	20.69	20.59	20.51	0.00	0.00	0.00
NS_122	Young St	57	102209591	DP37334	Cremorne	No	61.91	61.91	61.61	2	61.89	61.61	61.59	61.59	61.58	0.00
NS_255	Undercliff St	14	102160737	DP107472	Neutral Bay	No	40.62	40.62	40.52	2	40.67	40.56	40.56	40.56	40.56	0.00
NS_301	Hayes St	8	102160830	DP192932	Neutral Bay	No	15.69	15.69	15.69	2	16.65	16.04	16.00	15.93	15.85	15.84
NS_631	Brook St	4	103706619	DP853637	Crows Nest	No	73.45	73.45	73.15	2	73.14	0.00	0.00	0.00	0.00	0.00
NS_368	Burroway St	69	102210828	SP2918	Neutral Bay	No	45.19	45.19	43.19	1	44.59	43.81	43.77	43.74	43.71	43.68
NS_675	Lytton St	26	102157863	DP4588	Cammeray	No	69.66	69.66	69.61	2	71.34	69.76	69.67	69.64	0.00	0.00
NS_587	Bank St	74-76	102158991	DP726402	North Sydney	No	44.32	44.32	46.32	2	46.70	46.45	46.43	46.43	46.41	46.40
NS_211	Fall St	8	102156075	SP13978	Cammeray	No	44.06	44.06	43.86	2	45.10	44.49	44.42	44.40	44.27	44.04
NS_390	Fernhurst Ave	10	102204793	DP18381	Cremorne	No	58.07	58.07	57.77	2	58.72	58.30	58.26	58.26	58.24	58.20
NS_232	Ben Boyd Rd	77	102160752	DP80322	Neutral Bay	No	49.21	49.21	48.51	1	48.45	0.00	0.00	0.00	0.00	0.00
NS_165	Rocklands Rd	22	102158639	SP2545	Wollstonecraf	No	62.85	62.85	59.85	1	0.00	0.00	0.00	0.00	0.00	0.00
NS_876	Macpherson St	96B	102204835	DP802514	Cremorne	No	55.72	55.72	55.72	2	55.90	55.84	55.83	55.84	55.83	55.83
NS_653	Atchison St	54-60	104128144	SP60857	Crows Nest	No	81.94	81.94	80.74	1	81.80	81.16	81.01	81.02	80.82	0.00
NS_742	Rodborough Ave	2	102157693	SP18220	Crows Nest	No	78.99	78.99	77.79	1	79.16	77.99	77.97	77.97	77.95	77.91
NS_434	Rangers Rd	45	102210329	DP77614	Cremorne	No	64.66	64.66	64.46	2	64.86	64.61	64.59	64.58	64.55	64.53
NS_97	Gerard St	11	102209822	DP83047	Cremorne	No	77.12	77.12	77.12	2	77.62	77.41	77.38	77.38	77.35	77.31
NS_478	Hampden St	11	102159742	DP119732	North Sydney	No	53.41	53.41	52.91	2	53.60	52.78	52.78	52.78	52.77	52.77
NS_123	Young St	59	102209592	DP736777	Cremorne	No	61.10	61.10	60.95	2	61.33	61.03	60.99	60.99	60.98	0.00
NS_31	Carr St	1	161182796	DP1129652	Waverton	No	31.44	31.44	30.44	1	31.88	30.32	30.23	30.22	30.15	30.05
NS_719	Amherst St	102	102155858	DP6687	Cammeray	No	59.39	59.39	58.64	1	58.50	58.68	0.00	0.00	0.00	0.00
NS_51	Illiwa St	34	102204507	DP952188	Cremorne	No	59.35	59.35	59.25	2	60.14	59.81	59.78	59.79	59.77	59.76
NS_74	Levick St	12	102204920	DP10545	Cremorne	No	55.72	55.72	55.57	2	55.79	55.69	55.68	55.68	55.67	55.66
NS_5	Carr St	49?	102158705	DP346199	Waverton	No	52.73	52.73	52.53	2	52.87	52.64	52.61	52.60	52.59	52.56
NS_500	Miller St	288-290	102157718	DP1860	North Sydney	No	81.81	81.81	81.61	2	82.35	81.73	81.66	81.66	81.64	81.59
NS_697	Anzac Ave	2	150224491	DP1080152	Cammeray	No	71.00	71.00	70.90	2	71.34	71.00	70.97	70.97	70.96	70.93
NS_143	Young St	103	102204363	DP175819	Cremorne	No	45.54	45.54	44.54	1	44.56	44.17	44.17	44.17	44.17	0.00
NS_763	Webb St	5	105441888	0	McMahons Poi	No	40.82	40.82	40.72	2	40.83	40.65	40.65	40.65	40.62	40.59
NS_412	Grasmere Lane	4	102156039	DP572102	Cremorne	No	62.59	62.59	62.49	2	63.40	62.85	62.78	62.77	62.74	62.69
NS_188	Hipwood St	2	102163145	DP11950	Kirribilli	No	5.39	5.39	4.99	2	5.04	4.94	4.94	4.94	4.94	4.94
NS_522	Russel St	7	104391667	DP1031556	Wollstonecraf	No	44.62	44.62	42.62	1	42.05	0.00	0.00	0.00	0.00	0.00
NS_14	Ancrum St	43	102158983	DP231036	Waverton	No	38.94	38.94	37.94	1	38.68	38.06	37.99	37.98	37.91	37.84
NS_610	Chandos St	165	102154927	DP919751	Crows Nest	No	76.30	76.30	76.20	2	76.92	76.34	76.24	76.24	76.20	0.00
NS_785	Middlemiss St	3	103748651	SP52428	Lavender Bay	No	36.29	36.29	34.29	1	33.42	0.00	0.00	0.00	0.00	0.00
NS_38	Balls Head Road	3	160697492	SP80500	Waverton	No	12.99	12.99	12.59	2	13.96	13.09	12.66	12.67	0.00	0.00
NS_544	Nicholson St	8	102154231	DP385256	Wollstonecraf	No	79.98	79.98	79.88	2	80.71	80.34	80.29	80.30	80.27	80.26
NS_124	Cooper Ln	93	102209686	DP736777	Cremorne	No	60.46	60.46	59.96	2	60.47	59.97	59.93	59.93	59.91	59.88
NS_32	Bay Rd	116	173824419	SP89009	Waverton	No	36.02	36.02	35.92	2	35.95	35.88	35.87	35.87	35.87	35.87
NS_325	Eaton St	30	102160366	SP10392	Neutral Bay	No	14.27	14.27	12.27	1	14.64	13.63	13.58	13.53	13.46	13.33
NS_743	Rodborough Ave	2	102157693	SP18220	Crows Nest	No	80.00	80.00	78.00	1	79.16	78.14	78.08	78.08	78.05	78.00
NS_279	Ben Boyd Rd	35	102160705	DP403757	Neutral Bay	No	36.39	36.39	36.29	2	36.39	36.26	36.19	0.00	0.00	0.00
NS_302	Hayes St	6	102160831	DP192932	Neutral Bay	No	15.20	15.20	15.00	2	15.19	15.16	15.15	15.14	15.12	15.07
NS_676	Lytton St	24	102157862	DP4588	Cammeray	No	69.95	69.95	69.85	2	71.34	69.93	0.00	0.00	0.00	0.00
NS_632	Brook St	6	102154941	DP408885	Crows Nest	No	72.94	72.94	72.74	2	72.76	0.00	0.00	0.00	0.00	0.00
NS_369	Burroway St	67	102210831	DP338047	Neutral Bay	No	44.10	44.10	43.80	2	43.86	43.80	43.79	43.78	43.77	43.77
NS_212	Fall St	6	102156078	SP30702	Cammeray	No	42.85	42.85	42.85	2	44.16	43.52	43.44	43.43	43.33	43.18

ID or Survey No.	Depth of Inundation above Floor Level (m) for each AEP flood: PMF	1.00%	2.00%	5.00%	10.00%	20.00%	Depth of Inundation Above "Protection Level" (m) for each AEP flood: PMF	1.00%	2.00%	5.00%	10.00%	20.00%
NS_24	0.17	0.08	0.06	0.06	0.05	0.00	0.17	0.08	0.06	0.06	0.05	0.00
NS_116	0.41	-0.08	-0.08	-0.08	-0.08	-0.09	0.41	-0.08	-0.08	-0.08	-0.08	-0.09
NS_93	0.04	-0.14	-0.17	-0.17	-0.18	-0.22	0.04	-0.14	-0.17	-0.17	-0.18	-0.22
NS_47	0.46	0.12	0.07	0.08	0.03	0.01	0.46	0.12	0.07	0.08	0.03	0.01
NS_70	-0.05	-0.27	-0.78	-0.78	-0.78	-0.83	-0.05	-0.27	-0.78	-0.78	-0.78	-0.83
NS_1	1.12	0.33	0.26	0.24	0.19	0.10	1.12	0.33	0.26	0.24	0.19	0.10
NS_139	-0.65	-1.05	-1.07	-1.07	-1.12	-1.13	-0.65	-1.05	-1.07	-1.07	-1.12	-1.13
NS_873	0.99	0.49	0.46	0.46	0.45	0.44	0.99	0.49	0.46	0.46	0.45	0.44
NS_208	-0.01	-0.05	-0.06	-0.06	-0.06	-0.10	-0.01	-0.05	-0.06	-0.06	-0.06	-0.10
NS_162	-2.54	-2.95	-2.96	-2.96	-2.95	-2.96	-2.54	-2.95	-2.96	-2.96	-2.95	-2.96
NS_117	1.73	-0.07	-0.23	-0.25	-0.38	-0.55	1.73	-0.07	-0.23	-0.25	-0.38	-0.55
NS_25	0.50	0.20	0.16	0.15	0.11	0.02	0.50	0.20	0.16	0.15	0.11	0.02
NS_185	0.29	-0.02	-0.03	-0.04	-0.05	-0.05	0.29	-0.02	-0.03	-0.04	-0.05	-0.05
NS_94	0.05	-0.02	-0.06	-0.06	-0.07	-0.10	0.05	-0.02	-0.06	-0.06	-0.07	-0.10
NS_71	-0.01	-0.25	-0.26	-0.26	-0.41	-0.41	-0.01	-0.25	-0.26	-0.26	-0.41	-0.41
NS_48	0.23	0.01	0.00	0.01	0.00	-0.01	0.23	0.01	0.00	0.01	0.00	-0.01
NS_2	-0.07	-0.13	-0.14	-0.14	-0.14	0.00	-0.07	-0.13	-0.14	-0.14	-0.14	0.00
NS_140	-0.81	-0.92	-0.95	-0.95	-0.97	-0.98	-0.81	-0.92	-0.95	-0.95	-0.97	-0.98
NS_209	-1.96	-2.09	-2.09	-2.09	-2.09	0.00	-1.96	-2.09	-2.09	-2.09	-2.09	0.00
NS_118	0.77	0.35	0.30	0.30	0.07	0.00	0.77	0.35	0.30	0.30	0.07	0.00
NS_26	-0.69	-0.95	-1.00	-1.00	-1.06	-1.10	-0.69	-0.95	-1.00	-1.00	-1.06	-1.10
NS_95	-0.15	-0.30	-0.33	-0.33	-0.34	-0.37	-0.15	-0.30	-0.33	-0.33	-0.34	-0.37
NS_874	0.70	0.00	0.00	0.00	0.00	0.00	0.70	0.00	0.00	0.00	0.00	0.00
NS_163	-1.80	-2.49	-2.50	-2.50	0.00	0.00	-1.80	-2.49	-2.50	-2.50	0.00	0.00
NS_72	0.22	0.12	0.10	0.10	0.10	0.09	0.22	0.12	0.10	0.10	0.10	0.09
NS_49	0.64	0.47	0.46	0.43	0.42	0.42	0.64	0.47	0.46	0.43	0.42	0.42
NS_3	-0.45	-0.67	-0.69	-0.70	0.00	0.00	-0.45	-0.67	-0.69	-0.70	0.00	0.00
NS_119	0.22	0.08	0.05	0.05	0.03	0.01	0.22	0.08	0.05	0.05	0.03	0.01
NS_27	-1.01	-1.32	-1.35	-1.36	-1.39	0.00	-1.01	-1.32	-1.35	-1.36	-1.39	0.00
NS_141	-1.36	-1.55	-1.58	-1.58	-1.59	-1.61	-1.36	-1.55	-1.58	-1.58	-1.59	-1.61
NS_186	0.27	0.10	0.08	0.07	0.06	0.04	0.27	0.10	0.08	0.07	0.06	0.04
NS_277	0.08	-0.10	-0.10	0.00	0.00	0.00	0.08	-0.10	-0.10	0.00	0.00	0.00
NS_323	0.56	0.22	0.21	0.19	0.19	0.16	0.56	0.22	0.21	0.19	0.19	0.16
NS_254	0.14	0.00	-0.01	-0.01	-0.02	-0.03	0.14	0.00	-0.01	-0.01	-0.02	-0.03
NS_300	0.56	0.13	0.09	0.08	0.07	0.07	0.56	0.13	0.09	0.08	0.07	0.07
NS_367	0.20	0.07	0.06	0.05	0.05	0.04	0.20	0.07	0.06	0.05	0.05	0.04
NS_231	0.66	0.65	0.65	0.65	0.64	0.64	0.66	0.65	0.65	0.65	0.64	0.64
NS_36	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NS_389	0.64	0.49	0.46	0.46	0.45	0.40	0.64	0.49	0.46	0.46	0.45	0.40
NS_210	-2.01	-2.03	-2.03	-2.03	-2.03	0.00	-2.01	-2.03	-2.03	-2.03	-2.03	0.00
NS_28	-0.05	-1.22	-1.22	-1.22	-1.24	-1.27	-0.05	-1.22	-1.22	-1.22	-1.24	-1.27
NS_120	0.37	0.07	0.03	0.03	-0.01	0.00	0.37	0.07	0.03	0.03	-0.01	0.00
NS_875	-0.02	-0.11	-0.12	-0.12	-0.12	-0.13	-0.02	-0.11	-0.12	-0.12	-0.12	-0.13
NS_164	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NS_433	0.24	0.00	0.00	0.00	0.00	0.00	0.24	0.00	0.00	0.00	0.00	0.00
NS_477	0.55	-0.07	-0.09	-0.11	-0.14	-0.18	0.55	-0.07	-0.09	-0.11	-0.14	-0.18
NS_96	0.25	0.10	0.08	0.08	0.07	0.05	0.25	0.10	0.08	0.08	0.07	0.05
NS_499	0.13	-0.19	-0.25	-0.25	0.00	0.00	0.13	-0.19	-0.25	-0.25	0.00	0.00
NS_73	1.15	0.98	0.97	0.97	0.96	0.94	1.15	0.98	0.97	0.97	0.96	0.94
NS_29	0.28	-1.28	-1.31	-1.30	-1.33	-1.39	0.28	-1.28	-1.31	-1.30	-1.33	-1.39
NS_121	0.08	-0.12	-0.14	-0.15	-0.17	0.00	0.08	-0.12	-0.14	-0.15	-0.17	0.00
NS_4	-0.08	-0.23	-0.23	-0.24	-0.25	-0.26	-0.08	-0.23	-0.23	-0.24	-0.25	-0.26
NS_13	-0.37	-0.71	-0.77	-0.77	-0.85	-0.92	-0.37	-0.71	-0.77	-0.77	-0.85	-0.92
NS_411	0.17	-0.17	-0.22	-0.22	-0.25	-0.28	0.17	-0.17	-0.22	-0.22	-0.25	-0.28
NS_521	-1.74	0.00	0.00	0.00	0.00	0.00	-1.74	0.00	0.00	0.00	0.00	0.00
NS_50	-0.11	-0.31	-0.36	-0.35	-0.37	0.00	-0.11	-0.31	-0.36	-0.35	-0.37	0.00
NS_142	-1.04	0.00	0.00	0.00	0.00	0.00	-1.04	0.00	0.00	0.00	0.00	0.00
NS_187	-0.27	0.00	0.00	0.00	0.00	0.00	-0.27	0.00	0.00	0.00	0.00	0.00
NS_609	0.08	-0.12	-0.25	-0.25	-0.26	-0.29	0.08	-0.12	-0.25	-0.25	-0.26	-0.29
NS_741	0.82	-0.16	-0.16	-0.16	-0.16	-0.21	0.82	-0.16	-0.16	-0.16	-0.16	-0.21
NS_324	-1.24	-1.70	-1.72	-1.74	-1.77	-1.82	-1.24	-1.70	-1.72	-1.74	-1.77	-1.82
NS_543	0.50	0.13	0.10	0.10	0.07	0.06	0.50	0.13	0.10	0.10	0.07	0.06
NS_278	-0.14	-0.17	0.00	0.00	0.00	0.00	-0.14	-0.17	0.00	0.00	0.00	0.00
NS_37	-0.67	-0.71	-0.72	-0.72	-0.72	-0.72	-0.67	-0.71	-0.72	-0.72	-0.72	-0.72
NS_30	0.73	-0.87	-0.92	-0.94	-1.03	-1.15	0.73	-0.87	-0.92	-0.94	-1.03	-1.15
NS_565	-1.48	-1.57	-1.65	0.00	0.00	0.00	-1.48	-1.57	-1.65	0.00	0.00	0.00
NS_122	-0.02	-0.30	-0.32	-0.32	-0.32	0.00	-0.02	-0.30	-0.32	-0.32	-0.32	0.00
NS_255	0.05	-0.06	-0.06	-0.06	-0.06	0.00	0.05	-0.06	-0.06	-0.06	-0.06	0.00
NS_301	0.96	0.35	0.30	0.23	0.16	0.14	0.96	0.35	0.30	0.23	0.16	0.14
NS_631	-0.32	0.00	0.00	0.00	0.00	0.00	-0.32	0.00	0.00	0.00	0.00	0.00
NS_368	-0.61	-1.38	-1.42	-1.45	-1.49	-1.52	-0.61	-1.38	-1.42	-1.45	-1.49	-1.52
NS_675	1.68	0.10	0.01	-0.03	0.00	0.00	1.68	0.10	0.01	-0.03	0.00	0.00
NS_587	2.38	2.13	2.11	2.11	2.09	2.08	2.38	2.13	2.11	2.11	2.09	2.08
NS_211	1.04	0.43	0.36	0.34	0.21	-0.02	1.04	0.43	0.36	0.34	0.21	-0.02
NS_390	0.64	0.23	0.19	0.19	0.17	0.13	0.64	0.23	0.19	0.19	0.17	0.13
NS_232	-0.76	0.00	0.00	0.00	0.00	0.00	-0.76	0.00	0.00	0.00	0.00	0.00
NS_165	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NS_876	0.18	0.13	0.12	0.12	0.12	0.11	0.18	0.13	0.12	0.12	0.12	0.11
NS_653	-0.14	-0.78	-0.93	-0.92	-1.12	0.00	-0.14	-0.78	-0.93	-0.92	-1.12	0.00
NS_742	0.17	-1.00	-1.02	-1.02	-1.04	-1.08	0.17	-1.00	-1.02	-1.02	-1.04	-1.08
NS_434	0.20	-0.04	-0.06	-0.08	-0.10	-0.12	0.20	-0.04	-0.06	-0.08	-0.10	-0.12
NS_97	0.50	0.30	0.26	0.26	0.24	0.19	0.50	0.30	0.26	0.26	0.24	0.19
NS_478	0.19	-0.63	-0.63	-0.64	-0.64	-0.64	0.19	-0.63	-0.63	-0.64	-0.64	-0.64
NS_123	0.23	-0.06	-0.10	-0.11	-0.12	0.00	0.23	-0.06	-0.10	-0.11	-0.12	0.00
NS_31	0.45	-1.12	-1.21	-1.21	-1.29	-1.39	0.45	-1.12	-1.21	-1.21	-1.29	-1.39
NS_719	-0.89	-0.71	0.00	0.00	0.00	0.00	-0.89	-0.71	0.00	0.00	0.00	0.00
NS_51	0.79	0.46	0.43	0.43	0.42	0.40	0.79	0.46	0.43	0.43	0.42	0.40
NS_74	0.07	-0.04	-0.04	-0.04	-0.05	-0.06	0.07	-0.04	-0.04	-0.04	-0.05	-0.06
NS_5	0.14	-0.09	-0.12	-0.13	-0.14	-0.17	0.14	-0.09	-0.12	-0.13	-0.14	-0.17
NS_500	0.54	-0.08	-0.15	-0.15	-0.17	-0.22	0.54	-0.08	-0.15	-0.15	-0.17	-0.22
NS_697	0.35	0.01	-0.03	-0.02	-0.04	-0.07	0.35	0.01	-0.03	-0.02	-0.04	-0.07
NS_143	-0.98	-1.37	-1.37	-1.37	-1.37	0.00	-0.98	-1.37	-1.37	-1.37	-1.37	0.00
NS_763	0.01	-0.17	-0.17	-0.17	-0.20	-0.23	0.01	-0.17	-0.17	-0.17	-0.20	-0.23
NS_412	0.81	0.27	0.20	0.19	0.16	0.11	0.81	0.27	0.20	0.19	0.16	0.11
NS_188	-0.35	-0.45	-0.46	-0.46	-0.46	-0.46	-0.35	-0.45	-0.46	-0.46	-0.46	-0.46
NS_522	-2.57	0.00	0.00	0.00	0.00	0.00	-2.57	0.00	0.00	0.00	0.00	0.00
NS_14	-0.26	-0.88	-0.95	-0.96	-1.03	-1.10	-0.26	-0.88	-0.95	-0.96	-1.03	-1.10
NS_610	0.63	0.04	-0.06	-0.06	-0.10	0.00	0.63	0.04	-0.06	-0.06	-0.10	0.00
NS_785	-2.88	0.00	0.00	0.00	0.00	0.00	-2.88	0.00	0.00	0.00	0.00	0.00
NS_38	0.97	0.10	-0.33	-0.32	0.00	0.00	0.97	0.10	-0.33	-0.32	0.00	0.00
NS_544	0.73	0.36	0.32	0.32	0.29	0.28	0.73	0.36	0.32	0.32	0.29	0.28
NS_124	0.01	-0.49	-0.53	-0.53	-0.55	-0.58	0.01	-0.49	-0.53	-0.53	-0.55	-0.58
NS_32	-0.08	-0.15	-0.15	-0.15	-0.15	-0.15	-0.08	-0.15	-0.15	-0.15	-0.15	-0.15
NS_325	0.37	-0.64	-0.69	-0.75	-0.81	-0.94	0.37	-0.64	-0.69	-0.75	-0.81	-0.94
NS_743	-0.84	-1.86	-1.92	-1.92	-1.95	-2.00	-0.84	-1.86	-1.92	-1.92	-1.95	-2.00
NS_279	0.00	-0.13	-0.21	0.00	0.00	0.00	0.00	-0.13	-0.21	0.00	0.00	0.00
NS_302	0.00	-0.04	-0.04	-0.06	-0.08	-0.13	0.00	-0.04	-0.04	-0.06	-0.08	-0.13
NS_676	1.39	-0.02	0.00	0.00	0.00	0.00	1.39	-0.02	0.00	0.00	0.00	0.00
NS_632	-0.19	0.00	0.00	0.00	0.00	0.00	-0.19	0.00	0.00	0.00	0.00	0.00
NS_369	-0.24	-0.30	-0.31	-0.33	-0.33	-0.33	-0.24	-0.30	-0.31	-0.33	-0.33	-0.33
NS_212	1.31	0.67	0.60	0.58	0.48	0.33	1.31	0.67	0.60	0.58	0.48	0.33

Flood Damages

ID or Survey No.	PMF: Damages, total for event, per property affected	PMF: Properties Affected above floor level, damaged	AEP 1.00%: Damages, total for event, per property affected	AEP 1.00%: Properties Affected above floor level, damaged	AEP 2.0%: Damages, total for event, per property affected	AEP 2.0%: Properties Affected above floor level, damaged	AEP 5.0%: Damages, total for event, per property affected	AEP 5.0%: Properties Affected above floor level, damaged	AEP 10.0%: Damages, total for event, per property affected	AEP 10.0%: Properties Affected above floor level, damaged	AEP 20.0%: Damages, total for event, per property affected	AEP 20.0%: Properties Affected above floor level, damaged	AEP: Damages, total for event, per property affected	AEP: Properties Affected above floor level, damaged	AEP: Damages, total for event, per property affected	AEP: Properties Affected above floor level, damaged	AAD, total and per property
	$ 71,529,460	491	$ 41,507,489	299	$ 38,271,467	272	$ 37,301,451	266	$ 34,249,086	247	$ 29,597,377	216	$ -	0	$ -	0	$ 11,517,801
Average per property	$ 102,039	701	$ 68,721	604	$ 66,099	579	$ 65,556	569	$ 62,727	546	$ 59,077	501	$ -	0	$ -	0	$ 16,431
NS_24	$ 105,820	1	$ 101,197	1	$ 101,197	1	$ 101,197	1	$ 101,197	1	$ -		$ -		$ -		$ 15,202
NS_116	$ 115,064	1	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 6,158
NS_93	$ 47,264	1	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 5,819
NS_47	$ 119,686	1	$ 101,197	1	$ 101,197	1	$ 101,197	1	$ 47,264	1	$ 47,264	1	$ -		$ -		$ 20,679
NS_70	$ 16,183	0	$ 16,183	0	$ -		$ -		$ -		$ -		$ -		$ -		$ 243
NS_1	$ 147,420	1	$ 110,442	1	$ 110,442	1	$ 105,820	1	$ 105,820	1	$ 101,197	1	$ -		$ -		$ 36,458
NS_139	$ 43,025	0	$ 35,985	0	$ 35,985	0	$ 35,985	0	$ 35,985	0	$ 35,985	0	$ -		$ -		$ 12,630
NS_873	$ 142,797	1	$ 119,686	1	$ 119,686	1	$ 119,686	1	$ 119,686	1	$ 115,064	1	$ -		$ -		$ 41,080
NS_208	$ 47,264	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 5,819
NS_162	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
NS_117	$ 175,153	1	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ -		$ 3,221
NS_25	$ 119,686	1	$ 105,820	1	$ 105,820	1	$ 105,820	1	$ 101,197	1	$ 47,264	1	$ -		$ -		$ 25,047
NS_185	$ 110,442	1	$ 47,264	0	$ 47,264	0	$ 47,264	0	$ 47,264	0	$ 16,183	0	$ -		$ -		$ 10,641
NS_94	$ 101,197	1	$ 47,264	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 6,399
NS_71	$ 47,264	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 5,819
NS_48	$ 105,820	1	$ 47,264	1	$ 47,264	1	$ 47,264	1	$ 47,264	1	$ 47,264	0	$ -		$ -		$ 16,834
NS_2	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ -		$ 2,427
NS_140	$ 41,265	0	$ 39,505	0	$ 37,745	0	$ 37,745	0	$ 37,745	0	$ 37,745	0	$ -		$ -		$ 13,246
NS_209	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
NS_118	$ 133,553	1	$ 115,064	1	$ 110,442	1	$ 110,442	1	$ 101,197	1	$ -		$ -		$ -		$ 16,033
NS_26	$ 43,025	0	$ 39,505	0	$ 37,745	0	$ 37,745	0	$ 35,985	0	$ 35,985	0	$ -		$ -		$ 12,770
NS_95	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 5,664
NS_874	$ 128,931	1	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ 644
NS_163	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
NS_72	$ 105,820	1	$ 101,197	1	$ 101,197	1	$ 101,197	1	$ 101,197	1	$ 101,197	1	$ -		$ -		$ 35,441
NS_49	$ 124,309	1	$ 119,686	1	$ 119,686	1	$ 115,064	1	$ 115,064	1	$ 115,064	1	$ -		$ -		$ 40,456
NS_3	$ 16,183	0	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ 81
NS_119	$ 105,820	1	$ 101,197	1	$ 47,264	1	$ 47,264	1	$ 47,264	1	$ 47,264	1	$ -		$ -		$ 17,373
NS_27	$ 37,745	0	$ 32,466	0	$ 30,706	0	$ 30,706	0	$ 30,706	0	$ -		$ -		$ -		$ 4,658
NS_141	$ 30,706	0	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ 153
NS_186	$ 110,442	1	$ 101,197	1	$ 101,197	1	$ 101,197	1	$ 101,197	1	$ 47,264	1	$ -		$ -		$ 24,678
NS_277	$ 101,197	1	$ 16,183	0	$ 16,183	0	$ -		$ -		$ -		$ -		$ -		$ 991
NS_323	$ 124,309	1	$ 105,820	1	$ 105,820	1	$ 105,820	1	$ 105,820	1	$ 105,820	1	$ -		$ -		$ 37,128
NS_254	$ 101,197	1	$ 47,264	0	$ 47,264	0	$ 47,264	0	$ 47,264	0	$ 47,264	0	$ -		$ -		$ 16,811
NS_300	$ 124,309	1	$ 101,197	1	$ 101,197	1	$ 101,197	1	$ 101,197	1	$ 101,197	1	$ -		$ -		$ 35,534
NS_367	$ 105,820	1	$ 101,197	1	$ 101,197	1	$ 101,197	1	$ 47,264	1	$ 47,264	1	$ -		$ -		$ 20,609
NS_231	$ 128,931	1	$ 124,309	1	$ 124,309	1	$ 124,309	1	$ 124,309	1	$ 124,309	1	$ -		$ -		$ 43,530
NS_36	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
NS_389	$ 124,309	1	$ 119,686	1	$ 119,686	1	$ 119,686	1	$ 115,064	1	$ 115,064	1	$ -		$ -		$ 40,641
NS_210	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
NS_28	$ 53,584	0	$ 34,226	0	$ 34,226	0	$ 34,226	0	$ 34,226	0	$ 32,466	0	$ -		$ -		$ 11,723
NS_120	$ 115,064	1	$ 101,197	1	$ 47,264	1	$ 47,264	1	$ 47,264	0	$ -		$ -		$ -		$ 7,967
NS_875	$ 47,264	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 5,819
NS_164	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
NS_433	$ 105,820	1	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ 529
NS_477	$ 124,309	1	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 6,204
NS_96	$ 110,442	1	$ 101,197	1	$ 101,197	1	$ 101,197	1	$ 101,197	1	$ 47,264	1	$ -		$ -		$ 24,678
NS_499	$ 101,197	1	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ -		$ -		$ 1,638
NS_73	$ 147,420	1	$ 142,797	1	$ 142,797	1	$ 142,797	1	$ 142,797	1	$ 138,175	1	$ -		$ -		$ 49,076
NS_29	$ 120,351	1	$ 32,466	0	$ 32,466	0	$ 32,466	0	$ 32,466	0	$ 30,706	0	$ -		$ -		$ 11,450
NS_121	$ 101,197	1	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ -		$ 2,852
NS_4	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 5,664
NS_13	$ 48,304	0	$ 43,025	0	$ 41,265	0	$ 41,265	0	$ 41,265	0	$ 39,505	0	$ -		$ -		$ 14,143
NS_411	$ 105,820	1	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 6,112
NS_521	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
NS_50	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ -		$ 2,427
NS_142	$ 37,745	0	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ 189
NS_187	$ 16,183	0	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ 81
NS_609	$ 101,197	1	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 6,089
NS_741	$ 133,553	1	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 6,250
NS_324	$ 34,226	0	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ 171
NS_543	$ 119,686	1	$ 101,197	1	$ 101,197	1	$ 101,197	1	$ 101,197	1	$ 101,197	1	$ -		$ -		$ 35,510
NS_278	$ 16,183	0	$ 16,183	0	$ -		$ -		$ -		$ -		$ -		$ -		$ 243
NS_37	$ 43,025	0	$ 43,025	0	$ 43,025	0	$ 43,025	0	$ 43,025	0	$ 43,025	0	$ -		$ -		$ 15,058
NS_30	$ 128,931	1	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ 644
NS_565	$ 16,183	0	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ 81
NS_122	$ 47,264	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ -		$ 2,583
NS_255	$ 101,197	1	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ -		$ 2,852
NS_301	$ 142,797	1	$ 110,442	1	$ 110,442	1	$ 105,820	1	$ 105,820	1	$ 101,197	1	$ -		$ -		$ 36,435
NS_631	$ 16,183	0	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ 81
NS_368	$ 44,785	0	$ 30,706	0	$ 30,706	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ -		$ 3,006
NS_675	$ 175,153	1	$ 101,197	1	$ 47,264	1	$ 47,264	0	$ -		$ -		$ -		$ -		$ 4,722
NS_587	$ 193,620	1	$ 190,170	1	$ 190,170	1	$ 190,170	1	$ 190,170	1	$ 190,170	1	$ -		$ -		$ 66,575
NS_211	$ 142,797	1	$ 115,064	1	$ 115,064	1	$ 110,442	1	$ 105,820	1	$ 47,264	0	$ -		$ -		$ 25,972
NS_390	$ 124,309	1	$ 105,820	1	$ 105,820	1	$ 105,820	1	$ 105,820	1	$ 101,197	1	$ -		$ -		$ 36,204
NS_232	$ 41,265	0	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ 206
NS_165	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
NS_876	$ 105,820	1	$ 101,197	1	$ 101,197	1	$ 101,197	1	$ 101,197	1	$ 101,197	1	$ -		$ -		$ 35,441
NS_653	$ 53,584	0	$ 41,265	0	$ 39,505	0	$ 39,505	0	$ 35,985	0	$ -		$ -		$ -		$ 5,749
NS_742	$ 115,119	1	$ 37,745	0	$ 37,745	0	$ 37,745	0	$ 37,745	0	$ 35,985	0	$ -		$ -		$ 13,245
NS_434	$ 105,820	1	$ 47,264	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 6,422
NS_97	$ 119,686	1	$ 110,442	1	$ 110,442	1	$ 110,442	1	$ 105,820	1	$ 105,820	1	$ -		$ -		$ 37,429
NS_478	$ 105,820	1	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ 529
NS_123	$ 105,820	1	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ -		$ 2,875
NS_31	$ 125,583	1	$ 35,985	0	$ 34,226	0	$ 34,226	0	$ 32,466	0	$ 30,706	0	$ -		$ -		$ 11,617
NS_719	$ 39,505	0	$ 43,025	0	$ -		$ -		$ -		$ -		$ -		$ -		$ 627
NS_51	$ 133,553	1	$ 119,686	1	$ 115,064	1	$ 115,064	1	$ 115,064	1	$ 115,064	1	$ -		$ -		$ 40,410
NS_74	$ 101,197	1	$ 47,264	0	$ 47,264	0	$ 47,264	0	$ 47,264	0	$ 16,183	0	$ -		$ -		$ 10,595
NS_5	$ 101,197	1	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 6,089
NS_500	$ 119,686	1	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 6,181
NS_697	$ 110,442	1	$ 47,264	1	$ 47,264	0	$ 47,264	0	$ 47,264	0	$ 16,183	0	$ -		$ -		$ 10,641
NS_143	$ 37,745	0	$ 30,706	0	$ 30,706	0	$ 30,706	0	$ 30,706	0	$ -		$ -		$ -		$ 4,641
NS_763	$ 47,264	1	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 5,819
NS_412	$ 133,553	1	$ 110,442	1	$ 105,820	1	$ 105,820	1	$ 105,820	1	$ 101,197	1	$ -		$ -		$ 36,296
NS_188	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 5,664
NS_522	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
NS_14	$ 50,064	0	$ 39,505	0	$ 37,745	0	$ 37,745	0	$ 37,745	0	$ 35,985	0	$ -		$ -		$ 12,938
NS_610	$ 124,309	1	$ 47,264	1	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ -		$ 3,278
NS_785	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
NS_38	$ 142,797	1	$ 101,197	1	$ 16,183	0	$ 16,183	0	$ -		$ -		$ -		$ -		$ 2,696
NS_544	$ 128,931	1	$ 115,064	1	$ 110,442	1	$ 110,442	1	$ 110,442	1	$ 110,442	1	$ -		$ -		$ 38,792
NS_124	$ 47,264	1	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ -		$ 2,583
NS_32	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 5,664
NS_325	$ 125,583	1	$ 44,785	0	$ 43,025	0	$ 43,025	0	$ 41,265	0	$ 39,505	0	$ -		$ -		$ 14,652
NS_743	$ 41,265	0	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ 206
NS_279	$ 47,264	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ -		$ -		$ -		$ 722
NS_302	$ 47,264	0	$ 47,264	0	$ 47,264	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 6,752
NS_676	$ 161,286	1	$ 47,264	0	$ -		$ -		$ -		$ -		$ -		$ -		$ 1,278
NS_632	$ 16,183	0	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ 81
NS_369	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 5,664
NS_212	$ 156,664	1	$ 128,931	1	$ 124,309	1	$ 124,309	1	$ 119,686	1	$ 110,442	1	$ -		$ -		$ 40,595

ID or Survey No.	Street Name	Street Address	CADID	Plan Label	Suburb	Raisable Yes/No	Floor Level m AHD	"Protection Level" (Floor Level less Freeboard) m AHD	Ground Level m AHD	Type of Res 1-4	Flood Level at Property, m AHD for each AEP flood: PMF	1.00%	2.00%	5.00%	10.00%	20.00%
NS_166	Morton St	30	102156786	SP9995	Wollstonecraf	No	68.80	68.80	66.80	1	0.00	0.00	0.00	0.00	0.00	0.00
NS_391	Ellalong Rd	35A	102204789	DP411066	Cremorne	No	50.46	50.46	49.46	1	49.16	49.11	49.11	49.11	49.11	49.10
NS_877	Woolcott Ave	11	168432583	DP1178663	Waverton	No	14.30	14.30	14.30	2	15.95	15.24	15.21	15.17	15.06	14.87
NS_233	Ben Boyd Rd	75	102160746	DP21192	Neutral Bay	No	47.76	47.76	47.71	2	47.90	0.00	0.00	0.00	0.00	0.00
NS_256	Ben Boyd Rd	133	102160944	SP21974	Neutral Bay	No	75.99	75.99	75.49	2	75.66	75.49	75.48	75.48	75.48	75.47
NS_720	Amherst St	81	102155846	DP6687	Cammeray	No	56.74	56.74	56.54	2	57.13	56.71	56.67	56.67	56.65	56.62
NS_566	High St	68	102164312	DP134119	North Sydney	No	17.57	17.57	16.07	1	15.66	0.00	0.00	0.00	0.00	0.00
NS_98	Winnie St	16	174346496	DP1221807	Cremorne	No	78.93	78.93	78.83	2	79.26	78.94	78.91	78.91	78.90	78.87
NS_125	Grasmere Rd	73	102209688	SP802	Cremorne	No	59.07	59.07	58.07	1	59.01	58.24	58.22	58.22	58.19	58.15
NS_33	Woolcott St	6	102158441	DP5874	Waverton	No	31.39	31.39	30.39	1	30.34	30.34	30.34	30.34	30.34	30.34
NS_479	Hampden St	15	104735737	DP591516	North Sydney	No	52.07	52.07	51.92	2	53.64	52.27	52.26	52.24	52.23	52.21
NS_435	Rangers Rd	47	102210331	DP75298	Cremorne	No	63.54	63.54	63.14	2	63.79	63.39	63.36	63.33	63.31	63.29
NS_52	Illiwa St	36	102204511	DP5107	Cremorne	No	59.52	59.52	59.02	2	60.09	59.50	59.43	59.44	59.41	59.35
NS_6	Harriot Lane	1	102158706	DP718775	Waverton	No	52.99	52.99	52.79	2	53.43	52.96	52.92	52.91	52.88	52.84
NS_75	Levick St	14	102204916	DP456044	Cremorne	No	53.49	53.49	53.39	2	53.56	53.48	53.47	53.47	53.46	53.45
NS_744	Rodborough Ave	2	102157693	SP18220	Crows Nest	No	79.21	79.21	79.11	2	79.28	78.87	78.86	78.86	78.86	78.85
NS_764	Webb St	7	105441888	0	McMahons Poi	No	41.12	41.12	40.82	2	40.88	40.76	40.76	40.76	40.73	40.76
NS_501	Miller St	288-290	102157719	DP1860	North Sydney	No	81.64	81.64	81.54	2	82.31	81.67	81.58	81.58	81.57	81.52
NS_144	Young St	105	102204366	DP175819	Cremorne	No	44.86	44.86	43.86	1	43.78	43.73	43.73	43.73	43.73	43.73
NS_189	Hipwood St	4	102163148	DP11950	Kirribilli	No	5.17	5.17	4.77	2	4.69	4.51	4.51	4.50	4.50	4.50
NS_523	Milner Crescent	36A	102156638	SP19997	Wollstonecraf	No	60.80	60.80	55.80	1	60.22	55.78	55.78	55.78	55.78	55.78
NS_15	Ancrum St	41	102158982	DP726394	Waverton	No	39.66	39.66	37.86	1	38.70	38.11	38.05	38.04	38.00	37.95
NS_698	Rosalind St	79	102155506	SP13961	Cammeray	No	73.24	73.24	71.24	1	71.51	71.24	71.19	71.21	71.17	71.12
NS_654	Atchison St	50-52	104128143	SP21397	Crows Nest	No	81.62	81.62	81.52	2	81.75	81.47	81.46	81.47	81.46	81.46
NS_413	Grasmere Lane	6	102156041	DP979110	Cremorne	No	63.07	63.07	62.67	2	63.35	62.72	62.66	62.66	62.63	62.63
NS_39	Gerard St	81	160725950	SP80787	Cremorne	No	73.32	73.32	73.22	2	75.55	74.87	74.79	74.79	74.73	74.57
NS_588	Ancrum St	61	152177731	DP1092441	North Sydney	No	43.56	43.56	43.46	2	43.44	0.00	0.00	0.00	0.00	0.00
NS_611	Chandos St	163	102154925	DP442007	Crows Nest	No	76.32	76.32	76.22	2	77.17	76.44	76.32	76.32	76.27	0.00
NS_786	Middlemiss St	1	102164234	DP19368	Lavender Bay	No	36.41	36.41	34.41	1	33.42	0.00	0.00	0.00	0.00	0.00
NS_126	Young St	69	102209702	DP516200	Cremorne	No	56.67	56.67	54.87	1	54.62	54.45	54.44	54.43	54.42	54.39
NS_34	Woolcott St	14	102158513	SP3022	Waverton	No	25.78	25.78	24.78	1	25.04	24.80	0.00	0.00	0.00	0.00
NS_280	Ben Boyd Rd	31	103227988	SP9422	Neutral Bay	No	35.74	35.74	34.24	1	35.69	34.90	34.87	34.83	34.77	34.61
NS_545	Christie St	26	102156708	SP41115	Wollstonecraf	No	72.11	72.11	72.01	2	0.00	0.00	0.00	0.00	0.00	0.00
NS_326	Montpelier St	2A	169251668	DP1168334	Neutral Bay	No	19.69	19.69	18.69	1	19.12	18.74	18.72	18.71	18.70	18.69
NS_677	Lytton St	22	102157860	DP4588	Cammeray	No	70.42	70.42	70.37	2	71.34	70.42	0.00	0.00	0.00	0.00
NS_303	Manns Ave	11	164283265	DP1149402	Neutral Bay	No	14.35	14.35	14.15	2	15.17	14.38	14.36	14.31	14.25	0.00
NS_633	Brook St	10	102154943	SP15164	Crows Nest	No	72.09	72.09	71.09	1	71.21	70.98	0.00	0.00	0.00	0.00
NS_167	Morton St	36	102156796	SP5664	Wollstonecraf	No	63.72	63.72	60.72	1	61.75	60.96	60.90	60.90	60.82	60.79
NS_392	Ellalong Rd	37	102204790	DP9859	Cremorne	No	45.33	45.33	43.53	1	43.47	43.45	43.44	43.44	43.44	43.44
NS_370	Bannerman St	2	102210832	SP20198	Cremorne	No	36.84	36.84	36.64	2	36.21	35.97	35.97	35.97	0.00	0.00
NS_745	Falcon St	148	102157751	DP101153	Crows Nest	No	79.21	79.21	79.11	2	79.57	0.00	0.00	0.00	0.00	0.00
NS_213	Fall St	4	102156064	SP33206	Cammeray	No	42.97	42.97	42.67	2	44.31	43.17	43.09	43.07	42.97	42.83
NS_878	Woolcott St	n/a	104580627	DP752067	Waverton	No	19.35	19.35	19.25	2	19.94	19.63	19.60	19.59	19.57	19.54
NS_234	Ben Boyd Rd	73	102160750	DP21192	Neutral Bay	No	47.94	47.94	47.34	1	47.52	0.00	0.00	0.00	0.00	0.00
NS_721	Amherst St	83	102155849	DP6687	Cammeray	No	56.50	56.50	56.10	2	57.04	56.56	56.50	56.50	56.47	56.41
NS_99	Winnie St	44173	102209824	SP18758	Cremorne	No	80.75	80.75	79.75	1	80.06	79.90	79.88	79.88	79.86	79.84
NS_53	Illiwa St	38	102204528	DP168831	Cremorne	No	58.54	58.54	58.04	2	58.77	58.38	58.34	58.34	58.33	58.30
NS_35	Woolcoot St	32	102158577	SP41793	Waverton	No	23.82	23.82	22.62	1	22.85	22.62	22.60	22.60	22.59	22.59
NS_127	Young St	71	102209703	DP516199	Cremorne	No	55.59	55.59	53.79	1	54.16	53.66	53.62	53.61	53.58	53.55
NS_7	Bay Road	92	102158584	SP13915	Waverton	No	40.75	40.75	40.65	2	41.02	40.72	40.71	40.71	40.70	40.70
NS_480	Hampden	17	104735732	DP591516	North Sydney	No	50.64	50.64	50.24	2	53.64	50.62	50.61	50.60	50.60	50.60
NS_436	Rangers Rd	49	102210348	DP816948	Cremorne	No	62.46	62.46	62.46	2	63.37	62.87	62.83	62.79	62.76	62.72
NS_567	High St	70A	102164311	DP199399	North Sydney	No	17.70	17.70	15.70	1	15.37	0.00	0.00	0.00	0.00	0.00
NS_765	Webb St	9	102164374	DP786985	McMahons Poi	No	41.97	41.97	41.87	2	42.52	42.15	42.13	42.14	42.08	42.03
NS_76	Levick St	16	102204912	DP22892	Cremorne	No	51.02	51.02	50.92	2	51.68	51.20	51.17	51.17	51.15	51.15
NS_257	Ben Boyd Rd	131	102160943	SP20885	Neutral Bay	No	74.04	74.04	73.74	2	74.17	74.02	74.01	74.00	73.99	73.98
NS_190	Hipwood St	6	102163151	DP11950	Kirribilli	No	5.08	5.08	4.68	2	4.51	4.50	4.49	4.49	4.49	4.49
NS_145	Young St	107	102204365	DP175819	Cremorne	No	44.55	44.55	43.55	1	43.62	43.57	43.57	43.57	43.56	0.00
NS_502	Miller St	292	102157729	DP656298	North Sydney	No	81.19	81.19	81.09	2	81.37	81.09	81.08	81.08	81.07	80.94
NS_524	Milner Crescent	36	102156642	SP20594	Wollstonecraf	No	57.00	57.00	54.00	1	60.22	54.14	53.87	53.86	53.86	53.86
NS_746	Falcon St	150	102157752	DP101153	Crows Nest	No	82.07	82.07	79.07	1	79.42	79.03	0.00	0.00	0.00	0.00
NS_699	Rosalind St	77	102155504	DP115732	Cammeray	No	75.76	75.76	73.76	1	74.10	73.70	73.62	73.67	73.61	73.61
NS_414	Earle St	1	102156047	DP80728	Cremorne	No	57.99	57.99	54.99	1	54.76	54.73	54.73	54.73	54.73	54.73
NS_16	Euroka Lane	1	102158837	DP315237	Waverton	No	40.12	40.12	38.12	1	38.67	0.00	0.00	0.00	0.00	0.00
NS_40	Gerard St	78	102205017	DP932952	Cremorne	No	74.97	74.97	74.57	2	74.83	74.72	74.71	74.71	74.71	74.70
NS_612	Chandos St	161	102154923	DP442007	Crows Nest	No	76.23	76.23	76.13	2	76.51	76.18	0.00	0.00	0.00	0.00
NS_787	Middlemiss St	1	102164235	DP431983	Lavender Bay	No	36.71	36.71	34.71	1	33.42	0.00	0.00	0.00	0.00	0.00
NS_128	Young St	73	100106594	DP516201	Cremorne	No	55.31	55.31	53.51	1	53.81	53.09	53.09	53.09	53.09	53.09
NS_546	Christie St	30	100210135	SP56759	Wollstonecraf	No	71.69	71.69	71.09	1	71.81	71.25	71.19	71.18	71.12	71.09
NS_281	Ben Boyd Rd	29A	103227987	SP51515	Neutral Bay	No	33.87	33.87	33.72	2	34.93	34.28	34.26	34.22	34.16	34.03
NS_327	Eaton St	32	167876609	DP1168334	Neutral Bay	No	14.92	14.92	14.62	2	14.69	14.56	14.54	14.51	14.49	0.00
NS_589	Ancrum St	59	102158993	DP216800	North Sydney	No	41.70	41.70	41.60	2	42.05	0.00	0.00	0.00	0.00	0.00
NS_678	Lytton st	16	102157858	SP11746	Cammeray	No	70.77	70.77	70.47	2	71.38	70.51	0.00	0.00	0.00	0.00
NS_634	Donelly Rd	22-24	102153810	DP817826	Crows Nest	No	71.43	71.43	71.23	2	70.57	0.00	0.00	0.00	0.00	0.00
NS_304	Hayes St	23	102160836	SP9401	Neutral Bay	No	17.25	17.25	17.15	2	18.00	17.75	17.74	17.69	17.71	17.65
NS_168	Morton St	38	159050915	SP79380	Wollstonecraf	No	66.49	66.49	66.39	2	67.55	66.77	66.69	66.69	66.63	66.60
NS_393	Ellalong Rd	39	102204805	DP327768	Cremorne	No	45.14	45.14	44.64	2	0.00	0.00	0.00	0.00	0.00	0.00
NS_371	Bannerman St	2A	103750307	DP859325	Cremorne	No	35.76	35.76	35.66	2	36.47	35.91	35.88	35.85	35.83	35.80
NS_214	Creek Lane	3A	160329082	DP1124252	Cammeray	No	42.43	42.43	42.23	2	44.13	42.59	42.53	42.52	42.45	42.35
NS_235	Ben Boyd Rd	71	102160749	DP738047	Neutral Bay	No	46.68	46.68	46.28	2	46.67	0.00	0.00	0.00	0.00	0.00
NS_747	Rodborough Ave	8	159051122	DP1118129	Crows Nest	No	80.30	80.30	79.30	1	79.17	0.00	0.00	0.00	0.00	0.00
NS_722	Warringa Rd	14	102155852	DP6687	Cammeray	No	55.03	55.03	54.03	1	54.91	54.31	54.27	54.26	54.22	54.11
NS_8	Priory Rd	9	102159141	DP7544	Waverton	No	67.24	67.24	67.14	2	67.67	67.36	67.33	67.33	67.29	67.28
NS_54	Brightmore St	31	102204520	DP966806	Cremorne	No	55.82	55.82	55.62	2	56.42	55.96	55.89	55.90	55.87	55.81
NS_100	Winnie St	6	102209826	DP90591	Cremorne	No	80.04	80.04	79.89	2	80.32	80.01	79.97	79.97	79.95	79.92
NS_129	Young St	75	100106595	DP1080551	Cremorne	No	53.49	53.49	52.29	1	0.00	0.00	0.00	0.00	0.00	0.00
NS_481	Hampden St	2	102159745	DP573264	North Sydney	No	61.05	61.05	59.05	1	58.87	58.84	58.84	58.83	58.83	58.83
NS_437	Rangers Rd	49A	102210333	DP816948	Cremorne	No	61.81	61.81	61.81	2	62.46	62.11	62.08	62.05	62.03	62.00
NS_766	Webb St	11	105441888	0	McMahons Poi	No	42.08	42.08	41.38	1	41.30	41.09	41.08	41.08	41.08	41.08
NS_77	Levick St	18	102204626	DP22892	Cremorne	No	48.84	48.84	48.74	2	49.19	49.13	49.12	49.12	49.12	49.12
NS_191	Hipwood St	8	102163153	DP11950	Kirribilli	No	5.04	5.04	4.64	2	4.44	4.38	4.38	4.37	4.37	4.36
NS_568	High St	70B	102164313	DP996887	North Sydney	No	16.79	16.79	14.79	1	15.38	15.25	15.24	15.23	15.22	15.21
NS_258	Ben Boyd Rd	115-117	102160928	SP6656	Neutral Bay	No	74.01	74.01	71.81	1	72.68	72.33	72.30	72.27	72.24	72.22
NS_146	Young St	111-113	102204359	SP11872	Cremorne	No	37.07	37.07	36.57	2	36.14	36.13	36.13	36.13	36.13	36.13
NS_525	Milner Crescent	38	102156645	DP950445	Wollstonecraf	No	62.64	62.64	59.64	1	60.22	0.00	0.00	0.00	0.00	0.00
NS_807	Dumbarton St	7A	104319773	DP1021895	McMahons Poi	No	29.29	29.29	25.29	1	25.42	25.25	25.24	25.24	25.22	25.21
NS_700	Miller St	365	103676595	SP51874	Cammeray	No	76.21	76.21	76.16	2	77.02	76.46	76.38	76.39	76.36	76.31
NS_41	Gerard Lane	116A	102205015	DP166455	Cremorne	No	68.05	68.05	67.55	2	68.09	67.77	67.75	67.75	67.73	67.69
NS_748	Rodborough Ave	3	102157760	DP934249	Crows Nest	No	76.79	76.79	76.59	2	78.97	77.29	77.06	77.04	76.90	76.73
NS_130	Young St	77	102204338	DP504617	Cremorne	No	51.16	51.16	51.06	2	51.12	51.04	51.05	51.04	51.04	51.02
NS_656	Miller St	285	104500215	DP4206	Cammeray	No	75.55	75.55	75.25	2	76.78	75.49	75.48	75.48	75.48	75.36
NS_415	Earle St	3	102156049	DP87987	Cremorne	No	54.74	54.74	53.74	1	53.63	53.59	53.57	53.57	53.56	53.55
NS_169	Morton St	33	163844593	SP83438	Wollstonecraf	No	69.21	69.21	69.11	2	69.75	69.41	69.37	69.37	69.34	69.32
NS_880	Green St	5	102141689	SP16098	Cremorne Poir	No	12.66	12.66	14.66	2	15.36	15.33	15.33	15.33	15.33	15.33
NS_503	Bardsley Gardens	7	102157810	SP12037	North Sydney	No	73.26	73.26	72.76	2	73.25	73.03	72.99	72.99	72.96	72.89
NS_17	Euroka St	59	102158974	DP315237	Waverton	No	40.15	40.15	40.05	2	0.00	0.00	0.00	0.00	0.00	0.00
NS_788	Ernest St	99	100104695	DP630390	Crows Nest	No	89.96	89.96	89.91	2	90.34	90.22	89.87	89.85	0.00	0.00
NS_547	Lithgow St	1A	102156699	DP837841	Wollstonecraf	No	69.41	69.41	67.41	1	67.39	67.39	0.00	0.00	0.00	0.00
NS_808	Monford Place	7	102209821	SP15886	Cremorne	No	79.67	79.67	79.57	2	80.04	79.77	79.73	79.73	79.71	79.67
NS_679	Lytton St	14	102157826	DP83996	Cammeray	No	71.21	71.21	71.01	2	71.36	71.04	0.00	71.02	0.00	0.00
NS_613	Chandos St	159	102154921	DP1265	Crows Nest	No	75.73	75.73	75.53	2	76.62	76.14	76.06	76.06	76.00	75.86
NS_282	Aubin St	26-28	102160717	SP5298	Neutral Bay	No	32.14	32.14	31.54	1	31.66	31.49	31.49	31.47	31.46	0.00
NS_305	Hayes St	19-21	102160835	DP965067	Neutral Bay	No	16.22	16.22	15.92	2	15.76	15.69	15.69	15.68	15.68	15.43
NS_394	Ellalong Rd	41	104443274	DP341302	Cremorne	No	44.18	44.18	43.88	2	44.48	44.35	44.35	44.35	44.35	44.35
NS_215	Creek Lane	5	160329081	SP14089	Cammeray	No	46.07	46.07	44.07	1	44.12	43.97	43.97	43.97	43.97	0.00
NS_328	Spruson St	72	104236811	DP1011842	Neutral Bay	No	28.89	28.89	28.79	2	29.27	28.98	28.96	28.94	28.92	28.90
NS_590	Bank St	80	152177730	DP1092441	North Sydney	No	44.82	44.82	44.72	2	45.99	45.32	45.30	45.30	45.30	45.29
NS_372	Bannerman St	4A	102210839	SP14836	Cremorne	No	35.30	35.30	35.10	2	35.23	35.14	35.13	35.12	35.11	35.10
NS_749	Rodborough Ave	1A	102157758	DP398325	Crows Nest	No	76.53	76.53	76.43	2	78.96	77.30	77.07	77.05	76.91	76.73
NS_723	Warringa Rd	16	102155853	DP6687	Cammeray	No	54.53	54.53	53.63	1	54.91	54.31	54.27	54.26	54.22	54.11
NS_101	Winnie St	4	102209828	DP91451	Cremorne	No	80.60	80.60	80.15	2	80.40	80.22	80.20	80.20	80.19	80.18
NS_131	Young St	79	102204343	DP900348	Cremorne	No	51.31	51.31	49.51	1	50.27	49.52	49.47	49.46	49.42	49.36
NS_236	Ben Boyd Rd	69	102160748	DP438932	Neutral Bay	No	46.58	46.58	45.68	1	46.12	45.82	0.00	0.00	0.00	0.00

ID or Survey No.	Depth of Inundation above Floor Level (m) for each AEP flood: PMF	1.00%	2.00%	5.00%	10.00%	20.00%	Depth of Inundation Above "Protection Level" (m) for each AEP flood: PMF	1.00%	2.00%	5.00%	10.00%	20.00%
NS_166	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NS_391	-1.31	-1.35	-1.35	-1.35	-1.35	-1.36	-1.31	-1.35	-1.35	-1.35	-1.35	-1.36
NS_877	1.65	0.94	0.91	0.87	0.76	0.57	1.65	0.94	0.91	0.87	0.76	0.57
NS_233	0.14	0.00	0.00	0.00	0.00	0.00	0.14	0.00	0.00	0.00	0.00	0.00
NS_256	-0.33	-0.50	-0.50	-0.50	-0.51	-0.51	-0.33	-0.50	-0.50	-0.50	-0.51	-0.51
NS_720	0.40	-0.03	-0.07	-0.07	-0.08	-0.11	0.40	-0.03	-0.07	-0.07	-0.08	-0.11
NS_566	-1.92	0.00	0.00	0.00	0.00	0.00	-1.92	0.00	0.00	0.00	0.00	0.00
NS_98	0.33	0.01	-0.02	-0.02	-0.04	-0.06	0.33	0.01	-0.02	-0.02	-0.04	-0.06
NS_125	-0.06	-0.82	-0.85	-0.85	-0.87	-0.91	-0.06	-0.82	-0.85	-0.85	-0.87	-0.91
NS_33	-1.04	-1.04	-1.05	-1.05	-1.05	-1.05	-1.04	-1.04	-1.05	-1.05	-1.05	-1.05
NS_479	1.57	0.20	0.18	0.17	0.15	0.14	1.57	0.20	0.18	0.17	0.15	0.14
NS_435	0.25	-0.15	-0.18	-0.21	-0.23	-0.25	0.25	-0.15	-0.18	-0.21	-0.23	-0.25
NS_52	0.57	-0.01	-0.09	-0.08	-0.11	-0.17	0.57	-0.01	-0.09	-0.08	-0.11	-0.17
NS_6	0.45	-0.03	-0.07	-0.08	-0.11	-0.15	0.45	-0.03	-0.07	-0.08	-0.11	-0.15
NS_75	0.06	-0.02	-0.02	-0.02	-0.03	-0.04	0.06	-0.02	-0.02	-0.02	-0.03	-0.04
NS_744	0.07	-0.34	-0.35	-0.35	-0.35	-0.36	0.07	-0.34	-0.35	-0.35	-0.35	-0.36
NS_764	-0.24	-0.35	-0.36	-0.36	-0.39	-0.36	-0.24	-0.35	-0.36	-0.36	-0.39	-0.36
NS_501	0.66	0.02	-0.06	-0.06	-0.08	-0.13	0.66	0.02	-0.06	-0.06	-0.08	-0.13
NS_144	-1.08	-1.13	-1.13	-1.13	-1.13	-1.13	-1.08	-1.13	-1.13	-1.13	-1.13	-1.13
NS_189	-0.47	-0.66	-0.66	-0.66	-0.67	-0.67	-0.47	-0.66	-0.66	-0.66	-0.67	-0.67
NS_523	-0.58	-5.01	-5.01	-5.01	-5.01	-5.01	-0.58	-5.01	-5.01	-5.01	-5.01	-5.01
NS_15	-0.96	-1.54	-1.61	-1.61	-1.66	-1.71	-0.96	-1.54	-1.61	-1.61	-1.66	-1.71
NS_698	-1.72	-2.00	-2.05	-2.03	-2.07	-2.12	-1.72	-2.00	-2.05	-2.03	-2.07	-2.12
NS_654	0.12	-0.15	-0.16	-0.16	-0.16	-0.16	0.12	-0.15	-0.16	-0.16	-0.16	-0.16
NS_413	0.28	-0.35	-0.41	-0.41	-0.44	-0.45	0.28	-0.35	-0.41	-0.41	-0.44	-0.45
NS_39	2.22	1.55	1.46	1.47	1.41	1.25	2.22	1.55	1.46	1.47	1.41	1.25
NS_588	-0.12	0.00	0.00	0.00	0.00	0.00	-0.12	0.00	0.00	0.00	0.00	0.00
NS_611	0.84	0.12	0.00	0.00	-0.05	0.00	0.84	0.12	0.00	0.00	-0.05	0.00
NS_786	-2.99	0.00	0.00	0.00	0.00	0.00	-2.99	0.00	0.00	0.00	0.00	0.00
NS_126	-2.05	-2.22	-2.23	-2.23	-2.25	-2.27	-2.05	-2.22	-2.23	-2.23	-2.25	-2.27
NS_34	-0.74	-0.98	0.00	0.00	0.00	0.00	-0.74	-0.98	0.00	0.00	0.00	0.00
NS_280	-0.05	-0.84	-0.87	-0.91	-0.97	-1.13	-0.05	-0.84	-0.87	-0.91	-0.97	-1.13
NS_545	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NS_326	-0.57	-0.95	-0.97	-0.98	-0.99	-1.00	-0.57	-0.95	-0.97	-0.98	-0.99	-1.00
NS_677	0.92	-0.01	0.00	0.00	0.00	0.00	0.92	-0.01	0.00	0.00	0.00	0.00
NS_303	0.82	0.03	0.02	-0.04	-0.10	0.00	0.82	0.03	0.02	-0.04	-0.10	0.00
NS_633	-0.88	-1.11	0.00	0.00	0.00	0.00	-0.88	-1.11	0.00	0.00	0.00	0.00
NS_167	-1.97	-2.76	-2.82	-2.82	-2.90	-2.93	-1.97	-2.76	-2.82	-2.82	-2.90	-2.93
NS_392	-1.86	-1.88	-1.89	-1.89	-1.89	-1.89	-1.86	-1.88	-1.89	-1.89	-1.89	-1.89
NS_370	-0.63	-0.87	-0.87	-0.87	0.00	0.00	-0.63	-0.87	-0.87	-0.87	0.00	0.00
NS_745	0.35	0.00	0.00	0.00	0.00	0.00	0.35	0.00	0.00	0.00	0.00	0.00
NS_213	1.34	0.20	0.12	0.10	0.00	-0.14	1.34	0.20	0.12	0.10	0.00	-0.14
NS_878	0.59	0.28	0.25	0.24	0.22	0.18	0.59	0.28	0.25	0.24	0.22	0.18
NS_234	-0.42	0.00	0.00	0.00	0.00	0.00	-0.42	0.00	0.00	0.00	0.00	0.00
NS_721	0.53	0.05	0.00	0.00	-0.03	-0.09	0.53	0.05	0.00	0.00	-0.03	-0.09
NS_99	-0.69	-0.85	-0.87	-0.87	-0.89	-0.91	-0.69	-0.85	-0.87	-0.87	-0.89	-0.91
NS_53	0.23	-0.16	-0.20	-0.20	-0.21	-0.24	0.23	-0.16	-0.20	-0.20	-0.21	-0.24
NS_35	-0.97	-1.20	-1.22	-1.22	-1.23	-1.24	-0.97	-1.20	-1.22	-1.22	-1.23	-1.24
NS_127	-1.43	-1.93	-1.97	-1.98	-2.01	-2.04	-1.43	-1.93	-1.97	-1.98	-2.01	-2.04
NS_7	0.27	-0.03	-0.04	-0.04	-0.05	-0.05	0.27	-0.03	-0.04	-0.04	-0.05	-0.05
NS_480	3.00	-0.03	-0.04	-0.04	-0.05	-0.05	3.00	-0.03	-0.04	-0.04	-0.05	-0.05
NS_436	0.91	0.41	0.37	0.34	0.30	0.26	0.91	0.41	0.37	0.34	0.30	0.26
NS_567	-2.33	0.00	0.00	0.00	0.00	0.00	-2.33	0.00	0.00	0.00	0.00	0.00
NS_765	0.56	0.18	0.16	0.17	0.11	0.06	0.56	0.18	0.16	0.17	0.11	0.06
NS_76	0.66	0.17	0.14	0.14	0.13	0.13	0.66	0.17	0.14	0.14	0.13	0.13
NS_257	0.13	-0.02	-0.03	-0.04	-0.05	-0.06	0.13	-0.02	-0.03	-0.04	-0.05	-0.06
NS_190	-0.58	-0.59	-0.59	-0.59	-0.60	-0.60	-0.58	-0.59	-0.59	-0.59	-0.60	-0.60
NS_145	-0.93	-0.98	-0.98	-0.98	-0.99	0.00	-0.93	-0.98	-0.98	-0.98	-0.99	0.00
NS_502	0.18	-0.11	-0.11	-0.12	-0.12	-0.25	0.18	-0.11	-0.11	-0.12	-0.12	-0.25
NS_524	3.21	-2.87	-3.13	-3.14	-3.14	-3.15	3.21	-2.87	-3.13	-3.14	-3.14	-3.15
NS_746	-2.66	-3.05	0.00	0.00	0.00	0.00	-2.66	-3.05	0.00	0.00	0.00	0.00
NS_699	-1.66	-2.06	-2.14	-2.09	-2.15	-2.15	-1.66	-2.06	-2.14	-2.09	-2.15	-2.15
NS_414	-3.23	-3.26	-3.26	-3.26	-3.26	-3.26	-3.23	-3.26	-3.26	-3.26	-3.26	-3.26
NS_16	-1.45	0.00	0.00	0.00	0.00	0.00	-1.45	0.00	0.00	0.00	0.00	0.00
NS_40	-0.14	-0.25	-0.25	-0.25	-0.26	-0.26	-0.14	-0.25	-0.25	-0.25	-0.26	-0.26
NS_612	0.28	-0.05	0.00	0.00	0.00	0.00	0.28	-0.05	0.00	0.00	0.00	0.00
NS_787	-3.29	0.00	0.00	0.00	0.00	0.00	-3.29	0.00	0.00	0.00	0.00	0.00
NS_128	-1.50	-2.22	-2.22	-2.22	-2.22	-2.22	-1.50	-2.22	-2.22	-2.22	-2.22	-2.22
NS_546	0.12	-0.44	-0.50	-0.50	-0.57	-0.60	0.12	-0.44	-0.50	-0.50	-0.57	-0.60
NS_281	1.06	0.41	0.40	0.35	0.30	0.17	1.06	0.41	0.40	0.35	0.30	0.17
NS_327	-0.23	-0.36	-0.38	-0.40	-0.43	0.00	-0.23	-0.36	-0.38	-0.40	-0.43	0.00
NS_589	0.36	0.00	0.00	0.00	0.00	0.00	0.36	0.00	0.00	0.00	0.00	0.00
NS_678	0.62	-0.26	0.00	0.00	0.00	0.00	0.62	-0.26	0.00	0.00	0.00	0.00
NS_634	-0.86	0.00	0.00	0.00	0.00	0.00	-0.86	0.00	0.00	0.00	0.00	0.00
NS_304	0.76	0.50	0.49	0.45	0.47	0.40	0.76	0.50	0.49	0.45	0.47	0.40
NS_168	1.06	0.28	0.20	0.19	0.14	0.10	1.06	0.28	0.20	0.19	0.14	0.10
NS_393	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NS_371	0.71	0.15	0.12	0.09	0.06	0.04	0.71	0.15	0.12	0.09	0.06	0.04
NS_214	1.70	0.16	0.10	0.09	0.02	-0.08	1.70	0.16	0.10	0.09	0.02	-0.08
NS_235	-0.02	0.00	0.00	0.00	0.00	0.00	-0.02	0.00	0.00	0.00	0.00	0.00
NS_747	-1.13	0.00	0.00	0.00	0.00	0.00	-1.13	0.00	0.00	0.00	0.00	0.00
NS_722	-0.12	-0.71	-0.76	-0.76	-0.81	-0.91	-0.12	-0.71	-0.76	-0.76	-0.81	-0.91
NS_8	0.43	0.12	0.09	0.09	0.05	0.04	0.43	0.12	0.09	0.09	0.05	0.04
NS_54	0.60	0.14	0.07	0.08	0.05	-0.01	0.60	0.14	0.07	0.08	0.05	-0.01
NS_100	0.28	-0.03	-0.07	-0.07	-0.10	-0.13	0.28	-0.03	-0.07	-0.07	-0.10	-0.13
NS_129	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NS_481	-2.18	-2.21	-2.22	-2.22	-2.22	-2.22	-2.18	-2.21	-2.22	-2.22	-2.22	-2.22
NS_437	0.66	0.31	0.27	0.25	0.22	0.19	0.66	0.31	0.27	0.25	0.22	0.19
NS_766	-0.78	-0.99	-1.00	-1.00	-1.00	-1.00	-0.78	-0.99	-1.00	-1.00	-1.00	-1.00
NS_77	0.34	0.28	0.28	0.28	0.27	0.28	0.34	0.28	0.28	0.28	0.27	0.28
NS_191	-0.59	-0.66	-0.66	-0.67	-0.67	-0.68	-0.59	-0.66	-0.66	-0.67	-0.67	-0.68
NS_568	-1.41	-1.53	-1.54	-1.55	-1.56	-1.58	-1.41	-1.53	-1.54	-1.55	-1.56	-1.58
NS_258	-1.33	-1.68	-1.71	-1.74	-1.77	-1.79	-1.33	-1.68	-1.71	-1.74	-1.77	-1.79
NS_146	-0.94	-0.94	-0.94	-0.94	-0.95	-0.95	-0.94	-0.94	-0.94	-0.94	-0.95	-0.95
NS_525	-2.42	0.00	0.00	0.00	0.00	0.00	-2.42	0.00	0.00	0.00	0.00	0.00
NS_807	-3.88	-4.04	-4.05	-4.05	-4.07	-4.08	-3.88	-4.04	-4.05	-4.05	-4.07	-4.08
NS_700	0.82	0.25	0.18	0.18	0.15	0.10	0.82	0.25	0.18	0.18	0.15	0.10
NS_41	0.04	-0.28	-0.30	-0.30	-0.32	-0.36	0.04	-0.28	-0.30	-0.30	-0.32	-0.36
NS_748	2.18	0.50	0.27	0.25	0.11	-0.06	2.18	0.50	0.27	0.25	0.11	-0.06
NS_130	-0.04	-0.12	-0.11	-0.11	-0.12	-0.13	-0.04	-0.12	-0.11	-0.11	-0.12	-0.13
NS_656	1.23	-0.07	-0.07	-0.07	-0.07	-0.19	1.23	-0.07	-0.07	-0.07	-0.07	-0.19
NS_415	-1.11	-1.15	-1.17	-1.17	-1.18	-1.19	-1.11	-1.15	-1.17	-1.17	-1.18	-1.19
NS_169	0.54	0.20	0.16	0.17	0.13	0.12	0.54	0.20	0.16	0.17	0.13	0.12
NS_880	2.70	2.67	2.67	2.67	2.67	2.67	2.70	2.67	2.67	2.67	2.67	2.67
NS_503	-0.01	-0.23	-0.27	-0.27	-0.30	-0.36	-0.01	-0.23	-0.27	-0.27	-0.30	-0.36
NS_17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NS_788	0.39	0.27	-0.08	-0.11	0.00	0.00	0.39	0.27	-0.08	-0.11	0.00	0.00
NS_547	-2.02	-2.02	0.00	0.00	0.00	0.00	-2.02	-2.02	0.00	0.00	0.00	0.00
NS_808	0.37	0.10	0.06	0.06	0.04	0.00	0.37	0.10	0.06	0.06	0.04	0.00
NS_679	0.15	-0.18	0.00	-0.19	0.00	0.00	0.15	-0.18	0.00	-0.19	0.00	0.00
NS_613	0.90	0.42	0.33	0.33	0.27	0.13	0.90	0.42	0.33	0.33	0.27	0.13
NS_282	-0.48	-0.65	-0.65	-0.67	-0.68	0.00	-0.48	-0.65	-0.65	-0.67	-0.68	0.00
NS_305	-0.46	-0.53	-0.54	-0.54	-0.54	-0.79	-0.46	-0.53	-0.54	-0.54	-0.54	-0.79
NS_394	0.30	0.17	0.17	0.17	0.17	0.17	0.30	0.17	0.17	0.17	0.17	0.17
NS_215	-1.95	-2.10	-2.10	-2.10	-2.10	0.00	-1.95	-2.10	-2.10	-2.10	-2.10	0.00
NS_328	0.37	0.09	0.07	0.05	0.03	0.00	0.37	0.09	0.07	0.05	0.03	0.00
NS_590	1.16	0.50	0.48	0.48	0.47	0.47	1.16	0.50	0.48	0.48	0.47	0.47
NS_372	-0.07	-0.16	-0.17	-0.18	-0.19	-0.20	-0.07	-0.16	-0.17	-0.18	-0.19	-0.20
NS_749	2.44	0.78	0.54	0.53	0.38	0.20	2.44	0.78	0.54	0.53	0.38	0.20
NS_723	0.38	-0.22	-0.26	-0.26	-0.31	-0.41	0.38	-0.22	-0.26	-0.26	-0.31	-0.41
NS_101	-0.21	-0.38	-0.40	-0.40	-0.41	-0.42	-0.21	-0.38	-0.40	-0.40	-0.41	-0.42
NS_131	-1.04	-1.79	-1.84	-1.85	-1.89	-1.94	-1.04	-1.79	-1.84	-1.85	-1.89	-1.94
NS_236	-0.46	-0.76	0.00	0.00	0.00	0.00	-0.46	-0.76	0.00	0.00	0.00	0.00

ID or Survey No.	Flood Damages — PMF: Damages, total for event, per property affected	PMF: Properties Affected above floor level, damaged	AEP 1.00%: Damages, total for event, per property affected	AEP 1.00%: Properties Affected above floor level, damaged	AEP 2.0%: Damages, total for event, per property affected	AEP 2.0%: Properties Affected above floor level, damaged	AEP 5.0%: Damages, total for event, per property affected	AEP 5.0%: Properties Affected above floor level, damaged	AEP 10.0%: Damages, total for event, per property affected	AEP 10.0%: Properties Affected above floor level, damaged	AEP 20.0%: Damages, total for event, per property affected	AEP 20.0%: Properties Affected above floor level, damaged	AEP: Damages, total for event, per property affected	AEP: Properties Affected above floor level, damaged	AEP: Damages, total for event, per property affected	AEP: Properties Affected above floor level, damaged	AAD, total and per property
	$ 71,529,460	491	$ 41,507,489	299	$ 38,271,467	272	$ 37,301,451	266	$ 34,249,086	247	$ 29,597,377	216	$ -	0	$ -	0	$ 11,517,801
NS_166	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
NS_391	$ 32,466	0	$ 32,466	0	$ 30,706	0	$ 30,706	0	$ 30,706	0	$ 30,706	0	$ -		$ -		$ 10,773
NS_877	$ 175,153	1	$ 138,175	1	$ 138,175	1	$ 138,175	1	$ 133,553	1	$ 124,309	1	$ -		$ -		$ 45,425
NS_233	$ 101,197	1	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ 505
NS_256	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 5,664
NS_720	$ 115,064	1	$ 47,264	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 6,469
NS_566	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
NS_98	$ 110,442	1	$ 47,264	1	$ 47,264	0	$ 47,264	0	$ 47,264	0	$ 16,183	0	$ -		$ -		$ 10,641
NS_125	$ 53,584	0	$ 41,265	0	$ 41,265	0	$ 39,505	0	$ 39,505	0	$ 39,505	0	$ -		$ -		$ 13,950
NS_33	$ 37,745	0	$ 37,745	0	$ 37,745	0	$ 37,745	0	$ 37,745	0	$ 37,745	0	$ -		$ -		$ 13,210
NS_479	$ 170,531	1	$ 105,820	1	$ 105,820	1	$ 105,820	1	$ 105,820	1	$ 101,197	1	$ -		$ -		$ 36,435
NS_435	$ 110,442	1	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 6,135
NS_52	$ 124,309	1	$ 47,264	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 6,515
NS_6	$ 115,064	1	$ 47,264	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 6,469
NS_75	$ 101,197	1	$ 47,264	0	$ 47,264	0	$ 47,264	0	$ 47,264	0	$ 47,264	0	$ -		$ -		$ 16,811
NS_744	$ 101,197	1	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 6,089
NS_764	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 5,664
NS_501	$ 128,931	1	$ 47,264	1	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 6,538
NS_144	$ 35,985	0	$ 35,985	0	$ 35,985	0	$ 35,985	0	$ 35,985	0	$ 35,985	0	$ -		$ -		$ 12,595
NS_189	$ 16,183	0	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ 81
NS_523	$ 44,785	0	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ 224
NS_15	$ 37,745	0	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ 189
NS_698	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
NS_654	$ 101,197	1	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 6,089
NS_413	$ 110,442	1	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 6,135
NS_39	$ 191,320	1	$ 165,909	1	$ 165,909	1	$ 165,909	1	$ 161,286	1	$ 152,042	1	$ -		$ -		$ 55,073
NS_588	$ 16,183	0	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ 81
NS_611	$ 133,553	1	$ 101,197	1	$ 47,264	0	$ 47,264	0	$ 16,183	0	$ -		$ -		$ -		$ 5,728
NS_786	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
NS_126	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
NS_34	$ 43,025	0	$ 37,745	0	$ -		$ -		$ -		$ -		$ -		$ -		$ 592
NS_280	$ 104,655	0	$ 41,265	0	$ 39,505	0	$ 39,505	0	$ 37,745	0	$ 35,985	0	$ -		$ -		$ 13,334
NS_545	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
NS_326	$ 44,785	0	$ 39,505	0	$ 37,745	0	$ 37,745	0	$ 37,745	0	$ 37,745	0	$ -		$ -		$ 13,263
NS_677	$ 138,175	1	$ 47,264	0	$ -		$ -		$ -		$ -		$ -		$ -		$ 1,163
NS_303	$ 133,553	1	$ 47,264	1	$ 47,264	1	$ 47,264	0	$ 16,183	0	$ -		$ -		$ -		$ 5,189
NS_633	$ 39,505	0	$ 35,985	0	$ -		$ -		$ -		$ -		$ -		$ -		$ 557
NS_167	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
NS_392	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
NS_370	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
NS_745	$ 115,064	1	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ 575
NS_213	$ 156,664	1	$ 105,820	1	$ 101,197	1	$ 101,197	1	$ 47,264	0	$ 16,183	0	$ -		$ -		$ 14,694
NS_878	$ 124,309	1	$ 110,442	1	$ 110,442	1	$ 105,820	1	$ 105,820	1	$ 105,820	1	$ -		$ -		$ 37,267
NS_234	$ 48,304	0	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ 241
NS_721	$ 119,686	1	$ 101,197	1	$ 47,264	1	$ 47,264	1	$ 47,264	0	$ 16,183	0	$ -		$ -		$ 11,227
NS_99	$ 43,025	0	$ 41,265	0	$ 39,505	0	$ 39,505	0	$ 39,505	0	$ 39,505	0	$ -		$ -		$ 13,862
NS_53	$ 105,820	1	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 6,112
NS_35	$ 37,745	0	$ 34,226	0	$ 34,226	0	$ 34,226	0	$ 34,226	0	$ 34,226	0	$ -		$ -		$ 11,996
NS_127	$ 30,706	0	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ 153
NS_7	$ 110,442	1	$ 47,264	0	$ 47,264	0	$ 47,264	0	$ 47,264	0	$ 16,183	0	$ -		$ -		$ 10,641
NS_480	$ 200,520	1	$ 47,264	0	$ 47,264	0	$ 47,264	0	$ 47,264	0	$ 47,264	0	$ -		$ -		$ 17,307
NS_436	$ 138,175	1	$ 115,064	1	$ 115,064	1	$ 110,442	1	$ 110,442	1	$ 110,442	1	$ -		$ -		$ 38,931
NS_567	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
NS_765	$ 124,309	1	$ 105,820	1	$ 105,820	1	$ 105,820	1	$ 101,197	1	$ 101,197	1	$ -		$ -		$ 35,857
NS_76	$ 128,931	1	$ 105,820	1	$ 101,197	1	$ 101,197	1	$ 101,197	1	$ 101,197	1	$ -		$ -		$ 35,603
NS_257	$ 101,197	1	$ 47,264	0	$ 47,264	0	$ 47,264	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 8,264
NS_190	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
NS_145	$ 39,505	0	$ 37,745	0	$ 37,745	0	$ 37,745	0	$ 37,745	0	$ -		$ -		$ -		$ 5,670
NS_502	$ 105,820	1	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 6,112
NS_524	$ 226,895	1	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ 1,133
NS_746	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
NS_699	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
NS_414	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
NS_16	$ 16,183	0	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ 81
NS_40	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 5,664
NS_612	$ 110,442	1	$ 16,183	0	$ -		$ -		$ -		$ -		$ -		$ -		$ 713
NS_787	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
NS_128	$ 16,183	0	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ 81
NS_546	$ 109,887	1	$ 48,304	0	$ 46,545	0	$ 46,545	0	$ 44,785	0	$ 44,785	0	$ -		$ -		$ 16,140
NS_281	$ 147,420	1	$ 115,064	1	$ 115,064	1	$ 115,064	1	$ 110,442	1	$ 105,820	1	$ -		$ -		$ 38,237
NS_327	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ -		$ 2,427
NS_589	$ 115,064	1	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ 575
NS_678	$ 124,309	1	$ 16,183	0	$ -		$ -		$ -		$ -		$ -		$ -		$ 783
NS_634	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
NS_304	$ 133,553	1	$ 119,686	1	$ 119,686	1	$ 115,064	1	$ 119,686	1	$ 115,064	1	$ -		$ -		$ 40,849
NS_168	$ 147,420	1	$ 110,442	1	$ 105,820	1	$ 105,820	1	$ 101,197	1	$ 101,197	1	$ -		$ -		$ 36,019
NS_393	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
NS_371	$ 128,931	1	$ 105,820	1	$ 101,197	1	$ 101,197	1	$ 101,197	1	$ 47,264	1	$ -		$ -		$ 24,816
NS_214	$ 175,153	1	$ 105,820	1	$ 101,197	1	$ 101,197	1	$ 47,264	1	$ 16,183	0	$ -		$ -		$ 14,786
NS_235	$ 47,264	0	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ 236
NS_747	$ 35,985	0	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ 180
NS_722	$ 53,584	0	$ 43,025	0	$ 41,265	0	$ 41,265	0	$ 41,265	0	$ 39,505	0	$ -		$ -		$ 14,170
NS_8	$ 115,064	1	$ 101,197	1	$ 101,197	1	$ 101,197	1	$ 101,197	1	$ 47,264	1	$ -		$ -		$ 24,701
NS_54	$ 124,309	1	$ 101,197	1	$ 101,197	1	$ 101,197	1	$ 101,197	1	$ 47,264	0	$ -		$ -		$ 24,747
NS_100	$ 110,442	1	$ 47,264	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 6,446
NS_129	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
NS_481	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
NS_437	$ 128,931	1	$ 110,442	1	$ 110,442	1	$ 105,820	1	$ 105,820	1	$ 105,820	1	$ -		$ -		$ 37,290
NS_766	$ 41,265	0	$ 37,745	0	$ 37,745	0	$ 37,745	0	$ 37,745	0	$ 37,745	0	$ -		$ -		$ 13,228
NS_77	$ 110,442	1	$ 110,442	1	$ 110,442	1	$ 110,442	1	$ 110,442	1	$ 110,442	1	$ -		$ -		$ 38,654
NS_191	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
NS_568	$ 30,706	0	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ 153
NS_258	$ 32,466	0	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ 162
NS_146	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
NS_525	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
NS_807	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
NS_700	$ 133,553	1	$ 110,442	1	$ 105,820	1	$ 105,820	1	$ 105,820	1	$ 101,197	1	$ -		$ -		$ 36,296
NS_41	$ 47,264	1	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 5,819
NS_748	$ 191,320	1	$ 119,686	1	$ 110,442	1	$ 110,442	1	$ 101,197	1	$ 16,183	0	$ -		$ -		$ 19,605
NS_130	$ 47,264	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 5,819
NS_656	$ 152,042	1	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 6,343
NS_415	$ 35,985	0	$ 35,985	0	$ 34,226	0	$ 34,226	0	$ 34,226	0	$ 34,226	0	$ -		$ -		$ 12,005
NS_169	$ 119,686	1	$ 105,820	1	$ 105,820	1	$ 105,820	1	$ 101,197	1	$ 101,197	1	$ -		$ -		$ 35,834
NS_880	$ 197,070	1	$ 197,070	1	$ 197,070	1	$ 197,070	1	$ 197,070	1	$ 197,070	1	$ -		$ -		$ 68,973
NS_503	$ 47,264	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 5,819
NS_17	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
NS_788	$ 115,064	1	$ 110,442	1	$ 16,183	0	$ 16,183	0	$ -		$ -		$ -		$ -		$ 2,650
NS_547	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
NS_808	$ 115,064	1	$ 101,197	1	$ 101,197	1	$ 101,197	1	$ 47,264	1	$ 47,264	1	$ -		$ -		$ 20,656
NS_679	$ 105,820	1	$ 16,183	0	$ -		$ 16,183	0	$ -		$ -		$ -		$ -		$ 1,338
NS_613	$ 138,175	1	$ 115,064	1	$ 110,442	1	$ 110,442	1	$ 110,442	1	$ 101,197	1	$ -		$ -		$ 36,989
NS_282	$ 46,545	0	$ 44,785	0	$ 43,025	0	$ 43,025	0	$ 43,025	0	$ -		$ -		$ -		$ 6,488
NS_305	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ -		$ 2,427
NS_394	$ 110,442	1	$ 105,820	1	$ 105,820	1	$ 105,820	1	$ 105,820	1	$ 105,820	1	$ -		$ -		$ 37,059
NS_215	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
NS_328	$ 115,064	1	$ 101,197	1	$ 101,197	1	$ 47,264	1	$ 47,264	1	$ 47,264	1	$ -		$ -		$ 18,498
NS_590	$ 152,042	1	$ 119,686	1	$ 119,686	1	$ 119,686	1	$ 119,686	1	$ 119,686	1	$ -		$ -		$ 42,051
NS_372	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 5,664
NS_749	$ 193,620	1	$ 133,553	1	$ 119,686	1	$ 119,686	1	$ 115,064	1	$ 105,820	1	$ -		$ -		$ 39,277
NS_723	$ 125,583	1	$ 51,824	0	$ 50,064	0	$ 50,064	0	$ 50,064	0	$ 48,304	0	$ -		$ -		$ 17,565
NS_101	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 5,664
NS_131	$ 37,745	0	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ 189
NS_236	$ 46,545	0	$ 41,265	0	$ -		$ -		$ -		$ -		$ -		$ -		$ 645

Flood Level at Property (m AHD for each AEP flood)

ID or Survey No.	Street Name	Street Address	CADID	Plan Label	Suburb	Raisable Yes/No	Floor Level m AHD	"Protection Level" (Floor Level less Freeboard) m AHD	Ground Level m AHD	Type of Res 1-4	PMF	1.00%	2.00%	5.00%	10.00%	20.00%
NS_9	Priory Rd	11	102159142	DP7544	Waverton	No	67.01	67.01	66.41	1	66.72	66.58	66.56	66.56	66.54	66.53
NS_55	Brightmore St	33	102204522	DP5107	Cremorne	No	55.47	55.47	55.27	2	56.03	55.64	55.58	55.59	55.57	55.52
NS_192	Hipwood St	10	102163156	DP11950	Kirribilli	No	4.97	4.97	4.57	2	4.44	4.37	4.37	4.36	4.36	4.35
NS_767	Union St	22	105543402	27 - 2550 LP	McMahons Poi	No	43.38	43.38	41.88	1	41.43	41.36	41.35	41.35	41.35	41.34
NS_78	Brightmore St	53	102204624	DP384553	Cremorne	No	45.88	45.88	45.58	2	46.57	45.81	45.74	45.74	45.68	45.61
NS_438	Spofforth St	52	102210339	DP158107	Cremorne	No	60.54	60.54	58.54	1	58.44	58.32	58.31	58.22	58.22	58.22
NS_482	Hampden St	4	102159784	DP573264	North Sydney	No	60.63	60.63	58.63	1	58.08	58.07	58.07	58.07	58.06	58.06
NS_809	Wonga Rd	23	102204148	DP31762	Cremorne	No	30.11	30.11	27.11	1	25.69	25.65	25.65	25.65	25.64	25.64
NS_42	Reynolds St	69	102205005	DP901037	Cremorne	No	64.90	64.90	62.90	1	63.16	62.87	62.84	62.84	62.83	62.80
NS_147	Young St	137	102204423	DP315102	Cremorne	No	32.74	32.74	32.24	2	32.45	0.00	0.00	0.00	0.00	0.00
NS_526	Carlyle Lane	1	102156643	SP16432	Wollstonecraf	No	55.60	55.60	52.60	1	60.22	54.13	53.53	53.30	52.88	52.69
NS_569	High St	70C	155789827	DP1106349	North Sydney	No	17.23	17.23	15.23	1	15.38	15.25	15.24	15.23	15.22	15.21
NS_750	Rodborough Ave	1	102157756	DP398325	Crows Nest	No	76.40	76.40	76.30	2	78.87	77.26	77.03	77.02	76.88	76.70
NS_132	Young St	81	102204344	DP106436	Cremorne	No	50.82	50.82	49.32	1	50.18	49.40	49.37	49.37	49.35	0.00
NS_259	Raymond Rd	70	102160929	DP396950	Neutral Bay	No	71.68	71.68	71.58	2	72.17	71.84	71.83	71.81	71.80	71.80
NS_701	Miller St	361	102155503	DP5627	Cammeray	No	76.05	76.05	76.05	2	77.28	76.58	76.49	76.49	76.45	76.38
NS_170	Morton St	31	102156846	SP31308	Wollstonecraf	No	69.47	69.47	69.37	2	69.63	69.39	69.36	69.36	69.35	69.34
NS_881	Barry St	37	102210569	SP13050	Neutral Bay	No	82.18	82.18	82.08	2	0.00	0.00	0.00	0.00	0.00	0.00
NS_416	Earle St	5	102156051	DP979110	Cremorne	No	54.91	54.91	52.91	1	53.12	52.90	52.88	52.88	52.87	52.85
NS_18	Euroka St	61	102158975	DP418	Waverton	No	41.91	41.91	41.81	2	0.00	0.00	0.00	0.00	0.00	0.00
NS_504	Bardsley Gardens	6	102157811	SP22121	North Sydney	No	72.44	72.44	72.24	2	73.06	72.15	72.13	72.13	72.13	72.12
NS_548	Lithgow St	1B	102156697	DP921382	Wollstonecraf	No	65.54	65.54	65.14	2	65.91	65.51	65.46	65.46	65.41	65.37
NS_789	Ernest St	99A	100104696	DP630390	Crows Nest	No	89.61	89.61	89.56	2	90.35	90.23	89.87	89.83	0.00	0.00
NS_680	Lytton St	12	102157824	DP83996	Cammeray	No	71.90	71.90	71.70	2	71.80	0.00	0.00	0.00	0.00	0.00
NS_810	River Rd	30A	172174067	DP1188063	Wollstonecraf	No	67.48	67.48	67.18	2	67.98	67.65	67.61	67.61	67.58	67.56
NS_657	Miller St	287	104500214	DP4206	Cammeray	No	74.71	74.71	74.31	2	76.78	75.06	74.92	74.89	74.78	74.67
NS_283	Aubin St	30	102160718	DP599165	Neutral Bay	No	31.36	31.36	31.21	2	31.57	31.34	31.33	31.31	31.28	31.21
NS_614	Alexander St	169-173	102154799	SP55227	Crows Nest	No	76.17	76.17	76.07	2	76.58	76.17	76.13	76.13	76.10	76.05
NS_306	Lower Wycombe R	2	102160826	SP41344	Neutral Bay	No	18.01	18.01	17.91	2	18.30	18.14	18.12	18.11	18.09	18.05
NS_395	Ellalong Rd	45	103892260	DP108870	Cremorne	No	43.69	43.69	41.69	1	42.04	41.70	41.67	41.67	41.66	41.64
NS_216	Grafton St	18	102156086	SP60079	Cammeray	No	42.74	42.74	41.74	1	43.78	42.25	42.10	42.06	41.89	41.68
NS_724	Hayberry Ln	2	104610210	DP1052258	Crows Nest	No	86.88	86.88	86.78	2	87.16	86.98	86.95	86.95	86.93	86.89
NS_329	Rawson St	47	102160214	SP22725	Neutral Bay	No	8.28	8.28	3.28	1	4.16	3.29	3.25	3.19	3.18	3.17
NS_373	Bannerman St	4	103750306	SP52606	Cremorne	No	36.13	36.13	35.83	2	36.39	36.00	35.97	35.95	35.92	35.90
NS_102	Waters Rd	52	102209774	SP39443	Cremorne	No	72.73	72.73	72.68	2	72.93	0.00	0.00	0.00	0.00	0.00
NS_10	Priory Rd	8	102159137	DP7544	Waverton	No	64.94	64.94	64.04	1	64.39	64.20	64.19	64.18	64.13	64.12
NS_133	Young St	83	102204345	DP106436	Cremorne	No	49.11	49.11	49.01	2	49.82	49.05	49.02	49.02	49.01	49.00
NS_56	Brightmore St	35	102204525	DP305098	Cremorne	No	53.47	53.47	53.07	2	53.43	53.17	53.13	53.14	53.12	53.09
NS_237	Ben Boyd Rd	63	102160747	DP13486	Neutral Bay	No	45.18	45.18	44.78	2	44.99	44.86	44.86	44.86	44.86	0.00
NS_751	Falcon St	152	102157754	DP873427	Crows Nest	No	78.83	78.83	78.73	2	78.92	0.00	0.00	0.00	0.00	0.00
NS_193	Hipwood St	12	102163157	DP608113	Kirribilli	No	4.88	4.88	4.48	2	4.51	4.39	4.38	4.37	4.36	4.34
NS_768	Union St	24	102158916	DP612910	McMahons Poi	No	42.80	42.80	42.50	2	41.96	41.91	41.91	41.91	41.91	41.90
NS_79	Brightmore St	40	102204620	SP30226	Cremorne	No	44.64	44.64	44.64	2	45.84	45.22	45.22	45.21	45.09	45.03
NS_591	Bank St	96	102158989	DP418	North Sydney	No	45.33	45.33	45.23	2	46.13	45.45	45.38	45.38	45.31	45.25
NS_811	Spruson St	49	172790780	SP91489	Neutral Bay	No	35.14	35.14	35.04	2	35.20	35.11	35.09	35.08	35.07	35.12
NS_483	Hampden St	6	102159785	DP262512	North Sydney	No	60.35	60.35	58.35	1	58.26	58.23	58.23	58.22	58.22	58.22
NS_439	Spofforth St	48-50	102210337	SP30954	Cremorne	No	60.54	60.54	58.54	1	58.13	58.11	58.11	58.11	58.11	58.11
NS_43	Reynolds St	71	102205007	DP955597	Cremorne	No	64.70	64.70	62.70	1	62.94	62.75	62.72	62.72	62.71	62.69
NS_527	Carlyle Lane	5	103819939	DP746318	Wollstonecraf	No	56.47	56.47	53.47	1	60.22	54.13	53.53	53.30	0.00	0.00
NS_134	Young St	85	102204346	DP441158	Cremorne	No	50.90	50.90	49.10	1	49.95	49.35	49.35	49.35	49.35	49.34
NS_148	Young St	139	102204424	DP15481	Cremorne	No	32.87	32.87	32.07	1	32.21	0.00	0.00	0.00	0.00	0.00
NS_882	Nock Ave	3	149958746	SP73867	Neutral Bay	No	14.14	14.14	14.04	2	13.74	13.77	13.77	13.77	13.77	13.77
NS_171	Gillies St	10A	102156910	SP30572	Wollstonecraf	No	75.86	75.86	75.66	2	77.31	77.10	77.09	77.09	77.07	77.05
NS_260	Raymond Rd	68	102160930	DP396950	Neutral Bay	No	71.66	71.66	71.46	2	71.87	71.59	71.58	71.56	71.55	71.54
NS_570	High St	52	100104899	SP10193	North Sydney	No	24.17	24.17	21.17	1	21.50	21.36	21.35	21.33	21.32	21.31
NS_702	Miller St	359	102155502	DP5627	Cammeray	No	76.35	76.35	76.35	2	77.33	76.61	76.53	76.54	76.51	76.46
NS_19	Ancrum St	40	103831141	DP867961	Waverton	No	37.51	37.51	37.46	2	38.76	38.06	37.96	37.96	37.87	37.75
NS_417	Earle St	4	102156050	DP605881	Cremorne	No	50.49	50.49	49.99	2	50.66	50.25	50.22	50.21	50.21	50.20
NS_752	Falcon St	168	102157755	SP1513	Crows Nest	No	79.21	79.21	76.21	1	78.22	76.71	76.48	76.47	76.34	76.17
NS_681	Lytton St	10	102157823	DP550577	Cammeray	No	72.68	72.68	72.48	2	72.63	0.00	0.00	0.00	0.00	0.00
NS_549	Lithgow St	3	102156696	DP660965	Wollstonecraf	No	66.56	66.56	65.06	1	65.91	65.50	65.45	65.45	65.40	65.36
NS_505	Bardsley Gardens	5	102157812	SP21317	North Sydney	No	72.28	72.28	72.08	2	73.06	72.28	72.25	72.24	72.22	72.17
NS_812	Spruson St	49	172790760	SP91489	Neutral Bay	No	35.03	35.03	34.93	2	35.20	35.14	35.14	35.13	35.13	35.12
NS_790	Ernest St	101	100104697	DP506246	Crows Nest	No	89.95	89.95	89.87	2	90.35	90.23	89.87	89.76	0.00	0.00
NS_658	Miller St	334	102157759	SP11952	Cammeray	No	74.88	74.88	74.88	2	76.73	75.67	75.60	75.59	75.54	75.47
NS_298	Ellalong Rd	47	102204844	DP9859	Cremorne	No	45.00	45.00	44.90	2	45.12	45.00	45.00	44.99	0.00	0.00
NS_615	Chandos St	134	102154924	DP582081	Crows Nest	No	73.47	73.47	73.37	2	74.57	73.97	73.90	73.89	73.86	0.00
NS_307	Lower Wycombe R	6	102160974	DP3183	Neutral Bay	No	15.74	15.74	15.54	2	16.66	16.21	16.19	16.16	16.14	16.11
NS_284	Aubin St	32	102160723	DP599165	Neutral Bay	No	31.39	31.39	31.09	2	31.58	31.34	31.33	31.31	31.28	31.20
NS_217	Fall St	2	102156066	DP336323	Cremorne	No	43.02	43.02	42.97	2	44.24	43.10	43.07	43.06	43.04	43.00
NS_11	Priory Rd	21	102159138	SP32774	Waverton	No	63.38	63.38	63.23	2	63.70	63.41	63.38	63.38	63.35	63.34
NS_374	Powell St	3	102210836	DP19442	Neutral Bay	No	40.79	40.79	40.49	2	41.95	41.10	41.04	40.98	40.89	40.86
NS_725	Falcon St	69	104610208	DP1720	Crows Nest	No	86.67	86.67	86.59	2	86.93	86.75	86.72	86.72	86.71	86.64
NS_103	Belgrave St	74	102209677	DP733558	Cremorne	No	73.55	73.55	73.45	2	73.75	73.56	73.54	73.54	73.53	73.51
NS_330	Rawson St	49	102160206	DP232789	Neutral Bay	No	9.10	9.10	4.10	1	4.17	4.07	4.06	4.06	4.06	4.06
NS_135	Young St	87	102204347	DP441158	Cremorne	No	50.50	50.50	48.70	1	49.70	48.54	48.53	48.53	48.53	48.52
NS_57	Brightmore St	37	102204526	DP305098	Cremorne	No	52.38	52.38	51.98	2	52.35	52.13	52.06	52.07	52.05	52.02
NS_194	McDougall St	21	104108493	DP107669	Kirribilli	No	7.79	7.79	6.59	1	5.97	5.66	5.65	5.64	5.64	5.63
NS_80	Brightmore St	36	102204617	SP40189	Cremorne	No	45.30	45.30	45.10	2	45.73	45.52	45.50	45.50	45.49	45.41
NS_484	Hampden St	8	102159786	DP262512	North Sydney	No	59.95	59.95	57.95	1	57.90	57.89	57.89	57.88	57.88	57.88
NS_44	Reynolds St	73	102205010	DP956772	Cremorne	No	64.51	64.51	63.51	1	63.42	63.35	63.35	63.35	63.35	63.35
NS_238	Ben Boyd Rd	61	102160745	DP13486	Neutral Bay	No	44.71	44.71	44.41	2	44.49	44.42	44.42	44.42	44.41	44.41
NS_753	Falcon St	170	102157757	SP2326	Crows Nest	No	78.83	78.83	75.83	1	77.41	76.06	75.91	75.89	75.78	75.73
NS_813	Premier St	12	102160506	DP579433	Neutral Bay	No	49.14	49.14	49.04	2	49.30	49.19	49.18	49.17	49.15	49.09
NS_592	Bank St	83	102159026	DP726428	North Sydney	No	46.01	46.01	45.91	2	46.02	45.88	45.87	45.87	45.86	45.85
NS_440	Spofforth St	46	106695067	30 - 1990 LP	Cremorne	No	60.38	60.38	58.38	1	57.87	57.58	57.58	57.57	57.56	57.58
NS_528	Carlyle Lane	7	103819942	DP746318	Wollstonecraf	No	54.87	54.87	53.97	1	60.22	54.13	53.54	53.36	53.30	53.27
NS_172	Gillies St	2	102158885	DP4038	Wollstonecraf	No	75.30	75.30	74.70	1	74.60	74.60	0.00	0.00	0.00	0.00
NS_883	Alfred St N	357	102160052	SP8439	Neutral Bay	No	21.86	21.86	20.06	1	20.51	20.30	20.29	20.28	20.28	20.28
NS_136	Young St	89	102204348	DP553837	Cremorne	No	48.49	48.49	48.19	2	49.05	48.23	48.21	48.21	48.20	48.19
NS_149	Young St	141	157747175	SP78859	Cremorne	No	33.43	33.43	31.43	1	31.99	31.62	31.58	31.57	31.53	31.47
NS_261	Ben Boyd Rd	113	102160925	SP6655	Neutral Bay	No	67.74	67.74	67.54	2	69.06	68.50	68.46	68.43	68.40	68.39
NS_20	Ancrum St	38	104390866	DP1025762	Waverton	No	37.66	37.66	37.56	2	38.55	37.98	37.91	37.90	37.81	37.72
NS_703	Miller St	382	106736073	4607 - 3000 F	Cammeray	No	79.39	79.39	78.99	2	78.45	78.28	78.27	78.27	78.26	78.24
NS_682	Lytton St	31	102157900	DP89956	Cammeray	No	68.37	68.37	68.12	2	71.35	68.30	68.19	68.16	68.13	68.12
NS_550	Lithgow St	44017	102156702	SP46271	Wollstonecraf	No	65.13	65.13	65.08	2	65.91	65.50	65.45	65.45	65.40	65.36
NS_571	Whaling Rd	49	102160134	DP704510	North Sydney	No	32.99	32.99	32.89	2	33.30	33.11	33.09	33.08	33.07	33.06
NS_418	Earle St	6	102156053	DP78947	Cremorne	No	49.63	49.63	49.43	2	50.84	50.22	50.05	50.04	50.01	49.94
NS_814	Undercliff St	61	102160763	DP223368	Neutral Bay	No	52.76	52.76	50.76	1	50.59	0.00	0.00	0.00	0.00	0.00
NS_397	Ellalong Rd	43	162977345	SP82708	Cremorne	No	52.04	52.04	49.04	1	49.04	49.02	49.02	49.02	49.02	49.02
NS_506	Bardsley Gardens	4	102157816	SP9956	North Sydney	No	72.10	72.10	71.90	2	73.17	71.98	71.95	71.94	71.93	71.91
NS_791	Berry St	88	167379325	0	North Sydney	No	55.36	55.36	55.36	2	54.06	0.00	0.00	0.00	0.00	0.00
NS_659	Miller St	336-338	102157765	SP273	Cammeray	No	75.15	75.15	74.95	2	77.09	75.92	75.79	75.78	75.69	75.55
NS_616	Chandos St	132	102154922	DP582081	Crows Nest	No	73.56	73.56	73.46	2	74.52	73.89	73.80	73.79	73.75	73.66
NS_754	Warringa Rd	48	102155924	DP955179	Cammeray	No	68.61	68.61	67.61	1	67.64	67.62	67.62	67.62	67.62	67.62
NS_12	Toongarah Rd	1	102159021	DP540982	Waverton	No	63.96	63.96	63.91	2	0.00	0.00	0.00	0.00	0.00	0.00
NS_285	Aubin St	36	102160724	DP8295	Neutral Bay	No	32.31	32.31	32.01	2	32.32	32.14	32.14	32.13	32.12	32.09
NS_218	Grafton St	14	102156070	DP336323	Cremorne	No	42.85	42.85	42.05	1	42.34	42.24	42.00	42.00	42.00	42.00
NS_726	Falcon St	71	102157263	DP582541	Crows Nest	No	85.99	85.99	85.89	2	86.25	86.08	86.05	86.05	86.03	86.00
NS_58	Brightmore St	39	102204527	DP305098	Cremorne	No	52.06	52.06	51.76	2	51.90	51.83	51.82	51.82	51.81	51.81
NS_375	Thrupp St	8	102210400	DP790639	Neutral Bay	No	35.20	35.20	35.10	2	35.69	35.39	35.38	35.35	35.32	35.31
NS_104	Belgrave St	53	102209552	DP38344	Cremorne	No	71.71	71.71	70.71	1	70.56	70.56	70.63	70.63	0.00	0.00
NS_137	Young St	91	102204349	DP553837	Cremorne	No	47.94	47.94	47.84	2	48.94	47.74	47.71	47.71	47.70	47.69
NS_331	Kurraba Rd	42	102160207	DP519456	Neutral Bay	No	8.03	8.03	3.03	1	4.17	3.28	3.23	3.13	3.03	2.99
NS_195	McDougall St	23	104108491	DP1003533	Kirribilli	No	7.49	7.49	6.29	1	5.72	0.00	0.00	0.00	0.00	0.00
NS_81	Benelong Rd	2	102209706	DP925026	Cremorne	No	55.66	55.66	53.66	1	54.67	53.91	53.85	53.85	53.81	53.77
NS_352	Grosvenor St	58	102209545	SP34727	Neutral Bay	No	74.12	74.12	74.02	2	74.16	74.03	74.00	74.00	73.98	73.96
NS_485	Hampden St	10	102159787	DP262512	North Sydney	No	59.62	59.62	57.62	1	57.66	57.58	57.58	57.50	57.50	57.50
NS_45	Reynolds St	85	104405468	DP1031214	Cremorne	No	68.45	68.45	68.35	2	69.07	68.54	0.00	0.00	0.00	0.00
NS_239	Phillips St	12	102160729	DP177899	Neutral Bay	No	43.48	43.48	43.38	2	43.72	43.61	43.60	43.58	43.58	43.57
NS_815	Honda Rd	3	102210911	DP600595	Kurraba Point	No	21.60	21.60	20.80	1	0.00	0.00	0.00	0.00	0.00	0.00
NS_593	Bank St	85	102159024	DP418	North Sydney	No	47.71	47.71	47.46	2	47.91	47.75	47.72	47.72	47.71	47.69
NS_441	Harrison St	5	102210863	SP1923	Cremorne	No	75.66	75.66	75.26	2	75.35	75.33	75.33	75.32	75.32	75.32

ID or Survey No.	Depth of Inundation above Floor Level (m) for each AEP flood: PMF	1.00%	2.00%	5.00%	10.00%	20.00%	Depth of Inundation Above "Protection Level" (m) for each AEP flood: PMF	1.00%	2.00%	5.00%	10.00%	20.00%
NS_9	-0.29	-0.43	-0.45	-0.45	-0.47	-0.48	-0.29	-0.43	-0.45	-0.45	-0.47	-0.48
NS_55	0.56	0.17	0.11	0.12	0.10	0.05	0.56	0.17	0.11	0.12	0.10	0.05
NS_192	-0.53	-0.60	-0.61	-0.61	-0.62	-0.63	-0.53	-0.60	-0.61	-0.61	-0.62	-0.63
NS_767	-1.95	-2.03	-2.03	-2.03	-2.04	-2.04	-1.95	-2.03	-2.03	-2.03	-2.04	-2.04
NS_78	0.69	-0.07	-0.14	-0.14	-0.20	-0.27	0.69	-0.07	-0.14	-0.14	-0.20	-0.27
NS_438	-2.10	-2.22	-2.23	-2.32	-2.32	-2.32	-2.10	-2.22	-2.23	-2.32	-2.32	-2.32
NS_482	-2.56	-2.57	-2.57	-2.57	-2.57	-2.57	-2.56	-2.57	-2.57	-2.57	-2.57	-2.57
NS_809	-4.42	-4.46	-4.47	-4.47	-4.47	-4.47	-4.42	-4.46	-4.47	-4.47	-4.47	-4.47
NS_42	-1.74	-2.03	-2.06	-2.06	-2.08	-2.11	-1.74	-2.03	-2.06	-2.06	-2.08	-2.11
NS_147	-0.28	0.00	0.00	0.00	0.00	0.00	-0.28	0.00	0.00	0.00	0.00	0.00
NS_526	4.61	-1.47	-2.07	-2.30	-2.72	-2.91	4.61	-1.47	-2.07	-2.30	-2.72	-2.91
NS_569	-1.85	-1.97	-1.98	-1.99	-2.01	-2.02	-1.85	-1.97	-1.98	-1.99	-2.01	-2.02
NS_750	2.47	0.86	0.63	0.62	0.48	0.30	2.47	0.86	0.63	0.62	0.48	0.30
NS_132	-0.64	-1.42	-1.45	-1.46	-1.47	0.00	-0.64	-1.42	-1.45	-1.46	-1.47	0.00
NS_259	0.49	0.16	0.15	0.14	0.13	0.12	0.49	0.16	0.15	0.14	0.13	0.12
NS_701	1.23	0.53	0.44	0.45	0.40	0.33	1.23	0.53	0.44	0.45	0.40	0.33
NS_170	0.15	-0.09	-0.11	-0.11	-0.13	-0.14	0.15	-0.09	-0.11	-0.11	-0.13	-0.14
NS_881	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NS_416	-1.79	-2.01	-2.03	-2.03	-2.04	-2.06	-1.79	-2.01	-2.03	-2.03	-2.04	-2.06
NS_18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NS_504	0.61	-0.29	-0.31	-0.31	-0.31	-0.32	0.61	-0.29	-0.31	-0.31	-0.31	-0.32
NS_548	0.37	-0.03	-0.08	-0.08	-0.13	-0.17	0.37	-0.03	-0.08	-0.08	-0.13	-0.17
NS_789	0.73	0.61	0.26	0.22	0.00	0.00	0.73	0.61	0.26	0.22	0.00	0.00
NS_680	-0.10	0.00	0.00	0.00	0.00	0.00	-0.10	0.00	0.00	0.00	0.00	0.00
NS_810	0.50	0.17	0.13	0.13	0.10	0.09	0.50	0.17	0.13	0.13	0.10	0.09
NS_657	2.07	0.35	0.21	0.18	0.07	-0.04	2.07	0.35	0.21	0.18	0.07	-0.04
NS_283	0.21	-0.02	-0.03	-0.05	-0.08	-0.16	0.21	-0.02	-0.03	-0.05	-0.08	-0.16
NS_614	0.41	0.00	-0.04	-0.05	-0.07	-0.13	0.41	0.00	-0.04	-0.05	-0.07	-0.13
NS_306	0.30	0.13	0.12	0.10	0.08	0.04	0.30	0.13	0.12	0.10	0.08	0.04
NS_395	-1.66	-1.99	-2.03	-2.03	-2.04	-2.05	-1.66	-1.99	-2.03	-2.03	-2.04	-2.05
NS_216	1.04	-0.49	-0.64	-0.68	-0.85	-1.07	1.04	-0.49	-0.64	-0.68	-0.85	-1.07
NS_724	0.28	0.10	0.07	0.07	0.05	0.01	0.28	0.10	0.07	0.07	0.05	0.01
NS_329	-4.12	-4.99	-5.03	-5.08	-5.10	-5.10	-4.12	-4.99	-5.03	-5.08	-5.10	-5.10
NS_373	0.27	-0.13	-0.16	-0.18	-0.20	-0.23	0.27	-0.13	-0.16	-0.18	-0.20	-0.23
NS_102	0.19	0.00	0.00	0.00	0.00	0.00	0.19	0.00	0.00	0.00	0.00	0.00
NS_10	-0.54	-0.73	-0.75	-0.75	-0.80	-0.81	-0.54	-0.73	-0.75	-0.75	-0.80	-0.81
NS_133	0.71	-0.06	-0.08	-0.08	-0.10	-0.11	0.71	-0.06	-0.08	-0.08	-0.10	-0.11
NS_56	-0.04	-0.30	-0.34	-0.33	-0.34	-0.37	-0.04	-0.30	-0.34	-0.33	-0.34	-0.37
NS_237	-0.19	-0.32	-0.32	-0.32	-0.32	0.00	-0.19	-0.32	-0.32	-0.32	-0.32	0.00
NS_751	0.09	0.00	0.00	0.00	0.00	0.00	0.09	0.00	0.00	0.00	0.00	0.00
NS_193	-0.37	-0.50	-0.50	-0.51	-0.52	-0.54	-0.37	-0.50	-0.50	-0.51	-0.52	-0.54
NS_768	-0.85	-0.89	-0.89	-0.89	-0.90	-0.90	-0.85	-0.89	-0.89	-0.89	-0.90	-0.90
NS_79	1.19	0.57	0.57	0.57	0.44	0.39	1.19	0.57	0.57	0.57	0.44	0.39
NS_591	0.80	0.12	0.05	0.05	-0.02	-0.08	0.80	0.12	0.05	0.05	-0.02	-0.08
NS_811	0.05	-0.03	-0.06	-0.06	-0.07	-0.03	0.05	-0.03	-0.06	-0.06	-0.07	-0.03
NS_483	-2.09	-2.12	-2.12	-2.13	-2.13	-2.13	-2.09	-2.12	-2.12	-2.13	-2.13	-2.13
NS_439	-2.41	-2.42	-2.43	-2.43	-2.43	-2.43	-2.41	-2.42	-2.43	-2.43	-2.43	-2.43
NS_43	-1.76	-1.95	-1.97	-1.98	-1.99	-2.01	-1.76	-1.95	-1.97	-1.98	-1.99	-2.01
NS_527	3.74	-2.34	-2.94	-3.17	0.00	0.00	3.74	-2.34	-2.94	-3.17	0.00	0.00
NS_134	-0.95	-1.55	-1.56	-1.56	-1.56	-1.56	-0.95	-1.55	-1.56	-1.56	-1.56	-1.56
NS_148	-0.65	0.00	0.00	0.00	0.00	0.00	-0.65	0.00	0.00	0.00	0.00	0.00
NS_882	-0.41	-0.37	-0.37	-0.38	-0.38	-0.38	-0.41	-0.37	-0.37	-0.38	-0.38	-0.38
NS_171	1.45	1.24	1.22	1.22	1.21	1.19	1.45	1.24	1.22	1.22	1.21	1.19
NS_260	0.21	-0.07	-0.08	-0.10	-0.11	-0.12	0.21	-0.07	-0.08	-0.10	-0.11	-0.12
NS_570	-2.67	-2.80	-2.82	-2.84	-2.85	-2.86	-2.67	-2.80	-2.82	-2.84	-2.85	-2.86
NS_702	0.98	0.26	0.18	0.19	0.16	0.11	0.98	0.26	0.18	0.19	0.16	0.11
NS_19	1.25	0.55	0.45	0.45	0.36	0.24	1.25	0.55	0.45	0.45	0.36	0.24
NS_417	0.17	-0.24	-0.27	-0.28	-0.28	-0.29	0.17	-0.24	-0.27	-0.28	-0.28	-0.29
NS_752	-0.99	-2.50	-2.73	-2.75	-2.87	-3.04	-0.99	-2.50	-2.73	-2.75	-2.87	-3.04
NS_681	-0.05	0.00	0.00	0.00	0.00	0.00	-0.05	0.00	0.00	0.00	0.00	0.00
NS_549	-0.65	-1.06	-1.11	-1.11	-1.16	-1.20	-0.65	-1.06	-1.11	-1.11	-1.16	-1.20
NS_505	0.78	0.00	-0.03	-0.03	-0.06	-0.10	0.78	0.00	-0.03	-0.03	-0.06	-0.10
NS_812	0.17	0.11	0.10	0.10	0.10	0.09	0.17	0.11	0.10	0.10	0.10	0.09
NS_790	0.39	0.27	-0.08	-0.20	0.00	0.00	0.39	0.27	-0.08	-0.20	0.00	0.00
NS_658	1.85	0.79	0.72	0.72	0.66	0.60	1.85	0.79	0.72	0.72	0.66	0.60
NS_298	0.12	0.00	-0.01	-0.01	0.00	0.00	0.12	0.00	-0.01	-0.01	0.00	0.00
NS_615	1.10	0.49	0.43	0.42	0.38	0.00	1.10	0.49	0.43	0.42	0.38	0.00
NS_307	0.92	0.47	0.44	0.42	0.39	0.37	0.92	0.47	0.44	0.42	0.39	0.37
NS_284	0.19	-0.05	-0.06	-0.08	-0.11	-0.19	0.19	-0.05	-0.06	-0.08	-0.11	-0.19
NS_217	1.22	0.08	0.05	0.04	0.01	-0.02	1.22	0.08	0.05	0.04	0.01	-0.02
NS_11	0.32	0.04	0.00	0.00	-0.02	-0.03	0.32	0.04	0.00	0.00	-0.02	-0.03
NS_374	1.16	0.31	0.25	0.19	0.10	0.07	1.16	0.31	0.25	0.19	0.10	0.07
NS_725	0.27	0.08	0.05	0.05	0.04	-0.03	0.27	0.08	0.05	0.05	0.04	-0.03
NS_103	0.20	0.01	-0.01	-0.01	-0.02	-0.04	0.20	0.01	-0.01	-0.01	-0.02	-0.04
NS_330	-4.93	-5.03	-5.04	-5.04	-5.04	-5.04	-4.93	-5.03	-5.04	-5.04	-5.04	-5.04
NS_135	-0.80	-1.96	-1.97	-1.97	-1.98	-1.98	-0.80	-1.96	-1.97	-1.97	-1.98	-1.98
NS_57	-0.03	-0.25	-0.32	-0.32	-0.33	-0.36	-0.03	-0.25	-0.32	-0.32	-0.33	-0.36
NS_194	-1.82	-2.13	-2.14	-2.15	-2.15	-2.16	-1.82	-2.13	-2.14	-2.15	-2.15	-2.16
NS_80	0.43	0.22	0.20	0.20	0.19	0.11	0.43	0.22	0.20	0.20	0.19	0.11
NS_484	-2.05	-2.06	-2.06	-2.07	-2.07	-2.07	-2.05	-2.06	-2.06	-2.07	-2.07	-2.07
NS_44	-1.09	-1.16	-1.16	-1.16	-1.16	-1.16	-1.09	-1.16	-1.16	-1.16	-1.16	-1.16
NS_238	-0.22	-0.29	-0.29	-0.29	-0.30	-0.30	-0.22	-0.29	-0.29	-0.29	-0.30	-0.30
NS_753	-1.43	-2.77	-2.93	-2.94	-3.05	-3.10	-1.43	-2.77	-2.93	-2.94	-3.05	-3.10
NS_813	0.16	0.05	0.04	0.03	0.01	-0.05	0.16	0.05	0.04	0.03	0.01	-0.05
NS_592	0.01	-0.13	-0.14	-0.14	-0.15	-0.16	0.01	-0.13	-0.14	-0.14	-0.15	-0.16
NS_440	-2.51	-2.79	-2.80	-2.81	-2.82	-2.80	-2.51	-2.79	-2.80	-2.81	-2.82	-2.80
NS_528	5.35	-0.74	-1.33	-1.51	-1.57	-1.60	5.35	-0.74	-1.33	-1.51	-1.57	-1.60
NS_172	-0.70	-0.70	0.00	0.00	0.00	0.00	-0.70	-0.70	0.00	0.00	0.00	0.00
NS_883	-1.35	-1.57	-1.57	-1.58	-1.58	-1.59	-1.35	-1.57	-1.57	-1.58	-1.58	-1.59
NS_136	0.56	-0.25	-0.28	-0.28	-0.29	-0.30	0.56	-0.25	-0.28	-0.28	-0.29	-0.30
NS_149	-1.45	-1.82	-1.86	-1.87	-1.90	-1.96	-1.45	-1.82	-1.86	-1.87	-1.90	-1.96
NS_261	1.32	0.76	0.72	0.69	0.66	0.65	1.32	0.76	0.72	0.69	0.66	0.65
NS_20	0.89	0.32	0.26	0.25	0.16	0.06	0.89	0.32	0.26	0.25	0.16	0.06
NS_703	-0.94	-1.11	-1.12	-1.12	-1.13	-1.16	-0.94	-1.11	-1.12	-1.12	-1.13	-1.16
NS_682	2.98	-0.07	-0.18	-0.21	-0.24	-0.25	2.98	-0.07	-0.18	-0.21	-0.24	-0.25
NS_550	0.78	0.37	0.32	0.32	0.27	0.23	0.78	0.37	0.32	0.32	0.27	0.23
NS_571	0.31	0.12	0.11	0.09	0.08	0.07	0.31	0.12	0.11	0.09	0.08	0.07
NS_418	1.21	0.59	0.42	0.41	0.38	0.32	1.21	0.59	0.42	0.41	0.38	0.32
NS_814	-2.18	0.00	0.00	0.00	0.00	0.00	-2.18	0.00	0.00	0.00	0.00	0.00
NS_397	-2.99	-3.02	-3.02	-3.02	-3.02	-3.02	-2.99	-3.02	-3.02	-3.02	-3.02	-3.02
NS_506	1.06	-0.12	-0.15	-0.16	-0.17	-0.19	1.06	-0.12	-0.15	-0.16	-0.17	-0.19
NS_791	-1.30	0.00	0.00	0.00	0.00	0.00	-1.30	0.00	0.00	0.00	0.00	0.00
NS_659	1.94	0.77	0.64	0.63	0.54	0.40	1.94	0.77	0.64	0.63	0.54	0.40
NS_616	0.96	0.32	0.23	0.23	0.18	0.10	0.96	0.32	0.23	0.23	0.18	0.10
NS_754	-0.97	-0.99	-0.99	-0.99	-0.99	-0.99	-0.97	-0.99	-0.99	-0.99	-0.99	-0.99
NS_12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NS_285	0.01	-0.17	-0.18	-0.18	-0.19	-0.22	0.01	-0.17	-0.18	-0.18	-0.19	-0.22
NS_218	-0.51	-0.61	-0.85	-0.85	-0.85	-0.85	-0.51	-0.61	-0.85	-0.85	-0.85	-0.85
NS_726	0.26	0.09	0.06	0.06	0.04	0.00	0.26	0.09	0.06	0.06	0.04	0.00
NS_58	-0.15	-0.23	-0.24	-0.24	-0.24	-0.25	-0.15	-0.23	-0.24	-0.24	-0.24	-0.25
NS_375	0.49	0.19	0.17	0.15	0.12	0.10	0.49	0.19	0.17	0.15	0.12	0.10
NS_104	-1.15	-1.15	-1.09	-1.09	0.00	0.00	-1.15	-1.15	-1.09	-1.09	0.00	0.00
NS_137	1.01	-0.20	-0.23	-0.23	-0.24	-0.25	1.01	-0.20	-0.23	-0.23	-0.24	-0.25
NS_331	-3.86	-4.75	-4.80	-4.89	-4.99	-5.03	-3.86	-4.75	-4.80	-4.89	-4.99	-5.03
NS_195	-1.76	0.00	0.00	0.00	0.00	0.00	-1.76	0.00	0.00	0.00	0.00	0.00
NS_81	-0.99	-1.75	-1.80	-1.81	-1.85	-1.89	-0.99	-1.75	-1.80	-1.81	-1.85	-1.89
NS_352	0.05	-0.09	-0.12	-0.12	-0.14	-0.15	0.05	-0.09	-0.12	-0.12	-0.14	-0.15
NS_485	-1.96	-2.04	-2.04	-2.12	-2.12	-2.12	-1.96	-2.04	-2.04	-2.12	-2.12	-2.12
NS_45	0.62	0.09	0.00	0.00	0.00	0.00	0.62	0.09	0.00	0.00	0.00	0.00
NS_239	0.24	0.13	0.12	0.10	0.10	0.09	0.24	0.13	0.12	0.10	0.10	0.09
NS_815	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NS_593	0.21	0.04	0.02	0.02	0.00	-0.02	0.21	0.04	0.02	0.02	0.00	-0.02
NS_441	-0.31	-0.33	-0.33	-0.34	-0.34	-0.34	-0.31	-0.33	-0.33	-0.34	-0.34	-0.34

Flood Damages

ID or Survey No.	PMF: Damages, total for event, per property affected	PMF: Properties Affected above floor level, damaged	AEP 1.00%: Damages, total for event, per property affected	AEP 1.00%: Properties Affected above floor level, damaged	AEP 2.0%: Damages, total for event, per property affected	AEP 2.0%: Properties Affected above floor level, damaged	AEP 5.0%: Damages, total for event, per property affected	AEP 5.0%: Properties Affected above floor level, damaged	AEP 10.0%: Damages, total for event, per property affected	AEP 10.0%: Properties Affected above floor level, damaged	AEP 20.0%: Damages, total for event, per property affected	AEP 20.0%: Properties Affected above floor level, damaged	AEP: Damages, total for event, per property affected	AEP: Properties Affected above floor level, damaged	AEP: Damages, total for event, per property affected	AEP: Properties Affected above floor level, damaged	AAD, total and per property
	$ 71,529,460	491	$ 41,507,489	299	$ 38,271,467	272	$ 37,301,451	266	$ 34,249,086	247	$ 29,597,377	216	$ -	0	$ -	0	$ 11,517,801
NS_9	$ 50,064	0	$ 48,304	0	$ 48,304	0	$ 48,304	0	$ 46,545	0	$ 46,545	0	$ -		$ -		$ 16,431
NS_55	$ 124,309	1	$ 105,820	1	$ 101,197	1	$ 101,197	1	$ 101,197	1	$ 47,264	1	$ -		$ -		$ 24,793
NS_192	$ 16,183	0	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ 81
NS_767	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
NS_78	$ 128,931	1	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 6,227
NS_438	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
NS_482	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
NS_809	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
NS_42	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
NS_147	$ 16,183	0	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ 81
NS_526	$ 253,292	1	$ 16,183	0	$ -		$ -		$ -		$ -		$ -		$ -		$ 1,427
NS_569	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
NS_750	$ 194,770	1	$ 138,175	1	$ 124,309	1	$ 124,309	1	$ 119,686	1	$ 110,442	1	$ -		$ -		$ 40,877
NS_132	$ 44,785	0	$ 30,706	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ -		$ 2,715
NS_259	$ 119,686	1	$ 105,820	1	$ 105,820	1	$ 101,197	1	$ 101,197	1	$ 101,197	1	$ -		$ -		$ 35,649
NS_701	$ 152,042	1	$ 119,686	1	$ 115,064	1	$ 115,064	1	$ 115,064	1	$ 110,442	1	$ -		$ -		$ 39,578
NS_170	$ 105,820	1	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 6,112
NS_881	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
NS_416	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
NS_18	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
NS_504	$ 124,309	1	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 6,204
NS_548	$ 115,064	1	$ 47,264	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 6,469
NS_789	$ 128,931	1	$ 124,309	1	$ 110,442	1	$ 105,820	1	$ -		$ -		$ -		$ -		$ 8,328
NS_680	$ 16,183	0	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ 81
NS_810	$ 119,686	1	$ 105,820	1	$ 101,197	1	$ 101,197	1	$ 101,197	1	$ 101,197	1	$ -		$ -		$ 35,557
NS_657	$ 190,170	1	$ 110,442	1	$ 105,820	1	$ 105,820	1	$ 101,197	1	$ 47,264	0	$ -		$ -		$ 25,446
NS_283	$ 105,820	1	$ 47,264	0	$ 47,264	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 7,044
NS_614	$ 115,064	1	$ 47,264	1	$ 47,264	0	$ 47,264	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 8,333
NS_306	$ 110,442	1	$ 101,197	1	$ 101,197	1	$ 101,197	1	$ 101,197	1	$ 47,264	1	$ -		$ -		$ 24,678
NS_395	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
NS_216	$ 156,976	1	$ 46,545	0	$ 44,785	0	$ 43,025	0	$ 39,505	0	$ 35,985	0	$ -		$ -		$ 14,026
NS_724	$ 110,442	1	$ 101,197	1	$ 101,197	1	$ 101,197	1	$ 47,264	1	$ 47,264	1	$ -		$ -		$ 20,633
NS_329	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
NS_373	$ 110,442	1	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 6,135
NS_102	$ 105,820	1	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ 529
NS_10	$ 46,545	0	$ 43,025	0	$ 43,025	0	$ 41,265	0	$ 41,265	0	$ 41,265	0	$ -		$ -		$ 14,522
NS_133	$ 128,931	1	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 6,227
NS_56	$ 47,264	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 5,819
NS_237	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ -		$ 2,427
NS_751	$ 101,197	1	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ 505
NS_193	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 5,664
NS_768	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
NS_79	$ 152,042	1	$ 124,309	1	$ 124,309	1	$ 124,309	1	$ 115,064	1	$ 115,064	1	$ -		$ -		$ 41,103
NS_591	$ 133,553	1	$ 101,197	1	$ 47,264	1	$ 47,264	1	$ 47,264	0	$ 16,183	0	$ -		$ -		$ 11,296
NS_811	$ 101,197	1	$ 47,264	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 47,264	0	$ -		$ -		$ 12,615
NS_483	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
NS_439	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
NS_43	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
NS_527	$ 235,694	1	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ 1,177
NS_134	$ 37,745	0	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ 189
NS_148	$ 43,025	0	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ 215
NS_882	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 5,664
NS_171	$ 165,909	1	$ 152,042	1	$ 152,042	1	$ 152,042	1	$ 152,042	1	$ 152,042	1	$ -		$ -		$ 53,282
NS_260	$ 105,820	1	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 6,112
NS_570	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
NS_702	$ 142,797	1	$ 110,442	1	$ 105,820	1	$ 105,820	1	$ 105,820	1	$ 101,197	1	$ -		$ -		$ 36,342
NS_19	$ 152,042	1	$ 119,686	1	$ 115,064	1	$ 115,064	1	$ 115,064	1	$ 105,820	1	$ -		$ -		$ 38,653
NS_417	$ 105,820	1	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 6,112
NS_752	$ 37,745	0	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ 189
NS_681	$ 16,183	0	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ 81
NS_549	$ 43,025	0	$ 35,985	0	$ 35,985	0	$ 35,985	0	$ 34,226	0	$ 34,226	0	$ -		$ -		$ 12,146
NS_505	$ 133,553	1	$ 47,264	1	$ 47,264	0	$ 47,264	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 8,426
NS_812	$ 105,820	1	$ 101,197	1	$ 101,197	1	$ 101,197	1	$ 101,197	1	$ 101,197	1	$ -		$ -		$ 35,441
NS_790	$ 110,442	1	$ 110,442	1	$ 16,183	0	$ 16,183	0	$ -		$ -		$ -		$ -		$ 2,650
NS_658	$ 184,397	1	$ 133,553	1	$ 128,931	1	$ 128,931	1	$ 128,931	1	$ 124,309	1	$ -		$ -		$ 44,523
NS_298	$ 101,197	1	$ 47,264	0	$ 47,264	0	$ 47,264	0	$ -		$ -		$ -		$ -		$ 3,814
NS_615	$ 147,420	1	$ 119,686	1	$ 115,064	1	$ 115,064	1	$ 115,064	1	$ -		$ -		$ -		$ 17,466
NS_307	$ 138,175	1	$ 119,686	1	$ 115,064	1	$ 115,064	1	$ 115,064	1	$ 115,064	1	$ -		$ -		$ 40,433
NS_284	$ 105,820	1	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 6,112
NS_217	$ 152,042	1	$ 101,197	1	$ 47,264	1	$ 47,264	1	$ 47,264	1	$ 47,264	0	$ -		$ -		$ 17,604
NS_11	$ 110,442	1	$ 47,264	1	$ 47,264	1	$ 47,264	1	$ 47,264	0	$ 47,264	0	$ -		$ -		$ 16,858
NS_374	$ 152,042	1	$ 110,442	1	$ 105,820	1	$ 105,820	1	$ 101,197	1	$ 101,197	1	$ -		$ -		$ 36,042
NS_725	$ 110,442	1	$ 101,197	1	$ 101,197	1	$ 101,197	1	$ 47,264	1	$ 47,264	0	$ -		$ -		$ 20,633
NS_103	$ 105,820	1	$ 47,264	1	$ 47,264	0	$ 47,264	0	$ 47,264	0	$ 47,264	0	$ -		$ -		$ 16,834
NS_330	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
NS_135	$ 41,265	0	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ 206
NS_57	$ 47,264	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 5,819
NS_194	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
NS_80	$ 115,064	1	$ 105,820	1	$ 105,820	1	$ 105,820	1	$ 105,820	1	$ 101,197	1	$ -		$ -		$ 36,158
NS_484	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
NS_44	$ 35,985	0	$ 34,226	0	$ 34,226	0	$ 34,226	0	$ 34,226	0	$ 34,226	0	$ -		$ -		$ 11,987
NS_238	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 5,664
NS_753	$ 30,706	0	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ 153
NS_813	$ 105,820	1	$ 47,264	1	$ 47,264	1	$ 47,264	1	$ 47,264	1	$ 47,264	0	$ -		$ -		$ 16,834
NS_592	$ 47,264	1	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 5,819
NS_440	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
NS_528	$ 262,092	1	$ 43,025	0	$ 32,466	0	$ -		$ -		$ -		$ -		$ -		$ 2,388
NS_172	$ 43,025	0	$ 43,025	0	$ -		$ -		$ -		$ -		$ -		$ -		$ 645
NS_883	$ 30,706	0	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ 153
NS_136	$ 124,309	1	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 6,204
NS_149	$ 30,706	0	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ 153
NS_261	$ 156,664	1	$ 133,553	1	$ 128,931	1	$ 128,931	1	$ 128,931	1	$ 124,309	1	$ -		$ -		$ 44,385
NS_20	$ 138,175	1	$ 110,442	1	$ 110,442	1	$ 105,820	1	$ 105,820	1	$ 101,197	1	$ -		$ -		$ 36,412
NS_703	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
NS_682	$ 200,520	1	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 6,585
NS_550	$ 133,553	1	$ 115,064	1	$ 110,442	1	$ 110,442	1	$ 110,442	1	$ 105,820	1	$ -		$ -		$ 37,891
NS_571	$ 110,442	1	$ 101,197	1	$ 101,197	1	$ 101,197	1	$ 101,197	1	$ 101,197	1	$ -		$ -		$ 35,464
NS_418	$ 152,042	1	$ 124,309	1	$ 115,064	1	$ 115,064	1	$ 115,064	1	$ 110,442	1	$ -		$ -		$ 39,624
NS_814	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
NS_397	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
NS_506	$ 147,420	1	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 6,320
NS_791	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
NS_659	$ 184,397	1	$ 133,553	1	$ 124,309	1	$ 124,309	1	$ 119,686	1	$ 115,064	1	$ -		$ -		$ 41,704
NS_616	$ 142,797	1	$ 110,442	1	$ 105,820	1	$ 105,820	1	$ 105,820	1	$ 101,197	1	$ -		$ -		$ 36,342
NS_754	$ 37,745	0	$ 37,745	0	$ 37,745	0	$ 37,745	0	$ 37,745	0	$ 37,745	0	$ -		$ -		$ 13,210
NS_12	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
NS_285	$ 47,264	1	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 5,819
NS_218	$ 46,545	0	$ 44,785	0	$ 41,265	0	$ 41,265	0	$ 41,265	0	$ 41,265	0	$ -		$ -		$ 14,504
NS_726	$ 110,442	1	$ 101,197	1	$ 101,197	1	$ 101,197	1	$ 47,264	1	$ 47,264	1	$ -		$ -		$ 20,633
NS_58	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 5,664
NS_375	$ 119,686	1	$ 105,820	1	$ 105,820	1	$ 101,197	1	$ 101,197	1	$ 101,197	1	$ -		$ -		$ 35,649
NS_104	$ 34,226	0	$ 34,226	0	$ 35,985	0	$ 35,985	0	$ -		$ -		$ -		$ -		$ 2,672
NS_137	$ 142,797	1	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 6,296
NS_331	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
NS_195	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
NS_81	$ 37,745	0	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ 189
NS_352	$ 47,264	1	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 5,819
NS_485	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
NS_45	$ 124,309	1	$ 101,197	1	$ -		$ -		$ -		$ -		$ -		$ -		$ 1,632
NS_239	$ 105,820	1	$ 101,197	1	$ 101,197	1	$ 101,197	1	$ 101,197	1	$ 101,197	1	$ -		$ -		$ 35,441
NS_815	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
NS_593	$ 105,820	1	$ 47,264	1	$ 47,264	1	$ 47,264	1	$ 47,264	0	$ 47,264	0	$ -		$ -		$ 16,834
NS_441	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 5,664

ID or Survey No.	Street Name	Street Address	CADID	Plan Label	Suburb	Raisable Yes/No	Floor Level m AHD	"Protection Level" (Floor Level less Freeboard) m AHD	Ground Level m AHD	Type of Res 1-4	Flood Level at Property, m AHD for each AEP flood: PMF	1.00%	2.00%	5.00%	10.00%	20.00%
NS_529	Carlyle Lane	9	103819941	DP815314	Wollstonecraf	No	59.06	59.06	56.06	1	60.22	0.00	0.00	0.00	0.00	0.00
NS_755	Warringa Rd	46	102155922	DP1019089	Cammeray	No	67.84	67.84	66.64	1	66.58	66.55	66.54	66.54	66.54	66.53
NS_884	Young St	54	102209561	SP66531	Cremorne	No	65.68	65.68	65.18	2	66.00	65.87	65.84	65.84	65.82	65.80
NS_173	Gillies St	13-15	102158883	SP14745	Wollstonecraf	No	74.30	74.30	73.30	1	0.00	0.00	0.00	0.00	0.00	0.00
NS_138	Young St	93	102204350	DP626950	Cremorne	No	48.33	48.33	47.33	1	47.82	47.18	47.14	47.14	47.12	47.11
NS_21	Ancrum St	36	104390865	DP32827	Waverton	No	37.40	37.40	37.30	2	38.38	37.72	0.00	0.00	0.00	0.00
NS_262	Raymond Rd	52	102160916	DP398011	Neutral Bay	No	69.45	69.45	69.25	2	69.43	69.35	69.35	69.34	69.33	69.33
NS_704	Miller St	390	104733699	SP15842	Cammeray	No	79.35	79.35	78.65	1	78.89	78.67	78.65	78.65	78.64	78.61
NS_683	Lytton St	33	102157901	DP72089	Cammeray	No	67.99	67.99	67.79	2	71.35	68.28	68.15	68.11	67.99	67.83
NS_150	Benelong Rd	27	102204466	DP5107	Cremorne	No	46.31	46.31	45.71	1	0.00	0.00	0.00	0.00	0.00	0.00
NS_551	Lithgow St	9	102156707	DP825769	Wollstonecraf	No	67.51	67.51	66.01	1	65.91	0.00	0.00	0.00	0.00	0.00
NS_792	West Crescent St	11	102164499	DP802222	McMahons Poi	No	16.36	16.36	16.26	2	17.22	16.92	16.91	16.90	16.88	16.82
NS_572	Whaling Rd	51	102160135	DP704510	North Sydney	No	33.02	33.02	32.92	2	33.30	33.11	33.09	33.08	33.07	33.06
NS_398	Ryries Pde	23	102204798	DP10291	Cremorne	No	38.73	38.73	37.73	1	0.00	0.00	0.00	0.00	0.00	0.00
NS_660	Miller St	342	102157766	SP56604	Cammeray	No	75.47	75.47	75.17	2	76.79	75.62	75.55	75.54	75.50	75.43
NS_816	Honda Rd	1	102210910	DP86145	Kurraba Point	No	20.27	20.27	20.27	2	20.21	20.21	20.21	20.20	20.20	20.20
NS_419	Earle St	8	102156055	DP977399	Cremorne	No	50.30	50.30	50.15	2	50.74	50.41	50.40	50.39	50.39	50.38
NS_617	Chandos St	130	102154920	DP230948	Crows Nest	No	73.38	73.38	73.28	2	74.52	73.85	73.79	73.79	73.75	73.66
NS_507	Bardsley Gardens	3	102157819	SP12365	North Sydney	No	71.83	71.83	71.43	2	73.00	71.83	71.76	71.73	71.66	71.58
NS_59	Benelong Rd	106	102204915	DP947362	Cremorne	No	57.24	57.24	56.94	2	57.22	57.12	57.12	57.12	57.11	57.10
NS_286	Aubin St	21-33	102160692	DP508926	Neutral Bay	No	28.97	28.97	28.57	2	29.79	29.07	29.05	29.00	28.95	28.81
NS_756	Milray Ave	84	102156545	SP5744	Wollstonecraf	No	43.75	43.75	43.65	2	43.71	43.56	43.56	43.56	43.55	43.55
NS_219	Grafton St	16	102156087	DP336323	Cremorne	No	41.90	41.90	41.70	2	42.24	41.84	41.80	41.79	41.75	41.70
NS_727	Falcon St	73	102157265	DP582541	Crows Nest	No	85.87	85.87	85.77	2	86.12	85.99	85.98	85.98	85.94	85.91
NS_196	McDougall St	25	104108490	DP107669	Kirribilli	No	6.65	6.65	5.45	1	5.45	0.00	0.00	0.00	0.00	0.00
NS_376	Thrupp St	1A	102210403	DP557109	Neutral Bay	No	31.09	31.09	30.89	2	31.33	31.12	31.10	31.09	31.07	31.06
NS_829	Glenferrie Ave	17	102211253	DP337524	Cremorne Poi	No	25.46	25.46	25.41	2	25.75	25.51	25.50	25.50	25.49	25.49
NS_332	Darley St	37A	102160210	DP736637	Neutral Bay	No	4.52	4.52	4.32	2	4.32	3.50	3.48	3.44	3.39	3.38
NS_486	Hampden St	12	102159788	DP262512	North Sydney	No	59.47	59.47	57.47	1	57.25	57.25	57.25	57.25	57.25	57.25
NS_105	Belgrave St	35	102209544	SP67994	Cremorne	No	69.46	69.46	69.36	2	69.19	0.00	0.00	0.00	0.00	0.00
NS_82	Benelong Rd	4	102209708	DP925026	Cremorne	No	52.78	52.78	52.58	2	52.64	52.57	52.56	52.55	52.54	52.53
NS_46	Langley St	15	102205101	SP50165	Cremorne	No	78.30	78.30	78.10	2	78.17	78.14	78.13	78.13	78.13	78.12
NS_353	Grosvenor St	62-66	104313198	SP9760	Neutral Bay	No	77.82	77.82	75.82	1	0.00	0.00	0.00	0.00	0.00	0.00
NS_817	Bogota Ave	16	102210912	DP400986	Kurraba Point	No	18.72	18.72	18.52	2	18.90	18.54	18.52	18.51	18.50	18.49
NS_240	Phillips St	14	153423613	DP1097060	Neutral Bay	No	43.60	43.60	43.50	2	43.71	43.60	43.60	43.58	43.58	43.57
NS_594	Bank St	89	102159023	DP418	North Sydney	No	50.01	50.01	48.01	1	48.73	48.26	48.21	48.21	48.18	48.16
NS_530	Carlyle Lane	11	103819940	DP815314	Wollstonecraf	No	59.19	59.19	56.19	1	60.22	0.00	0.00	0.00	0.00	0.00
NS_885	Spofforth St	64-70	102210353	SP30331	Cremorne	No	64.51	64.51	63.51	1	63.48	63.46	63.45	63.44	0.00	0.00
NS_757	Victoria St	16	104014461	DP882641	McMahons Poi	No	35.12	35.12	35.02	2	35.24	35.11	35.10	35.10	35.08	35.07
NS_442	Harrison St	7	102210865	DP3104	Cremorne	No	75.82	75.82	75.32	2	76.00	75.66	75.64	75.61	75.57	75.54
NS_174	Broughton St	83	102162997	DP440743	Kirribilli	No	16.35	16.35	15.95	2	16.94	16.69	16.69	16.68	16.63	16.57
NS_22	Ancrum St	34	102158810	DP32827	Waverton	No	38.00	38.00	37.90	2	38.46	0.00	0.00	0.00	0.00	0.00
NS_830	Glenferrie Ave	19	102210223	DP589018	Cremorne Poi	No	28.13	28.13	25.13	1	25.93	25.36	25.33	25.30	25.27	25.24
NS_263	Undercliff St	89	102160927	DP547643	Neutral Bay	No	63.63	63.63	63.33	2	63.30	63.28	63.27	63.26	63.26	63.25
NS_705	Rosalind St	33	102155461	DP373193	Cammeray	No	81.49	81.49	81.29	2	81.95	81.64	81.60	81.60	81.58	81.55
NS_793	West Crescent St	11A	102164500	DP802222	McMahons Poi	No	16.39	16.39	16.29	2	17.21	16.92	16.91	16.90	16.88	16.83
NS_151	Benelong Rd	29	102204468	DP5107	Cremorne	No	46.60	46.60	45.60	1	45.40	0.00	0.00	0.00	0.00	0.00
NS_684	Ernest St	223	102157902	DP110096	Cammeray	No	67.85	67.85	67.05	1	71.33	67.51	67.45	67.43	67.36	67.27
NS_818	Bogota Ave	14	102210913	DP400986	Kurraba Point	No	18.41	18.41	18.41	2	18.87	18.53	18.52	18.52	18.52	18.52
NS_399	Ryries Pde	25	102204795	DP10291	Cremorne	No	33.75	33.75	33.45	2	36.20	34.97	34.74	34.75	34.66	34.48
NS_552	Lithgow St	13-15	103701559	SP50610	Wollstonecraf	No	67.57	67.57	66.77	1	67.25	66.79	66.77	66.76	66.74	66.73
NS_661	Miller St	291	175631017	SP95911	Cammeray	No	75.14	75.14	75.14	2	76.80	75.28	75.21	75.19	75.16	75.15
NS_573	Whaling Rd	53	102160129	DP913656	North Sydney	No	32.73	32.73	32.63	2	33.30	33.11	33.10	33.08	33.07	33.06
NS_60	Benelong Rd	108	102204918	DP105730	Cremorne	No	58.20	58.20	57.80	2	57.89	57.85	57.85	57.85	57.85	57.85
NS_618	Chandos St	128	102154918	DP230948	Crows Nest	No	73.29	73.29	73.19	2	74.51	73.84	73.78	73.77	73.74	73.65
NS_758	Thomas St	2	102163715	DP865933	McMahons Poi	No	36.50	36.50	36.40	2	36.90	36.64	36.62	36.62	36.56	36.55
NS_728	Falcon St	75	102157267	DP1720	Crows Nest	No	85.84	85.84	85.24	1	85.80	85.50	85.46	85.46	85.44	85.40
NS_420	Earle St	4A	102156052	DP805881	Cremorne	No	47.81	47.81	47.81	2	48.55	48.15	48.09	48.09	48.06	48.01
NS_831	Glenferrie Ave	21	102210224	DP589018	Cremorne Poi	No	22.40	22.40	22.35	2	22.88	22.41	22.38	22.36	22.33	22.30
NS_508	Bardsley Gardens	2	102157818	DP19405	North Sydney	No	72.06	72.06	71.86	2	72.94	72.03	71.95	71.93	71.87	71.75
NS_220	Park Ave	73	103931477	DP876877	Cremorne	No	44.94	44.94	44.84	2	45.67	44.96	44.89	44.87	44.77	0.00
NS_197	McDougall St	27	104108489	DP107669	Kirribilli	No	6.75	6.75	5.55	1	5.56	5.29	5.30	5.29	5.28	5.26
NS_287	Aubin St	25-27	102160695	SP15031	Neutral Bay	No	29.10	29.10	28.90	2	29.59	29.09	29.08	29.03	28.98	28.90
NS_487	Hampden St	14	102159790	DP262512	North Sydney	No	59.26	59.26	57.26	1	57.02	57.02	57.02	57.02	57.02	57.02
NS_819	Bogota Ave	12	102210908	DP20238	Kurraba Point	No	17.85	17.85	17.35	2	18.53	17.92	17.88	17.85	17.81	17.75
NS_106	Young St	37	104374645	DP1029838	Cremorne	No	68.85	68.85	68.80	2	68.89	0.00	0.00	0.00	0.00	0.00
NS_377	Kurraba Rd	112	102210401	SP20824	Neutral Bay	No	30.36	30.36	28.36	1	28.60	28.49	28.49	28.48	28.47	28.46
NS_83	Benelong Rd	6	102209709	DP925026	Cremorne	No	52.58	52.58	52.18	2	52.28	52.11	52.09	52.09	52.09	52.08
NS_333	Darley St	5A	102160034	DP740579	Neutral Bay	No	15.90	15.90	15.70	2	16.00	15.87	15.86	15.85	15.84	15.84
NS_241	Phillips St	18	102160731	DP13486	Neutral Bay	No	41.91	41.91	41.71	2	42.39	42.06	42.04	42.02	41.99	41.93
NS_531	Milner Crescent	23	102156634	DP225168	Wollstonecraf	No	66.73	66.73	66.43	2	0.00	0.00	0.00	0.00	0.00	0.00
NS_175	Broughton St	85	102162998	DP440743	Kirribilli	No	15.51	15.51	15.46	2	16.90	16.52	16.52	16.50	16.48	16.42
NS_886	Spofforth St	72-76	102210354	SP21638	Cremorne	No	64.74	64.74	62.74	1	63.58	63.54	63.52	63.49	63.42	63.18
NS_443	Spofforth St	96	102210133	DP957949	Cremorne	No	72.56	72.56	72.36	2	72.63	72.42	72.40	0.00	0.00	0.00
NS_23	Ancrum St	32	102158809	DP418	Waverton	No	37.85	37.85	37.75	2	38.40	0.00	0.00	0.00	0.00	0.00
NS_595	Riley St	4	102159020	SP15037	North Sydney	No	55.84	55.84	52.84	1	53.45	53.15	53.12	53.12	53.09	53.08
NS_354	Bennett St	10	102210862	DP3104	Neutral Bay	No	71.23	71.23	70.23	1	69.88	70.09	70.09	70.08	70.08	70.08
NS_264	Undercliff St	87	102160926	DP316926	Neutral Bay	No	61.32	61.32	61.02	2	61.05	60.96	60.95	60.95	60.95	60.94
NS_832	ower Spofforth Wa	6	102210226	SP11057	Cremorne Poi	No	32.52	32.52	32.47	2	33.35	33.31	33.31	33.30	33.30	33.23
NS_890	Illiliwa St	21	102204508	DP937675	Cremorne	No	62.83	62.83	62.58	2	62.88	0.00	0.00	0.00	0.00	0.00
NS_759	Thomas St	4	108011663	36 - 2550	McMahons Poi	No	36.72	36.72	36.62	2	36.95	36.74	36.73	36.73	36.68	36.66
NS_794	West Crescent St	13	102164501	SP36729	McMahons Poi	No	15.55	15.55	15.45	2	17.20	16.92	16.91	16.90	16.88	16.82
NS_152	Milner Crescent	2A	102156551	SP2919	Wollstonecraf	No	54.15	54.15	53.65	2	0.00	0.00	0.00	0.00	0.00	0.00
NS_685	Ernest St	225	102157903	DP110096	Cammeray	No	67.52	67.52	66.72	1	71.33	67.54	67.48	67.45	67.38	67.28
NS_400	Ryries Pde	27	102204802	DP10291	Cremorne	No	33.20	33.20	32.20	1	33.18	32.84	32.77	32.78	32.72	32.60
NS_820	Bogota Ave	4	102210909	DP20238	Kurraba Point	No	14.56	14.56	14.56	2	17.73	16.22	16.13	16.06	15.96	15.85
NS_706	Bellevue St	69	102155701	DP4895	Cammeray	No	74.92	74.92	74.82	2	75.24	75.01	74.99	74.98	74.97	74.94
NS_553	Lithgow St	17	102156706	DP3175	Wollstonecraf	No	67.73	67.73	67.13	1	66.92	0.00	0.00	0.00	0.00	0.00
NS_851	Abbott St	30	102155495	DP306631	Cammeray	No	70.70	70.70	70.70	2	71.08	0.00	0.00	0.00	0.00	0.00
NS_311	Hayes St	9	102160820	SP37157	Neutral Bay	No	9.91	9.91	9.81	2	10.17	9.86	9.86	9.84	9.82	9.80
NS_61	Benelong Rd	110	102204903	DP105730	Cremorne	No	58.89	58.89	58.74	2	59.16	59.01	58.99	58.99	58.98	58.96
NS_662	Miller St	295	102157828	DP105921	Cammeray	No	75.73	75.73	75.63	2	76.79	75.62	75.62	75.62	75.62	0.00
NS_729	Falcon St	77	102157412	DP415740	Crows Nest	No	85.41	85.41	85.31	2	85.70	85.47	85.45	85.45	85.44	85.42
NS_619	Chandos St	126	102154797	DP388042	Crows Nest	No	73.83	73.83	73.43	2	74.48	73.80	73.76	73.75	73.72	73.66
NS_574	Whaling Rd	55	102160138	DP704510	North Sydney	No	33.01	33.01	32.91	2	33.29	33.11	33.09	33.08	33.07	33.06
NS_833	Kareela Rd	70	102210219	DP948520	Cremorne Poi	No	26.48	26.48	24.48	1	0.00	0.00	0.00	0.00	0.00	0.00
NS_198	McDougall St	31	102163142	DP840197	Kirribilli	No	6.68	6.68	5.48	1	5.61	5.52	5.53	5.52	5.50	5.48
NS_488	McLaren St	5	105424756	38 - 2550	North Sydney	No	82.52	82.52	82.42	2	82.87	82.68	82.67	82.64	82.62	82.61
NS_221	Fall St	1A	103931476	DP876877	Cremorne	No	44.55	44.55	44.35	2	45.08	44.38	44.36	44.36	0.00	0.00
NS_821	Bogota Ave	6	102210907	DP20238	Kurraba Point	No	13.29	13.29	13.29	2	15.92	14.01	13.97	13.95	13.92	13.88
NS_760	Thomas St	6	108011663	36 - 2550	McMahons Poi	No	36.77	36.77	36.72	2	36.99	36.78	36.76	36.77	36.72	36.69
NS_107	Young St	39	104374647	DP86973	Cremorne	No	68.43	68.43	68.33	2	68.39	0.00	0.00	0.00	0.00	0.00
NS_509	Bardsley Gardens	1	102157815	SP55908	North Sydney	No	73.13	73.13	72.43	1	73.09	72.58	72.33	72.33	72.13	0.00
NS_773	Bay View St	31	102164140	DP630293	Lavender Bay	No	16.06	16.06	15.96	2	16.61	16.30	16.27	16.24	15.95	16.12
NS_84	Benelong Rd	8	100106596	DP925026	Cremorne	No	52.78	52.78	51.28	1	51.61	51.19	51.14	51.14	51.13	51.13
NS_421	Fall St	3	102156067	DP78947	Cremorne	No	45.68	45.68	44.88	1	44.83	44.78	44.74	44.74	44.73	0.00
NS_288	Kurraba Rd	88	102160693	SP10254	Neutral Bay	No	23.64	23.64	23.34	2	26.15	24.87	24.85	24.76	24.61	24.38
NS_378	Kurraba Rd	114A	104731300	DP881198	Neutral Bay	No	30.02	30.02	28.02	1	29.23	28.99	28.98	28.96	28.95	28.88
NS_242	Phillips St	20	102160735	DP13486	Neutral Bay	No	42.79	42.79	42.19	1	42.43	42.22	42.22	42.21	42.20	42.20
NS_887	Gerard St	87	102210168	SP11112	Cremorne	No	79.41	79.41	77.41	1	77.82	77.73	77.71	77.72	77.71	77.68
NS_334	Nook Ave	13-17	102160223	SP48934	Neutral Bay	No	11.09	11.09	10.59	2	11.19	10.84	10.82	10.80	10.79	10.78
NS_852	Abbott St	32	102153734	DP306631	Cammeray	No	70.37	70.37	70.07	2	70.37	70.22	70.20	70.20	70.20	70.18
NS_176	Broughton St	87	102162999	DP440743	Kirribilli	No	15.42	15.42	15.32	2	16.70	16.38	16.38	16.37	16.36	16.25
NS_532	Carlyle St	8	102156742	DP809169	Wollstonecraf	No	67.35	67.35	66.45	1	67.48	67.17	67.12	67.13	67.08	67.07
NS_444	Spofforth St	98	102210134	SP17513	Cremorne	No	74.30	74.30	72.80	1	73.78	73.66	73.65	73.64	73.63	73.63
NS_265	Undercliff St	82-86	102160774	SP36716	Neutral Bay	No	52.97	52.97	52.87	2	54.85	54.02	53.96	53.90	53.86	53.72
NS_834	Lytton St	29	103235125	SP52120	Cammeray	No	69.11	69.11	69.01	2	71.34	69.12	69.11	69.11	69.11	69.06
NS_401	Ryries Pde	22	102204811	DP445165	Cremorne	No	27.93	27.93	25.93	1	26.15	0.00	0.00	0.00	0.00	0.00
NS_153	Belmont Ave	3	102161178	SP15703	Wollstonecraf	No	49.61	49.61	49.41	2	49.79	49.55	49.52	49.52	49.49	49.48
NS_596	Alexander St	141	102154743	DP2781	Crows Nest	No	81.41	81.41	81.21	2	81.42	81.22	81.17	81.17	81.16	81.14
NS_891	Oaks Ave	4	102158274	DP18694	Cremorne	No	84.41	84.41	84.11	2	84.87	84.51	84.47	84.47	84.45	84.40
NS_822	Shellcove Rd	29	171257311	DP1196925	Kurraba Point	No	18.40	18.40	18.30	2	18.51	18.47	18.38	18.38	18.37	18.37
NS_686	Ernest St	227	102157904	DP202596	Cammeray	No	67.03	67.03	66.83	2	71.33	67.55	67.49	67.46	67.38	67.28

ID or Survey No.	Depth of Inundation above Floor Level (m) for each AEP flood: PMF	1.00%	2.00%	5.00%	10.00%	20.00%	Depth of Inundation Above "Protection Level" (m) for each AEP flood: PMF	1.00%	2.00%	5.00%	10.00%	20.00%
NS_529	1.16	0.00	0.00	0.00	0.00	0.00	1.16	0.00	0.00	0.00	0.00	0.00
NS_755	-1.26	-1.29	-1.30	-1.30	-1.30	-1.31	-1.26	-1.29	-1.30	-1.30	-1.30	-1.31
NS_884	0.32	0.19	0.16	0.16	0.15	0.12	0.32	0.19	0.16	0.16	0.15	0.12
NS_173	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NS_138	-0.50	-1.15	-1.18	-1.19	-1.21	-1.21	-0.50	-1.15	-1.18	-1.19	-1.21	-1.21
NS_21	0.98	0.32	0.00	0.00	0.00	0.00	0.98	0.32	0.00	0.00	0.00	0.00
NS_262	-0.03	-0.10	-0.11	-0.12	-0.12	-0.13	-0.03	-0.10	-0.11	-0.12	-0.12	-0.13
NS_704	-0.46	-0.68	-0.70	-0.70	-0.71	-0.74	-0.46	-0.68	-0.70	-0.70	-0.71	-0.74
NS_683	3.36	0.29	0.17	0.13	0.00	-0.15	3.36	0.29	0.17	0.13	0.00	-0.15
NS_150	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NS_551	-1.60	0.00	0.00	0.00	0.00	0.00	-1.60	0.00	0.00	0.00	0.00	0.00
NS_792	0.85	0.56	0.55	0.53	0.52	0.46	0.85	0.56	0.55	0.53	0.52	0.46
NS_572	0.27	0.08	0.07	0.05	0.04	0.03	0.27	0.08	0.07	0.05	0.04	0.03
NS_398	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NS_660	1.31	0.15	0.08	0.07	0.02	-0.04	1.31	0.15	0.08	0.07	0.02	-0.04
NS_816	-0.06	-0.07	-0.07	-0.07	-0.07	-0.07	-0.06	-0.07	-0.07	-0.07	-0.07	-0.07
NS_419	0.43	0.11	0.10	0.09	0.09	0.08	0.43	0.11	0.10	0.09	0.09	0.08
NS_617	1.14	0.47	0.41	0.41	0.37	0.28	1.14	0.47	0.41	0.41	0.37	0.28
NS_507	1.17	0.00	-0.07	-0.10	-0.16	-0.25	1.17	0.00	-0.07	-0.10	-0.16	-0.25
NS_59	-0.02	-0.12	-0.12	-0.12	-0.13	-0.14	-0.02	-0.12	-0.12	-0.12	-0.13	-0.14
NS_286	0.82	0.11	0.09	0.04	-0.02	-0.16	0.82	0.11	0.09	0.04	-0.02	-0.16
NS_756	-0.04	-0.19	-0.19	-0.19	-0.19	-0.20	-0.04	-0.19	-0.19	-0.19	-0.19	-0.20
NS_219	0.34	-0.06	-0.10	-0.11	-0.15	-0.20	0.34	-0.06	-0.10	-0.11	-0.15	-0.20
NS_727	0.25	0.12	0.11	0.11	0.07	0.04	0.25	0.12	0.11	0.11	0.07	0.04
NS_196	-1.20	0.00	0.00	0.00	0.00	0.00	-1.20	0.00	0.00	0.00	0.00	0.00
NS_376	0.24	0.03	0.02	0.00	-0.01	-0.02	0.24	0.03	0.02	0.00	-0.01	-0.02
NS_829	0.30	0.05	0.05	0.04	0.04	0.03	0.30	0.05	0.05	0.04	0.04	0.03
NS_332	-0.20	-1.02	-1.04	-1.08	-1.13	-1.14	-0.20	-1.02	-1.04	-1.08	-1.13	-1.14
NS_486	-2.21	-2.21	-2.21	-2.21	-2.22	-2.22	-2.21	-2.21	-2.21	-2.21	-2.22	-2.22
NS_105	-0.27	0.00	0.00	0.00	0.00	0.00	-0.27	0.00	0.00	0.00	0.00	0.00
NS_82	-0.13	-0.21	-0.22	-0.22	-0.23	-0.25	-0.13	-0.21	-0.22	-0.22	-0.23	-0.25
NS_46	-0.13	-0.16	-0.17	-0.17	-0.17	-0.18	-0.13	-0.16	-0.17	-0.17	-0.17	-0.18
NS_353	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NS_817	0.18	-0.18	-0.19	-0.21	-0.22	-0.23	0.18	-0.18	-0.19	-0.21	-0.22	-0.23
NS_240	0.11	0.00	-0.01	-0.02	-0.03	-0.04	0.11	0.00	-0.01	-0.02	-0.03	-0.04
NS_594	-1.28	-1.75	-1.79	-1.79	-1.82	-1.84	-1.28	-1.75	-1.79	-1.79	-1.82	-1.84
NS_530	1.02	0.00	0.00	0.00	0.00	0.00	1.02	0.00	0.00	0.00	0.00	0.00
NS_885	-1.03	-1.05	-1.06	-1.08	0.00	0.00	-1.03	-1.05	-1.06	-1.08	0.00	0.00
NS_757	0.12	-0.02	-0.03	-0.03	-0.05	-0.06	0.12	-0.02	-0.03	-0.03	-0.05	-0.06
NS_442	0.18	-0.16	-0.18	-0.21	-0.25	-0.29	0.18	-0.16	-0.18	-0.21	-0.25	-0.29
NS_174	0.59	0.34	0.34	0.33	0.28	0.22	0.59	0.34	0.34	0.33	0.28	0.22
NS_22	0.47	0.00	0.00	0.00	0.00	0.00	0.47	0.00	0.00	0.00	0.00	0.00
NS_830	-2.20	-2.77	-2.80	-2.83	-2.86	-2.89	-2.20	-2.77	-2.80	-2.83	-2.86	-2.89
NS_263	-0.33	-0.35	-0.36	-0.37	-0.37	-0.38	-0.33	-0.35	-0.36	-0.37	-0.37	-0.38
NS_705	0.45	0.15	0.10	0.11	0.09	0.05	0.45	0.15	0.10	0.11	0.09	0.05
NS_793	0.81	0.53	0.52	0.51	0.49	0.44	0.81	0.53	0.52	0.51	0.49	0.44
NS_151	-1.20	0.00	0.00	0.00	0.00	0.00	-1.20	0.00	0.00	0.00	0.00	0.00
NS_684	3.49	-0.34	-0.39	-0.42	-0.49	-0.57	3.49	-0.34	-0.39	-0.42	-0.49	-0.57
NS_818	0.46	0.12	0.12	0.11	0.11	0.11	0.46	0.12	0.12	0.11	0.11	0.11
NS_399	2.45	1.22	0.99	1.00	0.91	0.73	2.45	1.22	0.99	1.00	0.91	0.73
NS_552	-0.32	-0.78	-0.80	-0.81	-0.83	-0.84	-0.32	-0.78	-0.80	-0.81	-0.83	-0.84
NS_661	1.66	0.14	0.07	0.06	0.02	0.01	1.66	0.14	0.07	0.06	0.02	0.01
NS_573	0.57	0.38	0.37	0.35	0.34	0.33	0.57	0.38	0.37	0.35	0.34	0.33
NS_60	-0.30	-0.34	-0.34	-0.34	-0.35	-0.35	-0.30	-0.34	-0.34	-0.34	-0.35	-0.35
NS_618	1.22	0.55	0.49	0.48	0.45	0.36	1.22	0.55	0.49	0.48	0.45	0.36
NS_758	0.39	0.13	0.11	0.11	0.06	0.04	0.39	0.13	0.11	0.11	0.06	0.04
NS_728	-0.04	-0.34	-0.38	-0.38	-0.40	-0.45	-0.04	-0.34	-0.38	-0.38	-0.40	-0.45
NS_420	0.75	0.34	0.29	0.28	0.25	0.20	0.75	0.34	0.29	0.28	0.25	0.20
NS_831	0.48	0.01	-0.02	-0.04	-0.06	-0.09	0.48	0.01	-0.02	-0.04	-0.06	-0.09
NS_508	0.87	-0.03	-0.11	-0.13	-0.19	-0.31	0.87	-0.03	-0.11	-0.13	-0.19	-0.31
NS_220	0.73	0.01	-0.06	-0.07	-0.17	0.00	0.73	0.01	-0.06	-0.07	-0.17	0.00
NS_197	-1.19	-1.46	-1.45	-1.46	-1.47	-1.49	-1.19	-1.46	-1.45	-1.46	-1.47	-1.49
NS_287	0.49	-0.01	-0.02	-0.07	-0.11	-0.20	0.49	-0.01	-0.02	-0.07	-0.11	-0.20
NS_487	-2.25	-2.25	-2.25	-2.25	-2.25	-2.25	-2.25	-2.25	-2.25	-2.25	-2.25	-2.25
NS_819	0.68	0.06	0.03	0.00	-0.05	-0.10	0.68	0.06	0.03	0.00	-0.05	-0.10
NS_106	0.04	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00
NS_377	-1.76	-1.87	-1.88	-1.89	-1.90	-1.90	-1.76	-1.87	-1.88	-1.89	-1.90	-1.90
NS_83	-0.31	-0.47	-0.49	-0.49	-0.50	-0.50	-0.31	-0.47	-0.49	-0.49	-0.50	-0.50
NS_333	0.09	-0.03	-0.04	-0.05	-0.06	-0.06	0.09	-0.03	-0.04	-0.05	-0.06	-0.06
NS_241	0.47	0.14	0.13	0.11	0.08	0.02	0.47	0.14	0.13	0.11	0.08	0.02
NS_531	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NS_175	1.39	1.00	1.00	0.99	0.96	0.90	1.39	1.00	1.00	0.99	0.96	0.90
NS_886	-1.17	-1.21	-1.22	-1.25	-1.32	-1.57	-1.17	-1.21	-1.22	-1.25	-1.32	-1.57
NS_443	0.06	-0.14	-0.17	0.00	0.00	0.00	0.06	-0.14	-0.17	0.00	0.00	0.00
NS_23	0.55	0.00	0.00	0.00	0.00	0.00	0.55	0.00	0.00	0.00	0.00	0.00
NS_595	-2.38	-2.68	-2.72	-2.72	-2.74	-2.76	-2.38	-2.68	-2.72	-2.72	-2.74	-2.76
NS_354	-1.34	-1.14	-1.14	-1.14	-1.14	-1.14	-1.34	-1.14	-1.14	-1.14	-1.14	-1.14
NS_264	-0.27	-0.36	-0.37	-0.37	-0.37	-0.38	-0.27	-0.36	-0.37	-0.37	-0.37	-0.38
NS_832	0.83	0.78	0.78	0.78	0.78	0.71	0.83	0.78	0.78	0.78	0.78	0.71
NS_890	0.05	0.00	0.00	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.00
NS_759	0.23	0.02	0.01	0.01	-0.04	-0.06	0.23	0.02	0.01	0.01	-0.04	-0.06
NS_794	1.66	1.38	1.37	1.35	1.33	1.28	1.66	1.38	1.37	1.35	1.33	1.28
NS_152	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NS_685	3.81	0.02	-0.05	-0.07	-0.14	-0.24	3.81	0.02	-0.05	-0.07	-0.14	-0.24
NS_400	-0.02	-0.36	-0.43	-0.42	-0.48	-0.60	-0.02	-0.36	-0.43	-0.42	-0.48	-0.60
NS_820	3.16	1.65	1.57	1.50	1.40	1.29	3.16	1.65	1.57	1.50	1.40	1.29
NS_706	0.32	0.09	0.07	0.06	0.05	0.02	0.32	0.09	0.07	0.06	0.05	0.02
NS_553	-0.80	0.00	0.00	0.00	0.00	0.00	-0.80	0.00	0.00	0.00	0.00	0.00
NS_851	0.38	0.00	0.00	0.00	0.00	0.00	0.38	0.00	0.00	0.00	0.00	0.00
NS_311	0.26	-0.05	-0.05	-0.07	-0.09	-0.11	0.26	-0.05	-0.05	-0.07	-0.09	-0.11
NS_61	0.27	0.12	0.10	0.10	0.09	0.07	0.27	0.12	0.10	0.10	0.09	0.07
NS_662	1.06	-0.11	-0.12	-0.12	-0.12	0.00	1.06	-0.11	-0.12	-0.12	-0.12	0.00
NS_729	0.29	0.06	0.03	0.03	0.02	0.01	0.29	0.06	0.03	0.03	0.02	0.01
NS_619	0.65	-0.03	-0.07	-0.08	-0.11	-0.17	0.65	-0.03	-0.07	-0.08	-0.11	-0.17
NS_574	0.28	0.09	0.08	0.06	0.05	0.04	0.28	0.09	0.08	0.06	0.05	0.04
NS_833	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NS_198	-1.07	-1.16	-1.16	-1.17	-1.18	-1.20	-1.07	-1.16	-1.16	-1.17	-1.18	-1.20
NS_488	0.35	0.16	0.15	0.12	0.10	0.09	0.35	0.16	0.15	0.12	0.10	0.09
NS_221	0.53	-0.17	-0.18	-0.19	0.00	0.00	0.53	-0.17	-0.18	-0.19	0.00	0.00
NS_821	2.63	0.72	0.68	0.66	0.63	0.59	2.63	0.72	0.68	0.66	0.63	0.59
NS_760	0.22	0.01	0.00	0.00	-0.05	-0.08	0.22	0.01	0.00	0.00	-0.05	-0.08
NS_107	-0.05	0.00	0.00	0.00	0.00	0.00	-0.05	0.00	0.00	0.00	0.00	0.00
NS_509	-0.03	-0.54	-0.79	-0.80	-0.99	0.00	-0.03	-0.54	-0.79	-0.80	-0.99	0.00
NS_773	0.55	0.25	0.22	0.18	-0.11	0.06	0.55	0.25	0.22	0.18	-0.11	0.06
NS_84	-1.17	-1.59	-1.64	-1.64	-1.65	-1.65	-1.17	-1.59	-1.64	-1.64	-1.65	-1.65
NS_421	-0.85	-0.90	-0.94	-0.94	-0.95	0.00	-0.85	-0.90	-0.94	-0.94	-0.95	0.00
NS_288	2.51	1.24	1.22	1.12	0.98	0.74	2.51	1.24	1.22	1.12	0.98	0.74
NS_378	-0.79	-1.04	-1.05	-1.06	-1.07	-1.14	-0.79	-1.04	-1.05	-1.06	-1.07	-1.14
NS_242	-0.36	-0.57	-0.57	-0.58	-0.59	-0.59	-0.36	-0.57	-0.57	-0.58	-0.59	-0.59
NS_887	-1.58	-1.68	-1.69	-1.69	-1.70	-1.72	-1.58	-1.68	-1.69	-1.69	-1.70	-1.72
NS_334	0.10	-0.26	-0.27	-0.29	-0.31	-0.32	0.10	-0.26	-0.27	-0.29	-0.31	-0.32
NS_852	0.00	-0.16	-0.17	-0.17	-0.18	-0.20	0.00	-0.16	-0.17	-0.17	-0.18	-0.20
NS_176	1.28	0.96	0.96	0.95	0.94	0.83	1.28	0.96	0.96	0.95	0.94	0.83
NS_532	0.13	-0.19	-0.23	-0.22	-0.27	-0.28	0.13	-0.19	-0.23	-0.22	-0.27	-0.28
NS_444	-0.52	-0.64	-0.65	-0.66	-0.66	-0.67	-0.52	-0.64	-0.65	-0.66	-0.66	-0.67
NS_265	1.88	1.05	0.99	0.93	0.89	0.75	1.88	1.05	0.99	0.93	0.89	0.75
NS_834	2.23	0.01	0.00	0.00	-0.01	-0.05	2.23	0.01	0.00	0.00	-0.01	-0.05
NS_401	-1.78	0.00	0.00	0.00	0.00	0.00	-1.78	0.00	0.00	0.00	0.00	0.00
NS_153	0.18	-0.06	-0.09	-0.09	-0.12	-0.13	0.18	-0.06	-0.09	-0.09	-0.12	-0.13
NS_596	0.01	-0.19	-0.23	-0.23	-0.25	-0.27	0.01	-0.19	-0.23	-0.23	-0.25	-0.27
NS_891	0.46	0.09	0.05	0.06	0.04	-0.01	0.46	0.09	0.05	0.06	0.04	-0.01
NS_822	0.11	0.07	-0.02	-0.02	-0.03	-0.03	0.11	0.07	-0.02	-0.02	-0.03	-0.03
NS_686	4.30	0.52	0.45	0.43	0.35	0.25	4.30	0.52	0.45	0.43	0.35	0.25

ID or Survey No.	Flood Damages: PMF Damages, total for event, per property affected	PMF Properties Affected above floor level, damaged	AEP 1.00% Damages, total for event, per property affected	AEP 1.00% Properties Affected above floor level, damaged	AEP 2.0% Damages, total for event, per property affected	AEP 2.0% Properties Affected above floor level, damaged	AEP 5.0% Damages, total for event, per property affected	AEP 5.0% Properties Affected above floor level, damaged	AEP 10.0% Damages, total for event, per property affected	AEP 10.0% Properties Affected above floor level, damaged	AEP 20.0% Damages, total for event, per property affected	AEP 20.0% Properties Affected above floor level, damaged	AEP Damages, total for event, per property affected	AEP Properties Affected above floor level, damaged	AEP Damages, total for event, per property affected	AEP Properties Affected above floor level, damaged	AAD, total and per property
	$ 71,529,460	491	$ 41,507,489	299	$ 38,271,467	272	$ 37,301,451	266	$ 34,249,086	247	$ 29,597,377	216	$ -	0	$ -	0	$ 11,517,801
NS_529	$ 167,440	1	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ 836
NS_755	$ 32,466	0	$ 32,466	0	$ 32,466	0	$ 32,466	0	$ 32,466	0	$ 32,466	0	$ -		$ -		$ 11,363
NS_884	$ 110,442	1	$ 105,820	1	$ 105,820	1	$ 105,820	1	$ 101,197	1	$ 101,197	1	$ -		$ -		$ 35,788
NS_173	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
NS_138	$ 46,545	0	$ 34,226	0	$ 34,226	0	$ 34,226	0	$ 34,226	0	$ 34,226	0	$ -		$ -		$ 12,040
NS_21	$ 142,797	1	$ 110,442	1	$ -		$ -		$ -		$ -		$ -		$ -		$ 1,817
NS_262	$ 47,264	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 5,819
NS_704	$ 46,545	0	$ 43,025	0	$ 43,025	0	$ 43,025	0	$ 43,025	0	$ 43,025	0	$ -		$ -		$ 15,076
NS_683	$ 200,520	1	$ 110,442	1	$ 105,820	1	$ 101,197	1	$ 47,264	1	$ 16,183	0	$ -		$ -		$ 15,051
NS_150	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
NS_551	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
NS_792	$ 138,175	1	$ 124,309	1	$ 119,686	1	$ 119,686	1	$ 119,686	1	$ 119,686	1	$ -		$ -		$ 42,028
NS_572	$ 110,442	1	$ 101,197	1	$ 101,197	1	$ 101,197	1	$ 47,264	1	$ 47,264	1	$ -		$ -		$ 20,633
NS_398	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
NS_660	$ 156,664	1	$ 101,197	1	$ 101,197	1	$ 101,197	1	$ 47,264	1	$ 47,264	0	$ -		$ -		$ 20,863
NS_816	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 5,664
NS_419	$ 115,064	1	$ 101,197	1	$ 101,197	1	$ 101,197	1	$ 101,197	1	$ 101,197	1	$ -		$ -		$ 35,487
NS_617	$ 147,420	1	$ 119,686	1	$ 115,064	1	$ 115,064	1	$ 115,064	1	$ 110,442	1	$ -		$ -		$ 39,555
NS_507	$ 152,042	1	$ 47,264	1	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 6,653
NS_59	$ 47,264	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 5,819
NS_286	$ 133,553	1	$ 101,197	1	$ 101,197	1	$ 47,264	1	$ 47,264	0	$ 16,183	0	$ -		$ -		$ 12,375
NS_756	$ 47,264	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 5,819
NS_219	$ 110,442	1	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 6,135
NS_727	$ 110,442	1	$ 101,197	1	$ 101,197	1	$ 101,197	1	$ 101,197	1	$ 47,264	1	$ -		$ -		$ 24,678
NS_196	$ 34,226	0	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ 171
NS_376	$ 105,820	1	$ 47,264	1	$ 47,264	1	$ 47,264	1	$ 47,264	0	$ 47,264	0	$ -		$ -		$ 16,834
NS_829	$ 110,442	1	$ 47,264	1	$ 47,264	1	$ 47,264	1	$ 47,264	1	$ 47,264	1	$ -		$ -		$ 16,858
NS_332	$ 16,183	0	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ 81
NS_486	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
NS_105	$ 16,183	0	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ 81
NS_82	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 5,664
NS_46	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 5,664
NS_353	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
NS_817	$ 105,820	1	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 6,112
NS_240	$ 101,197	1	$ 47,264	0	$ 47,264	0	$ 47,264	0	$ 47,264	0	$ 47,264	0	$ -		$ -		$ 16,811
NS_594	$ 32,466	0	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ 162
NS_530	$ 156,976	1	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ 784
NS_885	$ 37,745	0	$ 35,985	0	$ 35,985	0	$ 35,985	0	$ -		$ -		$ -		$ -		$ 2,707
NS_757	$ 101,197	1	$ 47,264	0	$ 47,264	0	$ 47,264	0	$ 47,264	0	$ 16,183	0	$ -		$ -		$ 10,595
NS_442	$ 105,820	1	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 6,112
NS_174	$ 124,309	1	$ 110,442	1	$ 110,442	1	$ 110,442	1	$ 110,442	1	$ 105,820	1	$ -		$ -		$ 37,798
NS_22	$ 119,686	1	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ 598
NS_830	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
NS_263	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 5,664
NS_705	$ 119,686	1	$ 101,197	1	$ 101,197	1	$ 101,197	1	$ 101,197	1	$ 101,197	1	$ -		$ -		$ 35,510
NS_793	$ 133,553	1	$ 119,686	1	$ 119,686	1	$ 119,686	1	$ 119,686	1	$ 115,064	1	$ -		$ -		$ 41,034
NS_151	$ 34,226	0	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ 171
NS_684	$ 235,694	1	$ 50,064	0	$ 48,304	0	$ 48,304	0	$ 46,545	0	$ 44,785	0	$ -		$ -		$ 17,024
NS_818	$ 119,686	1	$ 101,197	1	$ 101,197	1	$ 101,197	1	$ 101,197	1	$ 101,197	1	$ -		$ -		$ 35,510
NS_399	$ 193,620	1	$ 152,042	1	$ 142,797	1	$ 142,797	1	$ 138,175	1	$ 128,931	1	$ -		$ -		$ 47,204
NS_552	$ 50,064	0	$ 41,265	0	$ 41,265	0	$ 41,265	0	$ 41,265	0	$ 41,265	0	$ -		$ -		$ 14,486
NS_661	$ 175,153	1	$ 101,197	1	$ 101,197	1	$ 101,197	1	$ 47,264	1	$ 47,264	1	$ -		$ -		$ 20,956
NS_573	$ 124,309	1	$ 115,064	1	$ 115,064	1	$ 115,064	1	$ 110,442	1	$ 110,442	1	$ -		$ -		$ 39,046
NS_60	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 5,664
NS_618	$ 152,042	1	$ 119,686	1	$ 119,686	1	$ 119,686	1	$ 115,064	1	$ 115,064	1	$ -		$ -		$ 40,780
NS_758	$ 115,064	1	$ 101,197	1	$ 101,197	1	$ 101,197	1	$ 101,197	1	$ 47,264	1	$ -		$ -		$ 24,701
NS_728	$ 104,655	0	$ 50,064	0	$ 48,304	0	$ 48,304	0	$ 48,304	0	$ 48,304	0	$ -		$ -		$ 17,205
NS_420	$ 128,931	1	$ 110,442	1	$ 110,442	1	$ 110,442	1	$ 110,442	1	$ 105,820	1	$ -		$ -		$ 37,821
NS_831	$ 119,686	1	$ 47,264	1	$ 47,264	0	$ 47,264	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 8,357
NS_508	$ 138,175	1	$ 47,264	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 6,584
NS_220	$ 128,931	1	$ 47,264	1	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ -		$ 3,301
NS_197	$ 34,226	0	$ 16,183	0	$ 30,706	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 6,045
NS_287	$ 119,686	1	$ 47,264	0	$ 47,264	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 7,113
NS_487	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
NS_819	$ 128,931	1	$ 101,197	1	$ 47,264	1	$ 47,264	0	$ 47,264	0	$ 16,183	0	$ -		$ -		$ 11,273
NS_106	$ 47,264	1	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ 236
NS_377	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
NS_83	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 5,664
NS_333	$ 101,197	1	$ 47,264	0	$ 47,264	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 7,021
NS_241	$ 119,686	1	$ 101,197	1	$ 101,197	1	$ 101,197	1	$ 101,197	1	$ 47,264	1	$ -		$ -		$ 24,724
NS_531	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
NS_175	$ 161,286	1	$ 142,797	1	$ 142,797	1	$ 142,797	1	$ 142,797	1	$ 138,175	1	$ -		$ -		$ 49,146
NS_886	$ 34,226	0	$ 34,226	0	$ 34,226	0	$ 32,466	0	$ 32,466	0	$ -		$ -		$ -		$ 4,931
NS_443	$ 101,197	1	$ 16,183	0	$ 16,183	0	$ -		$ -		$ -		$ -		$ -		$ 991
NS_23	$ 119,686	1	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ 598
NS_595	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
NS_354	$ 32,466	0	$ 35,985	0	$ 35,985	0	$ 35,985	0	$ 35,985	0	$ 35,985	0	$ -		$ -		$ 12,577
NS_264	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 5,664
NS_832	$ 133,553	1	$ 133,553	1	$ 133,553	1	$ 133,553	1	$ 133,553	1	$ 128,931	1	$ -		$ -		$ 45,818
NS_890	$ 47,264	1	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ 236
NS_759	$ 105,820	1	$ 47,264	1	$ 47,264	1	$ 47,264	1	$ 47,264	0	$ 16,183	0	$ -		$ -		$ 10,618
NS_794	$ 175,153	1	$ 161,286	1	$ 161,286	1	$ 161,286	1	$ 156,664	1	$ 156,664	1	$ -		$ -		$ 55,247
NS_152	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
NS_685	$ 235,694	1	$ 104,655	1	$ 104,655	0	$ 53,584	0	$ 53,584	0	$ 51,824	0	$ -		$ -		$ 20,843
NS_400	$ 104,655	0	$ 48,304	0	$ 48,304	0	$ 48,304	0	$ 46,545	0	$ 44,785	0	$ -		$ -		$ 16,352
NS_820	$ 200,520	1	$ 175,153	1	$ 170,531	1	$ 165,909	1	$ 161,286	1	$ 156,664	1	$ -		$ -		$ 56,229
NS_706	$ 110,442	1	$ 101,197	1	$ 101,197	1	$ 101,197	1	$ 47,264	1	$ 47,264	1	$ -		$ -		$ 20,633
NS_553	$ 41,265	0	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ 206
NS_851	$ 115,064	1	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ 575
NS_311	$ 110,442	1	$ 47,264	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 6,446
NS_61	$ 110,442	1	$ 101,197	1	$ 101,197	1	$ 101,197	1	$ 101,197	1	$ 101,197	1	$ -		$ -		$ 35,464
NS_662	$ 147,420	1	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ -		$ 3,083
NS_729	$ 110,442	1	$ 101,197	1	$ 47,264	1	$ 47,264	1	$ 47,264	1	$ 47,264	1	$ -		$ -		$ 17,397
NS_619	$ 128,931	1	$ 47,264	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 6,538
NS_574	$ 110,442	1	$ 101,197	1	$ 101,197	1	$ 101,197	1	$ 101,197	1	$ 47,264	1	$ -		$ -		$ 24,678
NS_833	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
NS_198	$ 35,985	0	$ 34,226	0	$ 34,226	0	$ 34,226	0	$ 34,226	0	$ 34,226	0	$ -		$ -		$ 11,987
NS_488	$ 115,064	1	$ 105,820	1	$ 101,197	1	$ 101,197	1	$ 101,197	1	$ 101,197	1	$ -		$ -		$ 35,534
NS_221	$ 119,686	1	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ -		$ -		$ 1,731
NS_821	$ 195,920	1	$ 128,931	1	$ 128,931	1	$ 128,931	1	$ 124,309	1	$ 124,309	1	$ -		$ -		$ 44,188
NS_760	$ 105,820	1	$ 47,264	1	$ 47,264	0	$ 47,264	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 8,287
NS_107	$ 47,264	0	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ 236
NS_509	$ 104,655	0	$ 46,545	0	$ 41,265	0	$ 41,265	0	$ 37,745	0	$ -		$ -		$ -		$ 6,295
NS_773	$ 119,686	1	$ 105,820	1	$ 105,820	1	$ 105,820	1	$ 16,183	0	$ 101,197	1	$ -		$ -		$ 29,458
NS_84	$ 34,226	0	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ 171
NS_421	$ 39,505	0	$ 39,505	0	$ 39,505	0	$ 39,505	0	$ 39,505	0	$ -		$ -		$ -		$ 5,925
NS_288	$ 194,770	1	$ 152,042	1	$ 152,042	1	$ 147,420	1	$ 142,797	1	$ 128,931	1	$ -		$ -		$ 47,926
NS_378	$ 41,265	0	$ 37,745	0	$ 37,745	0	$ 35,985	0	$ 35,985	0	$ 35,985	0	$ -		$ -		$ 12,674
NS_242	$ 48,304	0	$ 44,785	0	$ 44,785	0	$ 44,785	0	$ 44,785	0	$ 44,785	0	$ -		$ -		$ 15,692
NS_887	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
NS_334	$ 101,197	1	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 6,089
NS_852	$ 47,264	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 5,819
NS_176	$ 156,664	1	$ 142,797	1	$ 142,797	1	$ 138,175	1	$ 138,175	1	$ 133,553	1	$ -		$ -		$ 47,666
NS_532	$ 109,887	1	$ 51,824	0	$ 51,824	0	$ 51,824	0	$ 50,064	0	$ 50,064	0	$ -		$ -		$ 17,944
NS_444	$ 46,545	0	$ 44,785	0	$ 44,785	0	$ 43,025	0	$ 43,025	0	$ 43,025	0	$ -		$ -		$ 15,129
NS_265	$ 184,397	1	$ 142,797	1	$ 142,797	1	$ 138,175	1	$ 138,175	1	$ 128,931	1	$ -		$ -		$ 46,881
NS_834	$ 191,320	1	$ 47,264	1	$ 47,264	1	$ 47,264	1	$ 47,264	0	$ 16,183	0	$ -		$ -		$ 11,045
NS_401	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
NS_153	$ 105,820	1	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 6,112
NS_596	$ 47,264	1	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 5,819
NS_891	$ 119,686	1	$ 101,197	1	$ 101,197	1	$ 101,197	1	$ 47,264	1	$ 47,264	0	$ -		$ -		$ 20,679
NS_822	$ 101,197	1	$ 101,197	1	$ 47,264	0	$ 47,264	0	$ 47,264	0	$ 47,264	0	$ -		$ -		$ 17,350
NS_686	$ 212,020	1	$ 119,686	1	$ 119,686	1	$ 115,064	1	$ 115,064	1	$ 110,442	1	$ -		$ -		$ 39,970

ID or Survey No.	Street Name	Street Address	CADID	Plan Label	Suburb	Raisable Yes/No	Floor Level m AHD	"Protection Level" (Floor Level less Freeboard) m AHD	Ground Level m AHD	Type of Res 1-4	Flood Level at Property, m AHD for each AEP flood: PMF	1.00%	2.00%	5.00%	10.00%	20.00%
NS_355	Bennet St	12	102210864	DP212985	Neutral Bay	No	71.47	71.47	69.47	1	69.27	68.93	68.93	68.93	68.92	68.92
NS_795	West Crescent St	15	102164502	DP802222	cMahons Poi	No	16.27	16.27	16.17	2	17.20	16.92	16.91	16.89	16.88	16.82
NS_554	River Rd	28	103678543	DP850493	Wollstonecraf	No	71.86	71.86	71.81	2	72.24	72.14	72.13	72.13	72.13	72.13
NS_707	Bellevue St	83-87	102155703	SP19970	Cammeray	No	76.06	76.06	73.06	1	75.10	74.71	74.62	74.62	74.61	74.57
NS_761	Victoria St	20	102163811	DP801892	cMahons Poi	No	38.42	38.42	38.37	2	38.40	38.33	38.32	38.32	38.31	38.30
NS_62	Benelong Rd	112	102204902	DP105730	Cremorne	No	60.08	60.08	59.78	2	60.17	59.98	59.96	59.96	59.95	59.92
NS_730	West St	100	102157548	DP973362	Crows Nest	No	88.37	88.37	88.17	2	88.54	88.37	88.35	88.35	88.34	88.32
NS_199	McDougall St	33	102163150	DP440444	Kirribilli	No	6.70	6.70	5.50	1	5.39	0.00	0.00	0.00	0.00	0.00
NS_853	Abbott St	34-36	102153731	SP1550	Cammeray	No	71.27	71.27	70.67	1	70.73	0.00	0.00	0.00	0.00	0.00
NS_663	Miller St	297	102157829	DP105921	Cammeray	No	75.89	75.89	75.79	2	76.80	75.82	75.80	75.80	75.80	0.00
NS_489	McLaren St	9	102159503	DP339358	North Sydney	No	81.53	81.53	81.43	2	82.04	81.68	81.66	81.61	81.57	81.53
NS_620	Chandos St	116-118	102154788	SP20575	Crows Nest	No	73.29	73.29	73.19	2	73.88	73.43	73.41	73.41	73.39	73.32
NS_835	Lytton St	27A	103235125	SP52120	Cammeray	No	69.18	69.18	69.08	2	71.34	69.16	69.13	69.13	69.12	69.07
NS_575	Whaling Rd	57	102160110	DP545858	North Sydney	No	32.90	32.90	32.80	2	33.23	33.06	33.05	33.03	33.02	33.00
NS_823	Shellcove Rd	27	171257310	DP1196925	Kurraba Point	No	17.24	17.24	17.04	2	18.19	17.76	17.73	17.70	17.66	17.66
NS_108	Young St	41	102209564	SP12111	Cremorne	No	67.58	67.58	67.48	2	67.43	0.00	0.00	0.00	0.00	0.00
NS_774	Bay View St	29	102164139	DP206872	Lavender Bay	No	15.48	15.48	15.28	2	16.61	16.31	16.28	16.24	15.84	0.00
NS_85	Benelong Rd	10	100208939	DP873927	Cremorne	No	51.45	51.45	50.95	2	51.43	50.86	50.85	50.85	50.85	50.84
NS_222	Byrnes Ave	2	102158071	DP502175	Neutral Bay	No	87.56	87.56	87.16	2	87.36	87.27	87.26	87.26	87.25	87.24
NS_510	Falcon St	180	102157781	DP124563	North Sydney	No	76.12	76.12	75.92	2	76.73	76.15	76.12	76.12	76.10	76.06
NS_89	Waters Rd	36	102209743	DP809814	Cremorne	No	76.19	76.19	75.89	2	76.25	76.12	76.10	76.10	76.09	76.07
NS_762	Webb St	6	102163812	DP606359	cMahons Poi	No	39.95	39.95	39.85	2	39.93	39.84	39.83	39.83	39.83	39.82
NS_422	Fall St	5	102156068	DP78947	Cremorne	No	45.57	45.57	44.97	1	44.89	44.85	44.84	44.84	44.84	0.00
NS_243	Phillips St	3	102160732	DP307267	Neutral Bay	No	40.28	40.28	40.22	2	41.71	40.77	40.75	40.71	40.66	40.57
NS_379	Kurraba Rd	53	100157010	DP848770	Neutral Bay	No	25.00	25.00	24.90	2	25.50	25.32	25.31	25.30	25.29	25.28
NS_177	Broughton St	89	102163000	DP440743	Kirribilli	No	15.30	15.30	15.20	2	16.62	16.25	16.25	16.23	16.22	16.02
NS_289	Undercliff St	12	102160716	DP107472	Neutral Bay	No	40.35	40.35	40.25	2	40.42	40.33	40.33	40.33	40.32	0.00
NS_533	Carlyle Lane	37	102156740	DP836839	Wollstonecraf	No	65.48	65.48	65.18	2	65.00	0.00	0.00	0.00	0.00	0.00
NS_335	Nook Ave	21	102160232	DP3529	Neutral Bay	No	8.58	8.58	8.48	2	8.58	8.52	8.52	8.52	8.52	8.53
NS_854	Palmer St	40	102153730	SP11614	Cammeray	No	67.88	67.88	67.83	2	68.83	68.44	68.40	68.39	68.38	68.36
NS_889	Waters Lane	38A	102209759	DP806779	Cremorne	No	74.15	74.15	74.05	2	74.03	73.90	73.89	73.89	73.88	73.87
NS_836	Massey St	6	102153657	DP563632	Cammeray	No	65.23	65.23	64.83	2	64.51	0.00	0.00	0.00	0.00	0.00
NS_266	Undercliff St	78	102160766	SP16537	Neutral Bay	No	52.64	52.64	52.49	2	52.64	0.00	0.00	0.00	0.00	0.00
NS_402	Ryries Pde	28	102204812	DP10291	Cremorne	No	25.53	25.53	23.53	1	22.12	22.09	22.09	22.09	22.08	22.08
NS_445	Spofforth St	100	102210135	DP978049	Cremorne	No	75.13	75.13	73.63	1	74.70	74.47	74.45	74.43	74.41	74.41
NS_154	Belmont Ave	5	174529494	SP92709	Wollstonecraf	No	48.03	48.03	46.03	1	49.52	47.35	46.81	46.65	46.37	46.28
NS_555	River Rd	26	103678544	DP850493	Wollstonecraf	No	72.02	72.02	71.97	2	72.26	72.20	72.20	72.20	72.19	72.19
NS_892	Milson Rd	111	156457723	DP1108080	remorne Poi	No	26.82	26.82	25.62	1	25.39	25.34	25.34	25.34	25.33	25.34
NS_687	Ernest St	229	105084817	2460 - 3000	Cammeray	No	67.14	67.14	66.94	2	71.33	67.56	67.49	67.47	67.38	67.29
NS_824	Iredale Ave	5	102211254	DP945119	remorne Poi	No	32.51	32.51	32.46	2	33.01	33.00	33.00	33.00	33.00	32.98
NS_796	West Crescent St	15A	102164503	DP802222	cMahons Poi	No	16.40	16.40	16.30	2	17.19	16.92	16.91	16.89	16.88	16.82
NS_356	Burroway St	21	102210854	DP701770	Neutral Bay	No	64.95	64.95	64.85	2	65.24	65.11	65.10	65.09	65.08	65.06
NS_708	Lumsden St	2	102155728	DP4895	Cammeray	No	77.23	77.23	75.83	1	75.77	75.76	75.75	75.75	75.75	75.75
NS_597	Devonshire St	2	103773769	DP861447	Crows Nest	No	81.68	81.68	81.58	2	82.18	0.00	0.00	0.00	0.00	0.00
NS_643	Chandos St	111-115	105016158	0	Crows Nest	No	78.56	78.56	76.56	1	78.81	78.16	78.05	78.04	77.98	77.85
NS_63	Benelong Rd	114	102204904	DP105730	Cremorne	No	60.66	60.66	60.36	2	60.98	60.80	60.77	60.77	60.76	60.73
NS_200	McDougall St	35	105473369	16 - 2550 R	Kirribilli	No	6.51	6.51	5.31	1	4.63	4.43	4.43	4.43	4.43	4.43
NS_313	Hayes St	4	167958701	SP86927	Neutral Bay	No	10.18	10.18	9.18	1	9.26	8.77	8.77	8.37	8.36	0.00
NS_490	West St	41	102157491	DP935629	North Sydney	No	86.84	86.84	86.64	2	87.04	86.75	86.71	86.71	86.70	86.68
NS_731	West St	102	162766842	DP1140976	Crows Nest	No	88.45	88.45	88.35	2	88.52	88.37	88.35	88.35	88.33	88.32
NS_855	West St	287B	102153715	SP70266	Cammeray	No	67.94	67.94	67.44	2	68.68	68.30	68.25	68.25	68.23	68.19
NS_837	Palmer St	1	102153655	DP1044930	Cammeray	No	63.41	63.41	63.31	2	65.24	64.12	64.02	63.98	63.87	63.66
NS_775	Bay View St	27	102164138	DP206872	Lavender Bay	No	16.56	16.56	16.36	2	16.61	16.30	16.27	16.23	16.19	16.14
NS_664	Miller St	299	102157831	DP437032	Cammeray	No	76.28	76.28	75.78	2	76.79	75.84	75.83	75.83	0.00	0.00
NS_109	Young St	43	102209565	SP30777	Cremorne	No	66.79	66.79	66.74	2	66.70	0.00	0.00	0.00	0.00	0.00
NS_86	Benelong Rd	12	103889048	DP512547	Cremorne	No	53.14	53.14	51.14	1	51.14	51.02	51.02	51.02	51.01	51.01
NS_825	Iredale Ave	7	102211256	DP945118	remorne Poi	No	32.73	32.73	32.63	2	33.28	32.77	32.75	32.72	32.70	32.69
NS_621	Chandos St	110	102154780	DP731137	Crows Nest	No	72.19	72.19	71.99	2	73.58	72.29	72.26	72.25	72.22	72.16
NS_576	Whaling Rd	47	102160116	DP501312	North Sydney	No	32.52	32.52	32.52	2	33.29	33.11	33.09	33.08	33.06	33.06
NS_223	Byrnes Ave	4	102158074	DP502175	Neutral Bay	No	87.38	87.38	87.28	2	87.61	87.45	87.43	87.43	87.42	87.39
NS_90	Waters Rd	38	102209762	DP806779	Cremorne	No	75.91	75.91	75.51	2	75.99	75.83	75.81	75.81	75.80	75.77
NS_511	Falcon St	182	102157784	DP587173	North Sydney	No	75.01	75.01	74.91	2	75.90	0.00	0.00	0.00	0.00	0.00
NS_380	Kurraba Rd	55	100104936	DP787067	Neutral Bay	No	24.98	24.98	24.88	2	26.08	25.61	25.58	25.57	25.54	25.52
NS_244	Ben Boyd Rd	55	102160728	DP307267	Neutral Bay	No	40.95	40.95	40.80	2	40.82	0.00	0.00	0.00	0.00	0.00
NS_423	Fall St	7	102156069	DP78947	Cremorne	No	44.80	44.80	44.10	1	44.24	44.18	44.17	44.16	44.15	44.14
NS_290	Undercliff St	6A	102160713	DP620784	Neutral Bay	No	35.49	35.49	35.49	2	35.69	35.46	35.45	35.45	35.45	35.49
NS_534	Carlyle Lane	35A	102161506	DP835836	Wollstonecraf	No	63.85	63.85	63.65	2	63.87	63.71	63.68	63.68	0.00	0.00
NS_336	Nook Ave	27A	102160247	SP15365	Neutral Bay	No	12.86	12.86	10.86	1	10.75	10.66	10.66	10.68	0.00	0.00
NS_155	Belmont Ave	13	102158499	SP6309	Wollstonecraf	No	57.72	57.72	55.72	1	0.00	0.00	0.00	0.00	0.00	0.00
NS_556	Gas Works Rd	8	104069664	SP60590	Wollstonecraf	No	31.82	31.82	26.82	1	29.98	28.09	27.96	27.90	27.80	27.31
NS_838	Palmer St	3	102153656	DP975699	Cammeray	No	62.58	62.58	62.58	2	63.18	62.83	62.80	62.78	62.74	62.68
NS_403	Wonga Rd	20A	175366261	DP1196611	Cremorne	No	9.27	9.27	9.07	2	10.41	9.92	9.90	9.89	9.88	9.85
NS_856	West St	287	102153715	SP70266	Cammeray	No	67.54	67.54	67.24	2	67.43	67.38	67.37	67.37	67.36	67.35
NS_826	Boyle St	42	102211257	SP17934	remorne Poi	No	40.01	40.01	39.86	2	40.78	40.26	40.23	40.21	40.19	40.17
NS_267	Undercliff St	76	104499706	SP65643	Neutral Bay	No	51.47	51.47	51.37	2	51.93	51.72	51.70	51.69	51.68	51.67
NS_446	Cliff St	6	104330769	SP64607	Milsons Point	No	30.58	30.58	29.38	1	30.76	30.58	30.56	30.54	30.53	30.52
NS_178	Broughton St	91	102163001	DP440743	Kirribilli	No	15.64	15.64	15.54	2	16.23	16.03	16.03	16.02	16.01	16.15
NS_893	Shellcove Rd	25	102210761	DP791245	Kurraba Point	No	9.30	9.30	9.30	2	11.74	11.56	11.55	11.54	11.53	11.51
NS_797	West Crescent St	17	102164504	DP802222	cMahons Poi	No	16.40	16.40	16.30	2	17.19	16.92	16.91	16.89	16.88	16.82
NS_688	Ernest St	231	102157907	SP7664	Cammeray	No	69.67	69.67	67.67	1	71.33	67.56	67.49	67.46	67.38	67.29
NS_709	Carter St	9	102155794	DP4895	Cammeray	No	84.14	84.14	83.94	2	0.00	0.00	0.00	0.00	0.00	0.00
NS_644	Chandos St	111-115	105084810	0	Crows Nest	No	78.52	78.52	77.52	1	78.86	78.16	78.05	78.05	77.98	77.85
NS_357	Burroway St	19	102210853	DP701770	Neutral Bay	No	63.65	63.65	63.55	2	64.68	64.18	64.17	64.16	64.15	64.13
NS_598	Alexander St	143	102154765	DP396110	Crows Nest	No	82.07	82.07	81.07	1	81.12	0.00	0.00	0.00	0.00	0.00
NS_64	Reynolds St	79	104405470	DP115697	Cremorne	No	65.66	65.66	65.36	2	66.81	65.99	65.90	65.90	65.84	65.72
NS_201	McDougall St	37	105473369	16 - 2550 R	Kirribilli	No	6.25	6.25	5.05	1	4.34	4.28	4.28	4.27	4.27	4.27
NS_92	Waters Rd	42-46	103685202	SP19009	Cremorne	No	74.13	74.13	74.03	2	74.72	74.33	74.27	74.27	74.24	74.16
NS_491	West St	43	102157492	DP603668	North Sydney	No	86.81	86.81	86.61	2	87.12	86.82	86.78	86.78	86.77	86.73
NS_857	West St	289-295	102153717	SP45687	Cammeray	No	63.86	63.86	63.86	2	64.05	63.96	63.95	63.94	63.94	63.92
NS_776	Bay View St	25	102164137	DP206872	Lavender Bay	No	16.23	16.23	15.93	2	16.48	15.86	15.84	15.82	15.80	15.77
NS_839	Palmer St	5	102153658	DP975699	Cammeray	No	62.35	62.35	61.85	2	64.60	62.98	62.80	62.73	62.47	62.10
NS_622	Chandos St	112	102154782	DP406154	Crows Nest	No	72.32	72.32	71.62	1	73.59	72.09	71.99	71.96	71.87	71.73
NS_88	Waters Road	29	174385958	DP1222928	Cremorne	No	76.50	76.50	76.00	2	75.83	0.00	0.00	0.00	0.00	0.00
NS_110	Young St	45	102209566	DP14718	Cremorne	No	65.81	65.81	65.71	2	65.88	0.00	0.00	0.00	0.00	0.00
NS_732	West St	110	102157554	DP579404	Crows Nest	No	85.94	85.94	85.84	2	86.18	86.03	86.00	86.00	85.99	85.97
NS_87	Benelong Rd	14	102204355	DP201882	Cremorne	No	53.00	53.00	51.00	1	50.83	50.78	50.78	50.78	50.78	50.77
NS_224	Byrnes Ave	6	102158076	DP502175	Neutral Bay	No	87.51	87.51	87.31	2	87.63	87.45	87.43	87.43	87.42	87.39
NS_512	Falcon St	184	102157789	DP587173	North Sydney	No	75.17	75.17	75.07	2	75.39	0.00	0.00	0.00	0.00	0.00
NS_827	Boyle St	40	102211259	DP949859	remorne Poi	No	39.02	39.02	38.92	2	40.31	39.55	39.50	39.48	39.46	39.45
NS_665	Miller St	301	154586902	DP220909	Cammeray	No	76.71	76.71	76.71	2	76.82	76.73	76.71	76.72	0.00	0.00
NS_91	Waters Rd	40	102209761	SP10034	Cremorne	No	75.11	75.11	74.96	2	75.63	75.20	75.17	75.17	75.16	75.12
NS_381	Kurraba Rd	55A	100104935	DP787068	Neutral Bay	No	19.02	19.02	18.92	2	19.54	19.24	19.22	19.20	19.18	19.15
NS_577	Clark Rd	38	101911715	DP379129	North Sydney	No	2.58	2.58	2.43	2	3.57	2.51	2.51	2.50	2.50	2.49
NS_245	Ben Boyd Rd	49	102160698	SP16495	Neutral Bay	No	39.35	39.35	39.20	2	40.11	39.46	39.44	39.42	39.39	39.34
NS_858	West St	289-295	102153717	SP45687	Cammeray	No	62.92	62.92	62.92	2	63.03	63.01	63.01	63.01	63.01	63.00
NS_404	Wonga Rd	20B	175366262	DP1196611	Cremorne	No	24.74	24.74	24.54	2	25.75	25.46	25.43	25.43	25.43	25.42
NS_156	Belmont Ave	21	102158508	SP4277	Wollstonecraf	No	59.36	59.36	49.36	1	0.00	0.00	0.00	0.00	0.00	0.00
NS_179	McDougall St	14	102164301	DP17717	Kirribilli	No	21.50	21.50	19.50	1	19.95	19.51	19.51	19.51	19.51	0.00
NS_840	Palmer St	7	102153659	DP975699	Cammeray	No	62.09	62.09	61.79	2	64.61	62.99	62.81	62.74	62.49	62.12
NS_894	Aubin St	46	102160860	DP175650	Neutral Bay	No	36.10	36.10	34.90	1	34.89	34.87	34.87	0.00	0.00	0.00
NS_535	Carlyle Lane	33	102161487	DP835836	Wollstonecraf	No	63.58	63.58	63.08	2	63.44	63.19	63.14	63.15	63.04	63.04
NS_798	West Crescent St	17A	102164505	DP802222	cMahons Poi	No	16.34	16.34	16.34	2	17.12	16.86	16.86	16.84	16.83	16.78
NS_424	Bannerman St	13	102210925	SP32304	remorne Poi	No	33.72	33.72	33.22	2	34.36	34.35	34.35	34.35	34.34	34.34
NS_689	Cammeray Ave	1	102155584	SP7722	Cammeray	No	69.18	69.18	67.18	1	71.34	67.40	67.15	67.15	67.14	67.12
NS_337	Military Rd	135	102209381	DP595866	Neutral Bay	No	81.94	81.94	81.84	2	82.52	82.25	82.23	82.23	82.22	82.19
NS_828	Glenferrie Ave	21B	102210219	DP948520	remorne Poi	No	27.62	27.62	27.52	2	27.50	27.48	27.48	27.48	27.48	27.48
NS_710	Amherst St	80	102155711	DP6687	Cammeray	No	70.10	70.10	69.70	2	69.94	69.81	69.79	69.79	69.79	69.77
NS_268	Undercliff St	74	104374799	DP443728	Neutral Bay	No	51.52	51.52	51.42	2	51.81	51.64	51.63	51.61	51.60	51.59
NS_315	Military Rd	37	104425297	DP259885	Neutral Bay	No	88.06	88.06	87.26	1	86.95	0.00	0.00	0.00	0.00	0.00
NS_645	Atchison St	90	102154554	DP2872	Crows Nest	No	77.04	77.04	76.44	1	78.87	78.16	78.05	78.05	77.98	77.85
NS_202	McDougall St	39	104313209	DP230830	Kirribilli	No	6.32	6.32	5.12	1	4.69	4.68	4.68	4.68	4.68	4.68
NS_65	Reynolds St	81	104405469	DP1031214	Cremorne	No	65.79	65.79	65.29	2	66.42	65.77	65.69	65.69	65.65	65.55
NS_358	Burroway St	15	102210852	DP3104	Cremorne	No	62.61	62.61	62.51	2	62.73	62.63	62.63	62.63	62.62	62.62

ID or Survey No.	Depth of Inundation above Floor Level (m) for each AEP flood: PMF	1.00%	2.00%	5.00%	10.00%	20.00%	Depth of Inundation Above "Protection Level" (m) for each AEP flood: PMF	1.00%	2.00%	5.00%	10.00%	20.00%
NS_355	-2.20	-2.54	-2.54	-2.55	-2.55	-2.55	-2.20	-2.54	-2.54	-2.55	-2.55	-2.55
NS_795	0.93	0.65	0.64	0.63	0.61	0.56	0.93	0.65	0.64	0.63	0.61	0.56
NS_554	0.37	0.28	0.27	0.27	0.27	0.27	0.37	0.28	0.27	0.27	0.27	0.27
NS_707	-0.96	-1.35	-1.44	-1.44	-1.45	-1.49	-0.96	-1.35	-1.44	-1.44	-1.45	-1.49
NS_761	-0.02	-0.08	-0.10	-0.09	-0.11	-0.11	-0.02	-0.08	-0.10	-0.09	-0.11	-0.11
NS_62	0.09	-0.10	-0.12	-0.12	-0.13	-0.16	0.09	-0.10	-0.12	-0.12	-0.13	-0.16
NS_730	0.17	0.01	-0.02	-0.02	-0.03	-0.05	0.17	0.01	-0.02	-0.02	-0.03	-0.05
NS_199	-1.30	0.00	0.00	0.00	0.00	0.00	-1.30	0.00	0.00	0.00	0.00	0.00
NS_853	-0.55	0.00	0.00	0.00	0.00	0.00	-0.55	0.00	0.00	0.00	0.00	0.00
NS_663	0.91	-0.07	-0.09	-0.09	-0.09	0.00	0.91	-0.07	-0.09	-0.09	-0.09	0.00
NS_489	0.51	0.15	0.13	0.09	0.04	0.00	0.51	0.15	0.13	0.09	0.04	0.00
NS_620	0.59	0.13	0.11	0.11	0.10	0.03	0.59	0.13	0.11	0.11	0.10	0.03
NS_835	2.16	-0.02	-0.05	-0.05	-0.06	-0.11	2.16	-0.02	-0.05	-0.05	-0.06	-0.11
NS_575	0.33	0.16	0.15	0.13	0.12	0.10	0.33	0.16	0.15	0.13	0.12	0.10
NS_823	0.95	0.52	0.49	0.46	0.43	0.42	0.95	0.52	0.49	0.46	0.43	0.42
NS_108	-0.15	0.00	0.00	0.00	0.00	0.00	-0.15	0.00	0.00	0.00	0.00	0.00
NS_774	1.13	0.82	0.79	0.76	0.36	0.00	1.13	0.82	0.79	0.76	0.36	0.00
NS_85	-0.02	-0.60	-0.60	-0.60	-0.60	-0.61	-0.02	-0.60	-0.60	-0.60	-0.60	-0.61
NS_222	-0.20	-0.29	-0.30	-0.30	-0.31	-0.32	-0.20	-0.29	-0.30	-0.30	-0.31	-0.32
NS_510	0.61	0.04	0.01	0.01	-0.01	-0.05	0.61	0.04	0.01	0.01	-0.01	-0.05
NS_89	0.07	-0.07	-0.09	-0.09	-0.10	-0.12	0.07	-0.07	-0.09	-0.09	-0.10	-0.12
NS_762	-0.02	-0.12	-0.12	-0.12	-0.12	-0.13	-0.02	-0.12	-0.12	-0.12	-0.12	-0.13
NS_422	-0.68	-0.72	-0.73	-0.73	-0.73	0.00	-0.68	-0.72	-0.73	-0.73	-0.73	0.00
NS_243	1.43	0.49	0.47	0.43	0.38	0.29	1.43	0.49	0.47	0.43	0.38	0.29
NS_379	0.50	0.31	0.31	0.30	0.29	0.28	0.50	0.31	0.31	0.30	0.29	0.28
NS_177	1.32	0.95	0.95	0.93	0.92	0.72	1.32	0.95	0.95	0.93	0.92	0.72
NS_289	0.07	-0.02	-0.02	-0.03	-0.03	0.00	0.07	-0.02	-0.02	-0.03	-0.03	0.00
NS_533	-0.48	0.00	0.00	0.00	0.00	0.00	-0.48	0.00	0.00	0.00	0.00	0.00
NS_335	0.00	-0.06	-0.06	-0.06	-0.07	-0.05	0.00	-0.06	-0.06	-0.06	-0.07	-0.05
NS_854	0.94	0.56	0.51	0.51	0.49	0.48	0.94	0.56	0.51	0.51	0.49	0.48
NS_889	-0.13	-0.26	-0.27	-0.27	-0.28	-0.29	-0.13	-0.26	-0.27	-0.27	-0.28	-0.29
NS_836	-0.72	0.00	0.00	0.00	0.00	0.00	-0.72	0.00	0.00	0.00	0.00	0.00
NS_266	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NS_402	-3.41	-3.44	-3.44	-3.44	-3.45	-3.45	-3.41	-3.44	-3.44	-3.44	-3.45	-3.45
NS_445	-0.42	-0.66	-0.68	-0.70	-0.72	-0.72	-0.42	-0.66	-0.68	-0.70	-0.72	-0.72
NS_154	1.49	-0.68	-1.23	-1.38	-1.66	-1.75	1.49	-0.68	-1.23	-1.38	-1.66	-1.75
NS_555	0.23	0.17	0.17	0.17	0.17	0.17	0.23	0.17	0.17	0.17	0.17	0.17
NS_892	-1.42	-1.48	-1.48	-1.48	-1.48	-1.48	-1.42	-1.48	-1.48	-1.48	-1.48	-1.48
NS_687	4.19	0.42	0.35	0.33	0.24	0.15	4.19	0.42	0.35	0.33	0.24	0.15
NS_824	0.50	0.49	0.49	0.48	0.48	0.47	0.50	0.49	0.49	0.48	0.48	0.47
NS_796	0.79	0.52	0.51	0.49	0.48	0.42	0.79	0.52	0.51	0.49	0.48	0.42
NS_356	0.30	0.16	0.15	0.15	0.14	0.12	0.30	0.16	0.15	0.15	0.14	0.12
NS_708	-1.46	-1.47	-1.47	-1.47	-1.47	-1.47	-1.46	-1.47	-1.47	-1.47	-1.47	-1.47
NS_597	0.49	0.00	0.00	0.00	0.00	0.00	0.49	0.00	0.00	0.00	0.00	0.00
NS_643	0.25	-0.41	-0.52	-0.52	-0.58	-0.71	0.25	-0.41	-0.52	-0.52	-0.58	-0.71
NS_63	0.32	0.14	0.11	0.11	0.10	0.07	0.32	0.14	0.11	0.11	0.10	0.07
NS_200	-1.87	-2.07	-2.07	-2.07	-2.08	-2.08	-1.87	-2.07	-2.07	-2.07	-2.08	-2.08
NS_313	-0.92	-1.41	-1.41	-1.81	-1.82	0.00	-0.92	-1.41	-1.41	-1.81	-1.82	0.00
NS_490	0.20	-0.09	-0.12	-0.12	-0.13	-0.16	0.20	-0.09	-0.12	-0.12	-0.13	-0.16
NS_731	0.07	-0.08	-0.11	-0.10	-0.12	-0.14	0.07	-0.08	-0.11	-0.10	-0.12	-0.14
NS_855	0.74	0.36	0.31	0.31	0.29	0.25	0.74	0.36	0.31	0.31	0.29	0.25
NS_837	1.83	0.71	0.62	0.58	0.46	0.25	1.83	0.71	0.62	0.58	0.46	0.25
NS_775	0.05	-0.26	-0.29	-0.33	-0.37	-0.43	0.05	-0.26	-0.29	-0.33	-0.37	-0.43
NS_664	0.51	-0.44	-0.45	-0.44	0.00	0.00	0.51	-0.44	-0.45	-0.44	0.00	0.00
NS_109	-0.08	0.00	0.00	0.00	0.00	0.00	-0.08	0.00	0.00	0.00	0.00	0.00
NS_86	-2.00	-2.12	-2.13	-2.13	-2.13	-2.14	-2.00	-2.12	-2.13	-2.13	-2.13	-2.14
NS_825	0.54	0.04	0.02	-0.01	-0.03	-0.04	0.54	0.04	0.02	-0.01	-0.03	-0.04
NS_621	1.39	0.10	0.07	0.06	0.03	-0.03	1.39	0.10	0.07	0.06	0.03	-0.03
NS_576	0.77	0.58	0.57	0.55	0.54	0.53	0.77	0.58	0.57	0.55	0.54	0.53
NS_223	0.23	0.07	0.05	0.04	0.03	0.01	0.23	0.07	0.05	0.04	0.03	0.01
NS_90	0.08	-0.07	-0.09	-0.09	-0.11	-0.13	0.08	-0.07	-0.09	-0.09	-0.11	-0.13
NS_511	0.89	0.00	0.00	0.00	0.00	0.00	0.89	0.00	0.00	0.00	0.00	0.00
NS_380	1.11	0.63	0.61	0.59	0.57	0.55	1.11	0.63	0.61	0.59	0.57	0.55
NS_244	-0.13	0.00	0.00	0.00	0.00	0.00	-0.13	0.00	0.00	0.00	0.00	0.00
NS_423	-0.56	-0.62	-0.64	-0.64	-0.65	-0.67	-0.56	-0.62	-0.64	-0.64	-0.65	-0.67
NS_290	0.19	-0.04	-0.04	-0.04	-0.05	-0.01	0.19	-0.04	-0.04	-0.04	-0.05	-0.01
NS_534	0.01	-0.14	-0.18	-0.18	0.00	0.00	0.01	-0.14	-0.18	-0.18	0.00	0.00
NS_336	-2.10	-2.20	-2.20	-2.17	0.00	0.00	-2.10	-2.20	-2.20	-2.17	0.00	0.00
NS_155	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NS_556	-1.84	-3.73	-3.86	-3.92	-4.03	-4.52	-1.84	-3.73	-3.86	-3.92	-4.03	-4.52
NS_838	0.60	0.25	0.21	0.20	0.16	0.10	0.60	0.25	0.21	0.20	0.16	0.10
NS_403	1.15	0.66	0.63	0.63	0.61	0.59	1.15	0.66	0.63	0.63	0.61	0.59
NS_856	-0.11	-0.16	-0.17	-0.17	-0.17	-0.18	-0.11	-0.16	-0.17	-0.17	-0.17	-0.18
NS_826	0.77	0.25	0.22	0.20	0.17	0.16	0.77	0.25	0.22	0.20	0.17	0.16
NS_267	0.46	0.25	0.23	0.22	0.21	0.20	0.46	0.25	0.23	0.22	0.21	0.20
NS_446	0.19	0.00	-0.01	-0.03	-0.04	-0.05	0.19	0.00	-0.01	-0.03	-0.04	-0.05
NS_178	0.60	0.40	0.40	0.39	0.38	0.52	0.60	0.40	0.40	0.39	0.38	0.52
NS_893	2.44	2.26	2.25	2.24	2.23	2.22	2.44	2.26	2.25	2.24	2.23	2.22
NS_797	0.79	0.52	0.51	0.50	0.48	0.43	0.79	0.52	0.51	0.50	0.48	0.43
NS_688	1.67	-2.11	-2.18	-2.21	-2.29	-2.38	1.67	-2.11	-2.18	-2.21	-2.29	-2.38
NS_709	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NS_644	0.34	-0.36	-0.47	-0.48	-0.54	-0.67	0.34	-0.36	-0.47	-0.48	-0.54	-0.67
NS_357	1.02	0.53	0.52	0.51	0.49	0.47	1.02	0.53	0.52	0.51	0.49	0.47
NS_598	-0.95	0.00	0.00	0.00	0.00	0.00	-0.95	0.00	0.00	0.00	0.00	0.00
NS_64	1.16	0.34	0.24	0.24	0.18	0.06	1.16	0.34	0.24	0.24	0.18	0.06
NS_201	-1.91	-1.97	-1.97	-1.98	-1.98	-1.98	-1.91	-1.97	-1.97	-1.98	-1.98	-1.98
NS_92	0.59	0.20	0.14	0.14	0.11	0.03	0.59	0.20	0.14	0.14	0.11	0.03
NS_491	0.30	0.01	-0.03	-0.03	-0.04	-0.08	0.30	0.01	-0.03	-0.03	-0.04	-0.08
NS_857	0.20	0.10	0.09	0.09	0.08	0.07	0.20	0.10	0.09	0.09	0.08	0.07
NS_776	0.25	-0.37	-0.39	-0.41	-0.44	-0.46	0.25	-0.37	-0.39	-0.41	-0.44	-0.46
NS_839	2.24	0.63	0.45	0.37	0.12	-0.25	2.24	0.63	0.45	0.37	0.12	-0.25
NS_622	1.28	-0.22	-0.32	-0.36	-0.45	-0.59	1.28	-0.22	-0.32	-0.36	-0.45	-0.59
NS_88	-0.67	0.00	0.00	0.00	0.00	0.00	-0.67	0.00	0.00	0.00	0.00	0.00
NS_110	0.06	0.00	0.00	0.00	0.00	0.00	0.06	0.00	0.00	0.00	0.00	0.00
NS_732	0.24	0.08	0.05	0.06	0.04	0.02	0.24	0.08	0.05	0.06	0.04	0.02
NS_87	-2.17	-2.21	-2.22	-2.22	-2.22	-2.22	-2.17	-2.21	-2.22	-2.22	-2.22	-2.22
NS_224	0.12	-0.06	-0.08	-0.08	-0.09	-0.11	0.12	-0.06	-0.08	-0.08	-0.09	-0.11
NS_512	0.22	0.00	0.00	0.00	0.00	0.00	0.22	0.00	0.00	0.00	0.00	0.00
NS_827	1.28	0.52	0.48	0.45	0.43	0.43	1.28	0.52	0.48	0.45	0.43	0.43
NS_665	0.11	0.02	0.01	0.02	0.00	0.00	0.11	0.02	0.01	0.02	0.00	0.00
NS_91	0.53	0.09	0.06	0.07	0.05	0.01	0.53	0.09	0.06	0.07	0.05	0.01
NS_381	0.52	0.22	0.20	0.19	0.17	0.14	0.52	0.22	0.20	0.19	0.17	0.14
NS_577	0.99	-0.07	-0.07	-0.07	-0.08	-0.09	0.99	-0.07	-0.07	-0.07	-0.08	-0.09
NS_245	0.76	0.11	0.09	0.07	0.04	0.00	0.76	0.11	0.09	0.07	0.04	0.00
NS_858	0.11	0.09	0.09	0.09	0.09	0.08	0.11	0.09	0.09	0.09	0.09	0.08
NS_404	1.02	0.72	0.69	0.70	0.69	0.68	1.02	0.72	0.69	0.70	0.69	0.68
NS_156	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NS_179	-1.56	-2.00	-2.00	-2.00	-2.00	0.00	-1.56	-2.00	-2.00	-2.00	-2.00	0.00
NS_840	2.52	0.91	0.72	0.65	0.40	0.03	2.52	0.91	0.72	0.65	0.40	0.03
NS_894	-1.21	-1.23	-1.23	0.00	0.00	0.00	-1.21	-1.23	-1.23	0.00	0.00	0.00
NS_535	-0.13	-0.39	-0.43	-0.43	-0.53	-0.54	-0.13	-0.39	-0.43	-0.43	-0.53	-0.54
NS_798	0.78	0.52	0.51	0.50	0.48	0.43	0.78	0.52	0.51	0.50	0.48	0.43
NS_424	0.64	0.63	0.62	0.62	0.62	0.62	0.64	0.63	0.62	0.62	0.62	0.62
NS_689	2.15	-1.78	-2.03	-2.03	-2.04	-2.06	2.15	-1.78	-2.03	-2.03	-2.04	-2.06
NS_337	0.57	0.31	0.29	0.29	0.28	0.25	0.57	0.31	0.29	0.29	0.28	0.25
NS_828	-0.13	-0.14	-0.14	-0.14	-0.14	-0.14	-0.13	-0.14	-0.14	-0.14	-0.14	-0.14
NS_710	-0.16	-0.29	-0.31	-0.31	-0.32	-0.33	-0.16	-0.29	-0.31	-0.31	-0.32	-0.33
NS_268	0.29	0.12	0.11	0.09	0.08	0.07	0.29	0.12	0.11	0.09	0.08	0.07
NS_315	-1.11	0.00	0.00	0.00	0.00	0.00	-1.11	0.00	0.00	0.00	0.00	0.00
NS_645	1.83	1.12	1.01	1.01	0.94	0.81	1.83	1.12	1.01	1.01	0.94	0.81
NS_202	-1.63	-1.64	-1.64	-1.64	-1.64	-1.64	-1.63	-1.64	-1.64	-1.64	-1.64	-1.64
NS_65	0.63	-0.02	-0.09	-0.09	-0.14	-0.24	0.63	-0.02	-0.09	-0.09	-0.14	-0.24
NS_358	0.12	0.02	0.02	0.02	0.01	0.01	0.12	0.02	0.02	0.02	0.01	0.01

ID or Survey No.	Flood Damages: PMF – Damages, total for event, per property affected	PMF – Properties Affected above floor level, damaged	AEP 1.00% – Damages, total for event, per property affected	AEP 1.00% – Properties Affected above floor level, damaged	AEP 2.0% – Damages, total for event, per property affected	AEP 2.0% – Properties Affected above floor level, damaged	AEP 5.0% – Damages, total for event, per property affected	AEP 5.0% – Properties Affected above floor level, damaged	AEP 10.0% – Damages, total for event, per property affected	AEP 10.0% – Properties Affected above floor level, damaged	AEP 20.0% – Damages, total for event, per property affected	AEP 20.0% – Properties Affected above floor level, damaged	AEP – Damages, total for event, per property affected	AEP – Properties Affected above floor level, damaged	AEP – Damages, total for event, per property affected	AEP – Properties Affected above floor level, damaged	AAD, total and per property
	$ 71,529,460	491	$ 41,507,489	299	$ 38,271,467	272	$ 37,301,451	266	$ 34,249,086	247	$ 29,597,377	216	$ -	0	$ -	0	$ 11,517,801
NS_355	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
NS_795	$ 138,175	1	$ 128,931	1	$ 124,309	1	$ 124,309	1	$ 124,309	1	$ 124,309	1	$ -		$ -		$ 43,622
NS_554	$ 115,064	1	$ 110,442	1	$ 110,442	1	$ 110,442	1	$ 110,442	1	$ 110,442	1	$ -		$ -		$ 38,677
NS_707	$ 37,745	0	$ 30,706	0	$ 30,706	0	$ 30,706	0	$ 30,706	0	$ 16,183	0	$ -		$ -		$ 7,877
NS_761	$ 47,264	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 5,819
NS_62	$ 101,197	1	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 6,089
NS_730	$ 105,820	1	$ 47,264	1	$ 47,264	0	$ 47,264	0	$ 47,264	0	$ 47,264	0	$ -		$ -		$ 16,834
NS_199	$ 32,466	0	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ 162
NS_853	$ 46,545	0	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ 232
NS_663	$ 138,175	1	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ -		$ 3,037
NS_489	$ 119,686	1	$ 105,820	1	$ 101,197	1	$ 101,197	1	$ 47,264	1	$ 47,264	1	$ -		$ -		$ 20,725
NS_620	$ 124,309	1	$ 101,197	1	$ 101,197	1	$ 101,197	1	$ 101,197	1	$ 47,264	1	$ -		$ -		$ 24,747
NS_835	$ 191,320	1	$ 47,264	0	$ 47,264	0	$ 47,264	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 8,714
NS_575	$ 110,442	1	$ 105,820	1	$ 101,197	1	$ 101,197	1	$ 101,197	1	$ 101,197	1	$ -		$ -		$ 35,510
NS_823	$ 138,175	1	$ 119,686	1	$ 119,686	1	$ 119,686	1	$ 115,064	1	$ 115,064	1	$ -		$ -		$ 40,710
NS_108	$ 16,183	0	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ 81
NS_774	$ 147,420	1	$ 133,553	1	$ 133,553	1	$ 133,553	1	$ 115,064	1	$ -		$ -		$ -		$ 18,714
NS_85	$ 47,264	0	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ 236
NS_222	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 5,664
NS_510	$ 124,309	1	$ 47,264	1	$ 47,264	1	$ 47,264	1	$ 47,264	0	$ 16,183	0	$ -		$ -		$ 10,711
NS_89	$ 101,197	1	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 6,089
NS_762	$ 47,264	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 5,819
NS_422	$ 43,025	0	$ 43,025	0	$ 43,025	0	$ 43,025	0	$ 43,025	0	$ -		$ -		$ -		$ 6,453
NS_243	$ 161,286	1	$ 119,686	1	$ 119,686	1	$ 115,064	1	$ 115,064	1	$ 110,442	1	$ -		$ -		$ 39,716
NS_379	$ 119,686	1	$ 110,442	1	$ 110,442	1	$ 110,442	1	$ 110,442	1	$ 110,442	1	$ -		$ -		$ 38,700
NS_177	$ 156,664	1	$ 138,175	1	$ 138,175	1	$ 138,175	1	$ 138,175	1	$ 128,931	1	$ -		$ -		$ 46,603
NS_289	$ 101,197	1	$ 47,264	0	$ 47,264	0	$ 47,264	0	$ 47,264	0	$ -		$ -		$ -		$ 7,359
NS_533	$ 16,183	0	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ 81
NS_335	$ 47,264	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 47,264	0	$ -		$ -		$ 12,035
NS_854	$ 138,175	1	$ 124,309	1	$ 119,686	1	$ 119,686	1	$ 119,686	1	$ 119,686	1	$ -		$ -		$ 42,028
NS_889	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 5,664
NS_836	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
NS_266	$ 47,264	1	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ 236
NS_402	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
NS_445	$ 48,304	0	$ 43,025	0	$ 43,025	0	$ 43,025	0	$ 43,025	0	$ 43,025	0	$ -		$ -		$ 15,085
NS_154	$ 183,136	1	$ 43,025	0	$ 34,226	0	$ 30,706	0	$ -		$ -		$ -		$ -		$ 3,258
NS_555	$ 105,820	1	$ 105,820	1	$ 105,820	1	$ 105,820	1	$ 105,820	1	$ 105,820	1	$ -		$ -		$ 37,036
NS_892	$ 30,706	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 5,737
NS_687	$ 212,020	1	$ 115,064	1	$ 110,442	1	$ 110,442	1	$ 105,820	1	$ 101,197	1	$ -		$ -		$ 37,012
NS_824	$ 119,686	1	$ 119,686	1	$ 119,686	1	$ 119,686	1	$ 119,686	1	$ 119,686	1	$ -		$ -		$ 41,889
NS_796	$ 133,553	1	$ 119,686	1	$ 119,686	1	$ 119,686	1	$ 119,686	1	$ 115,064	1	$ -		$ -		$ 41,034
NS_356	$ 110,442	1	$ 105,820	1	$ 105,820	1	$ 101,197	1	$ 101,197	1	$ 101,197	1	$ -		$ -		$ 35,603
NS_708	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 5,664
NS_597	$ 119,686	1	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ 598
NS_643	$ 120,351	1	$ 48,304	0	$ 46,545	0	$ 46,545	0	$ 44,785	0	$ 43,025	0	$ -		$ -		$ 15,840
NS_63	$ 110,442	1	$ 101,197	1	$ 101,197	1	$ 101,197	1	$ 101,197	1	$ 101,197	1	$ -		$ -		$ 35,464
NS_200	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
NS_313	$ 39,505	0	$ 30,706	0	$ 30,706	0	$ -		$ -		$ -		$ -		$ -		$ 1,118
NS_490	$ 105,820	1	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 6,112
NS_731	$ 101,197	1	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 6,089
NS_855	$ 128,931	1	$ 115,064	1	$ 110,442	1	$ 110,442	1	$ 110,442	1	$ 105,820	1	$ -		$ -		$ 37,868
NS_837	$ 179,775	1	$ 128,931	1	$ 124,309	1	$ 124,309	1	$ 119,686	1	$ 110,442	1	$ -		$ -		$ 40,710
NS_775	$ 47,264	1	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 5,819
NS_664	$ 119,686	1	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ -		$ -		$ 1,731
NS_109	$ 16,183	0	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ 81
NS_86	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
NS_825	$ 119,686	1	$ 47,264	1	$ 47,264	1	$ 47,264	0	$ 47,264	0	$ 47,264	0	$ -		$ -		$ 16,904
NS_621	$ 161,286	1	$ 101,197	1	$ 101,197	1	$ 101,197	1	$ 47,264	1	$ 47,264	0	$ -		$ -		$ 20,887
NS_576	$ 133,553	1	$ 124,309	1	$ 124,309	1	$ 124,309	1	$ 119,686	1	$ 119,686	1	$ -		$ -		$ 42,282
NS_223	$ 105,820	1	$ 101,197	1	$ 47,264	1	$ 47,264	1	$ 47,264	1	$ 47,264	1	$ -		$ -		$ 17,373
NS_90	$ 101,197	1	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 6,089
NS_511	$ 138,175	1	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ 690
NS_380	$ 147,420	1	$ 124,309	1	$ 124,309	1	$ 124,309	1	$ 124,309	1	$ 119,686	1	$ -		$ -		$ 42,698
NS_244	$ 16,183	0	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ 81
NS_423	$ 44,785	0	$ 44,785	0	$ 44,785	0	$ 44,785	0	$ 44,785	0	$ 43,025	0	$ -		$ -		$ 15,322
NS_290	$ 105,820	1	$ 47,264	0	$ 47,264	0	$ 47,264	0	$ 47,264	0	$ 47,264	0	$ -		$ -		$ 16,834
NS_534	$ 47,264	1	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ -		$ -		$ 1,369
NS_336	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
NS_155	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
NS_556	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
NS_838	$ 124,309	1	$ 105,820	1	$ 105,820	1	$ 105,820	1	$ 105,820	1	$ 101,197	1	$ -		$ -		$ 36,204
NS_403	$ 147,420	1	$ 128,931	1	$ 124,309	1	$ 124,309	1	$ 124,309	1	$ 124,309	1	$ -		$ -		$ 43,668
NS_856	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 5,664
NS_826	$ 133,553	1	$ 105,820	1	$ 105,820	1	$ 105,820	1	$ 105,820	1	$ 105,820	1	$ -		$ -		$ 37,174
NS_267	$ 119,686	1	$ 105,820	1	$ 105,820	1	$ 105,820	1	$ 105,820	1	$ 105,820	1	$ -		$ -		$ 37,105
NS_446	$ 115,119	1	$ 104,655	1	$ 104,655	0	$ 104,655	0	$ 104,655	0	$ 53,584	0	$ -		$ -		$ 26,466
NS_178	$ 124,309	1	$ 115,064	1	$ 115,064	1	$ 115,064	1	$ 115,064	1	$ 119,686	1	$ -		$ -		$ 41,242
NS_893	$ 193,620	1	$ 192,470	1	$ 192,470	1	$ 191,320	1	$ 191,320	1	$ 191,320	1	$ -		$ -		$ 67,006
NS_797	$ 133,553	1	$ 119,686	1	$ 119,686	1	$ 119,686	1	$ 119,686	1	$ 115,064	1	$ -		$ -		$ 41,034
NS_688	$ 193,600	1	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ 967
NS_709	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
NS_644	$ 120,351	1	$ 48,304	0	$ 46,545	0	$ 46,545	0	$ 46,545	0	$ 43,025	0	$ -		$ -		$ 15,972
NS_357	$ 142,797	1	$ 119,686	1	$ 119,686	1	$ 119,686	1	$ 119,686	1	$ 119,686	1	$ -		$ -		$ 42,004
NS_598	$ 39,505	0	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ 197
NS_64	$ 152,042	1	$ 110,442	1	$ 105,820	1	$ 105,820	1	$ 105,820	1	$ 101,197	1	$ -		$ -		$ 36,388
NS_201	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
NS_92	$ 124,309	1	$ 105,820	1	$ 101,197	1	$ 101,197	1	$ 101,197	1	$ 47,264	1	$ -		$ -		$ 24,793
NS_491	$ 110,442	1	$ 47,264	1	$ 47,264	0	$ 47,264	0	$ 47,264	0	$ 16,183	0	$ -		$ -		$ 10,641
NS_857	$ 105,820	1	$ 101,197	1	$ 101,197	1	$ 101,197	1	$ 101,197	1	$ 101,197	1	$ -		$ -		$ 35,441
NS_776	$ 105,820	1	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 6,112
NS_839	$ 191,320	1	$ 124,309	1	$ 115,064	1	$ 115,064	1	$ 101,197	1	$ 16,183	0	$ -		$ -		$ 19,928
NS_622	$ 172,672	1	$ 51,824	0	$ 50,064	0	$ 48,304	0	$ 48,304	0	$ 44,785	0	$ -		$ -		$ 16,894
NS_88	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
NS_110	$ 101,197	1	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ 505
NS_732	$ 105,820	1	$ 101,197	1	$ 101,197	1	$ 101,197	1	$ 47,264	1	$ 47,264	1	$ -		$ -		$ 20,609
NS_87	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
NS_224	$ 101,197	1	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 6,089
NS_512	$ 105,820	1	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ 529
NS_827	$ 156,664	1	$ 119,686	1	$ 119,686	1	$ 119,686	1	$ 115,064	1	$ 115,064	1	$ -		$ -		$ 40,803
NS_665	$ 101,197	1	$ 47,264	1	$ 47,264	1	$ 47,264	1	$ -		$ -		$ -		$ -		$ 3,814
NS_91	$ 119,686	1	$ 101,197	1	$ 101,197	1	$ 101,197	1	$ 47,264	1	$ 47,264	1	$ -		$ -		$ 20,679
NS_381	$ 119,686	1	$ 105,820	1	$ 105,820	1	$ 105,820	1	$ 105,820	1	$ 101,197	1	$ -		$ -		$ 36,181
NS_577	$ 142,797	1	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 6,296
NS_245	$ 133,553	1	$ 101,197	1	$ 101,197	1	$ 101,197	1	$ 47,264	1	$ 47,264	0	$ -		$ -		$ 20,748
NS_858	$ 101,197	1	$ 101,197	1	$ 101,197	1	$ 101,197	1	$ 101,197	1	$ 101,197	1	$ -		$ -		$ 35,418
NS_404	$ 142,797	1	$ 128,931	1	$ 128,931	1	$ 128,931	1	$ 128,931	1	$ 128,931	1	$ -		$ -		$ 45,194
NS_156	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
NS_179	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
NS_840	$ 194,770	1	$ 138,175	1	$ 128,931	1	$ 128,931	1	$ 115,064	1	$ 47,264	1	$ -		$ -		$ 28,172
NS_894	$ 34,226	0	$ 34,226	0	$ 34,226	0	$ -		$ -		$ -		$ -		$ -		$ 1,198
NS_535	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 5,664
NS_798	$ 133,553	1	$ 119,686	1	$ 119,686	1	$ 119,686	1	$ 119,686	1	$ 115,064	1	$ -		$ -		$ 41,034
NS_424	$ 124,309	1	$ 124,309	1	$ 124,309	1	$ 124,309	1	$ 124,309	1	$ 124,309	1	$ -		$ -		$ 43,507
NS_689	$ 212,816	1	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ 1,063
NS_337	$ 124,309	1	$ 110,442	1	$ 110,442	1	$ 110,442	1	$ 110,442	1	$ 110,442	1	$ -		$ -		$ 38,723
NS_828	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 5,664
NS_710	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 5,664
NS_268	$ 110,442	1	$ 101,197	1	$ 101,197	1	$ 101,197	1	$ 101,197	1	$ 101,197	1	$ -		$ -		$ 35,464
NS_315	$ 35,985	0	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ 180
NS_645	$ 198,832	1	$ 162,208	1	$ 156,976	1	$ 156,976	1	$ 151,743	1	$ 146,511	1	$ -		$ -		$ 52,716
NS_202	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
NS_65	$ 124,309	1	$ 47,264	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 6,515
NS_358	$ 101,197	1	$ 47,264	1	$ 47,264	1	$ 47,264	1	$ 47,264	1	$ 47,264	1	$ -		$ -		$ 16,811

ID or Survey No.	Street Name	Street Address	CADID	Plan Label	Suburb	Raisable Yes/No	Floor Level m AHD	"Protection Level" (Floor Level less Freeboard) m AHD	Ground Level m AHD	Type of Res 1-4	Flood Level at Property, m AHD for each AEP flood: PMF	1.00%	2.00%	5.00%	10.00%	20.00%	Depth of Inundation above Floor Level (m) for each AEP flood: PMF	1.00%	2.00%	5.00%	10.00%	20.00%	Depth of Inundation Above "Protection Level" (m) for each AEP flood: PMF	1.00%	2.00%	5.00%	10.00%	20.00%	Flood Damages: PMF Damages, total for event, per property affected	PMF Properties Affected above floor level, damaged	AEP 1.00% Damages, total for event, per property affected	AEP 1.00% Properties Affected above floor level, damaged	AEP 2.0% Damages, total for event, per property affected	AEP 2.0% Properties Affected above floor level, damaged	AEP 5.0% Damages, total for event, per property affected	AEP 5.0% Properties Affected above floor level, damaged	AEP 10.0% Damages, total for event, per property affected	AEP 10.0% Properties Affected above floor level, damaged	AEP 20.0% Damages, total for event, per property affected	AEP 20.0% Properties Affected above floor level, damaged	AEP Damages, total for event, per property affected	AEP Properties Affected above floor level, damaged	AEP Damages, total for event, per property affected	AEP Properties Affected above floor level, damaged	AAD, total and per property
																													$ 71,529,460	491	$ 41,507,489	299	$ 38,271,467	272	$ 37,301,451	266	$ 34,249,086	247	$ 29,597,377	216	$ -	0	$ -	0	$ 11,517,801
NS_777	Bay View St	23A	102164136	DP24707	Lavender Bay	No	3.39	3.39	3.39	2	3.57	3.50	3.49	3.48	3.47	3.45	0.18	0.12	0.11	0.10	0.08	0.06	0.18	0.12	0.11	0.10	0.08	0.06	$ 105,820	1	$ 101,197	1	$ 101,197	1	$ 101,197	1	$ 101,197	1	$ 101,197	1	$ -		$ -		$ 35,441
NS_492	West St	45	102157493	DP603668	North Sydney	No	86.88	86.88	86.68	2	87.14	86.82	86.78	86.79	86.77	86.74	0.26	-0.06	-0.10	-0.09	-0.11	-0.15	0.26	-0.06	-0.10	-0.09	-0.11	-0.15	$ 110,442	1	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 6,135
NS_599	Alexander St	145	102154766	DP396110	Crows Nest	No	81.83	81.83	80.83	1	80.78	0.00	0.00	0.00	0.00	0.00	-1.05	0.00	0.00	0.00	0.00	0.00	-1.05	0.00	0.00	0.00	0.00	0.00	$ 35,985	0	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ 180
NS_111	Young St	45A	102209567	DP14718	Cremorne	No	65.36	65.36	65.26	2	65.54	0.00	0.00	0.00	0.00	0.00	0.18	0.00	0.00	0.00	0.00	0.00	0.18	0.00	0.00	0.00	0.00	0.00	$ 105,820	1	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ 529
NS_859	West St	297	102153721	SP21898	Cammeray	No	63.37	63.37	60.37	1	61.70	61.06	61.01	61.01	60.98	60.93	-1.67	-2.31	-2.37	-2.36	-2.39	-2.44	-1.67	-2.31	-2.37	-2.36	-2.39	-2.44	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
NS_841	Palmer St	9	102153660	DP975699	Cammeray	No	62.48	62.48	61.48	1	63.22	61.85	61.75	61.71	61.57	0.00	0.74	-0.63	-0.73	-0.78	-0.91	0.00	0.74	-0.63	-0.73	-0.78	-0.91	0.00	$ 141,279	1	$ 44,785	0	$ 43,025	0	$ 41,265	0	$ 39,505	0	$ -		$ -		$ -		$ 6,627
NS_623	Chandos St	114	102154785	DP406154	Crows Nest	No	72.49	72.49	71.64	1	73.59	72.10	72.00	71.96	71.87	71.72	1.11	-0.39	-0.49	-0.52	-0.62	-0.76	1.11	-0.39	-0.49	-0.52	-0.62	-0.76	$ 162,208	1	$ 48,304	0	$ 46,545	0	$ 46,545	0	$ 44,785	0	$ 41,265	0	$ -		$ -		$ 15,698
NS_557	Gas Works Rd	16	104069660	DP270176	Wollstonecraf	No	3.40	3.40	3.40	2	4.76	3.97	3.89	3.83	3.78	3.71	1.35	0.57	0.48	0.43	0.38	0.31	1.35	0.57	0.48	0.43	0.38	0.31	$ 161,286	1	$ 124,309	1	$ 119,686	1	$ 115,064	1	$ 115,064	1	$ 110,442	1	$ -		$ -		$ 39,763
NS_225	Byrnes Ave	8	102158168	DP219596	Neutral Bay	No	87.79	87.79	87.49	2	87.60	87.40	87.38	87.38	87.38	87.36	-0.18	-0.39	-0.40	-0.40	-0.41	-0.43	-0.18	-0.39	-0.40	-0.40	-0.41	-0.43	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 5,664
NS_382	Kurraba Rd	55B	100104937	DP787068	Neutral Bay	No	19.19	19.19	19.09	2	20.11	19.71	19.68	19.66	19.62	19.57	0.92	0.52	0.49	0.47	0.43	0.38	0.92	0.52	0.49	0.47	0.43	0.38	$ 138,175	1	$ 119,686	1	$ 119,686	1	$ 119,686	1	$ 115,064	1	$ 115,064	1	$ -		$ -		$ 40,710
NS_513	Falcon St	186	102157808	DP587173	North Sydney	No	74.79	74.79	74.69	2	75.11	0.00	0.00	0.00	0.00	0.00	0.31	0.00	0.00	0.00	0.00	0.00	0.31	0.00	0.00	0.00	0.00	0.00	$ 110,442	1	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ 552
NS_405	Wonga Rd	35A	102204717	DP847696	Cremorne	No	34.46	34.46	31.46	1	31.55	31.46	31.46	31.46	31.46	31.45	-2.91	-3.00	-3.00	-3.00	-3.00	-3.00	-2.91	-3.00	-3.00	-3.00	-3.00	-3.00	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
NS_578	Clark Rd	50-60	102160189	SP47119	North Sydney	No	5.49	5.49	3.49	1	3.66	2.65	2.63	2.60	2.55	2.51	-1.83	-2.84	-2.86	-2.89	-2.95	-2.98	-1.83	-2.84	-2.86	-2.89	-2.95	-2.98	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
NS_68	Reynolds St	56	102205020	DP102964	Cremorne	No	61.48	61.48	61.28	2	62.12	61.92	61.90	61.90	61.89	61.86	0.64	0.44	0.42	0.42	0.40	0.38	0.64	0.44	0.42	0.42	0.40	0.38	$ 124,309	1	$ 115,064	1	$ 115,064	1	$ 115,064	1	$ 115,064	1	$ 115,064	1	$ -		$ -		$ 40,317
NS_157	Rocklands Rd	6	102158561	SP6579	Wollstonecraf	No	55.67	55.67	50.67	1	50.34	50.33	0.00	0.00	0.00	0.00	-5.33	-5.33	0.00	0.00	0.00	0.00	-5.33	-5.33	0.00	0.00	0.00	0.00	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
NS_180	McDougallSt	16	102164302	SP11293	Kirribilli	No	18.14	18.14	16.14	1	18.11	16.22	16.19	16.14	16.06	16.06	-0.03	-1.92	-1.96	-2.00	-2.08	-2.08	-0.03	-1.92	-1.96	-2.00	-2.08	-2.08	$ 104,655	0	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ 523
NS_842	Palmer St	11	102153661	DP1922	Cammeray	No	63.26	63.26	61.26	1	62.00	61.35	61.29	61.27	0.00	0.00	-1.26	-1.91	-1.97	-1.99	0.00	0.00	-1.26	-1.91	-1.97	-1.99	0.00	0.00	$ 32,466	0	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ 162
NS_846	Marks St	30	102153703	SP22097	Cammeray	No	46.89	46.89	45.39	1	47.16	46.56	46.48	46.41	46.24	46.08	0.28	-0.33	-0.41	-0.47	-0.64	-0.80	0.28	-0.33	-0.41	-0.47	-0.64	-0.80	$ 120,351	1	$ 50,064	0	$ 48,304	0	$ 46,545	0	$ 44,785	0	$ 41,265	0	$ -		$ -		$ 15,541
NS_246	Ben Boyd Rd	53	102160698	SP16495	Neutral Bay	No	40.04	40.04	38.04	1	39.31	38.45	38.43	38.38	38.33	38.21	-0.73	-1.59	-1.61	-1.66	-1.71	-1.83	-0.73	-1.59	-1.61	-1.66	-1.71	-1.83	$ 43,025	0	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ 215
NS_66	Reynolds St	83	104405466	DP1031214	Cremorne	No	66.20	66.20	65.70	2	67.39	66.25	66.13	66.13	66.06	65.93	1.19	0.05	-0.07	-0.07	-0.14	-0.27	1.19	0.05	-0.07	-0.07	-0.14	-0.27	$ 152,042	1	$ 101,197	1	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 7,192
NS_203	Elamang Ave	43	102163370	DP535912	Kirribilli	No	3.56	3.56	3.46	2	4.31	4.14	4.13	4.12	3.73	0.00	0.76	0.58	0.57	0.56	0.17	0.00	0.76	0.58	0.57	0.56	0.17	0.00	$ 133,553	1	$ 124,309	1	$ 124,309	1	$ 124,309	1	$ 105,820	1	$ -		$ -		$ -		$ 17,305
NS_536	Carlyle St	11	102156751	DP4319	Wollstonecraf	No	71.58	71.58	70.58	1	70.62	70.57	70.56	70.56	70.55	70.55	-0.96	-1.01	-1.02	-1.02	-1.03	-1.03	-0.96	-1.01	-1.02	-1.02	-1.03	-1.03	$ 37,745	0	$ 37,745	0	$ 37,745	0	$ 37,745	0	$ 37,745	0	$ 37,745	0	$ -		$ -		$ 13,210
NS_860	West St	297	102153721	SP21898	Cammeray	No	66.12	66.12	63.12	1	63.47	63.29	63.26	63.27	63.25	63.23	-2.64	-2.83	-2.85	-2.85	-2.86	-2.88	-2.64	-2.83	-2.85	-2.85	-2.86	-2.88	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
NS_778	Bay View St	23B	103841888	DP788973	Lavender Bay	No	4.43	4.43	4.43	2	4.29	4.26	4.26	4.26	4.26	4.26	-0.14	-0.16	-0.16	-0.16	-0.16	-0.17	-0.14	-0.16	-0.16	-0.16	-0.16	-0.17	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 5,664
NS_799	Blues Point Rd	106	102163898	DP223657	McMahons Poi	No	30.41	30.41	30.31	2	32.01	30.73	30.72	30.71	30.69	30.68	1.60	0.32	0.31	0.30	0.28	0.27	1.60	0.32	0.31	0.30	0.28	0.27	$ 170,531	1	$ 110,442	1	$ 110,442	1	$ 110,442	1	$ 110,442	1	$ 110,442	1	$ -		$ -		$ 38,954
NS_711	Amherst St	82	102155716	DP749355	Cammeray	No	68.10	68.10	67.50	1	68.27	67.94	67.88	67.88	67.85	67.79	0.17	-0.15	-0.22	-0.21	-0.25	-0.31	0.17	-0.15	-0.22	-0.21	-0.25	-0.31	$ 115,119	1	$ 51,824	0	$ 51,824	0	$ 51,824	0	$ 51,824	0	$ 50,064	0	$ -		$ -		$ 18,102
NS_338	Military Rd	139-141	106731417	6108 - 3000	Neutral Bay	No	81.39	81.39	81.39	2	81.65	81.51	81.48	81.48	81.46	81.42	0.26	0.12	0.09	0.09	0.07	0.03	0.26	0.12	0.09	0.09	0.07	0.03	$ 110,442	1	$ 101,197	1	$ 101,197	1	$ 101,197	1	$ 101,197	1	$ 47,264	1	$ -		$ -		$ 24,678
NS_269	Undercliff St	30	102160758	SP19185	Neutral Bay	No	48.62	48.62	48.42	2	48.42	48.24	48.23	48.23	48.23	48.23	-0.20	-0.38	-0.38	-0.38	-0.39	-0.39	-0.20	-0.38	-0.38	-0.38	-0.39	-0.39	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 5,664
NS_316	Military Rd	39	104425298	DP259885	Neutral Bay	No	87.85	87.85	87.05	1	87.01	0.00	0.00	0.00	0.00	0.00	-0.84	0.00	0.00	0.00	0.00	0.00	-0.84	0.00	0.00	0.00	0.00	0.00	$ 41,265	0	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ 206
NS_646	Atchison St	88	105214470	42 - 2005 LF	Crows Nest	No	77.35	77.35	77.35	2	79.01	78.24	78.10	78.09	78.01	77.86	1.66	0.88	0.74	0.74	0.66	0.51	1.66	0.88	0.74	0.74	0.66	0.51	$ 175,153	1	$ 138,175	1	$ 128,931	1	$ 128,931	1	$ 128,931	1	$ 119,686	1	$ -		$ -		$ 43,599
NS_493	West St	47	102157494	DP606324	North Sydney	No	87.00	87.00	86.80	2	87.14	86.81	86.78	86.78	86.76	86.73	0.15	-0.18	-0.22	-0.22	-0.23	-0.27	0.15	-0.18	-0.22	-0.22	-0.23	-0.27	$ 101,197	1	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 6,089
NS_291	Undercliff St	4	102160721	DP108868	Neutral Bay	No	39.33	39.33	39.13	2	39.41	39.24	39.23	39.22	39.22	0.00	0.08	-0.09	-0.10	-0.11	-0.11	0.00	0.08	-0.09	-0.10	-0.11	-0.11	0.00	$ 101,197	1	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ -		$ 2,852
NS_359	Bertha Rd	4	102210855	DP350785	Cremorne	No	63.15	63.15	60.15	1	59.67	59.61	59.60	59.58	59.55	0.00	-3.48	-3.54	-3.55	-3.57	-3.60	0.00	-3.48	-3.54	-3.55	-3.57	-3.60	0.00	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
NS_112	Young St	47	102209568	DP14718	Cremorne	No	65.03	65.03	64.93	2	65.19	0.00	0.00	0.00	0.00	0.00	0.17	0.00	0.00	0.00	0.00	0.00	0.17	0.00	0.00	0.00	0.00	0.00	$ 105,820	1	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ 529
NS_425	Bannerman St	9	102210923	DP72206	Cremorne	No	30.93	30.93	30.83	2	32.22	31.38	31.34	31.31	31.27	31.23	1.29	0.45	0.41	0.38	0.34	0.30	1.29	0.45	0.41	0.38	0.34	0.30	$ 156,664	1	$ 119,686	1	$ 115,064	1	$ 115,064	1	$ 110,442	1	$ 110,442	1	$ -		$ -		$ 39,254
NS_558	Gas Works Rd	12	108132989	DP270176	Wollstonecraf	No	3.89	3.89	3.59	2	5.15	4.10	4.01	3.96	3.92	3.85	1.26	0.21	0.12	0.07	0.03	-0.04	1.26	0.21	0.12	0.07	0.03	-0.04	$ 156,664	1	$ 105,820	1	$ 101,197	1	$ 101,197	1	$ 47,264	1	$ 47,264	0	$ -		$ -		$ 20,910
NS_159	Belmont Ave	29	102158569	SP6275	Wollstonecraf	No	56.98	56.98	55.98	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
NS_843	Palmer St	12	102153672	DP7362	Cammeray	No	58.76	58.76	58.66	2	59.81	58.81	58.80	58.79	58.79	58.78	1.05	0.05	0.03	0.03	0.02	0.01	1.05	0.05	0.03	0.03	0.02	0.01	$ 142,797	1	$ 47,264	1	$ 47,264	1	$ 47,264	1	$ 47,264	1	$ 47,264	1	$ -		$ -		$ 17,019
NS_69	Levick St	2	102204926	DP102964	Cremorne	No	59.20	59.20	59.00	2	59.66	59.32	59.27	59.27	59.25	59.18	0.46	0.12	0.07	0.07	0.05	-0.02	0.46	0.12	0.07	0.07	0.05	-0.02	$ 119,686	1	$ 101,197	1	$ 101,197	1	$ 101,197	1	$ 47,264	1	$ 47,264	0	$ -		$ -		$ 20,679
NS_600	Alexander St	147	102154767	DP440438	Crows Nest	No	81.27	81.27	80.27	1	80.40	80.15	0.00	0.00	0.00	0.00	-0.87	-1.12	0.00	0.00	0.00	0.00	-0.87	-1.12	0.00	0.00	0.00	0.00	$ 39,505	0	$ 35,985	0	$ -		$ -		$ -		$ -		$ -		$ -		$ 557
NS_226	Falcon St	203	102158119	SP19284	Neutral Bay	No	84.02	84.02	83.97	2	84.81	84.62	84.61	84.60	84.59	84.59	0.79	0.60	0.59	0.58	0.58	0.57	0.79	0.60	0.59	0.58	0.58	0.57	$ 133,553	1	$ 124,309	1	$ 124,309	1	$ 124,309	1	$ 124,309	1	$ 124,309	1	$ -		$ -		$ 43,553
NS_861	Vale St	14	102153739	DP389250	Cammeray	No	59.76	59.76	59.46	2	59.53	59.46	59.45	59.45	59.44	59.43	-0.24	-0.31	-0.31	-0.31	-0.32	-0.33	-0.24	-0.31	-0.31	-0.31	-0.32	-0.33	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 5,664
NS_114	Young St	49	102209586	DP33208	Cremorne	No	64.11	64.11	63.91	2	64.12	63.80	0.00	0.00	0.00	0.00	0.01	-0.31	0.00	0.00	0.00	0.00	0.01	-0.31	0.00	0.00	0.00	0.00	$ 47,264	1	$ 16,183	0	$ -		$ -		$ -		$ -		$ -		$ -		$ 398
NS_624	Wheatleigh St	1A	102154778	DP731137	Crows Nest	No	72.77	72.77	72.67	2	74.34	73.35	73.29	73.26	73.19	73.07	1.57	0.58	0.51	0.49	0.41	0.30	1.57	0.58	0.51	0.49	0.41	0.30	$ 170,531	1	$ 124,309	1	$ 119,686	1	$ 119,686	1	$ 115,064	1	$ 110,442	1	$ -		$ -		$ 39,994
NS_406	Ellalong Rd	28	169627749	DP1186070	Cremorne	No	63.43	63.43	63.23	2	63.75	63.54	63.51	63.51	63.50	63.46	0.31	0.10	0.08	0.08	0.07	0.03	0.31	0.10	0.08	0.08	0.07	0.03	$ 110,442	1	$ 101,197	1	$ 101,197	1	$ 101,197	1	$ 101,197	1	$ 47,264	1	$ -		$ -		$ 24,678
NS_383	Lower Wycombe R	5	102160973	DP3183	Neutral Bay	No	13.01	13.01	12.21	1	13.20	12.76	12.76	12.75	12.73	12.65	0.19	-0.25	-0.25	-0.26	-0.28	-0.36	0.19	-0.25	-0.25	-0.26	-0.28	-0.36	$ 115,119	1	$ 51,824	0	$ 50,064	0	$ 50,064	0	$ 50,064	0	$ 48,304	0	$ -		$ -		$ 17,513
NS_158	Rocklands Rd	10A	102158565	DP736783	Wollstonecraf	No	55.08	55.08	52.08	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
NS_292	Kurraba Rd	90	173792225	SP92335	Neutral Bay	No	22.39	22.39	22.19	2	22.20	22.02	22.03	22.02	22.02	22.02	-0.19	-0.36	-0.36	-0.36	-0.37	-0.37	-0.19	-0.36	-0.36	-0.36	-0.37	-0.37	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 5,664
NS_514	Falcon St	188	102157809	DP587173	North Sydney	No	74.37	74.37	74.27	2	74.98	74.17	0.00	74.14	0.00	0.00	0.60	-0.20	0.00	-0.24	0.00	0.00	0.60	-0.20	0.00	-0.24	0.00	0.00	$ 124,309	1	$ 16,183	0	$ -		$ 16,183	0	$ -		$ -		$ -		$ -		$ 1,430
NS_847	Marks St	28A	150100201	DP1073630	Cammeray	No	46.81	46.81	46.11	1	47.39	46.63	46.55	46.50	46.39	46.29	0.58	-0.19	-0.26	-0.31	-0.43	-0.52	0.58	-0.19	-0.26	-0.31	-0.43	-0.52	$ 136,047	1	$ 51,824	0	$ 50,064	0	$ 50,064	0	$ 48,304	0	$ 46,545	0	$ -		$ -		$ 17,133
NS_844	Bridgeview Ave	21	102153674	SP21379	Cammeray	No	57.59	57.59	57.49	2	57.47	57.42	57.42	57.42	57.42	57.42	-0.12	-0.17	-0.17	-0.17	-0.17	-0.17	-0.12	-0.17	-0.17	-0.17	-0.17	-0.17	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 5,664
NS_181	McDougall St	18	102163010	DP17717	Kirribilli	No	15.23	15.23	15.13	2	18.20	15.18	15.13	15.08	14.90	14.57	2.97	-0.06	-0.10	-0.15	-0.33	-0.66	2.97	-0.06	-0.10	-0.15	-0.33	-0.66	$ 200,520	1	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ -		$ 3,348
NS_559	Gas Works Rd	12	108132989	DP270176	Wollstonecraf	No	3.91	3.91	3.81	2	5.66	4.34	4.22	4.18	4.13	4.04	1.76	0.43	0.32	0.27	0.23	0.13	1.76	0.43	0.32	0.27	0.23	0.13	$ 179,775	1	$ 115,064	1	$ 110,442	1	$ 110,442	1	$ 105,820	1	$ 101,197	1	$ -		$ -		$ 36,850
NS_67	Reynolds St	58	102205028	DP10545	Cremorne	No	65.43	65.43	65.03	2	65.01	64.97	64.97	64.97	64.96	64.96	-0.41	-0.46	-0.46	-0.46	-0.46	-0.47	-0.41	-0.46	-0.46	-0.46	-0.46	-0.47	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 5,664
NS_247	Ben Boyd Rd	47	102160697	DP565595	Neutral Bay	No	38.48	38.48	38.38	2	38.57	38.42	38.39	0.00	0.00	0.00	0.09	-0.06	-0.09	0.00	0.00	0.00	0.09	-0.06	-0.09	0.00	0.00	0.00	$ 101,197	1	$ 16,183	0	$ 16,183	0	$ -		$ -		$ -		$ -		$ -		$ 991
NS_667	Lillis St	10	102157847	DP439939	Cammeray	No	70.37	70.37	70.07	2	71.36	69.93	69.93	69.93	69.93	69.93	0.98	-0.44	-0.44	-0.44	-0.44	-0.45	0.98	-0.44	-0.44	-0.44	-0.44	-0.45	$ 142,797	1	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 6,296
NS_537	River Rd	9	102156760	SP65228	Wollstonecraf	No	75.40	75.40	75.30	2	75.42	75.38	75.38	75.38	75.38	75.38	0.02	-0.02	-0.02	-0.02	-0.02	-0.02	0.02	-0.02	-0.02	-0.02	-0.02	-0.02	$ 47,264	1	$ 47,264	0	$ 47,264	0	$ 47,264	0	$ 47,264	0	$ 47,264	0	$ -		$ -		$ 16,542
NS_779	Bay View St	21	102164135	DP222638	Lavender Bay	No	15.93	15.93	15.93	2	16.53	16.24	16.21	16.18	16.15	16.11	0.60	0.31	0.28	0.25	0.22	0.18	0.60	0.31	0.28	0.25	0.22	0.18	$ 124,309	1	$ 110,442	1	$ 110,442	1	$ 110,442	1	$ 105,820	1	$ 105,820	1	$ -		$ -		$ 37,452
NS_800	Dumbarton St	35	108020075	2 - 1990 R	McMahons Poi	No	29.69	29.69	25.69	1	24.63	0.00	0.00	0.00	0.00	0.00	-5.06	0.00	0.00	0.00	0.00	0.00	-5.06	0.00	0.00	0.00	0.00	0.00	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
NS_317	Bent St	87	102160411	SP18418	Neutral Bay	No	55.13	55.13	55.03	2	57.11	56.95	56.94	56.92	56.90	56.87	1.99	1.82	1.82	1.80	1.78	1.75	1.99	1.82	1.82	1.80	1.78	1.75	$ 189,020	1	$ 179,775	1	$ 179,775	1	$ 179,775	1	$ 179,775	1	$ 175,153	1	$ -		$ -		$ 62,041
NS_270	Undercliff St	28	102160757	SP10039	Neutral Bay	No	47.08	47.08	46.98	2	47.44	47.17	47.17	47.16	47.15	47.15	0.37	0.09	0.09	0.08	0.08	0.07	0.37	0.09	0.09	0.08	0.08	0.07	$ 115,064	1	$ 101,197	1	$ 101,197	1	$ 101,197	1	$ 101,197	1	$ 101,197	1	$ -		$ -		$ 35,487
NS_712	Amherst St	84	102155774	DP6687	Cammeray	No	67.48	67.48	67.28	2	67.33	67.20	67.18	67.17	67.16	67.15	-0.15	-0.28	-0.30	-0.31	-0.32	-0.33	-0.15	-0.28	-0.30	-0.31	-0.32	-0.33	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 5,664
NS_204	Elamang Ave	31-39	102163373	SP5186	Kirribilli	No	2.55	2.55	2.15	2	2.81	2.55	2.53	2.50	2.48	2.46	0.26	0.00	-0.02	-0.05	-0.07	-0.09	0.26	0.00	-0.02	-0.05	-0.07	-0.09	$ 110,442	1	$ 47,264	1	$ 47,264	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 7,067
NS_862	Vale St	2	102153727	DP748772	Cammeray	No	50.11	50.11	50.06	2	49.07	0.00	0.00	0.00	0.00	0.00	-1.04	0.00	0.00	0.00	0.00	0.00	-1.04	0.00	0.00	0.00	0.00	0.00	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
NS_494	West St	49	102157495	SP19820	North Sydney	No	86.88	86.88	86.68	2	87.14	86.79	86.74	86.75	86.73	86.70	0.26	-0.09	-0.14	-0.13	-0.15	-0.18	0.26	-0.09	-0.14	-0.13	-0.15	-0.18	$ 110,442	1	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 6,135
NS_647	Atchison St	84	102154550	DP2872	Crows Nest	No	77.74	77.74	77.74	2	79.05	78.23	78.09	78.09	78.01	77.86	1.31	0.49	0.35	0.35	0.27	0.12	1.31	0.49	0.35	0.35	0.27	0.12	$ 156,664	1	$ 119,686	1	$ 115,064	1	$ 110,442	1	$ 110,442	1	$ 101,197	1	$ -		$ -		$ 37,220
NS_849	Marks St	24	103725911	SP32687	Cammeray	No	46.02	46.02	45.92	2	48.96	47.14	47.07	47.00	46.83	46.68	2.94	1.13	1.05	0.98	0.81	0.66	2.94	1.13	1.05	0.98	0.81	0.66	$ 199,370	1	$ 147,420	1	$ 142,797	1	$ 142,797	1	$ 133,553	1	$ 128,931	1	$ -		$ -		$ 46,840
NS_735	West St	152	104698883	DP662961	Crows Nest	No	81.22	81.22	81.02	2	81.29	81.06	81.05	81.05	81.04	81.02	0.07	-0.16	-0.18	-0.17	-0.18	-0.20	0.07	-0.16	-0.18	-0.17	-0.18	-0.20	$ 101,197	1	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 6,089
NS_113	Young St	47A	102209585	DP14718	Cremorne	No	64.49	64.49	64.39	2	64.51	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	$ 47,264	1	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ 236
NS_360	Burroway St	7	102210847	SP32495	Cremorne	No	56.99	56.99	56.69	2	58.01	57.30	57.25	57.22	57.18	57.15	1.03	0.31	0.26	0.24	0.19	0.16	1.03	0.31	0.26	0.24	0.19	0.16	$ 142,797	1	$ 110,442	1	$ 110,442	1	$ 105,820	1	$ 105,820	1	$ 105,820	1	$ -		$ -		$ 37,359
NS_160	nds Lane / Rocklan	9 (12A)	164301517	DP1152110	Wollstonecraf	No	52.33	52.33	52.23	2	52.03	51.35	51.32	51.41	51.38	51.35	-0.30	-0.98	-1.01	-0.91	-0.95	-0.98	-0.30	-0.98	-1.01	-0.91	-0.95	-0.98	$ 16,183	0	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ 81
NS_161	Rocklands Rd	14B-14C	103789337	SP53546	Wollstonecraf	No	53.45	53.45	53.35	2	53.72	53.19	0.00	0.00	0.00	0.00	0.27	-0.26	0.00	0.00	0.00	0.00	0.27	-0.26	0.00	0.00	0.00	0.00	$ 110,442	1	$ 16,183	0	$ -		$ -		$ -		$ -		$ -		$ -		$ 713
NS_845	Marks St	28	150100191	DP1073630	Cammeray	No	46.82	46.82	46.52	2	47.11	46.55	46.47	46.41	0.00	0.00	0.29	-0.27	-0.35	-0.41	0.00	0.00	0.29	-0.27	-0.35	-0.41	0.00	0.00	$ 110,442	1	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ -		$ -		$ 1,684
NS_426	Bogota Ave	33	102210825	DP82855	Cremorne	No	31.49	31.49	31.29	2	32.60	31.58	31.53	31.49	31.45	31.40	1.11	0.09	0.04	0.00	-0.05	-0.09	1.11	0.09	0.04	0.00	-0.05	-0.09	$ 147,420	1	$ 101,197	1	$ 47,264	1	$ 47,264	0	$ 47,264	0	$ 16,183	0	$ -		$ -		$ 11,365
NS_293	Kurraba Rd	88A	102160844	SP45410	Neutral Bay	No	23.61	23.61	22.61	1	23.50	22.70	22.69	22.64	22.60	22.52	-0.11	-0.91	-0.92	-0.97	-1.01	-1.09	-0.11	-0.91	-0.92	-0.97	-1.01	-1.09	$ 53,584	0	$ 39,505	0	$ 39,505	0	$ 37,745	0	$ 37,745	0	$ 35,985	0	$ -		$ -		$ 12,990
NS_560	Milray Ave	40	102161057	DP27417	Wollstonecraf	No	27.12	27.12	27.12	2	28.07	27.91	27.89	27.89	27.88	27.88	0.94	0.79	0.77	0.77	0.76	0.76	0.94	0.79	0.77	0.77	0.76	0.76	$ 138,175	1	$ 133,553	1	$ 133,553	1	$ 133,553	1	$ 133,553	1	$ 133,553	1	$ -		$ -		$ 46,765
NS_115	Young St	51	102209587	DP33208	Cremorne	No	64.51	64.51	63.51	1	64.02	63.68	0.00	0.00	0.00	0.00	-0.50	-0.83	0.00	0.00	0.00	0.00	-0.50	-0.83	0.00	0.00	0.00	0.00	$ 46,545	0	$ 41,265	0	$ -		$ -		$ -		$ -		$ -		$ -		$ 645
NS_601	Alexander St	149	102154768	DP440438	Crows Nest	No	80.96	80.96	79.96	1	80.16	79.92	79.86	79.86	79.85	79.74	-0.81	-1.05	-1.11	-1.11	-1.12	-1.23	-0.81	-1.05	-1.11	-1.11	-1.12	-1.23	$ 41,265	0	$ 37,745	0	$ 35,985	0	$ 35,985	0	$ 35,985	0	$ 34,226	0	$ -		$ -		$ 12,287
NS_227	Undercliff St	72	102160770	DP370730	Neutral Bay	No	51.07	51.07	50.87	2	51.30	51.21	51.21	51.21	51.08	51.08	0.23	0.15	0.14	0.14	0.02	0.01	0.23	0.15	0.14	0.14	0.02	0.01	$ 105,820	1	$ 101,197	1	$ 101,197	1	$ 101,197	1	$ 47,264	1	$ 47,264	1	$ -		$ -		$ 20,609
NS_863	Miller St	560	102153772	DP737288	Cammeray	No	67.81	67.81	67.76	2	67.90	67.84	67.84	67.84	67.83	67.83	0.08	0.03	0.02	0.03	0.02	0.01	0.08	0.03	0.02	0.03	0.02	0.01	$ 101,197	1	$ 47,264	1	$ 47,264	1	$ 47,264	1	$ 47,264	1	$ 47,264	1	$ -		$ -		$ 16,811
NS_625	Wheatleigh St	1	102154800	DP11773	Crows Nest	No	72.57	72.57	72.47	2	73.68	0.00	0.00	0.00	0.00	0.00	1.11	0.00	0.00	0.00	0.00	0.00	1.11	0.00	0.00	0.00	0.00	0.00	$ 147,420	1	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ 736
NS_407	Sutherland St	9	102158276	SP39630	Cremorne	No	77.98	77.98	77.78	2	78.33	77.99	77.96	77.96	77.95	77.92	0.36	0.02	-0.02	-0.02	-0.03	-0.06	0.36	0.02	-0.02	-0.02	-0.03	-0.06	$ 115,064	1	$ 47,264	1	$ 47,264	0	$ 47,264	0	$ 47,264	0	$ 16,183	0	$ -		$ -		$ 10,664
NS_384	Lower Wycombe R	7	100104931	DP3183	Neutral Bay	No	12.64	12.64	10.64	1	13.23	12.79	12.79	12.77	12.75	12.67	0.59	0.15	0.15	0.14	0.12	0.03	0.59	0.15	0.15	0.14	0.12	0.03	$ 136,047	1	$ 115,119	1	$ 115,119	1	$ 109,887	1	$ 109,887	1	$ 104,655	1	$ -		$ -		$ 37,701
NS_848	Marks St	26	103725911	SP32687	Cammeray	No	46.52	46.52	46.42	2	48.63	47.05	46.96	46.89	46.70	46.55	2.11	0.53	0.44	0.37	0.18	0.03	2.11	0.53	0.44	0.37	0.18	0.03	$ 190,170	1	$ 119,686	1	$ 115,064	1	$ 115,064	1	$ 105,820	1	$ 47,264	1	$ -		$ -		$ 26,439
NS_182	McDougall St	40	102163159	DP740787	Kirribilli	No	12.41	12.41	12.21	2	14.45	13.28	13.23	13.19	13.18	13.16	2.04	0.87	0.82	0.78	0.77	0.75	2.04	0.87	0.82	0.78	0.77	0.75	$ 189,020	1	$ 138,175	1	$ 133,553	1	$ 133,553	1	$ 133,553	1	$ 128,931	1	$ -		$ -		$ 46,141
NS_515	Russel St	43952	103858532	SP57934	Wollstonecraf	No	41.50	41.50	40.20	1	42.37	41.98	41.94	41.93	41.89	41.84	0.87	0.48	0.44	0.43	0.39	0.34	0.87	0.48	0.44	0.43	0.39	0.34	$ 151,743	1	$ 130,815	1	$ 125,583	1	$ 125,583	1	$ 125,583	1	$ 120,351	1	$ -		$ -		$ 43,089
NS_780	Bay View St	17	102164133	DP222638	Lavender Bay	No	16.78	16.78	15.98	1	16.61	16.31	16.27	16.24	16.21	16.16	-0.16	-0.47	-0.50	-0.53	-0.57	-0.61	-0.16	-0.47	-0.50	-0.53	-0.57	-0.61	$ 51,824	0	$ 46,545	0	$ 46,545	0	$ 46,545	0	$ 44,785	0	$ 44,785	0	$ -		$ -		$ 15,833
NS_801	Dumbarton St	33	102164338	SP11714	McMahons Poi	No	28.75	28.75	24.75	1	24.61	24.40	24.38	24.38	24.33	24.32	-4.13	-4.35	-4.37	-4.37	-4.41	-4.43	-4.13	-4.35	-4.37	-4.37	-4.41	-4.43	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
NS_318	Bent St	89	102160412	SP48112	Neutral Bay	No	52.11	52.11	51.61	2	53.61	53.17	53.13	53.10	53.08	53.01	1.50	1.05	1.02	0.98	0.97	0.90	1.50	1.05	1.02	0.98	0.97	0.90	$ 165,909	1	$ 147,420	1	$ 142,797	1	$ 142,797	1	$ 142,797	1	$ 138,175	1	$ -		$ -		$ 49,215
NS_561	Milray Ave	42A	103931446	DP877526	Wollstonecraf	No	26.68	26.68	26.58	2	27.09	27.00	26.99	26.99	26.99	26.99	0.41	0.32	0.32	0.32	0.31	0.31	0.41	0.32	0.32	0.32	0.31	0.31	$ 115,064	1	$ 110,442	1	$ 110,442	1	$ 110,442	1	$ 110,442	1	$ 110,442	1	$ -		$ -		$ 38,677
NS_205	Holbrook Ave	10	102163646	SP54082	Kirribilli	No	12.73	12.73	10.73	1	10.81	10.72	10.71	10.70	10.70	10.69	-1.92	-2.01	-2.02	-2.03	-2.03	-2.04	-1.92	-2.01	-2.02	-2.03	-2.03	-2.04	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
NS_248	Ben Boyd Rd	45	102160699	DP565595	Neutral Bay	No	38.26	38.26	38.06	2	38.23	38.07	38.06	0.00	0.00	0.00	-0.03	-0.19	-0.20	0.00	0.00	0.00	-0.03	-0.19	-0.20	0.00	0.00	0.00	$ 47,264	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ -		$ -		$ -		$ 722
NS_495	Cassins Ave	1	159853274	SP79877	North Sydney	No	84.43	84.43	84.23	2	84.84	84.33	84.31	84.31	84.30	84.28	0.41	-0.10	-0.12	-0.12	-0.13	-0.15	0.41	-0.10	-0.12	-0.12	-0.13	-0.15	$ 115,064	1	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 6,158
NS_713	Amherst St	86	102155776	DP6687	Cammeray	No	67.01	67.01	66.81	2	66.94	66.88	66.87	66.87	66.87	66.86	-0.06	-0.12	-0.13	-0.13	-0.13	-0.14	-0.06	-0.12	-0.13	-0.13	-0.13	-0.14	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 5,664
NS_294	Kurraba Rd	86A	102160694	SP10255	Neutral Bay	No	22.86	22.86	22.26	1	23.46	22.68	22.67	22.61	22.55	22.41	0.60	-0.18	-0.19	-0.25	-0.31	-0.45	0.60	-0.18	-0.19	-0.25	-0.31	-0.45	$ 136,047	1	$ 51,824	0	$ 51,824	0	$ 50,064	0	$ 50,064	0	$ 48,304	0	$ -		$ -		$ 17,652
NS_538	Christie St	17-19	100104623	SP30197	Wollstonecraf	No	72.75	72.75	72.45	2	72.46	72.44	0.00	0.00	0.00	0.00	-0.29	-0.30	0.00	0.00	0.00	0.00	-0.29	-0.30	0.00	0.00	0.00	0.00	$ 16,183	0	$ 16,183	0	$ -		$ -		$ -		$ -		$ -		$ -		$ 243
NS_864	Miller St	499	102153846	DP344581	Cammeray	No	57.92	57.92	57.22	1	57.92	57.63	57.61	57.61	57.67	0.00	0.00	-0.29	-0.31	-0.31	-0.25	0.00	0.00	-0.29	-0.31	-0.31	-0.25	0.00	$ 104,655	0	$ 50,064	0	$ 50,064	0	$ 50,064	0	$ 51,824	0	$ -		$ -		$ -		$ 7,914
NS_648	Hume Lane	80	159511662	SP79884	Crows Nest	No	80.22	80.22	78.42	1	79.00	0.00	0.00	0.00	0.00	0.00	-1.22	0.00	0.00	0.00	0.00	0.00	-1.22	0.00	0.00	0.00	0.00	0.00	$ 34,226	0	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ 171
NS_271	Undercliff St	26	102160756	DP13486	Neutral Bay	No	48.99	48.99	47.59	1	48.09	47.91	47.90	47.89	0.00	0.00	-0.90	-1.08	-1.09	-1.10	0.00	0.00	-0.90	-1.08	-1.09	-1.10	0.00	0.00	$ 39,505	0	$ 35,985	0	$ 35,985	0	$ 35,985	0	$ -		$ -		$ -		$ -		$ 2,716
NS_736	West St	139-147	102157700	DP412803	Crows Nest	No	79.03	79.03	78.93	2	80.78	79.45	79.20	79.19	79.07	78.92	1.75	0.42	0.17	0.16	0.04	-0.11	1.75	0.42	0.17	0.16	0.04	-0.11	$ 179,775	1	$ 115,064	1	$ 105,820	1	$ 105,820	1	$ 47,264	1	$ 16,183	0	$ -		$ -		$ 15,179
NS_668	Lillis St	8	105248764	102 - 2550	Cammeray	No	70.13	70.13	69.73	2	71.36	69.63	69.62	69.61	69.60	69.57	1.23	-0.50	-0.51	-0.52	-0.53	-0.56	1.23	-0.50	-0.51	-0.52	-0.53	-0.56	$ 152,042	1	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ -		$ 3,106
NS_850	Marks St	22	102153699	DP320541	Cammeray	No	49.04	49.04	48.94	2	50.22	0.00	0.00	0.00	0.00	0.00	1.18	0.00	0.00	0.00	0.00	0.00	1.18	0.00	0.00	0.00	0.00	0.00	$ 152,042	1	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ 759
NS_361	Bertha Rd	1	102210847	SP32495	Cremorne	No	57.18	57.18	56.98	2	57.98	57.27	57.23	57.20	57.16	57.13	0.80	0.09	0.05	0.02	-0.02	-0.05	0.80	0.09	0.05	0.02	-0.02	-0.05	$ 133,553	1	$ 101,197	1	$ 47,264	1	$ 47,264	1	$ 47,264	0	$ 16,183	0	$ -		$ -		$ 11,296
NS_229	Undercliff St	64	102160772	DP21192	Neutral Bay	No	50.00	50.00	49.95	2	50.18	50.07	50.07	50.07	50.07	50.06	0.17	0.07	0.07	0.07	0.07	0.06	0.17	0.07	0.07	0.07	0.07	0.06	$ 105,820	1	$ 101,197	1	$ 101,197	1	$ 101,197	1	$ 101,197	1	$ 101,197	1	$ -		$ -		$ 35,441
NS_427	Bannerman St	5	102210824	DP523662	Cremorne	No	33.01	33.01	32.91	2	33.57	32.93	32.92	32.92	32.90	32.90	0.56	-0.08	-0.09	-0.10	-0.11	-0.12	0.56	-0.08	-0.09	-0.10	-0.11	-0.12	$ 124,309	1	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 6,204
NS_602	Alexander St	155	102154769	SP17528	Crows Nest	No	79.82	79.82	79.72	2	79.91	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.00	0.00	$ 101,197	1	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ 505
NS_184	McDougall St	44	102163144	SP41992	Kirribilli	No	7.15	7.15	5.15	1	6.40	5.39	5.36	5.33	5.30	5.26	-0.76	-1.76	-1.80	-1.82	-1.85	-1.89	-0.76	-1.76	-1.80	-1.82	-1.85	-1.89	$ 41,265	0	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ 206
NS_408	Sutherland St	8	100203980	SP54671	Cremorne	No	73.34	73.34	73.24	2	74.44	73.91	73.86	73.87	73.85	73.81	1.10	0.57	0.52	0.53	0.51	0.47	1.10	0.57	0.52	0.53	0.51	0.47	$ 147,420	1	$ 124,309	1	$ 119,686	1	$ 119,686	1	$ 119,686	1	$ 119,686	1	$ -		$ -		$ 42,074
NS_626	Wheatleigh St	3A	108118004	DP1033774	Crows Nest	No	71.56	71.56	71.46	2	72.11	71.48	0.00	0.00	0.00	0.00	0.55	-0.08	0.00	0.00	0.00	0.00	0.55	-0.08	0.00	0.00	0.00	0.00	$ 124,309	1	$ 16,183	0	$ -		$ -		$ -		$ -		$ -		$ -		$ 783
NS_385	Davidson Pde	8	102205174	DP12587	Cremorne	No	73.81	73.81	73.71	2	74.27	74.10	74.08	74.08	74.07	74.05	0.46	0.29	0.28	0.27	0.26	0.24	0.46	0.29	0.28	0.27	0.26	0.24	$ 119,686	1	$ 110,442	1	$ 110,442	1	$ 110,442	1	$ 110,442	1	$ 105,820	1	$ -		$ -		$ 37,775
NS_865	Miller St	501	102153848	SP9525	Cammeray	No	57.21	57.21	56.81	2	57.71	57.33	57.27	57.28	57.25	57.20	0.49	0.12	0.06	0.07	0.04	-0.01	0.49	0.12	0.06	0.07	0.04	-0.01	$ 119,686	1	$ 101,197	1	$ 101,197	1	$ 101,197	1	$ 47,264	1	$ 47,264	0	$ -		$ -		$ 20,679
NS_230	Undercliff St	62	102160753	DP21192	Neutral Bay	No	49.15	49.15	49.10	2	49.54	49.43	49.42	49.42	49.41	49.41	0.39	0.28	0.28	0.27	0.27	0.26	0.39	0.28	0.28	0.27	0.27	0.26	$ 115,064	1	$ 110,442	1	$ 110,442	1	$ 110,442	1	$ 110,442	1	$ 110,442	1	$ -		$ -		$ 38,677
NS_802	Dumbarton St	29	104766101	DP1059353	McMahons Poi	No	28.56	28.56	24.56	1	24.60	24.38	24.37	24.37	24.35	24.34	-3.96	-4.18	-4.19	-4.20	-4.21	-4.22	-3.96	-4.18	-4.19	-4.20	-4.21	-4.22	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
NS_228	Undercliff St	66	102160773	DP21192	Neutral Bay	No	49.11	49.11	48.81	2	49.19	48.96	48.95	48.94	48.93	48.91	0.08	-0.15	-0.16	-0.17	-0.19	-0.20	0.08	-0.15	-0.16	-0.17	-0.19	-0.20	$ 101,197	1	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 6,089
NS_295	Kurraba Rd	86	102160696	SP10256	Neutral Bay	No	21.71	21.71	21.51	2	22.54	21.86	21.85	21.81	21.76	21.64	0.82	0.15	0.14	0.09	0.05	-0.08	0.82	0.15	0.14	0.09	0.05	-0.08	$ 133,553	1	$ 105,820	1	$ 101,197	1	$ 101,197	1	$ 47,264	1	$ 16,183	0	$ -		$ -		$ 14,578
NS_251	Ben Boyd Rd	41	102160702	DP33304	Neutral Bay	No	37.19	37.19	37.14	2	37.31	37.18	37.18	0.00	0.00	0.00	0.11	-0.01	-0.02	0.00	0.00	0.00	0.11	-0.01	-0.02	0.00	0.00	0.00	$ 101,197	1	$ 47,264	0	$ 47,264	0	$ -		$ -		$ -		$ -		$ -		$ 1,923
NS_781	Bay View St	19	102164134	DP222638	Lavender Bay	No	16.15	16.15	16.15	2	16.61	16.31	16.27	16.24	16.21	16.16	0.47	0.16	0.13	0.10	0.06	0.02	0.47	0.16	0.13	0.10	0.06	0.02	$ 119,686	1	$ 105,820	1	$ 101,197	1	$ 101,197	1	$ 101,197	1	$ 47,264	1	$ -		$ -		$ 24,770
NS_866	The Boulevarde	7A	102153921	SP71781	Cammeray	No	49.76	49.76	47.76	1	47.52	47.45	47.45	47.45	47.45	47.44	-2.24	-2.31	-2.31	-2.31	-2.31	-2.32	-2.24	-2.31	-2.31	-2.31	-2.31	-2.32	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
NS_207	Beulah St	20-22	104019477	SP58872	Kirribilli	No	6.19	6.19	6.19	2	7.07	6.75	6.72	6.72	6.72	6.72	0.88	0.56	0.53	0.53	0.53	0.53	0.88	0.56	0.53	0.53	0.53	0.53	$ 138,175	1	$ 124,309	1	$ 119,686	1	$ 119,686	1	$ 119,686	1	$ 119,686	1	$ -		$ -		$ 42,028
NS_714	Amherst St	88	102155778	DP580343	Cammeray	No	66.66	66.66	66.16	2	66.30	66.18	66.16	66.16	66.16	66.14	-0.36	-0.49	-0.50	-0.50	-0.50	-0.52	-0.36	-0.49	-0.50	-0.50	-0.50	-0.52	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 5,664
NS_321	Darley St	4	102160058	DP934272	Neutral Bay	No	16.32	16.32	16.32	2	16.28	16.16	16.15	16.15	16.15	16.15	-0.04	-0.16	-0.16	-0.17	-0.17	-0.17	-0.04	-0.16	-0.16	-0.17	-0.17	-0.17	$ 47,264	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 5,819
NS_249	Ben Boyd Rd	43A	102160700	DP108214	Neutral Bay	No	37.83	37.83	37.73	2	37.86	37.78	37.78	0.00	0.00	0.00	0.03	-0.05	-0.05	0.00	0.00	0.00	0.03	-0.05	-0.05	0.00	0.00	0.00	$ 47,264	1	$ 16,183	0	$ 16,183	0	$ -		$ -		$ -		$ -		$ -		$ 722
NS_274	Ben Boyd Rd	79	102160764	DP980266	Neutral Bay	No	50.02	50.02	49.52	2	49.42	0.00	0.00	0.00	0.00	0.00	-0.61	0.00	0.00	0.00	0.00	0.00	-0.61	0.00	0.00	0.00	0.00	0.00	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -

ID or Survey No.	Street Name	Street Address	CADID	Plan Label	Suburb	Raisable Yes/No	Floor Level m AHD	"Protection Level" (Floor Level less Freeboard) m AHD	Ground Level m AHD	Type of Res 1-4	Flood Level at Property, m AHD for each AEP flood: PMF	1.00%	2.00%	5.00%	10.00%	20.00%
NS_649	Atchison St	53-57	102154526	DP608400	Crows Nest	No	79.72	79.72	78.22	1	78.99	78.33	78.30	78.30	78.29	78.23
NS_297	Manns Ave	2	102160686	DP80667	Neutral Bay	No	17.69	17.69	17.49	2	20.09	18.41	18.37	18.27	18.16	17.96
NS_562	Clark Road	4	102164303	DP594966	North Sydney	No	14.62	14.62	14.62	2	18.14	15.12	15.06	15.00	14.81	14.60
NS_583	Blues Point Rd	193-209	102159445	DP123336	North Sydney	No	50.97	50.97	50.92	2	51.29	51.51	51.51	51.50	51.50	51.50
NS_206	Holbrook Ave	25	151382693	SP74360	Kirribilli	No	7.89	7.89	7.69	2	8.81	8.27	8.22	8.18	8.14	8.05
NS_737	West St	135	102157699	SP20167	Crows Nest	No	79.29	79.29	78.59	1	80.87	79.48	79.22	79.22	79.09	78.88
NS_496	Carlow Street	44106	104301670	SP63942	North Sydney	No	84.51	84.51	84.21	2	84.88	84.22	84.11	84.12	84.09	84.05
NS_319	Bent St	22	103809037	SP57123	Neutral Bay	No	34.36	34.36	32.36	1	31.31	31.30	31.30	31.30	31.30	31.30
NS_539	Christie St	27	102154197	SP21942	Wollstonecraf	No	73.77	73.77	73.57	2	74.08	74.02	74.01	74.01	74.01	73.99
NS_803	Dumbarton St	25	102164340	SP37518	McMahons Poi	No	28.91	28.91	24.91	1	24.66	0.00	0.00	0.00	0.00	0.00
NS_253	Undercliff St	18	102160740	DP108214	Neutral Bay	No	41.06	41.06	40.86	2	41.01	40.87	40.87	40.86	40.85	40.85
NS_252	Undercliff St	20	102160733	DP789790	Neutral Bay	No	40.82	40.82	40.62	2	41.21	40.81	40.81	40.80	40.80	40.69
NS_867	The Boulevarde	7	102153901	DP214080	Cammeray	No	57.27	57.27	57.17	2	58.05	57.67	57.60	57.60	57.58	57.53
NS_690	Cammeray Ave	3	102155585	SP30198	Cammeray	No	65.87	65.87	65.47	2	71.34	67.40	66.53	66.11	65.59	65.27
NS_362	Bertha Rd	3	102210848	DP3104	Cremorne	No	58.13	58.13	58.13	2	58.21	0.00	0.00	0.00	0.00	0.00
NS_409	Grasmere Lane	17-19	102156037	SP5211	Cremorne	No	69.37	69.37	67.37	1	68.62	67.98	67.87	67.87	67.78	67.72
NS_296	Kurraba Rd	84	102160685	DP345592	Neutral Bay	No	23.53	23.53	23.13	2	23.64	23.04	23.04	23.03	22.93	22.93
NS_428	Bannerman St	21	103898273	DP874304	Cremorne Poi	No	40.07	40.07	39.97	2	40.78	40.39	40.37	40.35	40.33	40.33
NS_627	Wheatleigh St	11	104418572	DP11773	Crows Nest	No	70.10	70.10	70.10	2	70.73	70.08	70.08	70.08	70.06	70.14
NS_584	Bank St	66	102158984	DP104913	North Sydney	No	41.46	41.46	43.46	2	44.79	44.59	44.58	44.58	44.57	44.57
NS_782	Waiwera St	7	102164156	SP10340	Lavender Bay	No	37.61	37.61	37.61	2	37.96	37.73	37.71	37.69	37.67	37.66
NS_868	Pine St	11	102153902	DP308882	Cammeray	No	62.38	62.38	62.08	2	62.65	62.38	62.34	62.34	62.33	62.29
NS_516	Russel St	43952	103858532	SP57934	Wollstonecraf	No	41.35	41.35	41.25	2	42.44	42.13	42.04	42.03	42.00	41.95
NS_669	Lillis St	6	105248764	102 - 2550	Cammeray	No	70.47	70.47	69.47	1	71.36	69.44	69.42	69.42	69.42	69.41
NS_804	Dumbarton St	23A-B	160141358	SP79704	McMahons Poi	No	29.30	29.30	25.30	1	24.69	24.60	24.60	24.60	24.58	24.58
NS_715	Amherst St	88A	102155780	DP580343	Cammeray	No	65.94	65.94	65.44	2	65.96	65.73	65.69	65.70	65.67	65.64
NS_322	Darley St	32	102160231	DP656464	Neutral Bay	No	7.47	7.47	5.47	1	7.15	6.04	5.93	5.77	5.71	5.71
NS_275	Ben Boyd Rd	81	102160619	DP78216	Neutral Bay	No	50.26	50.26	50.06	2	50.38	50.32	50.30	50.27	50.25	50.17
NS_650	Atchison St	51	102154402	SP15827	Crows Nest	No	79.03	79.03	78.73	2	79.14	78.87	78.82	78.82	78.80	78.74
NS_298	Hayes St	14	102160829	DP79110	Neutral Bay	No	21.58	21.58	21.38	2	21.55	0.00	0.00	0.00	0.00	0.00
NS_603	Atchison St	81	102154893	SP51208	Crows Nest	No	79.87	79.87	79.87	2	80.18	79.81	0.00	0.00	0.00	0.00
NS_738	Falcon St	134	102157681	DP344348	Crows Nest	No	80.48	80.48	79.78	1	81.01	80.10	80.00	80.01	79.97	79.91
NS_363	Burroway St	5	102210844	DP76182	Neutral Bay	No	56.33	56.33	56.13	2	56.43	56.18	56.17	56.15	0.00	0.00
NS_272	Phillips St	14	153423613	DP1097060	Neutral Bay	No	42.98	42.98	41.98	1	41.94	41.88	41.88	41.88	41.87	41.87
NS_320	Ernest St	315	102158067	DP369998	Neutral Bay	No	82.98	82.98	82.98	2	82.75	82.72	82.72	82.72	82.71	82.71
NS_431	Education Lane	42A	102211291	SP30678	Cremorne	No	70.32	70.32	70.32	2	70.56	70.38	70.37	70.36	70.35	70.35
NS_563	High St	49-51	100104897	SP30105	North Sydney	No	25.41	25.41	23.41	1	23.42	0.00	0.00	0.00	0.00	0.00
NS_497	Carlow St	23	102157644	DP561243	North Sydney	No	83.73	83.73	83.63	2	0.00	0.00	0.00	0.00	0.00	0.00
NS_869	The Boulevarde	9	102153904	DP333692	Cammeray	No	66.10	66.10	56.10	1	56.77	56.63	56.61	56.61	56.60	56.58
NS_365	Powell St	6	102210837	DP3104	Neutral Bay	No	51.58	51.58	50.58	1	51.00	50.78	50.75	50.73	50.71	50.70
NS_691	Cammeray Ave	7	102155680	SP51731	Cammeray	No	64.71	64.71	64.71	2	71.34	67.40	66.53	66.11	65.58	65.06
NS_805	Dumbarton St	15	162680725	DP1139875	McMahons Poi	No	29.88	29.88	25.88	1	25.55	25.51	25.50	25.50	25.49	25.49
NS_585	Bank St	68	102158985	DP726396	North Sydney	No	41.49	41.49	43.49	2	44.93	44.69	44.68	44.68	44.67	44.67
NS_250	Ben Boyd Rd	43	102160701	DP33304	Neutral Bay	No	37.55	37.55	37.50	2	37.52	37.43	37.43	0.00	0.00	0.00
NS_386	Davidson Pde	10	102205176	DP12587	Cremorne	No	73.39	73.39	73.29	2	73.72	73.53	73.51	73.51	73.50	73.48
NS_871	Cowdroy Avenue	1	104290353	DP1016774	Cammeray	No	27.74	27.74	26.24	1	26.57	26.43	26.41	26.41	26.05	26.02
NS_410	Grasmere Lane	7	102155998	SP22049	Cremorne	No	67.94	67.94	67.84	2	68.08	67.75	67.73	67.73	67.72	67.71
NS_540	Christie St	2A	103678546	DP850493	Wollstonecraf	No	68.23	68.23	67.93	2	68.66	68.35	68.31	68.32	68.29	68.28
NS_783	Lavender St	10	102164450	DP786970	Lavender Bay	No	36.94	36.94	36.74	2	0.00	0.00	0.00	0.00	0.00	0.00
NS_276	Ben Boyd Rd	57	102160726	DP307267	Neutral Bay	No	42.03	42.03	40.53	1	40.91	40.49	40.48	40.47	40.46	40.44
NS_432	Education Lane	44A	102211291	SP30678	Cremorne	No	70.22	70.22	70.12	2	70.49	70.25	70.24	70.23	70.20	70.19
NS_517	Russel St	43952	103858532	SP57934	Wollstonecraf	No	43.93	43.93	43.83	2	44.95	44.41	44.36	44.36	44.32	44.26
NS_870	Pine St	7	102153898	SP12798	Cammeray	No	64.20	64.20	63.80	2	64.16	63.97	63.92	63.92	63.92	63.92
NS_299	Hayes St	12	102160828	SP40057	Neutral Bay	No	18.69	18.69	18.69	2	17.93	17.23	17.22	17.18	17.14	17.10
NS_628	Wheatleigh St	13	102154806	SP4123	Crows Nest	No	69.75	69.75	68.75	1	70.74	68.98	68.87	68.84	68.75	68.63
NS_651	Atchison St	41-49	102154400	DP2872	Crows Nest	No	79.33	79.33	79.23	2	80.25	79.54	79.44	79.44	79.39	79.25
NS_806	Dumbarton St	9	104319774	SP64641	McMahons Poi	No	29.05	29.05	25.05	1	25.26	25.18	25.17	25.17	25.15	25.14
NS_586	Bank St	72	102158987	DP448226	North Sydney	No	43.99	43.99	45.99	2	46.41	46.14	46.11	46.11	46.10	46.09
NS_542	Nicholson St	12	102154229	DP403932	Wollstonecraf	No	79.84	79.84	79.74	2	80.26	80.07	80.07	80.07	80.06	80.06
NS_739	Falcon St	136	102157684	DP344348	Crows Nest	No	80.22	80.22	79.82	2	80.94	79.85	79.82	79.82	79.80	79.78
NS_872	Rowlison Parade	14	102154102	DP533204	Cammeray	No	15.19	15.19	15.09	2	16.90	16.51	16.44	16.44	16.40	16.34
NS_387	Fernhurst Ave	5	102205175	DP18381	Cremorne	No	67.43	67.43	65.43	1	65.26	65.24	65.24	65.23	65.23	65.23
NS_716	Amherst St	90	102155781	DP6687	Cammeray	No	65.67	65.67	65.17	2	65.01	64.99	64.98	64.98	64.98	64.98
NS_429	Shellcove Rd	63	102210821	DP84960	Kurraba Point	No	32.24	32.24	32.14	2	33.04	32.84	32.83	32.81	32.79	32.76
NS_541	Nicholson St	14	102154228	DP403932	Wollstonecraf	No	80.01	80.01	79.91	2	80.18	80.12	80.12	80.12	80.11	80.10
NS_366	Powell St	2	102210833	SP5407	Neutral Bay	No	50.87	50.87	50.87	2	51.18	51.08	51.05	51.03	0.00	0.00
NS_474	Walker St	144-152	169706247	SP85010	North Sydney	No	66.36	66.36	64.36	1	64.86	64.67	64.65	64.63	64.61	64.59
NS_518	Russel St	43952	103858532	SP57934	Wollstonecraf	No	44.03	44.03	43.93	2	44.45	44.12	44.09	44.09	44.07	44.03
NS_692	Cammeray Ave	7	102155680	SP51731	Cammeray	No	64.46	64.46	64.36	2	71.34	67.40	66.53	66.11	65.58	65.06
NS_564	High St	53	102164305	DP215942	North Sydney	No	20.68	20.68	20.58	2	20.86	20.52	20.51	20.51	20.50	20.50
NS_604	Atchison St	112	102154896	DP964617	Crows Nest	No	78.76	78.76	78.56	2	79.07	78.59	78.54	78.54	78.51	0.00
NS_784	Walker St	4	107968961	1585 - 3000 F	Lavender Bay	No	17.18	17.18	17.13	2	16.30	16.23	16.23	16.23	16.23	16.22
NS_475	McLaren St	45	102159737	SP14598	North Sydney	No	65.57	65.57	65.27	2	65.66	65.40	65.39	65.38	65.36	65.33
NS_273	Ben Boyd Rd	71A	102160751	DP738047	Neutral Bay	No	45.98	45.98	45.98	2	46.70	46.30	46.27	46.25	46.22	46.17
NS_388	Fernhurst Ave	7	102205177	DP18381	Cremorne	No	67.02	67.02	65.02	1	65.14	65.01	64.99	64.99	64.99	64.97
NS_498	Miller St	282	102157717	DP312439	North Sydney	No	82.35	82.35	81.95	2	82.40	82.07	82.01	82.01	81.98	81.94
NS_519	Russel St	43952	103858532	SP57934	Wollstonecraf	No	44.60	44.60	44.50	2	45.54	45.16	45.12	45.12	45.08	45.03
NS_629	Brook St	28	102153810	DP817826	Crows Nest	No	68.92	68.92	67.42	1	70.04	68.50	68.34	68.30	68.14	67.82
NS_717	Amherst St	92	102155783	DP6687	Cammeray	No	64.42	64.42	64.12	2	64.08	64.04	64.03	64.03	64.03	64.03
NS_652	Atchison St	62	104128141	DP597786	Crows Nest	No	80.82	80.82	80.72	2	81.76	81.08	81.01	81.01	81.00	0.00
NS_630	Brook St	18	102154944	SP37774	Crows Nest	No	70.06	70.06	69.76	2	70.25	70.09	70.06	70.06	70.04	69.80
NS_695	Cammeray Ave	13	102155683	DP739173	Cammeray	No	64.15	64.15	63.75	2	71.34	67.40	66.53	66.11	65.58	65.06
NS_364	Powell St	4	102210835	SP828	Neutral Bay	No	50.70	50.70	50.60	2	52.06	51.50	51.44	51.37	51.32	51.27
NS_740	Falcon St	138	102157686	DP976767	Crows Nest	No	80.45	80.45	80.30	2	80.88	80.43	80.41	80.42	80.41	80.40
NS_670	Lillis St	4	102157856	DP176397	Cammeray	No	70.55	70.55	69.55	1	71.36	69.45	69.41	69.40	69.34	69.30
NS_718	Amherst St	94	102155785	DP6687	Cammeray	No	64.16	64.16	63.16	1	63.16	63.15	63.15	63.15	63.15	63.15
NS_693	Cammeray Ave	9	102155681	DP739173	Cammeray	No	64.64	64.64	64.24	2	71.34	67.40	66.53	66.11	65.58	65.06
NS_607	Alexander St	163	102154773	DP106650	Crows Nest	No	76.97	76.97	76.87	2	77.55	77.17	77.11	77.11	77.06	76.97
NS_476	Walker St	177	104735731	SP9808	North Sydney	No	54.93	54.93	54.83	2	55.09	55.07	55.06	0.00	0.00	0.00
NS_696	Anzac Ave	33	102155583	SP32580	Cammeray	No	69.63	69.63	67.63	1	71.34	67.87	67.83	67.83	67.80	67.74
NS_430	Honda Rd	4	102210924	DP405794	Kurraba Point	No	21.24	21.24	21.14	2	22.95	21.91	21.84	21.78	21.72	21.66
NS_605	Alexander St	159	102154771	DP1265	Crows Nest	No	77.89	77.89	77.79	2	78.18	77.87	77.84	77.84	77.82	0.00
NS_520	Boronia St	7	102156604	SP20225	Wollstonecraf	No	50.76	50.76	49.26	1	48.70	48.40	48.39	48.39	48.39	48.38
NS_673	Lytton St	30	102157865	DP609809	Cammeray	No	68.99	68.99	68.89	2	71.34	69.09	69.06	69.04	69.01	68.95
NS_671	Lillis St	1A	102157861	SP54245	Cammeray	No	68.11	68.11	68.01	2	71.36	68.98	68.87	68.82	68.70	68.58
NS_608	Alexander St	165	102154774	DP502236	Crows Nest	No	76.99	76.99	76.89	2	76.98	76.86	76.86	76.86	76.83	76.76
NS_694	Cammeray Ave	11	102155682	DP739173	Cammeray	No	64.41	64.41	64.01	2	71.34	67.40	66.53	66.11	65.58	65.06
NS_606	Alexander St	161	102154772	DP106650	Crows Nest	No	77.04	77.04	76.94	2	77.65	77.26	77.18	77.18	77.13	77.03
NS_674	Lytton St	28	102157864	DP4588	Cammeray	No	69.36	69.36	69.26	2	71.34	69.54	69.48	69.46	69.41	0.00
NS_672	Lillis St	215	102157894	SP15049	Cammeray	No	69.92	69.92	67.92	1	71.34	68.54	68.46	68.43	68.34	68.22

ID or Survey No.	Depth of Inundation above Floor Level (m) for each AEP flood: PMF	1.00%	2.00%	5.00%	10.00%	20.00%	Depth of Inundation Above "Protection Level" (m) for each AEP flood: PMF	1.00%	2.00%	5.00%	10.00%	20.00%
NS_649	-0.73	-1.39	-1.42	-1.42	-1.43	-1.49	-0.73	-1.39	-1.42	-1.42	-1.43	-1.49
NS_297	2.41	0.72	0.68	0.58	0.47	0.27	2.41	0.72	0.68	0.58	0.47	0.27
NS_562	3.52	0.50	0.44	0.38	0.20	-0.02	3.52	0.50	0.44	0.38	0.20	-0.02
NS_583	0.32	0.55	0.54	0.53	0.53	0.53	0.32	0.55	0.54	0.53	0.53	0.53
NS_206	0.92	0.39	0.33	0.29	0.25	0.16	0.92	0.39	0.33	0.29	0.25	0.16
NS_737	1.58	0.18	-0.07	-0.07	-0.21	-0.41	1.58	0.18	-0.07	-0.07	-0.21	-0.41
NS_496	0.37	-0.29	-0.39	-0.38	-0.41	-0.45	0.37	-0.29	-0.39	-0.38	-0.41	-0.45
NS_319	-3.04	-3.06	-3.06	-3.06	-3.06	-3.06	-3.04	-3.06	-3.06	-3.06	-3.06	-3.06
NS_539	0.31	0.24	0.24	0.24	0.23	0.22	0.31	0.24	0.24	0.24	0.23	0.22
NS_803	-4.25	0.00	0.00	0.00	0.00	0.00	-4.25	0.00	0.00	0.00	0.00	0.00
NS_253	-0.05	-0.18	-0.19	-0.20	-0.20	-0.21	-0.05	-0.18	-0.19	-0.20	-0.20	-0.21
NS_252	0.39	-0.01	-0.01	-0.02	-0.02	-0.13	0.39	-0.01	-0.01	-0.02	-0.02	-0.13
NS_867	0.78	0.40	0.33	0.33	0.31	0.26	0.78	0.40	0.33	0.33	0.31	0.26
NS_690	5.47	1.54	0.67	0.25	-0.28	-0.59	5.47	1.54	0.67	0.25	-0.28	-0.59
NS_362	0.08	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.00	0.00
NS_409	-0.75	-1.40	-1.51	-1.51	-1.59	-1.65	-0.75	-1.40	-1.51	-1.51	-1.59	-1.65
NS_296	0.11	-0.49	-0.50	-0.50	-0.60	-0.61	0.11	-0.49	-0.50	-0.50	-0.60	-0.61
NS_428	0.71	0.32	0.30	0.28	0.26	0.26	0.71	0.32	0.30	0.28	0.26	0.26
NS_627	0.63	-0.01	-0.02	-0.02	-0.03	0.04	0.63	-0.01	-0.02	-0.02	-0.03	0.04
NS_584	3.33	3.12	3.11	3.12	3.11	3.10	3.33	3.12	3.11	3.12	3.11	3.10
NS_782	0.35	0.12	0.11	0.08	0.06	0.06	0.35	0.12	0.11	0.08	0.06	0.06
NS_868	0.28	0.00	-0.03	-0.03	-0.05	-0.08	0.28	0.00	-0.03	-0.03	-0.05	-0.08
NS_516	1.09	0.78	0.68	0.68	0.64	0.60	1.09	0.78	0.68	0.68	0.64	0.60
NS_669	0.89	-1.04	-1.05	-1.05	-1.06	-1.06	0.89	-1.04	-1.05	-1.05	-1.06	-1.06
NS_804	-4.61	-4.69	-4.70	-4.70	-4.72	-4.72	-4.61	-4.69	-4.70	-4.70	-4.72	-4.72
NS_715	0.01	-0.21	-0.25	-0.25	-0.27	-0.31	0.01	-0.21	-0.25	-0.25	-0.27	-0.31
NS_322	-0.32	-1.43	-1.54	-1.70	-1.76	-1.76	-0.32	-1.43	-1.54	-1.70	-1.76	-1.76
NS_275	0.12	0.06	0.04	0.01	-0.01	-0.08	0.12	0.06	0.04	0.01	-0.01	-0.08
NS_650	0.11	-0.16	-0.22	-0.22	-0.24	-0.29	0.11	-0.16	-0.22	-0.22	-0.24	-0.29
NS_298	-0.02	0.00	0.00	0.00	0.00	0.00	-0.02	0.00	0.00	0.00	0.00	0.00
NS_603	0.31	-0.06	0.00	0.00	0.00	0.00	0.31	-0.06	0.00	0.00	0.00	0.00
NS_738	0.53	-0.38	-0.48	-0.47	-0.51	-0.57	0.53	-0.38	-0.48	-0.47	-0.51	-0.57
NS_363	0.10	-0.15	-0.16	-0.18	0.00	0.00	0.10	-0.15	-0.16	-0.18	0.00	0.00
NS_272	-1.04	-1.10	-1.10	-1.10	-1.11	-1.11	-1.04	-1.10	-1.10	-1.10	-1.11	-1.11
NS_320	-0.22	-0.26	-0.26	-0.26	-0.26	-0.27	-0.22	-0.26	-0.26	-0.26	-0.26	-0.27
NS_431	0.24	0.06	0.05	0.04	0.03	0.03	0.24	0.06	0.05	0.04	0.03	0.03
NS_563	-1.99	0.00	0.00	0.00	0.00	0.00	-1.99	0.00	0.00	0.00	0.00	0.00
NS_497	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NS_869	-9.33	-9.47	-9.49	-9.49	-9.49	-9.52	-9.33	-9.47	-9.49	-9.49	-9.49	-9.52
NS_365	-0.58	-0.81	-0.83	-0.85	-0.87	-0.88	-0.58	-0.81	-0.83	-0.85	-0.87	-0.88
NS_691	6.63	2.69	1.83	1.40	0.87	0.35	6.63	2.69	1.83	1.40	0.87	0.35
NS_805	-4.33	-4.37	-4.38	-4.37	-4.38	-4.39	-4.33	-4.37	-4.38	-4.37	-4.38	-4.39
NS_585	3.44	3.20	3.19	3.19	3.18	3.18	3.44	3.20	3.19	3.19	3.18	3.18
NS_250	-0.03	-0.11	-0.12	0.00	0.00	0.00	-0.03	-0.11	-0.12	0.00	0.00	0.00
NS_386	0.33	0.14	0.12	0.12	0.11	0.09	0.33	0.14	0.12	0.12	0.11	0.09
NS_871	-1.17	-1.30	-1.32	-1.32	-1.69	-1.72	-1.17	-1.30	-1.32	-1.32	-1.69	-1.72
NS_410	0.13	-0.19	-0.21	-0.21	-0.22	-0.24	0.13	-0.19	-0.21	-0.21	-0.22	-0.24
NS_540	0.43	0.12	0.08	0.08	0.05	0.04	0.43	0.12	0.08	0.08	0.05	0.04
NS_783	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NS_276	-1.12	-1.54	-1.55	-1.56	-1.57	-1.59	-1.12	-1.54	-1.55	-1.56	-1.57	-1.59
NS_432	0.28	0.04	0.03	0.01	-0.01	-0.02	0.28	0.04	0.03	0.01	-0.01	-0.02
NS_517	1.02	0.48	0.43	0.42	0.38	0.33	1.02	0.48	0.43	0.42	0.38	0.33
NS_870	-0.04	-0.23	-0.28	-0.28	-0.28	-0.28	-0.04	-0.23	-0.28	-0.28	-0.28	-0.28
NS_299	-0.76	-1.46	-1.47	-1.51	-1.55	-1.59	-0.76	-1.46	-1.47	-1.51	-1.55	-1.59
NS_628	0.99	-0.77	-0.88	-0.90	-0.99	-1.11	0.99	-0.77	-0.88	-0.90	-0.99	-1.11
NS_651	0.91	0.21	0.10	0.10	0.06	-0.08	0.91	0.21	0.10	0.10	0.06	-0.08
NS_806	-3.79	-3.87	-3.88	-3.88	-3.90	-3.90	-3.79	-3.87	-3.88	-3.88	-3.90	-3.90
NS_586	2.42	2.15	2.12	2.12	2.11	2.10	2.42	2.15	2.12	2.12	2.11	2.10
NS_542	0.42	0.24	0.23	0.23	0.22	0.22	0.42	0.24	0.23	0.23	0.22	0.22
NS_739	0.72	-0.37	-0.40	-0.40	-0.42	-0.44	0.72	-0.37	-0.40	-0.40	-0.42	-0.44
NS_872	1.71	1.32	1.25	1.25	1.21	1.15	1.71	1.32	1.25	1.25	1.21	1.15
NS_387	-2.17	-2.19	-2.19	-2.19	-2.19	-2.20	-2.17	-2.19	-2.19	-2.19	-2.19	-2.20
NS_716	-0.66	-0.68	-0.69	-0.69	-0.69	-0.69	-0.66	-0.68	-0.69	-0.69	-0.69	-0.69
NS_429	0.79	0.59	0.58	0.57	0.55	0.51	0.79	0.59	0.58	0.57	0.55	0.51
NS_541	0.16	0.11	0.11	0.11	0.10	0.08	0.16	0.11	0.11	0.11	0.10	0.08
NS_366	0.31	0.21	0.18	0.17	0.00	0.00	0.31	0.21	0.18	0.17	0.00	0.00
NS_474	-1.50	-1.69	-1.71	-1.73	-1.75	-1.77	-1.50	-1.69	-1.71	-1.73	-1.75	-1.77
NS_518	0.42	0.09	0.06	0.05	0.04	0.00	0.42	0.09	0.06	0.05	0.04	0.00
NS_692	6.88	2.95	2.08	1.66	1.12	0.61	6.88	2.95	2.08	1.66	1.12	0.61
NS_564	0.18	-0.16	-0.16	-0.17	-0.18	-0.18	0.18	-0.16	-0.16	-0.17	-0.18	-0.18
NS_604	0.31	-0.17	-0.23	-0.23	-0.26	0.00	0.31	-0.17	-0.23	-0.23	-0.26	0.00
NS_784	-0.88	-0.95	-0.95	-0.95	-0.96	-0.96	-0.88	-0.95	-0.95	-0.95	-0.96	-0.96
NS_475	0.09	-0.17	-0.19	-0.20	-0.21	-0.24	0.09	-0.17	-0.19	-0.20	-0.21	-0.24
NS_273	0.72	0.32	0.29	0.27	0.24	0.19	0.72	0.32	0.29	0.27	0.24	0.19
NS_388	-1.88	-2.01	-2.03	-2.03	-2.03	-2.05	-1.88	-2.01	-2.03	-2.03	-2.03	-2.05
NS_498	0.04	-0.29	-0.35	-0.35	-0.37	-0.42	0.04	-0.29	-0.35	-0.35	-0.37	-0.42
NS_519	0.94	0.56	0.52	0.52	0.48	0.43	0.94	0.56	0.52	0.52	0.48	0.43
NS_629	1.12	-0.42	-0.58	-0.62	-0.78	-1.10	1.12	-0.42	-0.58	-0.62	-0.78	-1.10
NS_717	-0.34	-0.39	-0.39	-0.39	-0.39	-0.39	-0.34	-0.39	-0.39	-0.39	-0.39	-0.39
NS_652	0.94	0.27	0.19	0.19	0.18	0.00	0.94	0.27	0.19	0.19	0.18	0.00
NS_630	0.19	0.03	0.00	0.00	-0.02	-0.26	0.19	0.03	0.00	0.00	-0.02	-0.26
NS_695	7.19	3.25	2.38	1.96	1.43	0.91	7.19	3.25	2.38	1.96	1.43	0.91
NS_364	1.36	0.80	0.75	0.68	0.62	0.58	1.36	0.80	0.75	0.68	0.62	0.58
NS_740	0.43	-0.02	-0.04	-0.04	-0.04	-0.05	0.43	-0.02	-0.04	-0.04	-0.04	-0.05
NS_670	0.81	-1.11	-1.14	-1.15	-1.21	-1.25	0.81	-1.11	-1.14	-1.15	-1.21	-1.25
NS_718	-1.00	-1.01	-1.01	-1.01	-1.01	-1.02	-1.00	-1.01	-1.01	-1.01	-1.01	-1.02
NS_693	6.70	2.76	1.90	1.48	0.94	0.42	6.70	2.76	1.90	1.48	0.94	0.42
NS_607	0.58	0.19	0.13	0.13	0.09	0.00	0.58	0.19	0.13	0.13	0.09	0.00
NS_476	0.16	0.13	0.13	0.00	0.00	0.00	0.16	0.13	0.13	0.00	0.00	0.00
NS_696	1.71	-1.76	-1.80	-1.80	-1.83	-1.89	1.71	-1.76	-1.80	-1.80	-1.83	-1.89
NS_430	1.71	0.67	0.60	0.54	0.48	0.42	1.71	0.67	0.60	0.54	0.48	0.42
NS_605	0.28	-0.02	-0.06	-0.06	-0.08	0.00	0.28	-0.02	-0.06	-0.06	-0.08	0.00
NS_520	-2.07	-2.36	-2.37	-2.37	-2.38	-2.38	-2.07	-2.36	-2.37	-2.37	-2.38	-2.38
NS_673	2.35	0.10	0.07	0.05	0.02	-0.04	2.35	0.10	0.07	0.05	0.02	-0.04
NS_671	3.24	0.87	0.76	0.71	0.59	0.47	3.24	0.87	0.76	0.71	0.59	0.47
NS_608	-0.01	-0.13	-0.13	-0.13	-0.16	-0.23	-0.01	-0.13	-0.13	-0.13	-0.16	-0.23
NS_694	6.93	2.99	2.12	1.70	1.16	0.65	6.93	2.99	2.12	1.70	1.16	0.65
NS_606	0.62	0.22	0.15	0.15	0.10	-0.01	0.62	0.22	0.15	0.15	0.10	-0.01
NS_674	1.98	0.18	0.13	0.10	0.06	0.00	1.98	0.18	0.13	0.10	0.06	0.00
NS_672	1.42	-1.38	-1.47	-1.50	-1.58	-1.71	1.42	-1.38	-1.47	-1.50	-1.58	-1.71

ID or Survey No.	Flood Damages: PMF – Damages, total for event, per property affected	PMF – Properties Affected above floor level, damaged	AEP 1.00% – Damages, total for event, per property affected	AEP 1.00% – Properties Affected above floor level, damaged	AEP 2.0% – Damages, total for event, per property affected	AEP 2.0% – Properties Affected above floor level, damaged	AEP 5.0% – Damages, total for event, per property affected	AEP 5.0% – Properties Affected above floor level, damaged	AEP 10.0% – Damages, total for event, per property affected	AEP 10.0% – Properties Affected above floor level, damaged	AEP 20.0% – Damages, total for event, per property affected	AEP 20.0% – Properties Affected above floor level, damaged	AEP – Damages, total for event, per property affected	AEP – Properties Affected above floor level, damaged	AEP – Damages, total for event, per property affected	AEP – Properties Affected above floor level, damaged	AAD, total and per property
	$ 71,529,460	491	$ 41,507,489	299	$ 38,271,467	272	$ 37,301,451	266	$ 34,249,086	247	$ 29,597,377	216	$ -	0	$ -	0	$ 11,517,801
NS_649	$ 43,025	0	$ 30,706	0	$ 30,706	0	$ 30,706	0	$ 30,706	0	$ 16,183	0	$ -		$ -		$ 7,904
NS_297	$ 193,620	1	$ 128,931	1	$ 128,931	1	$ 124,309	1	$ 119,686	1	$ 110,442	1	$ -		$ -		$ 40,872
NS_562	$ 206,270	1	$ 119,686	1	$ 115,064	1	$ 115,064	1	$ 105,820	1	$ 47,264	0	$ -		$ -		$ 26,520
NS_583	$ 110,442	1	$ 119,686	1	$ 119,686	1	$ 119,686	1	$ 119,686	1	$ 119,686	1	$ -		$ -		$ 41,843
NS_206	$ 138,175	1	$ 115,064	1	$ 110,442	1	$ 110,442	1	$ 110,442	1	$ 105,820	1	$ -		$ -		$ 37,914
NS_737	$ 188,368	1	$ 115,119	1	$ 53,584	0	$ 53,584	0	$ 51,824	0	$ 48,304	0	$ -		$ -		$ 18,854
NS_496	$ 115,064	1	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 6,158
NS_319	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
NS_539	$ 110,442	1	$ 105,820	1	$ 105,820	1	$ 105,820	1	$ 105,820	1	$ 105,820	1	$ -		$ -		$ 37,059
NS_803	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
NS_253	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 5,664
NS_252	$ 115,064	1	$ 47,264	0	$ 47,264	0	$ 47,264	0	$ 47,264	0	$ 16,183	0	$ -		$ -		$ 10,664
NS_867	$ 133,553	1	$ 115,064	1	$ 110,442	1	$ 110,442	1	$ 110,442	1	$ 110,442	1	$ -		$ -		$ 38,815
NS_690	$ 229,271	1	$ 165,909	1	$ 128,931	1	$ 105,820	1	$ 16,183	0	$ -		$ -		$ -		$ 10,829
NS_362	$ 101,197	1	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ 505
NS_409	$ 41,265	0	$ 30,706	0	$ -		$ -		$ -		$ -		$ -		$ -		$ 513
NS_296	$ 101,197	1	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ -		$ -		$ 1,638
NS_428	$ 128,931	1	$ 110,442	1	$ 110,442	1	$ 110,442	1	$ 110,442	1	$ 110,442	1	$ -		$ -		$ 38,746
NS_627	$ 124,309	1	$ 47,264	0	$ 47,264	0	$ 47,264	0	$ 47,264	0	$ 47,264	1	$ -		$ -		$ 16,927
NS_584	$ 200,520	1	$ 200,520	1	$ 200,520	1	$ 200,520	1	$ 200,520	1	$ 200,520	1	$ -		$ -		$ 70,180
NS_782	$ 110,442	1	$ 101,197	1	$ 101,197	1	$ 101,197	1	$ 101,197	1	$ 101,197	1	$ -		$ -		$ 35,464
NS_868	$ 110,442	1	$ 47,264	1	$ 47,264	0	$ 47,264	0	$ 47,264	0	$ 16,183	0	$ -		$ -		$ 10,641
NS_516	$ 147,420	1	$ 133,553	1	$ 128,931	1	$ 128,931	1	$ 124,309	1	$ 124,309	1	$ -		$ -		$ 43,992
NS_669	$ 151,743	1	$ 37,745	0	$ 37,745	0	$ 35,985	0	$ 35,985	0	$ 35,985	0	$ -		$ -		$ 13,226
NS_804	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
NS_715	$ 47,264	1	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 5,819
NS_322	$ 50,064	0	$ 30,706	0	$ -		$ -		$ -		$ -		$ -		$ -		$ 557
NS_275	$ 101,197	1	$ 101,197	1	$ 47,264	1	$ 47,264	1	$ 47,264	0	$ 16,183	0	$ -		$ -		$ 11,134
NS_650	$ 101,197	1	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 6,089
NS_298	$ 47,264	0	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ 236
NS_603	$ 110,442	1	$ 16,183	0	$ -		$ -		$ -		$ -		$ -		$ -		$ 713
NS_738	$ 130,815	1	$ 48,304	0	$ 46,545	0	$ 46,545	0	$ 46,545	0	$ 44,785	0	$ -		$ -		$ 16,377
NS_363	$ 101,197	1	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ -		$ -		$ 1,638
NS_272	$ 37,745	0	$ 35,985	0	$ 35,985	0	$ 35,985	0	$ 35,985	0	$ 35,985	0	$ -		$ -		$ 12,603
NS_320	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 5,664
NS_431	$ 105,820	1	$ 101,197	1	$ 47,264	1	$ 47,264	1	$ 47,264	1	$ 47,264	1	$ -		$ -		$ 17,373
NS_563	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
NS_497	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
NS_869	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
NS_365	$ 44,785	0	$ 41,265	0	$ 41,265	0	$ 41,265	0	$ 39,505	0	$ 39,505	0	$ -		$ -		$ 13,976
NS_691	$ 240,771	1	$ 197,070	1	$ 179,775	1	$ 161,286	1	$ 138,175	1	$ 115,064	1	$ -		$ -		$ 46,595
NS_805	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
NS_585	$ 200,520	1	$ 200,520	1	$ 200,520	1	$ 200,520	1	$ 200,520	1	$ 200,520	1	$ -		$ -		$ 70,180
NS_250	$ 47,264	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ -		$ -		$ -		$ 722
NS_386	$ 110,442	1	$ 101,197	1	$ 101,197	1	$ 101,197	1	$ 101,197	1	$ 101,197	1	$ -		$ -		$ 35,464
NS_871	$ 34,226	0	$ 32,466	0	$ 32,466	0	$ 32,466	0	$ -		$ -		$ -		$ -		$ 2,443
NS_410	$ 101,197	1	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 6,089
NS_540	$ 115,064	1	$ 101,197	1	$ 101,197	1	$ 101,197	1	$ 101,197	1	$ 47,264	1	$ -		$ -		$ 24,701
NS_783	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
NS_276	$ 35,985	0	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ 180
NS_432	$ 110,442	1	$ 47,264	1	$ 47,264	1	$ 47,264	1	$ 47,264	0	$ 47,264	0	$ -		$ -		$ 16,858
NS_517	$ 142,797	1	$ 119,686	1	$ 115,064	1	$ 115,064	1	$ 115,064	1	$ 110,442	1	$ -		$ -		$ 39,532
NS_870	$ 47,264	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 5,819
NS_299	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
NS_628	$ 156,976	1	$ 41,265	0	$ 39,505	0	$ 39,505	0	$ 37,745	0	$ 35,985	0	$ -		$ -		$ 13,595
NS_651	$ 138,175	1	$ 105,820	1	$ 101,197	1	$ 101,197	1	$ 101,197	1	$ 16,183	0	$ -		$ -		$ 18,646
NS_806	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
NS_586	$ 193,620	1	$ 190,170	1	$ 190,170	1	$ 190,170	1	$ 190,170	1	$ 190,170	1	$ -		$ -		$ 66,575
NS_542	$ 115,064	1	$ 105,820	1	$ 105,820	1	$ 105,820	1	$ 105,820	1	$ 105,820	1	$ -		$ -		$ 37,082
NS_739	$ 128,931	1	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 6,227
NS_872	$ 175,153	1	$ 156,664	1	$ 152,042	1	$ 152,042	1	$ 152,042	1	$ 152,042	1	$ -		$ -		$ 53,375
NS_387	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
NS_716	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
NS_429	$ 133,553	1	$ 124,309	1	$ 124,309	1	$ 124,309	1	$ 119,686	1	$ 119,686	1	$ -		$ -		$ 42,282
NS_541	$ 105,820	1	$ 101,197	1	$ 101,197	1	$ 101,197	1	$ 101,197	1	$ 101,197	1	$ -		$ -		$ 35,441
NS_366	$ 110,442	1	$ 105,820	1	$ 105,820	1	$ 105,820	1	$ -		$ -		$ -		$ -		$ 7,959
NS_474	$ 16,183	0	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ 81
NS_518	$ 115,064	1	$ 101,197	1	$ 101,197	1	$ 101,197	1	$ 47,264	1	$ 47,264	0	$ -		$ -		$ 20,656
NS_692	$ 240,771	1	$ 199,370	1	$ 190,170	1	$ 175,153	1	$ 147,420	1	$ 124,309	1	$ -		$ -		$ 49,923
NS_564	$ 105,820	1	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 6,112
NS_604	$ 110,442	1	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ -		$ 2,898
NS_784	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
NS_475	$ 101,197	1	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 6,089
NS_273	$ 128,931	1	$ 110,442	1	$ 110,442	1	$ 110,442	1	$ 105,820	1	$ 105,820	1	$ -		$ -		$ 37,475
NS_388	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
NS_498	$ 47,264	1	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 5,819
NS_519	$ 138,175	1	$ 124,309	1	$ 119,686	1	$ 119,686	1	$ 119,686	1	$ 115,064	1	$ -		$ -		$ 41,103
NS_629	$ 162,208	1	$ 48,304	0	$ 44,785	0	$ 44,785	0	$ 41,265	0	$ 35,985	0	$ -		$ -		$ 14,272
NS_717	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 5,664
NS_652	$ 138,175	1	$ 110,442	1	$ 105,820	1	$ 105,820	1	$ 105,820	1	$ -		$ -		$ -		$ 16,080
NS_630	$ 105,820	1	$ 47,264	1	$ 47,264	0	$ 47,264	0	$ 47,264	0	$ 16,183	0	$ -		$ -		$ 10,618
NS_695	$ 246,522	1	$ 200,520	1	$ 193,620	1	$ 189,020	1	$ 161,286	1	$ 138,175	1	$ -		$ -		$ 54,400
NS_364	$ 161,286	1	$ 133,553	1	$ 128,931	1	$ 128,931	1	$ 124,309	1	$ 124,309	1	$ -		$ -		$ 44,061
NS_740	$ 115,064	1	$ 47,264	0	$ 47,264	0	$ 47,264	0	$ 47,264	0	$ 16,183	0	$ -		$ -		$ 10,664
NS_670	$ 146,511	1	$ 35,985	0	$ 35,985	0	$ 35,985	0	$ 34,226	0	$ 34,226	0	$ -		$ -		$ 12,663
NS_718	$ 37,745	0	$ 37,745	0	$ 37,745	0	$ 37,745	0	$ 37,745	0	$ 37,745	0	$ -		$ -		$ 13,210
NS_693	$ 240,771	1	$ 198,220	1	$ 184,397	1	$ 165,909	1	$ 138,175	1	$ 115,064	1	$ -		$ -		$ 46,884
NS_607	$ 124,309	1	$ 105,820	1	$ 101,197	1	$ 101,197	1	$ 101,197	1	$ 47,264	0	$ -		$ -		$ 24,793
NS_476	$ 105,820	1	$ 101,197	1	$ 101,197	1	$ -		$ -		$ -		$ -		$ -		$ 3,564
NS_696	$ 193,600	1	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ 967
NS_430	$ 175,153	1	$ 128,931	1	$ 124,309	1	$ 119,686	1	$ 119,686	1	$ 115,064	1	$ -		$ -		$ 41,426
NS_605	$ 110,442	1	$ 47,264	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ -		$ 3,209
NS_520	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
NS_673	$ 192,470	1	$ 101,197	1	$ 101,197	1	$ 47,264	1	$ 47,264	1	$ 47,264	0	$ -		$ -		$ 18,885
NS_671	$ 200,520	1	$ 138,175	1	$ 133,553	1	$ 128,931	1	$ 124,309	1	$ 119,686	1	$ -		$ -		$ 43,471
NS_608	$ 47,264	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ 5,819
NS_694	$ 240,771	1	$ 200,520	1	$ 190,170	1	$ 175,153	1	$ 152,042	1	$ 124,309	1	$ -		$ -		$ 50,281
NS_606	$ 124,309	1	$ 105,820	1	$ 101,197	1	$ 101,197	1	$ 101,197	1	$ 47,264	0	$ -		$ -		$ 24,793
NS_674	$ 189,020	1	$ 105,820	1	$ 101,197	1	$ 101,197	1	$ 101,197	1	$ -		$ -		$ -		$ 15,663
NS_672	$ 177,904	1	$ 30,706	0	$ 16,183	0	$ 16,183	0	$ -		$ -		$ -		$ -		$ 2,167

Residential Flood Damage Calculations

AEP	0.001%	1.0%	2.0%	5%	10%	20%	50%

Project Name	North Sydney FRMSP
Job Number	180040
Case Description	Flood Damages
Freeboard necessary to give desired protection	0 m

Floods Assessed	
ARI Yrs	
100000	PMF
100	
50	
20	
10	
5	

Assume Damage is zero at what AEP: 2 year

Basement Type		
	1	With Basement
	2	Without Baesement

ID or Survey No.	Street Name	Street Address	CADID	Plan Label	Building Floor Area	Basement_ Type	Raisable Yes/No	Floor Level m AHD	"Protection Level" (Floor Level less Freeboard) m AHD	Ground Level m AHD	Type of Res 1-4	Flood Level at Property, m AHD for each AEP flood: PMF	1.00%	2.00%	5.00%	10.00%	20.00%
NS_345	Young St	43954	105220259	37 - 1990 LF	446.404	1	No	79.17	79.17	79.07	2	79.45	79.23	79.20	79.20	79.18	79.24
NS_346	Young St	7	105220259	37 - 1990 LF	270.292	1	No	78.62	78.62	78.42	2	78.76	78.58	78.56	78.56	78.54	78.50
NS_455	Arthur St	100	105349096	11 - 2550 LF	2089.98	1	No	42.61	42.61	42.56	2	46.04	44.86	44.55	44.25	44.02	43.73
NS_347	Young St	9	107568781	37 - 1990 LF	492.204	1	No	77.63	77.63	77.63	2	78.03	77.74	77.71	77.71	77.68	0.00
NS_456	Arthur St	90	105349096	11 - 2550 LF	1188	1	No	44.31	44.31	43.91	2	46.04	44.86	44.55	44.25	44.02	43.73
NS_655	Albany St	23	106740920	42 - 2005 LF	563.15	2	No	82.60	82.60	82.50	2	82.91	82.49	0.00	82.43	0.00	0.00
NS_348	Young St	9	175362121	SP94970	177.048	1	No	77.47	77.47	77.47	2	77.88	77.59	77.56	77.56	77.53	0.00
NS_879	Mount St	130	103851262	DP849663	773.07	2	No	42.00	42.00	42.00	2	0.00	0.00	0.00	0.00	0.00	0.00
NS_457	Arthur St	80	105349096	11 - 2550 LF	891.623	1	No	43.90	43.90	43.90	2	46.05	44.86	44.55	44.25	44.14	44.12
NS_458	Arthur St?	97?	103680252	DP733002	1845.32	1	No	44.13	44.13	44.13	2	44.36	44.31	44.31	44.31	44.31	44.30
NS_635	Willoughby Rd	129	102154657	DP933485	376.879	2	No	76.83	76.83	76.73	2	77.76	77.28	77.22	77.21	77.16	77.05
NS_349	Young St	19	105638062	37 - 1990 LF	346.611	1	No	77.25	77.25	77.25	2	77.70	77.26	77.22	77.21	77.17	77.07
NS_636	Willoughby Rd	127	102154656	DP933485	112.027	2	No	76.85	76.85	76.75	2	77.84	77.32	77.26	77.25	77.20	77.08
NS_459	Pacific Hwy	93-95	150143467	SP73356	240.862	1	No	47.29	47.29	47.29	2	47.83	47.66	47.65	47.63	47.61	47.60
NS_350	Grosvenor St	27	104279395	SP63503	1198.11	1	No	76.61	76.61	76.61	2	77.28	76.79	76.67	0.00	0.00	0.00
NS_637	Willoughby Rd	125	102154655	DP519221	224.176	2	No	77.38	77.38	76.98	2	77.84	77.32	77.26	77.25	77.20	77.09
NS_460	Pacific Hwy	97	103680188	SP13264	608.886	1	No	50.87	50.87	49.07	1	49.19	49.08	49.08	49.09	49.07	49.06
NS_769	Union St	2/101	100104861	DP774993	162.1	2	No	55.15	55.15	55.15	2	55.78	55.62	55.61	55.61	55.59	55.56
NS_351	Grosvenor Street	41-53	102325924	DP847474	3495.83	2	No	79.02	79.02	78.02	1	77.85	77.62	0.00	0.00	0.00	0.00
NS_638	Willoughby Rd	170	102154563	DP2872	299.305	2	No	77.74	77.74	77.34	2	78.65	78.11	78.02	78.02	77.96	77.85
NS_308	Hayes St	15	105084820	11 - 2019 R	148.952	2	No	11.68	11.68	11.48	2	13.00	11.79	11.77	11.73	11.69	11.65
NS_461	Pacific Hwy	77	105521300	4602 - 3000 R	1030.49	1	No	45.44	45.44	45.44	2	46.42	46.24	46.23	46.22	46.22	46.21
NS_770	Union St	1/101	100104862	DP774993	164.2	2	No	55.01	55.01	54.91	2	55.79	55.62	55.61	55.62	55.59	55.56
NS_639	Willoughby Rd	168	105016158	0	326.036	2	No	77.47	77.47	76.87	1	78.78	78.15	78.04	78.04	77.98	77.85
NS_309	Hayes St	13	105090427	11 - 2019 R	120.86	2	No	11.06	11.06	10.96	2	11.48	11.06	11.05	11.02	10.99	10.96
NS_462	Walker St	107	102159700	SP21592	407.075	1	No	50.41	50.41	50.01	2	50.47	50.13	50.11	50.09	50.05	50.01
NS_771	Union St	103	102164406	DP400809	93.5	2	No	54.97	54.97	54.87	2	55.79	55.62	55.61	55.62	55.59	55.56
NS_640	Willoughby Rd	166	102154561	DP2872	322.615	2	No	77.59	77.59	76.59	1	78.80	78.15	78.05	78.04	77.98	77.85
NS_310	Hayes St	11	105090427	11 - 2019 R	87.5	2	No	10.57	10.57	10.47	2	11.11	10.59	10.58	10.56	10.53	10.50
NS_772	Union St	105	102164407	DP400809	89.2	2	No	55.02	55.02	54.92	2	55.79	55.62	55.61	55.62	55.59	55.56
NS_463	Mount St	118	102159707	DP635642	843.823	1	No	44.97	44.97	44.97	2	45.03	0.00	0.00	0.00	0.00	0.00
NS_641	Willoughby Rd	164	173296216	SP92639	900.223	1	No	77.45	77.45	76.45	1	78.87	78.16	78.05	78.05	77.98	77.85
NS_888	Military Rd	121-123	106777421	21 - 1990 SH 1	298.6	1	No	82.78	82.78	82.48	2	82.99	82.82	82.80	82.80	82.79	82.76
NS_464	Mount St	104	105525076	12 - 2019 LF	232.677	1	No	47.30	47.30	47.00	2	47.04	46.98	46.97	46.96	46.94	46.92
NS_642	Willoughby Rd	160	102154558	DP2872	347.042	2	No	77.65	77.65	77.25	2	78.79	78.13	78.03	78.03	77.97	77.85
NS_312	Hayes St	1	102160815	DP341833	247.72	2	No	4.24	4.24	4.14	2	5.34	4.87	4.86	4.84	4.78	4.76
NS_465	Mount St	104	105525076	12 - 2019 LF	232.172	1	No	46.76	46.76	46.36	2	46.50	46.43	46.42	46.41	46.40	46.38
NS_466	Mount St	80	102159612	DP566189	522.157	1	No	56.99	56.99	56.49	2	56.60	56.55	56.55	56.54	56.54	56.53
NS_314	Falcon St	312	102158155	DP259885	37.85	2	No	86.64	86.64	86.64	2	86.92	86.71	86.70	86.69	86.68	86.67
NS_467	Mount St	90	102159617	DP702144	886.711	1	No	53.89	53.89	53.89	2	53.98	53.91	53.91	53.91	53.91	53.91
NS_447	Walker St	51	103680187	DP707510	759.511	1	No	49.01	49.01	49.01	2	50.00	49.73	49.70	49.67	49.64	49.60
NS_733	Bernard Lane	124	102157583	DP1720	504.681	2	No	81.52	81.52	81.32	2	82.06	81.59	81.51	81.51	81.47	81.39
NS_666	Ernest St	187	102157787	DP437031	860.45	2	No	72.14	72.14	72.14	2	72.65	72.30	72.27	72.21	72.18	72.16
NS_468	Mount St	100	105460681	11 - 2550 LF	538.026	1	No	51.25	51.25	51.15	2	51.35	51.22	51.21	51.20	51.19	51.18
NS_448	Walker St	53	103862315	SP55595	1092.11	1	No	49.89	49.89	49.54	2	50.06	49.80	49.77	49.75	49.72	0.00
NS_734	Bernard Lane	122	106754426	39 - 2550 R	782.31	2	No	81.01	81.01	80.61	2	81.22	80.86	80.80	80.81	80.78	80.74
NS_579	Clark Rd	66	106763939	55 - 2550 R	299.83	1	No	2.93	2.93	2.63	2	4.11	3.15	3.05	2.88	2.69	2.65
NS_339	Military Rd	151	106731417	16108 - 3000 R	230.433	1	No	81.43	81.43	81.43	2	81.65	81.51	81.48	81.48	81.46	81.42
NS_469	Walker St	88	103734878	DP832416	603.159	1	No	54.39	54.39	54.39	2	55.23	54.69	54.65	54.61	54.53	54.43
NS_580	Clark Rd	64A	106694934	55 - 2550 R	64.7445	1	No	2.58	2.58	2.58	2	4.12	3.11	3.02	2.85	2.67	2.62
NS_449	Walker St	65	103680193	DP800389	532.647	1	No	49.47	49.47	49.47	2	50.07	49.81	49.79	49.77	49.76	49.73
NS_340	Military Rd	151	106731417	16108 - 3000 R	232.395	1	No	81.54	81.54	81.54	2	81.65	81.51	81.48	81.48	81.46	81.42
NS_581	Clark Rd	64	106694934	55 - 2550 R	219.767	1	No	2.82	2.82	2.42	2	3.97	3.05	2.97	2.84	2.67	2.57
NS_341	Military Rd	151	106731417	16108 - 3000 R	250.949	1	No	81.76	81.76	81.76	2	81.65	81.51	81.48	81.48	81.46	81.42
NS_470	Walker St	86	105674271	0	468.892	1	No	54.24	54.24	54.24	2	55.24	54.64	54.60	54.57	54.54	54.53
NS_450	Walker St	69-71	103680194	SP70165	325.322	1	No	48.97	48.97	48.77	2	50.11	49.86	49.84	49.82	49.79	49.74
NS_582	Clark Rd	62	102160205	DP876876	216.633	2	No	3.02	3.02	2.72	2	3.85	2.89	2.83	0.00	0.00	0.00
NS_342	Military Rd	153	102209394	DP656318	95.7	2	No	81.62	81.62	81.62	2	81.65	81.51	81.48	81.48	81.46	81.42
NS_183	McDougall St	40A	102163158	DP740787	92.1	2	No	12.29	12.29	12.19	2	11.70	0.00	0.00	0.00	0.00	0.00
NS_343	Military Rd	162-164	102209392	DP577821	190.151	2	No	80.68	80.68	80.68	2	81.50	81.07	81.01	81.00	80.96	80.87
NS_451	Walker St	73-79	103680195	SP35394	644.001	1	No	48.92	48.92	48.92	2	50.12	49.87	49.85	49.83	49.80	49.74
NS_471	Denison St	1	105384563	0	4230.28	1	No	57.23	57.23	57.23	2	58.20	57.62	57.60	57.57	57.54	57.51
NS_344	Young St	1	102209408	DP577821	258.309	2	No	79.77	79.77	79.67	2	80.07	80.06	80.06	80.06	80.01	79.94
NS_472	Miller St	105-153	102159563	DP792740	4517.44	1	No	62.51	62.51	62.51	2	64.04	63.16	63.07	63.00	62.93	62.82
NS_473	Berry St	53	102159570	DP608746	2197.29	1	No	67.23	67.23	67.13	2	67.49	67.22	67.20	67.18	67.16	67.15
NS_452	Walker St	83	103680196	DP68001	324.938	1	No	49.18	49.18	49.10	2	50.13	49.89	49.87	49.85	49.82	49.76
NS_454	Mount St	107	103680259	DP533647	1140.72	1	No	45.36	45.36	45.06	2	45.61	45.12	45.10	45.04	45.04	45.04
NS_453	Walker St	99	105525076	12 - 2019 LF	2255.07	1	No	45.96	45.96	45.96	2	47.24	46.50	46.44	46.40	46.36	46.33

ID or Survey No.	Depth of Inundation above Floor Level (m) for each AEP flood: PMF	1.00%	2.00%	5.00%	10.00%	20.00%	Depth of Inundation Above "Protection Level" for each AEP flood ** Not used in Damages Calculation: PMF	1.00%	2.00%	5.00%	10.00%	20.00%
NS_345	0.28	0.06	0.03	0.03	0.01	0.07	0.28	0.06	0.03	0.03	0.01	0.07
NS_346	0.15	-0.04	-0.06	-0.06	-0.07	-0.12	0.15	-0.04	-0.06	-0.06	-0.07	-0.12
NS_455	3.43	2.24	1.94	1.64	1.40	1.12	3.43	2.24	1.94	1.64	1.40	1.12
NS_347	0.40	0.12	0.08	0.08	0.06	0.00	0.40	0.12	0.08	0.08	0.06	0.00
NS_456	1.73	0.54	0.24	-0.06	-0.30	-0.58	1.73	0.54	0.24	-0.06	-0.30	-0.58
NS_655	0.31	-0.11	0.00	-0.16	0.00	0.00	0.31	-0.11	0.00	-0.16	0.00	0.00
NS_348	0.41	0.12	0.09	0.09	0.06	0.00	0.41	0.12	0.09	0.09	0.06	0.00
NS_879	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NS_457	2.14	0.96	0.65	0.35	0.23	0.22	2.14	0.96	0.65	0.35	0.23	0.22
NS_458	0.22	0.18	0.18	0.17	0.17	0.16	0.22	0.18	0.18	0.17	0.17	0.16
NS_635	0.94	0.46	0.39	0.38	0.33	0.23	0.94	0.46	0.39	0.38	0.33	0.23
NS_349	0.45	0.01	-0.04	-0.04	-0.08	-0.18	0.45	0.01	-0.04	-0.04	-0.08	-0.18
NS_636	0.99	0.47	0.41	0.40	0.35	0.24	0.99	0.47	0.41	0.40	0.35	0.24
NS_459	0.54	0.37	0.36	0.34	0.32	0.31	0.54	0.37	0.36	0.34	0.32	0.31
NS_350	0.67	0.18	0.06	0.00	0.00	0.00	0.67	0.18	0.06	0.00	0.00	0.00
NS_637	0.46	-0.06	-0.12	-0.13	-0.18	-0.30	0.46	-0.06	-0.12	-0.13	-0.18	-0.30
NS_460	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NS_769	0.63	0.47	0.46	0.47	0.44	0.42	0.63	0.47	0.46	0.47	0.44	0.42
NS_351	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NS_638	0.92	0.38	0.28	0.28	0.22	0.11	0.92	0.38	0.28	0.28	0.22	0.11
NS_308	1.32	0.10	0.09	0.05	0.01	-0.03	1.32	0.10	0.09	0.05	0.01	-0.03
NS_461	0.99	0.81	0.79	0.79	0.78	0.77	0.99	0.81	0.79	0.79	0.78	0.77
NS_770	0.78	0.62	0.61	0.61	0.58	0.56	0.78	0.62	0.61	0.61	0.58	0.56
NS_639	1.31	0.68	0.57	0.57	0.50	0.38	1.31	0.68	0.57	0.57	0.50	0.38
NS_309	0.42	0.00	-0.01	-0.04	-0.07	-0.10	0.42	0.00	-0.01	-0.04	-0.07	-0.10
NS_462	0.06	-0.29	-0.31	-0.32	-0.36	-0.40	0.06	-0.29	-0.31	-0.32	-0.36	-0.40
NS_771	0.82	0.65	0.64	0.64	0.62	0.59	0.82	0.65	0.64	0.64	0.62	0.59
NS_640	1.21	0.56	0.45	0.45	0.38	0.26	1.21	0.56	0.45	0.45	0.38	0.26
NS_310	0.54	0.02	0.02	0.00	-0.04	-0.07	0.54	0.02	0.02	0.00	-0.04	-0.07
NS_772	0.77	0.60	0.59	0.59	0.57	0.54	0.77	0.60	0.59	0.59	0.57	0.54
NS_463	0.06	0.00	0.00	0.00	0.00	0.00	0.06	0.00	0.00	0.00	0.00	0.00
NS_641	1.42	0.71	0.60	0.59	0.53	0.40	1.42	0.71	0.60	0.59	0.53	0.40
NS_888	0.21	0.05	0.02	0.02	0.01	-0.01	0.21	0.05	0.02	0.02	0.01	-0.01
NS_464	-0.26	-0.32	-0.33	-0.34	-0.35	-0.37	-0.26	-0.32	-0.33	-0.34	-0.35	-0.37
NS_642	1.14	0.48	0.38	0.38	0.32	0.20	1.14	0.48	0.38	0.38	0.32	0.20
NS_312	1.10	0.63	0.63	0.60	0.54	0.53	1.10	0.63	0.63	0.60	0.54	0.53
NS_465	-0.26	-0.33	-0.34	-0.35	-0.36	-0.38	-0.26	-0.33	-0.34	-0.35	-0.36	-0.38
NS_466	-0.39	-0.44	-0.44	-0.44	-0.45	-0.45	-0.39	-0.44	-0.44	-0.44	-0.45	-0.45
NS_314	0.28	0.08	0.07	0.05	0.04	0.03	0.28	0.08	0.07	0.05	0.04	0.03
NS_467	0.09	0.02	0.02	0.02	0.02	0.02	0.09	0.02	0.02	0.02	0.02	0.02
NS_447	0.99	0.72	0.69	0.66	0.63	0.60	0.99	0.72	0.69	0.66	0.63	0.60
NS_733	0.54	0.08	-0.01	0.00	-0.05	-0.13	0.54	0.08	-0.01	0.00	-0.05	-0.13
NS_666	0.50	0.15	0.12	0.06	0.04	0.01	0.50	0.15	0.12	0.06	0.04	0.01
NS_468	0.09	-0.04	-0.04	-0.05	-0.06	-0.07	0.09	-0.04	-0.04	-0.05	-0.06	-0.07
NS_448	0.18	-0.09	-0.11	-0.14	-0.17	0.00	0.18	-0.09	-0.11	-0.14	-0.17	0.00
NS_734	0.20	-0.16	-0.21	-0.21	-0.24	-0.28	0.20	-0.16	-0.21	-0.21	-0.24	-0.28
NS_579	1.18	0.22	0.12	-0.06	-0.24	-0.28	1.18	0.22	0.12	-0.06	-0.24	-0.28
NS_339	0.22	0.08	0.06	0.06	0.04	0.00	0.22	0.08	0.06	0.06	0.04	0.00
NS_469	0.84	0.30	0.26	0.22	0.14	0.04	0.84	0.30	0.26	0.22	0.14	0.04
NS_580	1.54	0.53	0.44	0.27	0.09	0.04	1.54	0.53	0.44	0.27	0.09	0.04
NS_449	0.60	0.35	0.32	0.31	0.29	0.27	0.60	0.35	0.32	0.31	0.29	0.27
NS_340	0.11	-0.03	-0.06	-0.06	-0.08	-0.12	0.11	-0.03	-0.06	-0.06	-0.08	-0.12
NS_581	1.16	0.24	0.16	0.02	-0.15	-0.24	1.16	0.24	0.16	0.02	-0.15	-0.24
NS_341	-0.11	-0.25	-0.28	-0.28	-0.30	-0.34	-0.11	-0.25	-0.28	-0.28	-0.30	-0.34
NS_470	1.00	0.40	0.36	0.33	0.30	0.29	1.00	0.40	0.36	0.33	0.30	0.29
NS_450	1.13	0.89	0.87	0.85	0.82	0.77	1.13	0.89	0.87	0.85	0.82	0.77
NS_582	0.83	-0.13	-0.19	0.00	0.00	0.00	0.83	-0.13	-0.19	0.00	0.00	0.00
NS_342	0.03	-0.11	-0.13	-0.14	-0.15	-0.19	0.03	-0.11	-0.13	-0.14	-0.15	-0.19
NS_183	-0.59	0.00	0.00	0.00	0.00	0.00	-0.59	0.00	0.00	0.00	0.00	0.00
NS_343	0.82	0.39	0.33	0.32	0.28	0.20	0.82	0.39	0.33	0.32	0.28	0.20
NS_451	1.20	0.95	0.93	0.90	0.88	0.82	1.20	0.95	0.93	0.90	0.88	0.82
NS_471	0.97	0.40	0.37	0.35	0.31	0.28	0.97	0.40	0.37	0.35	0.31	0.28
NS_344	0.30	0.29	0.29	0.29	0.25	0.17	0.30	0.29	0.29	0.29	0.25	0.17
NS_472	1.54	0.65	0.56	0.49	0.42	0.31	1.54	0.65	0.56	0.49	0.42	0.31
NS_473	0.26	-0.01	-0.03	-0.05	-0.07	-0.08	0.26	-0.01	-0.03	-0.05	-0.07	-0.08
NS_452	0.95	0.71	0.69	0.67	0.64	0.58	0.95	0.71	0.69	0.67	0.64	0.58
NS_454	0.25	-0.24	-0.26	-0.32	-0.32	-0.33	0.25	-0.24	-0.26	-0.32	-0.32	-0.33
NS_453	1.28	0.54	0.48	0.44	0.40	0.37	1.28	0.54	0.48	0.44	0.40	0.37

Flood Damages

ID or Survey No.	PMF: Damages, total for event, per property affected	PMF: Properties Affected above floor level, damaged	AEP 1.00%: Damages, total for event, per property affected	AEP 1.00%: Properties Affected above floor level, damaged	AEP 2.0%: Damages, total for event, per property affected	AEP 2.0%: Properties Affected above floor level, damaged	AEP 5.0%: Damages, total for event, per property affected	AEP 5.0%: Properties Affected above floor level, damaged	AEP 10.0%: Damages, total for event, per property affected	AEP 10.0%: Properties Affected above floor level, damaged	AEP 20.0%: Damages, total for event, per property affected	AEP 20.0%: Properties Affected above floor level, damaged	AEP: Damages, total for event, per property affected	AEP: Properties Affected above floor level, damaged	AEP: Damages, total for event, per property affected	AEP: Properties Affected above floor level, damaged	AAD, total and per property
	$ 49,104,668	60	$ 30,984,866	47	$ 27,801,427	44	$ 25,421,339	40	$ 23,243,475	39	$ 20,442,621	34	$ -	0	$ -	0	$ 7,959,638
Average per property	$ 744,010	66	$ 476,690	65	$ 441,292	63	$ 410,022	62	$ 387,391	60	$ 365,047	56	$ -	0	$ -	0	$ 120,601
NS_345	$ 258,748	1	$ 207,618	1	$ 207,618	1	$ 207,618	1	$ 201,421	1	$ 207,618	1	$ -		$ -		$ 72,455
NS_346	$ 133,215	1	$ 106,948	0	$ 106,948	0	$ 106,948	0	$ 106,948	0	$ 91,937	0	$ -		$ -		$ 34,560
NS_455	$ 5,425,958	1	$ 4,896,420	1	$ 4,410,405	1	$ 3,772,057	1	$ 3,394,851	1	$ 2,872,566	1	$ -		$ -		$ 1,144,260
NS_347	$ 343,379	1	$ 235,753	1	$ 235,753	1	$ 235,753	1	$ 228,919	1	$ -		$ -		$ -		$ 35,386
NS_456	$ 2,226,604	1	$ 1,026,712	1	$ 618,501	1	$ 470,061	0	$ 206,167	0	$ 175,242	0	$ -		$ -		$ 103,067
NS_655	$ 326,417	1	$ 41,046	0	$ -		$ 13,682	0	$ -		$ -		$ -		$ -		$ 2,588
NS_348	$ 123,515	1	$ 84,801	1	$ 84,801	1	$ 84,801	1	$ 82,343	1	$ -		$ -		$ -		$ 12,728
NS_879	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
NS_457	$ 2,027,007	1	$ 1,104,796	1	$ 857,223	1	$ 569,419	1	$ 464,200	1	$ 451,821	1	$ -		$ -		$ 186,268
NS_458	$ 935,098	1	$ 935,098	1	$ 935,098	1	$ 909,479	1	$ 909,479	1	$ 909,479	1	$ -		$ -		$ 319,205
NS_635	$ 466,985	1	$ 285,162	1	$ 262,924	1	$ 262,924	1	$ 240,687	1	$ 196,212	1	$ -		$ -		$ 78,252
NS_349	$ 262,260	1	$ 156,393	1	$ 137,145	0	$ 137,145	0	$ 117,897	0	$ 79,400	0	$ -		$ -		$ 35,824
NS_636	$ 143,866	1	$ 84,764	1	$ 78,154	1	$ 78,154	1	$ 71,544	1	$ 58,324	1	$ -		$ -		$ 23,286
NS_459	$ 208,161	1	$ 153,822	1	$ 153,822	1	$ 153,822	1	$ 139,610	1	$ 139,610	1	$ -		$ -		$ 50,199
NS_350	$ 1,151,885	1	$ 607,131	1	$ 557,230	1	$ -		$ -		$ -		$ -		$ -		$ 22,967
NS_637	$ 169,621	1	$ 21,786	0	$ 16,340	0	$ 5,447	0	$ 5,447	0	$ -		$ -		$ -		$ 2,018
NS_460	$ 274,734	0	$ 274,734	0	$ 274,734	0	$ 274,734	0	$ 274,734	0	$ 274,734	0	$ -		$ -		$ 96,154
NS_769	$ 155,846	1	$ 122,651	1	$ 122,651	1	$ 122,651	1	$ 122,651	1	$ 113,087	1	$ -		$ -		$ 41,180
NS_351	$ 424,670	0	$ 424,670	0	$ -		$ -		$ -		$ -		$ -		$ -		$ 6,366
NS_638	$ 357,359	1	$ 208,806	1	$ 173,485	1	$ 173,485	1	$ 131,932	1	$ 84,146	1	$ -		$ -		$ 41,005
NS_308	$ 230,576	1	$ 41,876	1	$ 41,876	1	$ 29,985	1	$ 18,095	1	$ 14,476	0	$ -		$ -		$ 7,859
NS_461	$ 1,323,361	1	$ 1,137,375	1	$ 1,137,375	1	$ 1,137,375	1	$ 1,137,375	1	$ 1,090,878	1	$ -		$ -		$ 389,700
NS_770	$ 181,231	1	$ 149,886	1	$ 149,886	1	$ 149,886	1	$ 149,886	1	$ 141,907	1	$ -		$ -		$ 51,019
NS_639	$ 504,700	1	$ 329,300	1	$ 281,772	1	$ 281,772	1	$ 265,929	1	$ 227,454	1	$ -		$ -		$ 88,154
NS_309	$ 84,316	1	$ 14,682	1	$ 14,682	0	$ 11,746	0	$ 11,746	0	$ 8,809	0	$ -		$ -		$ 3,974
NS_462	$ 189,327	1	$ 70,644	0	$ 70,644	0	$ 70,644	0	$ 70,644	0	$ 70,644	0	$ -		$ -		$ 25,318
NS_771	$ 103,198	1	$ 89,893	1	$ 89,893	1	$ 89,893	1	$ 85,349	1	$ 85,349	1	$ -		$ -		$ 30,279
NS_640	$ 472,530	1	$ 278,815	1	$ 244,103	1	$ 244,103	1	$ 225,068	1	$ 167,961	1	$ -		$ -		$ 70,266
NS_310	$ 75,621	1	$ 10,629	1	$ 10,629	1	$ 10,629	0	$ 8,504	0	$ 8,504	0	$ -		$ -		$ 3,460
NS_772	$ 94,427	1	$ 81,424	1	$ 81,424	1	$ 81,424	1	$ 77,090	1	$ 77,090	1	$ -		$ -		$ 27,371
NS_463	$ 392,454	1	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ 1,960
NS_641	$ 1,462,274	1	$ 909,234	1	$ 821,748	1	$ 821,748	1	$ 778,005	1	$ 628,028	1	$ -		$ -		$ 249,653
NS_888	$ 151,313	1	$ 138,876	1	$ 134,730	1	$ 134,730	1	$ 134,730	1	$ 134,730	0	$ -		$ -		$ 47,279
NS_464	$ 40,379	0	$ 40,379	0	$ 40,379	0	$ 40,379	0	$ 40,379	0	$ 40,379	0	$ -		$ -		$ 14,132
NS_642	$ 492,650	1	$ 283,063	1	$ 242,109	1	$ 242,109	1	$ 201,155	1	$ 152,974	1	$ -		$ -		$ 65,498
NS_312	$ 340,478	1	$ 238,163	1	$ 238,163	1	$ 226,126	1	$ 214,088	1	$ 214,088	1	$ -		$ -		$ 76,764
NS_465	$ 40,291	0	$ 40,291	0	$ 40,291	0	$ 40,291	0	$ 40,291	0	$ 40,291	0	$ -		$ -		$ 14,102
NS_466	$ 90,616	0	$ 90,616	0	$ 90,616	0	$ 90,616	0	$ 90,616	0	$ 90,616	0	$ -		$ -		$ 31,715
NS_314	$ 21,939	1	$ 10,641	1	$ 7,620	1	$ 7,620	1	$ 7,620	1	$ 7,620	1	$ -		$ -		$ 2,768
NS_467	$ 424,711	1	$ 400,090	1	$ 400,090	1	$ 400,090	1	$ 400,090	1	$ 400,090	1	$ -		$ -		$ 140,151
NS_447	$ 975,368	1	$ 767,114	1	$ 767,114	1	$ 730,208	1	$ 730,208	1	$ 693,302	1	$ -		$ -		$ 250,516
NS_733	$ 436,163	1	$ 141,884	1	$ 61,308	0	$ 61,308	0	$ 49,046	0	$ 12,262	0	$ -		$ -		$ 13,406
NS_666	$ 701,821	1	$ 310,593	1	$ 241,904	1	$ 173,215	1	$ 173,215	1	$ 104,527	1	$ -		$ -		$ 52,273
NS_468	$ 257,700	1	$ 212,883	0	$ 212,883	0	$ 212,883	0	$ 212,883	0	$ 212,883	0	$ -		$ -		$ 74,731
NS_448	$ 553,416	1	$ 371,471	0	$ 371,471	0	$ 250,175	0	$ 250,175	0	$ -		$ -		$ -		$ 42,677
NS_734	$ 344,838	1	$ 19,007	0	$ 19,007	0	$ 19,007	0	$ -		$ -		$ -		$ -		$ 3,053
NS_579	$ 439,157	1	$ 151,936	1	$ 143,611	1	$ 118,635	0	$ 52,033	0	$ 52,033	0	$ -		$ -		$ 25,639
NS_339	$ 116,770	1	$ 110,371	1	$ 107,172	1	$ 107,172	1	$ 107,172	1	$ 103,973	0	$ -		$ -		$ 36,949
NS_469	$ 692,935	1	$ 349,608	1	$ 314,019	1	$ 305,645	1	$ 297,271	1	$ 280,524	1	$ -		$ -		$ 103,862
NS_580	$ 112,358	1	$ 55,954	1	$ 48,988	1	$ 33,708	1	$ 31,011	1	$ 30,112	1	$ -		$ -		$ 11,797
NS_449	$ 486,215	1	$ 340,165	1	$ 308,737	1	$ 308,737	1	$ 308,737	1	$ 277,309	1	$ -		$ -		$ 102,970
NS_340	$ 111,311	1	$ 91,953	0	$ 91,953	0	$ 91,953	0	$ 79,047	0	$ 79,047	0	$ -		$ -		$ 28,730
NS_581	$ 311,974	1	$ 114,416	1	$ 108,314	1	$ 99,160	1	$ 50,343	0	$ 38,139	0	$ -		$ -		$ 20,238
NS_341	$ 85,358	0	$ 43,550	0	$ 43,550	0	$ 43,550	0	$ 43,550	0	$ 43,550	0	$ -		$ -		$ 15,451
NS_470	$ 602,154	1	$ 327,116	1	$ 299,449	1	$ 299,449	1	$ 271,783	1	$ 271,783	1	$ -		$ -		$ 98,985
NS_450	$ 461,817	1	$ 388,423	1	$ 373,744	1	$ 373,744	1	$ 359,065	1	$ 344,386	1	$ -		$ -		$ 124,421
NS_582	$ 248,877	1	$ 5,263	0	$ 5,263	0	$ -		$ -		$ -		$ -		$ -		$ 1,401
NS_342	$ 19,265	1	$ 6,975	0	$ 2,325	0	$ 2,325	0	$ 2,325	0	$ 2,325	0	$ -		$ -		$ 945
NS_183	$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
NS_343	$ 209,874	1	$ 132,656	1	$ 121,436	1	$ 110,217	1	$ 110,217	1	$ 83,818	1	$ -		$ -		$ 34,241
NS_451	$ 943,261	1	$ 797,972	1	$ 797,972	1	$ 768,914	1	$ 768,914	1	$ 710,798	1	$ -		$ -		$ 259,232
NS_471	$ 5,241,675	1	$ 2,951,195	1	$ 2,701,591	1	$ 2,701,591	1	$ 2,451,988	1	$ 2,451,988	1	$ -		$ -		$ 892,072
NS_344	$ 149,723	1	$ 149,723	1	$ 149,723	1	$ 149,723	1	$ 134,482	1	$ 93,241	1	$ -		$ -		$ 39,962
NS_472	$ 7,839,622	1	$ 4,343,151	1	$ 3,904,132	1	$ 3,684,622	1	$ 3,151,528	1	$ 2,618,434	1	$ -		$ -		$ 1,068,088
NS_473	$ 1,143,961	1	$ 991,433	0	$ 869,411	0	$ 869,411	0	$ 869,411	0	$ 747,388	0	$ -		$ -		$ 282,472
NS_452	$ 402,626	1	$ 328,191	1	$ 328,191	1	$ 312,401	1	$ 312,401	1	$ 296,612	1	$ -		$ -		$ 107,104
NS_454	$ 593,886	1	$ 197,962	0	$ 197,962	0	$ 197,962	0	$ 197,962	0	$ 197,962	0	$ -		$ -		$ 71,262
NS_453	$ 3,490,821	1	$ 1,948,911	1	$ 1,839,334	1	$ 1,706,276	1	$ 1,573,218	1	$ 1,440,159	1	$ -		$ -		$ 547,977

Annual Average Damage Calculation (AAD) for a Range of Cases - Based upon Total Damages for a Range of Events

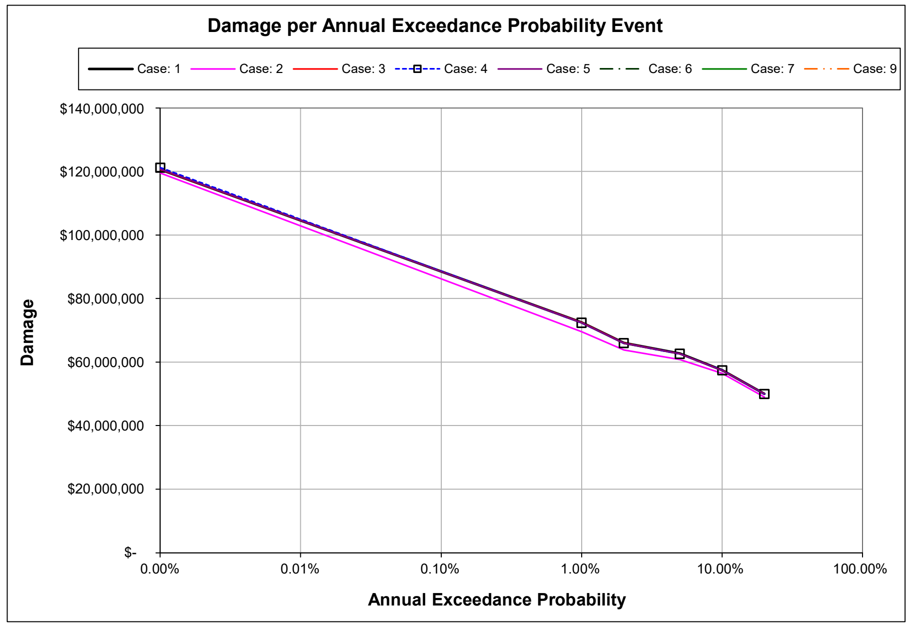
Project: North Sydney FRMSP

Job No: 180040

Discount Factors Used: 4% 7% 11%

Use 4,7 and 11% unless otherwise justified. All calculations based upon Middle Figure

Case	Description	Design Life of Options (Years) - 50 years max for structural options	AAD	NPV of Damage	Cost Of Option	Option Benefit Relative to Case 1	Benefit/Cost Relative to Case 1
1	Base Case for Comparison	50	$ 19,477,440	$ 287,619,429	n/a	n/a	n/a
2	Trunk Upgrade at North Sydney CBD (FM-S01)	50	$ 19,055,166	$ 281,383,800	$ 10,083,000	$ 6,235,629	0.62
3	Upsize Kurraba Road Culvert (FM-S03)	50	$ 19,470,378	$ 287,515,147	$ 371,000	$ 104,282	0.28
4	Bund at Forsyth Park (FM-S04)	50	$ 19,449,604	$ 287,208,384	$ 292,000	$ 411,045	1.41
5	Trunk Upgrade from Lindsay St to Kurraba Rd (FM-S05)	50	$ 19,460,483	$ 287,369,034	$ 2,452,000	$ 250,395	0.10
6		50	$ -	$ -			#DIV/0!
7		50	$ -	$ -			#DIV/0!
8		50	$ -	$ -			#DIV/0!
9		50	$ -	$ -			#DIV/0!



AAD Calculation for Various Cases

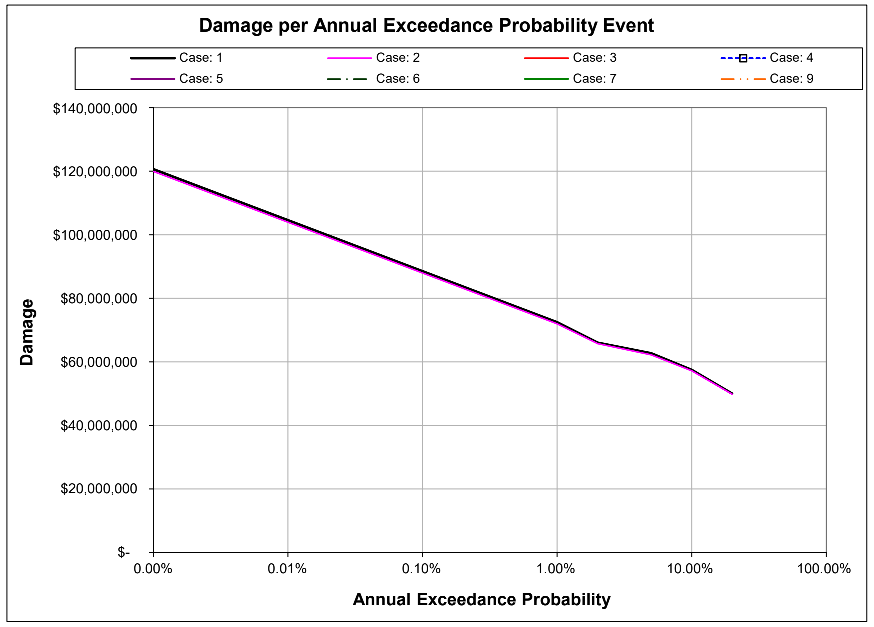
	Case: 1		Case: 2		Case: 3		Case: 4		Case: 5		Case: 6		Case: 7		Case: 8		Case: 9	
AEP	AEP Event Damage	Contribution to AAD	AEP Event Damage	Contribution to AAD	AEP Event Damage	Contribution to AAD	AEP Event Damage	Contribution to AAD	AEP Event Damage	Contribution to AAD	AEP Event Damage	Contribution to AAD	AEP Event Damage	Contribution to AAD	AEP Event Damage	Contribution to AAD	AEP Event Damage	Contribution to AAD
0.001%	$ 120,634,127	$ 964,667	$ 119,537,682	$ 944,449	$ 120,599,570	$ 964,332	$ 121,214,457	$ 967,014	$ 120,739,723	$ 964,715		$ -		$ -		$ -		$ -
1.0%	$ 72,492,355	$ 692,826	$ 69,541,193	$ 666,506	$ 72,459,927	$ 692,307	$ 72,381,894	$ 691,633	$ 72,396,448	$ 691,807		$ -		$ -		$ -		$ -
2.0%	$ 66,072,894	$ 1,931,935	$ 63,760,037	$ 1,869,361	$ 66,001,571	$ 1,929,094	$ 65,944,607	$ 1,928,054	$ 65,964,920	$ 1,929,554		$ -		$ -		$ -		$ -
5.0%	$ 62,722,790	$ 3,005,384	$ 60,864,051	$ 2,934,851	$ 62,604,674	$ 3,002,293	$ 62,592,355	$ 3,000,299	$ 62,672,022	$ 3,002,857		$ -		$ -		$ -		$ -
10.0%	$ 57,492,561	$ 5,376,628	$ 56,529,979	$ 5,279,874	$ 57,487,040	$ 5,376,352	$ 57,419,591	$ 5,368,886	$ 57,442,262	$ 5,371,972		$ -		$ -		$ -		$ -
20.0%	$ 50,039,998	$ 7,506,000	$ 49,067,500	$ 7,360,125	$ 50,039,998	$ 7,506,000	$ 49,958,125	$ 7,493,719	$ 49,997,184	$ 7,499,578		$ -		$ -		$ -		$ -
50.0%																		
100.0%	$ -																	
	TOTAL AAD	$ 19,477,440	TOTAL AAD	$ 19,055,166	TOTAL AAD	$ 19,470,378	TOTAL AAD	$ 19,449,604	TOTAL AAD	$ 19,460,483	TOTAL AAD	$ -	TOTAL AAD	$ -	TOTAL AAD	$ -	TOTAL AAD	$ -

Summary of NPV of Damages for Options

Discount Factor	Case 1	2	3	4	5	6	7	8	9
Applicable Timeframe For Option yrs (Max 50)	50	50	50	50	50	50	50	50	50
4%	$ 435,154,675	$ 425,720,462	$ 434,996,901	$ 434,532,783	$ 434,775,840	$ -	$ -	$ -	$ -
7%	$ 287,619,429	$ 281,383,800	$ 287,515,147	$ 287,208,384	$ 287,369,034	$ -	$ -	$ -	$ -
11%	$ 195,480,163	$ 191,242,126	$ 195,409,288	$ 195,200,797	$ 195,309,983	$ -	$ -	$ -	$ -

Annual Average Damage Calculation (AAD) for a Range of Cases - Based upon Total Damages for a Range of Events

Project:	North Sydney FRMSP						
Job No:	180040	Design Life of Options (Years) - 50 years max for structural options	AAD	NPV of Damage	Cost Of Option	Option Benefit Relative to Case 1	Benefit/Cost Relative to Case 1
Discount Factors Used	4% 7% 11% Use 4,7 and 11% unless otherwise justified. All calculations based upon Middle Figure						
Case	Description						
1	Base Case for Comparison	50	$ 19,477,440	$ 287,619,429	n/a	n/a	n/a
2	Trunk Upgrade from Yeo St to Bogota Ave (FM-E01)	50	$ 19,372,139	$ 286,064,477	$ 3,803,000	$ 1,554,952	0.41
3		50	$ -	$ -			#DIV/0!
4		50	$ -	$ -			#DIV/0!
5		50	$ -	$ -			#DIV/0!
6		50	$ -	$ -			#DIV/0!
7		50	$ -	$ -			#DIV/0!
8		50	$ -	$ -			#DIV/0!
9		50	$ -	$ -			#DIV/0!



AAD Calculation for Various Cases

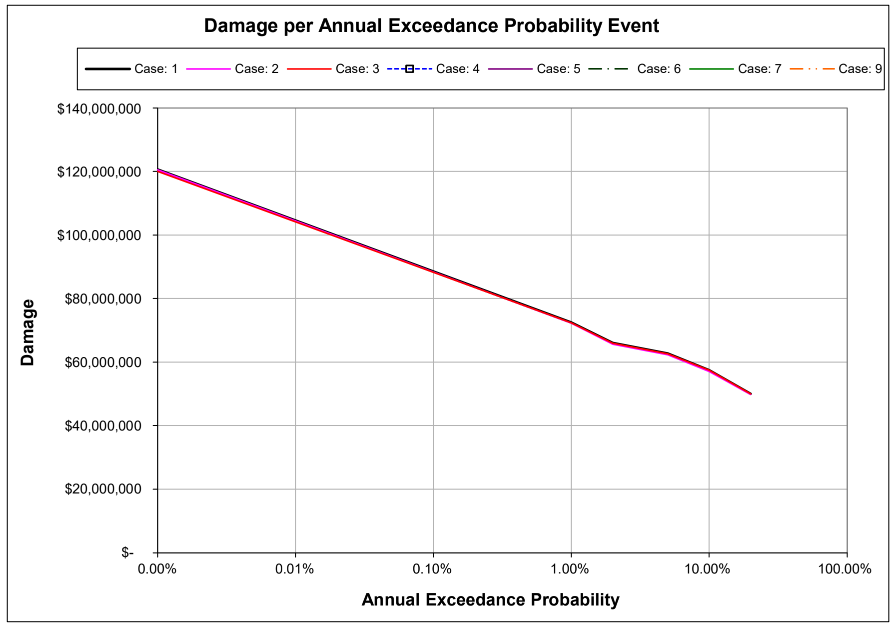
AEP	Case: 1 AEP Event Damage	Case: 1 Contribution to AAD	Case: 2 AEP Event Damage	Case: 2 Contribution to AAD	Case: 3 AEP Event Damage	Case: 3 Contribution to AAD	Case: 4 AEP Event Damage	Case: 4 Contribution to AAD	Case: 5 AEP Event Damage	Case: 5 Contribution to AAD	Case: 6 AEP Event Damage	Case: 6 Contribution to AAD	Case: 7 AEP Event Damage	Case: 7 Contribution to AAD	Case: 8 AEP Event Damage	Case: 8 Contribution to AAD	Case: 9 AEP Event Damage	Case: 9 Contribution to AAD
0.001%	$ 120,634,127	$ 964,667	$ 119,881,354	$ 958,515		$ -		$ -		$ -		$ -		$ -		$ -		$ -
1.0%	$ 72,492,355	$ 692,826	$ 72,013,610	$ 688,949		$ -		$ -		$ -		$ -		$ -		$ -		$ -
2.0%	$ 66,072,894	$ 1,931,935	$ 65,776,284	$ 1,920,174		$ -		$ -		$ -		$ -		$ -		$ -		$ -
5.0%	$ 62,722,790	$ 3,005,384	$ 62,235,346	$ 2,984,850		$ -		$ -		$ -		$ -		$ -		$ -		$ -
10.0%	$ 57,492,561	$ 5,376,628	$ 57,158,660	$ 5,348,362		$ -		$ -		$ -		$ -		$ -		$ -		$ -
20.0%	$ 50,039,998	$ 7,506,000	$ 49,808,584	$ 7,471,288		$ -		$ -		$ -		$ -		$ -		$ -		$ -
50.0%																		
	TOTAL AAD	$ 19,477,440	TOTAL AAD	$ 19,372,139	TOTAL AAD	$ -	TOTAL AAD	$ -	TOTAL AAD	$ -	TOTAL AAD	$ -	TOTAL AAD	$ -	TOTAL AAD	$ -	TOTAL AAD	$ -

Summary of NPV of Damages for Options

Discount Factor	Case 1	Case 2	Case 3	Case 4	Case 5	Case 6	Case 7	Case 8	Case 9
Applicable Timeframe For Option yrs (Max 50)	50	50	50	50	50	50	50	50	50
4%	$ 435,154,675	$ 432,802,106	$ -	$ -	$ -	$ -	$ -	$ -	$ -
7%	$ 287,619,429	$ 286,064,477	$ -	$ -	$ -	$ -	$ -	$ -	$ -
11%	$ 195,480,163	$ 194,423,342	$ -	$ -	$ -	$ -	$ -	$ -	$ -

Annual Average Damage Calculation (AAD) for a Range of Cases - Based upon Total Damages for a Range of Events

Project:	North Sydney FRMSP						
Job No:	180040	Design Life of Options (Years) - 50 years max for structural options	AAD	NPV of Damage	Cost Of Option	Option Benefit Relative to Case 1	Benefit/Cost Relative to Case 1
Discount Factors Used	4% 7% 11% Use 4,7 and 11% unless otherwise justified. All calculations based upon Middle Figure						
Case	Description						
1	Base Case for Comparison	50	$ 19,477,440	$ 287,619,429	n/a	n/a	n/a
2	Trunk Upgrade from Bank St to Waverton Park (FM-W01)	50	$ 19,383,120	$ 286,226,629	$ 2,247,000	$ 1,392,800	0.62
3	Carlyle Lane Drainage Upgrade (FM-W02)	50	$ 19,460,195	$ 287,364,775	$ 3,482,000	$ 254,654	0.07
4		50	$ -	$ -			#DIV/0!
5		50	$ -	$ -			#DIV/0!
6		50	$ -	$ -			#DIV/0!
7		50	$ -	$ -			#DIV/0!
8		50	$ -	$ -			#DIV/0!
9		50	$ -	$ -			#DIV/0!



AAD Calculation for Various Cases

AEP	Case: 1 AEP Event Damage	Case: 1 Contribution to AAD	Case: 2 AEP Event Damage	Case: 2 Contribution to AAD	Case: 3 AEP Event Damage	Case: 3 Contribution to AAD
0.001%	$ 120,634,127	$ 964,667	$ 120,515,411	$ 962,944	$ 119,985,401	$ 960,896
1.0%	$ 72,492,355	$ 692,826	$ 72,266,091	$ 689,852	$ 72,386,198	$ 691,794
2.0%	$ 66,072,894	$ 1,931,935	$ 65,704,380	$ 1,920,966	$ 65,972,629	$ 1,929,414
5.0%	$ 62,722,790	$ 3,005,384	$ 62,360,001	$ 2,985,496	$ 62,654,990	$ 3,003,327
10.0%	$ 57,492,561	$ 5,376,628	$ 57,059,845	$ 5,345,710	$ 57,478,085	$ 5,374,119
20.0%	$ 50,039,998	$ 7,506,000	$ 49,854,350	$ 7,478,152	$ 50,004,295	$ 7,500,644
50.0%						
100.0%	$ -					
	TOTAL AAD	$ 19,477,440	TOTAL AAD	$ 19,383,120	TOTAL AAD	$ 19,460,195

AEP	Case: 4 AEP Event Damage	Case: 4 Contribution to AAD	Case: 5 AEP Event Damage	Case: 5 Contribution to AAD	Case: 6 AEP Event Damage	Case: 6 Contribution to AAD	Case: 7 AEP Event Damage	Case: 7 Contribution to AAD	Case: 8 AEP Event Damage	Case: 8 Contribution to AAD	Case: 9 AEP Event Damage	Case: 9 Contribution to AAD
0.001%		$ -		$ -		$ -		$ -		$ -		$ -
1.0%		$ -		$ -		$ -		$ -		$ -		$ -
2.0%		$ -		$ -		$ -		$ -		$ -		$ -
5.0%		$ -		$ -		$ -		$ -		$ -		$ -
10.0%		$ -		$ -		$ -		$ -		$ -		$ -
20.0%		$ -		$ -		$ -		$ -		$ -		$ -
50.0%												
100.0%												
	TOTAL AAD	$ -	TOTAL AAD	$ -	TOTAL AAD	$ -	TOTAL AAD	$ -	TOTAL AAD	$ -	TOTAL AAD	$ -

Summary of NPV of Damages for Options

Discount Factor	Case 1	2	3	4	5	6	7	8	9
Applicable Timeframe For Option yrs (Max 50)	50	50	50	50	50	50	50	50	50
4%	$ 435,154,675	$ 433,047,434	$ 434,769,395	$ -	$ -	$ -	$ -	$ -	$ -
7%	$ 287,619,429	$ 286,226,629	$ 287,364,775	$ -	$ -	$ -	$ -	$ -	$ -
11%	$ 195,480,163	$ 194,533,548	$ 195,307,088	$ -	$ -	$ -	$ -	$ -	$ -

Annual Average Damage Calculation (AAD) for a Range of Cases - Based upon Total Damages for a Range of Events

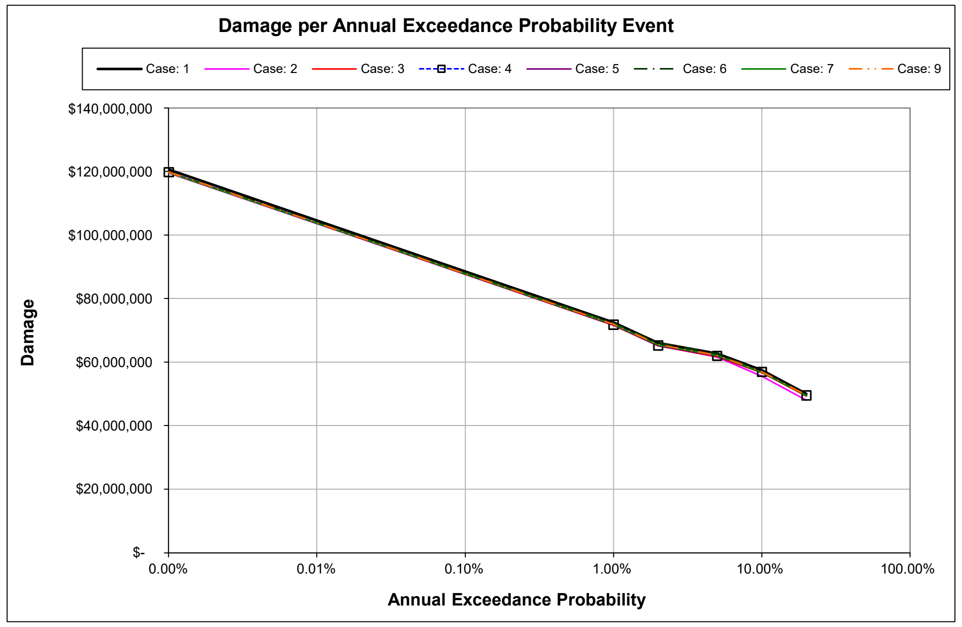
Project: North Sydney FRMSP

Job No: 180040

Discount Factors Used: 4% 7% 11%

Use 4,7 and 11% unless otherwise justified. All calculations based upon Middle Figure

Case	Description	Design Life of Options (Years) - 50 years max for structural options	AAD	NPV of Damage	Cost Of Option	Option Benefit Relative to Case 1	Benefit/Cost Relative to Case 1
1	Base Case for Comparison	50	$ 19,477,440	$ 287,619,429	n/a	n/a	n/a
2	Pacific Highway to Flat Rock Creek Trunk (FM-N01)	50	$ 18,857,510	$ 278,465,044	$ 8,866,000	$ 9,154,385	1.03
3	Bund at St Leonards Park (FM-N02)	50	$ 19,198,140	$ 283,495,072	$ 418,000	$ 4,124,357	9.87
4	Anzac Park Basin (FM-N03)	50	$ 19,275,338	$ 284,635,030	$ 9,988,000	$ 2,984,399	0.30
5	Trunk Upgrade from Anzac Park to Willoughby Creek and Warringa Rd Drainage Upgrade (FM-N05+N08)	50	$ 19,265,423	$ 284,488,617	$ 16,359,000	$ 3,130,812	0.19
6	Reynolds Street Drainaige Upgrade (FM-N06)	50	$ 19,347,622	$ 285,702,435	$ 4,041,000	$ 1,916,994	0.47
7	Cooper Lane Drainage Upgrade (FM-N07)	50	$ 19,282,088	$ 284,734,707	$ 6,068,000	$ 2,884,722	0.48
8	Cassins Avenue Drainage Upgrade (FM-N09)	50	$ 19,346,861	$ 285,691,199	$ 2,021,000	$ 1,928,230	0.95
9	Cammeray Golf Club Basin (FM-N11)	50	$ 19,301,714	$ 285,024,516	$ 1,351,000	$ 2,594,913	1.92



AAD Calculation for Various Cases

AEP	Case: 1 AEP Event Damage	Case: 1 Contribution to AAD	Case: 2 AEP Event Damage	Case: 2 Contribution to AAD	Case: 3 AEP Event Damage	Case: 3 Contribution to AAD	Case: 4 AEP Event Damage	Case: 4 Contribution to AAD
0.001%	$ 120,634,127	$ 964,667	$ 119,504,991	$ 954,892	$ 119,780,755	$ 955,843	$ 119,776,743	$ 956,871
1.0%	$ 72,492,355	$ 692,826	$ 71,664,544	$ 684,734	$ 71,579,226	$ 683,336	$ 71,789,048	$ 685,182
2.0%	$ 66,072,894	$ 1,931,935	$ 65,282,247	$ 1,903,163	$ 65,088,032	$ 1,901,421	$ 65,247,335	$ 1,907,702
5.0%	$ 62,722,790	$ 3,005,384	$ 61,595,299	$ 2,929,607	$ 61,673,339	$ 2,958,890	$ 61,932,809	$ 2,971,275
10.0%	$ 57,492,561	$ 5,376,628	$ 55,588,978	$ 5,180,865	$ 56,682,251	$ 5,300,247	$ 56,918,199	$ 5,323,009
20.0%	$ 50,039,998	$ 7,506,000	$ 48,028,324	$ 7,204,249	$ 49,322,691	$ 7,398,404	$ 49,541,987	$ 7,431,298
50.0%								
	TOTAL AAD	$ 19,477,440	TOTAL AAD	$ 18,857,510	TOTAL AAD	$ 19,198,140	TOTAL AAD	$ 19,275,338

AEP	Case: 5 AEP Event Damage	Case: 5 Contribution to AAD	Case: 6 AEP Event Damage	Case: 6 Contribution to AAD	Case: 7 AEP Event Damage	Case: 7 Contribution to AAD	Case: 8 AEP Event Damage	Case: 8 Contribution to AAD	Case: 9 AEP Event Damage	Case: 9 Contribution to AAD
0.001%	$ 119,727,376	$ 956,141	$ 119,826,338	$ 960,126	$ 119,599,049	$ 956,596	$ 119,786,013	$ 960,430	$ 119,804,432	$ 957,672
1.0%	$ 71,692,244	$ 685,022	$ 72,391,158	$ 692,320	$ 71,911,752	$ 686,848	$ 72,492,355	$ 692,872	$ 71,921,652	$ 687,205
2.0%	$ 65,312,140	$ 1,909,070	$ 66,072,894	$ 1,931,935	$ 65,457,945	$ 1,913,513	$ 66,082,139	$ 1,931,545	$ 65,519,257	$ 1,915,326
5.0%	$ 61,959,173	$ 2,970,430	$ 62,722,790	$ 2,992,802	$ 62,109,600	$ 2,972,513	$ 62,687,561	$ 2,991,806	$ 62,169,153	$ 2,978,873
10.0%	$ 56,858,017	$ 5,318,366	$ 56,989,293	$ 5,329,708	$ 56,790,900	$ 5,317,813	$ 56,984,670	$ 5,329,477	$ 56,985,773	$ 5,327,626
20.0%	$ 49,509,298	$ 7,426,395	$ 49,604,866	$ 7,440,730	$ 49,565,361	$ 7,434,804	$ 49,604,866	$ 7,440,730	$ 49,566,746	$ 7,435,012
50.0%										
	TOTAL AAD	$ 19,265,423	TOTAL AAD	$ 19,347,622	TOTAL AAD	$ 19,282,088	TOTAL AAD	$ 19,346,861	TOTAL AAD	$ 19,301,714

Summary of NPV of Damages for Options

Discount Factor	Case 1	Case 2	Case 3	Case 4	Case 5	Case 6	Case 7	Case 8	Case 9
Applicable Timeframe For Option yrs (Max 50)	50	50	50	50	50	50	50	50	50
4%	$ 435,154,675	$ 421,304,521	$ 428,914,716	$ 430,639,420	$ 430,417,904	$ 432,254,353	$ 430,790,227	$ 432,237,354	$ 431,228,693
7%	$ 287,619,429	$ 278,465,044	$ 283,495,072	$ 284,635,030	$ 284,488,617	$ 285,702,435	$ 284,734,707	$ 285,691,199	$ 285,024,516
11%	$ 195,480,163	$ 189,258,398	$ 192,677,049	$ 193,451,820	$ 193,352,311	$ 194,177,281	$ 193,519,566	$ 194,169,644	$ 193,716,534

APPENDIX J – PRELIMINARY COSTINGS

Cost Estimate - S01 Trunk Upgrade at North Sydney CBD					
No.	**Item**	**Unit rate ($)**	**Amount**	**Units**	**Cost**
1	**Pre-construction Costs**				
1.1	Site establishment		1		$ -
1.2	Provision of sediment and erosion control, geotechnical supervision		1		$ -
1.3	Detailed Design and Survey (Construction and WAE)		1		$ -
		Assume 20% of works cost			$ 1,309,392.10
2	**Construction**				
2.1	Pull up and dispose existing road surface	3.5	3813	m2	$ 13,344.96
2.2	Excavation of fill (soft rock)	221	16796	m3	$ 3,711,966.29
2.3	Supply and install of 1.2 m diameter pipe	1050	480	m	$ 503,791.77
	Supply and install of 1.5 m diameter pipe	1680	356	m	$ 597,742.99
	Supply and install of 1.2 x 1.6 m culvert	1790	64	m	$ 114,723.03
	Supply and install of 1.2 x 1.9 m culvert	1981	158	m	$ 313,117.63
2.4	Disposal of displaced pipe volume fill	300	1655	m3	$ 496,481.26
2.5	Drainage pit, assume 1 per 50 m	2000	21	each	$ 42,000.00
2.5	Backfilling, compaction and reinstate disturbed road pavement with bitumin surface	41.6	3813	m2	$ 158,614.33
2.6	Adjustment of existing services (assume 10% works cost)				$ 595,178.23
3	Contingency (assume 20% works cost)				$ 1,309,392.10
				Subtotal	$ 9,165,744.69
				GST	$ 916,574.47
				Total	$ 10,082,319.16

Cost Estimate - S03 Upsize Kurraba Road Culvert					
No.	**Item**	**Unit rate ($)**	**Amount**	**Units**	**Cost**
1	**Pre-construction Costs**				
1.1	Site establishment		1		$ -
1.2	Provision of sediment and erosion control, geotechnical supervision		1		$ -
1.3	Detailed Design and Survey (Construction and WAE)		1		$ -
		Assume 20% of works cost			$ 48,071.71
2	**Construction**				
2.1	Pull up and dispose existing road surface	3.5	194	m2	$ 680.05
2.2	Excavation of fill (soft rock)	221	544	m3	$ 120,232.84
2.3	Supply and install of 3.8 m x 1.8 m culvert	620	34	m	$ 20,770.00
2.4	Disposal of displaced pipe volume fill	300	229	m3	$ 68,742.00
2.5	Backfilling, compaction and reinstate disturbed road pavement with bitumin surface	41.6	194	m2	$ 8,082.88
2.6	Adjustment of existing services (assume 10% works cost)				$ 21,850.78
3	Contingency (assume 20% works cost)				$ 48,071.71
				Subtotal	$ 336,501.97
				GST	$ 33,650.20
				Total	$ 370,152.16

Cost Estimate - S04 Bund at Forsyth Park					
No.	**Item**	**Unit rate ($)**	**Amount**	**Units**	**Cost**
1	**Pre-construction Costs**				
1.1	Site establishment		1		$ -
1.2	Provision of sediment and erosion control, geotechnical supervision		1		$ -
1.3	Detailed Design and Survey (Construction and WAE)		1		$ -
		Assume 20% of works cost			$ 37,824.61
2	**Construction**				
2.1	Excavation of fill	$22.00	1397.3	m3	$ 30,739.72
2.2	Haulage of fill (assumed <10 km)	$13.80	1397.3	m3	$ 19,282.19
2.3	Placement, compaction and shaping	$6.50	838.3	m2	$ 5,448.88
2.4	Top soil placement	$10.60	838.3	m2	$ 8,885.86
2.5	Hydro mulch, sprayed grass seed compound	$3,250.00	0.1	ha	$ 272.44
2.6	Geotextile layer for embankment	64	1677		$ 107,300.93
2.7	Adjustment of existing services (assume 10% works cost)				$ 17,193.00
3	Contingency (assume 20% works cost)				$ 37,824.61
				Subtotal	$ 264,772.24
				GST	$ 26,477.22
				Total	$ 291,249.46

Cost Estimate - S05 Trunk Upgrade from Lindsay St to Kurraba Rd					
No.	**Item**	**Unit rate ($)**	**Amount**	**Units**	**Cost**
1	**Pre-construction Costs**				
1.1	Site establishment		1		$ -
1.2	Provision of sediment and erosion control, geotechnical supervision		1		$ -
1.3	Detailed Design and Survey (Construction and WAE)		1		$ -
		Assume 20% of works cost			$ 318,347.91
2	**Construction**				
2.1	Pull up and dispose existing road surface	3.5	3102	m2	$ 10,858.68
2.2	Excavation of fill (soft rock)	221	3405	m3	$ 752,415.92
2.3	Supply and install of 0.375 m diameter pipe	202	32	m	$ 6,378.69
	Supply and install of 0.45 m diameter pipe	246	744	m	$ 182,933.91
	Supply and install of 0.6 m diameter pipe	323	28	m	$ 9,021.00
	Supply and install of 0.675 m diameter pipe	429	19	m	$ 8,108.16
	Supply and install of 0.75 m diameter pipe	534	47	m	$ 25,352.66
	Supply and install of 0.9 m diameter pipe	706	73	m	$ 51,502.14
	Supply and install of 0.75 x 0.75 m culvert	701	117	m	$ 81,831.72
	Supply and install of 0.9 x 0.9 m culvert	1009	13	m	$ 13,114.84
	Supply and install of 1.3 x 1.3 m culvert	1668	25	m	$ 41,749.03
2.4	Disposal of displaced pipe volume fill	300	322	m3	$ 96,706.05
2.5	Drainage pit, assume 1 per 50 m	2000	19	each	$ 38,000.00
2.5	Backfilling, compaction and reinstate disturbed road pavement with bitumin surface	41.6	3102	m2	$ 129,063.17
2.6	Adjustment of existing services (assume 10% works cost)				$ 144,703.60
3	Contingency (assume 20% works cost)				$ 318,347.91
				Subtotal	$ 2,228,435.39
				GST	$ 222,843.54
				Total	$ 2,451,278.93

Cost Estimate - E01 Trunk Upgrade from Yeo St to Bogota Ave					
No.	**Item**	**Unit rate ($)**	**Amount**	**Units**	**Cost**
1	**Pre-construction Costs**				
1.1	Site establishment		1		$ -
1.2	Provision of sediment and erosion control, geotechnical supervision		1		$ -
1.3	Detailed Design and Survey (Construction and WAE)		1		$ -
		Assume 20% of works cost			$ 493,777.44
2	**Construction**				
2.1	Pull up and dispose existing road surface	3.5	2855	m2	$ 9,993.51
2.2	Excavation of fill (soft rock)	221	5751	m3	$ 1,270,908.03
2.3	Supply and install of 0.3 m diameter pipe	158.5	24	m	$ 3,783.82
	Supply and install of 0.675 m diameter pipe	429	273	m	$ 117,152.50
	Supply and install of 0.825 m diameter pipe	620	62	m	$ 38,634.93
	Supply and install of 1.5 m diameter pipe	1680	268	m	$ 450,240.00
	Supply and install of 2.1 m diameter pipe	3293	6	m	$ 20,539.76
2.4	Disposal of displaced pipe volume fill	300	628	m3	$ 188,410.36
2.5	Drainage pit, assume 1 per 50 m	2000	13	each	$ 26,000.00
2.5	Backfilling, compaction and reinstate disturbed road pavement with bitumin surface	41.6	2855	m2	$ 118,780.00
2.6	Adjustment of existing services (assume 10% works cost)				$ 224,444.29
3	Contingency (assume 20% works cost)				$ 493,777.44
				Subtotal	$ 3,456,442.09
				GST	$ 345,644.21
				Total	$ 3,802,086.30

Cost Estimate - W01 Trunk Upgrade from Bank St to Waverton Park					
No.	**Item**	**Unit rate ($)**	**Amount**	**Units**	**Cost**
1	**Pre-construction Costs**				
1.1	Site establishment		1		$ -
1.2	Provision of sediment and erosion control, geotechnical supervision		1		$ -
1.3	Detailed Design and Survey (Construction and WAE)		1		$ -
		Assume 20% of works cost			$ 291,706.40
2	**Construction**				
2.1	Pull up and dispose existing road surface	3.5	1118	m2	$ 3,912.23
2.2	Excavation of fill (soft rock)	221	3832	m3	$ 846,791.32
2.3	Supply and install of 0.825 m diameter pipe	620	283	m	$ 175,208.40
	Supply and install of 1.05 m diameter pipe	667	203	m	$ 135,453.49
2.4	Disposal of displaced pipe volume fill	300	327	m3	$ 98,073.05
2.5	Drainage pit, assume 1 per 50 m	2000	10	each	$ 20,000.00
2.5	Backfilling, compaction and reinstate disturbed road pavement with bitumin surface	41.6	1118	m2	$ 46,499.68
2.6	Adjustment of existing services (assume 10% works cost)				$ 132,593.82
3	Contingency (assume 20% works cost)				$ 291,706.40
				Subtotal	$ 2,041,944.79
				GST	$ 204,194.48
				Total	$ 2,246,139.27

Cost Estimate - W02 Carlyle Lane Drainage Upgrade					
No.	**Item**	**Unit rate ($)**	**Amount**	**Units**	**Cost**
1	**Pre-construction Costs**				
1.1	Site establishment		1		$ -
1.2	Provision of sediment and erosion control, geotechnical supervision		1		$ -
1.3	Detailed Design and Survey (Construction and WAE)		1		$ -
		Assume 20% of works cost			$ 452,090.85
2	**Construction**				
2.1	Pull up and dispose existing road surface	3.5	1715	m2	$ 6,001.42
2.2	Excavation of fill (soft rock)	221	4870	m3	$ 1,076,185.07
2.3	Supply and install of 1.8 m diameter pipe	2419	12	m	$ 27,867.08
	Supply and install of 1.8 m x 0.9 m culvert	1630	401	m	$ 653,876.71
2.4	Disposal of displaced pipe volume fill	300	679	m3	$ 203,696.92
2.5	Drainage pit, assume 1 per 50 m	2000	8	each	$ 16,000.00
2.5	Backfilling, compaction and reinstate disturbed road pavement with bitumin surface	41.6	1715	m2	$ 71,331.21
2.6	Adjustment of existing services (assume 10% works cost)				$ 205,495.84
3	Contingency (assume 20% works cost)				$ 452,090.85
				Subtotal	$ 3,164,635.96
				GST	$ 316,463.60
				Total	$ 3,481,099.56

Cost Estimate - N01 Pacific Highway to Flat Rock Creek Trunk					
No.	**Item**	**Unit rate ($)**	**Amount**	**Units**	**Cost**
1	**Pre-construction Costs**				
1.1	Site establishment		1		$ -
1.2	Provision of sediment and erosion control, geotechnical supervision		1		$ -
1.3	Detailed Design and Survey (Construction and WAE)		1		$ -
		Assume 20% of works cost			$ 1,151,421.22
2	**Construction**				
2.1	Pull up and dispose existing road surface	3.5	4011	m2	$ 14,038.09
2.2	Excavation of fill (soft rock)	221	12925	m3	$ 2,856,426.05
2.3	Supply and install of 1.35 m diameter pipe	1365	1197	m	$ 1,634,284.96
2.4	Disposal of displaced pipe volume fill	300	1714	m3	$ 514,131.02
2.5	Drainage pit, assume 1 per 50 m	2000	24	each	$ 48,000.00
2.5	Backfilling, compaction and reinstate disturbed road pavement with bitumin surface	41.6	4011	m2	$ 166,852.71
2.6	Adjustment of existing services (assume 10% works cost)				$ 523,373.28
3	Contingency (assume 20% works cost)				$ 1,151,421.22
				Subtotal	$ 8,059,948.55
				GST	$ 805,994.86
				Total	$ 8,865,943.41

Cost Estimate - N02 Bund at St Leonards Park					
No.	**Item**	**Unit rate ($)**	**Amount**	**Units**	**Cost**
1	**Pre-construction Costs**				
1.1	Site establishment		1		$ -
1.2	Provision of sediment and erosion control, geotechnical supervision		1		$ -
1.3	Detailed Design and Survey (Construction and WAE)		1		$ -
		Assume 20% of works cost			$ 54,163.18
2	**Construction**				
2.1	Excavation of fill	$22.00	1620.5	m3	$ 35,652.04
2.2	Haulage of fill (assumed <50 km)	$69.00	1620.5	m3	$ 111,817.77
2.3	Placement, compaction and shaping	$6.50	678.9	m2	$ 4,412.74
2.4	Top soil placement	$10.60	678.9	m2	$ 7,196.15
2.5	Hydro mulch, sprayed grass seed compound	$3,250.00	0.1	ha	$ 220.64
2.5	Geotextile layer for embankment	64	1358		$ 86,896.95
2.6	Adjustment of existing services (assume 10% works cost)				$ 24,619.63
3	Contingency (assume 20% works cost)				$ 54,163.18
				Subtotal	$ 379,142.28
				GST	$ 37,914.23
				Total	$ 417,056.51

Cost Estimate - N03 Anzac Park Basin					
No.	**Item**	**Unit rate ($)**	**Amount**	**Units**	**Cost**
1	**Pre-construction Costs**				
1.1	Site establishment		1		$ -
1.2	Provision of sediment and erosion control, geotechnical supervision		1		$ -
1.3	Detailed Design and Survey (Construction and WAE)		1		$ -
		Assume 20% of works cost			$ 1,297,062.80
2	**Construction**				
2.1	Disposal of excess fill	$300.00	17684.9	m3	$ 5,305,468.60
2.2	Excavation of lowered basin area (soil)	$30.00	18395.0	m3	$ 551,850.23
2.3	Placement, compaction and shaping	$6.50	471.9	m2	$ 3,067.09
2.4	Top soil placement	$10.60	471.9	m2	$ 5,001.72
2.5	Hydro mulch, sprayed grass seed compound	$3,250.00	0.0	ha	$ 153.35
2.5	Geotextile layer for embankment	64	472		$ 30,199.04
2.6	Adjustment of existing services (assume 10% works cost)				$ 589,574.00
3	Contingency (assume 20% works cost)				$ 1,297,062.80
				Subtotal	$ 9,079,439.63
				GST	$ 907,943.96
				Total	$ 9,987,383.60

Cost Estimate - N05 Trunk Upgrade from Anzac Park to Willoughby Creek					
No.	**Item**	**Unit rate ($)**	**Amount**	**Units**	**Cost**
1	**Pre-construction Costs**				
1.1	Site establishment		1		$ -
1.2	Provision of sediment and erosion control, geotechnical supervision		1		$ -
1.3	Detailed Design and Survey (Construction and WAE)		1		$ -
		Assume 20% of works cost			$ 2,028,922.76
2	**Construction**				
2.1	Pull up and dispose existing road surface	3.5	5902	m2	$ 20,658.21
2.2	Excavation of fill (soft rock)	221	31102	m3	$ 6,873,492.76
2.3	Supply and install of 2.4 x 3.05 m culvert	4654	18	m	$ 84,298.41
	Supply and install of 3.6 x 1.6 m culvert	3826	166	m	$ 635,169.93
	Supply and install of 4.2 x 1.6 m culvert	4336	161	m	$ 698,016.81
2.4	Disposal of displaced pipe volume fill	300	2171	m3	$ 651,202.54
2.5	Drainage pit, assume 1 per 50 m	2000	7	each	$ 14,000.00
2.5	Backfilling, compaction and reinstate disturbed road pavement with bitumin surface	41.6	5902	m2	$ 245,537.55
2.6	Adjustment of existing services (assume 10% works cost)				$ 922,237.62
3	Contingency (assume 20% works cost)				$ 2,028,922.76
				Subtotal	$ 14,202,459.35
				GST	$ 1,420,245.94
				Total	$ 15,622,705.29

Cost Estimate - N08 Warringa Road Drainage Upgrade					
No.	**Item**	**Unit rate ($)**	**Amount**	**Units**	**Cost**
1	Pre-construction Costs	0	0	0	0
1.1	Site establishment		1		$ -
1.2	Provision of sediment and erosion control, geotechnical supervision		1		$ -
1.3	Detailed Design and Survey (Construction and WAE)		1		$ -
0	Assume 20% works cost				$ 95,552.46
2	**Construction**				
2.1	Pull up and dispose existing road surface	3.5	481	m2	$ 1,682
2.2	Excavation of fill (soft rock)	221	1167	m3	$ 257,849
2.3	Supply and install of 0.6 m diameter pipe	323	34	m	$ 11,096
	Supply and install of 0.675 m diameter pipe	428.5	38	m	$ 16,212
	Supply and install of 0.75 m diameter pipe	534	16	m	$ 8,655
	Supply and install of 0.9 m diameter pipe	706	34	m	$ 23,727
	Supply and install of 1.05 m diameter pipe	878	25	m	$ 22,194
	Supply and install of 1.5 m diameter pipe	1680	20	m	$ 34,066
2.4	Disposal of displaced pipe volume fill	300	110	m3	$ 32,854
2.5	Drainage pit, assume 1 per 50 m	2000	3	each	$ 6,000
2.5	Backfilling, compaction and reinstate disturbed road pavement	41.6	481	m2	$ 19,994
2.6	Adjustment of existing services (assume 10% works cost)				$ 43,433
3	Contingency (assume 20% works cost)				$ 95,552
				Subtotal	$ 668,867
				GST	$ 66,887
				Total	$ 735,754

Cost Estimate - N06 Reynolds Street Drainage Upgrade					
No.	**Item**	**Unit rate ($)**	**Amount**	**Units**	**Cost**
1	**Pre-construction Costs**				
1.1	Site establishment		1		$ -
1.2	Provision of sediment and erosion control, geotechnical supervision		1		$ -
1.3	Detailed Design and Survey (Construction and WAE)		1		$ -
		Assume 20% of works cost			$ 524,758.09
2	**Construction**				
2.1	Pull up and dispose existing road surface	3.5	2044	m2	$ 7,154.00
2.2	Excavation of fill (soft rock)	221	5630	m3	$ 1,244,318.81
2.3	Supply and install of 0.45 m diameter pipe	246	51	m	$ 12,587.95
	Supply and install of 0.6 m diameter pipe	323	68	m	$ 22,078.51
	Supply and install of 1.05 m diameter pipe	878	135	m	$ 118,806.46
	Supply and install of 0.55 x 1.05 m culvert	719	38	m	$ 27,051.90
	Supply and install of 1.1 x 1.1 m culvert	1413	54	m	$ 76,302.44
	Supply and install of 2 x 1.5 m culvert	2362	127	m	$ 299,284.46
	Supply and install of 2 x 2 m culvert	2893	70	m	$ 202,939.86
2.4	Disposal of displaced pipe volume fill	300	892	m3	$ 267,709.26
2.5	Drainage pit, assume 1 per 50 m	2000	11	each	$ 22,000.00
2.5	Backfilling, compaction and reinstate disturbed road pavement with bitumin surface	41.6	2044	m2	$ 85,030.39
2.6	Adjustment of existing services (assume 10% works cost)				$ 238,526.40
3	Contingency (assume 20% works cost)				$ 524,758.09
				Subtotal	$ 3,673,306.63
				GST	$ 367,330.66
				Total	$ 4,040,637.29

Cost Estimate - N07 Cooper Lane Drainage Upgrade					
No.	**Item**	**Unit rate ($)**	**Amount**	**Units**	**Cost**
1	**Pre-construction Costs**				
1.1	Site establishment		1		$ -
1.2	Provision of sediment and erosion control, geotechnical supervision		1		$ -
1.3	Detailed Design and Survey (Construction and WAE)		1		$ -
		Assume 20% of works cost			$ 788,024.29
2	**Construction**				
2.1	Pull up and dispose existing road surface	3.5	3273	m2	$ 11,456.77
2.2	Excavation of fill (soft rock)	221	7879	m3	$ 1,741,264.45
2.3	Supply and install of 0.9 m diameter pipe	706	311	m	$ 219,566.00
	Supply and install of 1.2 m diameter pipe	1050	68	m	$ 70,934.64
	Supply and install of 1.5 m diameter pipe	1680	175	m	$ 293,341.98
	Supply and install of 2.25 m diameter pipe	3780	24	m	$ 90,711.68
	Supply and install of 1.6 x 1.1 m culvert	2893	229	m	$ 662,155.16
2.4	Disposal of displaced pipe volume fill	300	1081	m3	$ 324,326.07
2.5	Drainage pit, assume 1 per 50 m	2000	16	each	$ 32,000.00
2.5	Backfilling, compaction and reinstate disturbed road pavement with bitumin surface	41.6	3273	m2	$ 136,171.85
2.6	Adjustment of existing services (assume 10% works cost)				$ 358,192.86
3	Contingency (assume 20% works cost)				$ 788,024.29
				Subtotal	$ 5,516,170.03
				GST	$ 551,617.00
				Total	$ 6,067,787.04

Cost Estimate - N09 Cassins Avenue Drainage Upgrade					
No.	**Item**	**Unit rate ($)**	**Amount**	**Units**	**Cost**
1	**Pre-construction Costs**				
1.1	Site establishment		1		$ -
1.2	Provision of sediment and erosion control, geotechnical supervision		1		$ -
1.3	Detailed Design and Survey (Construction and WAE)		1		$ -
		Assume 20% of works cost			$ 262,392.84
2	**Construction**				
2.1	Pull up and dispose existing road surface	3.5	1980	m2	$ 6,928.87
2.2	Excavation of fill (soft rock)	221	2921	m3	$ 645,546.32
2.3	Supply and install of 0.375 m diameter pipe	202	56	m	$ 11,326.00
	Supply and install of 0.45 m diameter pipe	246	253	m	$ 62,311.25
	Supply and install of 0.525 m diameter pipe	285	238	m	$ 67,682.15
	Supply and install of 0.675 m diameter pipe	429	60	m	$ 25,645.73
	Supply and install of 0.75 m diameter pipe	534	6	m	$ 3,329.98
	Supply and install of 0.9 m diameter pipe	706	78	m	$ 54,950.95
	Supply and install of 0.5 x 0.6 m culvert	374	12	m	$ 4,483.33
	Supply and install of 0.75 x 0.5 m culvert	467	31	m	$ 14,701.18
	Supply and install of 0.9 x 0.94 m culvert	1054	15	m	$ 15,740.85
	Supply and install of 1.2 x 0.8 m culvert	1196	74	m	$ 88,471.11
2.4	Disposal of displaced pipe volume fill	300	271	m3	$ 81,222.51
2.5	Drainage pit, assume 1 per 50 m	2000	14	each	$ 28,000.00
2.5	Backfilling, compaction and reinstate disturbed road pavement with bitumin surface	41.6	1980	m2	$ 82,354.52
2.6	Adjustment of existing services (assume 10% works cost)				$ 119,269.47
3	Contingency (assume 20% works cost)				$ 262,392.84
				Subtotal	$ 1,836,749.89
				GST	$ 183,674.99
				Total	$ 2,020,424.88