



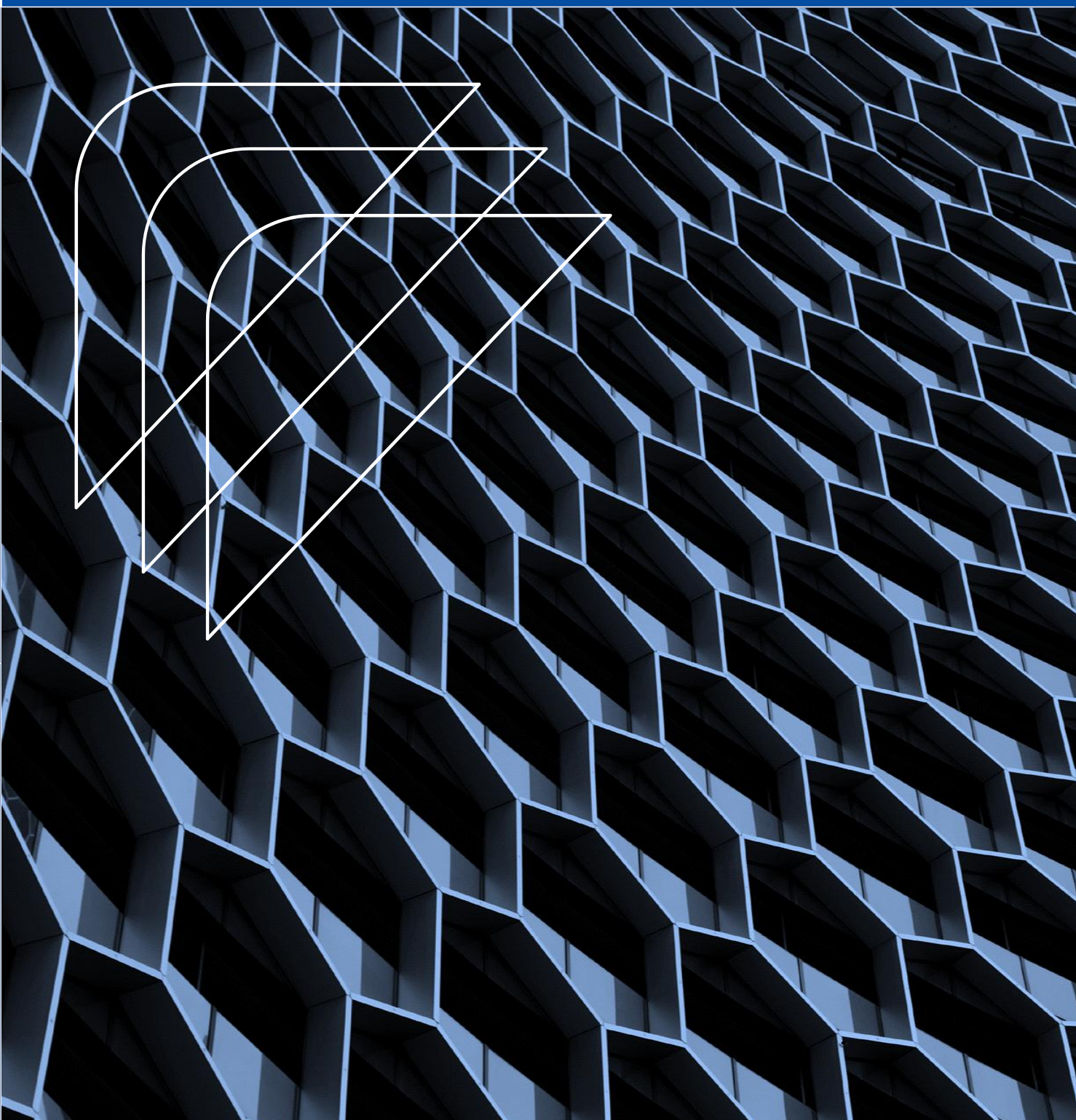
CIVIL

FLOODING

STORMWATER

STRUCTURAL

REMEDIAL



Flood Risk Management Report

142-150 Narrow Neck Road
Katoomba 2780

Prepared For



Management VDM Prime Pty Ltd




Document Control

Document Reference	20240356 -SS-DA-FL-FRMP-02-Flood Risk Management Report
Development Type	Residential
Document Type	Flood Risk Management Report
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REVISION HISTORY

Revision	Date	Description	Issued By	Approved By	Signature
01	05.11.2025	SS-DA Submission	EZ	AA	
02	14.01.2026	SS-DA Submission	EZ	AA	

DOCUMENT APPROVAL

Name	Andrew Arida
Title	Director
Client	Management VDM Prime Pty Ltd
Signature	



Limitations

The sole purpose of this report and the associated services performed by Deboke Engineering Consultants Pty Ltd is to provide a flood risk management assessment for the subject site in accordance with the scope of services set out in the contract / quotation between Deboke Engineering Consultants Pty Ltd and Management VDM Prime Pty Ltd. That scope of works and services were defined by the requests of the Client, by the time and budgetary constraints imposed by the Client, and by the availability of access to the site.

Deboke Engineering Consultants Pty Ltd derived the data in this report primarily from a number of sources which included site inspections, correspondence regarding the proposal, examination of records in the public domain, interviews with individuals with information about the site or the project, and field explorations conducted on the dates indicated. The passage of time, manifestation of latent conditions or impacts of future events may require further examination / exploration of the site and subsequent data analyses, together with a re-evaluation of the findings, observations and conclusions expressed in this report.

In preparing this report, Deboke Engineering Consultants Pty Ltd may have relied upon and presumed accurate certain information (or absence thereof) relative to the site. Except as otherwise stated in the report, Deboke Engineering Consultants Pty Ltd has not attempted to verify the accuracy of completeness of any such information (including for example survey data supplied by others).

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Glossary

ANNUAL EXCEEDANCE PROBABILITY (AEP)

The chance of a flood of a given or a larger size occurring in any one year, usually expressed as a percentage.

AUSTRALIAN HEIGHT DATUM (AHD)

A common national surface level datum approximately corresponding to mean sea level.

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.

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.

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 before entering a watercourse.

FINISHED FLOOD LEVEL (FFL)

FLOOD LIABLE LAND OR FLOOD PRONE LAND

Land susceptible to flooding by the PMF.

FLOOD PLANNING LEVELS (FPLS)

Are the combinations of flood levels and freeboards selected for floodplain risk management purposes.

FREEBOARD

Is a factor of safety typically used in relation to the setting of floor levels.

HABITABLE ROOM

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

Low FLOOD ISLAND

A Low Flood Island is defined as a locality which becomes isolated in a flood event, and which can be completely inundated by larger flood up to the Probable Maximum Flood (PMF) level.

LOW HAZARD ADULT

Flood conditions safe for average adults to wade through; shallow depth, low velocity, minimal risk.

LOW HAZARD CHILDREN

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Flood conditions safe for children; very shallow, very low velocity, minimal risk of instability or harm.

PEAK DISCHARGE

The maximum discharge occurring during a flood event.

PROBABLE MAXIMUM FLOOD

PMF is the largest flood that could conceivably occur at a location, usually estimated from probable maximum precipitation.

PROBABLE MAXIMUM PRECIPITATION (PMP)

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.

RUNOFF

The amount of rainfall which ends up as stream flow.

SoFACs

Statement of Facts and Contention

WATER SURFACE ELEVATION (WSE)

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1 Introduction

1.1 Overview

The purpose of a Flood Risk Management Plan (FRMP) is to impart a satisfactory understanding of the flood risks present and potential flood behaviours at a site. This includes identifying flood preparedness measures, procedures and evacuation routes during a flood event, and appropriate response following a flood event.

Deboke Engineering Consultants have been engaged by Management VDM Prime Pty Ltd produce a FRMP at 142-150 Narrow Neck Road Katoomba 2780 (the site).

1.2 Compliance and Preceding Documentation

This FRMP has been prepared made recommendations based upon the following documentation:

- Commonwealth of Australia (Geoscience Australia) (2019), Australian Rainfall and Runoff – A Guide to Flood Estimation;
- NSW Department of Infrastructure, Planning and Natural Resources (2005), Floodplain Development Manual;
- Engineers Australia, Australian Rainfall & Runoff;
- Aerial Scanning Data (ALS) for the study area received from ELVIS – Elevation – Foundation Spatial Data;
- BLUE MOUNTAINS CITY Development Control Plan 2015;
- Detailed Site Survey prepared by Norton Survey Partners, REF: 13498 –Date: 05th Aug 2021;
- Architectural Plans prepared by ANTONIADES ARCHITECTS, REF: 24012 - Revision B - Dated 18.12.2025.

2 Site Description & Background Information

2.1 Site Description and Location

Refer to Table 1 for the existing site description summary.

Table 1 Site Description Summary

Summary	Site Description
Address	142-150 Narrow Neck Road Katoomba 2780
Lot/DP	Lot 1 DP 1026915
Site Area	1.684 ha
LGA	BLUE MOUNTAINS CITY
Land Zoning	R3 Medium Density Residential
Existing Land Use	Vacant
Site Grading	The Site Grades towards Southern east boundary
Site Drainage	Site drains toward the golf course at the rear

The site is located at the intersection of Narrow Neck Road, Glencoe Road within the Blue Mountains LGA. It is currently undeveloped, covered with grass and scattered trees. Ground levels generally fall toward the south and southeast, with stormwater draining via overland flow to the basins within the golf course at the rear. Surrounding areas comprise residential dwellings to the north and west, and open recreational land to the east.

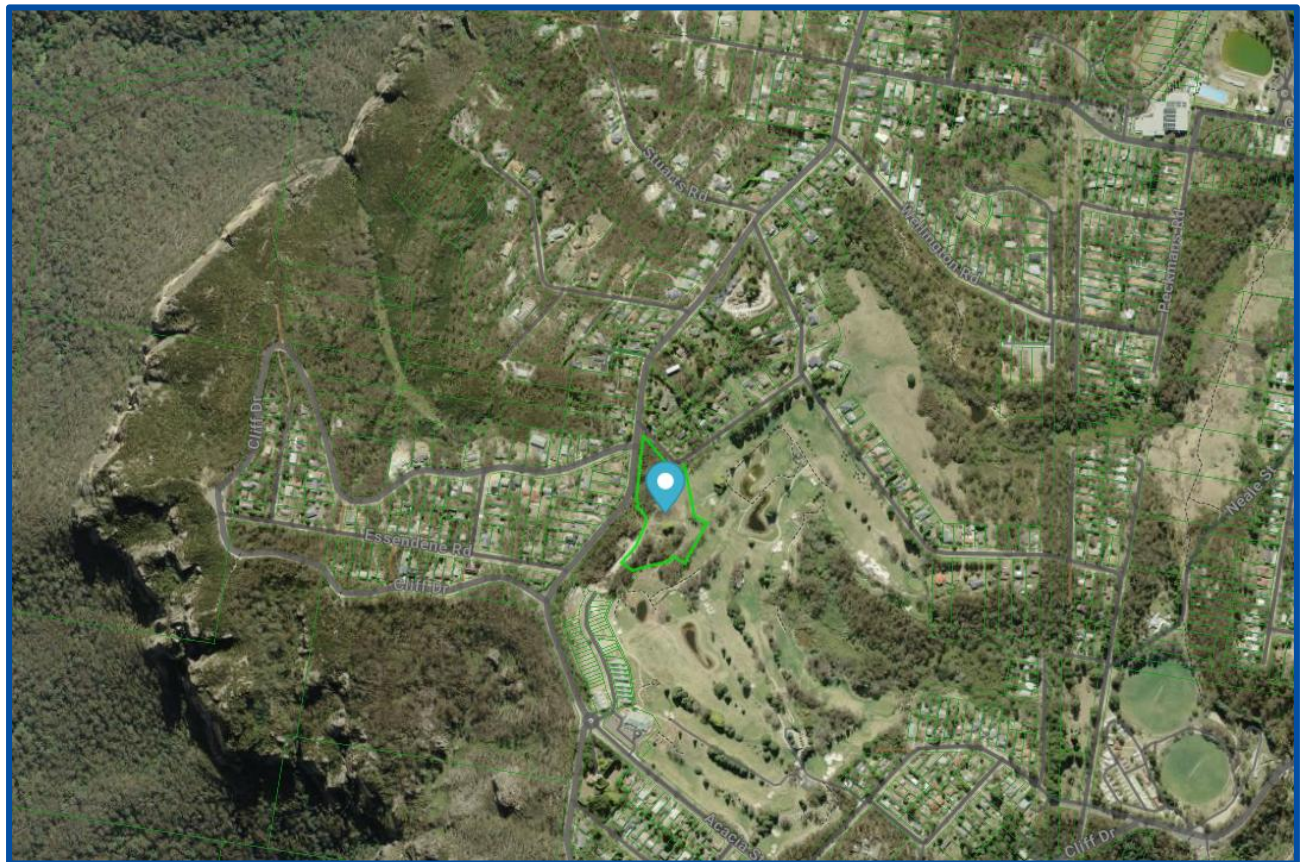


Figure 1 Site Locality



2.2 Proposed Development

The architectural drawings prepared by Antoniades Architects detail the proposed residential development, comprising multiple buildings (A to H) and a restaurant. The buildings are generally five-storey structures with basement or semi-basement car parks, with internal driveways connecting the various building blocks and providing access to the lower car park levels.



Figure 2 Proposed Architectural Plans

3 Authority Requirements

3.1 BLUE MOUNTAINS CITY Council

Although no detailed flood information or hydraulic modelling data are available for the subject site, the topography and elevated position strongly indicate that the site is not susceptible to overland flooding due to the site location on a high point. The surrounding terrain slopes away from the property in multiple directions, allowing surface runoff to flow naturally toward lower-lying areas. This means that during major rainfall events, stormwater is expected to disperse downslope rather than accumulate within the site. The absence of any defined overland flow paths or local depressions further supports this conclusion.

The difference in elevation between the existing basins within the downstream gold course and the lowest boundary of the subject site is at least 6 meters. The golf course drainage network directs water away from the site and toward the downstream sections of the course. Any potential surcharge or overflow from these basins would follow the existing surface gradients and continue within the golf course drainage system, making it highly unlikely for floodwaters to back up or enter the property.

Therefore, the site is not considered to be flood affected, and the overall risk of flooding or ponding on the site is negligible due to its topographic elevation and the surrounding drainage conditions. Accordingly,



the flood-related development controls outlined in the Council's Development Control Plan (DCP) may not be applicable to this site.

4 Flood Risk Management Plan

4.1 Existing, future and continuing risks

The site is located outside the flood-affected areas as presented in this report. It is situated near the local high point of the area, with a steep natural slope that provides excellent drainage capacity. As a result, stormwater runoff flows naturally downslope and away from the property, resulting in no potential for ponding or overland flooding. Accordingly, the site is not subject to mainstream or overland flood risk, and the proposed development will incorporate an independent stormwater drainage system within the site to manage runoff effectively.

Although the site is not affected by mainstream or overland flooding, consideration has been given to extreme flood events such as the Probable Maximum Flood (PMF). Due to the site's elevated position and safe topographic setting, evacuation during such events would not be necessary. Instead, a shelter-in-place approach is considered more appropriate, allowing occupants to safely remain within the dwelling during major storm events without exposure to flood risk.

Flood emergencies may be triggered by one or more of the following warnings:

- Flood Watch or Flood Warning issued by the Bureau of Meteorology (BoM);
- Severe Weather or Thunderstorm Warnings from BoM;
- NSW SES Flood Bulletins or Evacuation Advisories;
- Rising water levels observed on or near the site;
- Localised heavy rainfall events.

Upon receiving any of the above warnings, the Occupants should:

- Monitor conditions at the site frontage and nearby streets;
- Inform all home inhabitants of the evolving situation;
- Tune in to official media sources and SES updates for instructions;
- Begin implementing the Flood Emergency Response Plan (FERP) if required.

Ongoing flood risk management should be supported by:

- A site-specific flood risk management policy adopted by building operators and Occupants;
- Resident education and preparedness to increase flood awareness and ensure procedures are known and followed;
- Regular review and revision of the FRMP to reflect updated flood information and emergency protocols.

In summary, the site is located within a high and flood-free area, remaining safe even during extreme flood events such as the PMF. The proposed development provides a structurally resilient and well-planned dwelling that aligns with Council's land use objectives and satisfies the relevant performance requirements. As the site is not flood-affected, no evacuation is required, and a shelter-in-place approach remains the most suitable flood response strategy.

5 Flood Preparation and Response

5.1 Flood Preparation

In addition to the planning requirements detailed in the FRMP, the following pre-emptive measures are recommended by the SES for flood-prone sites:

SES Flood Preparation Advice

- Be aware and discuss with all Occupants the flood source, hazards, and warning signs of the property (see Sections 2 & 3)
- Plan accommodation / refuge if required to evacuate
- Maintain and practice a Flood Emergency Plan (see Section 4.5 & Section 5)
- Create and maintain an Emergency Kit (see Sections 4.4)
- Plan for the loss of services & amenities
- Check your insurance for adequate coverage

It is recommended that the owner of the property become familiarised with the flood information and preparation literature provided below:

Table 2 Additional Information

Additional Information	
Flood Information From Council	https://bluemountains.disasterdashboards.com/dashboard/flood
NSW SES brochure – Community flood safety	Appendix E
Emu Plains Overland Flow Flood Study	https://yoursaypenrith.com.au/emu-plains-floodplain-risk-management-study-and-plan
NSW SES – Storm readiness	www.ses.nsw.gov.au/get-involved/get-ready-nsw/

5.2 Emergency Contacts and Information

The following list of emergency contacts is to be included within an Emergency Kit:

Table 3 Emergency Contacts

Emergency Contacts	Phone Number
Life threatening emergency	000
NSW SES – Emergency assistance in flood & storms	132 500
NSW SES – Information line	1800 201 000

Occupant specific emergency contact details should be included in the above list. Consider inclusion of utility suppliers (electricity, water, gas, building manager/owner) in the event of issue / required shut-off of local utilities. This Emergency Contact List should be made known and available to all Occupants for use in the event of an emergency.

For information related to storm & flood events, suggested sources are listed below:



Table 4 Flood and Storm Information

Flood and Storm Information	Contact
NSW SES – News & information	www.floodsafe.com.au
BOM – NSW Warnings	www.bom.gov.au/nsw/warnings/
BOM – Rainfall & river conditions	www.bom.gov.au/nsw/flood/
SES – Local risks	www.ses.nsw.gov.au/your-local-risk/
Radio – Emergency alerts & coverage*: Sydney 2BL	702 AM
Disaster Welfare Service	1800 018 444
NSW SES Flood App	'Floods Near Me'
NSW SES – News & information	www.floodsafe.com.au
Site River Gauge [1]	www.bom.gov.au/nsw/warnings/

*Per ABC Frequency Information advice for the postcode

[1] Defer to proprietary flood gauge and warning system manual/specifications from installer

5.3 Emergency Kit

SES guidelines recommend the preparation of an Emergency Kit in the event of prolonged power/service loss. The Emergency Kit is to be kept in a waterproof container, in a location known and accessible to all Occupants. General contents of an Emergency Kit should include:

Table 5 Emergency Kit

Flood Emergency Kit	In Case of Evacuation
Portable radio & spare batteries Torch(es) & spare batteries First Aid kit & medical supplies specific to Occupants Candles & waterproof matches A local map & copy of Home Emergency Plan(s) Emergency contact details & personal documents Waterproof bag for valuables	In the event of evacuation of the property, the additional items should be readily available and added to the Emergency Kit: <ul style="list-style-type: none"> - A Good supply of personal medication (where required) - Appropriate clothing & footwear - Basic food items & bottled water - Communication devices Specific items required by infants, the elderly, or infirm Occupants

5.4 Flood Emergency Response Plan

SES guidelines recommend the preparation of an Emergency Kit in the event of prolonged power/service loss. The Emergency Kit is to be kept in a waterproof container, in a location known and accessible to all Occupants. General contents of an Emergency Kit should include:

NOTE: The plan detailed herein is general to the site and land-use case. Occupant specific information which may become relevant for evacuation/emergency events should be amended to this plan by the Chief Flood Warden as required.



IMPORTANT: Whilst this FRMP provides for an evacuation strategy which anticipates likely facility and flood conditions, actual conditions may vary and as such any directions given by EMS/SES personnel are to take precedence over the response procedure herein.

IMPORTANT: Whilst this FRMP provides for an evacuation strategy which anticipates likely facility and flood conditions, actual conditions may vary and as such any directions given by EMS/SES personnel are to take precedence over the response procedure herein.

The proposed development is designed above the flood planning level as the whole site is on a high point, ensuring adequate protection during events up to the PMF level.

Shelter in place procedure should commence as soon as major flood warnings are issued. Occupants must stay within the development during such. SES or other emergency service directions will take precedence over this procedure.

5.4.1 Valuables, equipment, & potential contaminants

All materials of that may pose potential environmental contamination (i.e. petroleum, chemicals) or be sensitive to water damage (i.e. electrical equipment/services) is located above the 1% AEP flood levels. Materials which pose a risk of buoyancy (or becoming flood born debris), such as material stockpiles and rainwater tanks, are located above the 1% AEP and suitably secured.

It is advised that where potential flooding is forecast, all movable valuable items shall be stored at the floor level of the buildings or raised were safe to do so onto furniture. Importantly, movement of items shall occur only in preparation of a flood event and shall not impede or precede preservation of life.

In addition to this Flood Risk Management Report, site management are encouraged to generate a plan via the SES web-service:

www.ses.nsw.gov.au/get-involved/get-ready-nsw/

Additional site-specific information to include in the self-generated Flood Emergency plan as a result of this report is provided on the following pages:

6 Discussion

This section of the report provides a review of the results and discusses Council's requirements as stated in the DCP

- a) The proposed development is not flood affected and does not have any adverse impacts on the flooding elsewhere in the floodplain.
- b) The proposed development does not increase the risk of life.
- c) The proposed development is located above the Flood Planning Level, providing a safe refuge for occupants during storm events up to and including the 1% AEP and PMF events. As the site is not flood-affected, evacuation is generally not required; however, in the unlikely event that authorities issue an extreme weather warning, occupants should follow official directions and remain alert to emergency updates.
- d) The requirements of the DCP are implemented.

7 Conclusion

This report has assessed the flood risk associated with the site at 142–150 Narrow Neck Road, Katoomba NSW 2780, in relation to the proposed residential development. Based on a review of the available topographic data, the site is located near a high point and is outside all identified flood-affected areas and not included in any Council flood study or flood planning overlay.

Due to its elevated position and steep natural topography, stormwater runoff drains rapidly away from the site toward lower surrounding areas, resulting in no risk of overland or mainstream flooding. In addition, the new development is expected to have a stormwater system designed by a suitably qualified civil engineer to cater the flows up to and including the 1% AEP. In the event of extreme rainfall or flood conditions up to the Probable Maximum Flood (PMF), evacuation is not considered necessary. Occupants can safely shelter in place, following official directions as required. Consequently, there is no requirement for specific flood mitigation or evacuation measures beyond standard stormwater drainage provisions.

The proposed development, comprising multi-storey residential buildings with basement parking, must be designed to ensure structural stability and adequate drainage consistent with Council's development controls. The design avoids any adverse impact on adjoining properties and maintains natural overland flow paths.

In conclusion, the site is considered free from flood risk, and the proposed development is feasible, compliant, and suitable for the local context. The design aligns with Council's flood management objectives by ensuring safety, resilience, and environmental compatibility despite the site's steep terrain.

8 Resources

8.1 References

Flood Hazard: Guideline 7.3, Australian Institute for Disaster Resilience 2017

Geoscience Australia, (2016) Australian Rainfall and Runoff: A guide to Flood Estimation

HNFMSC (2006) Reducing vulnerability of buildings to flood damage: guidance on building in flood prone areas

New South Wales Government, (2005) Floodplain Development Manual: the management of flood liable land

BLUE MOUNTAINS CITY Development Control Plan 2015



Appendices

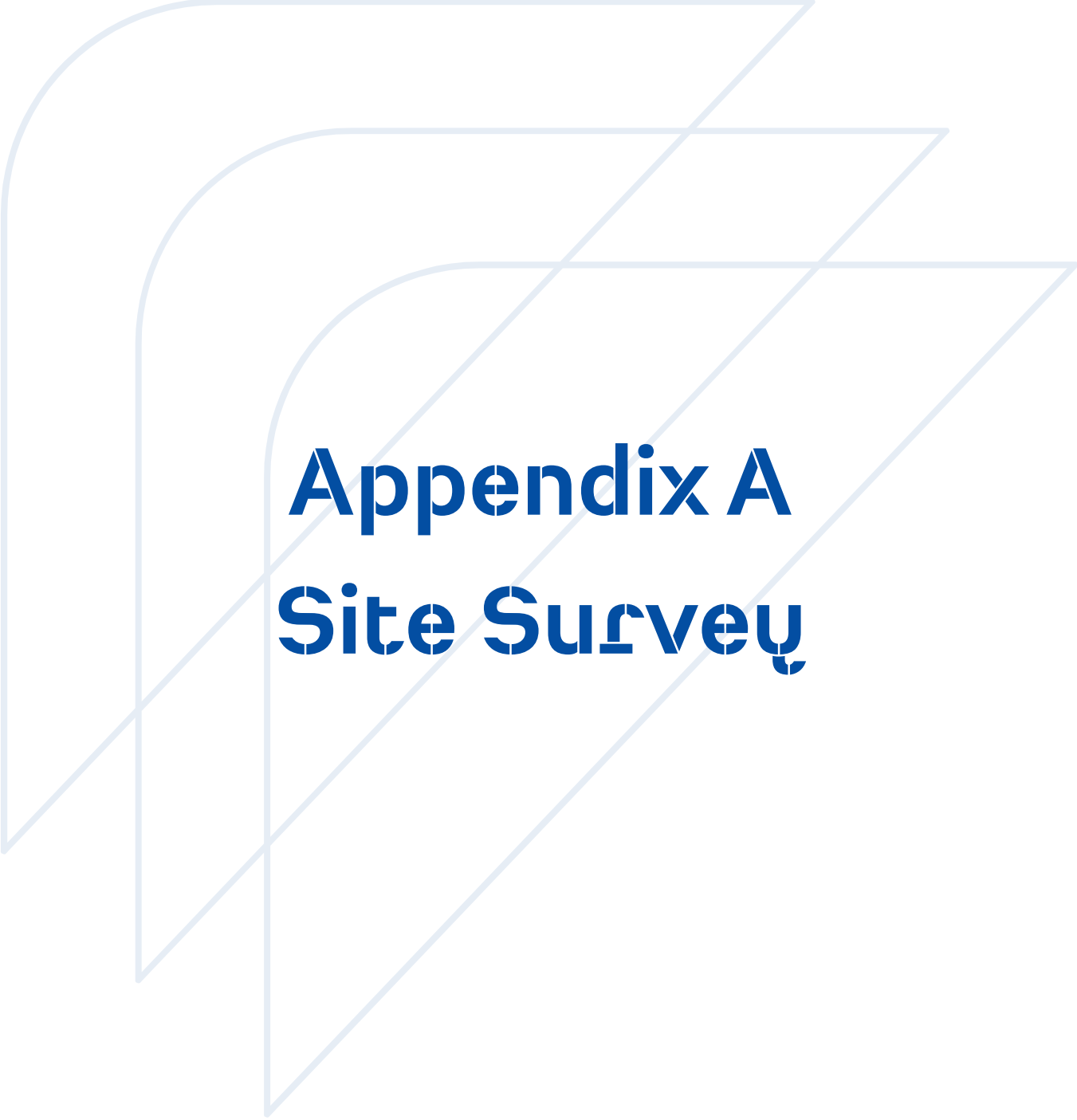
Appendix A – Site Survey

Appendix B – Architectural Plans

Appendix C - Flood Risk Precinct Controls

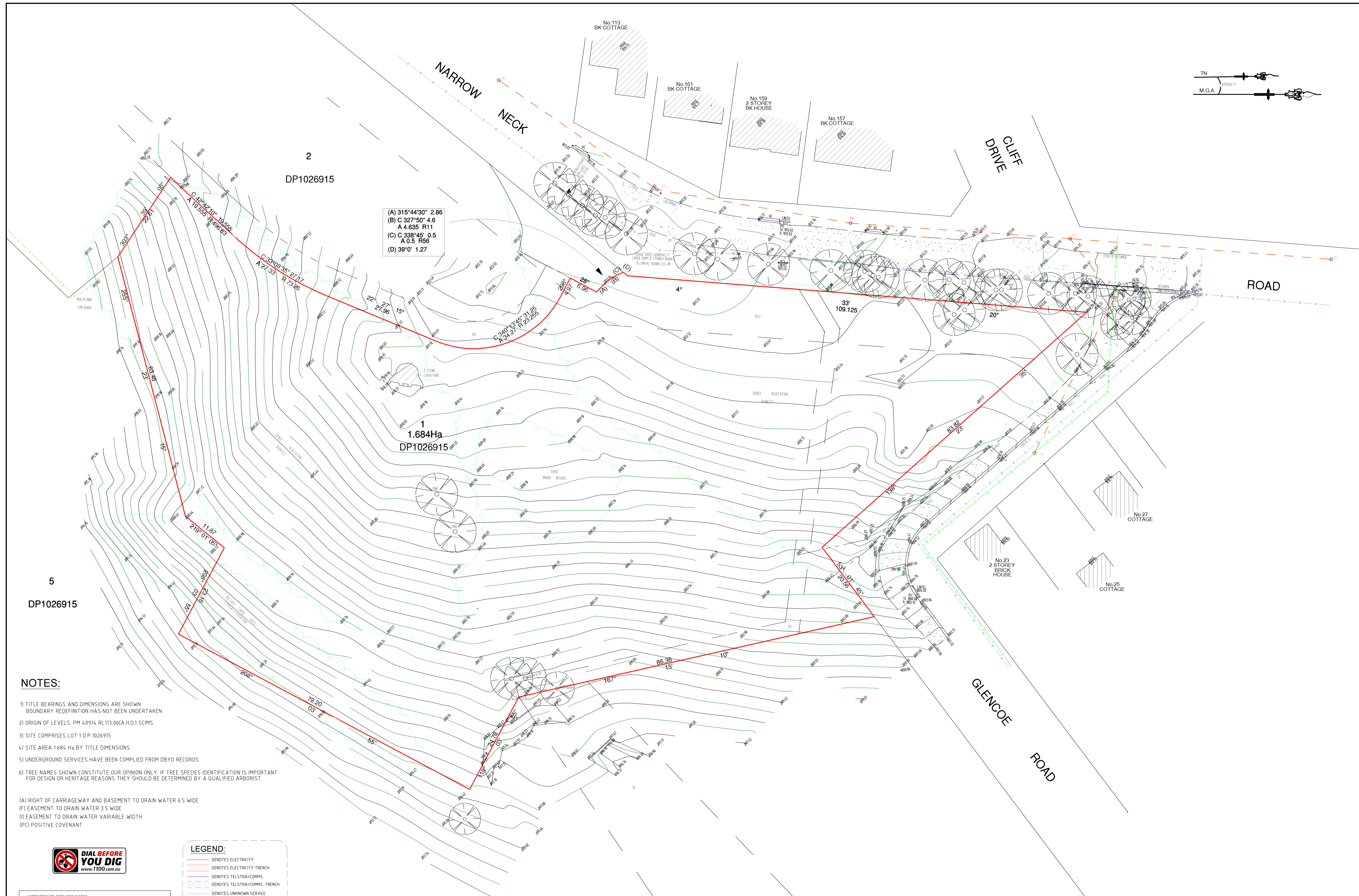
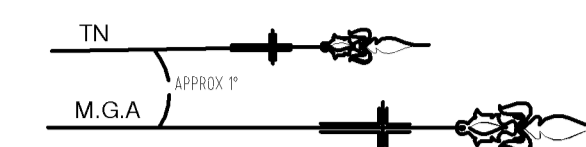
Appendix D - EMA Flood Warning, Preparedness, Safety

Appendix E - SES, NSW community Flood Safe Brochure



Appendix A

Site Survey



(A) 315°44'30" 2.86
 (B) C 327°50" 4.6
 A 4.635 R11
 (C) C 338°45" 0.5
 A 0.5 R56
 (D) 39°0' 1.27

NOTES:

- 1) TITLE BEARINGS AND DIMENSIONS ARE SHOWN BOUNDARY REDEFINITION HAS NOT BEEN UNDERTAKEN.
 - 2) ORIGIN OF LEVELS: PM 40914 RL113.06(A.H.D.) SCIMS
 - 3) SITE COMPRISES LOT 1 DP 1026915
 - 4) SITE AREA 1.684 Ha BY TITLE DIMENSIONS.
 - 5) UNDERGROUND SERVICES HAVE BEEN COMPILED FROM DBYD RECORDS
 - 6) TREE NAMES SHOWN CONSTITUTE OUR OPINION ONLY. IF TREE SPECIES IDENTIFICATION IS IMPORTANT FOR DESIGN OR HERITAGE REASONS THEY SHOULD BE DETERMINED BY A QUALIFIED ARBORIST.
- (A) RIGHT OF CARRIAGEWAY AND BASEMENT TO DRAIN WATER 6.5 WIDE
 (F) EASEMENT TO DRAIN WATER 3.5 WIDE
 (I) EASEMENT TO DRAIN WATER VARIABLE WIDTH
 (PC) POSITIVE COVENANT



LEGEND:

	DENOTES ELECTRICITY
	DENOTES ELECTRICITY TRENCH
	DENOTES TELSTRA/COMMS
	DENOTES TELSTRA/COMMS TRENCH
	DENOTES UNKNOWN SERVICE
	DENOTES SEWER
	DENOTES WATER
	DENOTES GAS
	DENOTES STORMWATER

UNDERGROUND SERVICES NOTES:
 VISIBLE SERVICE PIT LOCATIONS HAVE BEEN DETERMINED BY SURVEY. LOCATION OF UNDERGROUND SERVICES HAVE BEEN DETERMINED BY DIGITIZING DBYD RECORDS & IS APPROXIMATE ONLY.

ISSUE	DATE	AMENDMENT


SUPERVISING SURVEYOR:

 JOHN C HUGHES
 REGISTERED SURVEYOR
 BOSSI ID No.1327

TITLE: PLAN SHOWING SELECTED DETAIL & LEVELS OVER No.142-150 NARROW NECK ROAD, KATOOMBA
LGA: BLUE MOUNTAINS **REFERENCE:** 13498
CLIENT: ICON PROJECT MANAGEMENT **DATE:** 05/08/21 **SHEET:** 1
SCALE (AT A1): 1:400 **DATUM:** AHD **SURVEYOR:** JH

Norton Survey Partners
 SURVEYORS & LAND TITLE CONSULTANTS
 A.C.N. 199 734 968 **PH** +61 2 9555 2744
 SUITE 1 **FAX** +61 2 9555 2766
 505 BALMAIN ROAD **office@nspartners.com.au**
 LILYFIELD N.S.W. 2040





Appendix B

Architectural Plans



Appendix C
Flood Risk Precinct
Controls

C6.4. Flooding

Explanation

Flooding in NSW is managed in accordance with the NSW Government's Flood Prone Lands Policy, which 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, utilising ecologically positive methods wherever possible.

Blue Mountains City Council is in the process of undertaking Floodplain Risk Management Studies and Plans for its catchments to quantify flooding risks and potential measures in accordance with the NSW Government's Floodplain Development Manual. This part of the DCP is to be read in conjunction with the City of Blue Mountains Flood Liable Land Policy.

This part of the DCP applies to:

- all development on land below the 1% Annual Exceedance Probability (AEP) flood plus the required freeboard, and
- development of critical facilities on land below the Probable Maximum Flood (PMF) plus the required freeboard, and
- development on all land affected by or adjacent to a stormwater drainage system, and
- development on land in a catchment that has not been the subject of a Floodplain Risk Management Study, but due to its location and topography, it is considered reasonable to expect that the land may be subject to an overland flow path and/or flood impacts.

Applicants are encouraged to liaise with Council early in the design process to identify any applicable flooding implications.

Objectives

- O1. To control development at risk of flooding in accordance with the NSW Government's Floodplain Development Manual.
- O2. To ensure that the economic and social costs which may arise from damage to property due to flooding is minimised and can be reasonably managed by the property owner and general community.
- O3. To reduce the risk to human life and damage to property caused by flooding by controlling development on land impacted by potential floods.
- O4. To ensure that development is appropriately sited and designed according to the site's sensitivity to flood risk.



C6.4.1. Flood Studies and Plans

Objectives

- O1. To ensure that development addresses any relevant flood studies, and is consistent with the requirements of any floodplain risk management studies or plans.

Controls

- C1. Development applications are to identify any flood related information including flood levels, locations of floodways or overland flow paths impacting the site. Where the site is affected, the application is to be supported by a site specific flood study or other calculations to demonstrate there is no adverse impact on the development from flooding or overland flow paths in a 1% AEP event.
- C2. The development proposal is to comply with any catchment-specific controls in an adopted Floodplain Risk Management Plan in addition to the controls in this section.

Note: As the Council prepared flood studies are broad scale assessments generally utilising aerial photography contours, a site specific flood study may be required even if the site is located in a catchment where a Council flood study has already been prepared.

C6.4.2. Flood effects

Objectives

- O1. To ensure that development, either individually or cumulatively, minimises adverse impacts on flooding, conveyance of floodwaters and floodplain storage volume.
- O2. To ensure that floodways and overland flow paths are not obstructed by development.

Controls

- C1. The development shall not increase flood effects elsewhere, having regard to loss of flood storage, changes in flood levels and velocities and the cumulative impact of multiple potential developments, for floods up to and including the 1% AEP flood.
- C2. Floodways and overland flow paths must not be obstructed or diverted onto adjoining properties.



- C3. Areas identified as flood storage areas must not be filled unless compensatory excavation is provided to ensure that there will be no net loss of floodplain storage volume below the 1% AEP flood.

C6.4.3. Floor levels

Objective

- O1. To ensure that floor levels are set at an appropriate height to reduce the frequency of inundation of structures and floors to an acceptable probability.

Note: Floor levels refer to the minimum required building floor levels. For development such as basements, the floor level refers to the lowest level at each access point.

Controls

- C1. Building floor levels shall comply with the *Part C6 - Table 2*.
- C2. For the purposes of this part of the DCP, non-habitable floors include areas such as laundries or sheds, but exclude garages. All other floor spaces are habitable areas.

Part C6 - Table 2: Floor levels for buildings

Scenario	Floor Level
Habitable Floors - all development (excluding critical facilities)	
Inundated by flooding	1% AEP + 0.5m freeboard
Inundated by overland flow path	1% AEP + 0.5m freeboard
Habitable floors - Critical facilities	
Inundated by flooding	PMF + 0.5m freeboard
Inundated by overland flow path	1% AEP + 0.5m freeboard
Non-habitable floors – residential outbuildings (excluding garages)	
Gross floor area less than or equal to 10 square metres.	1% AEP but not less than 0.15m above surrounding ground level
Gross floor area greater than 10 square meters.	The applicable habitable floor level
Non-habitable floors – Industrial and commercial	
Located on flooding or overland flow path	1% AEP but not less than 0.15m above surrounding ground level

Material storage locations – all development

Materials sensitive to flood damage, or which may cause pollution or be potentially hazardous during flooding	1% AEP + 0.5m freeboard
---	-------------------------

Note: Floor levels for car parking areas are covered in *Part C6 - Table 3*.

C6.4.4. Building components

Objective

- O1. To ensure the structure and construction of development is compatible with flooding up to the applicable floor level.

Controls

- C1. All development shall have flood compatible building components below the floor levels identified in *Part C6 - Table 2*.
- C2. All structures within the flood plain shall be constructed to withstand the forces of floodwater, debris and buoyancy up to and including the floor levels identified in *Part C6 - Table 2*.
- C3. All development that is in 'cut' is to address the impacts of overland flow path from upstream catchments, and ensure that there is adequate provision for flows paths around the structure, stepping up at least 225mm from the finished ground level to the floor level of the structure.

C6.4.5. Driveway access and car parking

Objectives

- O1. To ensure car parking and site access is constructed to an acceptable flood standard.
- O2. To require appropriate protection measures for warning and safe evacuation from basement car parking.
- O3. To minimise the likelihood of cars or other objects becoming floating debris during a flood.

Controls

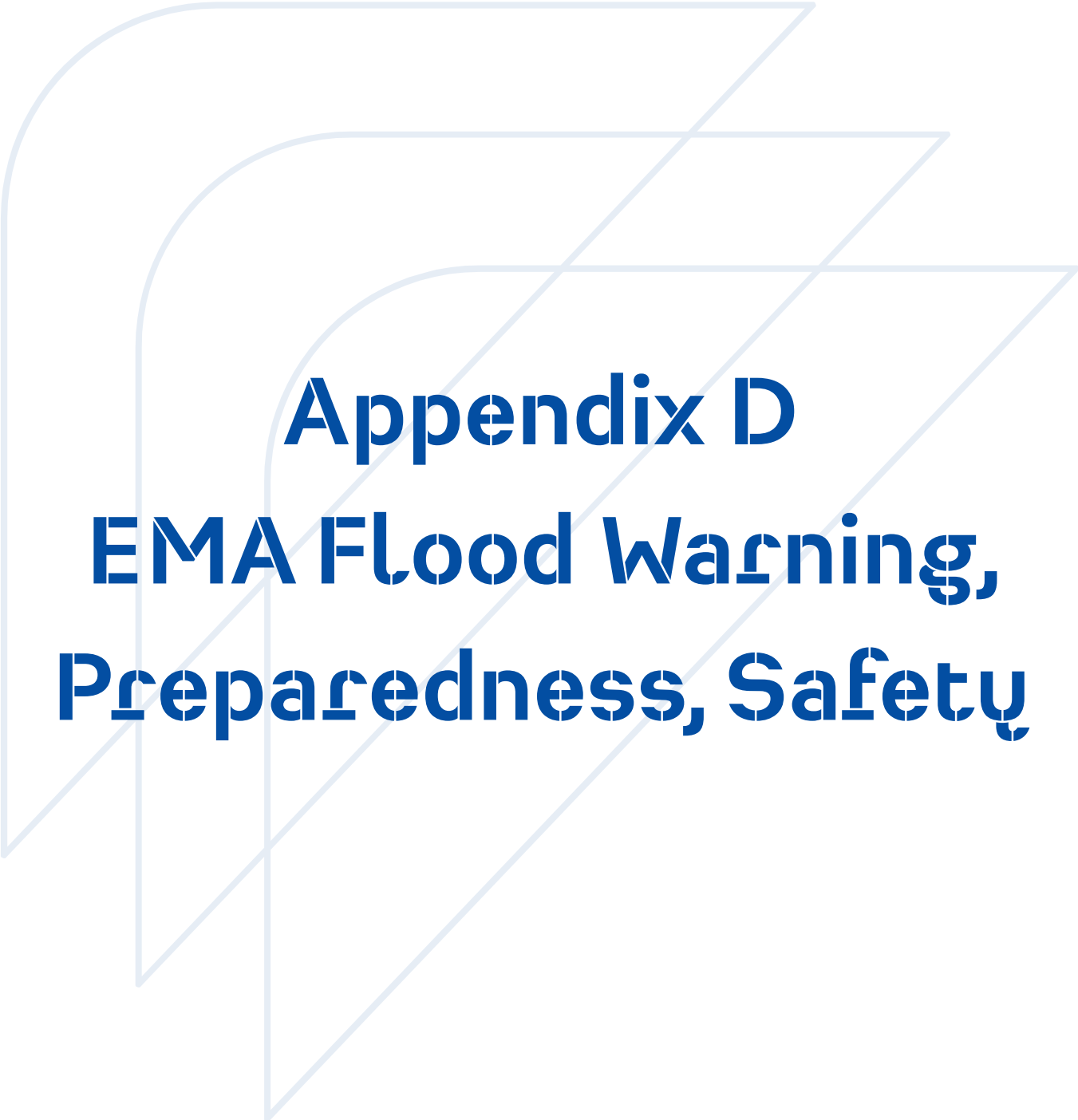
- C1. Car parking floor levels shall comply with *Part C6 - Table 3*.



- C2. Vehicular access is to be located where the road level is greater than or equal to the required floor level for the car park. Where road access above the required floor level is not available, the vehicular access is to be located at the highest feasible location.
- C3. The level of the driveway between the road and car park shall be no lower than 0.3m below the 1% AEP flood, or such that the depth of inundation during the 1% AEP flood is not greater than the depth of flooding at either the car park or the road where the site is accessed.
- C4. Underground car parking accommodating more than three vehicles shall have warning signage to ensure safe evacuation.
- C5. Barriers are to be provided to prevent floating vehicles leaving the site during a 1% AEP flood if the depth of flooding exceeds 0.3m.
- C6. Vehicle access to critical facilities that have an emergency function must be achieved for floods up to the PMF.

Part C6 - Table 3: Floor Levels for Car Parking

Scenario	Floor Level
Above ground level open car parking, car ports and garages	
Open car parking spaces and car ports	5% AEP flood
Residential garages with up to two spaces	1% AEP but not less than 0.15m above surrounding ground level
Residential garages with more than two spaces	Applicable residential habitable floor level requirement (Table 2)
Enclosed industrial/ Commercial parking spaces	Applicable industrial/commercial floor level requirement (Table 2)
Underground car park (where floor level is more than 0.8m below surrounding ground level)	
All driveways	1% AEP plus 0.3m freeboard at its highest point
All emergency exits	All underground garages and car parks to have emergency exits protected from inundation up to the 1% AEP flood plus 0.5m freeboard with a minimum of 0.2m freeboard from vehicle entry point.
All other openings inundated by flooding or local overland flow path	All openings to be sealed up to 1% AEP + 0.5m freeboard with a minimum of 0.3m above the surrounding ground level



Appendix D
EMA Flood Warning,
Preparedness, Safety

TYPES OF FLOODING IN AUSTRALIA

In Australia, the most common form of flooding is along rivers after heavy rainfall. Overflow of drainage systems in urban areas can also be a major problem, particularly in heavily populated areas. Low lying coastal areas can be inundated by storm surges usually caused by tropical cyclones. Our rivers can be broadly grouped as those around the coast draining more or less directly to the sea, and those draining large areas of the inland. Flooding patterns in each group can be quite different

Inland Rivers – Slow Onset Flooding

Flooding of rivers in the vast flat areas of central and western New South Wales and Queensland, as well as parts of North West Victoria and Western Australia, may last for one or more weeks, or even months on some occasions. Floods in these areas can lead to major losses of livestock and damage to crops, as well as extensive damage to rural towns and road and rail links. This may result in the isolation of whole communities

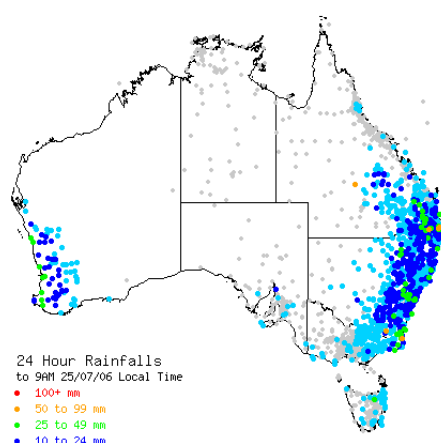
Mountain/Coastal Rivers – Quick Onset Flooding

Flooding can occur more quickly in the mountain headwater areas of large rivers, as well as in the rivers draining to the coast. In these areas, the rivers are steeper and flow more quickly, with flooding sometimes only lasting for one or two days. These floods can potentially pose a greater risk to loss of life and property because there is generally much less time to take preventative action, and flow of water is faster and more dangerous. This type of flooding can affect most of our major towns and cities, especially along the East and South of Australia and Tasmania.

Flash Flooding

Flash flooding results from relatively short, intense bursts of rainfall, often from severe thunderstorms. It can occur in almost all parts of Australia and poses the greatest threat of loss of life. People are often swept away after entering floodwaters on foot or in vehicles. These floods can also result in significant property damage and major social disruption. They are a serious problem in urban areas where drainage systems are often unable to cope. They also can occur in rural areas where the nature of terrain and steepness of the streams could lead to very rapid development of flooding.

MONITOR YOUR FLOOD



The Bureau web site provides rainfall and river level data from observation stations in many of the flood prone areas of Australia. Your Council and other agencies such as the Emergency Services also provide data on their web site. If you have access to internet, monitoring the observations that are available should be helpful in assessing your personal risk and in preparing for the flood.

FLOODS – THE HYDROLOGIC CYCLE

Floods are part of the natural water cycle or a “Hydrologic Cycle”. In this natural cycle, the energy of the sun causes water to evaporate and form clouds, which move inland and become rain. This rain will then runoff either directly through the river systems or be absorbed into the soil to later form groundwater flow.

Floods happen when the capacity of the rivers is not enough to carry the water that has entered the river network, and the banks overflow. The area that gets inundated quite regularly is called a floodplain.

Floods are caused by prolonged or heavy rainfall. Cyclones bring huge amounts of moisture inland from the ocean and are a major cause of floods, particularly in coastal areas. Thunderstorms are relatively small in area but can produce very intense rainfall that can cause floods in smaller streams. Larger storm systems that form around moist air masses moving across the country cause floods over large inland areas. Other, less common but significant causes are storm surge and tsunami which involve rapid rise of the seas.

Several factors determine the size of flooding including; rainfall intensity (the rate of rainfall) and duration (how long the rain lasts); how dry or wet the land is; topography; ground cover and many more. Therefore flooding is considered a complex natural phenomenon.



HUMANS AND FLOODS

FLOOD RISK MANAGEMENT

People who live near rivers or in low-lying coastal areas live with the greatest threat of floods. Townships living in threat of flooding have taken steps to mitigate the impact of the regular floods they endure by constructing levees, dams etc. These mitigation measures are often successful in giving protection against the smaller floods, but they are not designed to withstand every flood that may occur. Flood hazard is sometimes called a “silent killer” because it can build up quietly and may not always seem dangerous. It is also one hazard against which we can prepare and respond properly. Flood warnings are issued by the authorities whenever there is a threat of flood, and except for flash floods, there is usually a reasonable warning period given to take protective action.

FREQUENCY OF FLOODING

Floods are a natural phenomenon that occur frequently. The frequency of flooding in an area is commonly described by the average interval (in years) between occurrences of such flooding. For example, a flood that occurs around 5 times in 25 years is said to have an average recurrence interval of 5 years (5 year flood). Need to remember that it will not necessarily occur regularly every 5 years. There is a one in five chance that such a flood will occur during any one year. Although a much bigger flood such as a 100 year flood is expected to happen rarely, there is still a one in a hundred chance that a flood of that size will happen in any one year.

HUMAN INTERVENTION & FLOODS

While floods are natural phenomena, they get affected by human intervention. Changing land use from farmland to housing developments, for example, can cause the runoff to increase and lead to an increase in the magnitude and frequency of flooding, and the speed of onset. Building dams that store water can reduce the magnitude and frequency of floods peaks below the dam. With the ongoing changes to catchments and floodplains, it is important to keep track of changes in flood behaviour.

FLOOD PREPAREDNESS AND SAFETY

Before a flood

- identify local risks in your area. Your local council or state/territory emergency service can inform you of local plans, warning systems, evacuation routes and strategies
- prepare a home emergency plan and identify risks around the home
- fix faults and remove leaves, debris and items that can cause localised flooding
- develop an evacuation strategy which identifies routes and safe locations in which to shelter
- prepare an emergency kit containing:
 - a first aid kit
 - a torch and portable radio with spare batteries
 - candles and waterproof matches
 - important papers including emergency contact numbers
 - a copy of your emergency plan
 - rubber gloves, and waterproof bags for clothing and valuables
- prepare a checklist of important family records, including wills, birth/marriage certificates, banking, financial records, etc
- keep a list of emergency phone numbers on display
- store poisons and chemicals on high shelves to reduce contamination of flood water

During a flood

- monitor current flood warnings
- avoid entering flood water unless absolutely necessary, and never underestimate the strength of flood water even if you are in the comfort of a vehicle.
- if advised of local evacuation
 - listen/watch for flood reports and instructions
 - follow all instructions by emergency authorities and react to changing conditions
 - turn off electricity, water and gas and take your mobile phone
 - place a strong plastic bag full of sand or earth in the toilet bowl and over shower and bath outlets to prevent back-flow of sewage into your home
 - lock your home and take recommended evacuation routes for your area
 - take pets with you
- If leaving of your own accord, tell police, State or Territory Emergency Service, or neighbours so that they know of your whereabouts.

After the flood

- wait until authorities have declared the area safe before entering a flood zone
- before entering your house, wait until water has fallen below floor level
- wear rubber boots (or at least rubber-soled shoes) and rubber or leather gloves
- if you are going into an isolated area notify the proper authorities
- check with electricity, gas and water authorities to determine whether supplies to your area have been interrupted and are safe to be turned on by you. If the water supply system has been flooded, you must assume it is contaminated.
- don't use gas or electrical appliances until they have been checked for safety
- beware of damaged power lines, bridges, buildings, trees, and don't enter floodwater until authorities have declared the area safe before entering a flood zone



Attorney-General's Department
Emergency Management Australia

Bureau of Meteorology

FLOODS

Warning,
Preparedness
and Safety



'Safer Sustainable Communities'

WHERE CAN I GET WARNING INFORMATION?

Radio:

Listen to ABC and/or local radio for emergency warnings, evacuation advice and weather updates. To find your local ABC station visit:

<http://www.abc.net.au>

Flood warning information provided by the

Bureau of Meteorology

Can be obtained as follows:

<http://www.bom.gov.au/hydro/flood/>

Click on your region of interest.

Telephone Recorded Information Services:

Flood Warnings are available on a Bureau of Meteorology recorded message service. Charges apply.

National Directory

1900 926 113

FURTHER INFORMATION

For people who live in flood prone areas, more detailed information on flood preparedness, safety and recovery is available in the free booklet

"What to do Before, During and After a Flood"

and the

"Flood Action Guide"

published by

Emergency Management Australia (EMA)

These are available online at

<http://www.ema.gov.au>

Or through your local state/territory emergency service.

- check the telephone directory for your nearest office.

FLOOD WARNINGS

The range of flood warning information, which may vary slightly between states and areas within a state, includes:

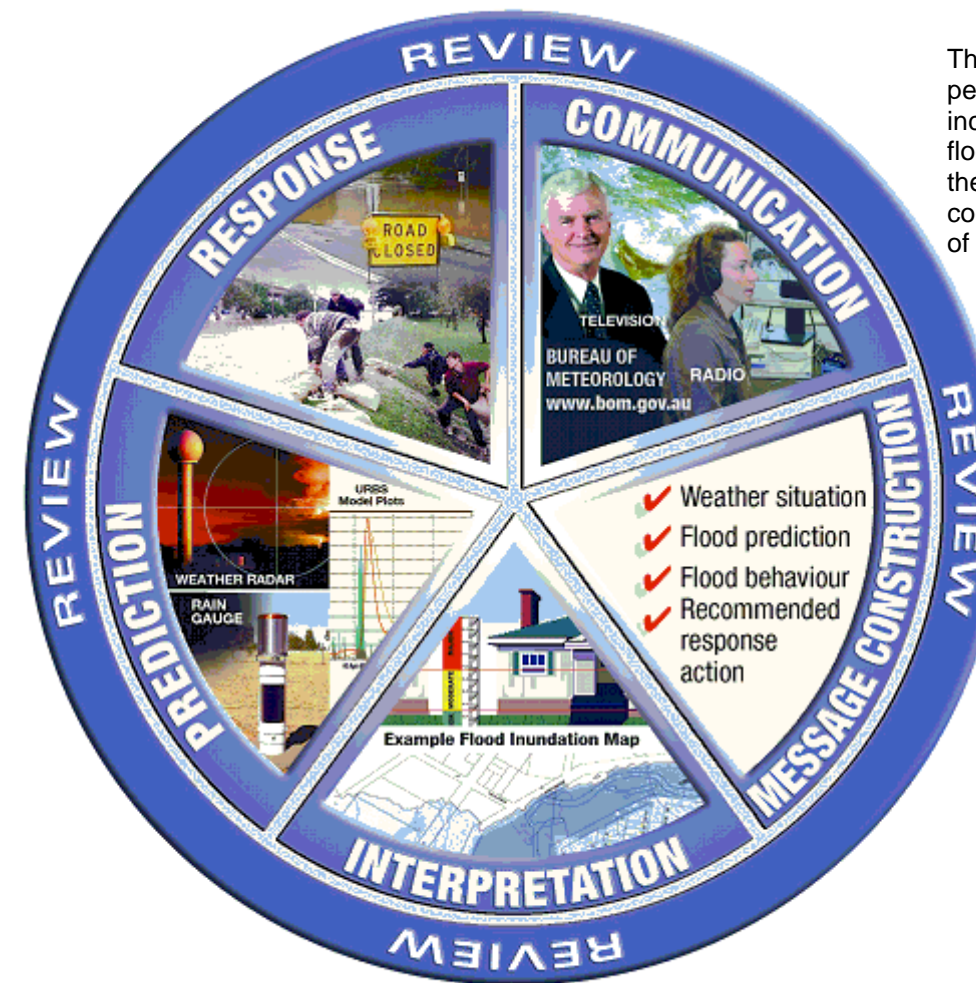
An Alert, Watch or Advice of possible flooding, if flood producing rain is expected to happen in the near future. The general weather forecasts can also refer to flood producing rain.

A Generalised Flood Warning that flooding is occurring or is expected to occur in a particular region. No information on the severity of flooding or the particular location of the flooding is provided. These types of warnings are issued for areas where no specialised warnings systems have been installed. As part of its Severe Weather Warning Service, the Bureau also provides warnings for severe storm situations that may cause flash flooding. In some areas, the Bureau is working with local councils and State and Territory governments to install systems to provide improved warnings for flash flood situations.

Warnings of 'Minor', 'Moderate' or 'Major' flooding in areas where specialised warning systems are installed. In these areas, the flood warning message will identify the river valley, the locations expected to be flooded, the likely severity of the flooding and when it is likely to occur.

Predictions of the expected height of a river at a town or other important locations along a river, and the time that this height is expected to be reached. This type of warning is normally the most useful in that it allows local emergency authorities and people in the flood threatened area to more precisely determine the area and likely depth of the flooding. This type of warning can only be provided where there are specialised flood warning systems and where flood forecasting models have been developed

TOTAL FLOOD WARNING SYSTEM



The purpose of flood warnings is to persuade people and enable them to take action to increase their safety and reduce the costs of flooding. A total flood warning system includes the following key elements and requires the cooperative involvement of agencies at all levels of government and the people at risk:

Prediction - detection of changes in the environment that lead to flooding and the prediction of future river levels during the flood.

Interpretation - identifying in advance the impacts of the predicted flood levels on the communities at risk.

Message construction - devising the content of the message in a way which will clearly warn people of impending flooding.

Communication - disseminating warning information in a timely way to people and organisations likely to be affected by the flood.

Response - getting the appropriate protective behaviour from the threatened community and from the agencies involved.

Review - examining the various aspects of the system with a view to improving its performance.

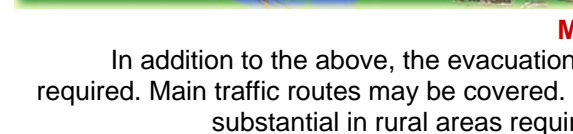
FLOOD SEVERITY CATEGORIES

To communicate the severity of flooding to emergency managers, water agencies who need flood information, and the community, we have devised a simple classification of severity levels.



MINOR FLOODING :

Causes inconvenience. Low-lying areas next to watercourses are inundated which may require the removal of stock and equipment. Minor roads may be closed and low-level bridges submerged.



MODERATE FLOODING:

In addition to the above, the evacuation of some houses may be required. Main traffic routes may be covered. The area of inundation is substantial in rural areas requiring the removal of stock.



MAJOR FLOODING:

In addition to the above, extensive rural areas and/or urban areas are inundated. Properties and towns are likely to be isolated and major traffic routes likely to be closed. Evacuation of people from flood affected areas may be required.

WHEN A FLOOD WARNING IS ISSUED

- be aware of all hazards warning systems that may be in place for your area, what the warning levels mean and what actions you should take
- listen to ABC and/or local radio for warnings and advice
- prepare to move vehicles, equipment, garbage, chemicals and poisons to higher locations
- farmers should plan to move livestock and equipment to high ground
- businesses should plan to relocate stock and equipment to high ground
- protect valuables and goods by moving household items to a high place
- secure dangerous or damageable items, and empty freezers and refrigerators, leaving doors open (to avoid damage or loss if they float about)
- locate your emergency kit and include items such as:
 - a good supply of required medications
 - any special requirements for family members
 - strong shoes, rubber boots, blankets and dry clothing
 - non perishable food and water for your family and pets
 - important papers, bank books, money and credit cards
 - valuables and cherished articles (jewellery, photographs etc)
- fill your petrol tank and stock your car with emergency supplies



Appendix E
SES, NSW community
Flood Safe Brochure

Are you at risk from floods?

New South Wales has a long history of floods. Some of these have been severe, costing an average of \$128 million damage annually.

Approximately 28% of the land area of New South Wales is subject to flooding. According to the Australian Water Resources Council, rural losses in terms of average annual actual damages are approximately equal to that of total urban losses.

The effects of flooding on rural property owners include losses to livestock, crops, fencing, buildings, personal items, farm equipment and machinery. While damage to crops and fences is usually unavoidable, there is the potential to reduce losses particularly of livestock, irrigation equipment, houses and sheds.

As a rural property owner or manager you may have experienced many floods. It is important to be aware that larger floods than those previously experienced can occur in your area.

Even if your property is not directly affected by flooding, you may be isolated and require assistance such as the supply of essential items and feed for livestock.

While in many cases evacuation will not be necessary, you should consider evacuation as an option if severe flooding is predicted. Deciding to remain in your home when it is inundated or surrounded by floodwaters can be dangerous.

Flooding may last for weeks. Your home may become a refuge for vermin, snakes and spiders. There may be no water, sewerage, power, telephone or other services for several weeks and you may be unable to call for help in an emergency.



Rural Properties
FloodSafe

Stay informed

Your local SES unit can give you information on what you can do to reduce the effects of flooding on your family and your property. This brochure and general information on preparing for floods and storms can be found on the SES website at www.ses.nsw.gov.au

The NSW Department of Primary Industries can also provide information for rural producers affected by severe floods. The NSW Department of Primary Industries website at www.dpi.nsw.gov.au has a range of articles relating to the effects on flooding on rural producers.

Your local council may be able to provide you with information on how flooding affects your property.

How you will be advised of a coming flood

Flood information including flood forecasts, road closures, and advice on evacuations and property protection will be broadcast over local radio stations.

In some areas Flood Bulletins are sent out by the SES using faxstream or telephone tree systems. Contact your local SES to find out how you may be advised.

For emergency help in floods and storms call the SES on

132 500

For life-threatening emergencies call 000

To volunteer or for FloodSafe and StormSafe information call

1800 201 000

Your local SES unit is:



NSW State Emergency Service (SES)
Level 3, 6-8 Regent St
Wollongong 2500

www.ses.nsw.gov.au

Brochure printed June 2008



How to help protect your household and property from floods

When flooding is likely (Flood Watch)

A Flood Watch is issued by the Bureau of Meteorology when flooding is likely. You should be prepared to act should flooding occur.

- Listen to your local radio station for information, updates and advice
- Lift household items and farm equipment on to benches and tables placing electrical goods on top
- Secure objects that are likely to float and cause damage
- Locate important papers, valuables and mementoes. Put them in your Emergency Kit and take them with you when you evacuate
- Check sheds and outbuildings and relocate waste containers, chemicals and poisons well above floor level
- Check if your neighbours need help
- Locate and prepare pets for possible evacuation
- If isolation is likely, have sufficient non-perishable food, essential medications fuel and other necessities to last two weeks. Do not forget pet food and stockfeed
- Move livestock to high ground where they can be provided with feed for the duration of the flood
- Relocate fodder supplies to high ground
- Move farm equipment and relocate pumps to high ground

During a flood (Flood Warning)

A Flood Warning is issued by the Bureau of Meteorology when flooding is about to happen. Flood Warnings provide a predicted flood level and time at which a river will reach that level. Flood Warnings are issued in relation to gauges along rivers.

- **Never drive, ride or walk through floodwater** – this is the main cause of death during floods as water may be deeper or faster flowing than you think and may conceal hidden snags and debris
- Remember the safety of your pets and any other animals You are responsible for their well-being. The NSW Department of Primary industries may be able to assist you
- Keep listening to a local radio station for further information, updates and advice
- Keep in contact with your neighbours
- Be prepared to evacuate if advised

If evacuation is required

Take your Emergency Kit with you.

Turn off the electricity and water as you leave and turn off and secure gas bottles.

You should leave well before roads to high ground are closed by floodwater. You can go to friends or relatives who live in flood-free areas, or you can go to an evacuation centre.

The Department of Community Services (DoCS) may establish evacuation centres in your area where help will be available including:

- temporary accommodation
- financial help
- personal support
- refreshments and meals
- clothing and personal needs
- help in contacting family and friends

Where evacuation is necessary and you have livestock, you should notify the NSW Department of Primary Industries with details of:

- a contact person, telephone number and an alternate contact number
- the location, type and number of animals
- your handling facilities – yards, loading ramps, stock crates
- availability of fodder/food
- potential problem animals such as unbroken horses and guard dogs
- any veterinary medication or health problems
- whether you have a suitable vehicle for transporting the animals
- whether you can transport the animals to a designated safe area or refuge
- whether, after the immediate danger period or evacuation, you have any alternative accommodation for your pets or agistment for your livestock

You should also advise the SES or other emergency services that you are evacuating.

Pets

Pets may be taken to the temporary evacuation centre. They may stay there with you or be collected by the various animal welfare organisations and cared for until the danger has passed.

Do not leave your pets behind. Put them on leads or in pet carriers. Dogs should wear a fixed collar with an identification tag. Animal carriers should be labelled with the owners details. Take feed and water with you as well as any medications for your pets.

How the SES can help you

The SES is responsible for responding to floods in NSW. This includes planning for floods and educating people about how to protect themselves and their property.

During floods the SES will provide flood information, safety advice and arrange for the delivery of essential supplies to people isolated by floodwater. Where appropriate, the SES will conduct evacuations and undertake flood rescue.

How the NSW Department of Primary Industries can help you

Under the Agricultural Services Functional Area Supporting Plan, the NSW Department of Primary Industries is responsible for coordinating animal relief services for livestock, wildlife and companion animals.

The NSW Department of Primary Industries is responsible for agriculture and animals in floods. Local agricultural coordinators in each area are responsible for planning, implementing and coordinating relief programs.



Prepare yourself

Some practical measures you can take right now include keeping a list of emergency numbers near the telephone and assembling an Emergency Kit.

Your Emergency Kit should contain at all times:

- Portable radio with spare batteries
- Torch with spare batteries
- First aid kit (with necessary supplies)
- Candles and waterproof matches
- Important papers including emergency contact numbers
- Copy of any emergency plans for your property
- Waterproof bag for valuables

When flooding is likely, place in your Emergency Kit:

- A good supply of required medications
- Important mementos and photographs
- Any special requirements for babies and the disabled, infirm and/or elderly
- Strong shoes
- Suitable food and drinks
- Farm records

