



CIVIL INVESTIGATION REPORT

Wesley Mission Sylvania

101 Port Hacking Road, Sylvania NSW 2224

Ref: SY200229-
Rev: 4
Date: 12.11.2020

PREPARED FOR
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Date	Revision	Issue	Prepared By	Approved By
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29.06.2020	2	Final	D. Tenhave	T. Howe
04.11.2020	3	Final Re-Issue - Updated Architectural Design	E. Flack	T. Howe
12.11.2020	4	For Planning Proposal	E. Flack	T. Howe

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Executive Summary

Northrop have prepared a site investigation report for the development of the Wesley Mission Frank Vickery Village, Sylvania. The concept masterplan has been reviewed with regard to relevant guidelines.

For this development it has been determined that the following will likely apply:

- Provision of OSD (detailed assessment to be carried out with each stage of development based on pre versus post-development runoff comparison),
- Provision of water quality treatment measures to meet council's reduction targets,
- Flood Planning Controls will apply to proposed lot D3.

Following provision of detailed concept drawings and discussions with council, these and other requirements can be determined more accurately and are subject to change.

1. Introduction

Northrop Consulting Engineers have been engaged to prepare a site investigation report to support the development of a Master Plan for the redevelopment of Wesley Mission Frank Vickery Village, 101-151 Port Hacking Road, Sylvania.

The purpose of this report is to highlight opportunities, constraints and risks for the proposed development. Comments provided herein are based on review of the following:

- an inspection of the existing site which was conducted on the 10th June 2020,
- the previous DA submission package and consent,
- current masterplan architectural site layout prepared by Group GSA
- consultation with Sutherland Shire Council (Council) regarding flooding, OSD and water quality
- Council's documents, information and guidelines,
 - Development Control Plan 2015 (DCP)
 - Gwawley Bay Flood Study 2012
 - Online stormwater network mapping
- Dial Before You Dig (DBYD) information
- Flood Information letter from Council

2. Locality Description

2.1 Existing Site

We understand the proposed development is to be located within Lot 1 of DP1025954, herein known as “the site”. The Site is bounded by Bellingara Road on the western boundary, low density residential properties to the southern boundary and Port Hacking Road to the east of the site.

The site is an established lot (brownfield) and has an approximate area of 5.7Ha which comprises a frontage to Bellingara Road of approximately 440m and Port Hacking Road of approximately 441m.

The site is in the suburb of Sylvania, in the local government area of Sutherland Shire Council. This site is currently an established aged care facility, retirement home and community housing. There is a heritage listed structure within the site.

The site is gently sloping running generally west to east with a minor crest running generally west to east near the heritage structure. There is an easement running along the southern boundary benefitting Council which covers a drainage line from Bellingara Road.

A schematic of the existing site (highlighted in yellow) is shown below in Figure 1. Several site photos illustrating existing site conditions have been included as part of Appendix A.



Figure 1 – Site Schematic

2.2 Proposed Development

The proposed development consists of major site redevelopment in multiple stages, including removal of existing structures, roadways and landscaped areas. It maintains two vehicular entrances, one on each Bellingara Road and Port Hacking Road frontages. There is a proposed 'heritage plaza' which generally sits along the crest adjacent to the heritage building to be retained. The conceptual site plan and concept staging diagram for the proposed development are shown in Figure 2 and Figure 3, respectively.



Figure 2 – Concept masterplan

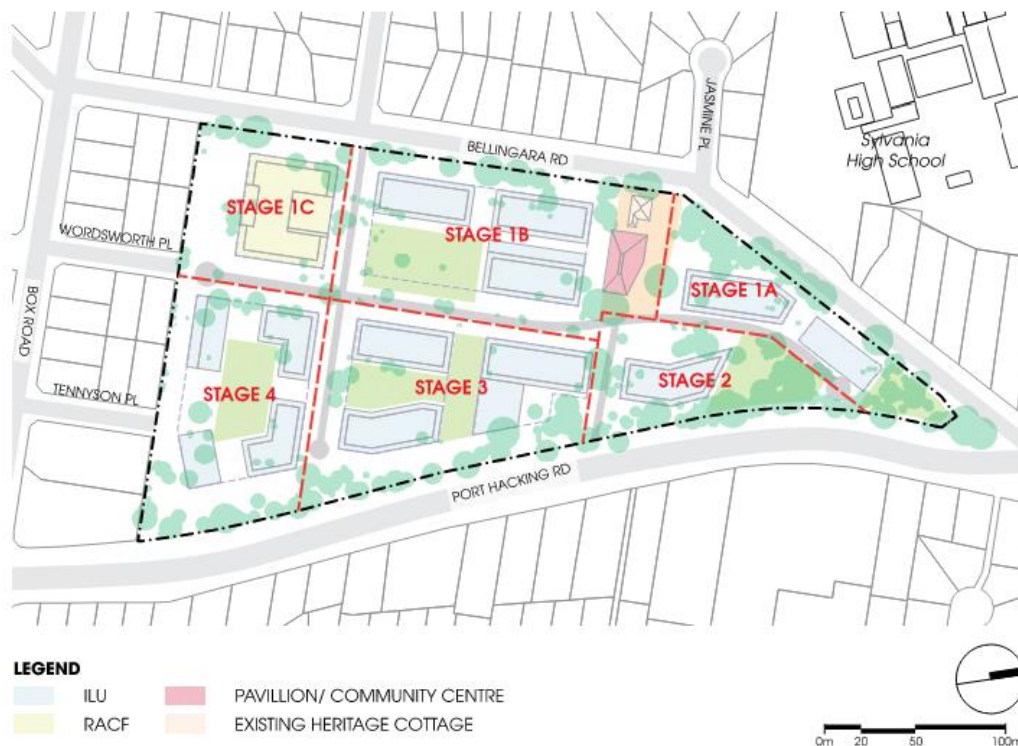


Figure 3 – Concept staging diagram

3. Access Infrastructure

3.1 Existing Access Infrastructure

The site has street frontages to Bellingara Road and Port Hacking Road, approximately 440m and 441m in length, respectively. Currently there are two vehicular entrances to the site, one on Bellingara Road and one on Port Hacking Road, which provide access to internal circulation roadways and car parking on the site. An existing pedestrian path runs along both frontages. There is no pedestrian or vehicular access through to the existing cul-de-sac roads Wordsworth Place and Tennyson Place to the south.

It is noted that the existing Bellingara Road vehicular entrance is being shifted north to align with Camden Street. A traffic investigation is being carried out by Varga Traffic Planning Consultants.

3.2 Potential Upgrade Requirements

The footpaths along and vehicular crossings on Bellingara Road and Port Hacking Road frontages are currently in good, serviceable condition and should not require upgrading.

4. Stormwater Drainage & Flooding

4.1 Existing Stormwater Network

The site is an established aged care and retirement village and has an existing in-ground drainage network. The site slopes generally west to east. A crest is present, located from opposite Jasmine Pl, just north of the heritage building, and continues through the chapel to meet Port Hacking Road, running near parallel with the southern boundary (refer Figure 4 below). Along the southern boundary runs a 1.83m wide easement for drainage purposes, through which the Council street drainage along Bellingara Road connects to the Port Hacking Road trunk drainage system. The available Council drainage network is shown in Figure 4 below.



Figure 4 – Approximate crest location and Council stormwater network

North of the crest there is minimal in-ground stormwater infrastructure present, with no internal street drainage system and irregularly placed inlet pits. It is believed that stormwater runoff is predominantly directed through overland flow channels, swales, etc. to Port Hacking Road. A probable overland flow route regime and assumed pipe network following site investigation is below in Figure 5.

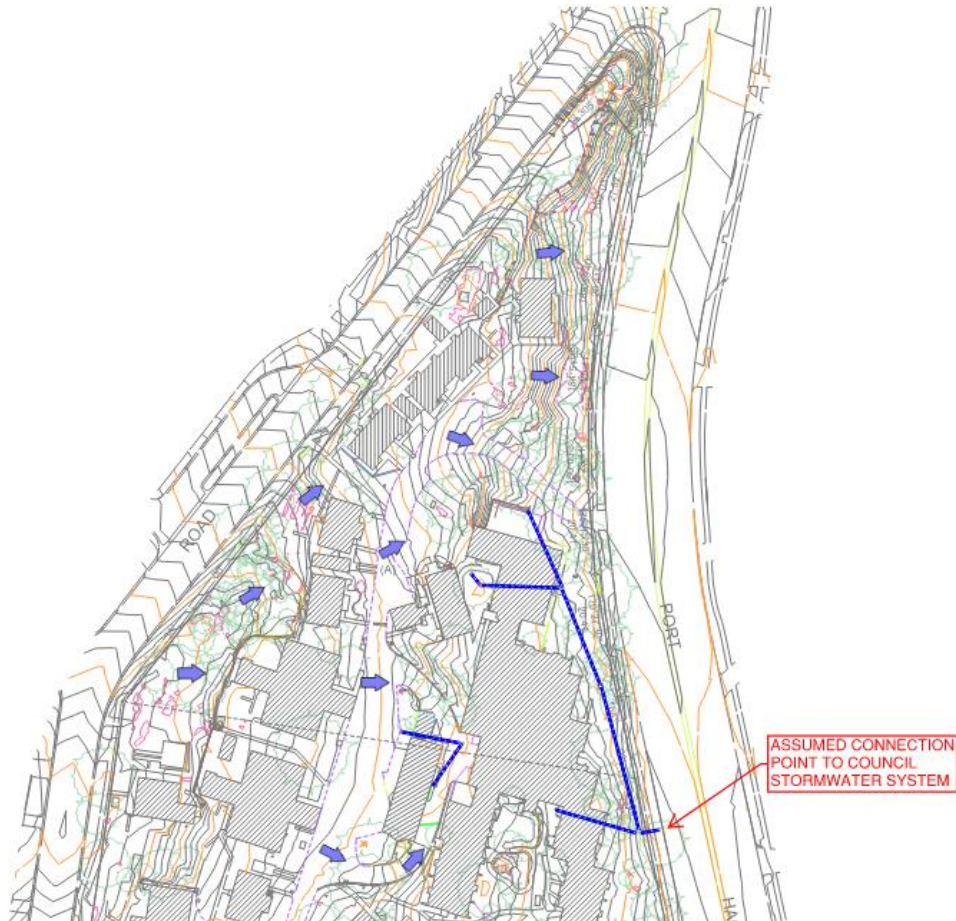


Figure 5 – Northern portion drainage diagram

South of the crest has a more formal drainage network, with a primary line following the internal roadway, generally following the western and southern boundaries, with several assumed connection points into the council trunk drainage line present within the easement. A probable overland flow route regime and assumed pipe network is below in Figure 6.



Figure 6 – Southern portion drainage diagram

The existing site has a combination of pervious landscaped areas and impervious paths, roadways and buildings resulting in approximately 51% impervious site coverage.

4.2 Proposed Stormwater Strategy

The proposed concept masterplan and staging diagram work well with the assumed piped stormwater network on the site. There is an existing disconnect between drainage lines that line up closely with the staging concept and is shown in Figure 7 below. This will enable staged development with minimal impact on the remainder of the site from a drainage perspective.



Figure 7 – Stormwater and staging overlay

Council's DCP stipulates on-site detention (OSD) requirements for developments including objectives of restricting post-development site runoff to a maximum of reasonable pre-development discharge rates. By comparing the existing site with the proposed concept masterplan (refer Appendix C – Concept Masterplan Impervious Area Sketch), a general increase can be seen in the impervious site area from 51% existing impervious to an approximated 58% proposed impervious area. With an increase in the impervious site area, the site runoff will be increased and therefore an OSD system will likely be required for the development. A pre versus post-development assessment will be required to be undertaken for each stage of the proposed development to determine the OSD system requirements and ensure compliance with Council guidelines is achieved at each stage. The respective OSD systems for each stage can either be above ground, incorporated into landscape or car parking areas; or below ground, incorporated into building structures or rainwater tanks.

Northrop have contacted Council and confirmed that a water quality treatment strategy will need to be implemented for the proposed development, with reduction targets in accordance with the DCP as shown in Table 1 below. Council have indicated that a stormwater masterplan and associated report will be required in support of the future development application for the overall site.

The concept masterplan includes an abundance of green landscaped external space, providing opportunity for passive water quality treatments methods like raingardens, treatment swales and bio-retention basins. Alternatively, proprietary treatment devices such as filtration cartridges, GPTs and pit inserts or a combination of both passive and proprietary means of treatment can be used.

Table 1 – Council water quality targets

Pollutant	% Reduction Post-Development Average Annual Load Reduction
Gross Pollutants	100 (for litter and organic matter > 50mm)
Total Suspended Solids (TSS)	80
Total Phosphorous (TP)	40
Total Nitrogen (TN)	40

Rainwater reuse tanks will be required by Council and assist in the reduction of stormwater pollutants discharged from site. The size of rainwater reuse is to be calculated by using Council guidelines and BASIX, as appropriate, based on water balance and is advised to be determined for each block. Rainwater reuse tanks will provide a reduction in the total volume of OSD (if required).

Northrop anticipates that the stormwater will have a primary discharge location from the site through the existing stormwater pit in the south east corner of the site into the existing council drainage line within the easement, subject to authority requirements.

4.3 Flooding

Northrop has reviewed documents available from Council to understand the mainstream and overland flow flooding constraints associated with the site – for the purpose of this site ‘Mainstream’ & ‘Overland Flow’ flooding is defined below.

Mainstream Flooding – flooding within the greater catchment area around the site which is defined by water that flows over banks of creeks and lagoons.

Overland Flow Flooding – surface runoff before it enters a water way. It is caused by rainfall which flows downhill and concentrates in in low points.

The Council Flood Information letter (refer Appendix D – Flood Information Letter) provided a range of flood levels, flood maps and defines the risk precinct for the site. The flood levels are summarised in Table 2 below.

Table 2 – Flood Levels

Flood Event	Flood Level (m AHD)
5% AEP	7.29 – 9.06
1% AEP	7.30 – 9.09
PMF	7.38 – 9.36

The Flood Risk Precinct mapping from Council's letter has been overlayed on the concept masterplan in Figure 8. As the figure illustrates, the south-eastern corner of proposed lot D4 is located within the Low Risk flood precinct.

It should be noted that in Council's Environmental Risk DCP (Chapter 40) *Residential Care facilities* are defined as ‘Essential Community Facilities’, whereas *Seniors Housing* is defined as ‘Sensitive Uses and Facilities’. The different uses are important in the flooding context as Low Risk Flood Precincts are considered unsuitable for Essential Community Facilities; whilst Sensitive Uses and Facilities are feasible so long as the flood planning controls listed in Table 3 (extracted from the DCP) are adopted.



Figure 8 – Flood Risk Precinct overlay

Table 3 – Flood Planning controls

	Control
Floor Level	Habitable floor levels shall be no lower than the PMF level or the 1% AEP flood levels plus 500mm freeboard, whichever is higher. <i>Based on the flood levels provided the flood planning level (FPL) for lot D3 shall be 9.59m AHD (i.e. 1% AEP + 500mm, which is higher than the PMF)</i>
Building Components and Method	All structures to have flood compatible building components below the PMF level
Structural Soundness	An engineer's report shall be provided to certify that the structure can withstand the forces of floodwater, debris and buoyancy up to and including a PMF
Flood Effects	An engineer's report shall be provided to certify that the development will not increase flood effects elsewhere, having regard to: <ul style="list-style-type: none"> • Loss of flood storage

	<ul style="list-style-type: none"> • Changes in flood levels, flows and velocities caused by alterations to the flood conveyance
Car Parking and Driveway Access	<ol style="list-style-type: none"> 1. The minimum surface level of open car parking spaces or carports shall be no lower than the 1% AEP flood or the level of the crest of the road at the location where the site has access to the road 2. Garages shall have a minimum finished floor level no lower than the 1% AEP flood plus 200mm freeboard 3. The level of the driveway providing access between the road and parking space shall be no lower than 300mm below the 1% AEP flood or such that the depth of inundation during a 1% AEP flood is not greater than either the depth at the road or the depth at the car parking space 4. Basement garages and car parking areas with floor below the 5% AEP flood or more then 0.8m below the 1% AEP flood level, shall have a pump-out system, adequate warning systems, signage and exits 5. Restraints or vehicle barriers shall be provided to prevent floating vehicles leaving a site during a 1% AEP flood. A flood depth of more than 200mm will cause serious water damage to a typical vehicle and a depth of 300mm is sufficient to cause a typical vehicle to float 6. The crest of the driveway providing access between the road and basement garages shall be a minimum of 200mm above the level of the 1% AEP flood
Evacuation	<ol style="list-style-type: none"> 2. Reliable access for pedestrians or vehicles shall be provided from the building commencing at a minimum level equal to the lower habitable floor level to an area of refuge above the PMF level 4. Adequate flood warning systems, signage and exits shall be available to allow safe and orderly evacuation without increased reliance upon the SES or other authorized emergency services personnel 5. The development shall be consistent with any relevant flood strategy, Floodplain Risk Management Plan adopted by Council or similar plan 6. An engineer's report shall be provided to certify that an area of refuge is available if circumstances are possible where the evacuation of persons might no be achieved within an effective warning time
Management and Design	<ol style="list-style-type: none"> 4. Applicant shall demonstrate area is available to store goods above the PMF level 5. No storage of materials which may cause pollution of be potentially hazardous during any flood is permitted below the 1% AEP plus 500mm freeboard

Through consultation with Council Northrop have also been advised that an overland flow and pipe capacity assessment of the existing piped system along the southern site boundary needs to be carried out. The intention of this assessment is to ensure an appropriately sized overland swale is provided and no proposed buildings are impacted.

5. Earthworks

5.1 Earthworks Quantities

With the demolition and removal of existing structures and construction of permanent facilities there will be further investigation required to determine cut to fill and the need for importing or exporting of fill.

No detailed conceptual plans / sketches for the proposed development have been provided, therefore Northrop have been unable to provide preliminary bulk earthworks calculations.

A geotechnical report by Douglas Partners (2004) was provided and advises the following considerations:

- Topsoil varied in depth from 0.1-0.4m,
- Fill was found generally up to 0.8m in depth,
- Groundwater was encountered in two boreholes at depths of 1.1m and 1.7m,
- Excavation of basements can expect to be through residual soils, then medium and high strength sandstone bedrock,
- Temporary excavation batters are acceptable and outlined below:
 - Filling and residual clay – 1.5H:1V
 - Extremely low to very low strength rock – 1H:1V
 - Medium to high strength rock – vertical
- Road pavements should be designed for a CBR of 5%

6. Conclusion

A preliminary site investigation in relation to the engineering and stormwater risks and constraints has been undertaken for the redevelopment of Wesley Mission Frank Vickery Village, Sylvania. From our investigations, it appears the development should be appropriate for the proposed site, with consideration to the restraints and upgrades required noted within this report.

Please note the assumptions we have made in the absence of detailed plans.

Appendix A – Existing Site Photos



Photo 1 – Vehicular entrance from Port Hacking Road



Photo 2 – Internal roadway from Port Hacking Road entrance



Photo 3 – Internal roadway above primary drainage line running parallel to southern boundary, looking east




Photo 4 – Internal roadway above primary drainage line running parallel to southern boundary, looking west



Photo 5 – Kerb inlet pits in Bellingara Road on western kerb draining to the council stormwater line through easement along southern boundary

Appendix B – Concept Masterplan Drainage Sketch



REV	DESCRIPTION	ISSUED	VER'D	APP'D	DATE	<div><p>Sydney Level 11, 345 George St, Sydney NSW 2000 T (02) 9241 4188 sydney@northrop.com.au ABN 81 094 433 100</p></div> <div>CLIENT MIDSON</div>	PROJECT WESLEY MISSION SYLVANIA	DRAWING TITLE CIVIL SKETCH MASTERPLAN CONCEPT DRAINAGE SCHEMATIC	JOB NUMBER 200229	
1	FOR INFORMATION	DT		DT	16.06.20				DRAWING NUMBER	REVISION
2	FOR INFORMATION	EF		TH	04.11.20				SK-01	2
									DRAWING SHEET SIZE = A3	

Appendix C – Concept Masterplan Impervious Area Sketch

DRAWN: J.PHILLIPS
DESIGNED: D.TENHAVE
JOB MANAGER: T.HOWE
VERIFIER: -



EXISTING
SCENARIO



POST
SCENARIO

GENERAL NOTES

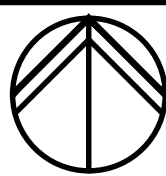
TOTAL AREA = 57191m²
EXISTING IMPERVIOUS = 28965m² (51%)
EXISTING PERVIOUS = 28226m² (49%)

POST IMPERVIOUS = 33323m² (58%)
POST PERVIOUS = 23668m² (42%)

REVISION	DESCRIPTION	ISSUED	VER'D	APP'D	DATE
1	XXXXXXXX	X.X		X.X	XX.XX.XX

midson

GROUP USA



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PROJECT
**WESLEY MISSION
SYLVANIA**

DRAWING TITLE
CATCHMENT PLAN

JOB NUMBER 200229	
DRAWING NUMBER SK01	REVISION 2
DRAWING SHEET SIZE = A1	

Appendix D – Flood Information Letter



Inam Ahmed
p: 9710 0486
File Ref: FC20/0042

17 June 2020

Tim Howe
Level 1, 57 Kembla Street
WOLLONGONG NSW 2500

Dear Sir/Madam,

FLOOD INFORMATION

Property Address: 101-151 Port Hacking Road, Sylvania
Property Description: Lot 1 DP 1025954
Issue Date: 19 June 2020
References: Gwawley Bay Catchment Floodplain Risk Management Study & Plan
Application No: FC20/0042

This flood information sheet provides information in regards to the above property. This property is identified as flood prone land in the Gwawley Bay Catchment Floodplain Risk Management Study & Plan.

Floodplain risk management controls as set out in SSDCP2015 (*Chapter 40: Environmental Risk*) apply to the development of this property. The nature of the development and level of risk (low, medium and high) will determine which controls apply under the following headings:

1. Floor Level
2. Building Components & Method
3. Structural Soundness
4. Flood Effects
5. Car Parking and Driveway Access
6. Evacuation

This information was made available to Council from the "Gwawley Bay Catchment Floodplain Risk Management Study & Plan" prepared by FloodMit dated 2015.

FLOOD RISK (SSDCP 2015):	Low and Medium
5% AEP:	7.29m AHD - 9.06m AHD
1% AEP:	7.30m AHD - 9.09m AHD
PMF:	7.38m AHD - 9.36m AHD
Minimum habitable floor level:	1% AEP + 500mm freeboard
Minimum finished floor level (garage and driveway access):	1% AEP + 200mm freeboard
Existing Floor Level:	Not available

DISCLAIMER: This information is provided by Council in good faith in accordance with s733 of the *Local Government Act 1993* and has been produced with the most current data available to Council as supplied by various sources. Council is not responsible for any inaccuracies in the data provided.

If you are undertaking a development application, this information should be submitted to Council.

Yours Faithfully,



Inam Ahmed
Stormwater & Waterways Engineer
Sutherland Shire Council

GLOSSARY:

Annual Exceedance Probability (AEP): The chance of a flood of a given size occurring in any one year, expressed as a percentage. For example, there is a 1% (1 in 100) chance of a 1% AEP storm event occurring in any given year.

Australian Height Datum (AHD): The Australian surface level datum is a convention for consistently measuring the height of land above sea level.

Flood Risk: A combination of the chance of a flood occurring and the consequences of the flood for people, property and infrastructure. The Sutherland Shire Council classifies these risks into **Low**, **Medium** and **High** categories.

Floodways: Those areas where a significant volume of water flows during floods and are often aligned with obvious natural channels. They are areas that, even if only partially blocked, would cause a significant increase in flood levels and/or a significant redistribution of flood flow, which may in turn adversely affect other areas. They are often, but not necessarily areas with deeper flow or areas where higher velocities occur.

Flood Storage: Those areas where parts of the floodplain that are important for the temporary storage of floodwaters during the passage of a flood. If the capacity of flood storage areas is substantially reduced by, for example, the construction of levees or by landfill, flood levels in nearby areas may rise and the peak discharge downstream may be increased. Substantial reduction of the capacity of a flood storage area can also cause a significant redistribution of flood flows.

Flood Fringe: It is the remaining area of land affected by flooding, after floodway and flood storage areas have been defined. Development in flood fringe areas would not have any significant effect on the pattern of flood flows and/or flood levels.

Floodplain: Area of land which is subject to inundation by floods upto and including the probable maximum flood even, that is, flood prone land.

Freeboard: it provides reasonable certainty that the risk exposures selected in deciding on a particular flood chosen as the basis for the flood planning level is actually provided. It is factor of safety typically used in relation to the setting of floor levels.

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.

High Flood Risk: The area of land below the Flood Planning Level (FPL) that has been identified by Council as being either subject to a high hydraulic hazard or where there are significant evacuation difficulties. The high flood risk precinct is where high flood damages,

potential risk to life and evacuation problems are anticipated, or development would significantly and adversely affect flood behaviour. Most development should be restricted in this precinct. In this precinct, there is significant risk of flood damages without compliance with flood related building and planning controls.

High Hazard: The area of the land within the floodplain where possible danger to personal safety, difficulty in evacuation by trucks, able bodied adults would have difficulty in wading to safety and potential for significant structural damage to buildings.

Low Flood Risk: All other land within the floodplain, i.e. within the extent of the Probable Maximum Flood (PMF) that has not been identified as having High or Medium flood risk. The low flood risk precinct is where the risk of damages is low for most land uses.

Low Hazard: The area of the land within the floodplain where truck could evacuate people & their possessions and able bodied adults would have little difficulty in wading to safety.

Mainstream Flooding: Refers to the inundation of normally dry land occurring when water overflows the natural or artificial banks of a stream, river, estuary, lake or dam. Mainstream flooding can affect large areas and is driven by widespread prolonged rainfall.

Medium Flood Risk: The area of land below the Flood Planning Level (FPL) that has been identified by Council as being not subject to high hydraulic hazard and where there are no significant evacuation difficulties. In the medium risk flood precinct there is significant risk of flood damage, but these damages can be minimized by the application of appropriate development controls.

Overland Flooding: Water that runs across the land after rain, either before it enters a creek or stream, or after rising to the surface naturally from underground. Overland flooding tends to affect localised areas and is driven by intense slow moving storms.

Probable Maximum Flood (PMF): Is the largest flood that could conceivably occur within a catchment, and is a very rare and unlikely event. However, when undertaking a Floodplain Risk Management Study, Council looks at all storm events up to and including the PMF.

Sutherland Shire Draft Development Control Plan 2015 (SSDCP 2015): The SSDCP provides the fine grain detail of the planning framework and applies in conjunction with LEP (Sutherland Shire Local Environment Plan 2015). It assists in the preparation of development applications and ensures development takes place in a quality and orderly manner.



SUTHERLANDSHIRE

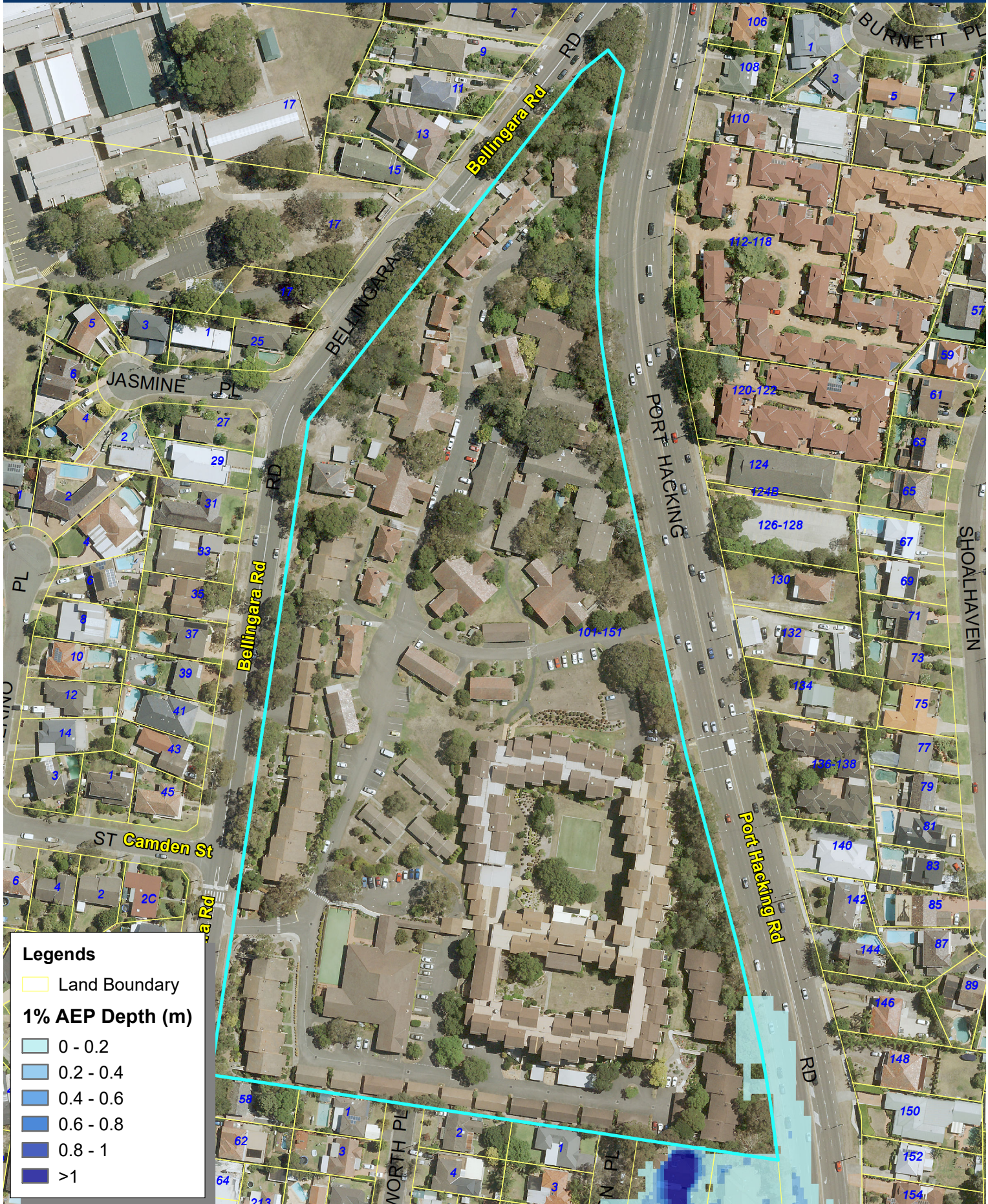
1:1,950

0 25 50 75 m @ A4

Gwawley Bay Catchment Floodplain Risk Management Plan 1% AEP Flood Depth



101-151 Port Hacking Road
SYLVANIA



Legends

Land Boundary

1% AEP Depth (m)

- 0 - 0.2
- 0.2 - 0.4
- 0.4 - 0.6
- 0.6 - 0.8
- 0.8 - 1
- >1



SUTHERLANDSHIRE

1:1,950

0 25 50 75m @ A4

Gwawley Bay Catchment Floodplain Risk Management Plan

Flood Risk Map
101-151 Port Hacking Road
SYLVANIA

