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CIVIL

Flood Assessment Report

for

Sydney Helicopters Cottage Upgrade

for Sydney Helicopters

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Contents

Figures

Photos

Tables

Acronyms

AEP	Annual Exceedance Probability
AHD	Australian Height Datum
ALS	Airborne Laser Survey (LiDAR)
ARI	Average Recurrence Interval
ARR	Australian Rainfall and Runoff
BoM	Bureau of Meteorology
DCP	Development Control Plan
FPL	Flood Planning Level
LGA	Local Government Area
LiDAR	Light Detection and Ranging (also see ALS)
m	Measure of length / height / distance (metres)
m AHD	Meters above Australian High Datum
m/s	Measure of velocity (metres per second)
m^3/s	Measure of flow rate (cubic metres per second)
OSD	On-Site Detention
PCC	Penrith City Council (“Council”)
PMF	Probable Maximum Flood
PMP	Probable Maximum Precipitation
PSD	Permissible Site Discharge
SES	NSW State Emergency Service
TUFLOW	A 1D and 2D hydraulic modelling software

Introduction

Northrop Consulting Engineers Pty Ltd (Northrop) have been engaged to prepare a Flood Impact Assessment report submission for the existing building at 89-151 Old Castlereagh Road, Castlereagh.

Included herein is a:

- List of related drawings.
- Description of the subject site and proposed development.
- Existing flood behaviour.
- Outline of Council requirements and development response.

Methodology

The following methodology has been adopted to undertake our assessment:

- Summarise the existing site conditions and proposed development.
- Review the existing flood behaviour according to ‘Nepean River Flood Study VOLUME 2 Advisian 2018’.
- Assess the proposal with respect to Council’s requirements.

Subject Site and Proposed Development

Subject Site

The subject site is located at 89-151 Old Castlereagh Road, Castlereagh and is otherwise known as Lot 2 DP 1013504. It is bounded by Old Castlereagh Road to the south, a waterway to the north and adjacent predominantly greenfield sites to the east and west. Site elevations range from approximately 15 to 26 metres AHD (Australian Height Datum) with terrain sloping away from Old Castlereagh Road. There are several structures on the lot with correlating driveways and roads as well as a hardstand carpark area. Pockets of dense vegetation are scattered throughout the lot with a large amount if the site being open grass. A large dam is located in the north-western portion of the lot.

Characteristics of the area are presented below in Photo 1, Photo 2, Photo 3 and Photo 4.

Aerial images showing the Site Locality, Existing Ground Elevations and Proposed Development is presented overleaf in Figure 1, Figure 2 and Figure 3 respectively.

The existing cottage being upgraded is located at approximately 26m AHD, outlined in blue in Figure 2 and Figure 3.

Photo 3 - Looking north from Castlereagh Road (©Google Maps, 2023)

Photo 4 – Looking northeast from Castlereagh Road (©Google Maps, 2023)

Photo 3 – Looking northwest from Castlereagh Road (©Google Maps, 2023)

Photo 4- Aerial Photo of Site

Legend

Subject Site

0 600 1,200 Metres

1:35,000

Figure 1

Locality

Sydney Helicopters
Cottage Upgrade
100 Old Castlereagh Road
NL230343-00

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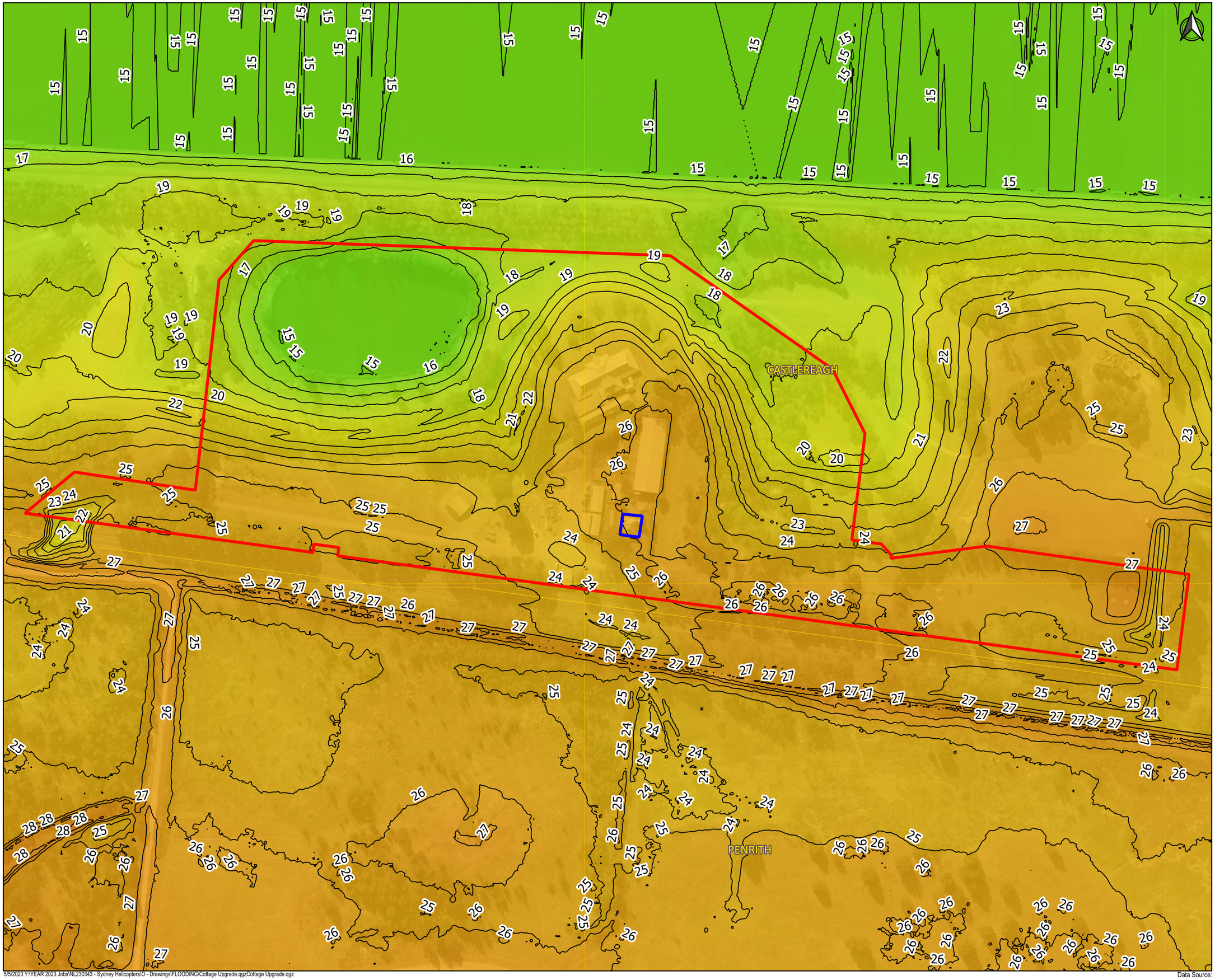
5/5/2023 Y:\YEAR 2023 Jobs\NL230343 - Sydney Helicopters\O - Drawings\FLOODING\Cottage Upgrade.qgzCottage Upgrade.qgz

Data Source:



Legend

- Subject Site
- Cottage
- 1m contours

Ground Elevation (m AHD)

50
0

0 40 80 Metres

1:2,500

Figure 2

Ground Elevations

Sydney Helicopters
Cottage Upgrade
100 Old Castlereagh Road
NL230343-00

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Data Source:

Legend

- Subject Site
- cottage

0 10 20 Metres

1:1,000

Figure 3

Site layout

Sydney Helicopters
Cottage Upgrade
100 Old Castlereagh Road
NL230343-00

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Data Source:

Proposed Development

The proposed development consists of the conversion of the existing cottage, outlined in blue in Figure 3 into a café and bar. Note that the cottage is located at a ground elevation of approximately 26m AHD.

Existing Flood Behaviour

The existing flood behaviour has been interpreted from the Nepean River Flood Study (Advisian, 2018). Flood extents for selected events are presented overleaf in Figure 4 to Figure 7 and flood levels are shown below in Table 1.

Table 1 – Peak flood levels

Event	m AHD	Site Inundation	Development Affected
1% AEP	22.0	Partial	No
1 in 500 AEP	24.0	Partial	No
1 in 1000 AEP	26.0	Majority	Yes
PMF	29.0	Complete	Yes

Noting that the proposed development is located at approximately 26m AHD, this shows the development is unaffected up to the 1 in 500 AEP flood event. The site becomes almost completely submerged in the 1 in 1000 AEP event and is subject to extreme high hazard flooding in the PMF.

Existing Flood Emergency Response

The site is a low flood island and will require evacuation prior to very rare to extreme flooding. Evacuation procedures involve vehicular evacuation by Castlereagh Road and the Great Western Highway. The emergency response procedure is documented in the Hawkesbury-Nepean Flood Emergency Sub plan (SES, 2020).

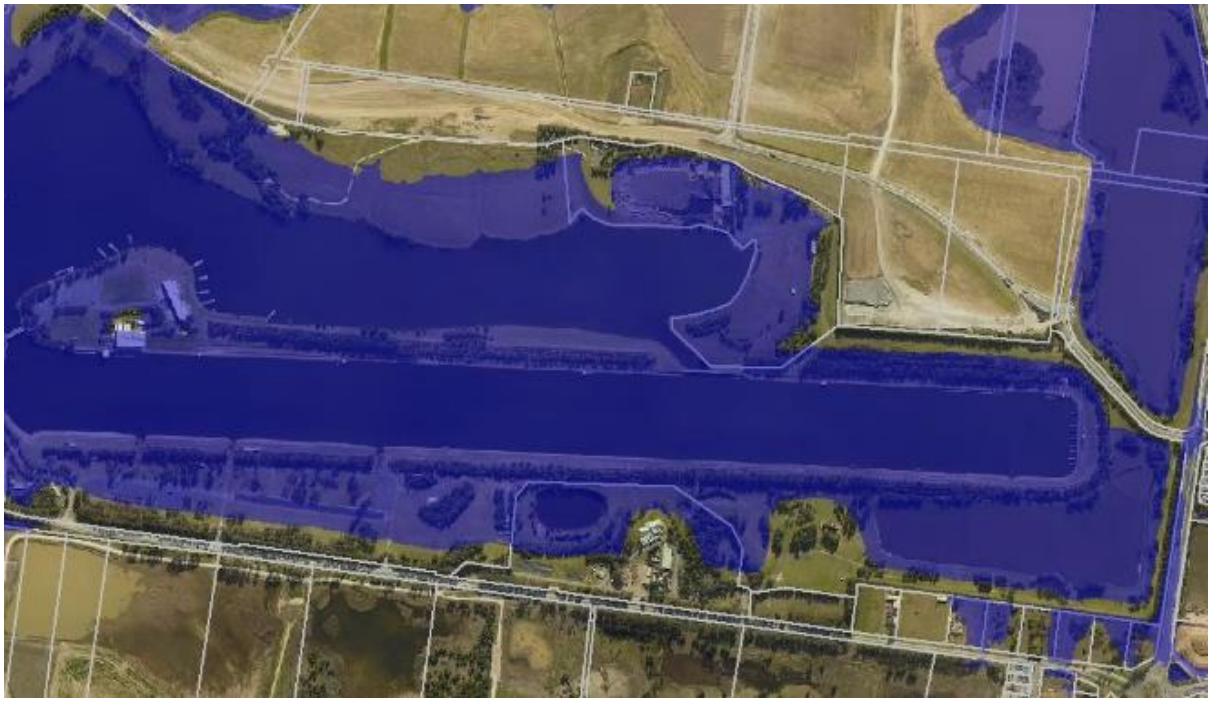

Figure 4 - 1% AEP Flood Extents

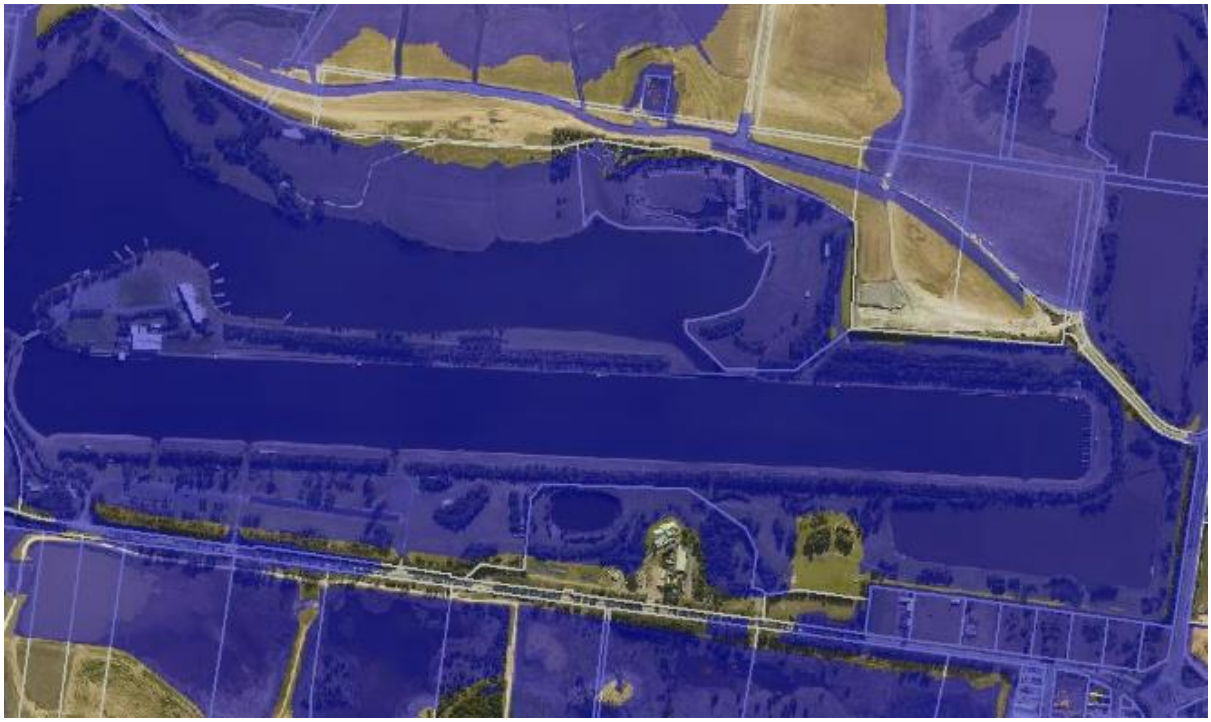

Figure 5 - 1 in 500 AEP Flood Extents

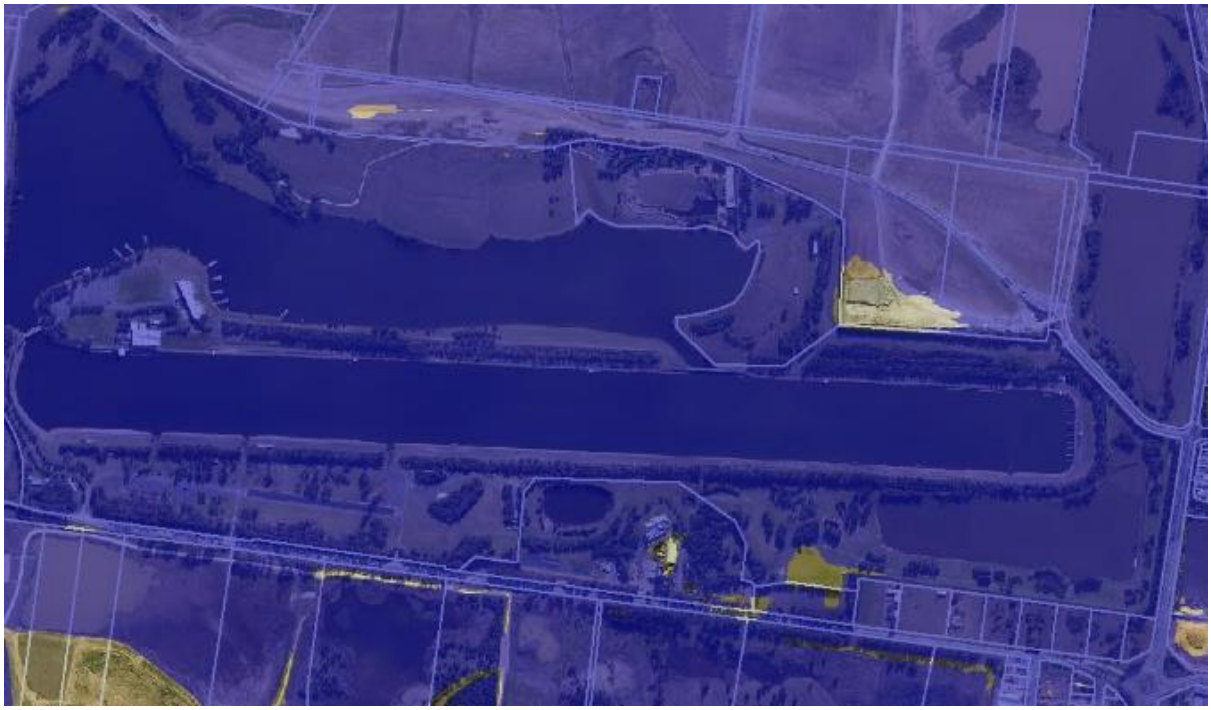

Figure 6 - 1 in 1000 AEP Flood Extents

Figure 7 - PMF Extents

Council Requirements and Response

LEP and DCP Design Principles

The Council requirements have been obtained from Penrith City Council LEP and DCP and are summarised below in **Table 2** and **Table 3**.

Responses are also summarised in these tables.

Table 2 – LEP requirements

Requirement	Response	Compliant
(1) The objectives of this clause are as follows		
(a) to minimise the flood risk to life and property associated with the use of land,	The flood risk to the property can be minimised by using flood compatible material in areas with the risk of inundation. The development only includes change of use of existing building with minimal changes from a flooding perspective, as such we do not believe the development increases flood risk based on the existing conditions.	**Yes**
(b) to allow development on land that is compatible with the flood function and behaviour on the land, taking into account projected changes as a result of climate change,	We believe the site is only inundated in the very rare and extreme events, and this use is commensurate with the flood function of the land.	**Yes**
(c) to avoid adverse or cumulative impacts on flood behaviour and the environment,	Since the development proposes minor changes to the extent of the external building, it is not expected to apply adverse impacts on flood behaviour elsewhere and the environment.	**Yes**
(d) to enable the safe occupation and efficient evacuation of people in the event of a flood.	We do not believe the proposed development impedes the flood evacuation procedures outlined in the Hawkesbury-Nepean Flood Emergency Sub plan (SES, 2020).	**Yes**
(2) Development consent must not be granted to development on land the consent authority considers to be within the flood planning area unless the consent authority is satisfied the development		

Requirement	Response	Compliant
(a) is compatible with the flood function and behaviour on the land, and	We believe the site is only inundated in the very rare and extreme events, and this use is commensurate with the flood function of the land.	**Yes**
(b) will not adversely affect flood behaviour in a way that results in detrimental increases in the potential flood affectation of other development or properties, and	Considering the development only includes minor external changes, it is not expected to adversely impact the flood behaviour or to increase in the potential flood affection of the other development or properties.	**Yes**
(c) will not adversely affect the safe occupation and efficient evacuation of people or exceed the capacity of existing evacuation routes for the surrounding area in the event of a flood, and	We do not believe the proposed development impedes the flood evacuation procedures outlined in the Hawkesbury-Nepean Flood Emergency Sub plan (SES, 2020).	**Yes**
(d) incorporates appropriate measures to manage risk to life in the event of a flood, and	Risk to life is minimised as floor levels are above the 1 in 500 AEP flood level. The proposed development does not impede the flood evacuation procedures outlined in the Hawkesbury-Nepean Flood Emergency Sub plan (SES, 2020).	**Yes**
(e) will not adversely affect the environment or cause avoidable erosion, siltation, destruction of riparian vegetation or a reduction in the stability of riverbanks or watercourses.	Considering the development only includes minor changes to the external building, we believe the development is unlikely to affect erosion and siltation from a flooding perspective.	**Yes**
(3) In deciding whether to grant development consent on land to which this clause applies, the consent authority must consider the following matters		
(a) the impact of the development on projected changes to flood behaviour as a result of climate change,	The development includes change of use of existing building with minimal external changes. Hence, the flood function and the behaviour as a result of the climate change is not expected to change comparing to the existing case.	**Yes**
(b) the intended design and scale of buildings resulting from the development,	The scale of the building will remain the same as the existing case.	**Yes**

Requirement	Response	Compliant
(c) whether the development incorporates measures to minimise the risk to life and ensure the safe evacuation of people in the event of a flood,	Risk to life is minimised as floor levels are above the 1 in 500 AEP flood level. The proposed development does not impede the flood evacuation procedures outlined in the Hawkesbury-Nepean Flood Emergency Sub plan (SES, 2020).	**Yes**
(d) the potential to modify, relocate or remove buildings resulting from development if the surrounding area is impacted by flooding or coastal erosion.	Given the context of the site it is unlikely to be significantly impacted by coastal erosion.	**Yes**

Table 3 - DCP Design Principles

Reference Clause	Controls	Response	Compliant
Section 3.5.8 Change of use of Existing Buildings	a) Development consent for change of use of an existing building with floor levels below the 1% AEP (100 year ARI) flood will only be given where it can be demonstrated by the applicant that: i) There is no foreseeable risk of pollution associated with the proposed use of the building in the event that the 1% AEP (100 year ARI) flood occurs; ii) All practical measures shall be taken to minimise the risk of flood damage to the property within the building by the 1% AEP (100 year ARI) flood. These measures could include: • Flood proofing the building to the level of the 1% AEP (100 year ARI) flood by either construction of a wall or levee bank or some other means of preventing water entry; • Raising the floor level of the building to the level of the 1% AEP (100 year ARI) flood; and/or • Storing all equipment, machinery and stock above the 1% AEP (100 year ARI) flood level	Not applicable as existing building is outside the 1% AEP flood extent.	**Yes**

Conclusions

Northrop Consulting Engineers were engaged by Sydney Helicopters to complete Flood Impact Assessment, for the proposed development at 89-151 Old Castlereagh Road, Castlereagh.

It was concluded, based on the above assessment, that the proposed development, which incorporates the change of use of an existing building, meets all flood related requirements of Penrith City Council DCP.

We submit these findings for consideration.

Angus Brien

Principal | Flood Engineer

Limitation Statement

Northrop Consulting Engineers Pty Ltd (Northrop) has been retained to prepare this report based on specific instructions, scope of work and purpose pursuant to a contract with its client. It has been prepared in accordance with the usual care and thoroughness of the consulting profession for the use by Sydney Helicopters. The report is based on generally accepted practices and standards applicable to the scope of work at the time it was prepared. No other warranty, express or implied, is made as to the professional advice included in this report.

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Document Register

Rev	Status	Prepared	Approved	Date
A	For Client Review	SH	GB	11/05/23