Woolacotts.
CONSULTING ENGINEERS

Flood Risk Assessment Report
Curl Curl North Public School

20 April 2017 | 16-258

Contents

Document control

Rev No	Date	Revision details	Approved	Verified	Prepared
A	20/04/17	Issued For DA	SDC	JL	JG

1.0 Introduction

Curl Curl North Public School is an existing facility located on the corner of Playfair Road and Abbott Road. Redevelopment of the site is proposed to provide new facilities as well as maintain a portion of the existing. Refer Figure 1 below for the site location.

This report has been prepared to document and discuss flood related issues associated with the development, as the site is located on a lot identified as affected. Recommendations on all precautions to minimise risk to personal safety of occupants, and the risk of property damage of the total development in the event of a flood will be investigated.

Flood information relating to the site has been obtained from the Northern Beaches Council Flooding Information Report for property Por 271/ Playfair Road North Curl Curl NSW 2099, dated 28th February 2017.

As part of the preparation of this report, the site was inspected on the 8th March 2017, to identify existing stormwater drainage structures within the site, and to gain further understanding of the overland flow paths and general flooding issues.

Figure 1 – Site Location

2.0 Location and site details

The site is approximately 28,000m^2 and has frontages to Playfair Road and Abbott Road. It is currently approximately 40% impervious surfaces comprising of hard paved games courts, parking areas and existing buildings.

The site falls at an approximate grade of 3.2% from the north-west to the south-east corner. Stormwater runoff from the site is predominately via overland flow to a final pit at the south-east end of the site discharging through a 375mm diameter pipe to Councils system within Abbott Road, directed towards Curl Curl Lagoon.

The site has been identified by Council to be within the medium flood risk planning precinct due to its proximity to Curl Curl Lagoon and location within the lower end of the larger catchment.

It is proposed to construct new facilities including a permanent block of classrooms, outdoor learning areas and carpark to the south, including new sports courts and playgrounds to the north.

3.0 Flood management and impacts

3.1 Flood information

A flooding information report was obtained from Northern Beaches Council which outlines flood information applicable to the site based on a catchment wide flood modelling analysis. We understand the results within the report were obtained from data within the Dee Why and Curl Curl Lagoons Floodplain Risk Management Study (2005).

The information within the report includes extents of the following:

- Flood Planning Level
- 1 in 100 year Flood Event
- High Risk Flood
- Probable Maximum Flood

The following table outlines flood level information specific to the site:

Flood Level Information	
Design flood level (1% AEP / 100 yr ARI)	3.7m AHD
Freeboard	0.5m
Flood Planning Level (FPL)	4.2m AHD
Probable Maximum Flood (PMF)	5.7m AHD
Flood Risk Planning Precinct	Medium

Refer to Appendix A for a copy of Councils flooding information report and to Figures 2, 3 and 4 below, depicting the flood information at the site.

Figure 2 – Flood Extents

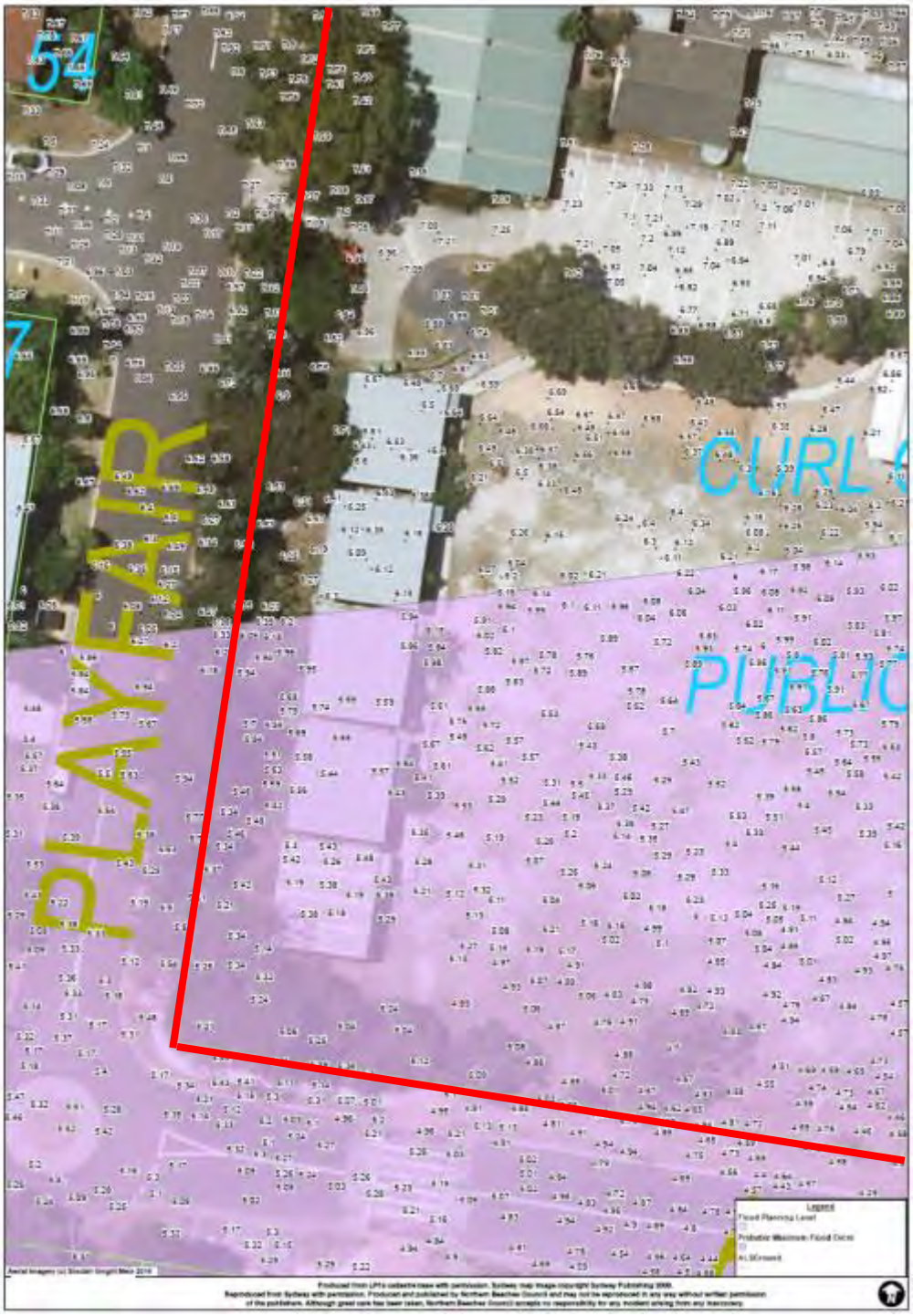

Figure 3 – Aerial Laser Survey (South-West)

Figure 4 – Aerial Laser Survey (South-East)

As depicted in the images above, a portion at the lower end of the site is located within the PMF and below the Flood Planning Level.

The levels as determined on the Aerial Laser Survey from Councils analysis match the levels within the detailed survey undertaken for the development. As such we believe the information within the flood information report is accurate for this site.

There are currently no buildings on the existing site that are affected by the 1% AEP event and are above the Flood Planning Level of 4.20m AHD. The maximum depth of the 1% AEP event is 0.3m above the final discharge pit to the south-east corner of the site.

The demountables within the southern end of the site are determined to be within the Probable Maximum Flood Event (PMF), however the finished floor levels are set above the 5.70m AHD.

The flood information report identifies this site as medium risk as a result of the above information.

3.2 Warringah Development Control Plan and Local Environmental Plan

Section E11 – Flood Prone Land of Councils Development Control Plan DCP (2011) outlines objectives which apply to land that is identified within a flood planning precinct. This documentation is further assessed within the PLM documentation from Northern Beaches Council.

The site is located within a medium risk planning precinct and is considered as a vulnerable development. Council define the medium flood risk planning precinct as land below the Flood Planning Level (FPL) but not within the high flood risk planning precinct.

The proposed development must therefore comply with the relevant requirements set out in the PLM documentation. A summary of the requirements relative to the site are outlined below:

- Floor Levels

  Floor levels of the proposed development to be set at a minimum of the PMF or FPL, whichever is greater.

- Building Components and Method

  All structures to have flood compatible building components up to the PMF level to withstand the hydraulic forces of the PMF at the site.

  All services must be located above the PMF level.

- Structural Soundness

  Structure can withstand the forces of floodwater, debris, and buoyancy up to and including the PMF level plus a suitable freeboard specific to the site.

- Impact of Development:

  Development will not increase flooding upstream or downstream in the PMF event.

- Evacuation

  Reliable access for pedestrians and/ or vehicles id required above the PMF level or the FPL whichever is greater.

  A Flood Emergency and Evacuation Plan must demonstrate that any occupants will be able to safely shelter in place in a PMF or have reliable access for pedestrians to evacuate safely above the PMF.

- Management and Design

  Area must be available to store goods above the PMF level plus a suitable freeboard specific to the site. There is to be no external storage of materials below the FPL which may cause pollution or be potentially hazardous during a flood.

- Car Storage

  The 100 year ARI flood flow level must be established in AHD for the proposed future floor levels which shall be a minimum of 500mm above the 100 year flood level. This is to ensure that the proposed future dwellings and basement car parking areas are protected in major storm events.

Section 6.3 – Flood Planning, of the Warringah Local Environmental Plan LEP (2011) outlines objectives to minimise the flood risk to life and property associated with the use of land, to allow development that is compatible with the land's flood hazard, and to avoid significant adverse impacts on flood behaviour and the environment.

A summary of the development requirements set out in the LEP 2011 are outlined below:

- Is compatible with the flood hazard of the land.
- Is not likely to significantly adversely affect flood behaviour resulting in detrimental increases in the potential flood affectation of other development or properties.
- Incorporates appropriate measures to manage risk to life from flood.
- Is not likely to significantly adversely affect the environment.
- Is likely to result in unsustainable social and economic costs to the community as a consequence of flooding

The above listed requirements set out in the Warringah Council's DCP and LEP 2011 are considered as part of the design of the proposed site. Refer to sections 4.0 Flood Evacuation Plan, and 5.0 Mitigation Measures to Reduce Impacts, within this report for information on how these requirements are satisfied.

3.3 Controls and Impact of development on flood

It is proposed to construct new facilities including a permanent block of classrooms, outdoor learning areas and carpark to the south, including new sports courts and playgrounds to the north.

A portion to the south of the proposed site will be located within the PMF zone and will require flood development controls. Refer Appendix B – Flood Extents to Proposed Site.

The flood information report outlines specific development controls as listed below:

- The minimum habitable floor level of the site must be set at or above the PMF level of 5.70m AHD.
- The development must not reduce flood storage under the FPL of 4.20m AHD
- All new building works and services shall be designed to withstand the hydraulic forces of a flood up to PMF of 5.70m AHD
- Hazardous chemicals must not be stored below the Flood Planning Level of 4.20m AHD

4.0 Flood Evacuation Plan

4.1 When to evacuate?

The site has been considered to be minimally affected by the peak of the 1% AEP event. The Probable Maximum Flood event is predicted to partially inundate the site, however is classified by Council to be within a medium risk planning precinct.

Warnings of an upcoming flood may occur through numerous avenues. The Bureau of Meteorology issue thunderstorm and severe weather warnings when such events are expected to develop or move into the area under threat. The NSW State Emergency Service (SES) receive updated weather information and notify the general public through numerous forms. The SES commonly distributes flood bulletins to the media who will broadcast information regarding what is expected to happen during a flood.

School staff are encouraged to seek out updated information regarding current weather status and severity in the event of heavy rain. Common forms of communicating flooding information include door knocks from emergency services, TV/ radio and other media, word of mouth, and the SES emergency alert.

It is critical that staff are able to identify when evacuation from the site is necessary. In relation to the school, when flood waters are identified to be within Abbott Road and fringing within the south-east corner of the schools boundary, all staff and students are encouraged to access the higher levels at the structures to the north of the site, or evacuate via the Playfair Road access. Staff are required to follow requests as presented by authorities, such as the Police or SES, in the event of a flood risk.

If at any time the SES issues an Evacuation Warning, staff should immediately arrange for any individual remaining on the site to leave and to implement the evacuation plan.

4.2 Evacuation route

The evacuation route free of floodwaters during the 1% AEP and PMF events is outlined as follows:

- Head north of the buildings and evacuate via the stairs
- Head across the site towards the hall where it is safely above the flood level. Remain there until flood waters recede and emergency services provide confirmation to return
- Site evacuation is available via the existing pedestrian access off Playfair Road
- Crossing of Abbott Road should not occur at any stage as it will be inundated during the flood event

Refer to Appendix C for a plan of the evacuation route.

Alternatively, if emergency authorities encourage people to remain onsite due to increased flood risk, proceed to level 1of the new buildings until flood levels recede.

DO NOT attempt to access the site if flood waters are rising rapidly or if flood waters are approaching the building. Move immediately to higher ground and leave the area, as per the evacuation plan.

DO NOT walk through flood waters to access the building.

Follow any instructions given by the police or SES.

Ensure all staff and students gather at a known location to confirm all have been accounted for and safely out of the flood area.

4.3 Emergency contacts

Police	000
SES	132 500

5.0 Mitigation measures to reduce impacts

The objectives set out in the Northern Beaches Council PLM documentation, LEP 2011 and Flooding Information report have been investigated/ satisfied with the following design measures:

- Proposed structure FFL ranges from a minimum of 5.85m AHD. This is above the minimum requirement of the PMF level at 5.70m AHD.
- Flood proofing of all structural components to the PMF level 5.70m AHD. We note that all services are required to be above this level including electrical and mechanical.
- The types of materials to be used to ensure the structural integrity of the building and potential risk of damage in the event of a flood due to floodwaters and debris must be considered in the structural design. Robust concrete and masonry structural elements will be adopted for the framing at the lower levels of the building.
- The development will not increase flood levels as there will be no reduction in flood storage under the FPL of 4.20m AHD.
- The Flood Evacuation Plan outlines reliable access/ egress for pedestrians during the PMF event. Refer Section 4.0 for further detail.
- Proposed storage areas must be above the FPL of 4.20m AHD.
- Proposed carpark level at RL 4.75. This is above the FPL of 4.20m AHD.
- Appropriate stormwater quality and erosion control measures inclusive of grassed swales and silt fences to ensure environmental protection.

Appendix A
Flood Certificate

NORTHERN BEACHES
COUNCIL

northernbeaches.nsw.gov.au

28 February 2017 Our ref: 2017/056905

S J New
Level 1
19 Foster Street
SURRY HILLS NSW 2010

Dear Sir/Madam

Re: Flooding Information Report for Property: Por 271/ Playfair Road NORTH CURL CURL NSW 2099

I refer to your Flood Information Report application for the subject property and provide the following information in response.

The following table shows the flood level information applicable to the property.

Design flood level (1% AEP / 100year ARI)	3.7m AHD
Freeboard	0.5m
Flood Planning Level (FPL)	4.2m AHD
Probable Maximum Flood (PMF)	5.7mAHD
Flood Risk Planning Precinct	Medium

*AHD (Australian Height Datum)

Attached are three maps indicating the flood extents and ground level spot heights relevant to the property.

The information provided is currently the best available information Council has on flooding for the area and the extents are considered indicative only. This data is taken from the Dee Why and Curl Curl Lagoons Floodplain Risk Management Study (2005).

Council recommends that you obtain a detailed survey of the above property and surrounds to AHD by a registered surveyor to determine any features that may influence the predicted extent or frequency of flooding. It is recommended you compare the flood level to the ground and floor levels to determine the level of risk the property may experience should flooding occur.

DEVELOPMENT
As your property is within the Medium Risk Planning Precinct, and a school is listed as Vulnerable Development, the following development controls will apply:

- The minimum habitable floor level for the site must be set at or above the Probable Maximum Flood Level of 5.7m AHD.
- The development must not reduce flood storage under the FPL of 4.2m AHD.
- All new building works and services shall be designed to withstand the hydraulic forces of a flood up to PMF of 5.7m AHD.

- Hazardous chemicals must not be stored below the Flood Planning Level of 4.2m AHD.

Development approval is dependent on a range of issues, including compliance with all relevant provisions of Northern Beaches Council's WLEP 2011 and DCP. The flood related development controls are detailed in Part E11 of the Warringah DCP.

Please note that compliance with these flood requirements does not guarantee Council will approve a development on this property. A Flood Risk Assessment will be required to be provided with your DA submission. Guidelines for this are enclosed. Further advice should be obtained from a practising qualified civil/structural engineer regarding suitable types of floor and house construction.

Please note that the information contained within this letter is general advice only as a detail survey of the property as well as other information is not available. Council recommends that you engage a suitably experienced consultant to provide site specific flooding advice prior to making any decisions relating to the purchase or development of this property.

Should you require clarification of the above information please contact Council's Natural Environment on 9942 2111.

Yours faithfully

Valerie Tulk
Senior Floodplain Management Officer

Figure 1 – Flood extents relative to the property at Curl Curl North Public School

Figure 2 – Aerial Laser Survey spot heights at the property (western side)

Figure 3 – Aerial Laser Survey spot heights at the property (eastern side)

Appendix B
Flood Extents of Proposed Site

PLAYFAIR ROAD

ABBOTT ROAD

RL 6240

RL 5300

RL 5250

RL 5190

RL 4265

LEGEND

PMF= RL 5.70

FPL= RL 4.20

1% AEP= RL 3.70

Appendix C

Site Evacuation Plan

Site Evacuation Plan

Curl Curl North Public School