

Dapto Leagues Club
c/- Integrated Projects Pty Ltd

Date
23rd February 2024

Job Number
230626

**Flood Review for proposed Commercial Development for DA [Rev#B]
Station St & Bong Bong Rd, DAPTO NSW**

Dear Sir/Madam,

Please find following our review of flooding at the above site. The subject site is the Dapto Leagues Club located in the block formed by Bong Bong Rd, Station St, Osborne St and Baan Baan St, refer **Figure A** and comprises Lot 1 DP 1277336 with an area of 1.47ha. Ground levels grade from the south-east corner (+13.0 mAHD) to the northern boundary (+11.7 mAHD). The site currently contains the Dapto Leagues Club, with main clubhouse located to the south and an open parking area to the north. The site is located within the Mullet Creek catchment, noting the main arm of Mullet Creek is some 250m to the west of the site. The subject site itself is entirely flood free in the 1%AEP and PMF events.

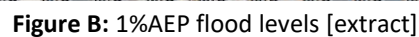


Figure A: Site Location

- Internal alterations.
- Demolition of the western segment of the club (being at-ground parking with a level #1 area) and construction of a new bar / lounge / alfresco area.
- Replacement of the existing northern open carpark with a multi-level parking facility.

FLOOD INFORMATION

- A. The site is entirely flood free in the 1%AEP and PMF events.
- B. The nearest 1%AEP flood level is around RL +11.7 mAHd located to the west.
- C. The site has been mapped as No Flood Risk and Medium Flood Risk (refer discussions following).



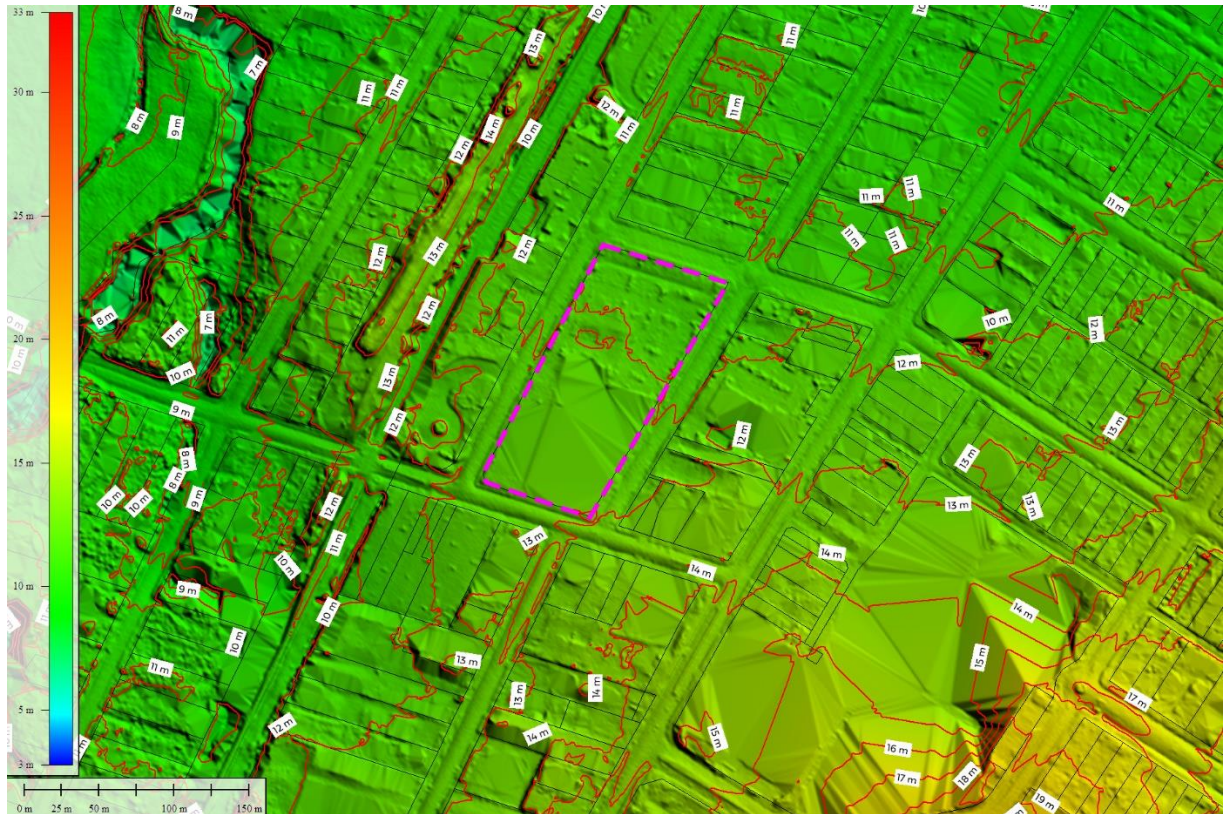


Figure C: Local Topography

FLOOD HAZARD AND RISK

NSW FDM Hazard

With respect to flood hazard, the NSW Floodplain Development Manual (2005) provides guidelines for determining the hydraulic flood hazard. A provisional hazard can be assigned to an area using Figure L2 and the combined impact of flood velocity and flood depth. In general, an area will be (provisionally) assigned High Hazard if any of the following criteria are satisfied:

- The flood depth (D) is greater than 1.0 m.
- The flood velocity (V) is greater than 2.0 m/s.
- The combination of V and D lie in the dark blue region (mathematically this is approximately where $V + 3.33D$ is greater than 3.33).

The site has no hydraulic hazard in the 1%AEP flood event as it is flood free during this event.

ARR2019 Hazard

ARR2019 provides updated Hazard curves as described in Table 6.7.3 and 6.7.4 of ARR2019 Chapter 6. We have provided mapping of the 6 hazard categories (**Figure C**), with the definitions as follows:

H1: Generally safe for vehicles, people and buildings [$D < 0.3\text{m}$, $V < 2\text{m/s}$, $V \cdot D < 0.3$].

H2: Unsafe for small vehicles [$D < 0.5\text{m}$, $V < 2\text{m/s}$, $V \cdot D < 0.6$].

H3: Unsafe for vehicles, children and the elderly [$D < 1.2\text{m}$, $V < 2\text{m/s}$, $V \cdot D < 0.6$].

H4: Unsafe for vehicles and people [$D < 2.0\text{m}$, $V < 2\text{m/s}$, $V \cdot D < 1.0$].

H5: Unsafe for vehicles and people. All buildings vulnerable to structural damage. Some less robust buildings subject to failure [$D < 4.0\text{m}$, $V < 4\text{m/s}$, $V \cdot D < 4.0$].

H6: Unsafe for vehicles and people. All building types considered vulnerable to failure.

The site has no hydraulic hazard in the 1%AEP flood event as it is flood free during this event.

Flood Risk

Some Council's adopt Flood Risk Precinct categories for the purpose of assessing flood risk at a particular site. These typically relate to (but do not necessarily correlate with) the Hydraulic Hazard zones discussed above. Wollongong Council defines these as follows:

High Risk:

- Areas greater than H3 hazard conditions during a 1% AEP flood.
- Land within 10m from the top of a watercourse bank.
- Floodways.

Medium Risk: land below the 1% AEP level plus 0.5 m that is not High Risk.

Low Risk:

- All other areas within the floodplain (i.e. within the extent of the PMF).
- All areas within the 2100 Coastal Zone Inundation Extent not classified Medium Flood Risk.

The majority of the site is outside the Flood Risk precincts and has no Risk category. A small part of the northern carpark has been mapped as Medium Flood Risk (refer **Figure D**) but in our opinion this area should also be considered to have no Flood Risk category noting that:

1. The area is outside the floodplain and above the PMF extents.
2. Is not subject to either mainstream or overland flows.
3. Has been mapped Medium Risk based on the 1%+0.5m rule, which is difficult to define in areas of shallow flow with no clearly defined watercourse (as is the case in the local area)



Figure D: Flood Risk Mapping [Rhelm 2023]

PRACTICAL CONSIDERATIONS

Floor Levels

The new additions to the existing club are outside the mapped flood Risk precincts and therefore not subject to flood related development controls.

Flood Planning Level

We suggest a flood planning level (FPL) of +12.1 mAHD, being the adjacent 1%AEP flood level midway along the western edge of the site (11.6 mAHD) plus 500mm. We note that this level is some 100m distance from the subject site itself.

Building Components

All components used below the relevant FPL are to be constructed from flood compatible materials. The structural engineer designing the development must confirm all materials below the relevant FPL meet this requirement.

Structural Soundness

A structural engineer must confirm that the proposed works as shown on the current architectural drawings must be able to withstand the forces of floodwaters up the relevant FPL, including:

- Force from floodwater (flows)
- Force from debris
- Uplift forces due to buoyancy

CONVEYANCE & FLOOD STORAGE IMPACTS

We do not believe that the development as proposed will cause adverse flood affectation in terms of water level increases on adjacent lots, or increased scour and/or erosion on adjacent lots, or contribute to cumulative impacts in terms of flood storage losses in the 1%AEP and PMF events or smaller noting that:

- The site is entirely flood free in the 1%AEP and PMF events.

DCP COMPLIANCE

Wollongong Council typically requires that all development be assessed against its DCP 2009 Chapter E13 "Floodplain Management". We note the majority of the development is outside the mapped Flood Risk precincts and therefore not subject to flood related development controls. The only section of the development as proposed within the Medium Flood Risk Precinct is the northern multi-story carpark.

For the purposes of assessment we have assumed the development will be assessed under Schedule 6 "Mullet Creek" – Commercial / Industrial, Medium Risk.

Table 1: DCP Compliance

Control	Comment
Floor Levels [2] Habitable floor levels to be equal to or greater than the 1% AEP flood level plus freeboard. [5] Floor levels of shops to be as close to the flood planning level as practical. Where below the flood planning level, more than 30% of the floor area to be above the flood planning level or premises to be flood proofed below the flood planning level.	N/A, the development is a carpark.
Building Components [1] All structures to have flood compatible building components below or at the 1% AEP flood level plus freeboard.	All components used below RL +12.1 mAHD are to be constructed from flood compatible materials. The structural engineer designing the development must confirm all materials below the relevant FPL meet this requirement.
Structural Soundness [2] Applicant to demonstrate that any structure can withstand the forces of floodwater, debris & buoyancy up to & including a 1% AEP flood plus freeboard, PMF plus freeboard if required to satisfy evacuation criteria (see below).	A structural engineer must confirm that the proposed works as shown on the current architectural drawings must be able to withstand the forces of floodwaters up to RL +12.1 mAHD, including: <ul style="list-style-type: none"> • Force from floodwater (flows) • Force from debris • Uplift forces due to buoyancy
Flood Affection [1] Engineer's report required to certify that the development will not increase flood affection elsewhere, includes medium & high-density residential proposals.	We do not believe that the development as proposed will cause adverse flood affection in terms of water level increases on adjacent lots, or increased scour and/or erosion on adjacent lots, or contribute to cumulative impacts in terms of flood storage losses in the 1%AEP and PMF events or smaller noting that the site is entirely flood free in the 1%AEP and PMF events.
Evacuation [1] Reliable access or refuge required during a 1% AEP flood. [4] The development is to be consistent with any relevant flood evacuation strategy or similar plan.	The entire site is above the PMF extents and onsite occupants may evacuate by remaining within the clubhouse, where all levels are above the PMF.
Management & Design [2] Site Emergency Response Flood plan required (except for single dwelling-houses) where floor levels are below the flood planning level. [3] Applicant to demonstrate that area is available to store goods above the 1% AEP flood level plus freeboard. [5] No external storage of materials below the flood planning level which may cause pollution or be potentially hazardous during any flood.	The entire site is above the PMF extents and therefore all areas are readily suitable for storing goods. Due to the elevated nature of the site, we do not believe there will be any risk of pollution due to storage of goods.
Section 6.5.3 Carparking a) Open car parking – open car parking subject to inundation should be designed giving regard to vehicle stability in terms of depths and velocity during inundation by floodwaters, ensuring that each car parking space is within hydraulic hazard category H1 in Figure 3 during a 1 % AEP flood.	There are no carparks subject to inundation in any flood event up to and including the PMF. There are no proposed basement carparks.

<p>b) Garage addition or open car parking to an existing house – the minimum floor level should be as high as practical but shall be no lower than 300mm above adjacent finished ground levels. Refer to Schedule 1 for the maximum floor areas within the various FRPs.</p> <p>c) Garage as part of new development and redevelopment;</p> <p>i) Not permitted within a floodway;</p> <p>d) Basement car parks – are to be protected from inundation during a 1 % AEP flood, ensuring all vehicular access, doors and ventilation points are a minimum of 0.2 metres above the 1 % AEP flood level.</p>	
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CONCLUSIONS

We therefore conclude that:

- The site is flood free during the 1%AEP and PMF events.
- The subject site has been mapped as No Risk and Medium Flood Risk with respect to Flood Risk Precincts.
- The development as proposed meets the requirements of DCP 2009 Chapter E13 "Floodplain Management".

Yours faithfully,



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