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28 May 2020

Flood Risk Management Report for 29 White Street Balgowlah

1. INTRODUCTION AND BACKGROUND

At 29 White Street Balgowlah, it is proposed to undertake alterations and additions at the south-east corner of the existing development. A Development Application (DA2020/0095) has been submitted to Northern Beaches Council seeking consent for these works. Based on a "Natural Environment Referral Response – Flood" provided by Council as part of the DA, a Flood Risk Management Report must be submitted as part of the DA, as set out herein.

The report author is Peter Horton [BE (Hons 1) MEngSc MIEAust CPEng NER]. Peter has postgraduate qualifications in water engineering and 28 years of water engineering experience. He is a Member of Engineers Australia and Chartered Professional Engineer (CPEng) registered on the National Engineering Register. Peter inspected the property on 24 April 2020.

Form A/A1 of the *Guidelines for Preparing a Flood Management Report* of Council is attached at the end of the report herein, as required by Council. All levels given herein are to Australian Height Datum (AHD). Zero metres AHD is approximately equal to mean sea level at present.

2. INFORMATION PROVIDED

Horton Coastal Engineering was provided with a total of 9 Habitat Studio drawings, namely A.10.1, A.20.1, A.20.2, A.30.1, A.30.2, A.40.1, A.70.3, A.80.2 and A.90.1 (all Revision C except A70.3 was Revision B, and all dated 23/4/20 except A.10.1 was 12/3/20, A.40.1 was 16/4/20, A.70.3 was 5/2/20, and A.80.2 was 4/5/20). A survey prepared by CMS Surveyors (surveyed 8 July 2019 and dated 17 July 2019 as Issue 2), Drawing 18674detail, was also provided.

Flood information was obtained from Council on 7 April 2020, showing mapping of 1% Annual Exceedance Probability (AEP) and Probable Maximum Flood (PMF) flood extents, risk precincts, and information on flood levels and depths over the site.

3. EXISTING SITE DESCRIPTION

The subject property is located on the lower (southern) side of White Street in Balgowlah. Based on the survey provided, ground levels vary from 25.3m AHD at the driveway entrance to the property, falling to 23.8m AHD at the SW corner of the property. The backyard of the property has a slight fall from east to west, from 24.2m AHD to 23.8m AHD, with the property to the west (No. 31) about 0.3m lower. The ground floor level of the two-storey duplex is 24.33m AHD, with the laundry area to the SE at 24.15m AHD.

A public stormwater pipe extends under the driveway, with 2 pipes (from the NW and W) joining into 1 pipe immediately NW of the subject property, and 2 pipes (from the N and NE) joining into 1 pipe immediately N of the property, with these two combined pipes combining to a single pipe conveying the flow under the driveway. Three stormwater grates are located adjacent to the driveway to the property, north of the property.

Photographs of the property are provided in Figure 1 to Figure 3 (all photographs taken on 24 April 2020).

Figure 1: View (to the south) of driveway at subject property (towards backyard)

Figure 2: View of proposed development area (to left of clothes line) in backyard, looking SE

Figure 3: View of proposed development area, with existing ground floor level marked at arrow

4. PROPOSED DEVELOPMENT

It is proposed to demolish and rebuild the first-floor balcony at the SE corner of the dwelling, and to demolish and rebuild the portion of the dwelling projecting beyond the main dwelling structure to the SE. The ground floor of the proposed development is to comprise two laundries, a toilet, and a deck. As per the colour-coding on Drawing A.80.2 (see Figure 4):

- the red area is the existing dwelling footprint, which is to be raised as part of its renovation (from 24.15m to 24.33m AHD), with an open sub-floor to allow flood storage underneath (this area does not currently contribute to flood storage as it is enclosed by solid walls and doors);
- the blue area is a proposed new laundry extending west of the existing ground floor, that will again be elevated above natural ground to provide flood storage underneath, so will have a negligible impact on flood storage for the design 1% AEP event; and
- the yellow area is a proposed new deck extending west of the new laundry that is to be of open (slatted timber) construction, thus allowing flood storage within the deck footprint and again having a negligible impact on flood storage for the design 1% AEP event.

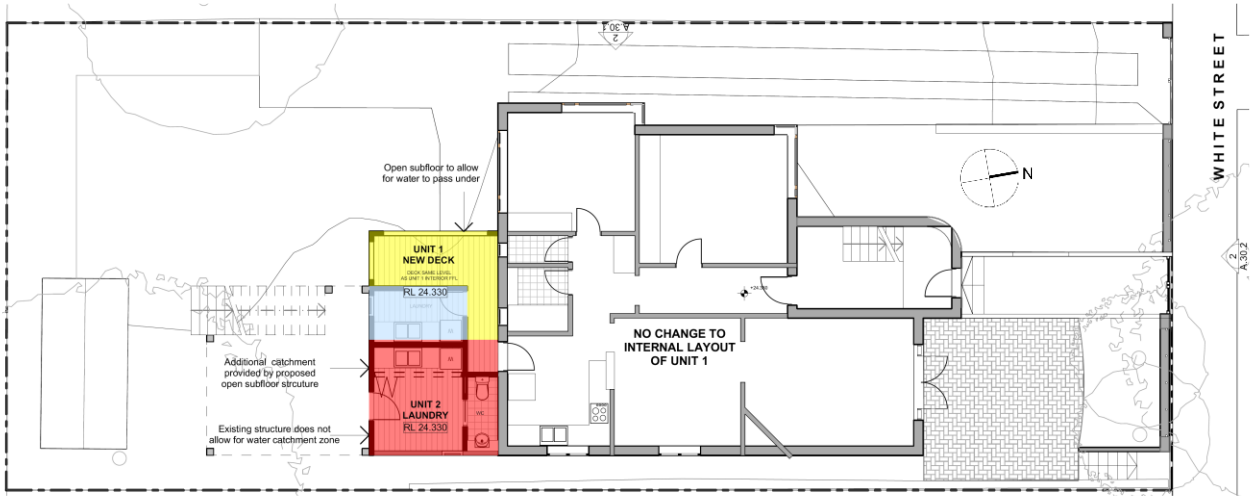


Figure 4: Proposed development colour coding from Drawing A.80 .2

5. FLOODING HAZARDS

The piped drainage network extending under the driveway at the subject property would generally be expected to convey at least minor flood events without significant overland flow through the property. The mechanism for flooding in the design event is assumed to have blockage of the pipe network, ponding of water to the north of the driveway, and eventually flow over the driveway crest and south along the driveway at a maximum depth of about 0.2m to 0.3m AHD. The overland flow will have a tendency to flow SE when it reaches the bottom the driveway, towards the lower ground levels at No. 31.

Based on flood information obtained from Council, the 1% AEP flood level in the vicinity of the proposed development is 24.15m AHD, while the PMF level is 24.38m AHD. With natural ground levels over the proposed development footprint equal to about 24.15m AHD, the proposed development area is just outside the 1% AEP flood extent[1].

It is not appropriate to add a 0.3m freeboard to a zero depth flood extent, but it is recognised that there is the potential for up to a 0.15m depth of overland flow over the proposed development area in the design event (ponded water less than 0.15m depth was not mapped in

[1] Except that ground levels at the proposed deck (yellow area) are approximately 24.0m AHD, so the deck is within the flood extent. However, as noted above the open deck has a negligible impact on flood storage, and inundation above the floor level of the deck (if a freeboard of 0.3m is applied to the 24.15m AHD 1% AEP flood level) is considered to be acceptable for a minor deck structure that would be designed to withstand inundation. Therefore, a minor variation to one or more of the flood related development controls is requested for the deck.

the *Manly to Seaforth Flood Study*, from which the flood levels outlined above were derived). That is, a Flood Planning Level of 24.3m AHD is considered to be appropriate for the proposed development (equal to the 1% AEP flood level, with this 0.15m of ponding added). The proposed ground floor level of 24.33m AHD is 0.18m above natural ground, and is 30mm above this Flood Planning Level. The proposed ground floor level is only 50mm below the PMF level.

The proposed development is considered to be at an acceptably low risk of damage from flooding hazards if:

- high durability timber is used for the floor joists and flooring of the ground floor of the proposed development, namely in-ground Class 1 (preferably) or in-ground Class 2 as per Australian Standard AS 5604;
- the guidance on use of timber subject to immersion, and other relevant guidance in Hawkesbury-Nepean Floodplain Management Steering Committee (2006), is followed for the floor joists and flooring and any other structural elements in the under-floor area;
- the sub-floor is kept open (at least 50% open) to allow flood waters to flow underneath; and
- no electrical items or other services or materials that could be damaged by inundation are located in the sub-floor area, or are waterproofed if in that area.

6. COMPLIANCE WITH CONTROLS

6.1 Manly Local Environmental Plan 2013

Clause 6.3 of *Manly Local Environmental Plan 2013* (LEP 2013) applies to land at or below the Flood Planning Level, so applies to the proposed development. Based on Clause 6.3(3) of LEP 2013, "development consent must not be granted to development on land to which this clause applies unless the consent authority is satisfied that the development:

(a) is compatible with the flood hazard of the land, and
(b) is not likely to significantly adversely affect flood behaviour resulting in detrimental increases in the potential flood affectation of other development or properties, and
(c) incorporates appropriate measures to manage risk to life from flood, and
(d) is not likely to significantly adversely affect the environment or cause avoidable erosion, siltation, destruction of riparian vegetation or a reduction in the stability of river banks or watercourses, and
(e) is not likely to result in unsustainable social and economic costs to the community as a consequence of flooding".

With regard to (a), the proposed development is suspended above natural ground, and comprises laundries, a toilet and deck on the ground floor. This is considered to be compatible with the likely shallow depths of floodwater over the development footprint in the design event. If the recommendations in Section 5 are followed, the design and construction of the proposed development would be compatible with the flood hazard.

With regard to (b), the proposed development increases flood storage compared to the existing development, by about 1,500L up to the Flood Planning Level[2]. It will therefore reduce the risk of flood damage at the subject property and adjacent properties.

With regard to (c), risk to life is not a significant issue for the proposed development given the shallow depths of flooding (less than 0.15m).

With regard to (d), the proposed development would not significantly adversely affect the environment as long as appropriate standard construction environmental controls are applied. No significant erosion, siltation, or effect on river banks or watercourses would be expected with the proposed development, as it is suspended above natural ground and remote from any watercourses. No riparian vegetation would be affected by the proposed development, with no such vegetation in its vicinity.

With regard to (e), the proposed development is at an acceptably low risk of damage from flooding, and does not increase the risk of flooding at any other properties, so is not likely to result in unsustainable social and economic costs to the community.

6.2 *Manly Development Control Plan 2013*

Chapter 5.4.3 of *Manly Development Control Plan 2013* (DCP 2013) applies at the subject property, as the property is potentially affected by flooding. Based on DCP 2013, development must comply with the performance criteria set out in Chapter 5.4.3.1, or if it satisfies the prescriptive controls in Chapter 5.4.3.2 then it is deemed to satisfy Chapter 5.4.3.1.

With the proposed development in the medium risk flood precinct, for residential development, it must satisfy items A1, A3, B1, B2, C1 to C3, D1, D2, E1, E2, F1 to F4, F6, F8, F9, G1 to G3, G5 to G8, H1 and I1 of the development matrix in Chapter 5.4.3.2. With car parking not proposed as part of the proposed development, G1 to G3 and G5 to G8 are not applicable. With no change to fencing proposed, H1 is not applicable. With a pool not proposed, I1 is not applicable. The other items are discussed below.

For A1, development shall not be approved unless it can be demonstrated that it complies with the Flood Prone Land Design Standard. The proposed development complies with this Standard as:

- the development has been designed and can be constructed so that in a 1% AEP flood event there is no net loss of flood storage/ floodway (there is a 1,500L gain in flood storage with the proposed development up to the Flood Planning Level), there are no adverse changes in flood levels and velocities caused by alterations to the flood conveyance (this is the case with the development suspended above natural ground), there are no adverse effects on surrounding properties (this is the case with the development suspended above natural ground and there being a gain in flood storage) and it is sited to minimise exposure to flood hazard (it is located away from the main overland flow path) as per A1 in the Standard;
- the development has been designed and can be constructed so that in a 1% AEP flood event the works do not have an adverse impact on the environment (the development will not change flow patterns, affect riparian vegetation, nor affect watercourses) as per B1 in the standard; and

[2] Calculated as (24.3-24.15) × (12.48 – 2.5) = 1.5m^3, where 24.3m AHD is the Flood Planning Level, 24.15m AHD is the natural ground level, 12.48m^2 is the raised area of the ground floor, and 2.5m^2 is the area occupied by footings, supports and other items that must be subtracted from the flood storage calculation.

- for suspended pier/pile footings, there must also be sufficient openings in perimeter walls located below the 1% AEP flood level to allow for the flood waters to flow through unimpeded (the natural ground level at the proposed development is *at* the 1% AEP flood level, with the proposed ground floor suspended above this, so there are no underfloor areas below the 1% AEP flood level, but there will in fact be sufficient openings *above* the 1% AEP flood level) as per F2 in the Standard.

A3 is not applicable as the proposed development increases flood storage, and no compensatory works are required.

B1 and B2 are not applicable as no flood mitigation works or stormwater devices that modify a major drainage system, stormwater system, natural water course, floodway or flood behaviour within or outside the development site are proposed.

For C1, all buildings shall be designed and constructed as flood compatible buildings in accordance with Hawkesbury-Nepean Floodplain Management Steering Committee (2006), as was listed as being required in Section 5.

For C2, "all structures must be designed and constructed to ensure structural integrity up to the Flood Planning Level, taking into account the forces of floodwater, wave action, flowing water with debris, buoyancy and immersion. Structural certification shall be provided confirming the above". This could be a consent condition if required, but such detailed structural design is not considered to be necessary for DA purposes.

For C3, "all new electrical equipment, power points, wiring, fuel lines, sewerage systems or any other service pipes and connections must be waterproofed and/or located above the Flood Planning Level. All existing electrical equipment and power points located below the Flood Planning Level must have residual current devices installed that turn off all electricity supply to the property when flood waters are detected". This was partly listed as being required in Section 5.

For D1, hazardous or potentially polluting materials shall not be stored below the Flood Planning Level unless adequately protected from floodwaters in accordance with industry standards. This means that such materials shall not be stored in the sub-floor area, as was listed as being required in Section 5.

For D2, goods, materials or other products which may be highly susceptible to water damage are to be located/stored above the Flood Planning Level. This again means that such materials shall not be stored in the sub-floor area, as was listed as being required in Section 5.

E1 is not applicable as flood risk to life is considered negligible and the flood emergency response planning policy does not apply.

For E2, "new development must provide an appropriately sized area to safely shelter in place above the Probable Maximum Flood level and appropriate access to this area should be available from all areas within the development". The proposed development has a first floor that can be used to shelter in place.

For F1, "new floor levels within the development shall be at or above, the Flood Planning Level. The structure must be flood proofed (wet or dry) to the Flood Planning Level". The proposed development has a ground floor level of 24.33m AHD, just above the Flood Planning Level of

24.3m AHD[3]. If the requirements in Section 5 are followed, the development would be adequately flood-proofed.

For F2, "all development structures must be designed and constructed so as not to impede the floodway or flood conveyance on the site, as well as ensuring no loss of flood storage in a 1% AEP Event. Where the dwelling is located over a flow path it must be elevated on suspended pier/pile footings such that the level of the underside of all floors including balconies and decks within the flood affected area are at or above, or raised to the Flood Planning Level to allow clear passage of the floodwaters under the building. The development must comply with the Flood Prone Land Design Standard". As noted above, the proposed development increases flood storage up to the Flood Planning Level, and complies with the Standard.

For F3, "where the lowest floor has been elevated to allow the passage of flood waters, a restriction shall be imposed on the title of the land, pursuant to S88B of the Conveyancing Act confirming that the undercroft area is not to be enclosed". This is a matter for Council, if required.

F4 is not applicable as the renovation exceeds 30m^2.

F5 is not applicable as subdivision is not proposed.

F6 is not applicable as an existing floor level is not being retained below the Flood Planning Level when undertaking a first-floor addition.

F8 is not applicable as a first-floor addition is not proposed, although it can be noted that the floor level of the first floor of the proposed development (27.25m AHD) is well above the PMF level of 24.38m AHD.

F9 is not applicable as no foyer is proposed.

Therefore, the proposed development satisfies the prescriptive controls in Chapter 5.4.3.2, and hence is deemed to satisfy Chapter 5.4.3.1 of DCP 2013.

6.3 Flood Risk Management Policy

This policy does not introduce any specific controls for the proposed development.

7. CONCLUSIONS

At 29 White Street Balgowlah, it is proposed to undertake alterations and additions at the SE corner of the existing development. The ground floor is to be raised as part of its renovation, with an open sub-floor to allow flood storage underneath (this area does not currently contribute to flood storage as it is enclosed by solid walls and doors). A new laundry extending west of the existing ground floor is proposed, that will again be elevated above natural ground to provide flood storage underneath, so will have a negligible impact on flood storage for the design 1% AEP event. A deck extending west of the new laundry will also have a negligible impact on flood storage.

[3] The deck is below a Flood Planning Level of 24.45m AHD that could theoretically be applied if a 0.3m freeboard is added to the 50mm flood depth at that location. However, as discussed at Footnote 1 on page 4, this is considered to be acceptable from a flooding risk perspective.

Based on flood information obtained from Council, the 1% AEP flood level in the vicinity of the proposed development is 24.15m AHD, while the PMF level is 24.38m AHD. With natural ground levels over the proposed development footprint equal to about 24.15m AHD, the proposed development area is just outside the 1% AEP flood extent. It is not appropriate to add a 0.3m freeboard to a zero depth flood extent, but it is recognised that there is the potential for up to a 0.15m depth of overland flow over the proposed development area in the design event. That is, a Flood Planning Level of 24.3m AHD is considered to be appropriate for the proposed development. The proposed ground floor level of 24.33m AHD is 0.18m above natural ground, and is 30mm above this Flood Planning Level.

As natural ground levels are 24.1m AHD at the proposed deck, this is just within the 1% AEP flood extent, and a freeboard of 0.3m must then theoretically be applied this location. The proposed deck at 24.33m AHD is thus below the theoretical Flood Planning Level of 24.45m AHD at this location, but this is considered to be acceptable as it has a negligible impact on flood storage, and inundation above the floor level of the deck is considered to be acceptable for a minor deck structure that would be designed to withstand inundation. Therefore, a minor variation to one or more of the flood related development controls is requested for the deck.

The proposed development is considered to be at an acceptably low risk of damage from flooding hazards if high durability timber is used, relevant guidance in Hawkesbury-Nepean Floodplain Management Steering Committee (2006) is followed, the sub-floor is kept open, and no electrical items or other services or materials that could be damaged by inundation are located in the sub-floor area, as outlined in Section 5.

The proposed development satisfies Clause 6.3(3) of *Manly Local Environmental Plan 2013*, and satisfies the prescriptive controls in Chapter 5.4.3.2 of *Manly Development Control Plan 2013* (including satisfying the Flood Prone Land Design Standard).

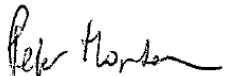
8. REFERENCES

Hawkesbury-Nepean Floodplain Management Steering Committee (2006), *Reducing Vulnerability of Buildings to Flood Damage, Guidance on Building in Flood Prone Areas*, ISBN 0 7347 5614 3

9. SALUTATION

If you have any further queries, please do not hesitate to contact Peter Horton via email at peter@hortoncoastal.com.au or via mobile on 0407 012 538.

Yours faithfully
HORTON COASTAL ENGINEERING PTY LTD



Peter Horton
Director and Principal Coastal Engineer

Form A/A1 of the "Guidelines for Preparing a Flood Management Report" of Council is attached overleaf

NORTHERN BEACHES COUNCIL
STANDARD HYDRAULIC CERTIFICATION FORM
FORM A/A1 – To be submitted with Development Application

Development Application for

Address of site: 29 White Street Balgowlah

Declaration made by hydraulic engineer or professional consultant specialising in flooding/flood risk management as part of undertaking the Flood Management Report:

I, Peter Horton on behalf of Horton Coastal Engineering Pty Ltd
(Insert Name) (Trading or Business/ Company Name)

on this the 28th May 2020 certify that I am engineer or a
(Date)
professional consultant specialising in flooding and I am authorised by the above organisation/ company to issue this document and to certify that the organisation/ company has a current professional indemnity policy of at least $2 million.

Flood Management Report **Details:**

Report Title: Flood Risk Management Report for 29 White Street Balgowlah

Report Date: 28 May 2020

Author: Peter Horton

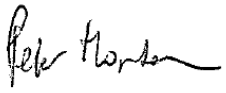
Author's Company/Organisation: Horton Coastal Engineering Pty Ltd

I: Peter Horton
(Insert Name)
Please tick all that are applicable (more than one box can be ticked)

☑ have obtained and included flood information from Council (must be less than 12 months old) (**This is mandatory**)

☑ have followed Council's Guidelines for Preparing a Flood Management Report

☑ have requested a (minor) variation to one or more of the flood related development controls. Details are provided in the *Flood Management Report*.

Signature 

Name Peter Horton, Director of Horton Coastal Engineering Pty Ltd