2-4 Lakeside Crescent & 389 Pittwater Road, North Manly, NSW

Applicant Responses to Flooding Queries, Contentions and Comments 3 July 2023

As advised by Kerry Gordon Planning Services in an email received on 29 June 2023:

Below in red are Council's qualifying statements in relation to whether they agree with my summary. Please let me know if you agree with any of the qualifications.

Council identified 4 issues in terms of the suitability of the development in the flood situation as follows. Could you please give me a response in relation to them:

Our latest responses are given below in this colour.

Potential for failure of flood door/s – blocked, don't work, need for maintenance and the
resultant risk if they fail

The proposed mitigating measures will be constructed to appropriate standards and are not intended to fail. This is the same as all engineered structures, that while there always remains the possibility of failure, are designed to avoid intolerable risks. The fact that the complex will be managed by a CHP provides greater assurance that the structures will be maintained to appropriate standards.

In the FERP it is also proposed, in part, that water levels be monitored visually from any location within the building that has a clear view of the main entry ramp and the proposed marker as follows:

- (i) If floodwaters are observed in the vicinity of the property and these floodwaters reach the level of the marker (at 2.4 m AHD), then residents and any visitors on the ground floor are to be warned that they may need to evacuate to Level 1;
- (ii) If floodwaters continue to rise and reach the level of the top of the ramp ie. around 2.9 m AHD), then evacuation of residents and any visitors on the ground floor to Level 1 is to commence;
- (iii) The indicative time available to evacuate residents and any visitors on the ground floor to Level 1 is expected to be around the same time it takes for water levels at the gauges to rise from 2.4 m to 3.0 m.

A flood door would only fail to operate if it the door was physically blocked from self closing. One of the responsibilities for the flood warden(s) would be to confirm that all flood doors are fully closed at the time that any evacuation of the Ground Floor is initiated ie. prior to floodwaters reaching the Ground Floor.

If the flood door seals are in need of maintenance then any "failure" would result in leaks around the door seal that would very slowly inundate the ground floor. Given that any evacuation of any remaining residents on the Ground Floor will have already commenced prior floodwaters reaching the door sill any failure would have minimal impact on the evacuation of Ground Floor residents.

During the detailed design stage an assessment would be undertaken of the vulnerability of any flood doors to damage by floating debris eg cars If a door is assessed to be vulnerable in events where floodwaters rise up to the FPL then measures would be identified to protect any vulnerable flood door. It is noted that once floodwaters rise above the FPL that it is intended that the ground floor be inundated so any "failure" of a flood door is a non-issue.

Such mitigation measures are appropriate for an adaptive reuse of a building, which I understand is desirable for planning reasons.

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• Problem with disabled person getting up the stairs unaided particularly in case of power failure

In relation to the proposed tenant allocation policy and as described by Link Wentworth in their letter dated 11 January 2023 **(Attachment A)**:

Noting, that specifically for this building it would mean ensuring that residents within the ground floor boarding house and the upper floors DO NOT have physical vulnerabilities that would cause difficulties in responding effectively during a flood event and preventing timely access to the refuge on the first floor to shelter-in-place, or to evacuate if told by the Flood Warden or emergency response teams.

Link Wentworth is developing a policy with procedural guidelines, specific to this project to guide tenant selection. This means that Link Wentworth will offer the property to customers who are best suited to the property and local area dynamics. This will restrict potential occupants at 2-4 Lakeside Crescent, North Manly with physical vulnerabilities from being allocated accommodation due to the building being in a flood prone area.

It should be noted that power failure and rain events do not always occur together. Many storms come and go without any loss of power. Power failure is more common in electrical storms which do not always result in peak flood events.

In relation to evacuation of any remaining residents from the Ground Floor to the refuge area on Level 1 at the time of major floods, there is a hierarchy of evacuation methods which will be implemented.

- (i) Evacuate by internal lift (vulnerable residents would be given priority)
- (ii) If the lifts cease to operate then:
 - (a) Able bodied residents walk up the stairs
 - (b) vulnerable people for the ground floor to the flood refuge on Level 1 using the installed stair lift
- (iii) If the stair lift ceases to operate then flood wardens would manually assist any vulnerable persons on the ground floor up the stairs to Level 1.

Consideration has already been given to the concept of battery backup to continue to operate the stair lift. During the detailed design stage consideration can be also given to battery backup/solar power in the event mains supply is disrupted –this would eliminate any fire hazard due to residents lighting candles.

• Concern that it is inappropriate planning to change the use to a relatively high density residential use given the flood characteristics of the site, it is putting vulnerable people at unreasonable and unnecessary risk.

It is our view that the 2012 Flood Impact Assessment, the 2022 Flood Emergency Response Plan and additional advice contained in Cardno (now Stantec) letters dated 2 September 2022 and 5 October 2022 and Stantec letter dated 5 April 2023 have comprehensively demonstrated that DA DA2021/1912 for the proposed adaptive re-use of the existing building on 8 Palm Avenue and 2-4 Lakeside Crescent, North Manly addresses the flood risks experienced on the subject property and that no tenant/resident is faced with unreasonable risk.

It is our view the management measures including a readily accessed refuge above the PMF and the active implementation of a FERP means that tenants/residents are at far less risk than others living in single storey dwellings elsewhere in the Lakeside Crescent/Palm Avenue/Riverview Parade area. It is noted that around 45% of all dwellings in this area are single storey.

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As concluded by Link Wentworth in their letter dated 30 June 2023:

The **major vulnerability** of potential tenants of this building is **Homelessness** - these proposed homes will provide, **safe, secure, well managed and well-maintained homes** for local Northern Beaches residents for many years to come-subject to the approval to proceed. (refer **Attachment B**)

• Difficulties with medical evacuation if necessary

The issue of medical evacuation is the same as far any other resident in the Lakeside Crescent/Palm Avenue/Riverview Parade area. An external stair provides access from Level 1 down to any emergency vehicle that attends the property and approaches the base of the external stair. This external stair would provide ready access for emergency service personnel to Level 1 in contrast to the need for emergency services staff to enter two storey dwellings in order to access any resident sheltering on a second floor in need of medical evacuation. It is also considered that residents in single storey dwellings (around 45% of all dwellings) in the Lakeside Crescent/Palm Avenue/Riverview Parade area are a more likely to initiate a medical evacuation given the direct exposure to floodwaters experienced by these residents in major to extreme floods.

In particular Council noted the two attached documents, identifying the suggested 6 hour flood duration for SIP in the first document and the appropriateness related to the flow chart for considering flood emergency management in redevelopment; and the potential for other issues to emerge during shelter in place, for example "medical emergencies and fire either due to power surges or makeshift lighting or heating" in the second document.

DPE draft Shelter-in-Place Guideline

The FERP was prepared over the period October 2021 – May 2022.

The DPE draft Shelter-in-place guideline was on exhibition for public comment from 17 January until 28 February 2023. This is 7+ months after the FERP was finalized. Notwithstanding the Department's draft Shelter in Place guidelines were released after the FEDRP was finalised, the following is an assessment of the consistency with the draft guidelines.

Horizontal evacuation at street level by vehicles before any roads are cut by floodwaters is preferred by NSW SES. It may be feasible under circumstances where significant antecedent rainfall is capable of generate flooding in Manly Creek and Manly Lagoon but which does not cut off Lakeside Crescent. Such flooding may encourage tenants/residents to evacuate from the site if even greater flooding is forecast.

Conversely, in the absence of significant antecedent rainfall capable of generate significant flooding in Manly lagoon, then any horizontal evacuation would need to be commenced based on rainfall forecasts and likely prior to the start of an extreme storm or the observation of floodwaters in the Manly Creek and Manly Lagoon. While some tenants/residents may be willing to evacuate based on forecast rainfall and before any significant flooding is observed close to the site, any tenants/residents who attempted to evacuate off-site in response to observations of significant flooding (in the absence of significant antecedent rainfall) would likely encounter unsafe conditions for a period of time (refer **Attachment C**) and it would be safer to remain on site on levels above the PMF level.

The elapsed time from the start of a PMP storm (PMF) until unsafe pedestrian conditions are experienced on Lakeside Crescent footpath are 25-30 mins while the duration of unsafe conditions for adults in a PMF would be less than 5 hours. This is consistent with the draft guidance as to when shelter-in-place would be appropriate.

Levels 1 and 2 of the development are all above the PMF level which is consistent with the draft guidance.

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Support for Emergency Management Planning, Flood Risk Management Guide EM01

As stated in the introduction, in part: the advice provided in this guide is not intended to endorse or condone a decision to place or manage a development in a given location where the specifics of the development are not known. It is intended to inform decision-making under the FRM framework and FRM process.

The 2018 Manly Lagoon Flood Risk Management Study and Plan maps the property as within a Low Flood Island in both the 1% AEP and PMF events (see **Attachment D**).

As described in Section 9.3.2 RM02: Flood Warning and Emergency Response Strategies in WMAwater, 2018 in part:

... Current advice is to watch out for 70mm rainfall in 3 hours and/or 150mm rainfall in 24 hours and states that "when flash flooding is likely, leave low-lying homes and businesses well before any flooding begins. Evacuation is the best action to take, but only if it is safe to do so".

.... As described in Section 6.4.2, the evacuation potential of the Manly Lagoon catchment in the event of flooding is limited. Accordingly, it was concluded that safe evacuation is not possible for a large number of properties within the catchment, and in some instances may actually exacerbate risk by increasing the chance of motorists entering flood waters. This conclusion is in accordance with the Australasian Fire and Emergency Service Authorities Council (2013, Reference 5) guideline which states that evacuation is the most effective strategy, provided that evacuation can be safely implemented. Additionally, a review of flood fatalities in Australia has found that the large majority (76%) of fatalities occurred not in the home, but outside when people have entered flood waters (Reference 8). A key issue with shelter-in-place is whether floor levels are sufficiently high to be above the level of the PMF and what hazard classification is experienced at the property for various events.

.... Due to the short available warning times and the various factors described in the previous sections, the provision of an effective flood warning service for flooding in the Manly Lagoon catchment is difficult. Issuing evacuation orders in many cases may actually exacerbate risk by requiring people to leave their homes leading to an increased risk of motorists attempting to traverse floodwaters

It was recommended, in part, in Council's 2018 Manly Lagoon Flood Risk Management Study and Plan:

 Shelter-in-place preferred to evacuation for properties with sufficiently high floor levels.

This recommendation is supported for the adaptive re-use of the existing building on 8 Palm Avenue and 2-4 Lakeside Crescent, North Manly.

2-4 Lakeside Crescent & 389 Pittwater Road, North Manly, NSW

Further to our discussion this afternoon, the following edits of your summary of flooding characteristics are suggested for your consideration in this colour:

Site Flooding Characteristics

- The Site is affected by the 1% AEP event which would result in a flood level of RL 3.14 3.16 (with a 5% AEP tailwater) and a flood depth of 0.7-1.0m. In such an event the flood velocity would be 0-0.5m/s. The Site is identified as part Low and Transitional with High Hazard areas adjoining Lakeside Crescent (2005 NSW Floodplain Development Manual hazards), with a categorization of H1-H2 and H3-H4 (2022 DPE Flood Risk Management Guide hazards) in the 1% AEP event \.
- During the PMF event the Site would have in a flood level of RL 5.72 5.74 and a flood depth of >1.5m. In such an event the flood velocity would be 0-0.5m/s. The Site is identified as High Hazard (2005 NSW Floodplain Development Manual hazards), with a categorization of H5 (2022 DPE Flood Risk Management Guide hazards) in a PMF event.
- The Flood Planning Level (FPL) for the Site is RL 3.66 AHD.

Flood Impacts

During a 1% AEP (with a 5% AEP tailwater) event

• by virtue of the proposed flood mitigations measures, including no openings below the FPL in the building walls other than entrance doors, flood doors or flood barriers at entrances and flood walls incorporated into the landscape, the proposed ground level (boarding house) would not flood in events up to the flood planning level (3.66 m AHD).

Assuming the flood doors operate during a flood. Even with strong conditioning and redundancies, there is risk that they won't operate.

The proposed mitigating measures will be constructed to appropriate standards and are not intended to fail. This is the same as all engineered structures, that while there always remains the possibility of failure, are designed to avoid intolerable risks. The fact that the complex will be managed by a CHP provides greater assurance that the structures will be maintained to appropriate standards

 characterized by an initial surge of 200mm then a more gradual rise after approximately 2 hours and 40 minutes, with the peak flooding occurring approximately 6 hours and 40 minutes after the start of the storm burst.

This may be the case for some scenarios, however [based on ARR 1987 Guidelines and adopted flood study], a 1% AEP flood can flood to 2.7mAHD in 1 hour after the start of the rain.

The assessment are based on storm bursts. In flood producing storms, the start of rain typically preceeds the start of the storm burst.

• Evacuation by small vehicles becomes unsafe in the Lakeside Crescent low point 2 hours and 55 minutes after the start of the storm burst.

In a 1% AEP storm, I expect this could happen in 40minutes. In some storms there would be no warning and its not expected that a evac plan would be followed.

An updated assessment of pedestrian safety /evacuation is given in Attachment C.

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• Evacuation on foot is potentially possible early in the event but given the nature of residents, particularly on the upper levels, may be problematic.

In some storms there would be no warning and its not expected that a evac plan would be followed.

This is a Council opinion only and Link Wentworth would strongly dispute this opinion.

• Shelter in place is likely the preferred option in case of this event.

Cautious about say "preferred", my suggested wording is it is the only realistic outcome

Preferred is a reasonable descriptor given the DCP (Part E11, Control E2) and "Guidelines for development on flood prone land" both identify SIP as an option.

- Adequate area is provided on the first floor to accommodate residents of the ground floor to shelter in place.
- Onsite isolation in the event evacuation does not occur for this event would be up to 8 hours for small vehicles driving through the Lakeside low point.

[Based on ARR 1987 Guidelines and adopted flood study], it could be +10hrs for the 1% AEP flood in some scenarios because roads are cut off at approx 2.0mAHD. I think its "very unlikely" to be longer than 14 hours, but I don't think it has been modelled, so is a guess. I would expect that's its "extremely" unlikely that it could be cut off for longer than 18hrs, but this is also a guess (also this may be affected by sea level rise, and may be longer for events bigger than a 1% AEP, but still unlikely to be over 18hrs).

An updated assessment of pedestrian safety /evacuation is given in Attachment C.

I agree that Council is guessing.

• No detrimental impact upon flood storage or surrounding properties due to development.

During a PMF event

- the proposed ground level (boarding house) would flood to a depth of 2.76m (ie close to the ceiling).
- the first floor would be 240mm above the PMF flood level.
- characterized by an initial surge of 220mm 500mm, with the peak flooding occurring approximately 1 hour and 55 minutes after the start of the storm burst

fyi - timed for the start of the rain

The assessments are based on storm bursts. In flood producing storms, the start of rain typically preceeds the start of the storm burst.

- Evacuation by small vehicles becomes unsafe at the Lakeside Crescent low point 13 minutes after the start of the storm burst.
- Evacuation on foot is likely to be unsafe.

2-4 Lakeside Crescent & 389 Pittwater Road, North Manly, NSW

• Shelter in place is the preferred option in case of this event

only realistic option

As recommended in Council's 2018 Manly Lagoon Flood Risk Management Study and Plan - Shelter-in-place preferred to evacuation for properties with sufficiently high floor levels.

• Onsite isolation in the event evacuation does not occur for this event would be up to 6 hours and 25 minutes for small vehicles driving through the Lakeside low point.

See comment in 1% section regarding this.

An updated assessment of pedestrian safety /evacuation is given in Attachment C.

 No detrimental impact upon flood storage or surrounding properties due to development. 11 January 2023

Bill Donohoe Development manager Landcom

Dear Bill,

We offer the following clarification in relation to the recent meetings with Landcom and Council in relation to the Development Application for the Queenscliff Site.

Community Housing providers are obligated to match and offer properties in accordance with the provisions of the:

- Housing Act 2001
- Anti-Discrimination Act 1977
- Disability Discrimination Act 1992
- Occupational Health and Safety Act 2000

Notwithstanding and further to our meeting with Council held 20th December 2022, concerns were raised by the Council flood engineers about flood risk and how Link Wentworth management would ensure the successful deployment of our Flood Emergency Response Plan (FERP). Link Wentworth takes seriously the potential risk to life, and whilst the recent 1 in 100-year storm event in March 2022 did not flood the ground floor of the existing Queenscliff Community Health Centre and severe flooding of the building is likely remote, Link Wentworth would like to clarify and believes the following actions will provide additional safety and security to residents, should we experience a significant storm and flood event. Additionally, the inclusion of an on-site Flood Warden and a Restrictive Tenant Allocation Policy will ensure those with physical vulnerabilities are not allocated housing within this building. These measures will provide Council with the assurance that in the event of a flood the residents and building will be professionally managed.

Proposed onsite Flood Warden

As discussed with Council, Link Wentworth considers the addition of an onsite Flood Warden an important measure for managing residents during a storm and flood event. Typically for other Link Wentworth buildings this would be a voluntary role held by an on-site resident with a discount to their weekly rent for their services.





Link Wentworth Providing homes, building futures.

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The Flood Warden's role and responsibilities would be documented in the FERP. Training would be provided to establish the role for each new incoming Flood Warden and annual training would be provided to ensure up to date knowledge, currency of responsibilities, key actions and information required for residents and Link Wentworth management and the conditions that would trigger activation of the FERP.

The Flood Warden position will play a key role in assisting Link Wentworth Housing Managers, building residents, and Council with local information on flood conditions. For example, before or during a potential flooding event the Flood Wardens may be contacted to give an account of ground conditions, water levels, weather, etc, to help the Link Wentworth Management Team with implementing our FERP and providing Council with information about activities to coordinate an appropriate response for residents.

The proposed Flood Wardens may notice or have been given information about rising flood waters, a blocked watercourse, culvert, drain or burst pipe in the locality of the site. The Flood Warden would then report this to the relevant agency so that the necessary remedial action is carried out. By doing this, watercourses will be kept flowing unobstructed thus reducing the risk of local flooding.

The role of the Flood Warden would primarily be about communication, and there are many ways in which a Flood Warden can help their local community in times of flood. These include:

- Assist with the review and maintenance of the FERP with Link Wentworth Management, relevant Environment Agency, and council.
- Monitor the condition of local drains, culverts, brooks, and other watercourses and report any defects or blockages to the appropriate agency.
- Distributing flood related information to residents and local community.
- Encouraging individuals to sign up to the Environment Agency free flood warning
- service, Floodline Warnings Direct (FWD) where available.
- Reinforce flood warnings when they are issued.
- Visit residents at risk to ensure that warnings have been received.
- Call for assistance on behalf of people who are struggling to carry out essential
- actions to safeguard themselves or their property.
- Have local knowledge and information on the latest flood situation (the Environment Agency will help with this).
- Liaise with the Environment Agency, Council and Emergency Services on local conditions and needs on the ground.
- Note and report local flood event details.
- If possible, set up local patrols to monitor the situation.

Link Wentworth Tenant Allocation Policy

The community housing sector aims to promote a successful and sustainable tenancies when matching a client to an affordable housing property. In general, this means matching a client to a property that:

- is large enough for the client's household, and
- meets any special needs of the client, so far as these are known, and
- assists the client to access special support services that they need, and



• makes the best use of available housing stock in a timeframe that balances the client's need for stable housing with the costs to the housing provider of helping.

This includes ensuring that properties with specific features that are in high demand and short supply are only offered to those clients who need them. These features include:

- properties suitable for older people, or
- properties that have been built or modified to meet the needs of people with a disability, or
- in some areas, properties on the ground floor, properties with level access, or properties with yards.

Noting, that specifically for this building it would mean ensuring that residents within the ground floor boarding house and the upper floors DO NOT have physical vulnerabilities that would cause difficulties in responding effectively during a flood event and preventing timely access to the refuge on the first floor to shelter-in-place, or to evacuate if told by the Flood Warden or emergency response teams.

Link Wentworth is developing a policy with procedural guidelines, specific to this project to guide tenant selection. This means that Link Wentworth will offer the property to customers who are best suited to the property and local area dynamics. This will restrict potential occupants at 2-4 Lakeside Crescent, North Manly with physical vulnerabilities from being allocated accommodation due to the building being in a flood prone area.

Could you please pass on these clarifications to Council so they can be considered as part of their referral to the Northern Beaches Planning Panel

Yours sincerely

Paul Hunt Head of Development

30 June 2023

Jillian Sneyd, GLN Planning Level 10, 70 Pitt Street Sydney, NSW 2001

Dear Jillian,

59919086: 389 Pittwater Road | Queenscliff, North Manly

1 am pleased to provide Link Wentworth's position in relation to tenancy and property management for the management of flood risk. Could you please forward this advice to the Expert Planner appointed to review the Development Application for this important project.

I would like to acknowledge the significant due diligence by Landcom, Link Wentworth's management, the expert Consultant team and our Asset & Development Committee and Board members in reviewing, recommending and now willing to deliver this important project to provide much needed affordable accommodation in an area deemed extremely unaffordable by council's Local Strategic Planning Statement and Housing Strategy.

As an overview, the following provided me with the confidence to recommend our project for approval to the Link Wentworth Board, which our Board have indeed approved to proceed, subject to receipt of Development Approval:

- the quality and thoroughness of the significant flood studies undertaken by our expert consultants;
- the design and mitigation measures incorporated into the building design;
- the significant flooding events that have occurred over the last two years, which did not impact the ground floor of the existing building (the March 2022 event recorded as a 1 in 100-year storm event, which Northern Beaches residents and the media called the worst in living memory);
- that our insurance provider has confirmed the project is insurable during construction and on an individual unit basis without a significant premium;
- that should the ground floor of the building flood, there are significant design and management processes in place, including a resident refuge and common area incorporated into the design on the first floor. In this eventuality the building would become a refuge (and a massive asset) for surrounding properties which are at greater risk;
- that Link Wentworth has great confidence in our high calibre Asset Management team, with comprehensive processes in place to ensure an appropriate cycle of recurrent inspections, annual testing and staff training to ensure and maintain operational effectiveness of all safety measures designed for this project;



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- that Link Wentworth has operational processes in place to ensure our dedicated Housing Managers activate and provide leadership in the implementation of the building's Flood Emergency Response Plan when required; and,
- Most importantly in relation to housing need, I attach a circular which I received a week ago.
 - Community Northern Beaches report that they have "seen a massive and alarming **60% increase** in the people presenting to our Manly and Brookvale community drop-in centres facing homelessness".
 - Our 37 high quality homes proposed at Queenscliff are in a high-value area with huge demand.
 Subject to receiving approval to proceed, these homes will be a valuable asset to the community for generations.

The major vulnerability of potential tenants of this building is **Homelessness** – these proposed homes will provide, safe, secure, well managed and well-maintained homes for local Northern Beaches residents for many years to come – subject to the approval to proceed.

Yours sincerely, Andrew McAnulty **Chief Executive Officer**

Attached: Community Northern Beaches email dated 20 June 2023

Andrew McAnulty

From:	Community Northern Beaches <info@mail145-6.atl61.mandrillapp.com> on behalf of</info@mail145-6.atl61.mandrillapp.com>			
	Community Northern Beaches <info@cnb.org.au></info@cnb.org.au>			
Sent:	Tuesday, 20 June 2023 11:12 AM			
То:	Andrew McAnulty			
Subject:	Help Address a Growing Crisis			
Follow Up Flag:	Follow up			
Flag Status:	Flagged			



WE'RE SEEING A WAVE OF NEED IN OUR COMMUNITY

Dear Andrew,

As winter sets in, remember that victims of domestic and family violence may not have a safe home, and at Community Northern Beaches we have seen a 60% increase in the people presenting to our Manly and Brookvale community drop in centres facing homelessness. This is nothing short of a crisis. As the end of financial year approaches, remember that you can help and claim a tax deduction.

<u>Donate Today</u> or join one of our Events (below)

Our support workers and volunteers support people in the community who are doing it tough. Whether it is domestic and family violence, homelessness or other complex needs,

we are locals supporting locals and we build connections with fellow community members, and provide holistic support.

Give a Gift \$1,500: supports one person facing homelessness or 0.8 Domestic & Family Violence clients for a year

<u>Give a Gift \$250</u>: provides 3.5 support services to homeless/DFV clients + an emergency food voucher

Give a Gift \$100: provides 1.75 instances of support to homeless/DFV clients

Give a Gift \$40: supports an emergency food voucher for a person facing homelessness or DFV

Donate Today!



Surf Legend and Gourmet Delights

Wednesday Aug 23, 12 noon, we would like to invite you to our Fundraising Lunch at awarded, seaside, gourmet restaurant Pilu at Freshwater, with key guest speaker Local Surf Legend, Layne Beachley AO. You will be served with a 2-course meal and welcomed with a unique cocktail. Wine pairing will also be available. There are some amazing raffle and silent auction prizes for you to bid on. Many local pillars of the community will be in attendance.

Join Lunch Event

#LocalsSupportingLocals - Other members of our community recognise an ongoing call for support of people in need in our community and choose subscription donations. Our support workers and volunteers are at the core of providing support for homelessness, domestic & family violence, refugee settlement, community drop-in, and family & youth services. But with the crisis upon us, another way to ensure we can plan predictability and continuity of services is with subscription giving.



DEVELOPMENT APPLICATION NO: DA2021/1912, 2-4 LAKESIDE CRESCENT & 389 PITTWATER ROAD, NORTH MANLY, NSW

PEDESTRIAN SAFETY

3 July 2023

An updated assessment of pedestrian safety in the vicinity of the low point in Lakeside Crescent that controls vehicular egress to Pittwater Road is outlined as follows.

LIKELIHOOD OF FLOODS

As discussed, in part, in the 2005 NSW Floodplain Development Manual (2005 FDM):

Flood planning levels (FPLs) are an important tool in the management of flood risk. They are derived from a combination of a flood event, an historic flood or flood of certain AEP (discussed in Section K4), and a freeboard (see Section K5).

..... As decisions on FPLs are generally based around floods of a certain AEP, Figure K3 showing the relationship between AEP and the chance that an event occurring in a given period of years and Table K1 showing probabilities of experiencing various AEP floods over 70 years, provide valuable background information.

Table K1 highlights that a 2% AEP flood has a 75% chance of occurring once and a 41% chance of occurring twice in 70 years. The possibility of getting two large floods in a relatively short period is highlighted by around 1% AEP floods in Kempsey in 1949 and 1950 and in Lismore in 1954 and 1974

Table K1 in the 2005 FDM provided the template for **Table 1** which summarises the probabilities of experiencing a given size flood once or twice in a 70 year period.

Event AEP		At least once in 70	At least twice in 70	
(%)	1 in X	years	years	
10.0%	10	99.9%	100.0%	
5.0%	20	97.2%	87.1%	
2.0%	50	75.7%	41.0%	
1.0%	100	50.5%	15.5%	
0.5%	200	29.6%	4.8%	
0.2%	500	13.1%	0.9%	
0.1%	1,000	6.8%	0.2%	
0.00001%	10,000,000	0.0007%	0.000000024%	

Table 1 Probability of experiencing the Given Flood once or twice in a 70-year Period

The likelihood of experiencing a 1% AEP flood once or twice over a 70-year period is highlighted in **Table 1.** The likelihood of experiencing an extreme flood approaching the PMF (1 in 10,000,000) once or twice over a 70-year period as also tabulated.



PEDESTRIAN STABILITY IN FLOODS

The latest edition of Australian Rainfall and Runoff released in 2019 provides guidance pedestrian stability in floods.

Pedestrian Stability



Figure 9.2.4. Safety Criteria for People in Variable Flow Conditions (After Cox et al, 2010)

As stated in ARR2019:

Cox et al., 2010 concluded that self-evacuation of the most vulnerable people in the community (typically small children, and the elderly) is limited to relatively placid flow conditions. Furthermore, a D.V as low as 0.4 m2s-1 would prove problematic for people in this category, *i.e.* the more vulnerable in the community.

These hazard regimes for tolerable flow conditions (D.V) as related to the individual's physical characteristics (H.M) are presented in Figure 9.2.4

The variation in flood depths and velocity in a 1% AEP flood and the PMF at the reference location L4 (refer Figure 1) are plotted and compared to the pedestrian stability limits in **Attachment C1**.

Three scenarios are assessed as follows:

- (i) Location L4 on the centreline of Lakeside Crescent in the vicinity of the low point
- (ii) Opposite L4 on the footpath
- (iii) Opposite L4 on the footpath but under conditions where the footpath has ben raised to provide a rising path from the corner of Palm Avenue to Pittwater Road (ie. raising the current footpath level at this location by 0.22 m)

Based on the criterion for pedestrian stability, the periods of time that conditions would be unsafe for children and adults at the Location L4 are given in **Table 2**.





Figure 1 Reference Locations and Indicative Evacuation Routes (

Fable 1	Available	Warning	Time and	Periods	of Isolation
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	Duration (mins) it is Unsafe for:				
_	Children	Adults	Children	Adults	
Location	1%.	AEP	PMF		
L4 Road	415	210	370	310	
	6 hrs 55 mins	3 hrs 30 mins	6 hrs 10 mins	5 hrs 10 mins	
L4 Footpath	405	195	365	285	
	6 hrs 45 mins	3 hrs 15 mins	6 hrs 5 mins	4 hrs 45 mins	
L4 Footpath					
Raised	350	135	350	270	
	5 hrs 50 mins	2 hrs 15 mins	5 hrs 50 mins	4 hrs 30mins	

	Elapsed Time from Start of Storm Burst until Unsafe Conditions Reached (mins):			
	Children	Adults	Children	Adults
Location	1%	AEP	PMF	
L4 Road	205	310	15	35
	3 hrs 25 mins	5 hrs 10 mins	15 mins	35 mins
L4 Footpath	210	315	25	35
	3 hrs 30 mins	5 hrs 15 mins	25 mins	35 mins
L4 Footpath				
Raised	240	340	20	45
	4 hrs	5 hrs 40 mins	20 mins	35 mins



It will be noted that in short duration extreme floods that unsafe conditions can develop rapidly on Pittwater Road. In longer duration storms the time available to evacuate by vehicle increases. It is also noted that conditions become unsafe on Lakeside Crescent more rapidly than on Pittwater Road and would prolong the period of isolation of any residents relying on egress via Lakeside Crescent.

Table 2 discloses that:

- (i) In a 1% AEP flood, conditions:
 - adults would be able to evacuate through floodwaters for an additional 3+ hours longer than would unaccompanied children;
 - Raising the footpath to provide a rising path from the corner of Palm Avenue to Pittwater Road would:
 - reduce the time it would be unsafe for unaccompanied children and adults to evacuate by around 1 hour;
 - reduce the duration of unsafe conditions for adults to around 2 hrs and 15 mins
- (ii) In a PMF conditions it would be:
 - Unsafe for children for around 6 hours and unsafe for adults for around 4 hours and 45 mins;
 - Raising the footpath to provide a rising path from the corner of Palm Avenue to Pittwater Road would:
 - reduce the time it would be unsafe for unaccompanied children and adults to evacuate by around 15 25 minutes;
 - reduce the duration of unsafe conditions for adults to around 4 hrs and 30 mins







