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3 February 2023

Our ref: RL-01-1679-03

Paul Maher
Department of Planning and Environment
6 Stewart Avenue
NEWCASTLE NSW 2300

Dear Paul,

Independent Advice re Use of an Interim Flood Planning Level for the North Tuncurry Urban Land Release (NTURA)

Rhelm Pty Ltd (Rhelm) has completed an independent review of the flood-related planning matters associated with the Planning Proposal for the North Tuncurry Urban Land Release (NTURA). Details of the proposed land release are available in a range of documents, including at the NSW Planning Portal (https://pp.planningportal.nsw.gov.au/North-Tuncurry-PP, accessed 29 January 2023) . We have made some recommendations regarding options for dealing with flood-planning matters, specifically with respect to flood planning levels. We refer to other advice issued by email correspondence with respect to other flood-related planning advice (for example, the provision of overland flow paths).

In preparing this advice we understand that the NTURA rezoning is not directly subject to the Ministerial Local Planning Directions (March 2022) issued under Section 9.1 of the *Environmental Planning and Assessment Act*, 1979 (such as Direction 4.1 - Flooding). However, we have had general regard to the:

- the principles of the *Floodplain Development Manual* 2005,
- the *Considering flooding in land use planning guideline* 2021.

Our advice is based on our evaluation of flood-related data collected and assessments by others for the site (as identified in this letter, being generally documents prepared by EMM for Landcom, as referenced), overlaid with engineering judgement to provide our opinion on the management of flood-related risks.

Background and Site Context

The site is not located within a mapped floodplain as part of a Council-adopted Flood Study prepared under the provisions of the NSW Floodplain Development Manual (2005) but is located in the area between the coastal hind dune system of Nine Mile Beach and the Wallamba River floodplain. It is known to be affected by elevated coastal groundwater conditions. In the event an intense rainfall event occurs when the groundwater is elevated, the site can effectively 'fill' with floodwaters, as it is does not have a formal overland flow path to release those waters to either Wallis Lake (to the south), the Wallamba River (to the west), or directly to the coast (to the east).

The existing ground levels at the site range from approximately 3 - 6 mAHD and generally average at around 4 mAHD (Source: NSW LIDAR, 2012, accessed via ELVIS). The nearest major road is The Lakes Way. The road level at the connection point for the proposed access to the land release is at approximately 5.7 mAHD.

Key Issue – Uncertainty in Design Flood Levels

Uncertainties with the groundwater assessments submitted in support of the proposed rezoning (SMEC, 2014) have been highlighted in various independent reviews (e.g. DHI, 2021). This uncertainty has driven efforts to find a way to continue on with the rezoning by finding opportunities to reduce the uncertainty after the land is rezoned. This includes the use of a concurrence mechanism with the Biodiversity and Conservation Division (BCD) of the Department of Planning and Environment to ensure an appropriate flood planning level is adopted.

In addition to, or as an alternative to some components of the concurrence mechanism, we have considered that a pragmatic approach to addressing the issue of uncertainty could offer a way forward for the rezoning.

Use of the Upper Bound of Available Flood Assessments

From a practical perspective, in the absence of a reliable or accepted flood planning level for the site, we have considered the upper bound of the analysis presented by EMM in their Memorandum of 24 November 2022 is a 1%AEP flood level of 5mAHD (Table 1.1 of that Memorandum). This level represented a modelled flood level as a result of elevated groundwater, 2100 rainfall and 100% blockage of the outlet pipe. Addressing the uncertainty with a freeboard of 0.5 m, a flood planning level of 5.5 mAHD is recommended as an interim measure for the site as a whole.

Note that the available estimates of the Probable Maximum Flood (PMF) level (short duration events) are of the order of 5.3 mAHD and long duration events range between 5.5 and 6 mAHD (EMM, 2022). Thus, the interim flood planning level of 5.5 mAHD is not considered to be an unreasonable value in this regard.

Further, a maximum level of 5 mAHD accords with the groundwater analysis that has been completed for the site under existing conditions for long duration elevated groundwater events, such as the 1963 event (SMEC, 2014). Whilst it is noted that the reviews completed of the groundwater modelling indicate uncertainty associated with this modelling (as reported above), the use of a 0.5 m freeboard assists in addressing this uncertainty.

Note that this does not address coastal planning level requirements (for hazards such as wave runup). The estimated level in this regard is reported to be 6.2 mAHD for the affected areas of the site.

Application of Interim Flood Planning Level

The interim FPL of 5.5 mAHD should be applied to the entire footprint of the area proposed for rezoning. The practical outcomes of this would be most likely to be either:

- A sloped batter around the perimeter to raise the existing ground levels up to 5.5 mAHD (where they are below that level), or
- A retaining wall solution.

Either solution must ensure that the limit of the proposed footprint of works does not extend beyond the limit of the zoning into conservation areas.

Alternatively, rezoning could be restricted to the lower risk areas set at existing higher elevations (e.g. perhaps those above 4.5 mAHD). The FPL of 5.5 mAHD would still apply to these areas, but the depth of fill would be less than for those portions of the site with existing lower elevations. The overall outcome being a reduction of risk and a reduction in the cost associated with site fill.

The effect of using an interim flood planning level of 5.5 mAHD is that the estimated dwelling yield may be less than that estimated in documentation prepared for Landcom by Hatch Roberts Day in their Master Plan Review and Yield Study of December 2022.

Application of an alternative FPL (through the concurrence process)

If an FPL other than the interim FPL is desired for the site as part of the detailed design and Development Application process, this would need to be identified through detailed groundwater and flood analysis outlined in the concurrence process (see **Attachment A**).

Risk of Interim FPL Being Less than Actual FPL

It is noted that there is a risk that further groundwater studies and related flood assessments may reveal that a level of 5.5 mAHD might not be adequate. However, this risk is considered low as existing modelling (EMM, 2022) producing this level considers an elevated groundwater level and full blockage of the gravity pipe. Further the short duration PMF is shown to be 5.3 mAHD (EMM, 2022), which is below the proposed interim FPL.

As an outcome of the low risk discussed above, the freeboard of 0.5m is considered suitable to address this risk.

Summary and Recommendations

It is concluded that:

- There is currently no flood planning level for the site set by an adopted flood study for the locality that can be applied to the site
- Available information prepared in support of the rezoning suggests an upper limit on a design flood level (which includes provisions for climate change to 2100) could be a level of 5 mAHD. Given uncertainties with this value, it would be prudent to apply a freeboard to this upper limit, meaning an interim flood planning level of 5.5 mAHD would apply.
- The interim flood planning level should be applied to:
    - Access roads within the NTURA area, to allow for evacuation prior to or during a flood event.
    - Habitable floor levels within the NTURA area for all types of development except for sensitive and hazardous development as identified under Clause 5.22 of the Standard Instrument (such as child care, seniors, emergency services etc), whereby the Probable Maximum Flood would be the minimum habitable floor level.

Should you have any queries, please do not hesitate to contact either Emma Maratea or myself on 02 9098 6998.

Sincerely,

Louise Collier B.E. MEngSc FIEAust CPEng RPEQ
Director/Principal

DHI (2021) North Tuncurry Urban Release Area - Stormwater Management System Review - Final, Prepared for NSW Department of Planning, Industry and Environment, 12 July 2021.

EMM (2022) Memorandum to Department of Planning and Environment, Subject: *Updated flood modelling results and proposed flood planning levels*, 24 November 2022.

SMEC (2014) North Tuncurry Development Project Groundwater Modelling Technical Report, Prepared for UrbanGrowth NSW.

Attachments

Attachment A – Concurrence Process (Supplied by DPE Planning 31 February 2023)

1 - Background

The flood risk management aspects of the NTURA proposal were under review and negotiation between the Department of Planning and Environment and relevant State agencies, Mid-Coast Council and Landcom for an extensive period of time (nearly two years).

The negotiations have been successful in resolving numerous material concerns including the functionality of the proposed gravity pipe and provisions for emergency response, including a flood emergency response plan.

An independent expert review of the groundwater elements of the flood assessments was also undertaken by DHI in mid-2021. Overall, the review was favourable, concluding that the concept design and flood assessments are suitable to support a rezoning. The review made four recommendations regarding further design development and assessment (see Table 1.1 from the DHI report).

Additionally, DPE Water reviewed the groundwater model and provided advice see recommendations (in their Memo dated 12 September 2022).

Despite several attempts, the matter of suitable flood planning levels for the precinct was not able to be resolved.

Overall, that process has been constrained by:

- the original models and assessment being 10 years old,
- the documentation being spread over several reports and therefore being difficult to understand; and
- the inability for DHI to continue to provide independent expert advice further to their advice of 2021, due to staff changes.

A new process is required to resolve the outstanding issues and ensure that the flood risk aspects are managed in accordance with current practice.

As an alternative to the use of the proposed interim flood planning level of 5.5 mAHD (outlined in the letter this attachment is related to, dated 3 February 2023), the Department of Planning and Environment have indicated that the new process can be undertaken post rezoning approval via a concurrence clause. This approach would be consistent with the recommendations from the DHI (2021) independent review.

Item 2 of this attachment describes a proposed framework for the new process, which was originally proposed by Landcom and has been reviewed by DPE and related stakeholders.

2 - Proposed Concurrence Process

2.1 Objectives

The flood-related concurrence process seeks to facilitate further assessment and design development to:

- resolve concerns around model uncertainty;
- establish flood planning levels for the development, that include predicted climate change impacts up to 2100; and
- resolve the intention to include an overland flow path from the precinct.

In setting these objectives, it is important to note that:

- some adjustments to the water management strategy and /or the masterplan may be required as part of the process;
- the following additional information will be required prior to the commencement of design for the purposes of a development application:
  - a precinct level concept design of earthworks, basins and other water management infrastructure;
  - accepted flood model(s) that are linked to the concept design and can be adjusted; and
  - a staging plan for stormwater infrastructure.

The objectives of the new process are to resolve the above issues, update the water management strategy and masterplan (if needed) and to provide the additional information that is required to accompany any related development applications.

2.2 Proposed framework

It is proposed that the new process will have three stages:

- Stage 1 – Initial tasks
- Stage 2 - Model updates and concept development
- Stage 3 – Review and finalise.

To avoid some of the issues that have occurred to date with regard to flood risk management for the precinct, it is recommended that:

- Landcom lead and provide overall coordination of the process.
- Government inputs (local and state level) to the concurrence process be facilitated by the Planning and Land Use Strategy Division of the Department of Planning and Environment.
- Representatives of the Biodiversity and Conservation Division (BCD) of the Department of Planning and Environment and Mid-Coast Council (Council) be involved from the outset of the process.
- If BCD and Council propose to engage a technical peer review (in addition to the independent peer review), this reviewer is also nominated at the outset of the process and is made available to be involved in the model development process and to resolve any outstanding issues.
- DPE Water to be included to provide advice on groundwater modelling and aquifer interference license.

The table below provides the outline of the proposed framework.

Stage	Scope	Implementation	Estimated Timing
1 – Initial tasks	Landcom, as developer of the precinct, initiate the process. Consultation with BCD and Council is required to resolve: • modelling approach and key assumptions (groundwater, hydrological and hydraulic); • flood risk management approach (ie approach to setting floor and road levels); • overland flow/ system redundancy mechanism; and • the peer review; approach for Step 2a • outputs from the process. Ideally this consultation can occur via a workshop. Landcom will provide a position paper prior to the workshop. The position paper will reference outcomes from the rezoning process.	This process will be coordinated by Landcom. Input will be required from Council and BCD.	February 2023
2 – Model updates and concept development			
2a) – Model updates	Develop new models for the project based on the agreed approach from Step 1. The models will be applied to: • establish 1%AEP basin and groundwater levels for 2100 conditions; and • quantify uncertainty associated with model predictions and the functionality of the proposed water management system (a DHI recommendation).	This task will be implemented by Landcom in parallel with step 2b. See notes on peer review approach (Item 2.3)	completion in mid-2023
2b) – Concept development	• adjust water management strategy and masterplan (if required) • provide staging plan for stormwater infrastructure	This task will be implemented by Landcom in parallel with step 2a.	completion in mid-2023
2c) – Documentation	2a and 2b will be documented in a report. A peer review report will also be provided as an attachment.	This task will be implemented by Landcom as part of steps 2a and 2b.	completion in mid-2023
3 – Review and finalise	As required – note models can be provided for review if requested.	The process for this task will be established in consultation with Council and BCD.	2nd half of 2023

2.3 Peer review scope

Landcom is expected to engage an independent peer reviewer for Step 2a (model updates). Prior to engagement the preferred peer reviewer should be put forward to Council and BCD for endorsement. Once engaged, the peer reviewer is to be involved in the key steps of the model development process. A peer review report that will be provided as an attachment to the documentation prepared by Landcom. The reviewer will also be made available to answer questions.

If BCD or Council propose that additional technical review of the modelling is undertaken, it is recommended that the reviewer is made available to be involved in the model development process and to resolve any outstanding issues.

2.4 - Alignment with other processes

The proposed process will be undertaken concurrently with the related concept design process that is focused on identifying the optimal approach / configurations for stormwater treatment and the basin systems. This process is focused on optimising water quality and maintenance outcomes.

1 - Background

The flood risk management aspects of the NTURA proposal ~~have been~~ were under review and negotiation between the Department of Planning and Environment and relevant State agencies, Mid-Coast Council and Landcom for an extensive period of time (nearly ~~2~~ two years).

The~~se~~ negotiations have been successful in resolving numerous material concerns including the functionality of the proposed gravity pipe and provisions for emergency response, including a~~a~~ flood emergency response plan.

An independent expert review of the groundwater elements of the flood assessments was also undertaken by DHI in mid-2021. Overall, the review was favourable, concluding that the concept design and flood assessments are suitable to support a rezoning. The review made four recommendations regarding further design development and assessment (see Table 1.1 from the DHI report).

Additionally, DPE Water reviewed the groundwater model and provided advice see recommendations (in their ~~2022.09.~~Memo dated 12 September 2022).

Despite several attempts, the matter of suitable flood planning levels for the ~~project~~ precinct ~~have~~ was not able to be ~~been~~ resolved.

Overall, that process has been ~~hobbled~~ constrained by:

- the original models and assessment being 10 years old,
- the documentation being spread over several reports and therefore being difficult to understand; and
- the inability for DHI to continue to provide independent expert advice further to their advice of 2021, due to staff changes.

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A new process is required to resolve the outstanding issues and ~~set the project up for success~~ensure that the flood risk aspects are managed in accordance with current practice.

As an alternative to the use of the proposed interim flood planning level of 5.5 mAHD (outlined in the letter this attachment is related to, dated 3 February 2023), ~~As recommend by~~ the Department of Planning and Environment have indicated that~~PE,~~ the new process can be undertaken post rezoning approval via a concurrence clause. This approach would be consistent with the recommendations from the DHI (2021) ~~peer~~ independent review.

Item 2 of this attachment describes ~~Landcom's~~ a proposed framework for the new process, which was originally proposed by Landcom and has been reviewed by DPE and related stakeholders.

2 - Proposed ~~new~~ Concurrence P~~p~~rocess

2.1 Objectives

~~Overall, the work completed to date has demonstrated that the proposed flood risk management approach is sound.~~ The flood-related concurrence process seeks to facilitate ~~However,~~ further assessment and design development ~~is required~~ to:

- resolve concerns around model uncertainty;
- establish flood planning levels for the development, that include predicted climate change impacts up ~~till~~ to 2100; and
- resolve the intention ~~request~~ to include an overland flow path from the precinct.

In setting these objectives, it is important to ~~Landcom also~~ note~~s~~ that:

- some adjustments to the water management strategy and /or the masterplan may be required as part of the process;
- the following additional information will be required prior to the commencement of ~~detailed~~ design for the purposes of a development application:
  - a precinct level concept design of earthworks, basins and other water management infrastructure;
  - accepted flood model(s) that are linked to the concept design and can be adjusted; and
  - a staging plan for stormwater ~~water~~ infrastructure.

The objectives of the new process are to resolve the above issues, update the water management strategy and masterplan (if needed) and to provide the additional information that is required ~~prior to the commencement of detailed design~~to accompany any related development applications.

~~If successful this process will provide sufficient certainty and information to enable the detailed design and construction of the project to occur in a staged manner without complex assessment and the associated lengthy delays.~~

2.2 Proposed framework

It is proposed that the new process will have three ~~steps~~stages ~~that will be completed in 2023~~:~~.~~

- Stage 1 – Initial tasks
- Stage 2 - Model updates and concept development
- Stage 3 – Review and finalise.

~~As part of the process Landcom will:~~

- ~~develop new models using best available methods; and~~
- ~~engage an independent peer review of the new models.~~

To avoid some of the issues that have occurred ~~during the current process~~to date with regard to flood risk management for the precinct, it is recommended that:~~it is requested that:~~

- Landcom lead and provide overall coordination of~~e~~ the process.
- Government inputs (local and state level) to the concurrence process be facilitated by the Planning and Land Use Strategy Division of the Department of Planning and Environment.

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- Representatives of the Biodiversity and Conservation Division (BCD) of the Department of Planning and Environment and Mid-Coast Council (Council) be involved from the outset of the process. ~~attended a workshop at the start of the process. The purpose of this workshop will be to resolve the:~~
  - ~~modelling approach and key assumptions;~~
  - ~~flood risk management approach;~~
  - ~~the request to include an overland flow path from the precinct;~~
  - ~~the peer review approach; and~~
  - ~~outputs from the new process.~~
- If BCD and Council propose to engage a technical peer review (in addition to the independent peer review), ~~it is requested that~~ this reviewer is also nominated ~~upfront~~ at the outset of the process and is made available to be involved in the model development process and to resolve any outstanding issues.
- DPE Water to be included to provide advice on groundwater modelling and aquifer interference license.
- ~~Landcom lead and coordinate the process.~~

The table below provides ~~further information~~ the outline ~~on~~ of the proposed framework.

Stageep	Scope	Implementation	Estimated Timing
1 – Initial tasks	Landcom, as developer of the precinct, initiate the process. Consultation with BCD and Council is required to resolve: • modelling approach and key assumptions (groundwater, hydrological and hydraulic); • flood risk management approach (ie approach to setting floor and road levels); • overland flow/ system redundancy mechanism; and • the peer review; approach for Step 2a • outputs from the ~~new~~ process. Ideally this consultation can occur via a workshop. Landcom will provide a position paper prior to the workshop. The position paper will reference outcomes from the ~~current~~ rezoning process.	This process will be coordinated by Landcom. Input will be required from Council and BCD.	February 2023
2 – Model updates and concept development			
2a) – M~~a~~odel updates	Develop new models for the project based on the agreed approach from Step 1. The models will be applied to: • establish 1%AEP basin and groundwater levels for 2100 conditions; and	This task will be implemented by Landcom in parallel with step 2b.	completion in mid-2023

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Stageep	Scope	Implementation	Estimated Timing
	• quantify uncertainty associated with model predictions and the functionality of the proposed water management system (a DHI recommendation).	See notes on peer review approach (Item 2.3)	
2b) – Cconcept development	• adjust water management strategy and masterplan (if required) • provide staging plan for stormwater infrastructure	This task will be implemented by Landcom in parallel with step 2a.	completion in mid-2023
2c) – Documentation	2a and 2b will be documented in a report. A peer review report will also be provided as an attachment.	This task will be implemented by Landcom as part of steps 2a and 2b.	completion in mid-2023
3 – Review and finalise	As required – note models can be provided for review if requested.	The process for this task will be established in consultation with Council and BCD.	2nd half of 2023

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2.3 ~~peer~~ Peer review scope

Landcom ~~propose~~ is expected to engage an independent peer reviewer for Step 2a (model updates). Prior to engagement the preferred peer reviewer ~~will~~ should be put forward to Council and BCD for endorsement. Once engaged, the peer reviewer ~~will~~ is to be involved in the key steps of the model development process. A peer review report that will be provided as an attachment to the documentation prepared by Landcom. The reviewer will also be made available to answer questions.

If BCD or Council propose that additional technical review of the modelling is undertaken, it is ~~requested~~ recommended that the reviewer is made available to be involved in the model development process and to resolve any outstanding issues.

2.4 - Alignment with other processes

The proposed process will be undertaken concurrently with ~~another~~ the related concept design process that is focused on identifying the optimal approach / configurations for stormwater treatment and the basin systems. This process is focused on optimising water quality and maintenance outcomes.