



19 February 2021

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**Attention:**

Dear

**Property - Tumut  
Independent Review - Flooding**

**Background**

submitted a Development Application for a farm shed and granny flat on their land which has a building entitlement, and is also located within the floodplain of the Tumut River. It is understood that Council has requested further information before making a final determination.

Snowy Valley Council's letter cites several valid concerns with the proposal, summarised as:

- location within a flood hazard area
- associated risk to life and safety
- affectation to neighbours
- potential for discharge pollutants

Council has requested an independent report on flooding issues prior to determining the matter. SLR has been engaged to provide this independent review.

**Methodology**

The review provides an independent assessment based on the following information:

- review of information in Surveyors flood report dated 22 July 2019t;
- the 1984 Department of Water Resources Flood Study (kindly provided by );
- the various plans attached to the DA;
- the Tumut 2012 Local Environmental Plan; and
- the NSW Floodplain Development Manual 2005

This report should be read in conjunction with the information submitted with the Development Application.

## Hydrology

Flood behaviour along the Tumut River has been substantially regulated by the construction of dams, which significantly reduce flood flows. The most substantial, Blowering Dam is 25km upstream from the township of Tumut.

A major tributary, the Goobarragandra River joins the Tumut some 5km upstream from Tumut township. Floods from this catchment are not regulated by dams, and are likely to contribute the majority of flows for minor flood events.

Following the 1984 flood, the then Department of Water Resources in 1984 prepared a flood study, which remains the basis of setting flood planning levels at Tumut. The flood study considers two options for Blowering Dam being either full at the start of the storm, or with storage 185ML below spillway level. The recommended flood level estimates are based on Blowering Dam being full, which is appropriate, but is likely to provide a very conservative estimate of flood levels.

Based on the flood mapping included with the 1984 study, the 100 year flood level at the subject site is 264.0m. The estimate 20 year flood level is between 263.6m.

## Flood Planning Levels

Council's flood planning level is equal to the estimated 100 year flood level plus an additional 0.5m freeboard. This would be **264.5m** at the subject property.

## Proposal Flood Levels

The proposal is for a farm shed and granny flat which would be located on the fringe of the flood plain, with ground levels varying from RL262.5 to just over RL263.0. A car parking area is proposed underneath the granny flat. The proposed building has three floor levels:

- carpark RL263.0
- shed floor RL264.0
- mezzanine granny flat over carparking RL 266.24

Important aspects of this proposal to be considered in relation to flooding are:

- the carpark and farm shed areas are non-habitable areas and would be constructed of flood resilient materials. These areas would not include materials such as plasterboard, carpet, or particle board that are easily damaged by moisture.
- The farm shed floor is below the 'flood planning level', but marginally above the estimated 100 year flood level, and well clear of the 20 year flood level.
- The granny flat is elevated over 2.3m above the estimated 100 year flood level

## Regulatory context

The relevant planning instrument is Tumut Local Environmental Plan (LEP) 2012. Clause 6.2.3 - Flood Planning applies to land identified as 'Flood Planning Area' on the Flood Planning Map. The Flood Planning Maps attached to the LEP confirm that the subject site is located within the floodplain.

Clause 6.2(3) gives Council the discretion to approve development which are flood prone based on merit with consideration to the following specific aspects:

*'(3) 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.'*

These aspects are discussed below, along with some suggested recommendations for changes or conditions to the proposal which are designed to minimise reasonable risk, and facilitate possible approval by Council based on the merit of the flood risk being acceptable.

#### Risk to life

Risk to life should be assessed with regard to the NSW Floodplain Planning Guidelines. An important consideration is safe egress or refuge during extreme flood events.

It is noted that the mezzanine level is elevated above the 100 year flood level by 2.24m. However, it is acknowledged that there is no published estimate of the flood level during a Probable Maximum Flood (PMF).

It is considered likely that the elevated floor levels in the granny flat would provide safe refuge in a PMF originating in the **Goobarragandra River**, for which there is limited flood warning (provided the building structure remains sound, as addressed further below). For extreme flood events (exceeding the 100 year flood) in the **Tumut River**, and passing through and regulated by Blowering Dam, the flood levels could be substantially higher than the estimated 100 year flood level, particularly if coincident with flooding along the Goobarragandra River. In these extreme events the granny flat is unlikely to provide safe refuge. However, in these instances there would be sufficient flood warning for evacuation in accordance with the SES Local Flood Plan for the Tumut Shire, and the subject property would need to be evacuated. Target warning times for forecast flooding at Tumut associated with flooding through Blowering Dam is 3 hours.

- ⇒ **It is recommended that a site specific Flood Plan be developed which documents appropriate responses to flood warnings, including evacuation.**

Flood hazard is addressed below.

**Flood Hazard and Risk to property**

The NSW Floodplain Development Manual provide guidance on ‘hydraulic categorisation’ and flooding hazard based on the depth and velocity of flooding.

The overall site includes areas of floodway in which it is very important that the development not constrict the free passage of flood flows. The actual location of the proposed building is on the edge of this floodway.

The proposed location for the shed and granny flat is within the edge of the floodplain with ground levels varying from RL 262.5 to just over RL263.0. The proposed building has three floor levels:

- carpark RL 263.0
- shed floor RL 264.0
- mezzanine granny flat over carparking RL 266.24

Flood Hazard at the specific building site has been assessed in accordance with Figure L2 – Provisional Hydraulic Hazard Categories of the NSW Floodplain Development Manual (reproduced below)

The estimated 100 year flood level is at RL 264.0. The depth of flood waters at the building site with a floor level of 263.0m would be approximately 1.0m. The 1984 Flood Study provides an estimate of average flood velocities of 0.9m/s across the floodplain. Based on these depths and velocities the site would be a **high hazard** area.

However, at the actual building site location on the edge of the floodplain the velocities would likely be significantly less than 0.9m/s, and based on SLR experience would likely be around 0.5m/s at that specific location. If carpark levels are raised by 0.5m in accordance with SLR’s recommendations (see below), then the flood hazard would be **low hazard**. (depth 0.5m, velocity 0.5m)

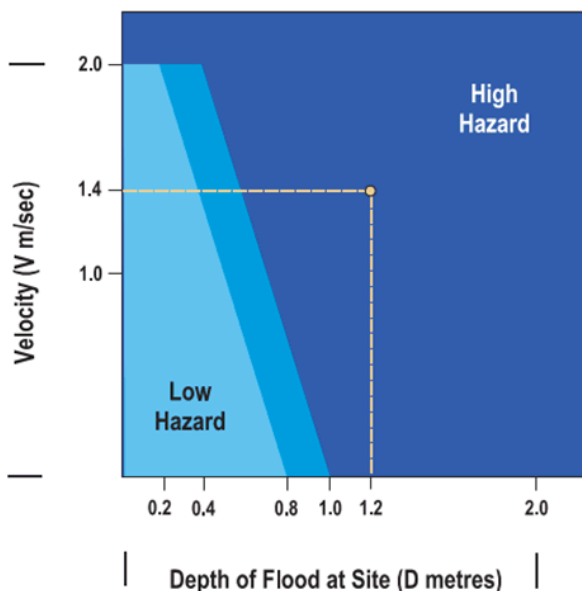


Figure L2 – Provisional Hydraulic Hazard Categories of the NSW Floodplain Development Manual.

LEP 2012 requires that floor levels be 0.5m above the 100 year flood level, or in this case at RL264.5.

With consideration to the LEP and flood hazard it is recommended that the carpark level be raised by 0.5m.

⇒ **It is recommended that floor levels of the proposal be amended as follows:**

- **carpark raised from RL 263.0 to RL263.5**

The carpark and farm shed floor level would not comply with the minimum floor level requirements of LEP 2012. However, it is noted that:

- The carpark level is not proposed for habitable use
- Proposed building materials are flood resilient
- Cars can be readily relocated to higher ground during flood events
- The farm shed is not proposed to contain any hazardous materials (other than typical household containerised products at household/small acreage volumes). The farm shed is elevated 0.4 above the 20 year flood so the frequency of inundation would be very low.

⇒ **It is recommended that the building plans specify (or confirm) the use of flood resilient building materials within the farm shed and car park areas up to RL 264.5m.**

#### Risk to property

Concerning the robustness of the building during flood events, it is noted that implementation of the above recommendation would mean that the depth of flooding would be reduced to 0.5m against only the carparking area in a 100 year flood, significantly reducing the flood loadings associated with both moving water and debris impact.

However, if the building is to be relied on as a safe refuge during a PMF flood event (with low warning time), then the building frame (not necessarily the cladding) would need to be structurally sound when subjected to the force of moving water, and impacts from debris such as trees or cars.

⇒ **SLR recommend that a structural engineer be engaged to provide recommendations for alterations to the building frame and/or certify that the building frame and mezzanine floor is structurally capable of withstanding loads associated with extreme flooding including hydraulic load and debris impact(velocity 1.5m/s and level 265.5m would be reasonable limits).**

#### Adverse impacts on flood behaviour

Minor filling associated with achieving the recommended floor levels has a relatively low potential to affect flood flows or levels on adjoining properties, since the reduction in floodway area and loss of floodplain storage are minimal. However, to ensure that the affect is in fact negligible, SLR provide the following recommendations:

⇒ **SLR recommend that:**

- a) To minimise loss of flood storage the carpark cladding not be waterproof, and allow the ingress of floodwaters
- b) To minimise any affect of flood levels associated with constricting the floodway, that fill for the site preparation works be sourced from within the lot, on the area located immediately west of the proposed building (as shown below)



⇒ SLR Recommended area for sourcing fill to raise building floor levels – to mitigate any minor loss of floodway conveyance

**Environmental Impacts**

It is noted that the flood flow path through the subject is not a watercourse (not shown as a hydroline on NSW government spatial data), but rather an overland flow path during major flood events.

The proposal will not cause avoidable erosion, siltation, destruction of riparian vegetation or a reduction in the stability of river banks or watercourses provided that disturbed areas are revegetated and standard erosion and sediment controls are implemented.

The proposed building is not anticipated to have any unusual environmental impacts associated with flooding.

The risk of pollution resulting from flood flows through the farm shed is negligible on the basis that flooding is very infrequent (the floor level is at the 100 year flood level)

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Should you have any queries on this report please contact the undersigned.

Yours sincerely

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Authorised by:  PC