

16.3 DRAFT MARULAN FLOOD STUDY

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- Attachments:**
1. Marulan Flood Study 1_ AEP - Flood Depths 
 2. Draft Marulan Flood Study (separately enclosed) 

Reference to LSPS:	Planning Priority 8: Natural Hazards – Vision 2040 – Natural hazards are identified, planned for and mitigated where possible throughout the planning process.
Key Issues:	Flood planning Urban and Fringe Housing Strategy

RECOMMENDATION

That:

1. The Business Manager Strategic Planning’s report on the Draft Marulan Flood Study be received.
2. The Draft Marulan Flood Study be placed on exhibition for a minimum of 28 days.

Section 375A of the *Local Government Act 1993* requires General Managers to record which Councillors vote for and against each planning decision of the Council, and to make this information publicly available.

BACKGROUND

Council’s Local Strategic Planning Statement sets a priority for planning for natural hazards being “*Natural Hazards are identified, planned for and mitigated where possible throughout the planning process*”. In addition to this the *Urban and Fringe Housing Strategy* (Housing Strategy) has identified potential land for development in Marulan. During the preparation and consultation process for the Strategy it was noted that some areas identified for urban release were potentially affected by either creeks or overland flows. Therefore, a flood assessment for areas identified in the Housing Strategy is required to inform future planning and to facilitate the release of land by improving the understanding of land use constraints.

Council received a grant from the NSW Floodplain Management Program towards the development of a flood study and floodplain risk management plan for Marulan. Council engaged GRC Hydro to prepare the flood study and the flood plain risk management plan (following the adoption of the flood study).

A Draft Marulan Flood Study has now been prepared and this report recommends placing it on exhibition for public comment.

REPORT

Marulan and Flooding

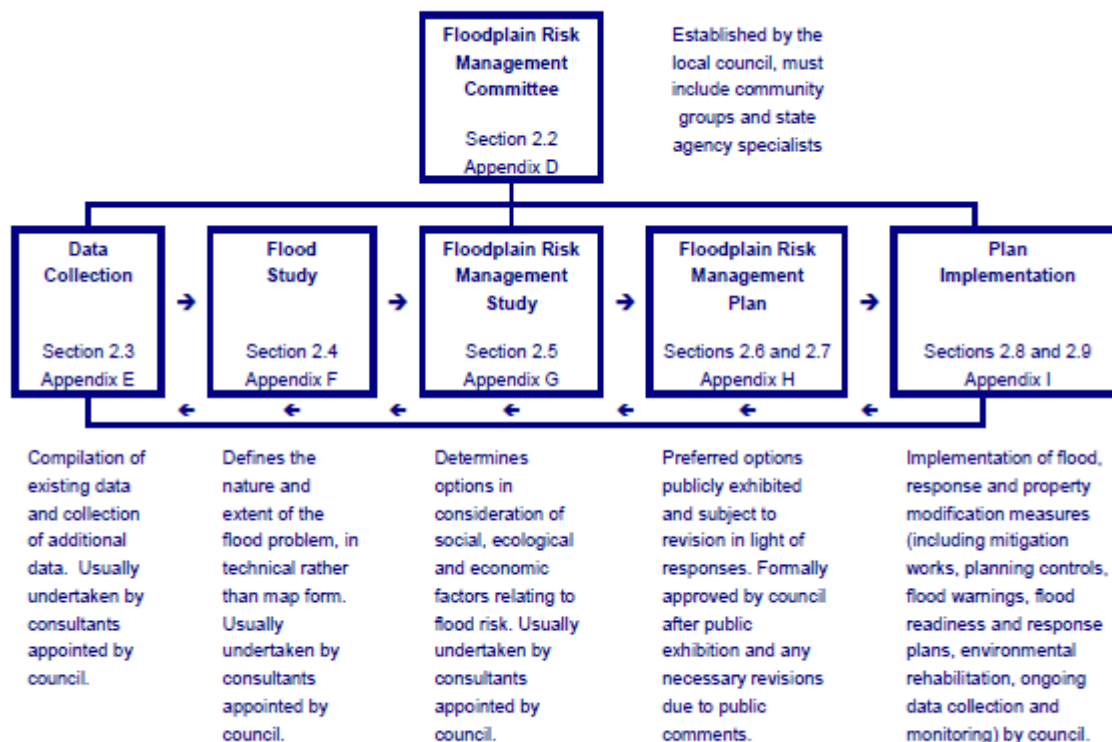
Unlike Goulburn, Marulan is sited at the top of two catchments and does not have any proximity to rivers and the impacts of riverine flooding. However, Marulan does have creeks and watercourses which are located within the town and surrounding rural catchment. Furthermore, some areas within the town are known to experience problems with overland flows and stormwater. The risks to life and property still apply to flooding whether due to overland flow or riverine flooding.

Council as a land manager is required to understand these systems to mitigate the associated risks to the community, development and infrastructure.

A Draft Flood Study has been prepared following community consultation, data collation and the development of an appropriate model.

The following image details the floodplain risk management process in NSW

Image 1: The floodplain risk management process in New South Wales (FDM, 2005)



Source: NSW Government (2005)

Data Collection

Data was collected from a variety of sources including Council, Transport for NSW, Australian Rail Track Corporation, topographic data and survey, meteorological data (daily read rainfall gauges, stream gauges) etc.

Community Consultation

A newsletter and questionnaire were developed for the Marulan community which introduced the study and its objectives and requested information via a questionnaire. The newsletter and questionnaire were distributed to all property owners within the Marulan locality. Community members were able to participate in the questionnaire either via return of the paper questionnaire, email or submission on Council’s website.

Twenty (28) responses were received from the community. Approximately 68% of respondents indicated that they were aware of flooding from overland flow in their area. Around 25% of replies indicated that they had experienced flooding in their yard or garage, with one respondent noting flooding above their floor level at their property.

GRC Hydro held or offered one on one follow up interviews with each of the respondents.

These results highlight that there is a general awareness of flooding in Marulan and the potential for flooding to impact on properties. The questionnaire asked the community about the management of flood related development controls within the floodplain and the varying degrees of restrictions that can be applied.

Approximately 71% of respondents selected that property owners should be informed of potential flood risks and flood related development controls on their property and allow for development provided these controls are adhered to. These results will inform the implementation of flood related development controls for properties within the final Flood Planning Area, undertaken during the Floodplain Risk Management Study and Plan.

With the development of the Flood Study, it is recommended that Council exhibit the study prior to developing the floodplain risk management plan.

Model Development

Computer models were established to simulate catchment rainfall/runoff response and flood behaviour for Marulan and surrounding areas. A rainfall/runoff model (DRAINS software) was used to convert design rainfall into runoff, which was then applied to the flood model (TUFLOW software) to define flood depths, extents and velocities.

The study area's flood model represents the urban area and surrounds as a 2 m resolution grid of cells. Physical features including the area's topography, creek and river bathymetry, roads, buildings, and drainage features (e.g. bridges, culverts and stormwater drainage) are all incorporated into the model. Applied model parameters have been obtained from applicable reference documents such as Australian Rainfall and Runoff (2019).

Limited hydrometric data was available for model calibration and instead, a model validation process was implemented. The rainfall/runoff model results were validated to ARR2019 Regional Flood Frequency Estimation (RFFE) flows and flood model results were compared to flood observations provided by the community.

Model Results

Design flood behaviour was produced for the study area for the 20%, 10%, 5%, 2%, 1%, 0.5% and 0.2% Annual Exceedance Probability (AEP) events, as well as the Probable Maximum Flood (PMF). The primary model outputs are high-resolution raster outputs of peak flood depth, level and velocity across the study area. These results were then used to derive the hydraulic hazard, which describes the risk to pedestrians, vehicles and buildings based on a flood's depth and velocity. Flood function will be produced during the Floodplain Risk Management Study phase of the project.

Developed areas are noted to be typically subject to limited flood affectation and low hazard flow conditions. A notable exception is Morris Place which is reported by the community to be frequently flooded. Areas of high flood hazard affecting dwellings is noted upstream of the ARTC rail corridor for events rarer than 0.2% AEP.

Greenfield areas identified for urban development in the Urban and Fringe Housing Strategy are also subject to various levels of inundation. This Study will assist in informing and facilitating the planning proposal process to ensure that future development is appropriately planned.

Attachment 1 is an extract of the flood mapping detailing the depth and extent of inundation from a 1% AEP event (formerly described as a 1 in 100-year event but is really a 1% chance of occurrence in any given year). The 1% AEP event is the most used for planning purposes. **Attachment 2** provides a full copy of the flood study which is provided under separate cover due to its size.

Flood Damages Assessment

A flood damages assessment was undertaken to quantitatively assess the impacts of flooding on the community. The flood damages assessment described herein has been completed for 451 properties within the study area. Based on the flood liability of each development, a monetary value was applied to each property based on the level of property damage over a range of design flood events.

Property flood liability for residential and non-residential properties is presented in the tables below.

Design Event (AEP)	Number of Properties Affected	Number of Properties affected above Floor Level
20%	1	0
10%	2	0
5%	2	0
2%	7	0
1%	14	0
0.5%	15	0
0.2%	15	0
PMF	77	30

Table 1 - Residential Property Flood Affection

Design Event (AEP)	Number of Properties Affected	Number of Properties affected above Floor Level
20%	9	2
10%	10	2
5%	10	3
2%	10	3
1%	12	3
0.5%	12	3
0.2%	12	3
PMF	24	7

Table 2 – Non- Residential Property Flood Affection

The estimated average annual flood damages for both residential and non-residential flooding is \$426,400, which is comprised of \$22,900 of residential damages and \$403,500 of non-residential damages.

Floodplain Risk Management Plan

The development of a floodplain risk management plan will follow Council’s public exhibition and adoption of the flood study. The results of the flood study will inform a range of recommendations to mitigate the impacts of flooding. Measures may include defining a flood planning area, a freeboard height for development, mapped flood planning constraint categories, physical measures to mitigate flooding impacts, warning systems, public awareness etc.

Council’s recently amended flood affected land provisions in the Goulburn Mulwaree Development Control Plan 2009 and the adopted flood policy specify a freeboard of 0.5m above the 1%AEP for development outside the area covered by the Goulburn Flood Study. Should Council adopt the Marulan Flood Study, these provisions would apply as an interim measure until the floodplain risk management plan is completed and adopted for Marulan.

Conclusion and Recommendation

In conclusion, a draft Marulan Flood Study has been prepared to inform the future planning and development. It is recommended that the Draft Marulan Flood Study be placed on public exhibition prior to the development of the Floodplain Risk Management Plan.