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Date: 28 February 2025
Amended: 11 April 2025
Amended2: 30 July 2025

Flood Risk Management Report for proposed development at No. 2 to 16 Pockley Avenue Roseville

SEARs Requirements Declaration: Pockley Island

Declaration		
Name	Pavel Kozarovski	
Qualifications	BE (Civil) MIEAus, CPEng, NER	
	The undersigned declares that Flood Risk Management Report for **Pockley Avenue** has been prepared in response to the following SEARs requirements issued for the Project on 15/11/2024 for SSD-77825469:	
SEARs item no.	**SEARs Requirement**	**Relevant Section of this Report**

15	• Identify the flood planning level as set out in the relevant council LEP or SEPP and identify any:
	• flood risks on site having regard to adopted flood studies
	  ○ the potential effects of climate change, and
	  ○ any relevant provisions of the *NSW Flood Risk Management Manual*.
	• Where the development is occurring on flood prone land a flood impact and risk assessment (FIRA) must be prepared having regard to the *Flood Impact and Risk Assessment Guideline - LU01* (FIRA guide). When determining the scope and category of the FIRA the requirements outlined in the FIRA guide must be considered.
	• Detail any flood risk management measures that are to be incorporated as part of the development having regard to relevant guidelines (including any design solutions, flood modification measures, property modification measures, operational procedures or Flood Emergency Response Plan).Detail any flood risk management measures that are to be incorporated as part of the development having regard to relevant guidelines (including any design solutions, flood modification measures, property modification measures, operational procedures or Flood Emergency Response Plan).
		All report

Signed		
Dated: 30 July	2025	

Summary

The location of the site is shown on Figure 1. It is proposed to develop the site and construct a multi-level apartment complex with basement parking. The layout of the proposed Basement 2 plan is shown on Figure 2 and a section through the development is shown on Figure 3.

Figure 1 Site location

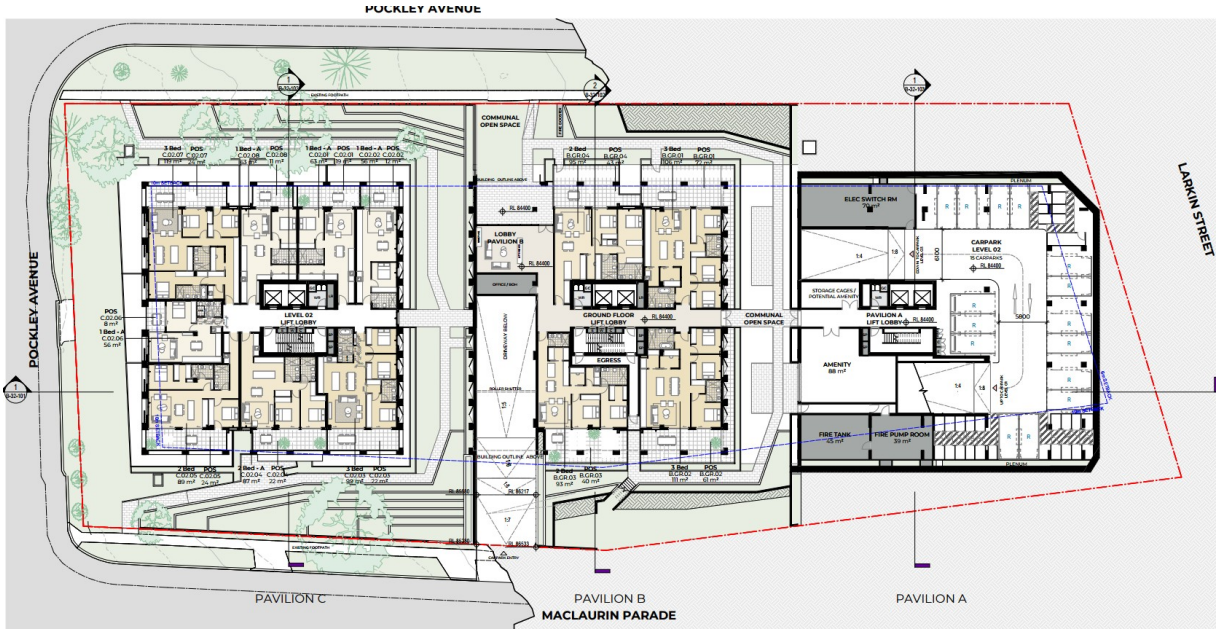

Figure 2, Proposed Basement 2, Note: Floor Level at RL 84.4m driveway hump level at RL 86.53m AHD

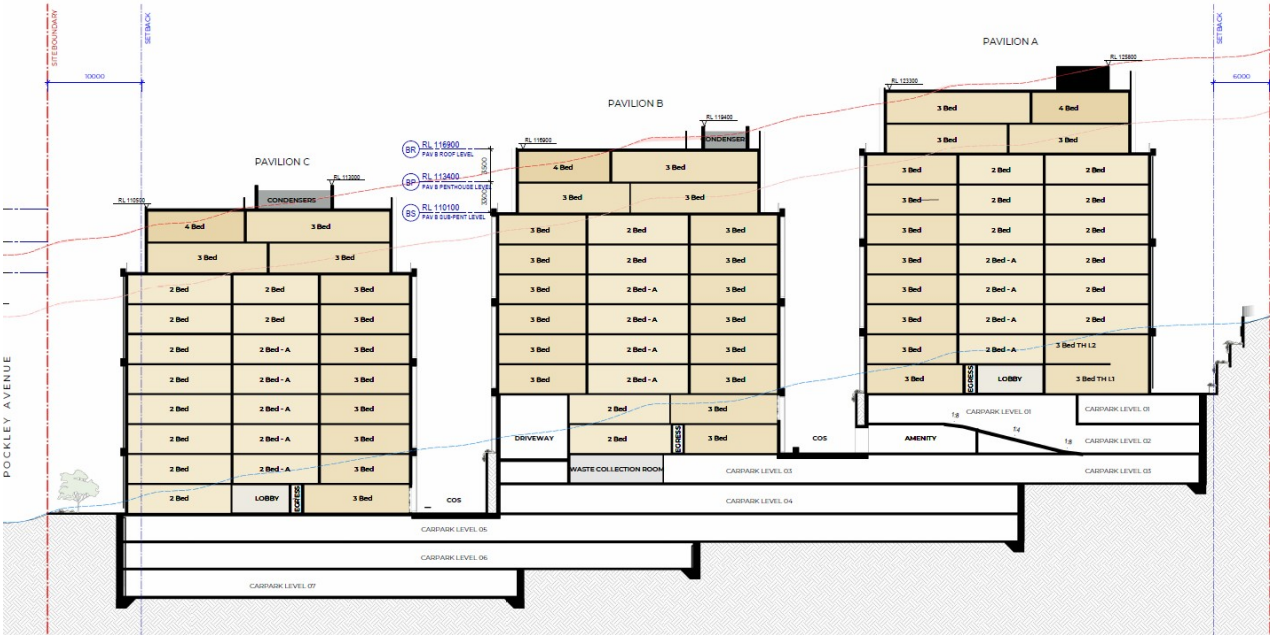

Figure 3, Section

It is necessary to conduct a flood study to determine the flood behavior for existing conditions and its impact on the proposed development and vice versa, the impact of the proposed development on flood behavior.

A detailed hydraulic model was established for the entire catchment using a “rainfall on grid” approach and the resulting 1% AEP flood and Probable Maximum Flood maps are shown on Figures 5 and 6 respectively.

The development site is slightly affected by the 1% AEP flood at the North-Western corner, however the footprint of the development is not affected at all. It would be necessary to physically protect the North-Western corner of the site from the PMF plus say 200 mm freeboard to eliminate any risk of flooding during the maximum possible flood as shown on Figure 4.

The localized small patches within the site are a result of the “rainfall on grid” method. It should be noted that showing the flood contours at smaller intervals would only clog the maps. The main finding of the study is that the flood is contained within the streets’ corridors.

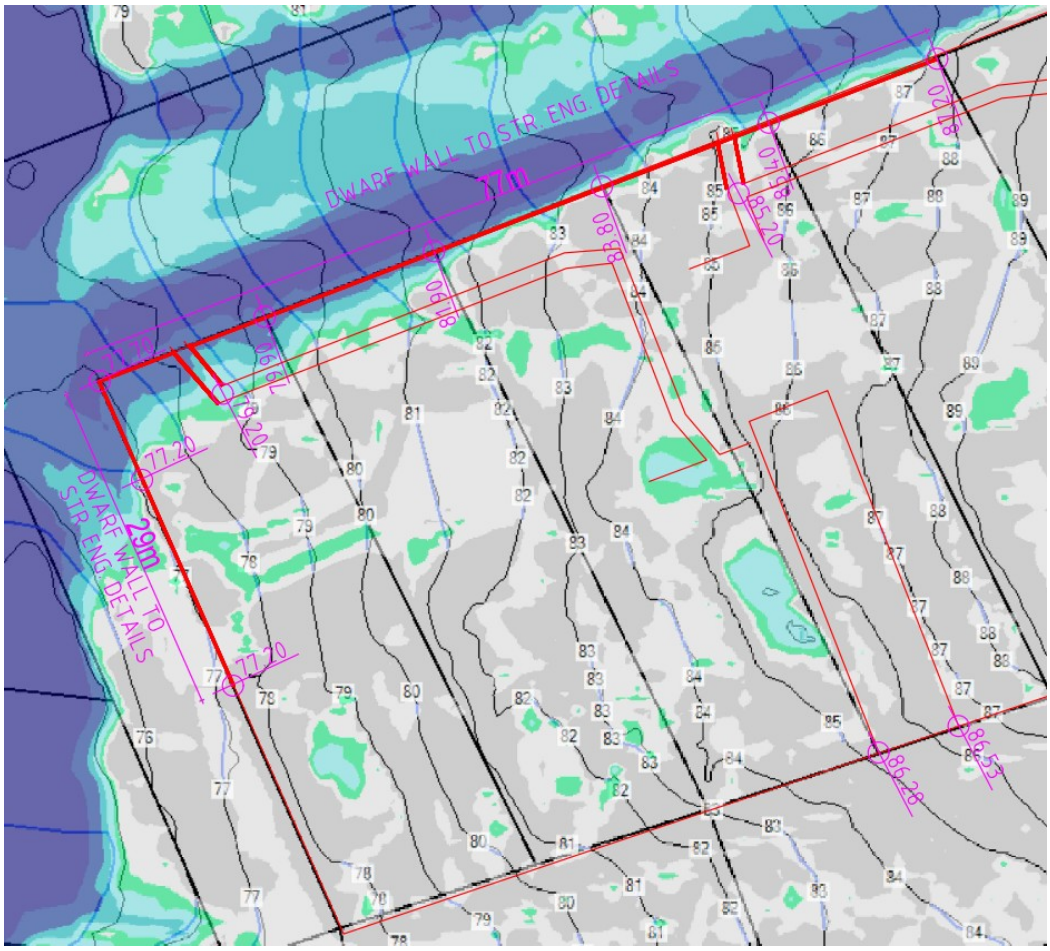

Figure 4, proposed flood protection measures

The part of the site where the proposed driveway crossing is located is not affected by flooding. The driveway hump should be higher than the kerb level.

The development site is not affected by the 1% AEP flood and therefore it does not have any impact on flood behavior as shown on Figure 9 in Appendix B.

The details of the hydraulic modelling and the applicable flood controls are described in the following text, the emergency flood response plan is given in Appendix A and the relevant flood maps are presented in Appendix B.

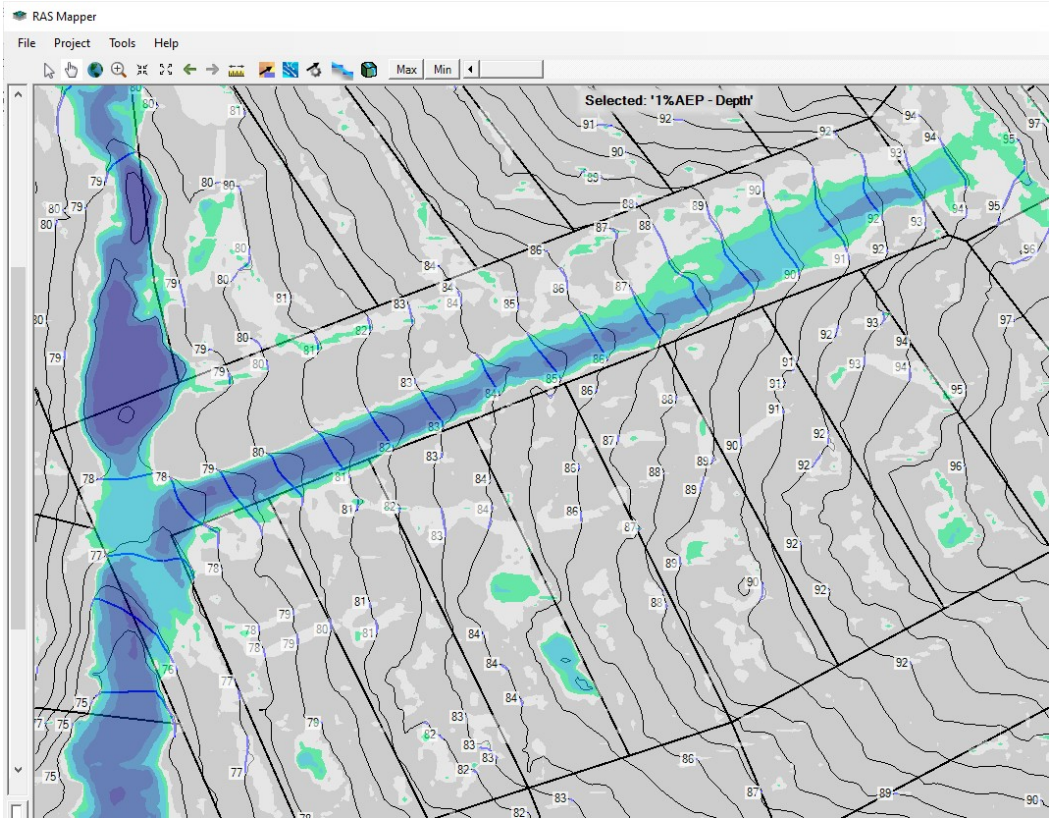

Figure 5, 1%AEP Flood Map

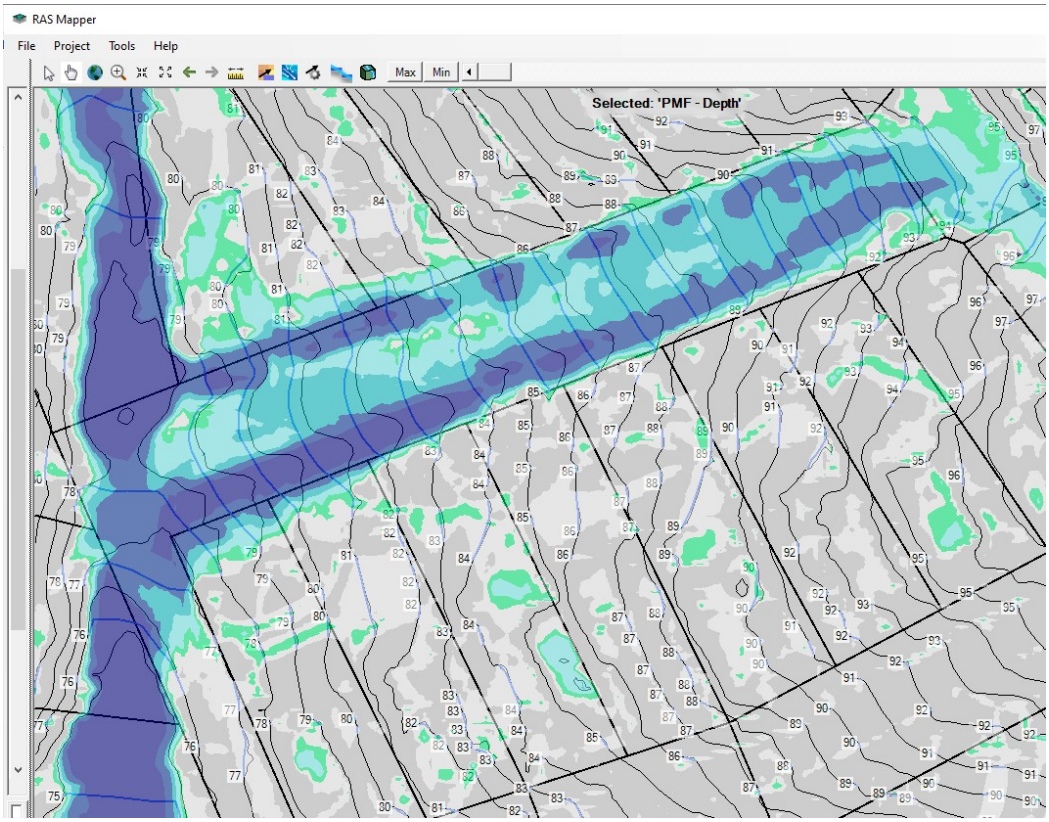

Figure 6, Probable Maximum Flood Map

Hydraulic Modelling

A flood study was prepared using a rainfall on grid approach. The design rainfall is directly applied to the entire catchment area and the flood behavior is modelled using a detailed hydraulic model based on HEC-RAS software. The design rainfall was determined in accordance with the recommendations in ARR 2019. The catchment is relatively steep and small. A 5 minute storm duration is the critical duration for this catchment. The catchment (model) domain is shown on Figure 7. The hydraulic model was configured from the downloaded LIDAR data using 1x1m cells. Manning's n value of 0.05 was applied to the residential lots and 0.025 to the land dedicated to roads (cadastral information). 5 mm and 1.5 mm/hr were used as initial and continuous losses for the residential areas and 1mm and 0 mm/hr were used as initial and continuous losses for the land dedicated to roads. The resulting Probable Maximum Food map for the entire catchment is shown on Figure 8.

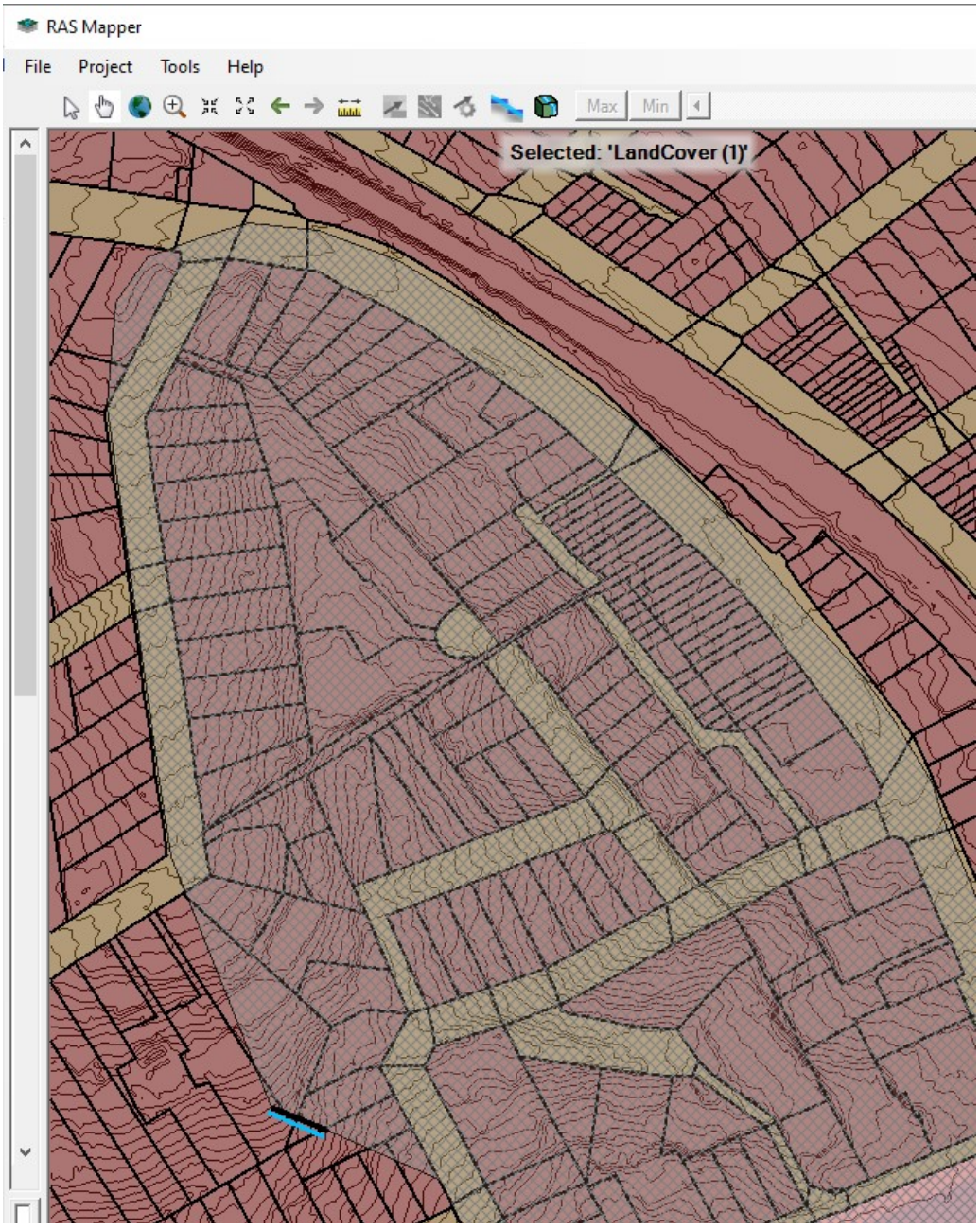

Figure 7, 2D domain

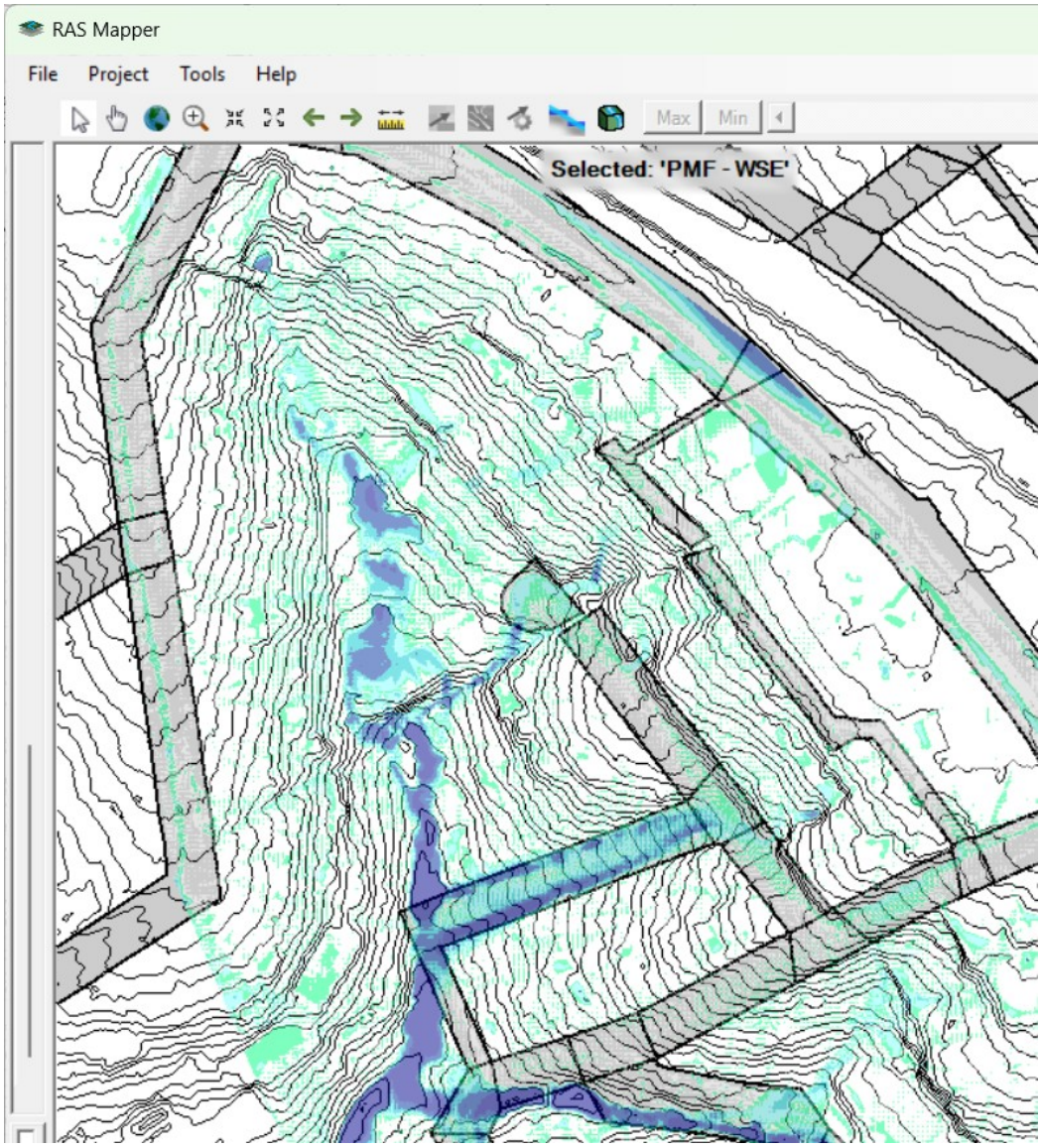

Figure 8, PMF, rainfall on grid, catchment layout

The various flood maps are shown in Appendix B. The flood hazard categories were determined in accordance with the diagram shown on Figure 9.

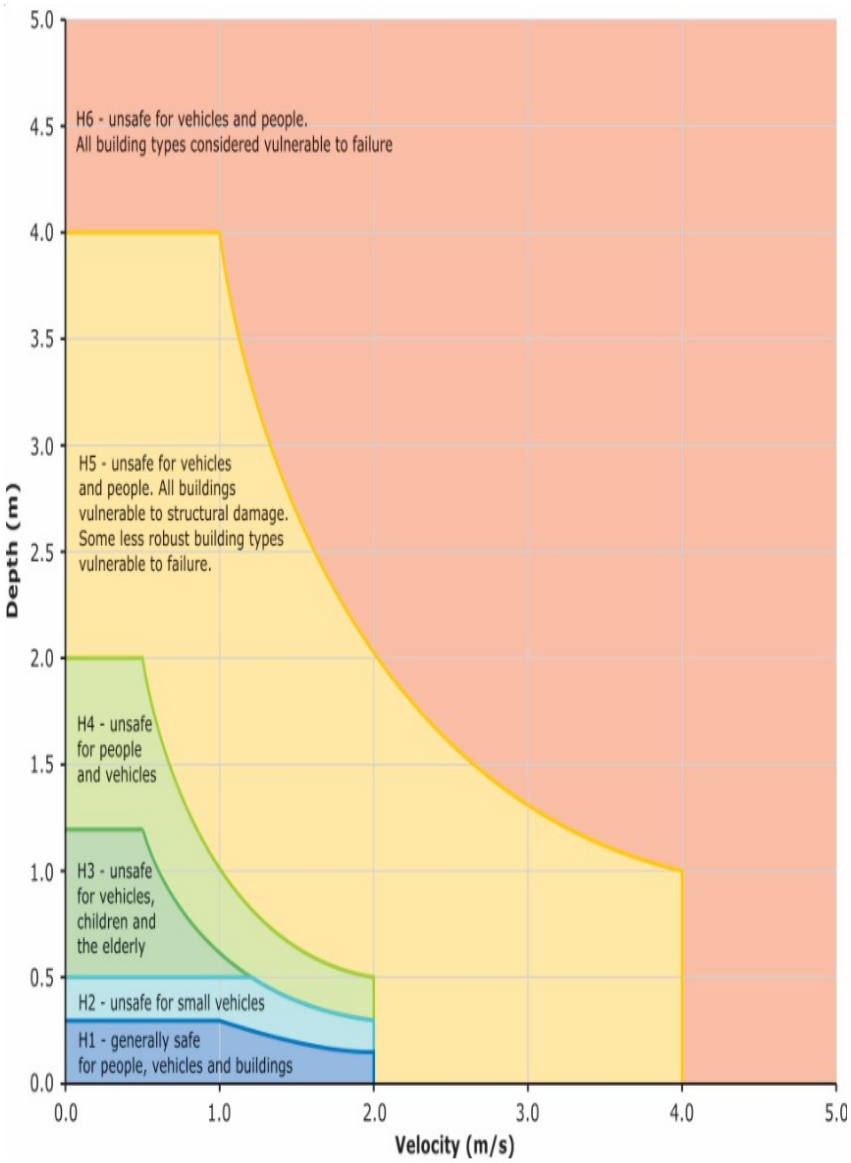

Figure 9, Flood Hazard Classification

Applicable Controls
The land use of the proposed development is residential. Most of the development is not affected by flood with some minor areas at the North-Western corner located in a Medium Flood Risk Precinct. The following controls are applicable to the site:

Floor Level
The lower ground floor and the basements' floor levels are lower than the 1%AEP flood levels in the streets, however, they are protected by the existing ground levels. The North Western corner of the site is affected by the PMF and it must be physically protected by a dwarf wall as shown on Figure 4. The pedestrian access paths must have a lending 200 mm above the PMF levels as shown on Figure 4 too.

Building Components
The proposed development must be constructed from flood compatible materials for the components exposed to flood waters. All electrical connections must be physically protected 500 mm above the 1% AEP flood levels. No control for electrical connections applies to the internal areas of the building.
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Structural Soundness
The building structure is not exposed to floods, however any flood protection walls must be designed to withstand the forces of buoyancy, flowing water and debris during the PMF. The depth and the velocity of flow during the PMF event in contact with the flood protection wall are low and the wall will be able to withstand the forces of water flow, debris and buoyancy, subject to a structural engineer's design and report at the CC stage.

Flood Affectation
The proposed development would not result in an increase in 1% AEP flood levels anywhere in the catchment (Flood Map 9 in Appendix B). The increase in the site's runoff due to the development is offset by the proposed On Site Detention.

Evacuation
The proposed development is physically protected from flooding and it can be considered as a safe refuge during all possible floods. Evacuation from the building is not required. The streets around the site are affected by flooding with relatively high velocities and depths. The floods in this area would be of a short nature and it is recommended that the occupants remain within the site during the periods of extremely heavy rain. Flood advise signs should be affixed at a visible location(s) along the pedestrian paths and at the driveway crossing. The signs should advise the occupants that the streets can be subject to flooding during severe rainfall events and that it is safer to remain within the building. In addition, laminated copies of the flood emergency response plan (Appendix A) should be permanently attached to the cupboard doors in every kitchen.

Management and design
Site emergency response plan is given in Appendix A.

Pavel Kozarovski, MIEAust, CPEng, NER

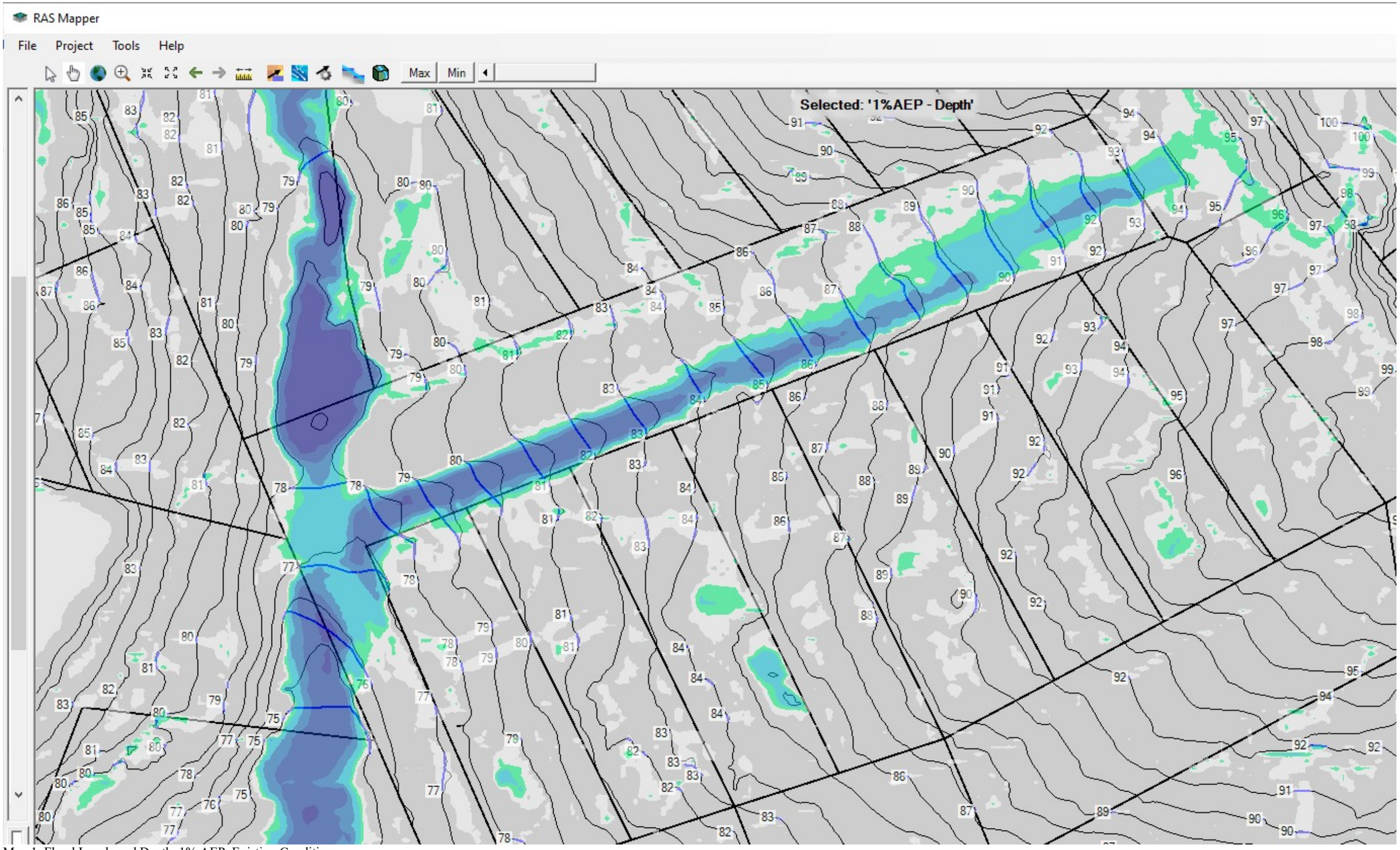
Appendix A
Flood Emergency Response Plan

1. Floods in Roseville are considered as “flash floods” and no warning system for this catchment is available. Storms leading to major flooding are typically few hours long, however shorter storms as little as a 10 minutes long can produce significant flooding. Once the storm passes floodwaters usually disappear rapidly.
2. Flood signs should be displayed at visible locations along the pedestrian paths and at the driveway crossing. The wording on the flood sign should be similar to the following: “**STREETS MIGHT BE FLOODED DURING PERIODS OF HEAVY RAIN, IT IS SAFER TO REMAIN WITH THE BUILDING**”.
3. Extremely heavy rainfall should be used as an indicator of a possible flood in the street. The flood flow in the street will not last longer than say 15 to 20 minutes and it is advised not to leave the building during these events.
4. During floods many local and major streets and roads will be cut by floodwaters. Travelling through floodwaters on foot, or in a vehicle can be very dangerous as the water may be polluted, obstructions can be hidden under the floodwaters, or you could be swept away. It is recommended to remain within the home as this is the safest option. If you need to leave the home do so early in the flood event, before the streets are inundated.
5. Do not evacuate from the building unless instructed to do so by the SES or the Police.
6. In the case of a medical emergency ring 000 as normal, but explain about the flooding.
7. A laminated copy of this plan should be permanently attached (glued) on an inside cupboard door in the kitchen.
8. This flood management plan should be reviewed every 5 years, particularly with the potential effects of Climate Change.

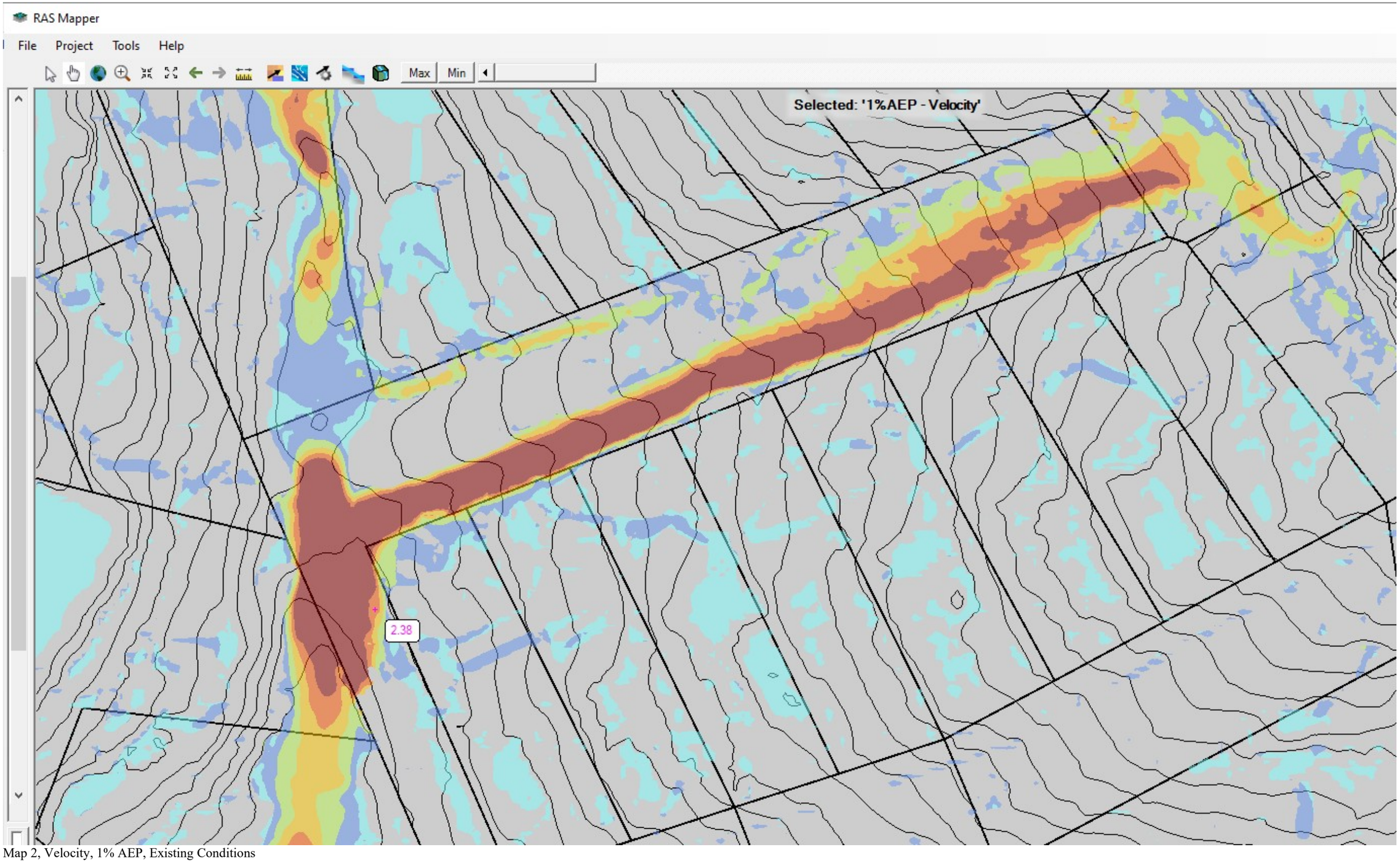
Pavel Kozarovski, MIEAust, CPEng, NER

Appendix B
Flood Maps

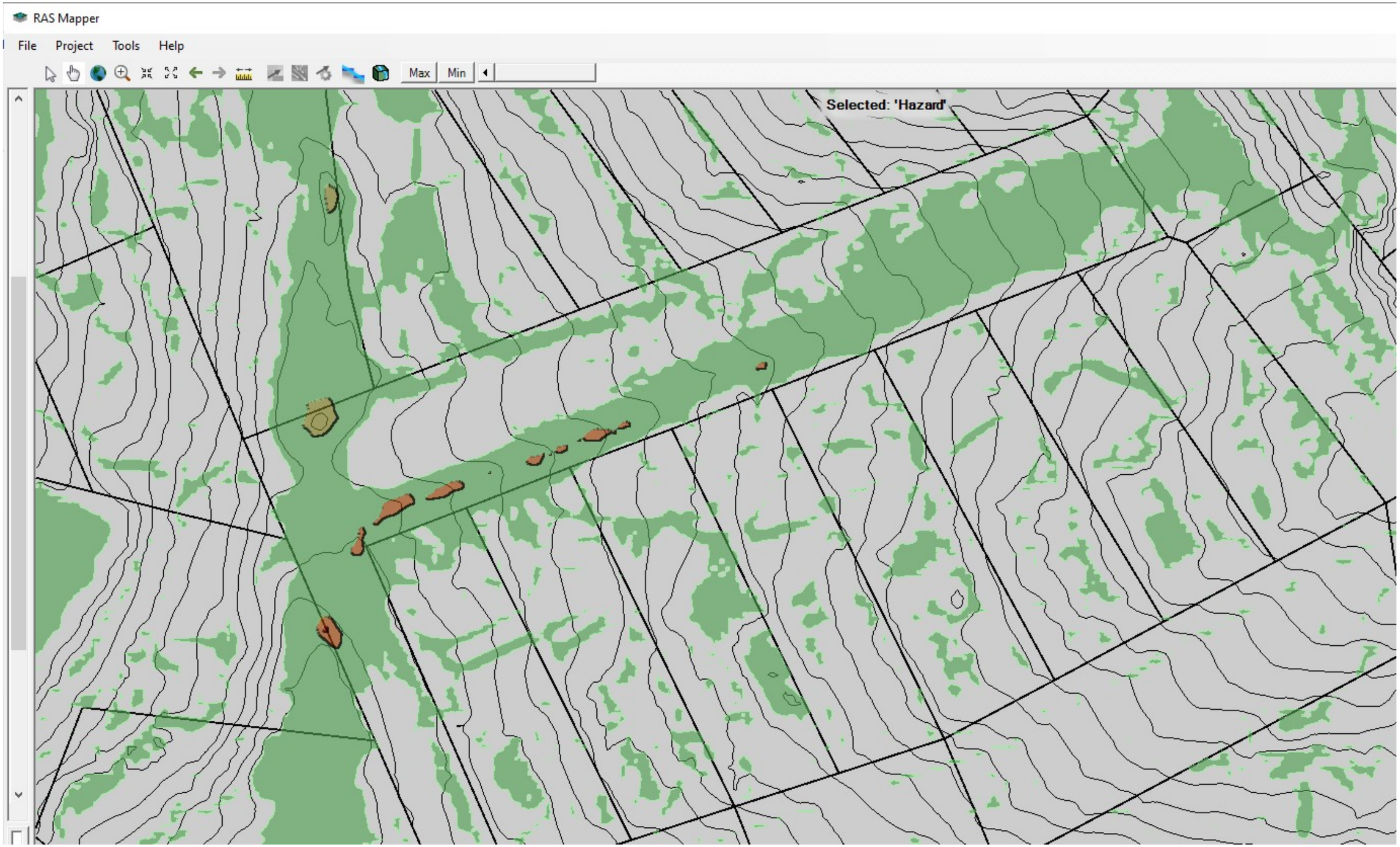
Map 1, Flood Levels and Depth, 1% AEP, Existing Conditions
Map 2, Velocity, 1% AEP, Existing Conditions
Map 3, Flood Hazard, 1% AEP, Existing Conditions, 1-H1, 2-H2, 3-H3, 4-H4, 5-H5, 6-H6
Map 4, Hydraulic Categories, 1% AEP, Exis. Conditions, 1-Flood Fringe, 2- Flood Storage, 3-Floodway
Map 5, Flood Levels and Depth, 1% AEP, Existing Conditions
Map 6, Velocity, 1% AEP, Existing Conditions
Map 7, Flood Hazard, 1% AEP, Existing Conditions, 1-H1, 2-H2, 3-H3, 4-H4, 5-H5, 6-H6
Map 8, Hydraulic Categories, 1% AEP, Ex. Conditions, 1-Flood Fringe, 2- Flood Storage, 3-Floodway
Map 9, Differences 1% AEP (Proposed-Existing)
Map 10, Flood Levels and Depth, PMF, Existing Conditions
Map 11, Velocity, PMF, Existing Conditions
Map 12, Flood Hazard, PMF, Existing Conditions, 1-H1, 2-H2, 3-H3, 4-H4, 5-H5, 6-H6
Map 13, Hydraulic Categories, PMF, Exis. Conditions, 1-Flood Fringe, 2- Flood Storage, 3-Floodway



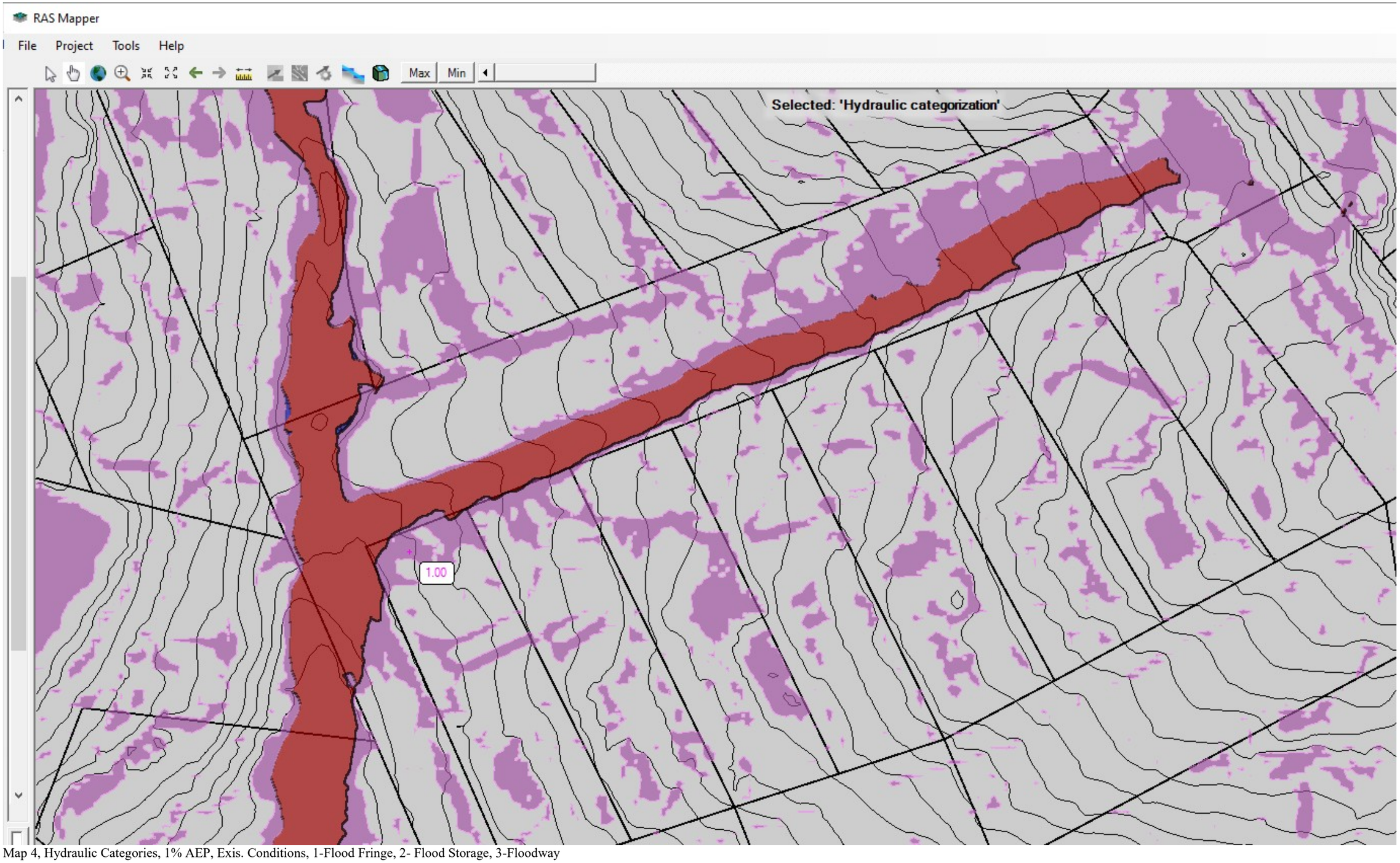
Map 1, Flood Levels and Depth, 1% AEP, Existing Conditions



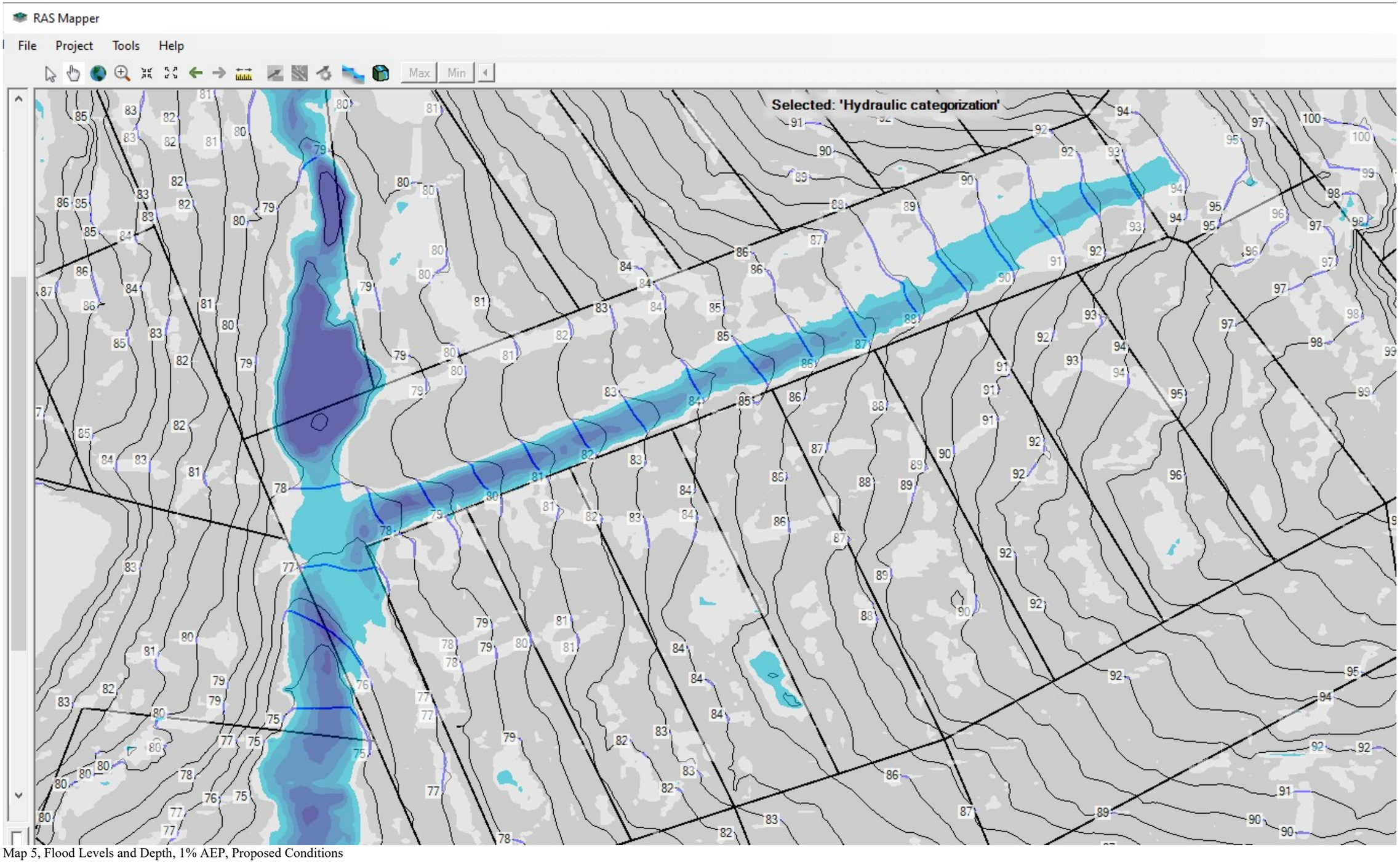
Map 2, Velocity, 1% AEP, Existing Conditions



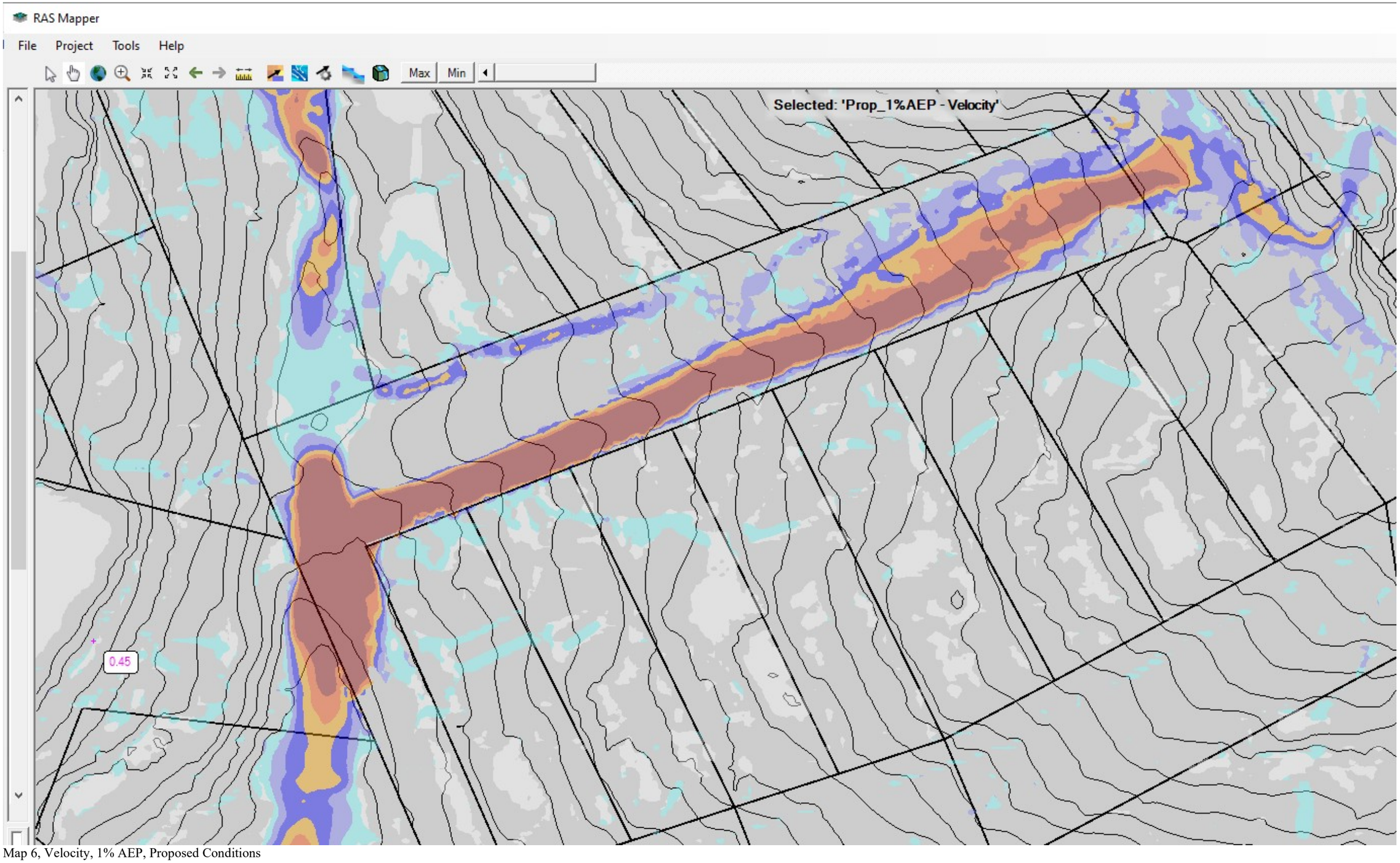
Map 3, Flood Hazard, 1% AEP, Existing Conditions, 1-H1, 2-H2, 3-H3, 4-H4, 5-H5, 6-H6



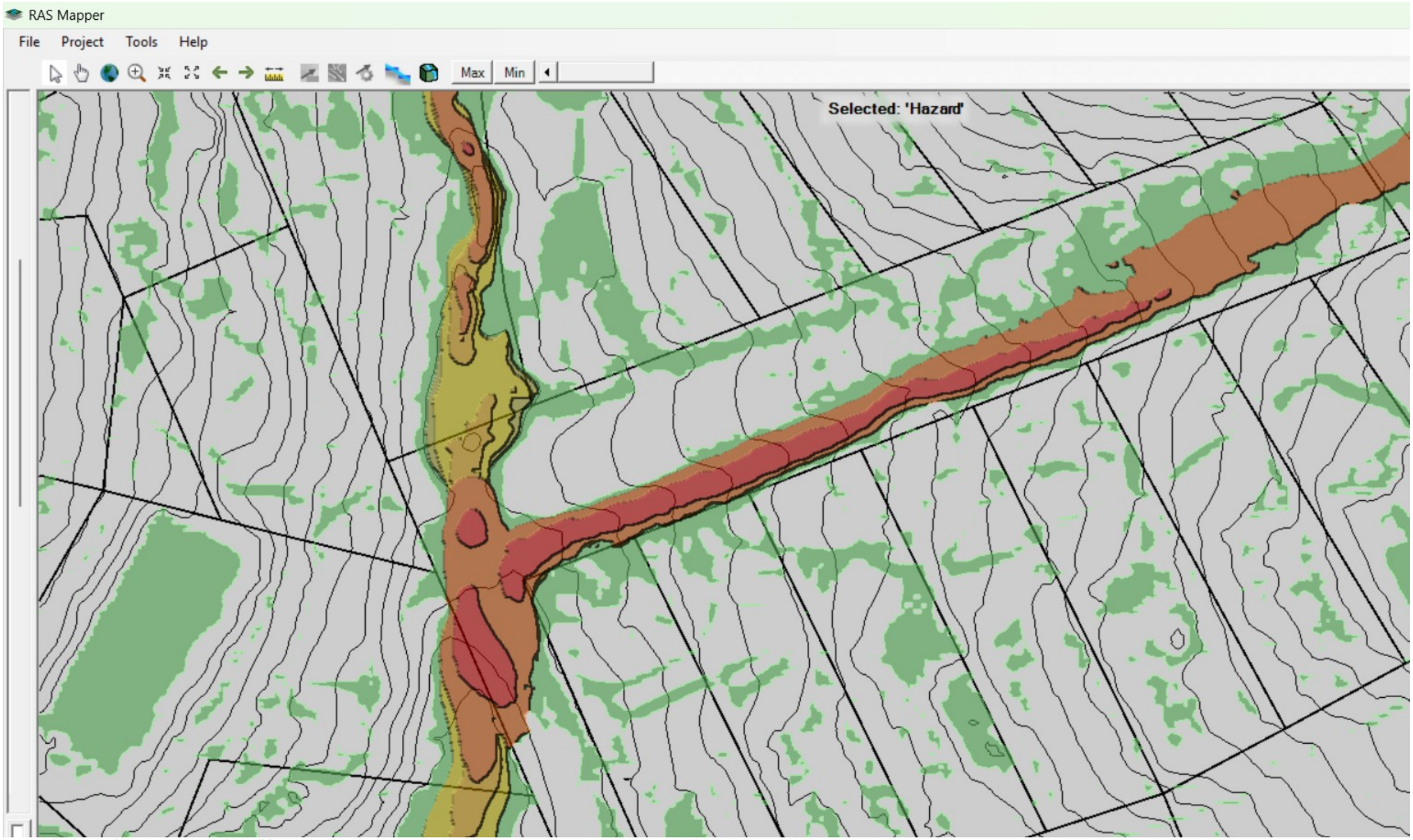
Map 4, Hydraulic Categories, 1% AEP, Exis. Conditions, 1-Flood Fringe, 2- Flood Storage, 3-Floodway



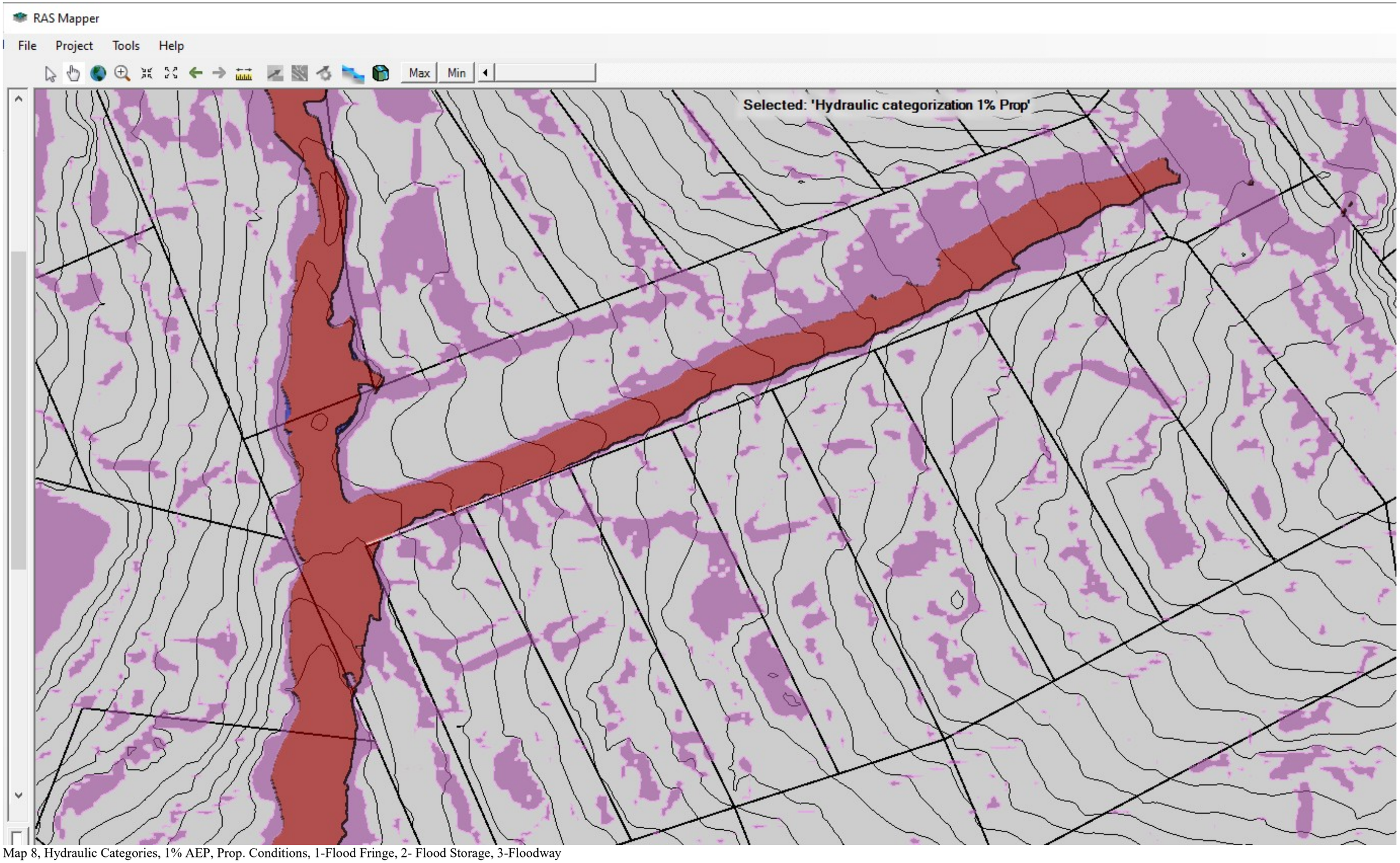
Map 5, Flood Levels and Depth, 1% AEP, Proposed Conditions



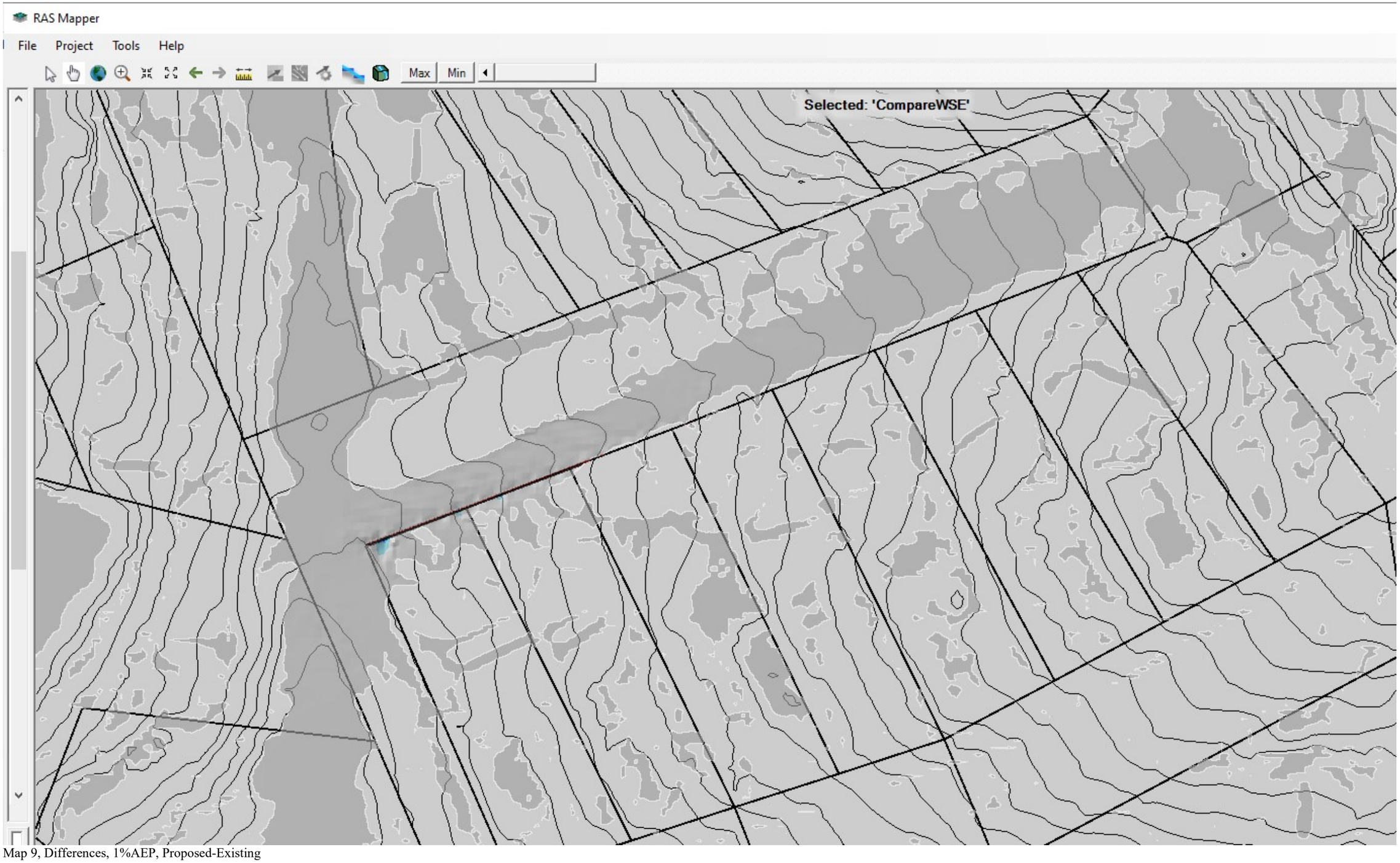
Map 6, Velocity, 1% AEP, Proposed Conditions



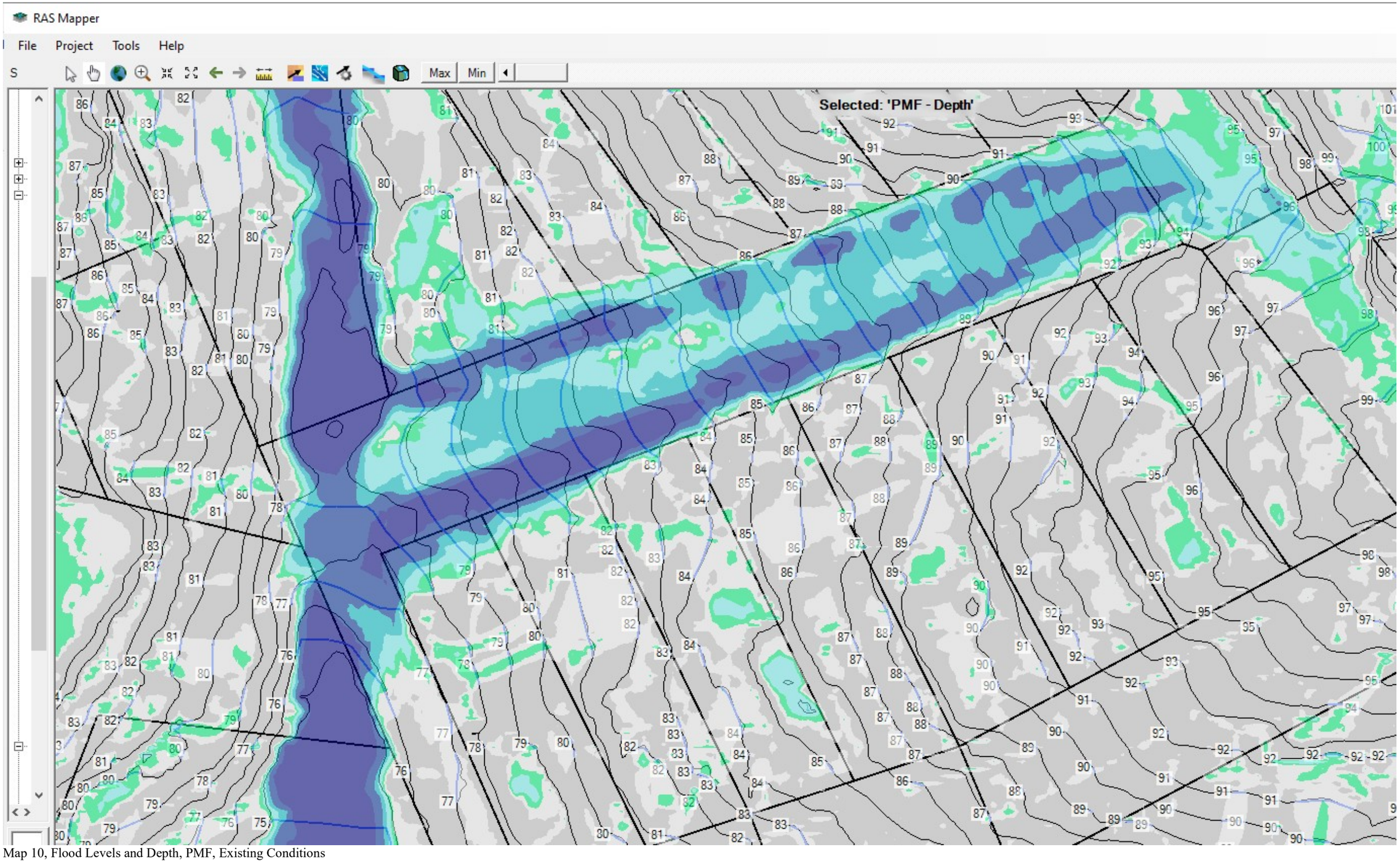
Map 7, Flood Hazard, 1% AEP, Proposed Conditions, 1-H1, 2-H2, 3-H3, 4-H4, 5-H5, 6-H6



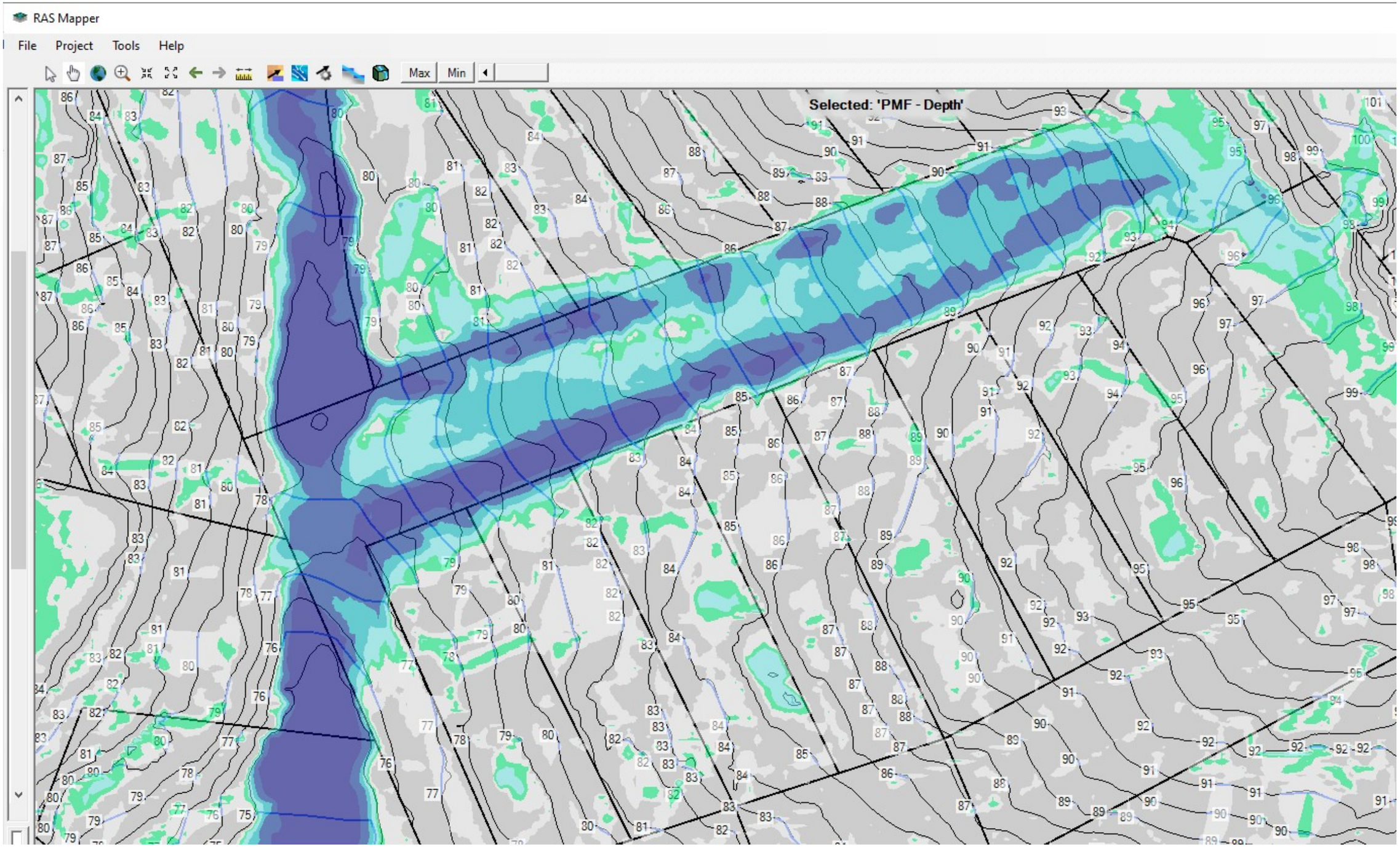
Map 8, Hydraulic Categories, 1% AEP, Prop. Conditions, 1-Flood Fringe, 2- Flood Storage, 3-Floodway



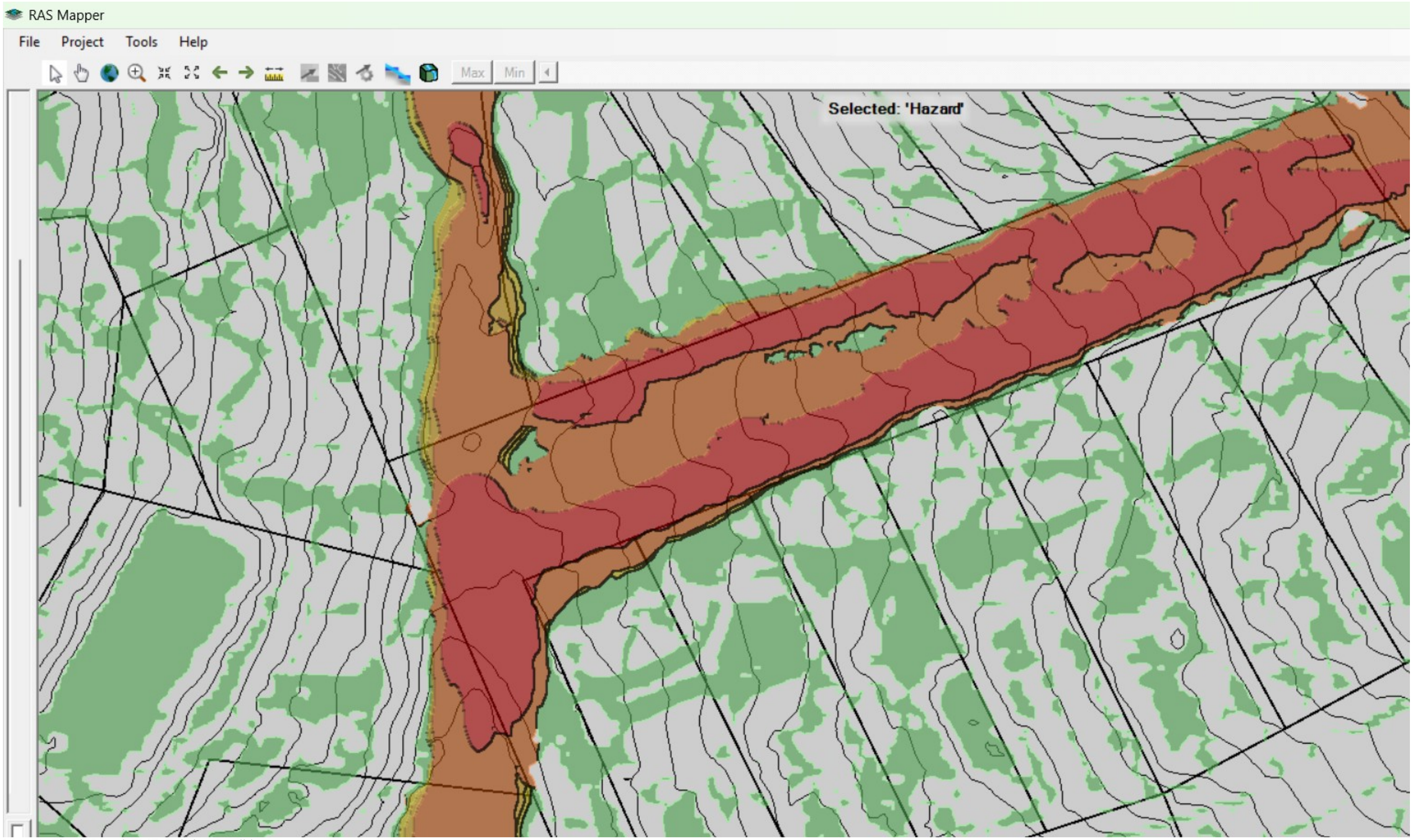
Map 9, Differences, 1%AEP, Proposed-Existing



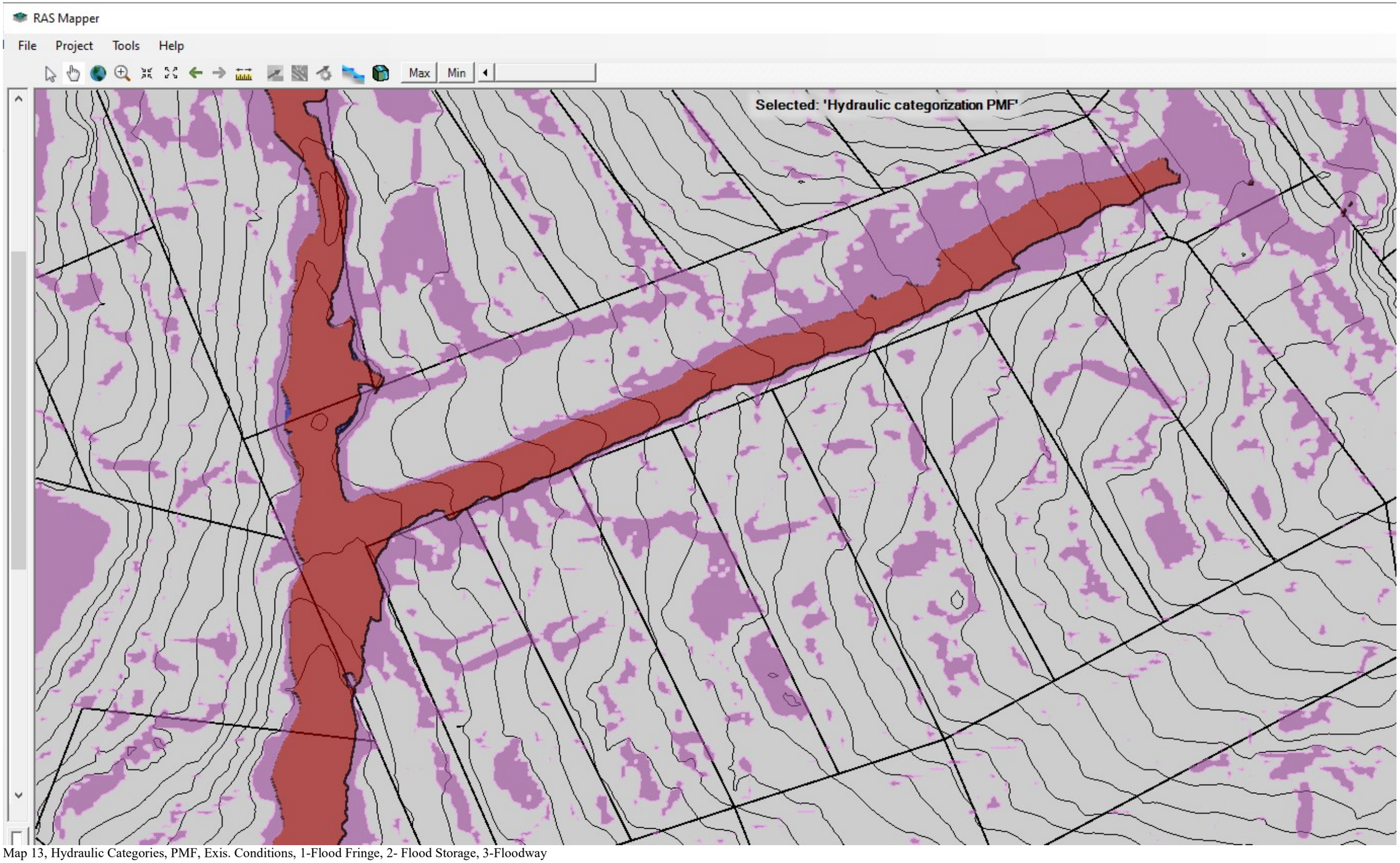
Map 10, Flood Levels and Depth, PMF, Existing Conditions



Map 11, Velocity, PMF, Existing Conditions



Map 12, Flood Hazard, PMF, Existing Conditions



Map 13, Hydraulic Categories, PMF, Exis. Conditions, 1-Flood Fringe, 2- Flood Storage, 3-Floodway