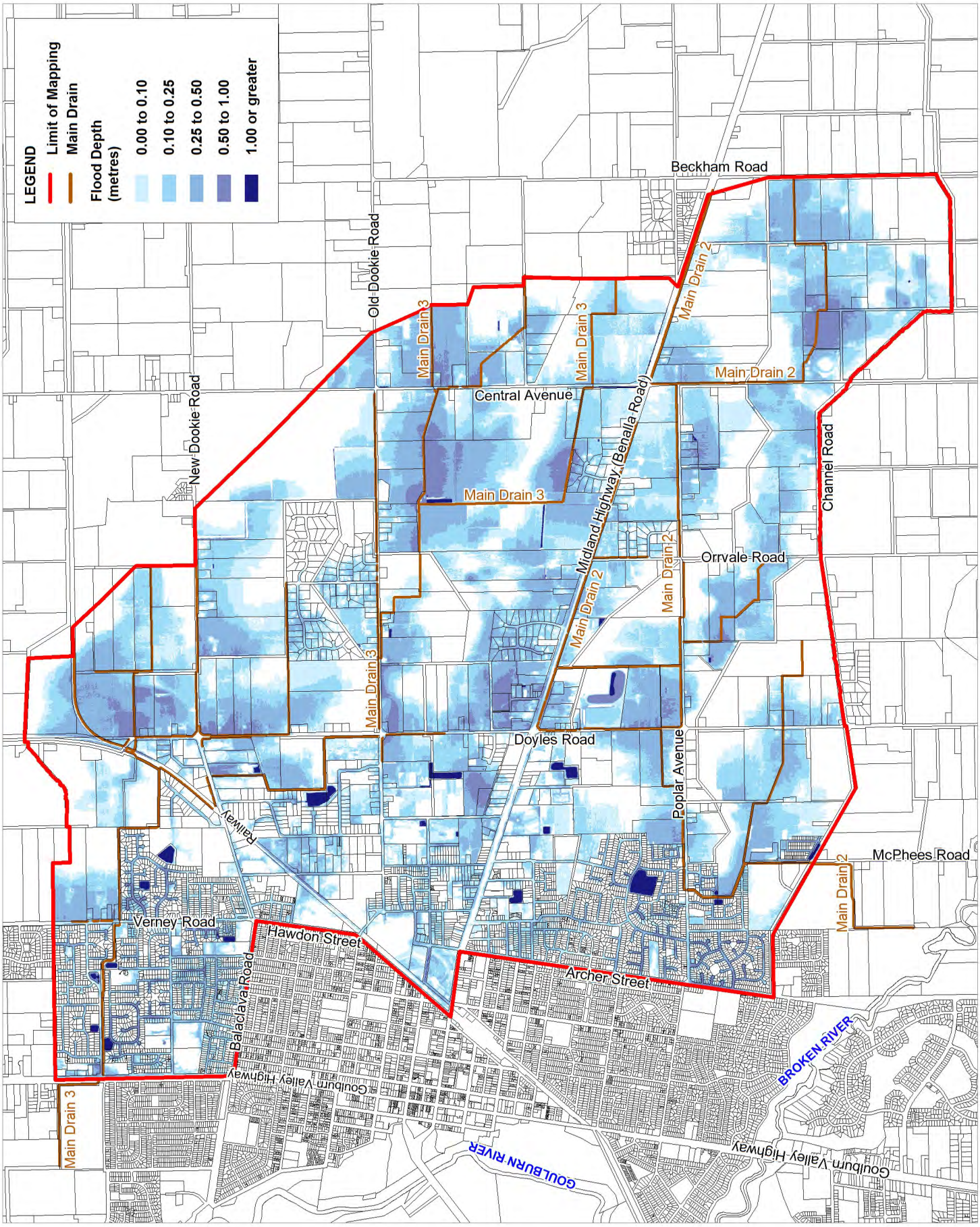
6.4 Developed Case - Climate Change Sensitivity

A worst case combined assessment investigating the impact of ultimate development in addition to an increase in rainfall intensity of 32% was undertaken for the catchment for the 1% AEP flood event, the results of which are presented in Figure 6-10. For details on the adjusted parameters refer to Section 3.1.

Figure 6-11 shows the increase in climate change peak flood levels from existing conditions for the 1% AEP event. It can be seen in Figure 6-11 that there are significance increases seen across the floodplain. The increases are generally greater than 0.025 m but less than 0.250 m. This results in a similar flood extent to the 0.5% AEP existing conditions event, however, the peak flood levels are slightly greater.

A comparison of the existing case, developed case, climate change scenario and developed with climate change scenario, Figure 6-7, Figure 6-9 and Figure 6-11 respectively, show that the catchment is most affected by the climate change rather than the increase in impervious surfaces assumed in the developed scenario. Compared to the increases of the individual assessments, the combined assessment of both is only incrementally larger than individual components.



Title:

Shepparton East
Developed Climate Change 1% AEP Peak Flood Depth

Figure: **6-10**

Rev: **A**

N

0 0.75 1.5km

Approx. Scale

BMT WBM

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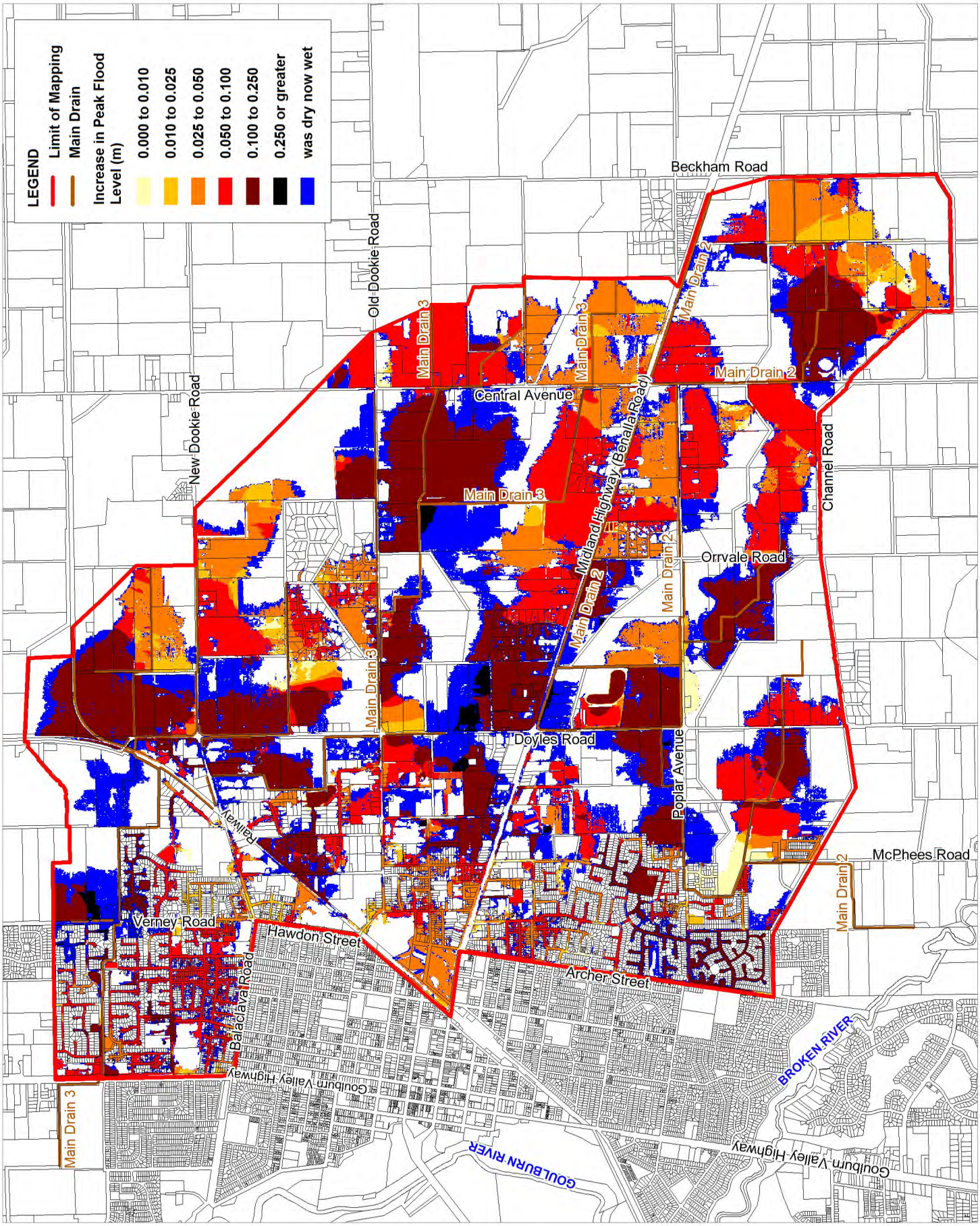
Filepath : T:\M8415.JL.SheppartonEast_Urban_FS\MapInfo\Drawings\R.M8415.003.00.Final\Fig6-10_UCC01_039_100y_dMax_RevA.wor



Title:

Shepparton East
Increase in 1% AEP Peak Flood Level - Developed Climate Change

Figure: **6-11**

Rev: **A**

N

0 0.75 1.5km

Approx. Scale

BMT WBM

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Filepath : T:\M8415.JL.SheppartonEast_Urban_FS\MapInfo\Drawings\R.M8415.003.00.Final\Fig6-11_UCC01_039_100y_Impact_RevA.wor

6.5 Flood Hazard Mapping

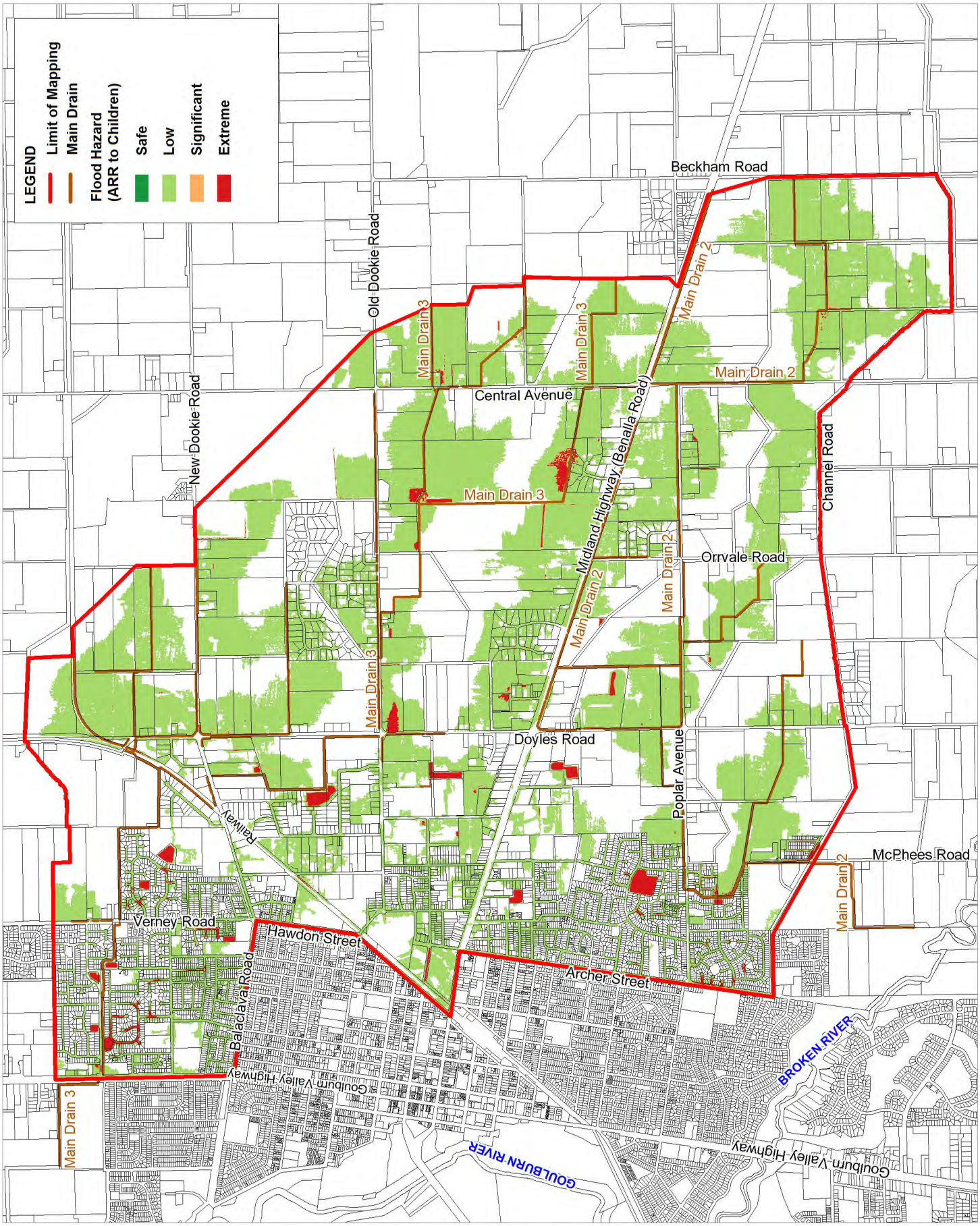
Peak flood hazard is based on the results from the 1% AEP event for each scenario. The flood hazard is presented spatially in Figure 6-12 though Figure 6-15 for the four scenarios, these scenarios were;

- Existing Conditions;
- Developed Conditions;
- Climate Change; and
- Developed Conditions with Climate Change.

Hazard mapping was undertaken using a methodology from the ARR revision project (Engineers Australia 2010) based on flow hazard regimes Hazardous to Children. Hazard is defined in terms of the depth and velocity-depth product as follows:

- Safe - velocity x depth equal to 0.0 m^2/s (no flooding);
- Low Hazard - velocity x depth less than 0.4 m^2/s (0.0 – 0.4 m^2/s);
- Significant Hazard - velocity x depth less than 0.6 m^2/s (0.4 – 0.6 m^2/s); and
- Extreme Hazard - depth greater than 500 mm and/or velocity x depth greater than 0.6 m^2/s (>0.6m^2/s).

Whilst flooding is extensive throughout the catchment the depths of flows are often shallow and slow moving. As a result the vast majority of the catchment is classified as a low hazard to children. High hazard is driven primarily by the depth rather than depth/velocity product and is primary only located within the many retarding basins within the catchment. High hazard to children also occurs within a number of road reserves.



Title:

Shepparton East
Existing Conditions Flood Hazard

Figure: **6-12**

Rev: **A**

0 0.75 1.5km

Approx. Scale

BMT WBM

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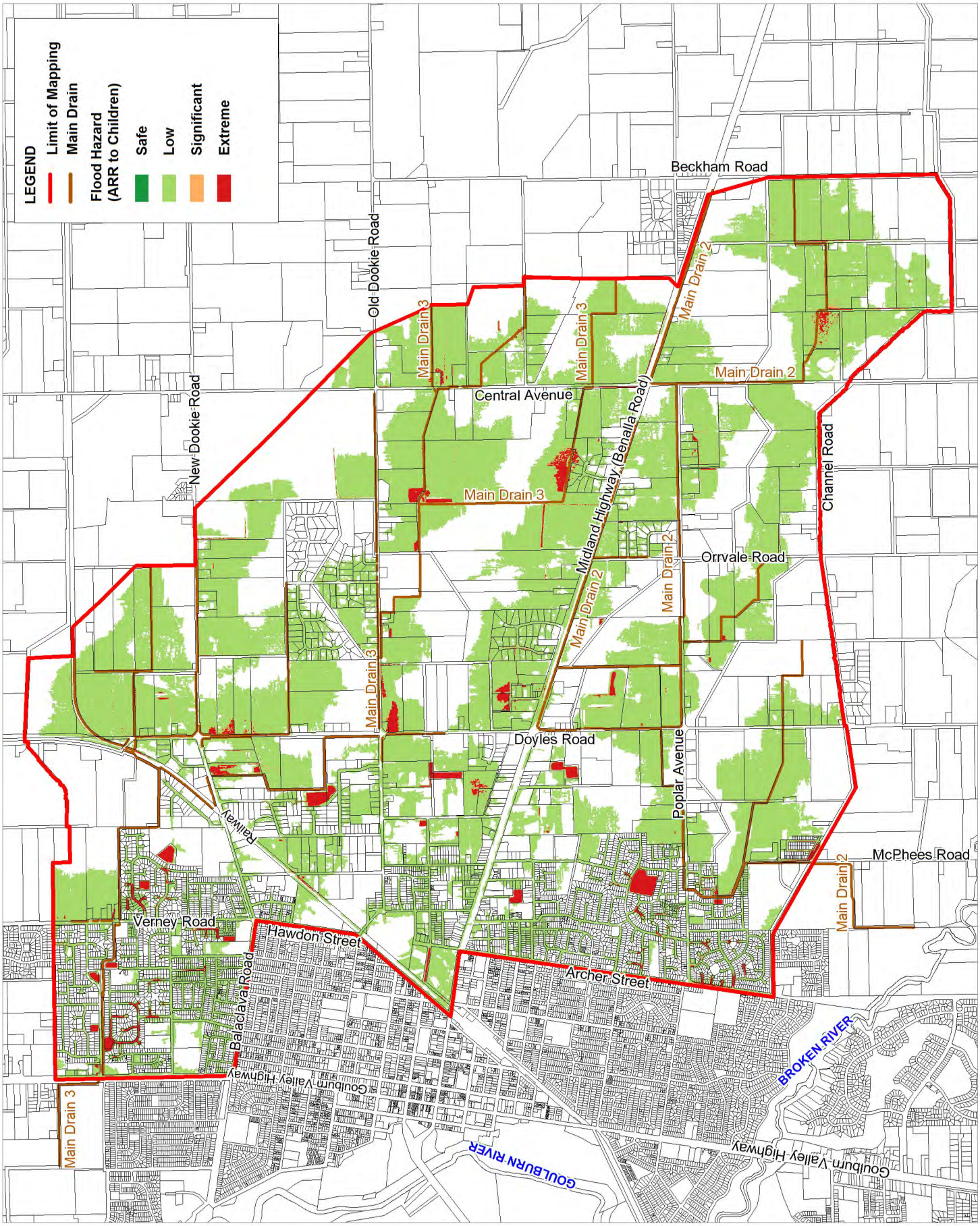
Filepath : T:\M8415.JL.SheppartonEast_Urban_FS\MapInfo\Drawings\R.M8415.003.00.Final\Fig6-12_E01_039_ZPCMax_RevA.wor



Title:

Shepparton East
Developed Conditions Flood Hazard

Figure: **6-13**

Rev: **A**

N

0 0.75 1.5km

Approx. Scale

BMT WBM

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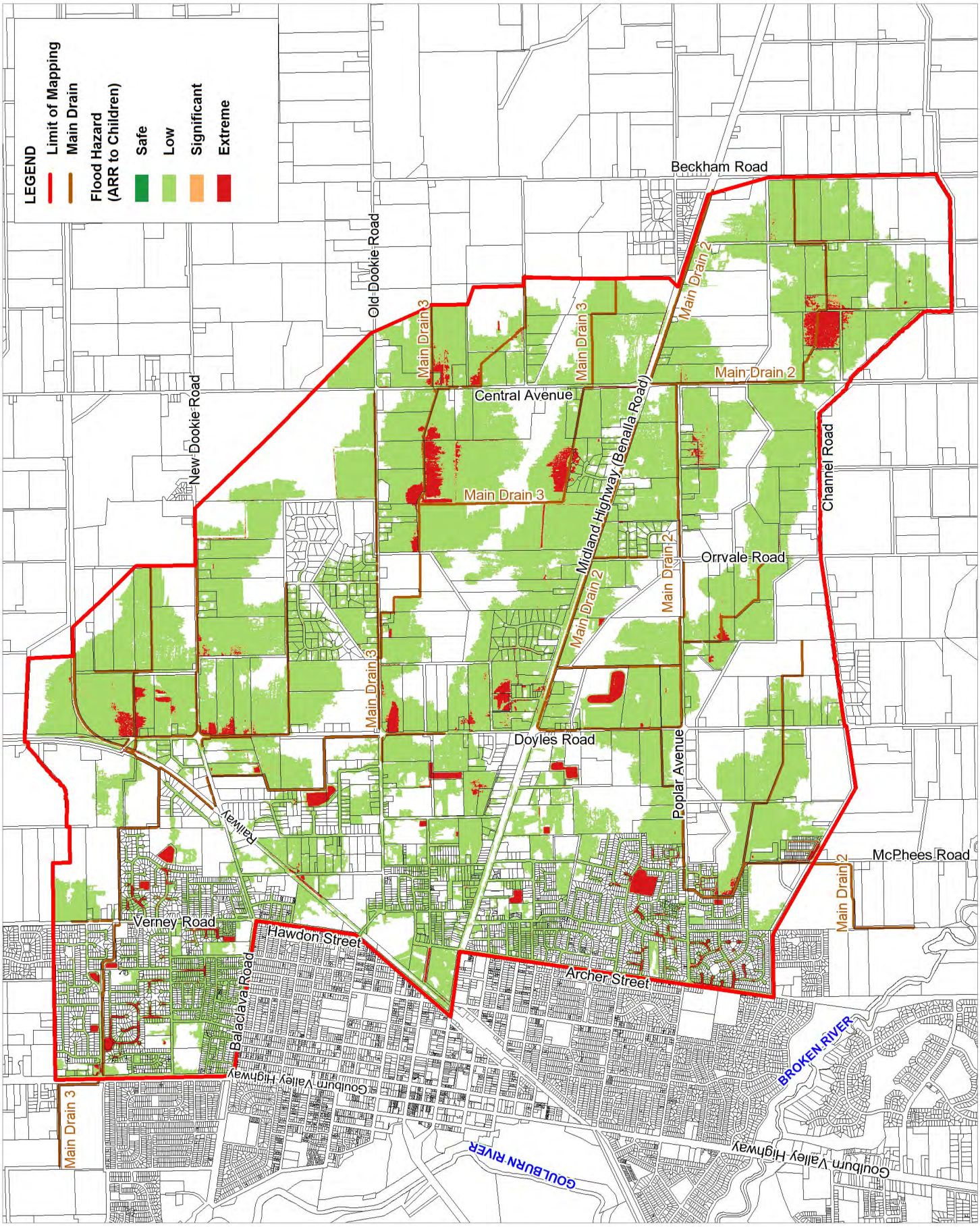
Filepath : T:\M8415.JL.SheppartonEast_Urban_FS\MapInfo\Drawings\R.M8415.003.00.Final\Fig6-13_U01_039_ZPCMax_RevA.wor



Title:

Shepparton East
Climate Change Flood Hazard

Figure: **6-14**

Rev: **A**

N

0 0.75 1.5km

Approx. Scale

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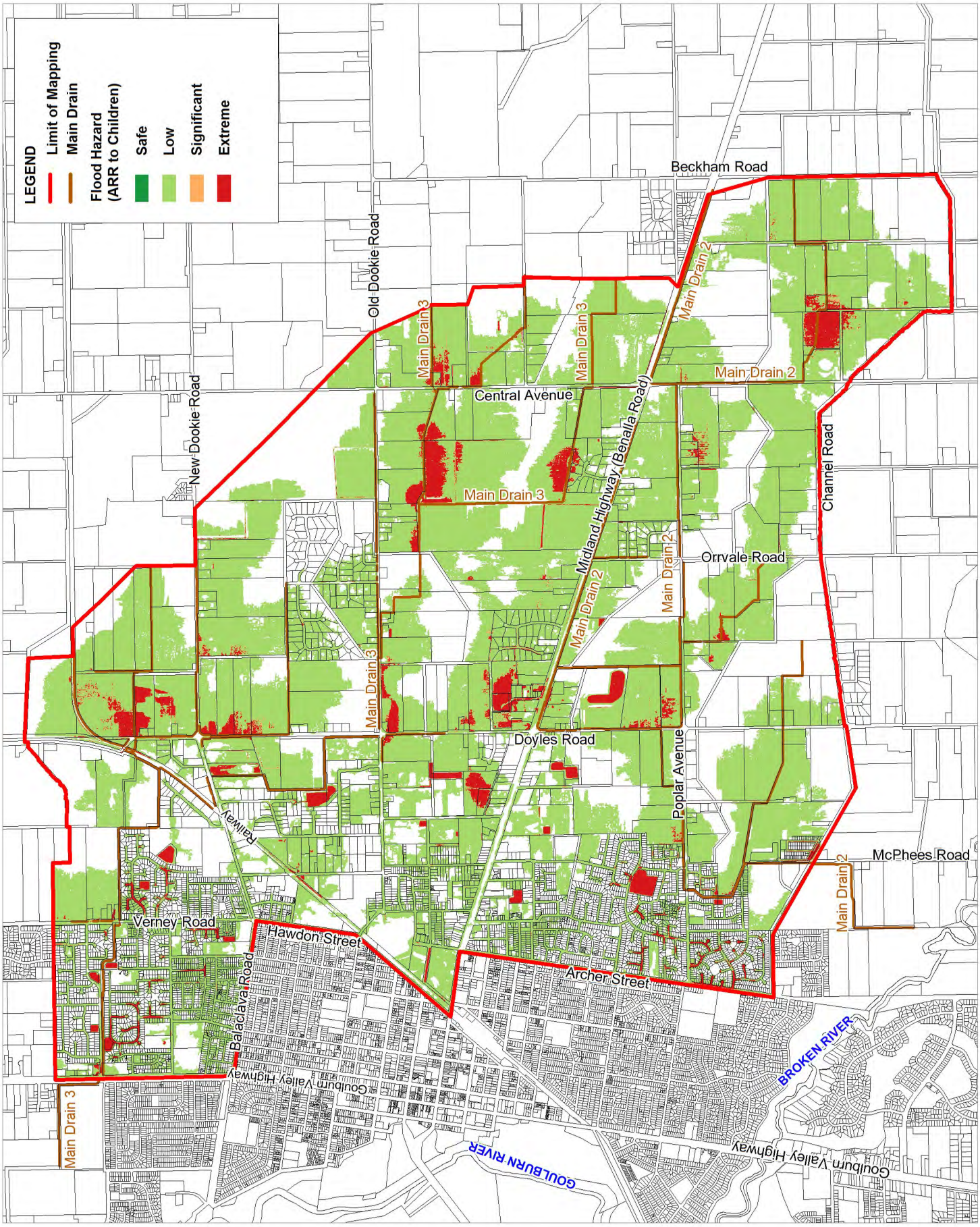
Filepath : T:\M8415.JL.SheppartonEast_Urban_FS\MapInfo\Drawings\R.M8415.003.00.Final\Fig6-14_CC01_039_ZPCMax_RevA.wor



Title:

Shepparton East
Developed Climate Change Flood Hazard

Figure: **6-15**

Rev: **A**

N

0 0.75 1.5km

Approx. Scale

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Filepath : T:\M8415.JL.SheppartonEast_Urban_FS\MapInfo\Drawings\R.M8415.003.00.Final\Fig6-15_UCC01_039_ZPCMax_RevA.wor

6.6 Property Risk Mapping

Existing conditions flood risk mapped for the peak flood level for each scenario investigated. The flood risk to property is presented spatially in Figure 6-16 through Figure 6-19 for each of the four scenarios and a summary of the number of properties within each flood risk category are summarised in Table 6-1 for all scenarios. Risk mapping was undertaken using a methodology that was defined by GBCMA. Risk to property is as likely of flooding as below from lowest risk to highest;

Category 1 - The property is above the 2% AEP but below the 1% AEP flood level;

Category 2 - The property is above the 5% AEP but below the 2% AEP flood level;

Category 3 - The property is above the 10% AEP but below the 5% AEP flood level;

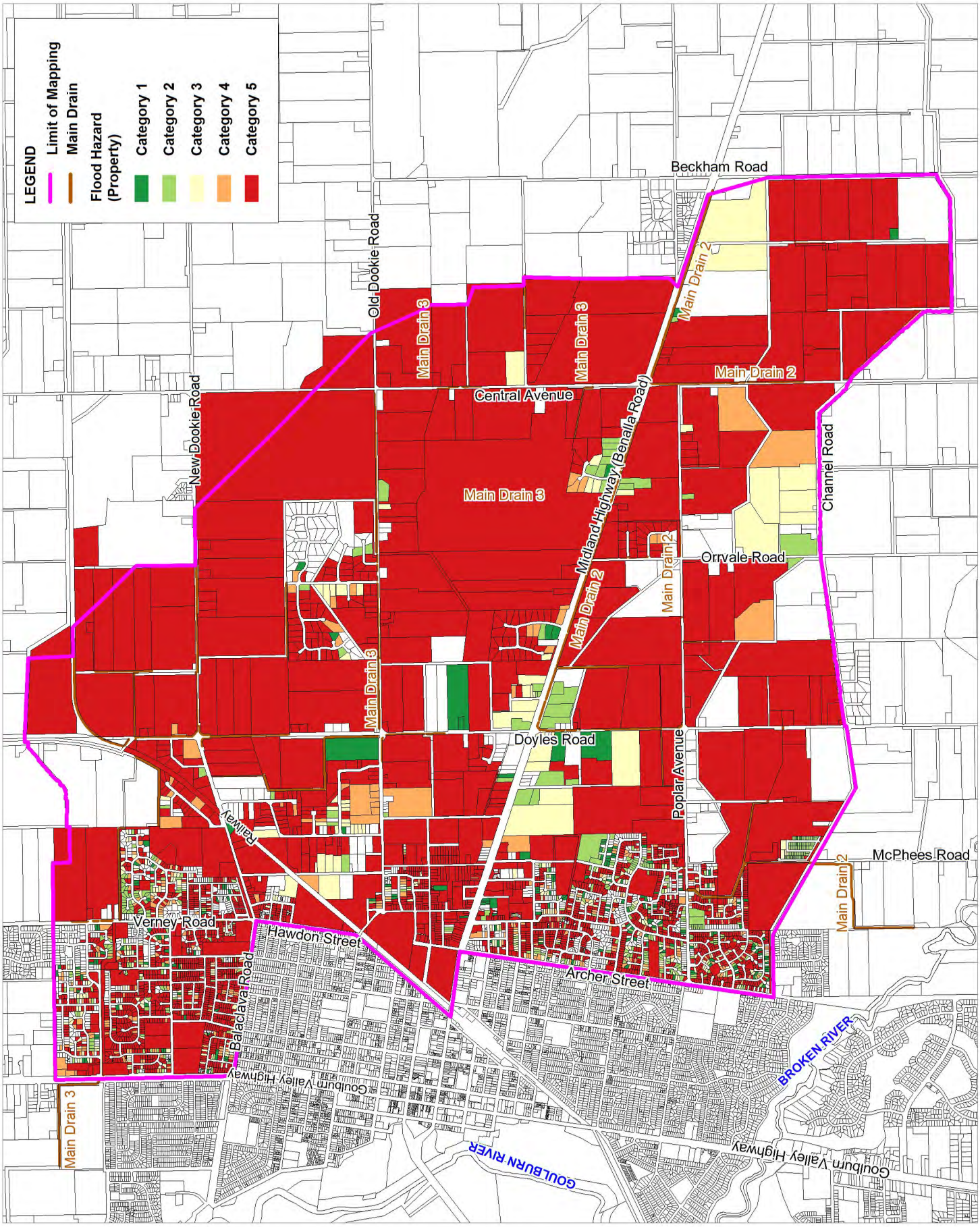
Category 4 - The property is above the 20% AEP but below the 10% AEP flood level; or

Category 5 - The property is below the 20% AEP flood level.

Table 6-1 Properties at Risk

Scenario	Existing	Developed	Climate Change	Climate Change – Developed
Category 1	321	238	207	236
Category 2	564	472	391	330
Category 3	408	378	420	353
Category 4	279	415	445	343
Category 5	1585	1944	2253	2719

Due to the flat nature of the catchment the vast majority of properties are deemed at the highest risk category (Category 5). However it should be noted that this assessment is based on property boundaries and as such if any water, no matter how shallow or expansive is on the property it is deemed at risk. Properties with less than 5% of the parcel inundated were excluded from analysis as a large number of properties were reported as inundated along the edge due to the resolution of the model. A less conservative approach would be through use of floor levels of dwellings but this information does not exist for each property within the catchment.



Title:

Shepparton East
Existing Conditions Flood Risk to Property

Figure: **6-16**

Rev: **A**

N

0 0.75 1.5km

Approx. Scale

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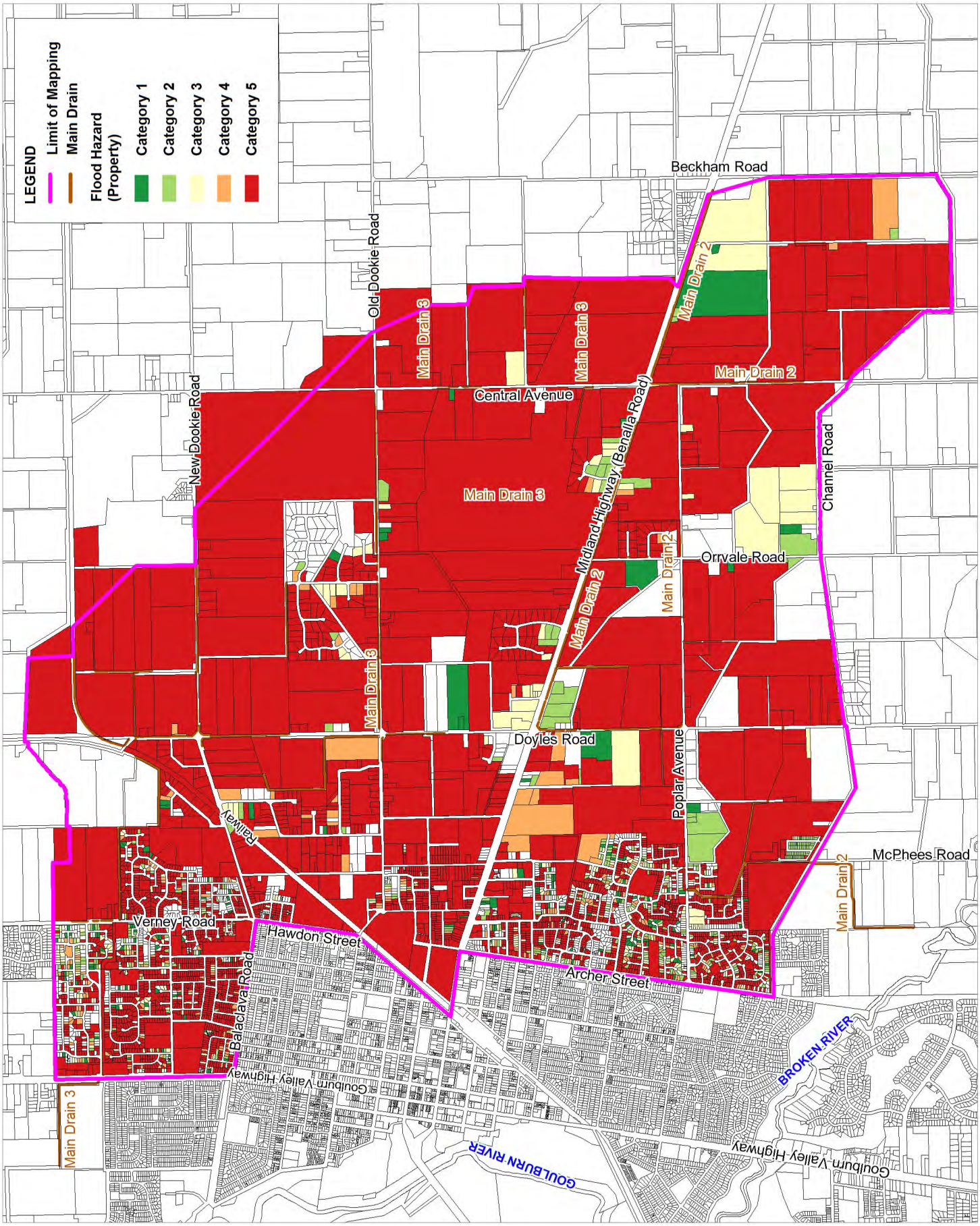
Filepath : T:\M8415.JL.SheppartonEast_Urban_FS\MapInfo\Drawings\R.M8415.003.00.Final\Fig6-16_E01_039_PropRisk_RevA.wor



Title:

Shepparton East
Developed Conditions Flood Risk to Property

Figure: **6-17**

Rev: **A**

N

0 0.75 1.5km

Approx. Scale

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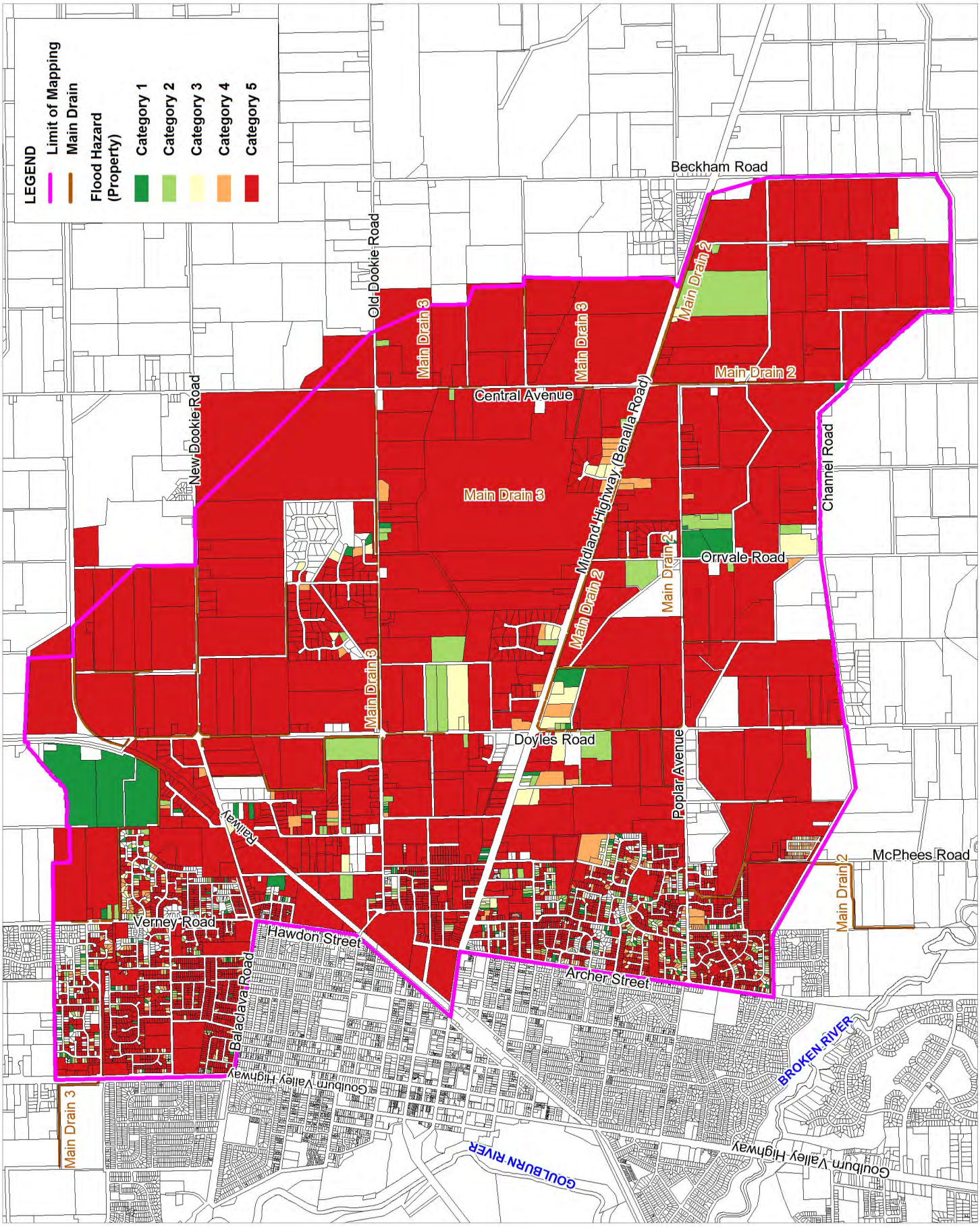
Filepath : T:\M8415.JL.SheppartonEast_Urban_FS\MapInfo\Drawings\R.M8415.003.00.Final\Fig6-17_U01_039_PropRisk_RevA.wor



Title:

Shepparton East
Climate Change Flood Risk to Property

Figure: **6-18**

Rev: **A**

N

0 0.75 1.5km

Approx. Scale

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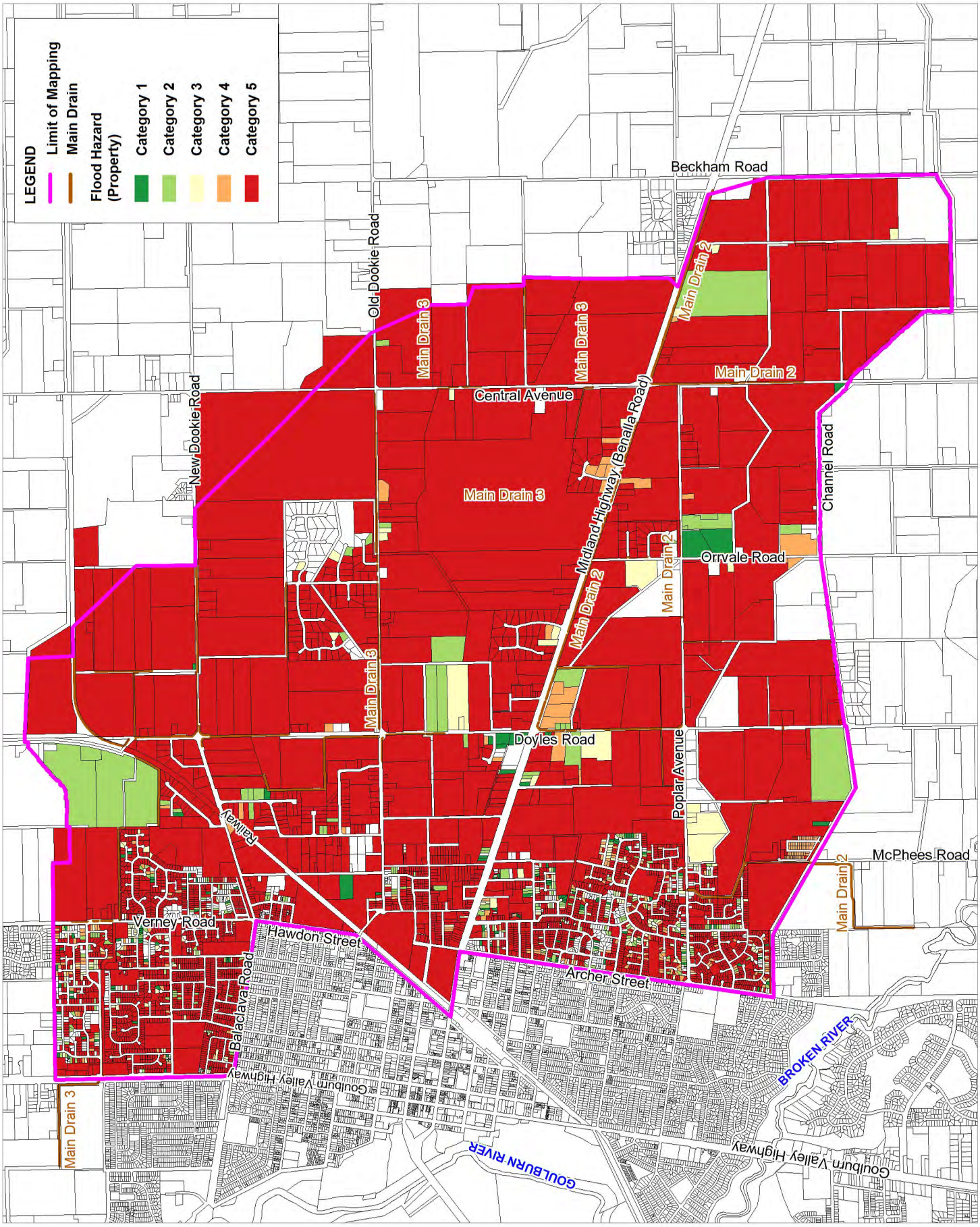
Filepath : T:\M8415.JL.SheppartonEast_Urban_FS\MapInfo\Drawings\R.M8415.003.00.Final\Fig6-18_CC01_039_PropRisk_RevA.wor



Title:

Shepparton East
Developed Climate Change Flood Risk to Property

Figure: **6-19**

Rev: **A**

N

0 0.75 1.5km

Approx. Scale

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Filepath : T:\M8415.JL.SheppartonEast_Urban_FS\MapInfo\Drawings\R.M8415.003.00.Final\Fig6-19_U01_039_PropRisk_RevA.wor