6 Flood Mapping and Results

This section provides an overview of the floodplain mapping process used in the study and presents a selection of the existing conditions mapping outputs.

TUFLOW was used to produce geo-referenced datasets defining peak water levels, depths, velocities, depth velocity product (i.e. flood hazard) and critical storm durations throughout the model domain. For each given AEP and dataset type (e.g. water level), the peak value from each of the storm durations was selected for each computational cell to generate a peak envelope. The datasets were then imported into GIS to generate digital surface models of the above mentioned flood properties and produce the required flood mapping outputs.

6.1 Existing Case

6.1.1 Flood Depth Mapping and Description

Flooding within Shepparton East is generally very widespread throughout the catchment with large portions of the catchment taking considerable time to drain, if at all without the aid of pumping. Flood depths throughout the catchment are presented in Figure 6-1 and Figure 6-2 for the 20% and 1% AEP respectively. A complete set of flood depth maps are provided in Appendix E.

The mapping shows that in the urban portion of the catchment the floodwaters are by and large managed very well, with the majority of the flooding occurring within the road reserve. Flood depths within the roads are typically between 0.25 and 0.5m with isolated areas up to 1.0m. Depths greater than 1.0m only occurred within the many retarding basins within the catchment. Where flooding was found to occur within residential and commercial properties the depth of inundation was typically less than 0.25m.

Flooding of the rural and farm areas of Shepparton East was found to be widespread in even the 20% AEP flood event with floodwaters filling local depressions and backing up behind roadways or other ridges throughout the catchment. Due to the widespread nature of flooding within these areas flood depths were found to be typically low with depths rarely exceeding 0.5m in the 1% AEP design flood event.

6.1.2 Flood Velocity Mapping

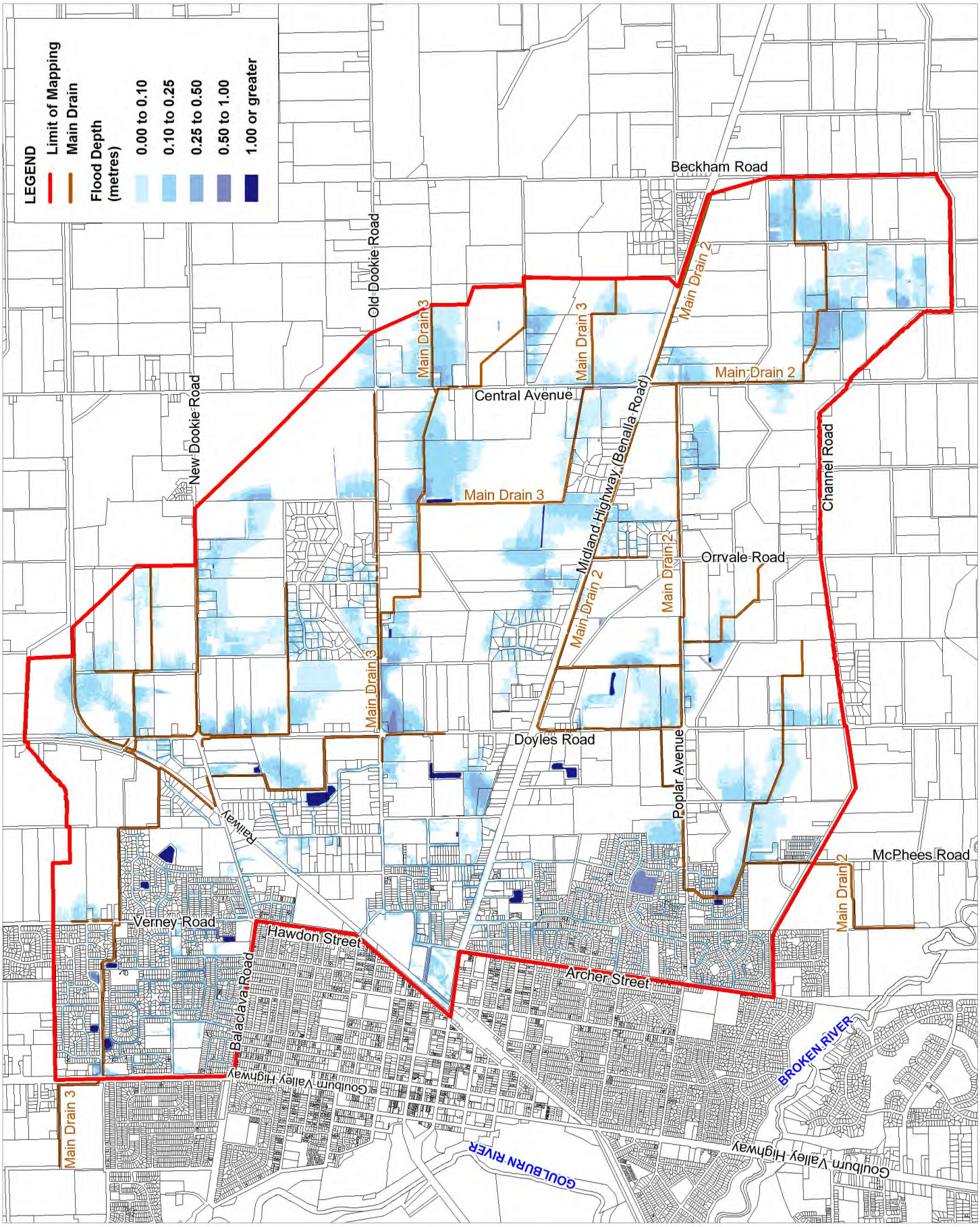
Existing conditions flood velocity is mapped for the 1% AEP event at peak flood level. The flood velocity mapping is designed to depict both the magnitude and direction of the flow velocities. The 1% AEP flood velocity is shown in Figure 6-3. A complete set of flood velocity maps are provided in Appendix F.

Flood velocity mapping is useful in determining the areas of flood risk, identifying flowpaths and identifying the direction of flow.

As discussed above, the catchment is generally quite flat in nature with widespread but shallow flooding. As such, flood velocities within the catchment were typically very slow, rarely exceeding 0.25 m/s. Due to the concentration of floodwaters in road reserve in the urban proportion of the

catchment the velocities are higher than elsewhere in the catchment, however even so velocities exceeding 0.5 m/s are rare up to the 1% AEP.

Where flow was observed to flow through residential or commercial properties velocities rarely exceeded 0.1 m/s.



Title:

Shepparton East
Existing Conditions 20% AEP Peak Flood Depth

Figure: **6-1**

Rev: **A**

N

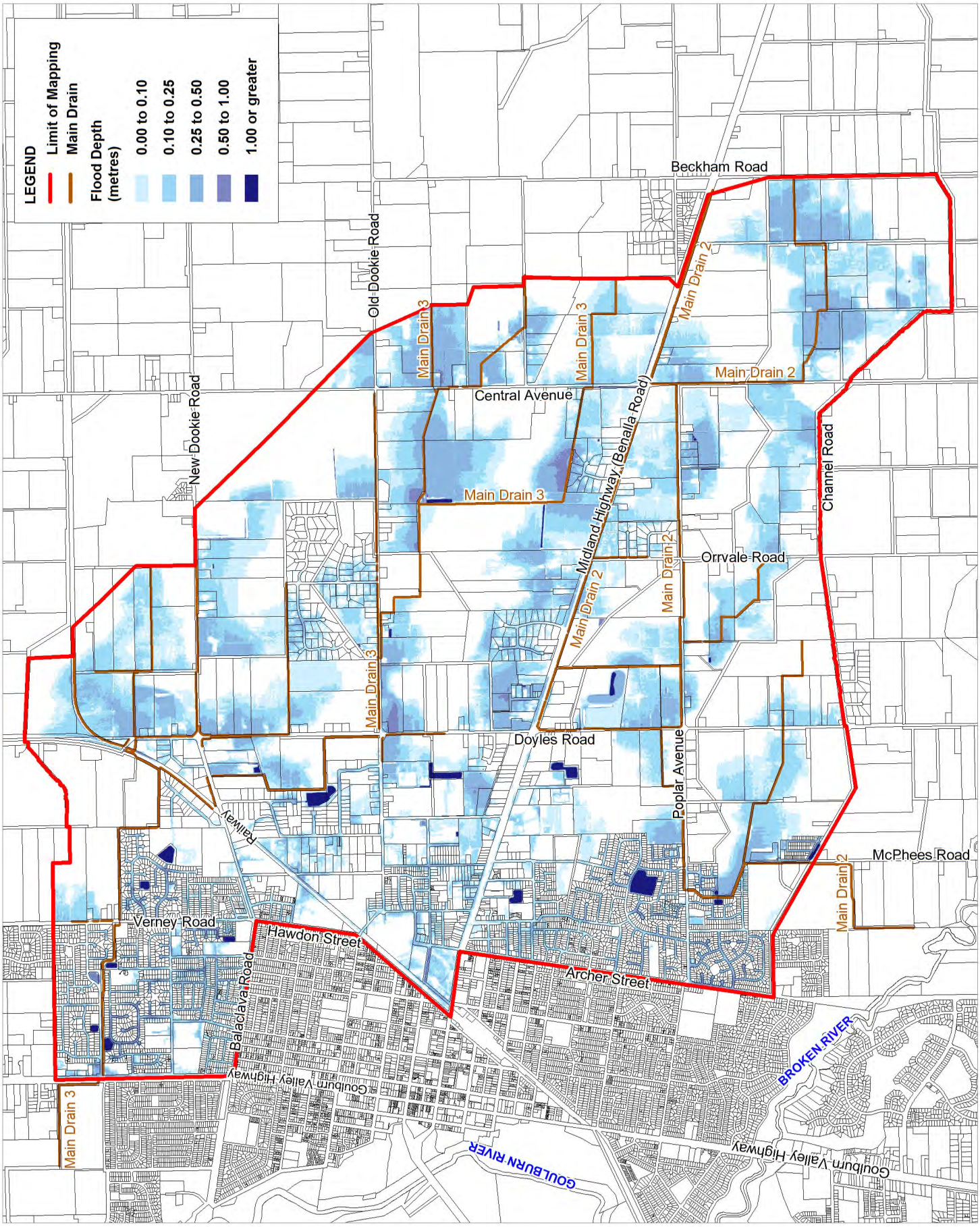
0 0.75 1.5km

Approx. Scale

BMT WBM

www.bmtwbm.com.au

Filepath : T:\M8415.JL.SheppartonEast_Urban_FS\MapInfo\Drawings\R.M8415.003.00.Final\Fig6-1_E01_039_5y_dMax_RevA.wor



Title:

Shepparton East
Existing Conditions 1% AEP Peak Flood Depth

Figure: **6-2**

Rev: **A**

N

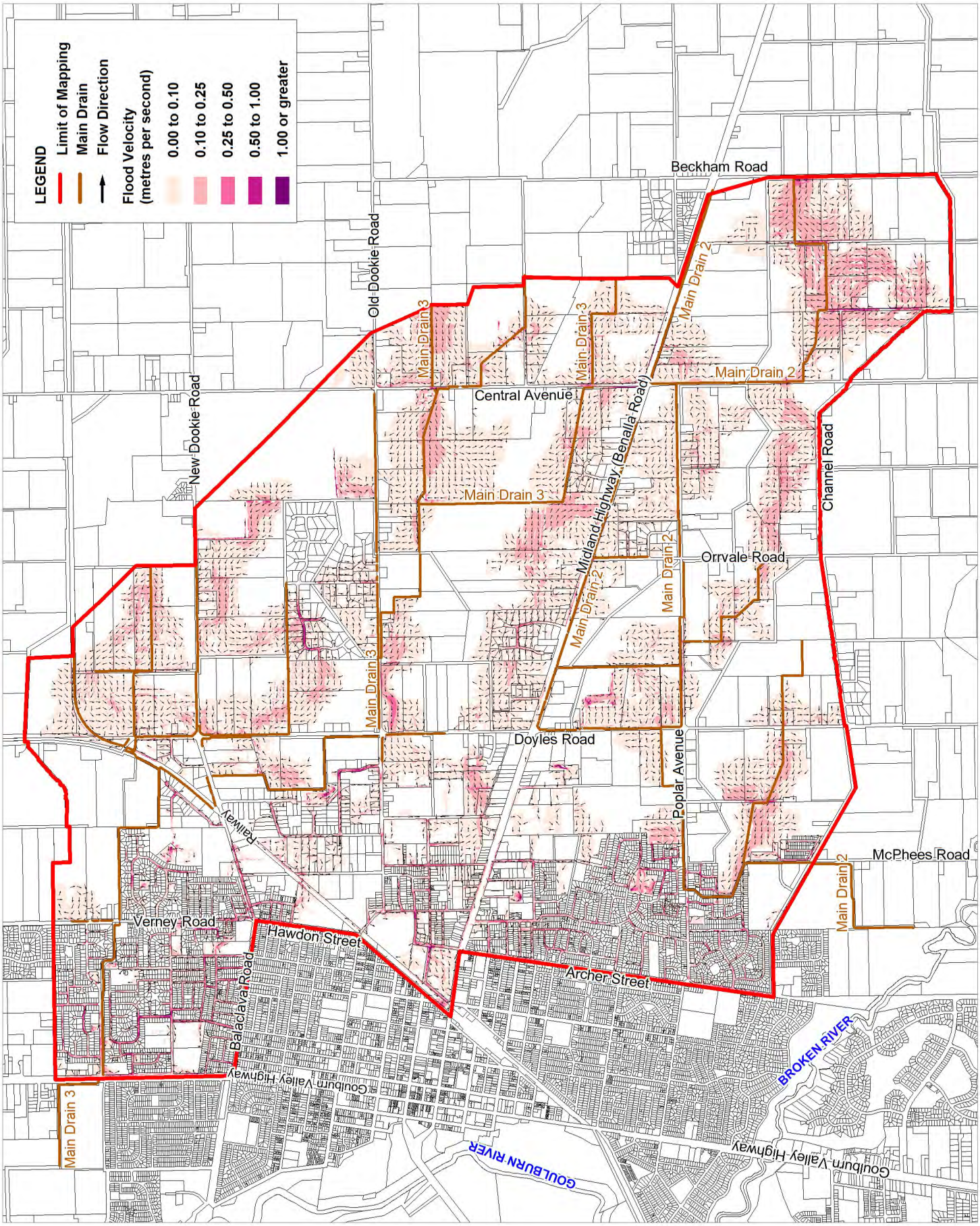
0 0.75 1.5km

Approx. Scale

BMT WBM

www.bmtwbm.com.au

Filepath : T:\M8415.JL.SheppartonEast_Urban_FS\MapInfo\Drawings\R.M8415.003.00.Final\Fig6-2_E01_039_100y_dMax_RevA.wor



Title:

Shepparton East
Existing Conditions 1% AEP Peak Flood Velocity

Figure: **6-3**

Rev: **B**

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\Fig6-3_E01_039_100y_vMax_RevB.wor

6.2 Developed Case

6.2.1 Flood Depth Mapping and Description

Flooding within Shepparton East is generally very widespread throughout the catchment with large portions of the catchment taking considerable time to drain, if at all without the aid of pumping. Flood depths throughout the catchment are presented in Figure 6-4 and Figure 6-5 for the 20% and 1% AEP flood events respectively. The full suite of flood depth maps is provided in Appendix E.

The purpose of this analysis will allow planners to gain an understanding of the potential impact that increased urbanisation of the catchment could have on the study area and make future decisions accordingly.

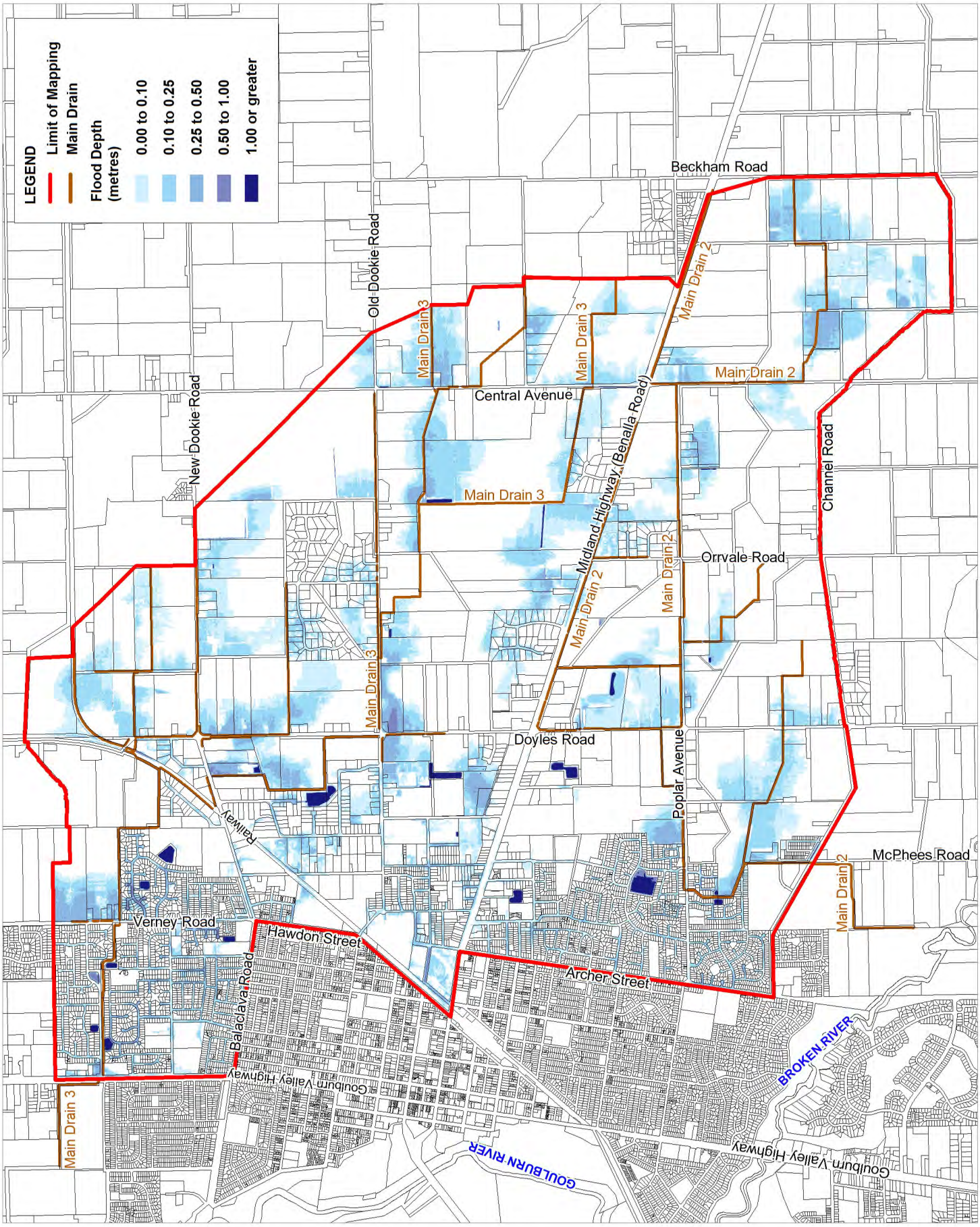
Figure 6-7 shows the increase in developed case peak flood levels from existing conditions for the 1% AEP event. It can be seen in Figure 6-7, that in the existing residential area, increases were generally below 0.025 m, while in the rural areas upstream of the proposed future development increases were up to 0.250 m. Generally, the 1% AEP under developed conditions was found to approximate the existing case 0.5% AEP design levels in areas where development increases were incremental. Where substantial development is planned flood levels would exceed the existing 0.2% AEP flood levels if unmanaged.

As with the 1% AEP event, in the existing residential areas the flood levels in the 20% AEP developed case design flood event were found to only increase marginally, approximately matching the 10% AEP flood depths under existing conditions. Similar increases were observed in the rural areas upstream of the proposed future development with flood levels increasing to align approximately with the 10% AEP under existing conditions. In the areas proposed for development flood levels are expected to increase dramatically without development constraints. If left unmanaged the flood risk from the 20% AEP event is likely to exceed the existing 0.2% design flood depths due to these changes in land use, particularly fraction imperviousness.

6.2.2 Flood Velocity Mapping

Existing conditions flood velocity is mapped for the 1% AEP event at peak flood level. The flood velocity mapping is designed to depict both the magnitude and direction of the flow velocities. The 1% AEP flood velocity is shown in Figure 6-6, a complete set of maps are provided in Appendix F.

Despite the increased flood depths due to the increased development, flood velocities are largely unchanged from the existing case.



Title:

Shepparton East
Developed Conditions 20% AEP Peak Flood Depth

Figure: **6-4**

Rev: **A**

N

0 0.75 1.5km

Approx. Scale

BMT WBM

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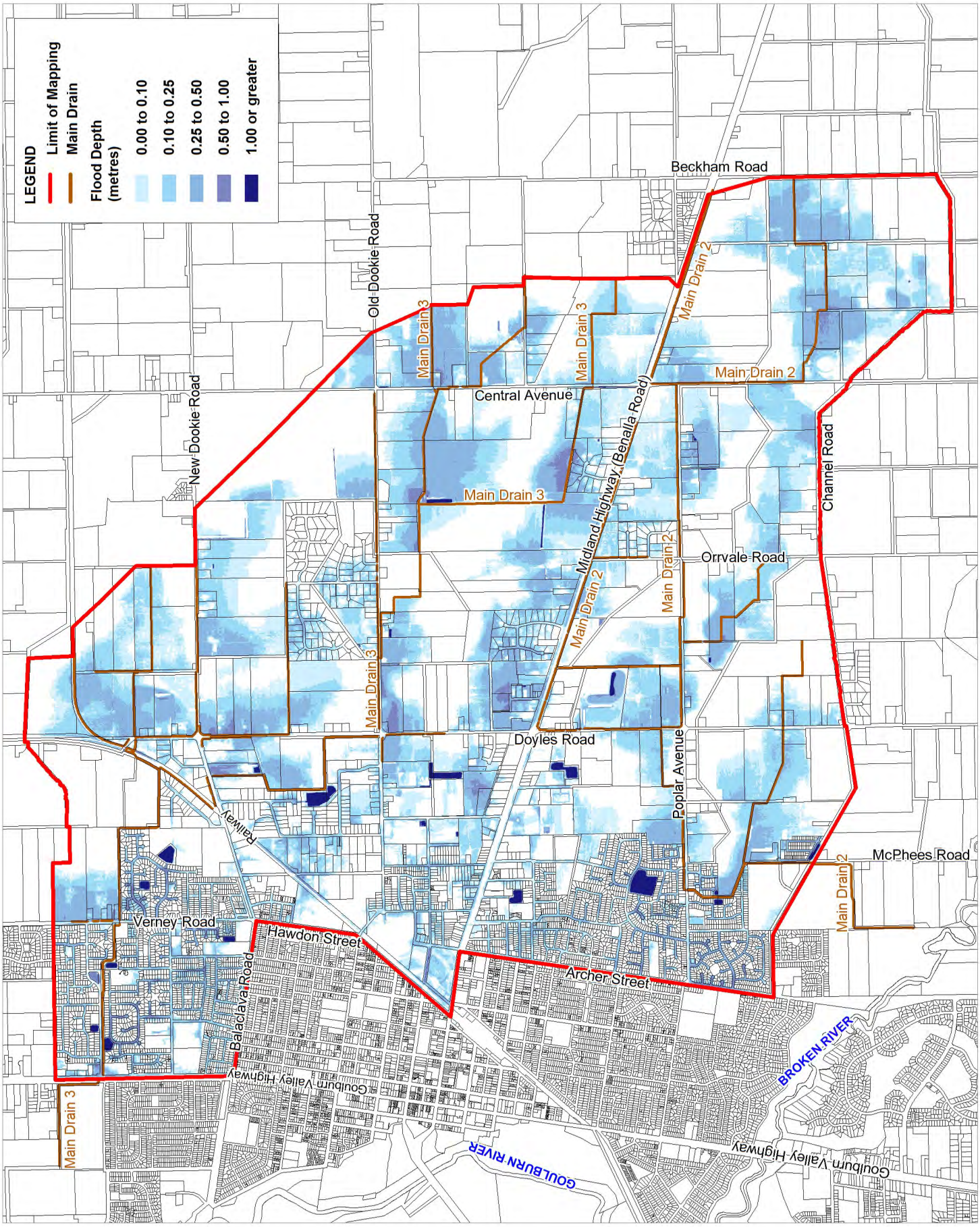
Filepath : T:\M8415.JL.SheppartonEast_Urban_FS\MapInfo\Drawings\R.M8415.003.00.Final\Fig6-4_U01_039_5y_dMax_RevA.wor



Title:

Shepparton East
Developed Conditions 1% AEP Peak Flood Depth

Figure: **6-5**

Rev: **A**

N

0 0.75 1.5km

Approx. Scale

BMT WBM

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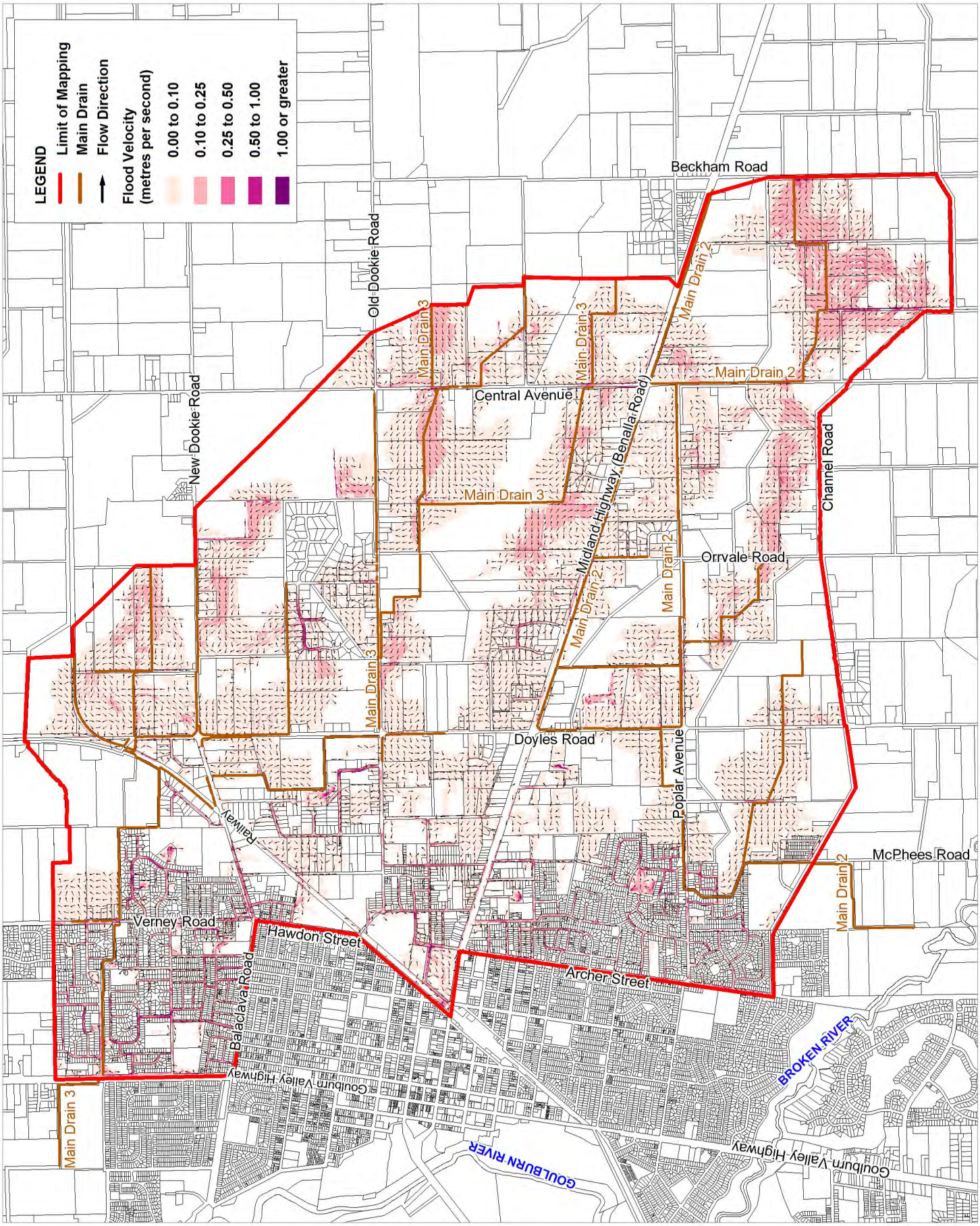
Filepath : T:\M8415.JL.SheppartonEast_Urban_FS\MapInfo\Drawings\R.M8415.003.00.Final\Fig6-5_U01_039_100y_dMax_RevA.wor



Title:

Shepparton East
Developed Conditions 1% AEP Peak Flood Velocity

Figure: **6-6**

Rev: **B**

N

0 0.75 1.5km

Approx. Scale

BMT WBM

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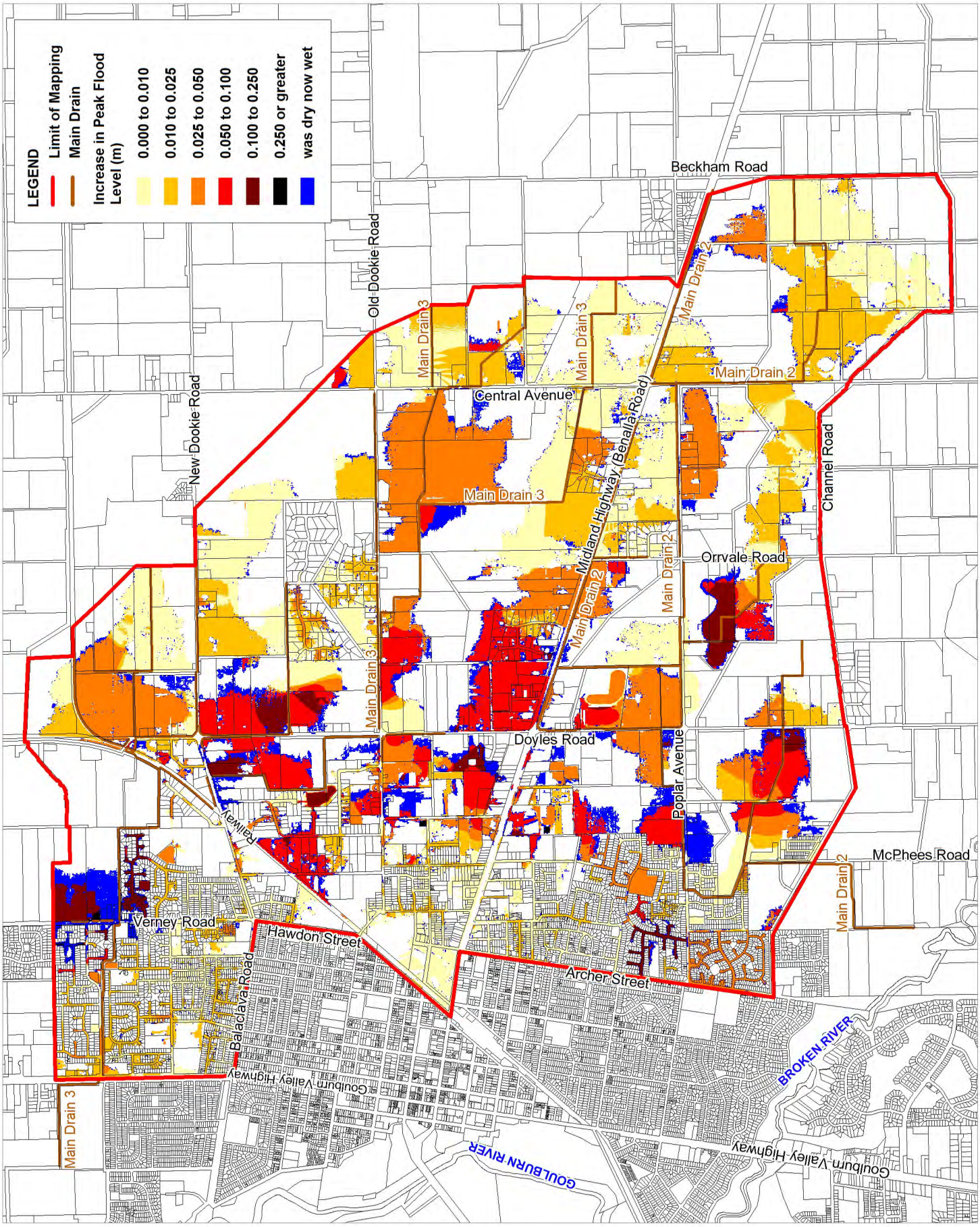
Filepath : T:\M8415.JL.SheppartonEast_Urban_FS\MapInfo\Drawings\R.M8415.003.00.Final\Fig6-6_U01_039_100y_vMax_RevB.wor



Title:

Shepparton East
Increase in Developed Conditions 1% AEP Peak Flood Level

Figure: **6-7**

Rev: **A**

N

0 0.75 1.5km

Approx. Scale

BMT WBM

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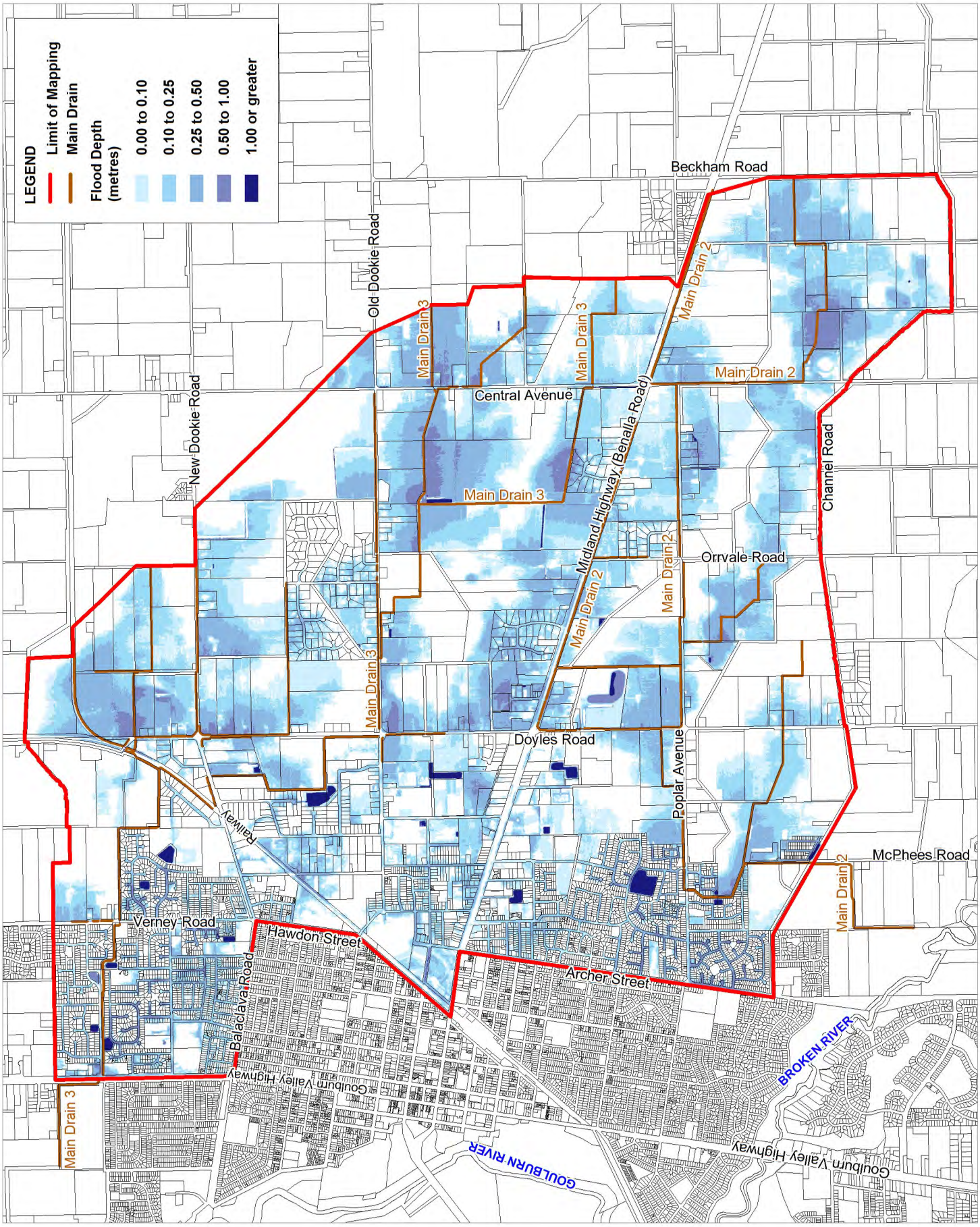
Filepath : T:\M8415.JL.SheppartonEast_Urban_FS\MapInfo\Drawings\R.M8415.003.00.Final\Fig6-7_U01_039_100y_Impact_RevA.wor

6.3 Existing Case - Climate Change Sensitivity

Climate change sensitivity modelling was undertaken for the catchment for increased rainfall intensities of 32% for the 1% AEP flood event, the results of which are presented in Figure 6-8. For details on the adjusted parameters refer to Section 3.3.1.6.

The purpose of this analysis will allow planners to gain an understanding of the potential impact that climate change could have on the study area and make future decisions accordingly. Figure 6-9 shows the increase in climate change peak flood levels from existing conditions for the 1% AEP event. It can be seen in Figure 6-9 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.



Title:

Shepparton East
Climate Change 1% AEP Peak Flood Depth

Figure: **6-8**

Rev: **A**

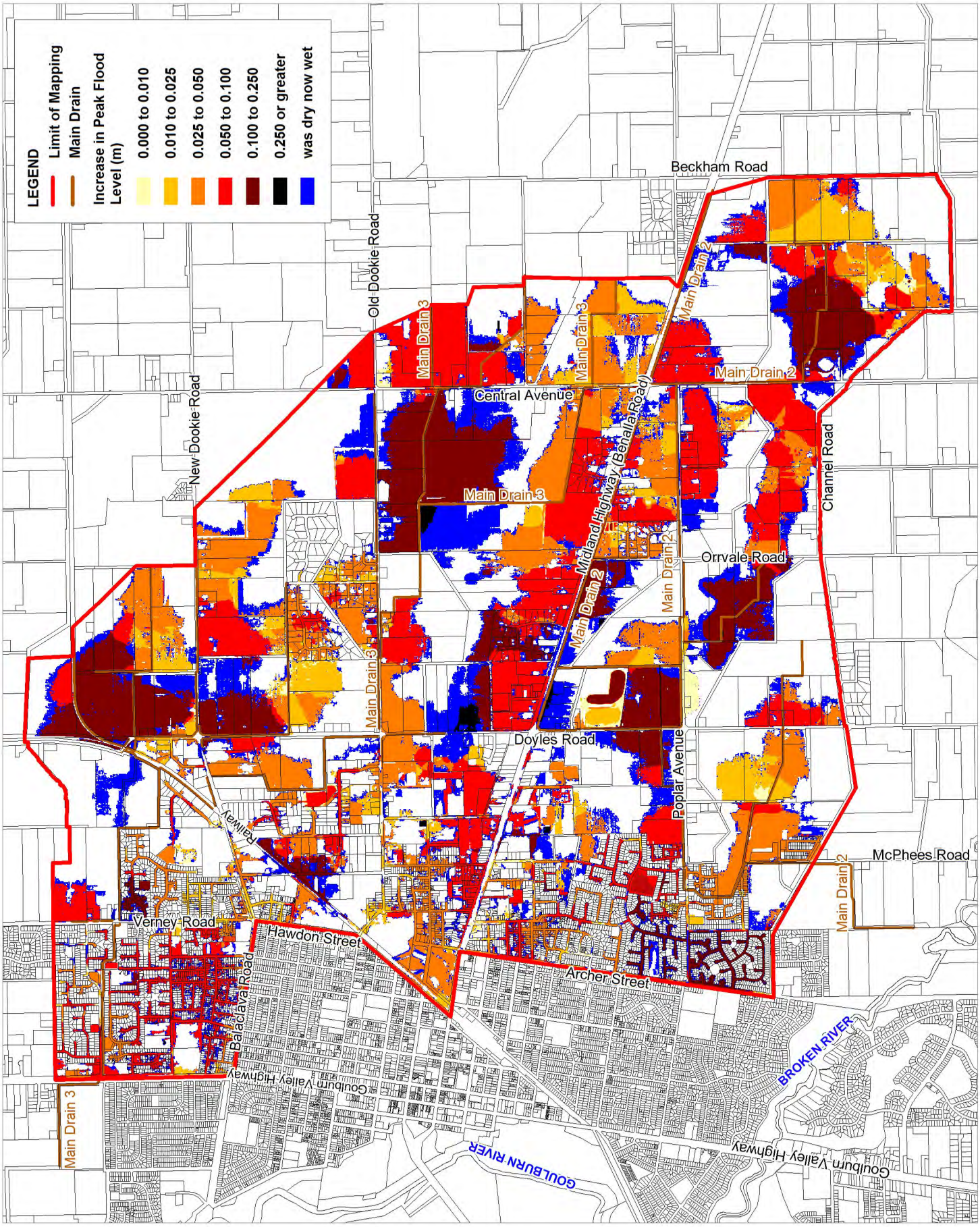
0 0.75 1.5km

Approx. Scale

BMT WBM

www.bmtwbm.com.au

Filepath : T:\M8415.JL.SheppartonEast_Urban_FS\MapInfo\Drawings\R.M8415.003.00.Final\Fig6-8_CC01_039_100y_dMax_RevA.wor



Title:

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

Figure: **6-9**

Rev: **A**

N

0 0.75 1.5km

Approx. Scale

BMT WBM

www.bmtwbm.com.au

Filepath : T:\M8415.JL.SheppartonEast_Urban_FS\MapInfo\Drawings\R.M8415.003.00.Final\Fig6-9_CC01_039_100y_Impact_RevA.wor