



MANSFIELD SHIRE

Mansfield Flood Study Extension

Supplementary Report

April 2006

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Mansfield Flood Study Extension

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Appendix A Flood Mapping

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1. Introduction

The Mansfield Flood Study was completed in November 2005. The study area was limited to the Ford Creek reach extending from Greenvale Lane on the upstream side of Mansfield to Dead Horse Lane on the downstream side.

This report documents the results of additional investigations into Ford Creek flooding behaviour for the adjoining upstream reach extending from Greenvale Lane to opposite the Mt Buller Road / Woods Point Road intersection.

The flood study extension was commissioned by the Mansfield Shire Council and the Goulburn Broken Catchment Management Authority (CMA) to assist in the future land use planning of the Rural Living Zone (RLZ) land located east of Greenvale Lane.

2. Approach

2.1 Hydrology

Design flow rates for Ford Creek at Mansfield are documented in the November 2005 Flood Study report. The design flows are based on the results of flood frequency analysis of the period 1970 – 2004 for the streamflow gauge located 4 km downstream of Highett Street.

Design flow rates for the current extension study are consistent with the 2005 study, with upstream flows adjusted to take account of changes in catchment areas. The 100-year ARI design flow is equivalent to the peak flow recorded in the September 1975 flood.

The adopted design flow rates are given in Table 2.1.

Table 2.1 Adopted Design Event Peak Flows

Design ARI (years)	Peak Design Flow (m ³ /s)		
	At streamflow gauge site (Ac = 115 km ²)	At Greenvale Lane (Ac = 78 km ²)	At upstream limit (Ac = 49 km ²)
5	74	55	39
10	102	76	53
20	134	100	70
50	183	136	96
100	232	173	121

Note:

1. Design flow at Mansfield based on the ratio of the respective contributing catchment areas proportional to a recognised regionally based formula (peak flow = 4.67 x catchment area^{0.763}).

2.2 Hydraulics

Hydraulic modelling within the extension reach was carried out by expanding the XP-STORM model used for the 2005 Flood Study.

A total of 12 cross sections were obtained within the reach to be modelled (refer Figure 1 in Appendix A). The cross sections were assigned Mannings roughness values similar to the calibrated values used for the 2005 Mansfield Flood Study. Two of the cross sections span a south side tributary. Flows for this tributary were estimated using the approach outlined in Section 2.1 above.

Steady state flows were input into the XP-STORM model consistent with Table 2.1.

Flooding behaviour immediately upstream of the study area reach is relatively complex in major flood events. Landholders have indicated that floodwaters overtop the Mt Buller Road east of the Woods Point Road junction. Floodwaters overtopping Mt Buller Road subsequently spill across the Woods Point Road and into the adjoining tributary waterway south of the Mt Buller Road. The modelling undertaken for the current study has assumed that all of the upstream Ford Creek flow remains confined to the Ford Creek floodplain.

The only observed flood level within the study area reach was provided by a landholder (David Blunden) based on his observations during the October 1996 flood. The October 1996 flood is approximately equivalent to a 5 year-ARI event (refer to Table 2.1 of the November 2005 Flood Study report).

The landholder recalled that the top of a strainer post was fully submerged below floodwaters during the 1996 flood. The strainer post is located just upstream of cross section 37 (refer Figure 1). The modelled flood level at this location was compared with the surveyed level of the strainer post. The modelled flood level of 327.0m AHD is 0.2 metre above the strainer post level (326.80m AHD). This is considered a good result given the landholder is not certain as to the depth of floodwater above the top of the strainer post.

The resulting modelled design flood levels at cross section locations are given in Table 2.2. The 20-year ARI flood levels are on average approximately 0.6 metre below the 100-year ARI levels. The 5-year ARI levels are on average 1.0 metre below the 100-year ARI levels.

Table 2.2 Design Flood Levels

Cross Section No.	Design Flood Level (m AHD)				
	5-year ARI	10-year ARI	20-year ARI	50-year ARI	100-year ARI
29	323.01	323.20	323.34	323.53	323.69
30	323.07	323.24	323.39	323.57	323.74
31	323.46	323.62	323.76	323.94	324.08
32	324.01	324.22	324.40	324.62	324.79
33	324.73	324.98	325.23	325.54	325.73
34	325.06	325.30	325.55	326.03	326.52
35	325.42	325.63	325.85	326.25	326.67
36	326.44	326.57	326.69	326.87	327.13
37	327.01	327.24	327.45	327.73	328.00
38	327.59	327.85	328.10	328.44	328.78
39	328.08	328.38	328.64	329.01	329.38
40*	325.29	325.51	325.74	326.13	326.69
41*	325.74	325.87	326.03	326.31	326.78

Notes

1. Cross section locations are shown on Figure 1.
2. * Indicates design flood levels are for the south side tributary.

Greenvale Lane at the downstream boundary of the reach has an overtopping threshold equivalent to a 2-year ARI flood. There is negligible afflux across Greenvale Lane as the road becomes drowned out in moderate and large flood events.

2.3 Flood Mapping

Flood mapping for the 100-year ARI event is shown on Figure 2 in Appendix A. The following features are shown on this plan:

- 100-year ARI flood height contours. The contours have been defined at 0.2 metre intervals based on interpolating between the modelled flood levels.
- 100-year ARI flood extent. The extent has been defined based on the modelled flood levels, the surveyed cross sections and additional survey collected around the fringe of the floodplain to enable reliable plotting of the flood extent line between cross sections.

Flood mapping of the extent of the floodway and LSI areas is shown on Figure 3 in Appendix A. The delineation of the floodway and LSI areas was determined as follows:

- Floodway extent boundary generally coincides with a depth of 100-year ARI flooding of 0.5 metre.
- LSI extent boundary coincides with the 100-year ARI flood extent.

Additional ground survey data was collected specifically to allow for mapping of the floodway and LSI extent boundaries between the previously surveyed cross sections. The additional survey involved obtaining ground level elevations at regular intervals between the cross sections in the vicinity of the floodway and LSI boundaries.

2.4 Flood Risks

There are no known significant buildings subject to flooding within the extension study area reach. All existing houses are located on high ground above the 100-year ARI flood level.

3. Summary

This report serves as a supplementary report to the November 2005 Mansfield Flood Study report. It documents the results of hydraulic modelling undertaken for Ford Creek and a south side tributary between Greenvale Lane and the intersection of the Mt Buller Road and the Woods Point Road.

The main outputs from this report are as follows:

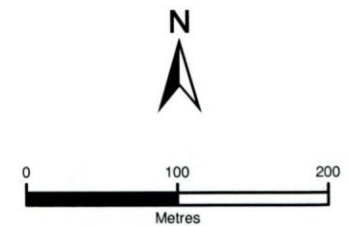
- 100-year ARI flood height contours and extents as per Figure 2.
- Floodway and LSI flood overlay extents as per Figure 3.

The newly defined 100-year ARI flood levels and flood overlay areas are to be adopted by the Mansfield Shire Council and the Goulburn Broken CMA for planning purposes.

The Goulburn Broken CMA are to declare the 100-year ARI flood level contours under the provisions of the Water Act, 1989. The mapped floodway and LSI areas are to be incorporated into the Mansfield Shire Council's planning scheme.

Appendix A

Flood Mapping



Legend

- Ford Creek
- Property Boundary
- + 17 Recorded Flood Level and Identification Number
- CS29 Survey Cross Section and Identification Number

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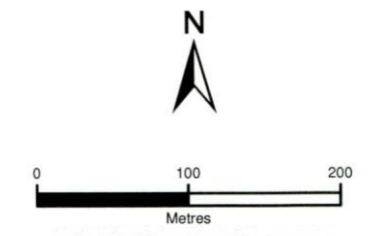
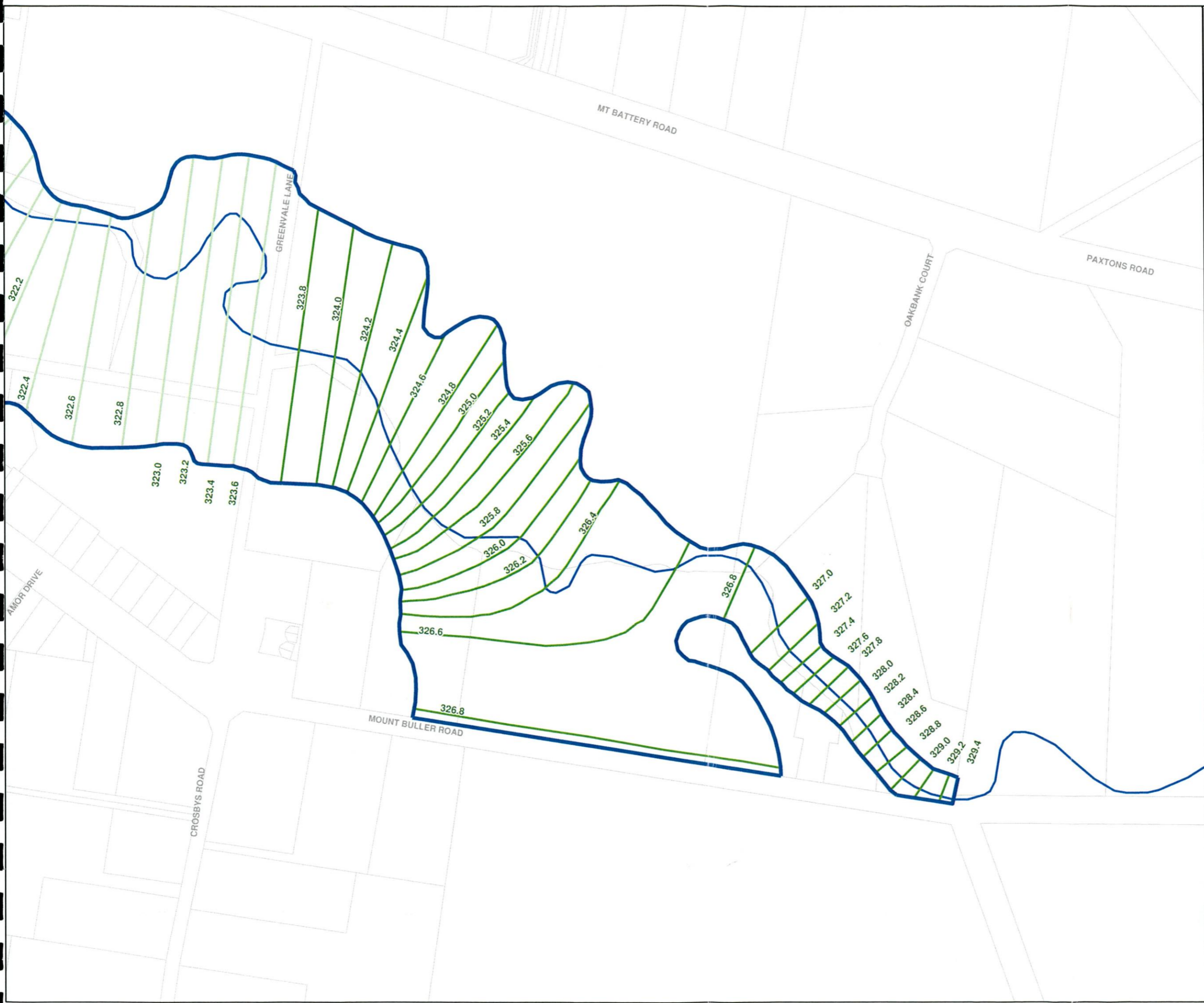
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MANSFIELD FLOOD STUDY EXTENSION

Cross Section Survey Locations

April, 2006

Figure 1

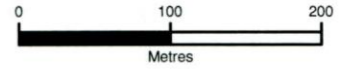
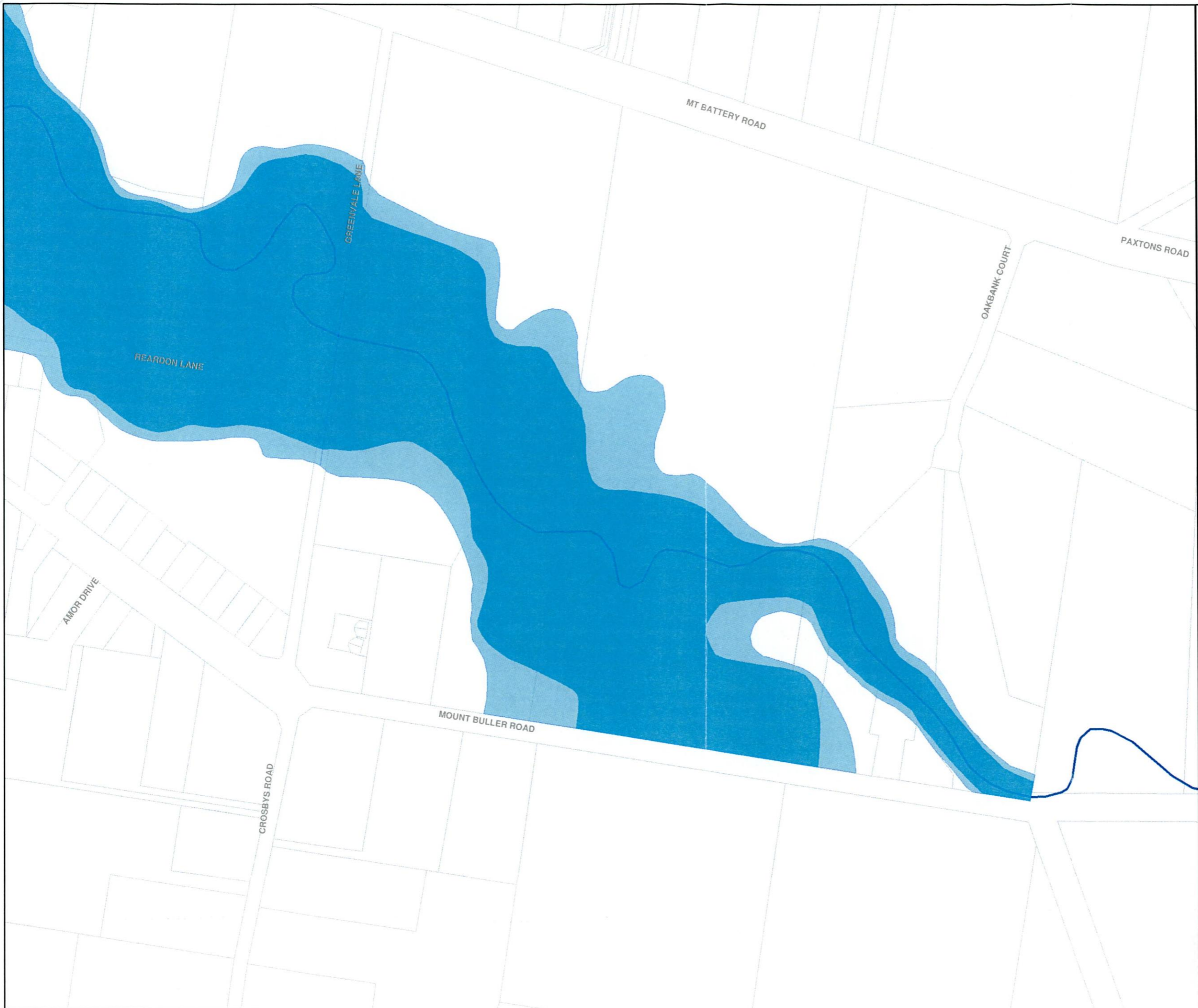


Legend





- Ford Creek
- Property Boundary
- 100- Year ARI (1%) Flood Extent
- 112.30 100- Year ARI (1%) Flood Height Contour and Level Value (m AHD)

- Notes:**
1. The flood levels shown on this plan define the surface level of the 1% probability flood. This is the flood prescribed by Sec. 204 of the Water Act – 1989, for floodplain management purposes and has a 1 in 100 chance of being equalled or exceeded in any given year.
 2. The derivation of these 1% flood level lines has been based on available historical flood level and flow information, hydrologic and hydraulic modelling.
 3. Areas outside the 1% probability flood limit may be inundated by rarer flood events.
 4. For the purpose of determining flood levels for locations between flood level lines, it can be assumed that the flood surface levels change at a uniform rate between the flood level lines.
 5. The flood level lines shown on this plan can be used to assist in the determination of designated levels in accordance with Clause 6.2 of the Building Regulations – 1994.
 6. Although there may be buildings within the area covered by the flood level lines, it should not be assumed that the floor of any individual building is below flood level. Buildings should be surveyed to determine whether their floors are above or below the 1% flood level.

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Legend

-  Ford Creek
-  Property Boundary
-  Proposed Floodway
-  Proposed Land Subject to Inundation (LSI)

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MANSFIELD FLOOD STUDY EXTENSION

Floodway and LSI Extent

April, 2006



LEGEND

-  Proposed Floodway
-  Proposed 1% Flood Extent
-  1% Flood Height Contour and Level Value (m AHD)



- Notes:**
1. The flood levels shown on this plan define the surface level of the 1% probability flood. This is the flood prescribed by Sec. 204 of the Water Act – 1989, for floodplain management purposes and has a 1 in 100 chance of being equalled or exceeded in any given year.
 2. The derivation of these 1% flood level lines has been based on available historical flood level and flow information, hydrologic and hydraulic modelling.
 3. Areas outside the 1% probability flood limit may be inundated by rarer flood events.
 4. For the purpose of determining flood levels for locations between flood level lines, it can be assumed that the flood surface levels change at a uniform rate between the flood level lines.
 5. The flood level lines shown on this plan can be used to assist in the determination of designated levels in accordance with Clause 6.2 of the Building Regulations – 1994.
 6. Although there may be buildings within the area covered by the flood level lines, it should not be assumed that the floor of any individual building is below flood level. Buildings should be surveyed to determine whether their floors are above or below the 1% flood level.
 7. The flood levels were declared by the Goulburn Broken Catchment Management Authority on the _____ under the provisions of the Water Act 1989.

FORD CREEK - MANSFIELD FLOOD STUDY EXTENSION

Designation of Flood Levels

Drawing Number: 540258
April, 2006

