



# **ATTACHMENTS**

**UNDER SEPARATE COVER**

**Ordinary Council Meeting**

**13 December 2017**

## 2 Background Information

### 2.1 Catchment Description

The Mirrool Creek catchment totals an area of around 8500 km<sup>2</sup> downstream to Barren Box Storage and Wetland, with some 2000 km<sup>2</sup> upstream of Barellan.

The topography of the catchment is shown in Figure 2-1. The upper catchment is approximately situated between Ardlethan and Temora and is largely elevated between 200 m and 400 m AHD. The mid-catchment area is a relatively flat expanse, with poorly defined catchments and channel alignments. Elevations are typically between 130 m AHD to 180 m AHD. Substantial irrigation supply and drainage infrastructure has modified the natural drainage of the lower catchment, downstream of the Murrumbidgee Irrigation (MI) Main Canal.

The catchment has been predominantly cleared for farming purposes, being irrigated agriculture in the lower catchment. There are also small areas of remnant vegetation, most notably on the Coccoparra Range.

The nature of the soils is relatively complex, as the catchment is situated within an area of transition between the sandy inland soils and the heavier soils of the western slopes.

There are a number of major transport routes traversing the catchment, the most significant being Burley Griffin Way and the Temora-Griffith Railway.

### 2.2 History of Flooding

A number of floods have been experienced in the study catchment since European settlement and the construction of the irrigation system in 1912. Major floods are known to have occurred in 1928, 1931, 1939, 1956, 1974, 1984, 1989 and most recently in 2012.

The June 1931 event was not in itself overly severe, with rainfall records indicating a daily total of 57 mm being recorded at Barellan on 24th. This constitutes less than a 20% AEP (roughly equivalent to a one in five year occurrence) rainfall event when compared to standard intensity frequency duration (IFD) curves. More significant was the rainfall in preceding months, which totalled around 100 mm across the Mirrool Creek catchment in the month preceding the event and around 200 mm for the two months preceding the event. This represents an extremely wet antecedent condition, when compared to the average annual rainfall of around 450 mm. These conditions resulted in the highest flow conditions in Mirrool Creek on record prior to the March 2012 event.

The January 1984 event resulted in the largest flood in recorded history at Ardlethan and in the upper Mirrool Creek catchment, with 125 mm rainfall being recorded at Aria Park on 26<sup>th</sup>. This constitutes in excess of a 1% AEP rainfall event when compared to standard intensity frequency duration (IFD) curves.

The March 1989 flood is one of the largest recorded within the study catchment. The continuous rainfall record at Hanwood indicates that a total of 103 mm fell in a 15-hour period on 14th, which is the equivalent of a 1% AEP magnitude design event when compared to the IFD curves.

The March 2012 flood was the largest in recorded history at Barellan. The continuous rainfall record at Griffith Airport indicates that a total of 147 mm fell in a 16-hour period, which is in excess

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of a 0.1% AEP magnitude design event when compared to the IFD curves. Even more rainfall was recorded at Barellan (~164 mm), but total rainfall depths reduced to around half of this amount at the eastern edge of the Mirrool Creek catchment.

Further details of the known flood behaviour within the region are presented in Section 4.

## 2.3 Previous Studies

A number of investigations into the management of flood risk in the region have been undertaken in the past. Various studies have looked at the design flood conditions and the management of the flood risk along Mirrool Creek, largely with focus on specific townships. Also of interest in this study is the management of flood risk within the wider LGA, which includes flooding of the Murrumbidgee River and floodplain.

### 2.3.1 Guidelines for Mirrool Creek Floodplain Development Barellan to Yenda (Water Resources Commission, 1978)

The floodplain development guidelines were prepared for landholders on the Mirrool Creek floodplain between Barellan and the East Mirrool Regulator. Damage from previous flood events had led to landholders constructing embankments to protect certain areas and drains to improve the drainage of other areas. However, these works were undertaken without coordination and resulted in other landholders becoming disadvantaged at the expense of the protection of others.

The guidelines sought to address the problem of uncoordinated flood protection works by defining a system of floodways that were seen as the most efficient way to convey floodwaters through the area. It also suggested areas that could be protected by the construction of embankments if the land holders desired. Consideration is also provided to the removal of floodplain "pondage" areas and the impact this may have on flood attenuation.

The document includes mapping of the defined floodways downstream of Barellan Road, constituting around 10% of the current study area. The floodway identified in the report was designed to be of similar magnitude to the October 1974 flood. For reference, the flood frequency analysis completed in the Flood Study estimated the October 1974 event to have an average return interval of approximately 30 years.

### 2.3.2 MIA – Land and Water Management Plan: Hydrology of Mirrool Creek and Works Options on Floodway Lands (Water Resources River Management Branch, 1994)

Additional investigation into the flood management of the Murrumbidgee Irrigation Area (MIA), including the Mirrool Creek floodplain downstream of Barellan was completed as part of the *MIA – Land and Water Management Plan: Hydrology of Mirrool Creek and Works Options on Floodway Lands* (Water Resources River Management Branch, 1994).

For the Barellan to Yenda section of the floodplain, the study advised that the Water Resources Commission (1978) guidelines were the most suitable means for managing flood risk.

### 2.3.3 Narrandera Floodplain Risk Management Study and Plan (SKM, 2009)

The Narrandera Floodplain Risk Management Study and Plan (FRMS&P) were completed by SKM in 2009 following the Narrandera Flood Study (SKM, 2000) and the Narrandera Flood Study

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Review (SKM, 2007). These studies focused on the township of Narrandera which is located 50 km south of Barellan on the Murrumbidgee River. A number of flood risk management measures were recommended as a result of the study and included property modification, response modification and flood modification measures.

One of the key recommendations of the Narrandera FRMS&P was updates to the Narrandera Local Environment Plan (LEP) and Narrandera Development Control Plan (DCP) to define and control development on flood liable land. To inform updates to the DCP, the Narrandera FRMS&P developed a "Flood Policy Matrix" to define the development controls applicable to each different development type, depending on where it is to be located within the flood plain.

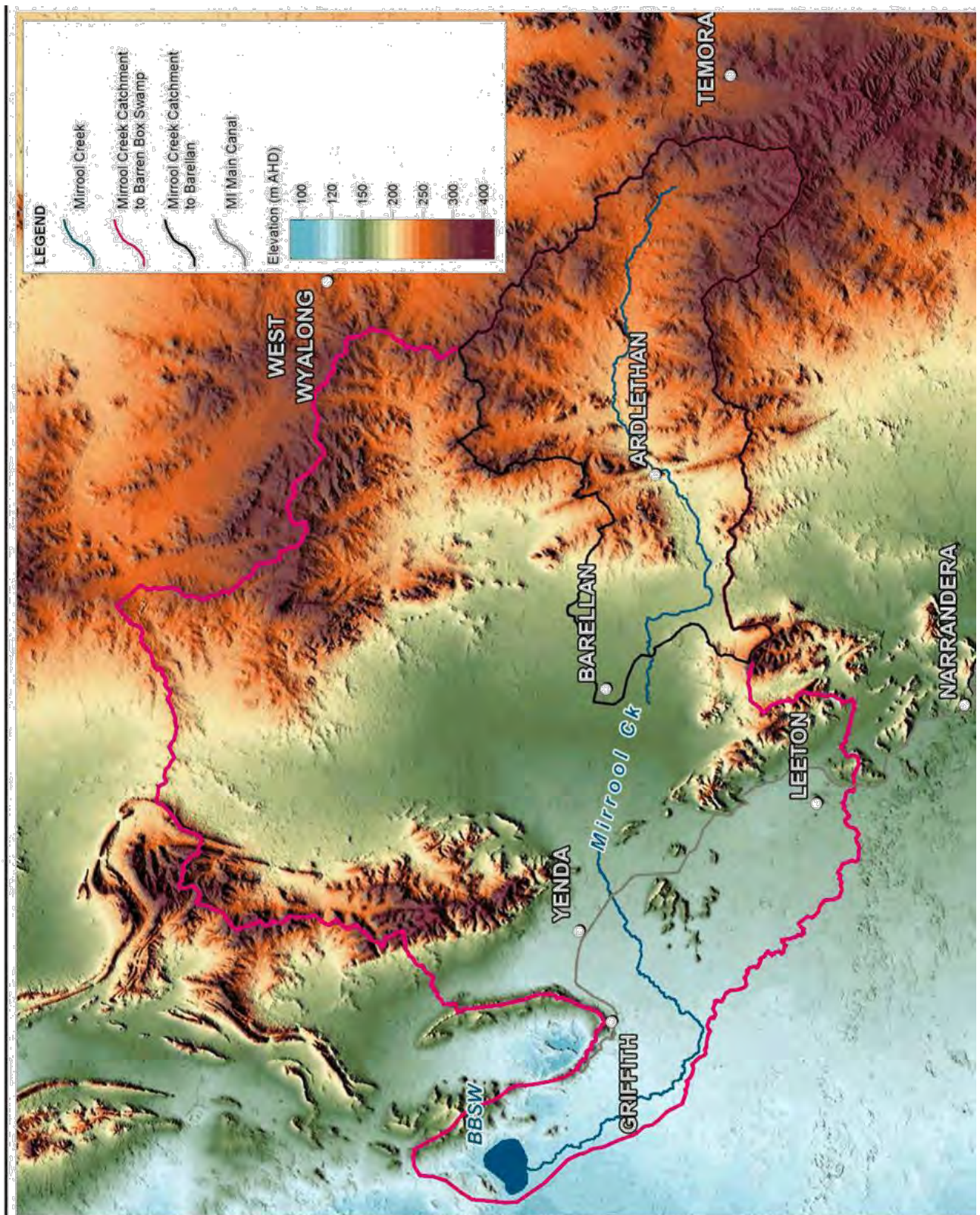
Another major recommendation was levee upgrade works and proposed new levee construction to increase existing flood protection to the 1% AEP design flood level plus a 0.5 m freeboard, and to protect additional areas of flood liable land.

**2.3.4 Barellan Flood Study (BMT WBM, 2017)**

The Barellan Flood Study was completed concurrently with this study. Both studies were commissioned by Narrandera Shire Council in 2016 following from the March 2012 flood event.

The Flood Study defined the flood behaviour of the catchment, with specific focus on flooding of the township and considered local catchment runoff and flood flow contributions breaking out from Mirrool Creek. The study produced information on flood flows, velocities, levels and extents for a range of flood event magnitudes under existing catchment and floodplain conditions. As detailed investigation into flooding at Barellan had not previously been completed, the information in the Flood Study formed the basis for the floodplain risk management investigation considered herein.





Title:  
**Topography of the Mirrool Creek Catchment  
 to Barren Box Swamp**

Figure:  
**2-1**

Rev:  
**A**

BMT.WBM endeavours to ensure that the information provided in this map is correct at the time of publication. BMT.WBM does not warrant, guarantee or make representations regarding the currency and accuracy of information contained in this map.



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