6. OPTION P1 - IMPACT OF FUTURE DEVELOPMENT

6.1 BACKGROUND

There are a number of potential future development areas within the Shire, particularly in the eastern section adjacent to the Murray River. Some of these areas are potentially flood affected, but will be subject to increasing pressure for residential development due to their proximity to the river and Mildura.

Through an assessment of existing land-use zonings across the Wentworth Shire LGA and the location of key infrastructure (*ie., roads, etc.*), the likely areas where development pressure may occur during the next 10 years have been determined. The assessment has also recognised that people appear to be most interested in developing areas adjacent to the major waterways, and therefore areas that are potentially susceptible to flooding.

In consultation with the Committee, four broad-scale potential scenarios within or adjacent to the floodplain have been identified. These scenarios are detailed in the following section.

As discussed above, the modelling undertaken for these investigations was completed prior to the upgrade of the model to incorporate the LiDAR topographic data obtained in 2009. Notwithstanding, it is considered that the previous assessment of relative flood impacts resulting from the development scenarios is sufficiently reliable for the purposes of this report.

6.2 POTENTIAL DEVELOPMENT SCENARIOS

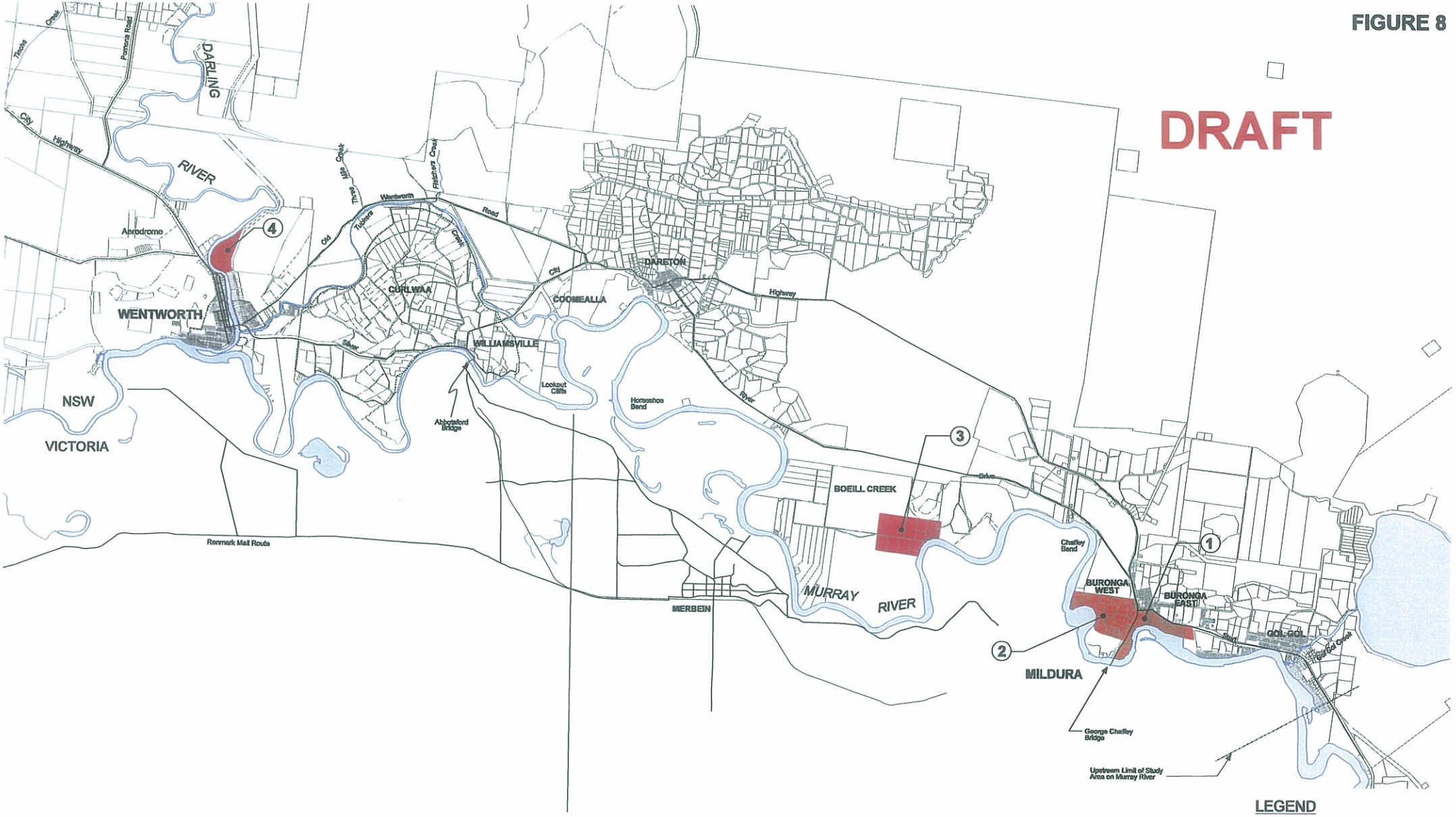
The potential development scenarios that have been adopted for this investigation are listed in **Table 3**. The location and extent of these potential development areas are shown in **Figure 8**.

TABLE 3 POTENTIAL DEVELOPMENT SCENARIOS

SCENARIO	DESCRIPTION OF AREA	AREA (*ha*)
1	Buronga East – between the Sturt Highway and Carramar Drive	75.5
2	Buronga West – between the Murray River and the Silver City Highway	134.6
3	Boeill Creek – land adjacent to Boeill Creek Road and south of Boeill Creek	150.9
4	Wentworth East – incorporating the area immediately east of the Darling River and north of the existing levee	45.7

Development of these four areas would effectively "block" floodwaters from leaving the river and travelling overland across these areas. Therefore, these sections of the floodplain would effectively be "blocked" by the potential future development scenarios. This may result in localised increases in

FIGURE 8



LEGEND

1 Potential development area

Alignment of existing levee

N

0 5km

Scale 1:120,000

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AREAS OF POTENTIAL FUTURE DEVELOPMENT

peak flood levels and velocities across the floodplain of the Murray and Darling Rivers. It will also marginally reduce the available flood storage across the floodplain.

Current peak flood level and velocity estimates for the Murray River are based on results generated by the RMA-2 two-dimensional hydraulic computer model developed as part of the Flood Study. RMA-2 is a finite element model which employs a variable grid geometry in which elements with irregular and curved boundaries can be modified as required without the need for regeneration of the entire grid. As such, any proposed development area can be quickly incorporated into the existing model and the associated impacts can be quantified.

The potential development scenarios listed in **Table 3** were incorporated into the existing hydraulic model to investigate the associated flood impacts, in terms of their potential to increase peak flood levels, flood extents and flow velocities across the floodplain of the Murray and Darling Rivers.

In order to represent the blockage that would be caused by these scenarios, the entire sections of the floodplain that form the potential development areas have been assumed to be filled to above the 100 year recurrence flood. Therefore, these areas were assumed to be entirely "blocked out" in the model for independent and cumulative analysis.

The modified model was used to simulate four potential development scenarios for the 100 year recurrence flood to determine flood impacts of the development of these areas in isolation and in combination.

6.2.1 Impact of Potential Development Scenarios on Flood Behaviour

As discussed previously, the proposed filling of these four areas has the potential to cause localised increases in peak flood levels across the combined floodplain of the Murray and Darling Rivers. It will also marginally reduce the available flood storage across areas of the floodplain.

Accordingly, flood level difference mapping was generated to assess the impact of the proposed floodplain filling on peak flood levels for each of the potential development scenarios. A flood level difference map provides a graphical representation of the magnitude and location of predicted changes in flood level by comparing water levels generated at each node in the hydraulic model from simulations for both existing and post-development scenarios. This effectively creates a contour map of predicted post-development "affluxes" and allows easy determination of the impact of the proposed development on peak flood levels.

A summary of maximum predicted changes in floodwater level for each potential development area is provided in **Table 2**. A detailed discussion of the impacts associated with each of the four potential development areas is provided in the following sections.

Area 1 – Buronga East

Figure 9 shows the flood level difference map for the design 100 year recurrence flood associated with the development of Area 1 at Buronga East. This figure shows the location and magnitude of increases in peak flood level.

Figure 9 indicates that the blocking of this area will increase peak 100 year recurrence flood levels across areas immediately to the south and east of the potential development area, on the northern and southern floodplains of the Murray River. The maximum increase is predicted to be 50 mm (*refer* **Figure 9**) and will occur across a number of lots situated between Carramar Drive and the Sturt Highway.

Area 2 – Buronga West

The flood level difference map for the design 100 year recurrence flood associated with the development of Area 2 at Buronga West is shown in **Figure 10**. This figure shows the location and magnitude of increases in peak flood level.

Figure 10 indicates that the blocking of this area will increase peak 100 year recurrence flood levels across areas across large areas of both the northern and southern floodplain of the Murray River. The maximum increase is predicted to be about 1.0 metres and will occur across a small area to the north-east of the intersection between the Silver City Highway and the Sturt Highway, at the north-eastern corner of the potential development area (*refer* **Figure 10**).

A major increase in peak 100 year recurrence flood level is also predicted at the south-eastern corner of the potential development area. At this location, the increase in peak flood level is predicted to be about 0.5 metres (*refer* **Figure 10**).

Increases in peak 100 year recurrence flood level across floodplain to the north of the Sturt Highway are generally predicted to be less than 0.1 metres.

Area 3 – Boeill Creek

Figure 11 shows the location and magnitude of increases in peak flood level associated with the development of Area 3 at Boeill Creek.

Blocking of this potential development area will increase peak 100 year recurrence flood levels across areas across large areas of both the northern and southern floodplain of the Murray River. The maximum increase is predicted to be 0.18 metres and will occur across a small area at the southern boundary of the blocked area (*refer* **Figure 11**).

Area 4 – Wentworth East

Figure 12 shows the flood level difference map for the design 100 year recurrence flood associated with the development of Area 4 at Wentworth East. This figure shows the location and magnitude of increases in peak flood level.

FIGURE 9

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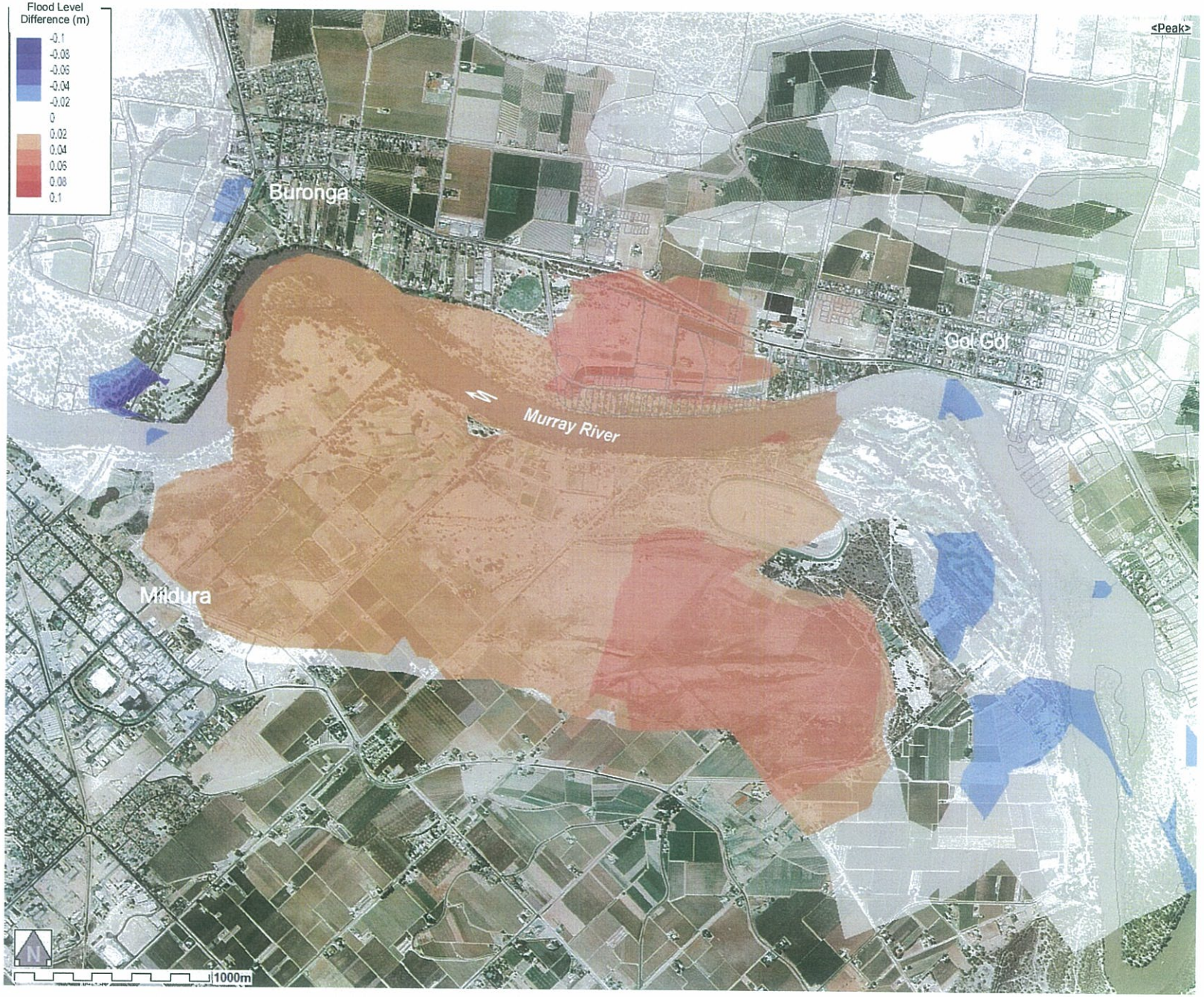

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IMPACT OF DEVELOPMENT SCENARIO 1 ON PEAK 100 YEAR RECURRENCE FLOOD LEVELS

Blocking of this area to enable development will increase peak 100 year recurrence flood levels across a localised area immediately to the east of the potential development area. The maximum increase is predicted to be 30 mm (*refer* **Figure 12**). However, the majority of the area impacted is restricted to the three lots that adjoin the western site boundary. Elsewhere, the predicted increases in peak flood level are generally predicted to be less than 10 mm.

Therefore, blocking Area 4 for potential development is predicted to result in negligible impact on the flood behaviour across the floodplain of the Murray and Darling Rivers.

6.2.2 Discussion

As shown in **Table 4**, Development Scenarios 1 and 4 are expected to result in flood level increases of 50 mm or less, meaning that the impact will be relatively insignificant.

Accordingly, it is recommended that development could occur in these areas with minimal expected impacts. As a result, the

Development within the areas included in Scenarios 2 and 3 could occur, but it is recommended that further modelling investigations would need to be undertaken in order to assess the potential impact of any associated filling on local flood characteristics.

TABLE 4 CHANGES IN PEAK FLOOD LEVELS FOR 100 YEAR RECURRENCE EVENT FOR DEVELOPMENT SCENARIOS

POTENTIAL DEVELOPMENT SCENARIO	MAXIMUM INCREASE IN PEAK WATER LEVEL (*m*)	LOCATION OF MAXIMUM INCREASE	DOWNSTREAM EXTENT OF INFLUENCE	UPSTREAM EXTENT OF INFLUENCE
1 – Buronga East	0.05	Between Carramar Drive and the Sturt Highway	Charcoal Bend	Approximately 500 m downstream of the confluence between the Murray River and Gol Gol Creek
2 – Buronga West	1.0	North-east of the intersection between the Silver City Highway and the Sturt Highway	700 m downstream of Lock Island	Gol Gol
3 – Boeill Creek	0.18	Southern boundary of Area 3	"Murray View" (Between Ranfurly Bend and Merbein Racecourse)	Approximately 800 m downstream of the confluence between the Murray River and Gol Gol Creek
4 – Wentworth East	0.03	Immediately west of Area 4	900 m downstream of the development area	500 m upstream of the development area