



Mr FERLAZZO

## Flooding and Engineering Advice

67 Tallawong Road, Rouse Hill

Project No: SY150175R01 September 2015

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# **1 Introduction**

Barker Ryan Stewart Pty Ltd has been engaged by Mr Ferlazzo to review the suitability of 67 Tallawong Road, Rouse Hill to be re-zoned for open space and drainage purposes from an engineering and flooding perspective.

The site is shown as being proposed for open space, drainage reserve and playing fields, under a zoning of RE1 (public recreation) and SP2 infrastructure for drainage.

In preparation for this report the following documents have been considered:

1. The Riverstone East Water Cycle Management Report April 2015;
2. Blacktown City Council Growth Centre Precincts, Development Control Plan, 2015;
3. Draft State Environmental Planning Policy Maps (SEPP) 2006;
4. Riverstone east Precinct, Biodiversity and Riparian Corridors Assessment – Ecological Australia, 17 April 2015;
5. Water Cycle Management Report, Riverstone East April 2015

## 2 Site and Surrounding Topography

### 2.1 Site Details

The subject site is located at 67 Tallawong Road, Rouse Hill within a rural area. The lot contains a house, a couple of sheds and a small dam. The total site area is approximately 2 ha with access to Tallawong Road. The north eastern corner has an RL of 49m AHD and the southern side has an RL of 42m AHD. The slope on the site varies from approximately 2.5% to 7% and would be best described as undulating with a fall to the sites south west.

The property is positioned below a low point in Tallawong Road which has a catchment of approximately 16 Hectares draining to it. The depression continues through the property in a westerly direction but is at times ill-defined with no formal creek line and does contain a small farm dam. There is no evidence of erosion and only scattered trees are to be found along the creek line and it is considered that the watercourse has been highly modified and influenced by past agricultural and residential purposes.

The depression that passes through the site is identified on the 1:25000 orthophoto maps with a blue line (refer to site locality extract below) and so was included in an assessment by the Office of Water. The Biodiversity and Riparian Corridors Assessment report identified the watercourse as being in a “highly modified and in degraded condition”.

The majority of the site has a limited number of established trees scattered across it with a higher concentration found in the most eastern corner of the site below where the watercourse crosses Tallwong Road.



Location of site – (source NSW Dept of Lands).

The following photographs have been taken of the site and of Tallawong Road during a site visit on the 23<sup>th</sup> September, 2015.



**Figure 1 Low point in front of 67 Tallawong Road**



**Figure 2 Watercourse Entering the Property from Tallawong Rd**



**Figure 3** III Defined Watercourse in Property – View from Tallawong Rd



**Figure 4** Watercourse Entering the Dam – In the Middle of the Picture



**Figure 5 Looking from Tallawong Rd Into Marshalling Area Along Common Boundary**

## 2.2 Surrounding Details

The land form found across the site is typical of the area and is comprised of undulating relief with slopes typically in the range of 2 to 10 percent. Across the landscape small depressions are formed which convey runoff from the higher regions down to the main creek within the area, being First ponds Creek.

A catchment area of approximately 15.7 Hectares drains to the depression in Tallawong Road from the northern side of Tallawong Road as shown in blue in Attachment A. The "blue line" as indicated on the 1:25000 orthophoto maps (refer to site Locality sketch) is shown to extend past the site well into this area. The watercourse within this area appears to be in a similar state, being at times ill-defined and classified as degraded. A few farm dams are also found within the catchment.

A second catchment area drains into the subject site from the east (as shown red in Attachment A) entering the property about two thirds of the way along the eastern boundary with a catchment area of approximately 6.5 Hectares. This catchment is heavily dammed, is not identified with a blue line on the orthophoto maps and is currently being altered to accommodate the Sydney Metro North West train stabling yards (Marshalling Area). These catchments are shown in Attachment A.

The site and its surrounds drain in a south westerly direction into an unnamed watercourse, under Oak Street and into First Ponds Creek, approximately 600 metres away from the site.

## 3 Requirements

### 3.1 Riverstone East Water Cycle Management Report

The report shows the existing and proposed flood extents along First Ponds Creek and up along the unnamed tributary into the site. While the report shows that the 1% flood extent of the existing flooding does not extend up into the site, there will be minor local flooding within the site due to the catchment located above the site. This however has been considered to be of low significance. In the developed case the extent of flooding has been shown as extending into the site via a formalised engineered channel which ends just short of Tallawong Road.

The report identifies the sub catchments throughout the First Ponds Creek catchment across the area being rezoned, including two within the immediate vicinity of the site. The first of these catchments is labelled as CF52B which includes the land above Tallawong Road and describes the post development catchments impervious values as being that from a completely built up area. The second sub catchment known as CF52A incorporates the land located below Tallawong Road down to a spot some 200m below the subject property and includes the area of land draining into the property from the east. A blow up of the sub catchment extents within the area of interest has been extracted from the water Cycle Management Report is shown in Attachment B.

The Water Cycle Management report shows the results of the rainfall runoff modelling for various average return periods in its Appendix C. However this data does not break down the flows for the two sub catchments CF52A and B, it only shows there being flows for a single sub catchment, called CF52. Given the value of the peak flow that is nominated for the sub catchment it has been concluded that the flows given correspond to the flows generated at the lower end of the combined sub catchments, being at the base of sub catchment CF52A. The flow that has been estimated as the 100 year ARI runoff event is 7.15 cubic metres per second.

The report details in the figure – Proposed Channel Plan, Channel CF-49 an engineered channel to be constructed through the subject property and down to First Ponds Creek in part following the existing depression and in part deviating from it. A typical section is also shown on the figure showing a cross sectional shape of the engineered channel along its entire length from First Ponds Creek up to Tallawong Road. The dimensions of this channel are suitable to convey flows for the entire catchment (both CF52A and CF52B) and so is over designed for the upper reaches of the watercourse. This Figure is shown in Attachment C.

### 3.2 Department of Planning and Environments Documents

The NSW Department of Planning and Environment's Riverstone East- North West Growth Centre- Development Control Map shows the existing flood extents along First Ponds Creek. The flood map shows the land at 67 Tallawong Road as a site which has an engineered channel passing through it and no other associated flooding across it.

The Land Zoning Map within the report shows 67 Tallawong proposed to be a local park, sporting field or for water management.

Refer to Attachment D for extracts of report.

### 3.3 Biodiversity and Riparian Corridors Assessment

The report aims to assess the biodiversity and riparian values of the Riverstone East Precinct and to then provide recommendations for the use within an indicative layout plan. The report identified a limited amount of vegetation (Cumberland Plain Woodland) on the site that is considered to be in moderate to good condition and the watercourse that passes through the site as being a riparian corridor that has been "severely modified, only small patches of well separated native vegetation remain. One or more strata dominated by exotic species, high impact species present. More than one stratum completely altered from reference (lost or <10% remaining). Reduced cover (<50%) of dominant strata, and only one age class present. Very small quantities of debris present." The report also identifies the watercourse as being in a degraded condition.

The report also identifies that while the watercourse as defined by a blue line continues upstream of Tallawong Road that it is considered that this stretch of the depression is not a suitable section to rehabilitate with an engineered creek system.

Table 9 on page 43 of the report identifies that streams of first order may be realigned subject to approval from the Office of water.

### 3.4 Commentary on Above Reports

The proposed channel alignment does not take into consideration the flows that will be originating from the adjoining catchment within the marshalling area to the sites east. The channel is shown as being located within the adjoining property (number 77 Tallawong to the sites west) by the time they connect with each other. Flows draining into the watercourse system from Tallawong Road will be small up until a greater catchment is captured.

It has been proposed in the report that the start of the riparian corridor should be just below Tallawong Road, however the stretch of watercourse immediately below the road displays little ability to provide a sustainable riparian corridor. There is no defined creek line found below Tallawong Road with the first defining feature being a dam that will be removed. Also there is no water quality infrastructure proposed to servicing the road and residential areas proposed for upstream prior to stormwaters discharging into the watercourse. The first

instance of water quality infrastructure being proposed in the report is some 200m below the subject property.

Further, in order for an engineered channel to be constructed at the rear of the subject property and the neighbouring properties, it will need to be dug into the existing topography and have its top of bank level matched with the surrounding surface levels to ensure that its floodwaters are contained. To do this so that the flood levels as nominated in the Water Cycle Management Report are produced, will require the channel to be dug into the existing topography by a couple of metres. A number of trees located within the property along the sites road frontage will need to be removed to allow for drainage pipes to be laid and for the channel to be excavated into the existing ground. Additional construction works associated with a cycle way and pedestrian usage would also be likely to be undertaken.

Once the earthworks for the channel is complete, with surface levels adjusted to match and suit the design, an increase in the local relief will be introduced. This discrepancy in level will need to be taken up in the earthworks surrounding the channel works.

It is therefore considered that the construction of the watercourse between Tallawong Road and the confluence of these depressions (as shown in Attachment A) will add little to no value to the precinct once the amount of earthworks and construction of the engineered channel are complete.

A more appropriate starting point for the riparian channel would be at the junction of the depression that originates within the Metro's marshalling land and the main watercourse. At this point runoff stormwaters could be conveyed to the start of an engineered channel in the standard pit and pipe and overland flow system in a way that would not be excessive. Indeed at this location it is estimated that a 100 year flow of approximately 5 cubic metres per second would be generated in the 100 year rainfall event of which some will be from the marshalling area. It is traditionally at this flow that a street drainage system is considered to be at its capacity.

From here the channel could pass across the subject lot and into the adjoining property at approximately the location as currently indicated in the reports (ie at the location of the existing dam in number 77 Tallawong Road) and continue on as shown or it could be redirected to the rear boundary of the site and be directed straight in a north westerly direction matching in with its proposed redirected route at the rear of the properties - 83 to 95 Tallawong Road. Refer to Attachment E.

It should also be noted that the channel in the Water Cycle Management Report has been designed for the larger nominated flow as calculated for the watercourse just prior to its confluence with First Ponds Creek. The width of the channel as shown is constant for the entire length from Tallawong Road down to First Ponds Creek. The section at the upstream end will be able to be reduced in size to cater for the smaller flows at its upstream extremity.

### 3.5 Properties Potential for Development

The report shows that the only flooding on the site will be contained within the proposed engineered channel. An estimate of flows from the above catchment reveals that there is no hydraulic need for a channel to be brought up to Tallawong Road and that flows originating from the upstream catchment could be easily accommodated in a pit and pipe and overland street system as per standard engineering design.

It is considered that an engineered channel and the associated construction works will add little to no overall improvement to the area given the earthworks that will need to be undertaken resulting in tree loss and the removal of the existing watercourse.

Two possible alternatives to that proposed within the DCP and indicative layout plan are described below, one with the start of the watercourse being located at the confluence of the depressions that drain the catchment upstream of Tallawong Road and the smaller catchment draining the marshalling area, and the second with the watercourse being taken up to Tallawong Road but in a realigned position to that shown in the DCP and indicative layout plan.

- Option 1 – Shortened Watercourse

The channel starts at the confluence of the catchment above Tallawong Road and the marshalling area with the street drainage system conveying stormwater runoff down a road constructed along the eastern boundary of the site which comes off Tallawong Road. The road could run along the entire length of the eastern boundary and allow road access to the remaining land within the site. A preliminary layout of the street system and reduced channel length has been shown in Attachment E.

- Option 2 – Realigned Watercourse

This option sees the channel being taken though to Tallawong Road as in the DCP, but with the channel running along the eastern boundary. The channel with associated 10m riparian set backs on either side will need to be 25m wide and have a road alongside the channel, which will take up another 13.5m in width. This will leave the lot with about 29.5m of developable land along approximately two thirds of its length. A culvert crossing would then be required to get to the other side of the watercourse. A preliminary layout of the street system and altered channel alignment is shown in Attachment F.

Both of these options will provide adequate drainage arrangements in accordance with council requirements.

## 4 Conclusion and Recommendations

In summary, the review of the relevant documents show that;

- extensive earthworks would need to be undertaken to the vicinity of the proposed drainage channel in order to allow the ground levels and watercourse to work, impacting on any established trees and the existing land form.
- The length of proposed engineered watercourse between Tallawong Road and the confluence of a depression originating from the marshalling area is of limited engineering and flooding value.
- Any new watercourse within the subject site will be comprised of a new engineered channel.
- There is scope to provide developable land on the site once a small change in the extent and or location of the watercourse is made. Two options have been provided to demonstrate possible layouts for the site which incorporate a drainage solution in accordance with council requirements.

## **5 References**

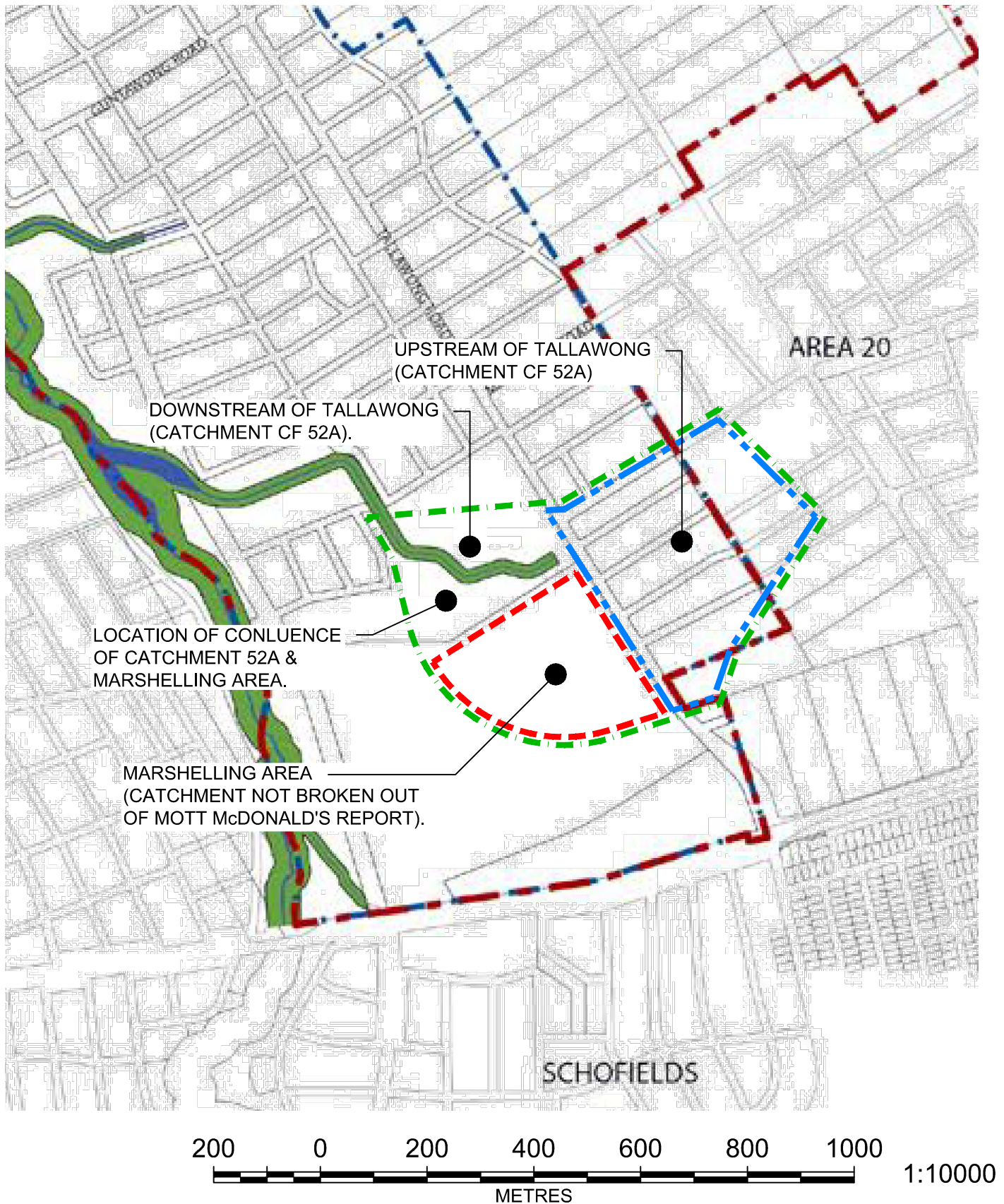
NSW Department of Planning and Environment, Water Cycle Management Report, Riverstone East, April 2015.

NSW Department of Planning and Environment, Transport Study, Riverstone East Precinct, April 2015.

NSW Department of Planning and Environment, Sydney Region Growth Centres, 2006.

## **Attachment A**

### **CATCHMENT PLAN**



Plan No. SY15175SK1  
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 67 TALLAWONG ROAD  
 ROUSE HILL

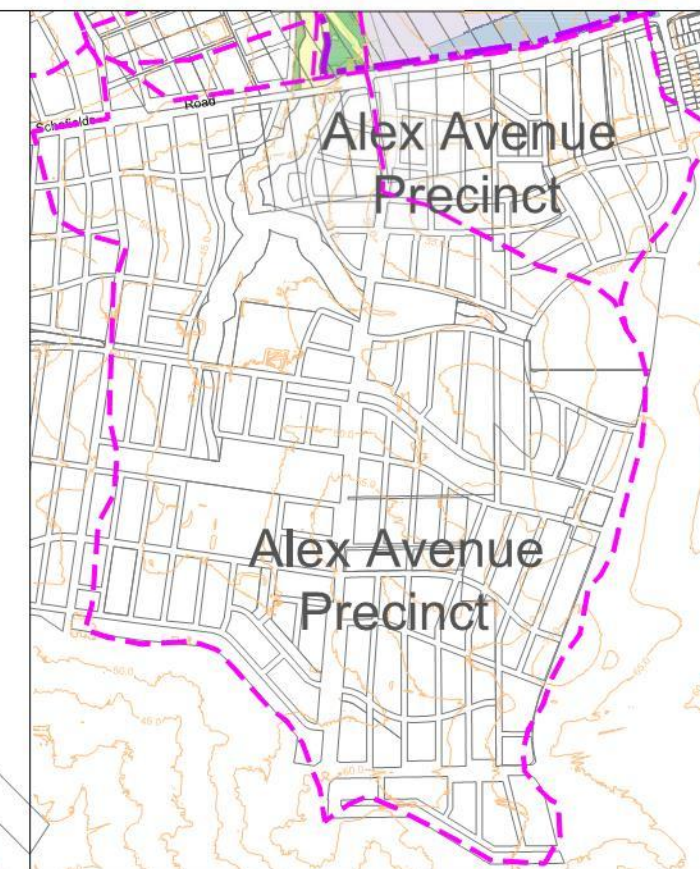
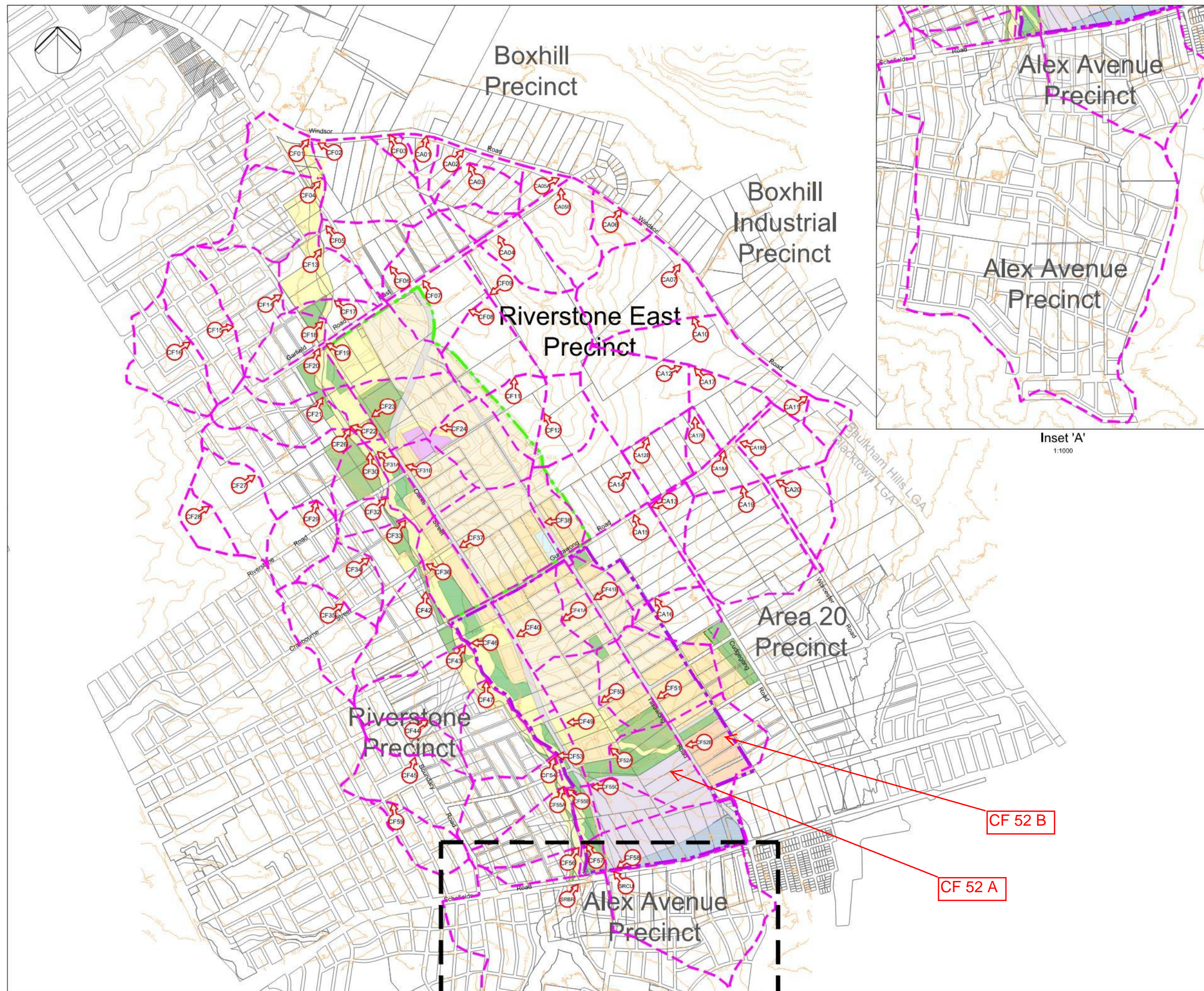
ATTACHMENT A - CATCHMENT PLAN



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## **Attachment B**

### **MOTT MCDONALDS CATCHMENT PLAN**



Notes

Key to symbols

- Riverstone East precinct boundary
- Catchment Boundary
- Stage 1 boundary
- Stage 2 boundary
- Catchment To Pit Node In Drains

Reference drawings

Rev	Date	Drawn	Description	Ch'k'd	App'd
P7	19.03.15	MMc	Issued for Exhibition	GL	CJA
P6	27.01.15	AMP	Issued for Exhibition	GL	CJA
P5	16.01.15	AMP	Issued for Exhibition	GL	CJA
P4	28.11.14	ADS	Issued for Draft ILP (Not Issued)	GL	-
P3	03.09.14	AMP	Issued for information	GL	-

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Client

Planning & Environment

Title

Riverstone East Precinct  
Water Cycle Management Plan

Proposed Catchment Plan

Designed	JT	.	Eng check	GL	.
Drawn	DW	.	Coordination	GL	.
Dwg check	GC	.	Approved	CJA	.

Scale at A1: 1:10000

Status: PRE

Rev: P7

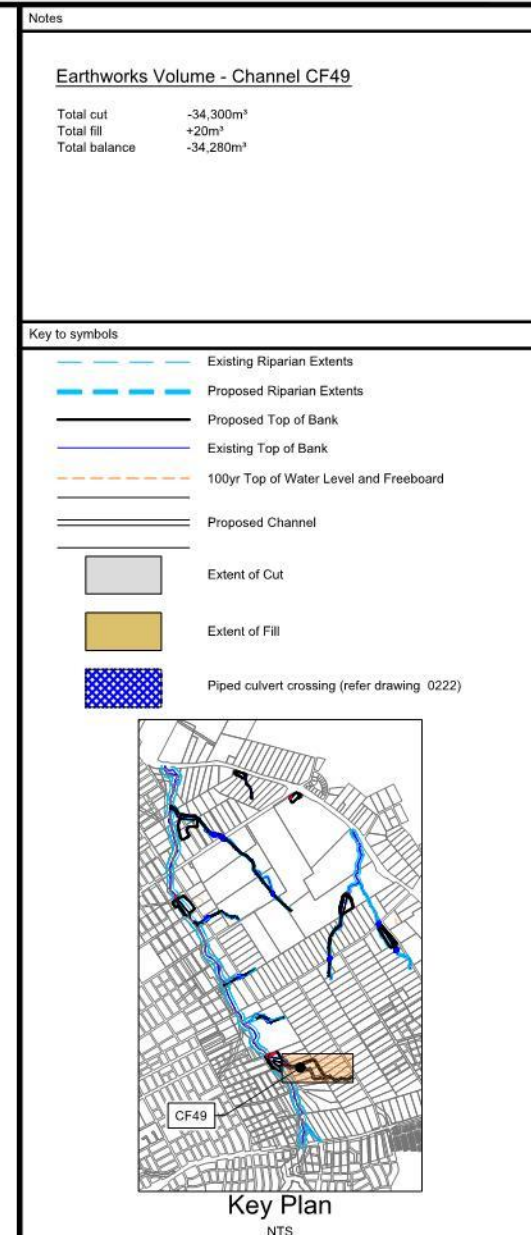
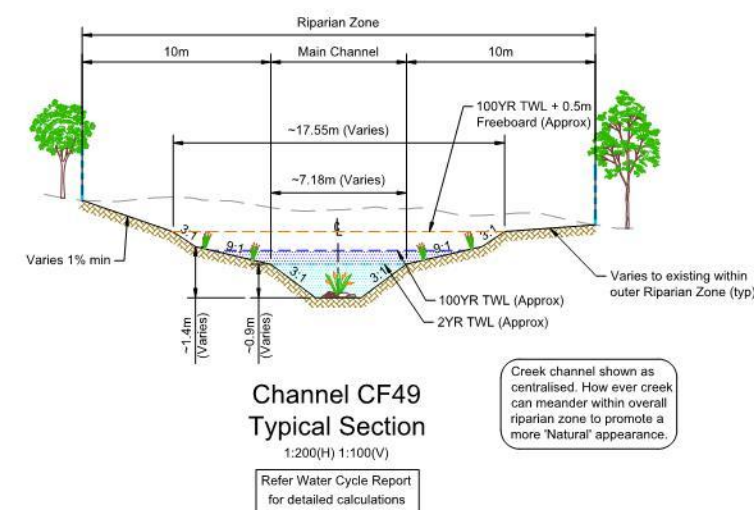
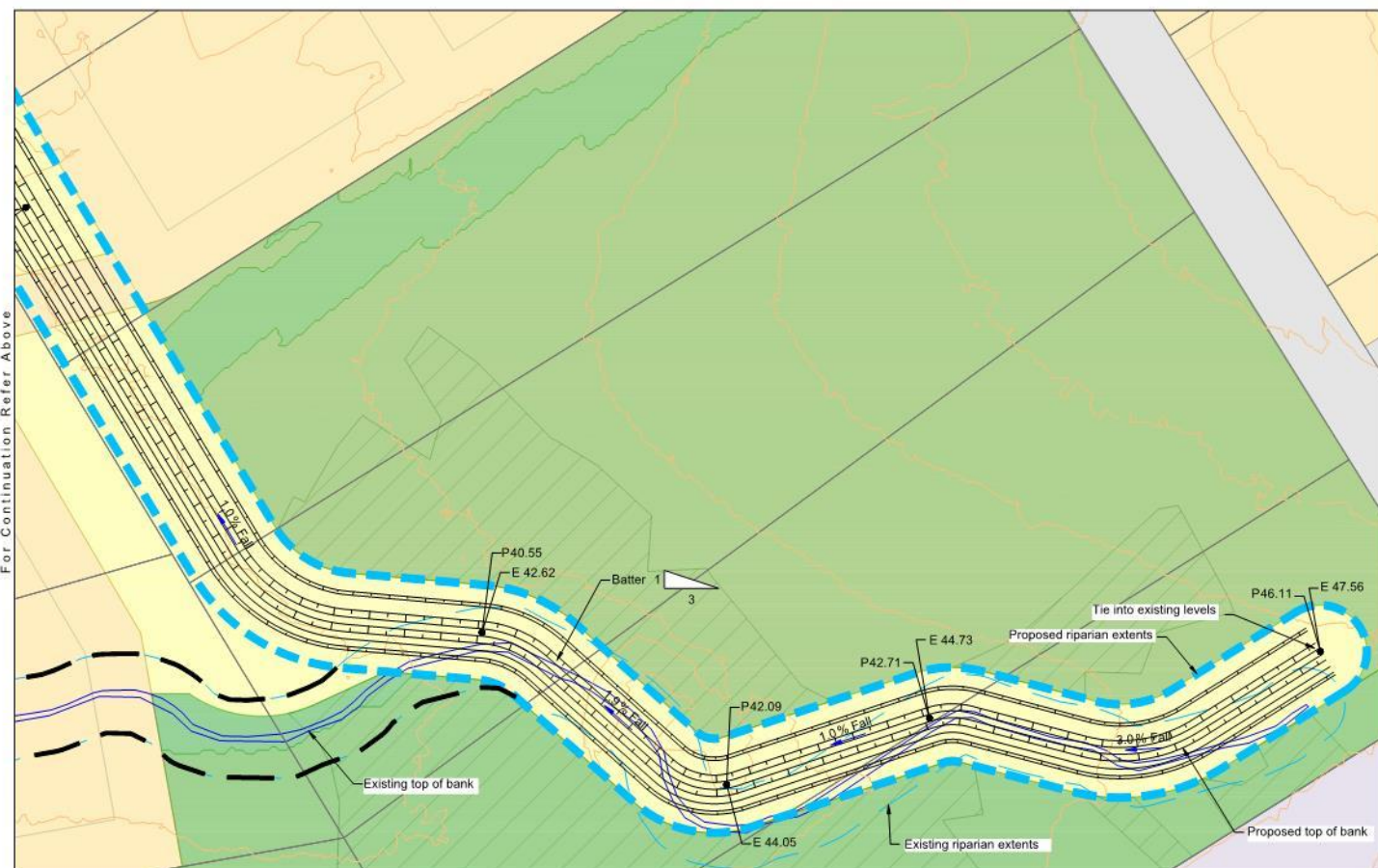
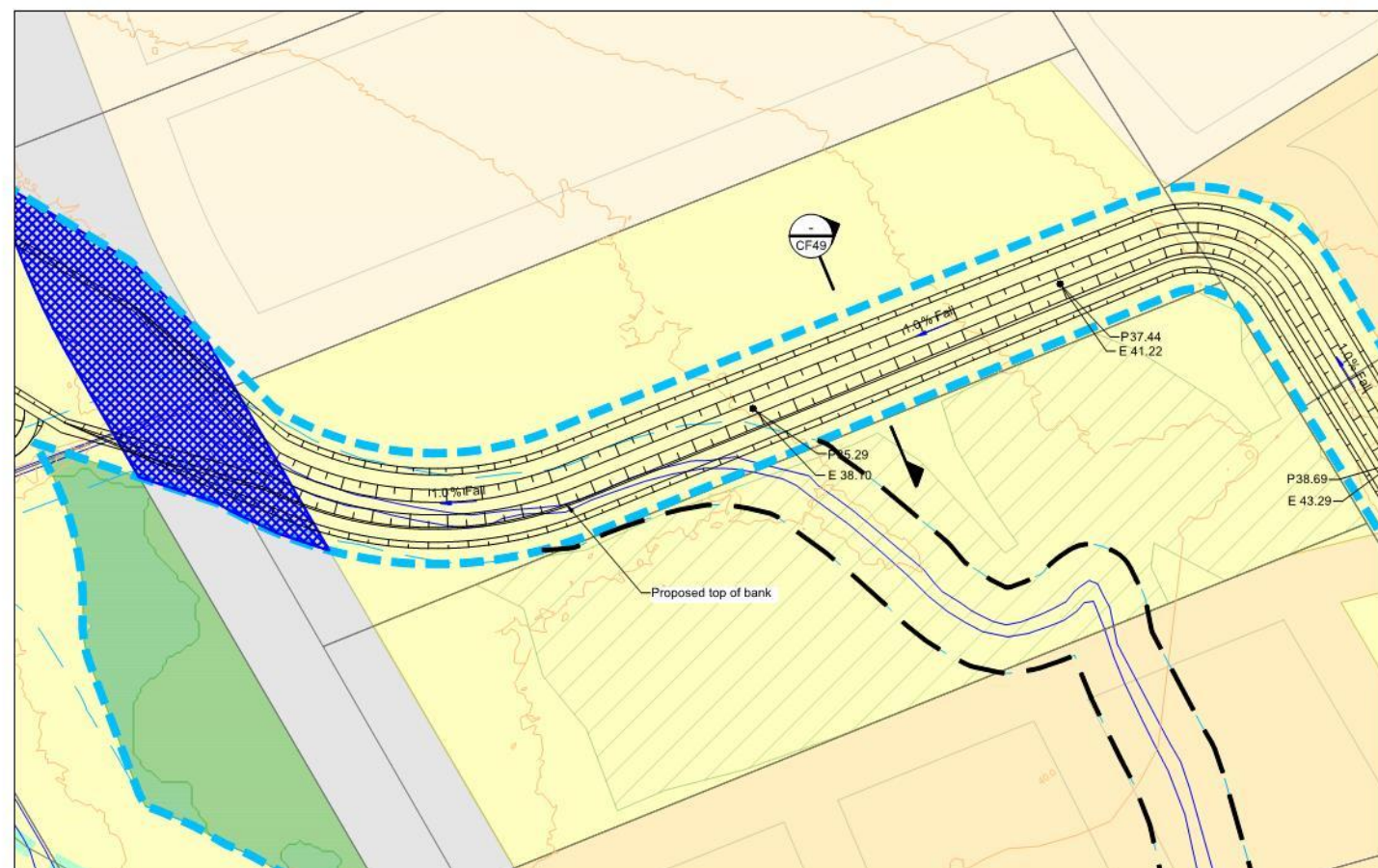
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**ATTACHMENT C**

**MOTT MCDONALDS WATERCOURSE DESIGN**



Reference drawings					
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P5	27.01.15	AMP	Issued for Exhibition	GL	CJA
P4	16.01.15	AMP	Issued for Exhibition	GL	CJA
P3	28.11.14	ADS	Issued for Draft ILP (Not Issued)	GL	-
P2	03.09.14	AMP	Issued for information	GL	-
Rev	Date	Drawn	Description	Ch'kd	App'd

  
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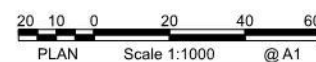
Client  **Planning & Environment**

Title Riverstone East Precinct  
Water Cycle Management Plan

Proposed Channel Plan  
Channel CF49

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As Shown		PRE		P6	

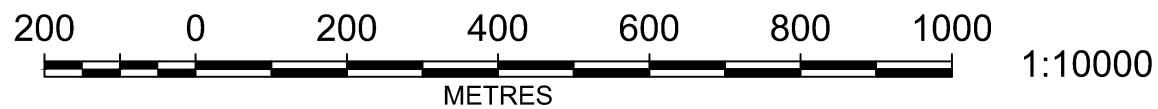
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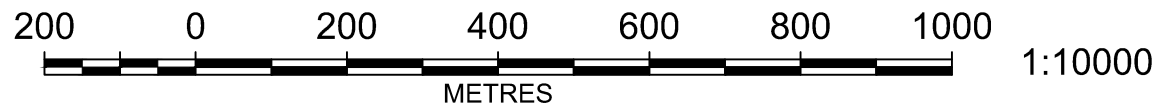
## **ATTACHMENT D**

### **EXTRACT FROM NORTH WEST GROWTH CENTRE DCP**



## **ATTACHMENT E**

### **PROPOSED LAYOUT – OPTION 1**



67 TALLAWONG ROAD  
ROUSE HILL

**ATTACHMENT F**

**PROPOSED LAYOUT – OPTION 2**

