

**Date** 6/12/2018  
**To** Dominic Crinnion  
**From** Richard Johnson  
**Copy to** Steve Ryan (Tactical Group), Nathan Cairney (Tactical Group)  
**Subject** MPW Stage 2 – Riparian corridor measurements

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## 1. Introduction

The purpose of this memorandum is to present information in support of the assessment of the MPW Stage 2 Application (SSD-7709) in its address of the future development assessment conditions under Schedule 4, condition of consent (CoC) E16 of the MPW Concept Approval (SSD-5066). Specifically, the supporting information is provided to confirm the width of the riparian corridor at its narrowest point from the top bank of the George's River, Moorebank.

Previously information, in relation to the measurement of the riparian corridor has been provided to DP&E as part of the MPW Stage 2 Response to Submissions (July 2017) and also subsequent supporting assessment information.

## 2. Condition, guidelines and definitions

The MPW Concept (Stage 1) Approval (SSD 5066), includes three conditions relating to the riparian corridor, none of which are prohibitive to works or infrastructure.

### **Schedule 3 Part B Prior to Construction, Soil, Water Quality and Hydrology:**

*B5 All activities taking place in, on, or under waterfront land, as defined in the Water Management Act 2000 should be conducted generally in accordance with the NSW Office of Water's Guidelines for Controlled Activities.*

### **Schedule 4 Conditions to be Met in Future Development Applications, Biodiversity**

*E15. All future Development Applications shall consider measures to improve the condition of the riparian corridor along the western bank of the Georges River (known as the 'hourglass land').*

*E16. All future Development Applications shall include the following riparian corridor widths (measured from the top of bank):*

- a) a minimum of 50 metres wide associated with the rail corridor; and*
- b) a minimum of 40 metres wide along the terminal site.*

Condition E16 is understood to have originated, at least partially, in a submission provided by the Department of Primary Industries<sup>1</sup> (DPI) during the exhibition of the MPW Concept Environmental Impact Statement (EIS) (Parsons Brinckerhoff, October 2014). The submission requested that a 40 m wide riparian corridor (as measured from the top of bank), consistent with the Office of Water guidelines for controlled activities<sup>2</sup> (the Guidelines), be provided along the Georges River.

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<sup>1</sup> This submission is not dated, however it is assumed that it was received during the exhibition of the EIS (8/10/2014 – 8/12/2014).

<sup>2</sup> Department of Primary Industries – Office of Water – Controlled activities on waterfront land – Guidelines for riparian corridors on waterfront land (June 2012), included as Appendix B.

The Guidelines relate to approval for controlled activities in, on or under waterfront land under Section 91 of the *Water Management Act 2000* (WM Act). Under Section 4.41(g) of the *Environmental Planning and Assessment Act 1979* (EP&A Act) controlled activity approvals (under s91 of the WM Act) do not apply to State significant development approvals.

While approval of controlled activities under s91 of the WM Act is not required for SSD the intent is to remain consistent with the guideline provisions for management of construction and operation activities occurring within the riparian zone. This consistency is demonstrated in the inclusion and application of CoC B5 within the MPW SSD 5066 consent for the conduct of activities within the riparian zone to be undertaken “generally in accordance with” the Guidelines.

The Guidelines define the vegetated riparian zone (VRZ) as:

*The required width of the VRZ measured from the top of the high bank on each side of the watercourse.*

It is identified that the VRZ adjoins the channel and “forms a transition zone between the land, also known as the terrestrial environment, and the river or watercourse or aquatic environment”.

Further regulatory definitions and guidance in identification of riparian zones is provided within:

- *State Water Management Outcomes Plan Order 2002:*
  - **riparian zone:** The zone along or surrounding a water body where the vegetation and associated ecology are influenced by the passage and storage of water, and conversely the aquatic environment benefits from the proximity of the vegetation (eg from bio-filtering of sediment or pollutants, inputs of detritus, shading etc).
- *Greater Metropolitan Regional Environmental Plan No. 2 – Georges River Catchment:*
  - “Riparian Areas” are the lands immediately adjacent to waterbodies

Defining the width of the recommended VRZ involves identification of the order of the watercourse under the Strahler System, and identification of the top of the high bank.

Under the Strahler System, the Georges River is a 6<sup>th</sup> order watercourse, and a VRZ width of 40 m is recommended by the Guidelines.

The Guidelines alternatively reference VRZ measurement as being “measured from the top of the high bank” and “measured from the top of the highest bank on both sides of the watercourse”. Neither “top of the high bank” or “highest bank” are expressly defined within the Guidelines, although Figure 1 of the Guidelines identifies this referenced point as being in immediate proximity to, and having an interface with, the flow within the channel of the watercourse.

Other regulatory definitions to assist in defining the point of measurement are provided within:

- *Crown Land Management Act 2016:*
  - Section 13.3(9) Bank means the limit of the bed of a lake or river
- *Environmental Planning and Assessment Regulation 2000, Schedule 3 Part 5 – How are distances measured for the purposes of this Schedule?:*
  - The distance from a waterbody is to be measured as the shortest distance between:
    - (a) the top of the high bank, if present, or
    - (b) if no high bank is present, then:
      - (i) the mean high water mark in tidal waters, or
      - (ii) the mean water level in non-tidal waters,and the boundary of the development site.

In utilising a definition of “riparian zone” and “top of high bank” to identify the relevant point of measurement it is fundamental to providing development certainty that utilisation of alternative methods should provide a consistent outcome.

The *Environmental Planning and Assessment Regulation 2000* (EP&A Reg), Schedule 3 provides two methods by which to define the distance from a waterbody, the top of the high bank or the mean water level (Georges River being non-tidal at this point due to the presence of the downstream weir).

The western side of the MPW development site heading towards the Georges River is characterised by a floodplain terrace that drops down to the foreshore slopes that run to the bank of the Georges River (refer dark blue line on attached survey plan). This terrace represents the highest bank in immediate proximity to the Georges River, however, it is not immediately proximate to the watercourse or channel, being approximately 20 m from the edge of the river adjacent to the proposed MPW development at its narrowest and extending over 150 m further upstream. While the terrace may represent the highest bank, it does not fully satisfy the proximity or transitional environment factors for the VRZ as a top of bank channel landform.

The mean water level of the Georges River is defined by the downstream weir, so the river’s edge (light blue dashed /solid line on survey plan) represents the mean water level. Immediately to the east of the river’s edge is a slightly elevated area that represents an immediately proximate high point to the mean water level (purple dashed/solid line on attached survey plan).

Using the two methods provided within the EP&A Reg, consideration of the floodplain terrace as the highest bank and the mean water level as measurement reference points provides points of commencement with a variance of between 20 m and 120 m+.

By comparison, referencing the mean water level and the adjacent access track provides a more consistent outcome with a variance of < 2m.

To summarise, riparian zones commence adjacent to a waterbody, form a transition zone between aquatic and terrestrial environments, and are measured from the top of the high bank on either side of the watercourse. The required 40 m VRZ should be measured from a position proximate to the interface with the Georges River, being the interface between aquatic and terrestrial environments. For consistency and certainty of determination, this point is the mean water level of the Georges River, as represented by the water’s edge (light blue line), or the immediately proximate top of bank (purple line).

### 3. MPW measurement

Previous measurements, provided within the MPW Stage 2 RtS and assessment reporting, have been undertaken based on aerial photography. These previous measurements identified the following:

*The riparian corridor is approximately 40 metres wide at its narrowest point at a single location between the northern boundary of the riparian corridor and the northern-most basin outlet. The remainder of the 2.1 km long riparian corridor is greater than 50 metres wide and is up to 290 metres wide in some locations.*

Notwithstanding this, additional survey information has recently been undertaken by Cardno Hard and Forrester (included at [Attachment A](#)).

The attached survey plan represents a consolidation of field survey results using traditional and GNSS technique. Due to the inaccessibility of much of the river bank, Nearmap Imagery (2018) has been used to determine the edge of water for the typical flow. Where surveyed, the typical the bank ranges in width from 3 m to 5 m and in height from 2 m to 6 m. A width of 4 m has been used for areas that were not physically surveyed.

This survey information indicates that the earlier assessment statements continue to be correct, and at its narrowest point from the western extent of OSD basin 5, the riparian corridor (based on aerial photograph measurements) is 42.5m.

However, when applying the measurement to the highest bank, the survey has identified that the terrace (as the highest bank) varies and at its narrowest point from the top of the highest bank the distance from the western extent of OSD basin 5 is 18.9 m. Notably this point is >120 m from the current mean water level of the Georges River.

#### 4. Conclusion

As identified above, the three conditions of consent pertaining to works within and maintenance of the riparian corridor (CoC B5, E15 and E16) within the MPW SSD 5066 do not prohibit further works, infrastructure or operations within the riparian corridor. COC B5 requires such works to be “conducted generally in accordance with the” Guidelines. E15 and E16 require measures to improve the condition of the riparian corridor and to maintain a minimum corridor width of 40 m.

The Guidelines identify in the provided Riparian Corridor Matrix a number of works that may be undertaken with the VRZ, expressly including, but not limited to, stormwater outlet structures and detention basins.

The inclusion of detention basins with the VRZ is subject to the following:

- Located only within the 50% outer VRZ (i.e. part of the VRZ closest to the development boundary)
- Ensuring that an average width of the VPZ can be achieved over the length of the water course
- An equivalent area connected to the riparian corridor must be offset
- Protection and vegetation of the 50% inner VRZ must be provided.

This averaging rule (as presented in Figure 3 of the Guidelines) has been provided within Figure 1.

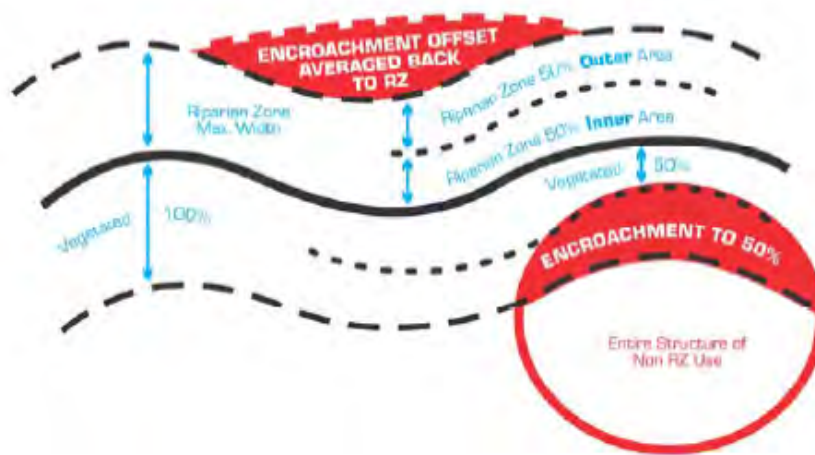


Figure 1 Averaging rule (within the Guidelines)

On the basis of the recent survey (Appendix A) the current distance of the Proposal from the mean water level is 42.5 m at the closest point, 2.5 m in excess of the required 40 m VRZ. When measured from the highest bank at the same point the Proposal is 23 m. By application of the Guidelines and the EP&A Reg. measurement methods, the proposed OSD basin 5 either sits outside of the VRZ in its entirety, or within the outer 50% of the VRZ, respectively. Both of these outcomes remain consistent with the application of the Guidelines and do not restrict the ability of the Applicant to improve the riparian corridor or maintain riparian widths (taking into consideration the Guideline’s averaging rule).



The Proposal is considered to be consistent with the Guidelines and compliant in addressing the requirements of CoC E15 and E16 to be able to improve and maintain riparian corridor conditions and achieve positive biodiversity outcomes, expectedly operating under a comparable condition of consent to that provided in COC B5 under MPW Stage 1 SSD 5066.

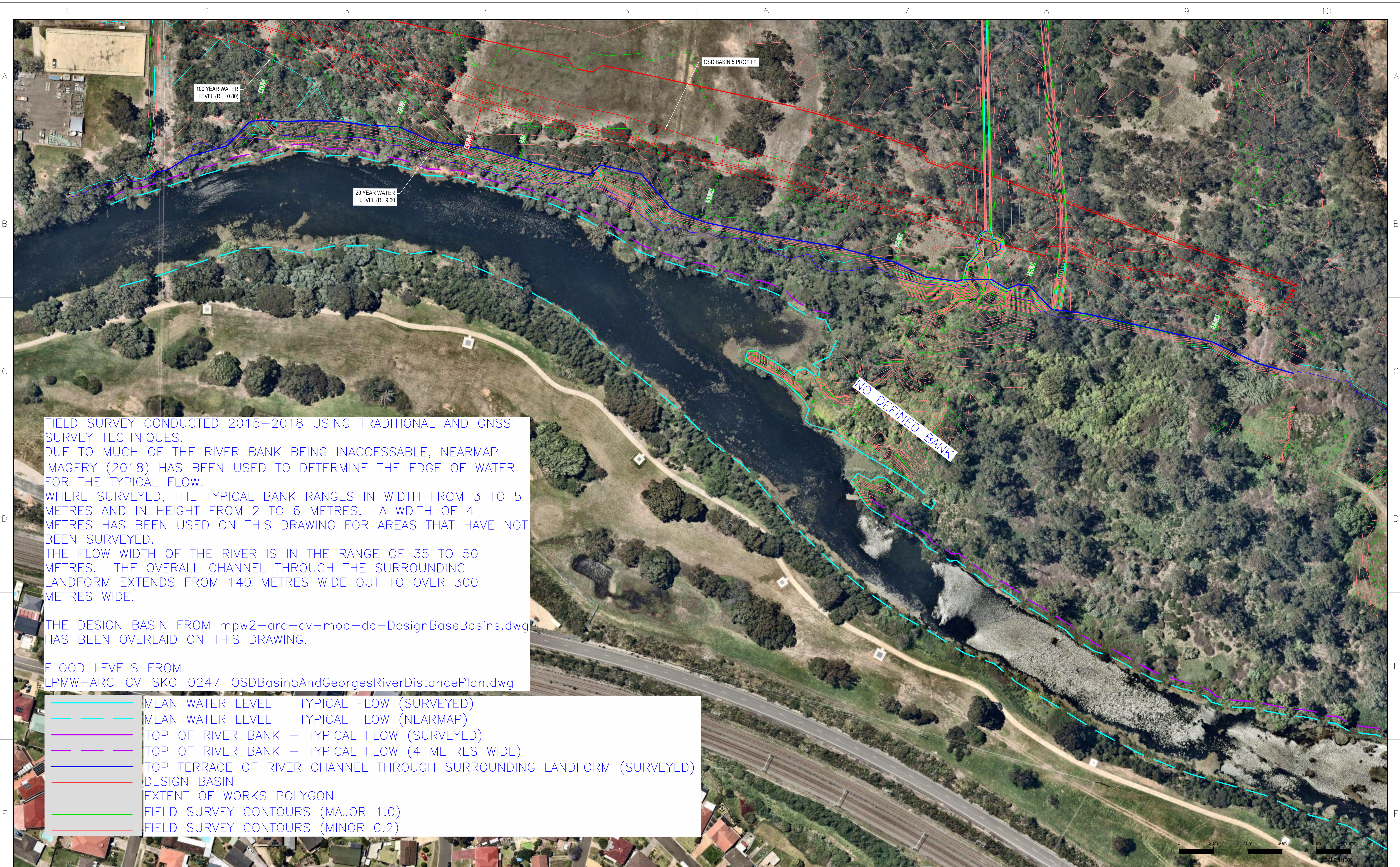
In addition to the above a number of factors are also relevant to the assessment of the MPW Stage 2 Proposal and the consideration of achieving both the numeric control of E16 and the principles of the Guidelines, namely:

- The MPW Concept approval documentation identified outlet structures to be located within the riparian corridor. The western boundary of the MPW Stage 2 site is generally consistent with the boundary of the MPW Concept site and therefore a similar riparian corridor is to be provided within the MPW Stage Proposal, as envisaged within the MPW Concept approval documentation.
- The batters to be provided on the western boundary of the proposed basins, within the MPW Stage 2 Proposal, would be vegetated with species that are consistent with the existing vegetation thereby further extending the riparian corridor, above the identified measurement.

The Proposal is considered consistent and compliant with the Guidelines and the expectations of CoC E16.

## APPENDIX A: SURVEY (GEORGES RIVER BANK)





FIELD SURVEY CONDUCTED 2015-2018 USING TRADITIONAL AND GNSS SURVEY TECHNIQUES. DUE TO MUCH OF THE RIVER BANK BEING INACCESSABLE, NEARMAP IMAGERY (2018) HAS BEEN USED TO DETERMINE THE EDGE OF WATER FOR THE TYPICAL FLOW. WHERE SURVEYED, THE TYPICAL BANK RANGES IN WIDTH FROM 3 TO 5 METRES AND IN HEIGHT FROM 2 TO 6 METRES. A WIDTH OF 4 METRES HAS BEEN USED ON THIS DRAWING FOR AREAS THAT HAVE NOT BEEN SURVEYED. THE FLOW WIDTH OF THE RIVER IS IN THE RANGE OF 35 TO 50 METRES. THE OVERALL CHANNEL THROUGH THE SURROUNDING LANDFORM EXTENDS FROM 140 METRES WIDE OUT TO OVER 300 METRES WIDE.

THE DESIGN BASIN FROM mpw2-arc-cv-mod-de-DesignBaseBasins.dwg HAS BEEN OVERLAID ON THIS DRAWING.

FLOOD LEVELS FROM LPMW-ARC-CV-SKC-0247-OSDBasin5AndGeorgesRiverDistancePlan.dwg

	MEAN WATER LEVEL - TYPICAL FLOW (SURVEYED)
	MEAN WATER LEVEL - TYPICAL FLOW (NEARMAP)
	TOP OF RIVER BANK - TYPICAL FLOW (SURVEYED)
	TOP OF RIVER BANK - TYPICAL FLOW (4 METRES WIDE)
	TOP TERRACE OF RIVER CHANNEL THROUGH SURROUNDING LANDFORM (SURVEYED)
	DESIGN BASIN
	EXTENT OF WORKS POLYGON
	FIELD SURVEY CONTOURS (MAJOR 1.0)
	FIELD SURVEY CONTOURS (MINOR 0.2)

**IMPORTANT NOTE:**  
This plan is prepared for TACTICAL PROJECT MANAGEMENT from a combination of field survey and existing records for the purpose of designing new constructions on the land and should not be used for any other purpose. The title boundaries shown hereon were not marked by the author at the time of survey and have been determined by plan dimensions only and not by field measurement.



A services search of the area surveyed above has not been undertaken. Visible services shown hereon have been located where possible by field survey. Prior to any demolition, excavation or construction on the site, the relevant authority should be contacted for possible location of further underground services and detailed locations of all services. This note is an integral part of this plan.

REVISION	DATE	DESCRIPTION	12D REF	APPROVED
02	06.12.2018	EXTENT EXPANDED AND NOTES CLARIFIED	-	PAH
01	30.11.2018	HIGHEST BANK AND OFFSETS ADDED	-	PAH
00	27.11.2018	ORIGINAL ISSUE	-	PAH

SCALE: HORIZ. 1:1000 VERT. A1
CONTOUR INTERVAL: MAJOR 1.0 MINOR 0.5
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COORD. SYSTEM MGA
MARK ADOPTED: SSM 17778
COORDINATES: E 308 107.627 N 6 241 567.758
VERTICAL DATUM
DATUM: AHD
BM ADOPTED: PM 31039 RL: 15.212

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**PLAN SHOWING EXISTING DETAIL AND CONTOURS WITH DESIGN (IN RED)**

CLIENT: TACTICAL PROJECT MANAGEMENT

SHEET 01 OF 04

DRAWING NUMBER	REV
115804542	02





	MEAN WATER LEVEL – TYPICAL FLOW (SURVEYED)
	MEAN WATER LEVEL – TYPICAL FLOW (NEARMAP)
	TOP OF RIVER BANK – TYPICAL FLOW (SURVEYED)
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SHEET 02 OF 04

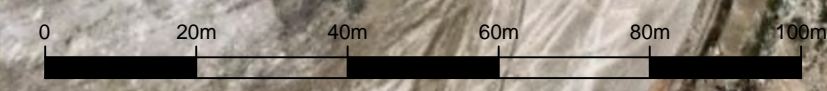
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**115804542 02**



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NO DEFINED BANK  
EVEN GRADE FROM WATER  
EDGE TO RETAINING WALL



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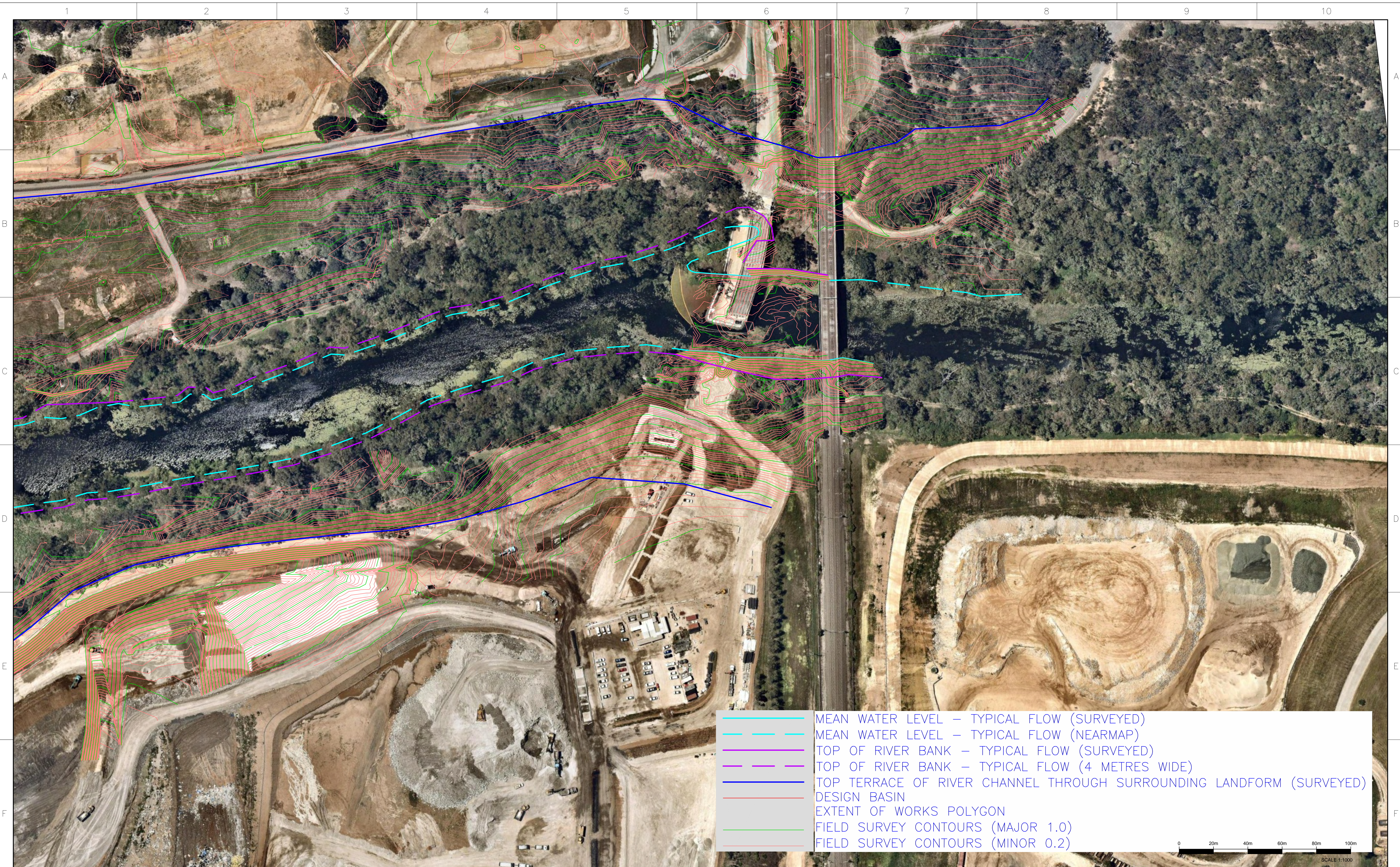
PROJECT: SIMTA - MOOREBANK

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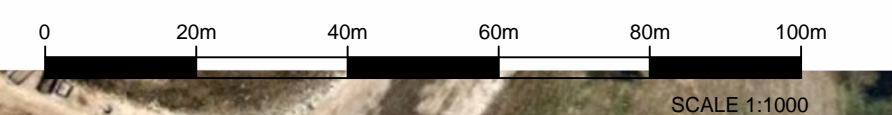
CLIENT: TACTICAL PROJECT MANAGEMENT

SHEET 03 OF 04  
DRAWING NUMBER REV  
**115804542 02**





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