Leichhardt Floodplain Risk Management Study and Plan

APPENDIX D

MITIGATION OPTION ASSESSMENTS SUB-CATCHMENT REPORTS - DRAFT

Cardno
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Area 6 - Parramatta River and Snails Bay Options Assessment

Leichhardt Flood Risk Management Study and Plan - DRAFT

NA49913094

Prepared for
Inner West Council

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1 Parramatta River and Snails Bay Catchments Description

Both Parramatta River and Snails Bay Catchments are within Balmain and Birchgrove suburbs. Smaller overland flowpaths are located in these catchments and the overland flows discharge to the Parramatta River and Snails Bay. In a number of cases, the streets in this area are aligned such that the majority of the overland flow proceeds along them, rather than directly through the houses. Significant ponding does occur on Birchgrove Oval, due to the low grades in this area.

The options proposed for assessment in the report are located within the study area portion of the Parramatta River and Snails Bay Catchment.

The location of the Parramatta River and Snails Bay Catchment within the study area is shown in **Figure 1-1**

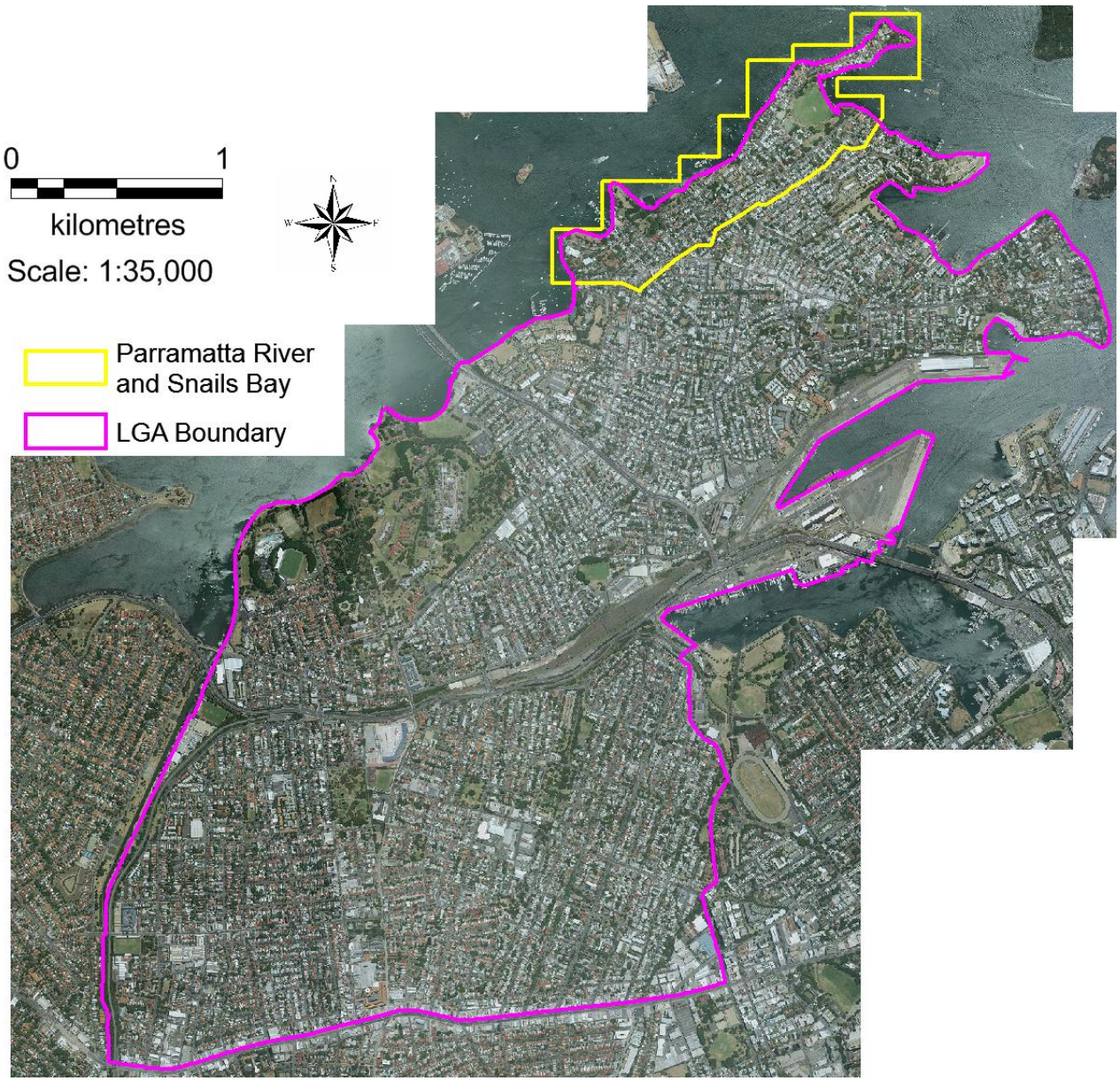

Figure 1-1 Parramatta River and Snails Bay Catchment Location

2 Flood Mitigation Options Identification

2.1 Flood Modification Measures for the Parramatta River and Snails Bay Catchments

The existing flood behaviour within the Parramatta River and Snails Bay Catchments are detailed in the Leichhardt Flood Study (Cardno 2014). Based on the flood model results, historical information and engineering judgement, possible flood modification measures (i.e. structural measures) for the study area were identified.

The various management options were identified taking into consideration the:

- flood behaviour and flow in the 20 year ARI event;
- grade of pipe (upstream and downstream); and
- preliminary availability and location of easements.

2.2 Parramatta River and Snails Bay Catchments Flood Mitigation Options

While several preliminary options were identified as part of the preliminary options report within these catchments, subsequent revision of flood modelling and mapping identified reduced and in some cases no flood risk in those location previously identified for potential options. As a result only one option was identified for further assessment, this option is located in the Snails Bay Catchment. This option is shown in Table 2-1 and Figure 2-1. The 100yr, 20yr and 5yr ARI peak water level difference plots for each mitigation option are attached at the end of this appendix report.

Table 2-1 Parramatta River and Snails Bay Mitigation Options

Option Description	Option Name	ID
Cove Street Branch – The proposed pipe starts from the Cove/Birchgrove St Intersection and then goes along Ferdinand St and connects to the existing pipe network in The Terrace. Additional pipes along Grove St, Rose St and Bay St.	Cove St Branch and Additional Pipes SB-FM1	SB-FM1

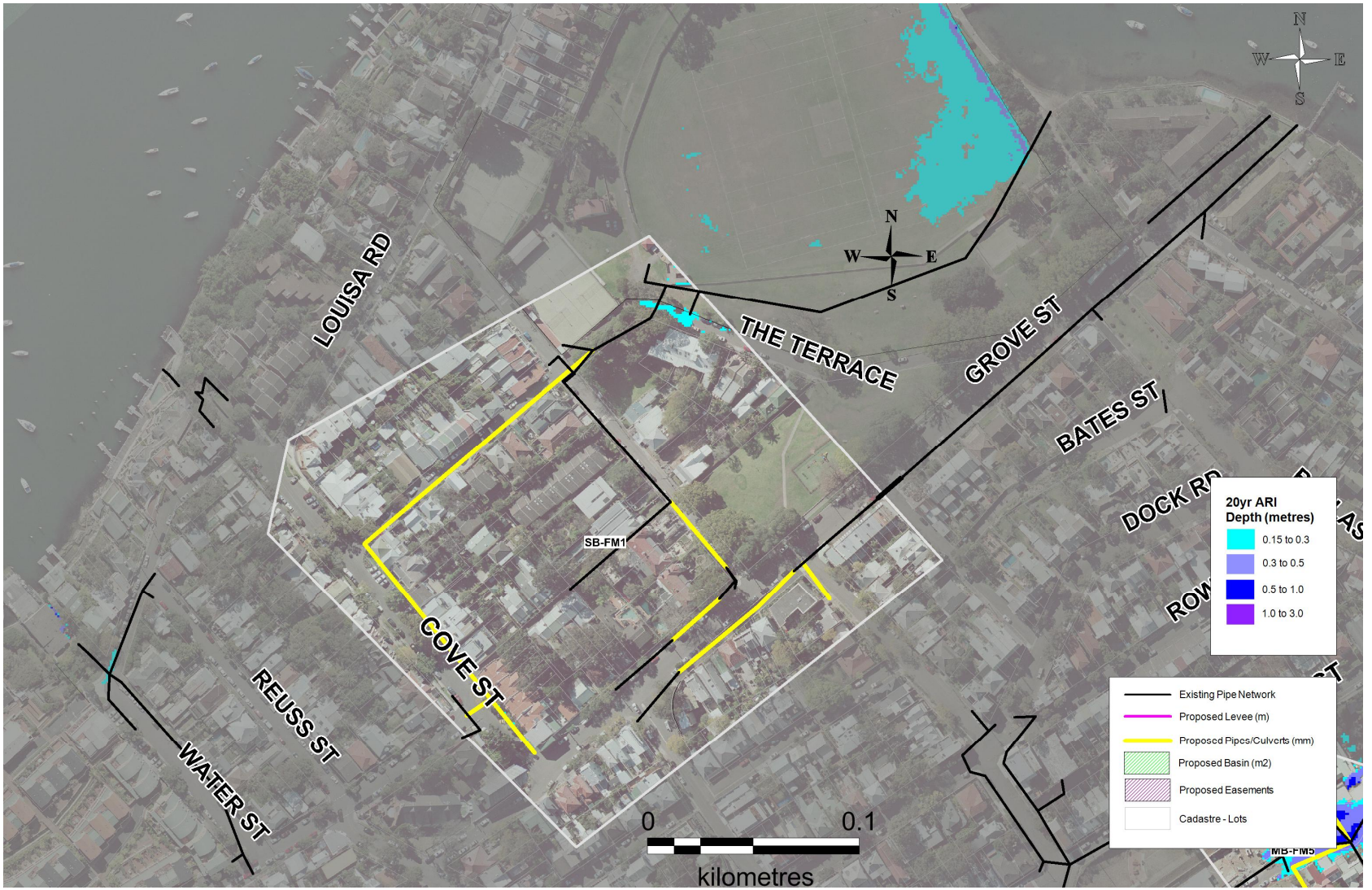

Figure 2-1 Snails Bay Mitigation Options Locations

2.2.1 Cove St Branch and Additional Pipes SB-FM1

Following extensive review of the flooding conditions and impacts in the Snails Bay catchment, it was identified that SB-FM1 is the only potentially effective option to justify further assessment. The option consists of a proposed pipe starting from the Cove Street / Birchgrove Street Intersection (600mm diameter), which then goes along Ferdinand Street and connects to the existing pipe network in The Terrace. Additional pipes (450mm diameter) are also proposed along Grove Street, Rose Street and Bay Street.

Flood depths along this flow path under existing conditions reach 0.2m in the 20 Year ARI event.

3 Mitigation Option Modelling Outcomes

The Snails Bay flood mitigation option was assessed for the 5, 10, 20, 50 and 100 Year ARI design flood events, along with the PMF event.

The outcomes of the modelling are shown in the 5, 20, and 100 Year ARI water level difference plots attached at the end of this catchment report.

A summary of the impacts on flood behaviour for the option is provided below.

3.1 Cove St Branch and Additional Pipes SB-FM1

Mitigation option SB-FM1 shows decreases in water levels along parts of Cove Street, Ferdinand Street, Sardinia Place and Grove Street in an order of 0.01m to 0.05m. The maximum flood depth prior to implementation of the option is 0.2m in a 20 Year ARI event.

There is very little decrease in flood level on private properties. As a result there is no change in the flood damages for all events except the PMF.

4 Economic Assessment of Flood Damages in the Snails Bay Catchment

4.1 Snails Bay Mitigation Options Damages Assessment

An assessment of damages for the existing condition in the Parramatta River and Snails Bay Catchment is presented in the Floodplain Risk Management Study. The approach adopted for calculating the existing damages has been repeated for the modelling results from the mitigation options proposed for the Snails Bay catchment.

The economic flood damage results for the option and the existing scenario are presented in Table 4-1. The reductions in properties affected by overground and overfloor flooding, total damages and AAD are provided in Table 4-2. Negative values represent increases from the existing scenario.

The total reduction in damaged properties and the associated reduction in damage costs for SB-FM1 is also provided in Table 4-2.

The flood damages assessment is a useful tool for comparing the merits of various options, it is not a precise flood risk analysis tool and the limitation associated with the assessment should be considered when interpreting the results.

The following information should be considered when interpreting the damages data:

- Negative property or dollar values represent increases from the existing scenario.
- Where an option results in a reduction in flood depths there may not be any reduction in the flood damages where:
    - The reduction in flood depths or extent occur in open space or roadways; or
    - The reduction in flood depths occurs on properties that were not impacted by over floor flooding (i.e. the flooding on the property grounds is shallower but still exists).
- The flood damages are calculated at a discrete location on each property. This location is where the floor level and ground level survey was obtained from. As such, if the flooding occurs at another location on the property other than the survey point, this property will not register any damages with regards to this damages assessment.
- Commercial and industrial damages are only incurred when over floor flooding exists.
- The reduction in the number of properties impacted as a result of an option may vary between different flood events due to the performance of the proposed work under the different flow behaviour of each flood event.

Table 4-1 SB-FM1 Flood Damage Assessment Summary

Event / Property type	Properties with Overfloor Flooding		Properties with Overground Flooding		Estimated Total Damage ($ June 2016)	
	Existing Case	*Mitigation Case*	*Existing Case*	*Mitigation Case*	*Existing Case*	*Mitigation Case*
PMF Event						
Residential	28	28	57	57	$ 1,604,314	$ 1,531,771
Commercial	0	0	0	0	$ -	$ -
Industrial	0	0	0	0	$ -	$ -
PMF Total	**28**	**28**	**57**	**57**	**$ 1,604,314**	**$ 1,531,771**
100yr ARI						
Residential	0	0	0	0	$ -	$ -
Commercial	0	0	0	0	$ -	$ -
Industrial	0	0	0	0	$ -	$ -
100yr ARI Total	**0**	**0**	**0**	**0**	**$ -**	**$ -**
50yr ARI						
Residential	0	0	0	0	$ -	$ -
Commercial	0	0	0	0	$ -	$ -
Industrial	0	0	0	0	$ -	$ -
50yr ARI Total	**0**	**0**	**0**	**0**	**$ -**	**$ -**
20yr ARI						
Residential	0	0	0	0	$ -	$ -
Commercial	0	0	0	0	$ -	$ -
Industrial	0	0	0	0	$ -	$ -
20yr ARI Total	**0**	**0**	**0**	**0**	**$ -**	**$ -**
10yr ARI						
Residential	0	0	0	0	$ -	$ -
Commercial	0	0	0	0	$ -	$ -
Industrial	0	0	0	0	$ -	$ -
10yr ARI Total	**0**	**0**	**0**	**0**	**$ -**	**$ -**
5yr ARI						
Residential	0	0	0	0	$ -	$ -
Commercial	0	0	0	0	$ -	$ -
Industrial	0	0	0	0	$ -	$ -
5yr ARI Total	**0**	**0**	**0**	**0**	**$ -**	**$ -**
Total Annual Average Damage					**$ 8,021**	**$ 7,658**

Table 4-2 Reduction in Damages Associated with Option SB-FM1

	Overfloor flooding properties reduction	Overground flooding properties reduction	Total Damage Reduction ($)	AAD Reduction ($)
SB-FM1				
PMF event	0	0	$ 72,544	$363
100yr ARI event	0	0	$ -	$0
50yr ARI event	0	0	$ -	$0
20yr ARI event	0	0	$ -	$0
10yr ARI event	0	0	$ -	$0
5yr ARI event	0	0	$ -	$0
Total				**$363**

4.2 Benefit to Cost Ratio of Options

The economic evaluation of each modelled measure was assessed by considering the reduction in the amount of flood damages incurred for the design events and by then comparing this value with the cost of implementing the measure.

Table 4-3 summarises the results of the economic assessment of each of the flood management options. The indicator adopted to rank these measures on economic merit is the benefit-cost ratio (B/C), which is based on the net present worth (NPW) of the benefits (reduction in AAD) and the costs (capital and ongoing), adopting a 7% discount rate and an implementation period of 50 years.

The benefit-cost ratio provides an insight into how the damage savings from a measure, relate to its cost of construction and maintenance:

- Where the benefit-cost is greater than 1 the economic benefits are greater than the cost of implementing the measure;
- Where the benefit-cost is less than 1 but greater than 0, there is still an economic benefit from implementing the measure but the cost of implementing the measure is greater than the economic benefit;
- Where the benefit-cost is equal to zero, there is no economic benefit from implementing the measure; and
- Where the benefit-cost is less than zero, there is a negative economic impact of implementing the measure.

Table 4-3 Summary of Economic Assessment of Flood Management Options

Option ID	Option Description	NPW of Reduction in AAD	NPW of Cost of Implementation	B/C Ratio	Economic Ranking
SB_FM1	Cove Street Branch – The proposed pipe starts from the Cove/Birchgrove St Intersection and then goes along Ferdinand St and connects to the existing pipe network in The Terrace. Additional pipes along Grove St, Rose St and Bay St.	$5,000	$3,004,000	0.00	1

Parramatta River and Snails Bay Mitigation Option Figures

Figure SB_FM1_5yr_WlDiff
Figure SB_FM1_20yr_WlDiff
Figure SB_FM1_100yr_WlDiff

DATE PLOTTED: 04-Nov-2016 BY: Matthew Prumm
FILE: N:\Projects\499\FY13\NA49913094_LEICHHARDT FRMS&P\01-Package_10\11-WATER\Drawings\GIS\MapInfo\2016_FRMSP\MitigationFigures\Figure_A6_7_SB_FM1_5yr_WlDiff.wor

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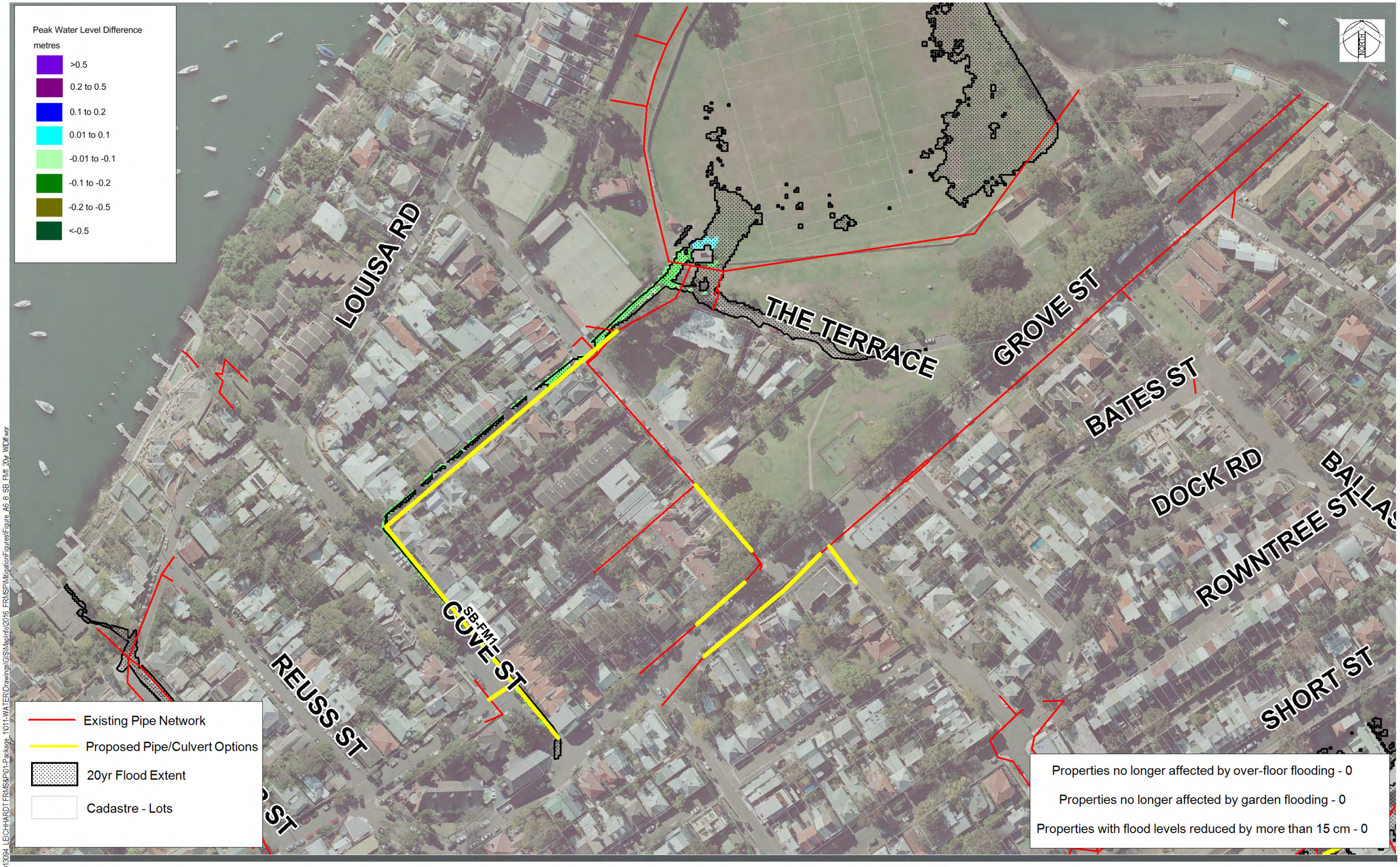
INNER WEST COUNCIL
LEICHHARDT FRMS&P
SB_FM1 5YR ARI WL DIFF
MITIGATION LESS EXISTING
FIG_A6_7

Date
03/2017

Size
A3

SB_FM1_5yr_WlDiff
Drawing Number

03
Revision



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INNER WEST COUNCIL
LEICHHARDT FRMS&P
SB_FM1 20YR ARI WL DIFF
MITIGATION LESS EXISTING
FIG_A6_8

Date
03/2017

Size
A3

SB_FM1_20yr_WlDiff
Drawing Number

03
Revision

Peak Water Level Difference
metres

- >0.5
- 0.2 to 0.5
- 0.1 to 0.2
- 0.01 to 0.1
- -0.01 to -0.1
- -0.1 to -0.2
- -0.2 to -0.5
- <-0.5

LOUISA RD

THE TERRACE

GROVE ST

BATES ST

DOCK RD

ROWNTREE ST

SHORT ST

REUSS ST

SB-FM1

COVE ST

- Existing Pipe Network
- Proposed Pipe/Culvert Options
- 100yr Flood Extent
- Cadastre - Lots

Properties no longer affected by over-floor flooding - 0

Properties no longer affected by garden flooding - 0

Properties with flood levels reduced by more than 15 cm - 0

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INNER WEST COUNCIL
LEICHHARDT FRMS&P
SB_FM1 100YR ARI WL DIFF
MITIGATION LESS EXISTING
FIG_A6_9

Date
03/2017

Size
A3

SB_FM1_100yr_WIDiff
Drawing Number

03
Revision