Lewisham Estate
78-90 Old Canterbury Road
Lewisham
Flood Management Report

Prepared For:

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(Cardno ITC)

CONTENTS

1 EXECUTIVE SUMMARY

This document is a flood management report for the proposed development located at 78-90 Old Canterbury Road, Lewisham. The flooding includes:

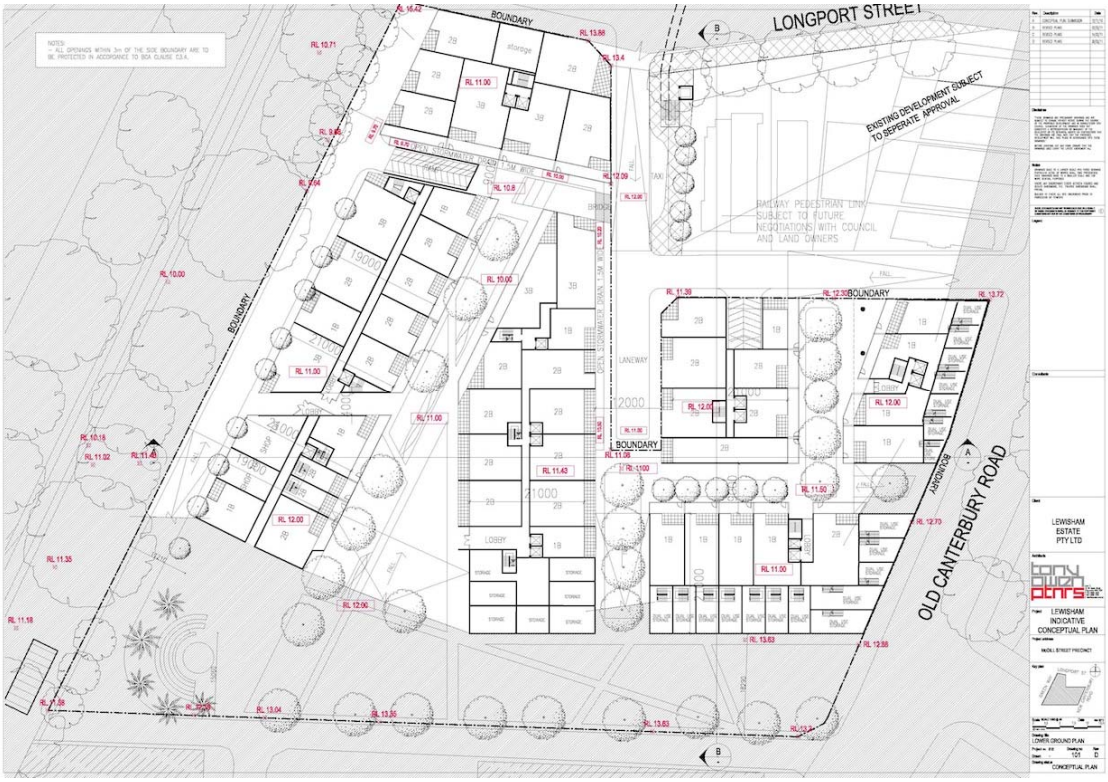
- The Hawthorne Canal main drain; and
- The overland flow from the upstream catchment.

The site is legally described as Lot 11 in DP 774322 and Lots 6-8 in DP 977044.

Lewisham Estates P/L in conjunction with Planning Ingenuity P/L are proposing a concept plan for a Major Project comprising a mixed use development for residential, commercial and retail land uses with associated car parking facilities and public domain improvements.

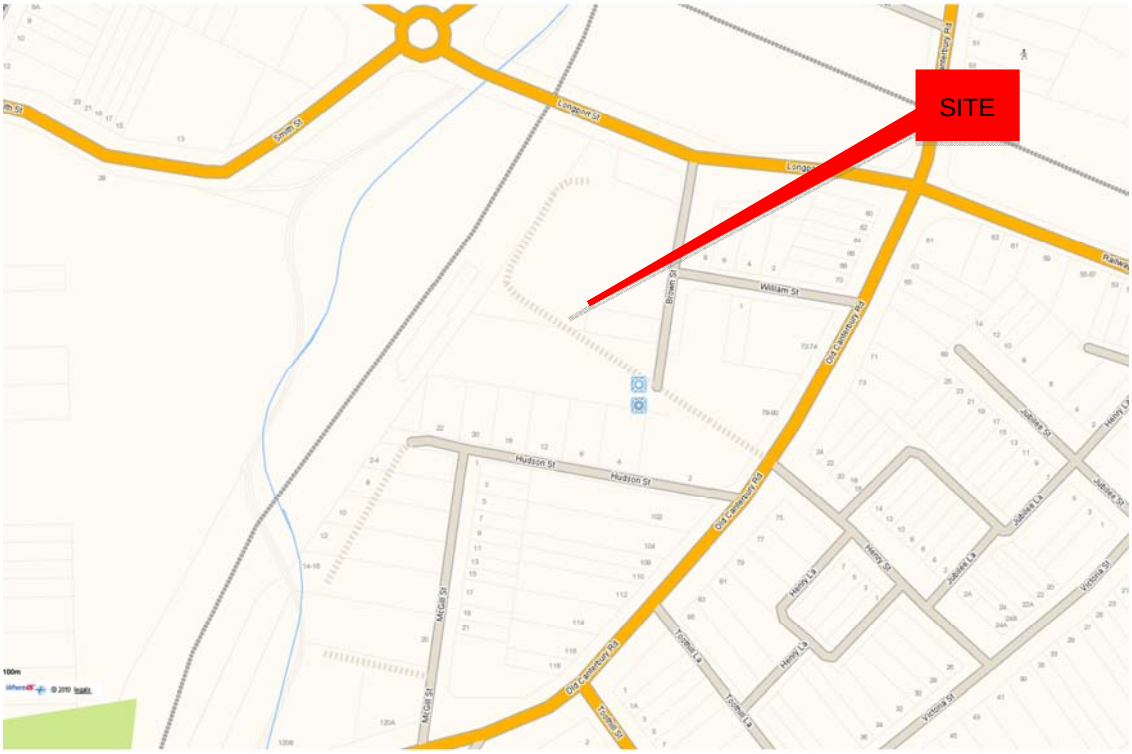
The Concept Plan is for buildings ranging in height from 4 to 9 storeys. Public domain improvements include the creation of new streets, open space areas and pedestrian access points.

The proposed development is illustrated in the lower ground retail level plan below.



This report responds to Council's concerns as stipulated in Council's response letter reference P3570.750-02 to the Planning Application MP08_0195, in relation to the flooding affectation on the site, both from the Hawthorne Canal and from the localised overland flow in Old Canterbury Road.

2 SITE LOCATION



The site is a large block of land legally described as Lot 11 in DP 774322 and Lots 6-8 in DP 977044 in the suburb of Lewisham. The site falls in the Local Government Area of Marrickville Council.

The site is bounded by the Goods Railway Corridor to the West, Hudson Street to the South, Old Canterbury Road to the East and Longport Street to the North. The site is currently fully developed with old warehouses and bitumen areas.

The site has an irregular shape and is characterised by a gentle natural gradient from East to West.

The railway line separates the site from the Hawthorne Canal located further to the West. The upstream catchment area east of the site is drained into the Canal via a trunk main traversing the site from a low point in Old Canterbury Road, through the low point in Brown Street and into the Canal downstream of Lonport Street.

3 FLOOD MANAGEMENT

3.1 Reference Documents

The following documents have been reviewed and used to prepare the stormwater strategy and this section of the report:-

1. Architectural drawings ref. 815 Prepared by Tony Owen & Partners;
2. Survey drawing ref. 1593-DT01 prepared by StrataSurv revision G dated 04.06.2009;
3. Australian Rainfall & Runoff (AR&R) dated 1997 by the Institution of Engineers, Australia;
4. The Floodplain Development Manual Revision 2005 by the NSW Government;
5. Marrickville Council response letter to the Planning Application ref. P3570.750-02 dated 23 December 2010;
6. Hawthorne Canal Flood Assessment report by Meinhardt ref. 3473 revision B dated 29 July 2010;
7. Marrickville Council Stormwater and On-Site Detention Code (19 February 1999); and
8. Stormwater Asset plans received from Council.

3.2 Glossary

Annual Exceedance Probability (AEP)

The chance of a flood of a given or a larger size occurring in any one year, usually expressed as a percentage.

Australian Height Datum (AHD)

A common national surface level datum approximately corresponding to mean sea level.

Average Recurrence Interval (ARI)

The long term average number of years between the occurrence of a flood as big as or larger than the selected event.

Catchment

The land area draining through the main stream, as well as tributary streams, to a particular site. It always relates to an area above a specific location.

Flood

Relatively high stream flow which overtops the natural or artificial banks in any part of a stream, river, estuary, lake or dam, and/or local overland flooding associated with major drainage before entering a watercourse.

Flood Liable Land

Land susceptible to flooding by the PMF.

Flood Planning Levels (FPLs)

Are the combinations of flood levels and freeboards selected for floodplain risk management purposes.

Freeboard

Is a factor of safety typically used in relation to the setting of floor levels.

Habitable Room

In industrial or commercial situation: an area used for offices or to store valuable possessions susceptible to damage in the event of a flood.

Peak Discharge

The maximum discharge occurring during a flood event.

Probable Maximum Flood

PMF is the largest flood that could conceivably occur at a placation, usually estimated from probable maximum precipitation.

Probable Maximum Precipitation

PMP is the greatest depth of precipitation for a given duration meteorologically possible over a given size storm area at a particular location at a particular time of the year.

Runoff

The amount of rainfall which actually ends up as stream flow.

3.3 Development Description

The proposed mixed-use development comprises residential, commercial and retail uses, an underground carpark basement and public domain improvements.

3.4 Authorities Requirements

3.4.1 Sydney Water Corporation

(Extract from Sydney Water Corporation letter dated 20 December 2010)

Stormwater

Building over or under Sydney Water's stormwater assets is not permitted. For Sydney Water to support the proposal, a one metre offset is required between any new structures and Sydney Water's assets.

The developer proposes to adjust (make redundant) a section of Sydney Water's Hawthorne Canal stormwater system. For Sydney Water to support this adjustment, we require the entire section of redundant asset be removed with a new maintenance pit constructed in its place to terminate the adjustment.

The developer will need to engage a Water Servicing Coordinator to submit on their behalf an asset adjustment application with Sydney Water. Sydney Water will not consent to the termination of the existing drainage easement until all demolition/construction works required under the approved adjustment application have been completed.

3.4.2 Marrickville Council

(Extract from Marrickville Council letter P3570.750-02 dated 23 December 2010)

Key issue 15 of the of the Director-General's Requirements is an assessment of any flood risk on the site in consideration of the NSW Floodplain Development Manual (2005) including the potential effects of climate change, sea level rise and an increase in rainfall fall intensity.

The NSW Floodplain Development Manual (2005) provides a framework to ensure the sustainable use of floodplain environments. The primary objective of the policy is to reduce the impact of flooding and flood liability, to reduce private and public losses from floods and to ensure that any new development is compatible with the flood hazard of the site and does not create additional flooding problems in the area.

This key issue has not been adequately addressed. The Environment Assessment report comments that the site is not flood prone with no investigation or analysis.

Although the site is not currently zoned as flood prone land (as Council has not undertaken a flood study of the Hawthorn Canal Catchment), it is very likely that the site is at risk of flooding as the Hawthorne Canal runs adjacent to the site west of the railway line. The site is located towards the bottom of a 300 Ha catchment which has had its natural overland flow path blocked by the construction of the Longport Street Rail Bridge. The Longport Rail Bridge forms a barrier to the north of the site blocking the overland flow of stormwater in excess of the capacity of the Hawthorne Canal as it passes under Longport Street. During extreme storms the culvert under Longport Street will be susceptible to blockage further exacerbating the potential for flooding of the site.

The site also is traversed by a Council 900mm stormwater pipe which enters the site at a low point in Old Canterbury Road (adjacent to the Old Canterbury Road/Henry Street intersection). The stormwater pipe continues to Brown Street where it converts to a 1200 diameter Sydney Water pipe which re-enters the site at Brown Street. The development proposes to block the existing overland flow path through site from Old Canterbury Road and to divert the pipe down the new Hudson Street. This has been proposed without any assessment of the resultant flood levels on Old Canterbury Road or the increased flood risk this may cause to residential properties opposite the site on Old Canterbury Road.

A flood study needs to be undertaken that fully investigates the potential for flooding from the Hawthorn Canal and from overland flows from the low point on Old Canterbury Road (near Henry Street);

3.5 Hawthorne Canal

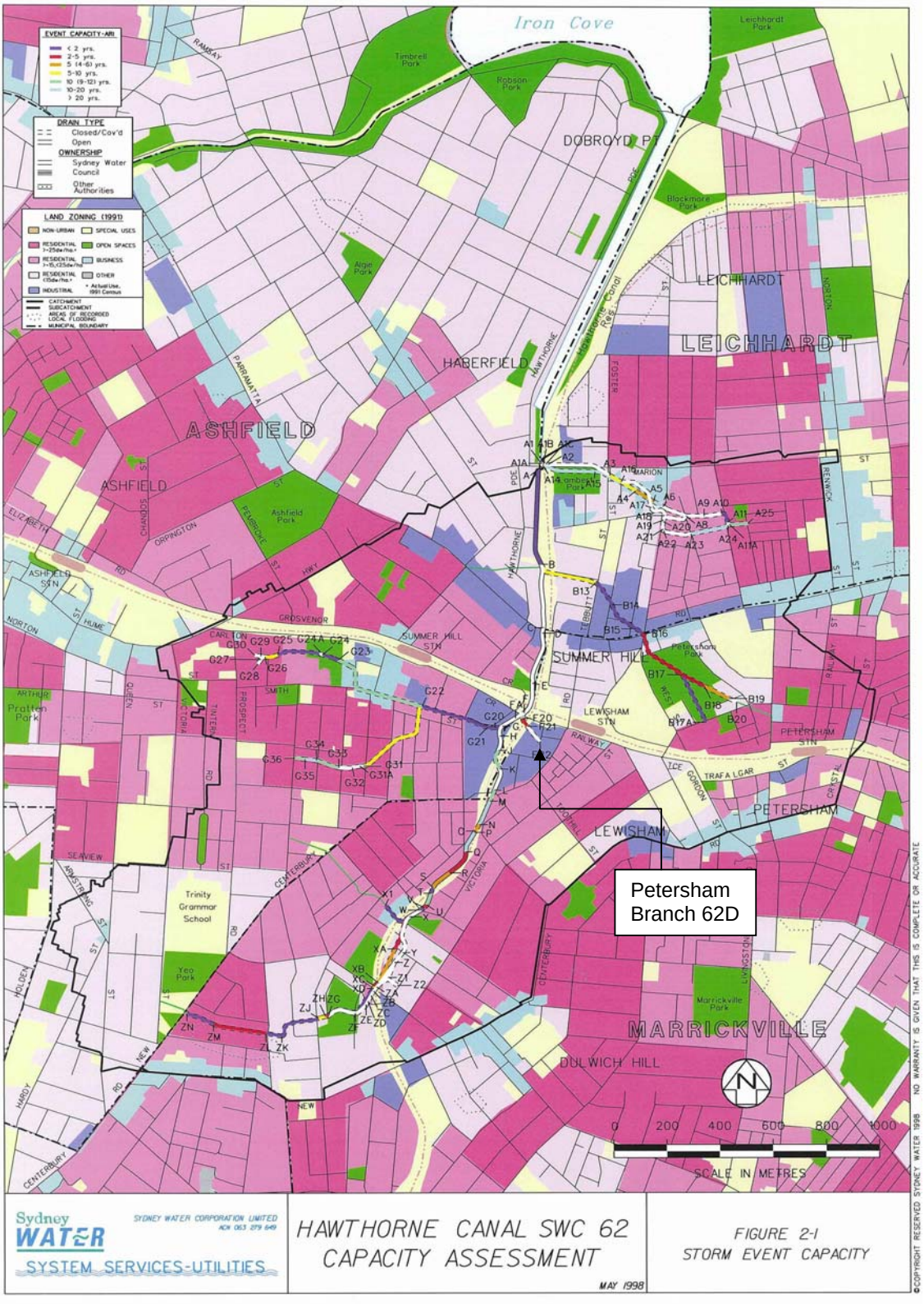
The Hawthorne Canal is a main drain running west of the railway and draining a catchment area of 30ha approximately. The canal is owned and managed by Sydney Water Corporation (SWC) and is identified as SWC62.

The canal travels under the Summer Hill Four Mills site and runs under the Longport Street bridge and Longport Rail bridge, before it continues further downstream and discharges into the Iron Cove Bay.

SWC have carried out a capacity assessment on the canal, which identifies if the canal is open or covered and determines the preliminary capacity of each section of the canal.

The assessment indicates that the canal adjacent to the site is open and has a capacity that exceeds the 20-year ARI storm event.

A copy of the plan showing the details of the canal and its capacity is included below for reference.



Meinhardt Infrastructure & Environment Pty Ltd (Meinhardt) have also carried out a flood assessment on the Hawthorne Canal under a separate commission for the Flour Mills site. This assessment covered the hydrological simulations for the catchment upstream of the Flour Mills site (294.7ha) and the hydraulic simulations within and in the vicinity of the site.

The hydraulic simulations adopted in the flood study use a 1D flood model to determine the flood levels in the canal and the adjoining overbank areas.

The canal section between nodes J and FA is adjacent to the Lewisham Estate site. The flood levels within these nodes are relative to the Lewisham site and are as such of interest in assessing if the site is actually affected by flooding.

Node FA is just upstream of the Longport Bridge, which forms a barrier to the overbank flows and could potentially create a rise in flood levels. It is possible then that the railway tunnel under the bridge could convey the overland flows.

Node J is located at cross section 1-400.00 at the upstream end of the site and the flood level at that node in a 100-year ARI storm event is determined at WL:9.71m. Node FA is at cross section 1-270.00 and the flood level at that node is determined at WL:8.76m. A copy of the flood extent plan by Meinhardt is included in Appendix 2 for reference.

The Lewisham Estate levels vary between RL:11.58m at the same section with Node J and RL:9.61 at the same section with Node FA. These levels indicate that the Lewisham Estate site is approximately between 1.8m (southern boundary) to 0.8m (northern boundary adjoining Longport Street Bridge) higher than the 100-year ARI flood levels. The table below summarises these results.

Node	Section	100-yr ARI Flood Level (mAHD)	Lewisham Estate Level (mAHD)	Freeboard (m)
J	1-400.00	9.71	11.58	1.87
FA	1-270.00	8.76	9.61	0.85

Based on the flood assessment results by Meinhardt, it appears that the Lewisham site is not affected by flooding from the Hawthorne Canal up to and including the 100-year ARI storm event.

The extreme floods such as the Problable Maximum Flood (PMF) were not within the scope of the flood assessment report by Meinhardt.

The canal section adjacent to the site and upstream of the Longport Bridge does not appear to be affected by tidal influences. The report outlines that SWC advised that the canal is affected by tidal influences up to approximately 130m downstream from the Longport Street Bridge.

The rise in sea level associated with climate change, as required by the Department of Environment and Climate Change (DECC) “Practical Consideration of Climate Change” guideline (October 2007), was not considered in the Meinhardt flood assessment report. The report concludes that because the Longport Street is the downstream control for the upstream flood waters, it is unlikely that the rise in sea levels will have any influence on the flood levels.

3.6 External Overland Flow

3.6.1 General

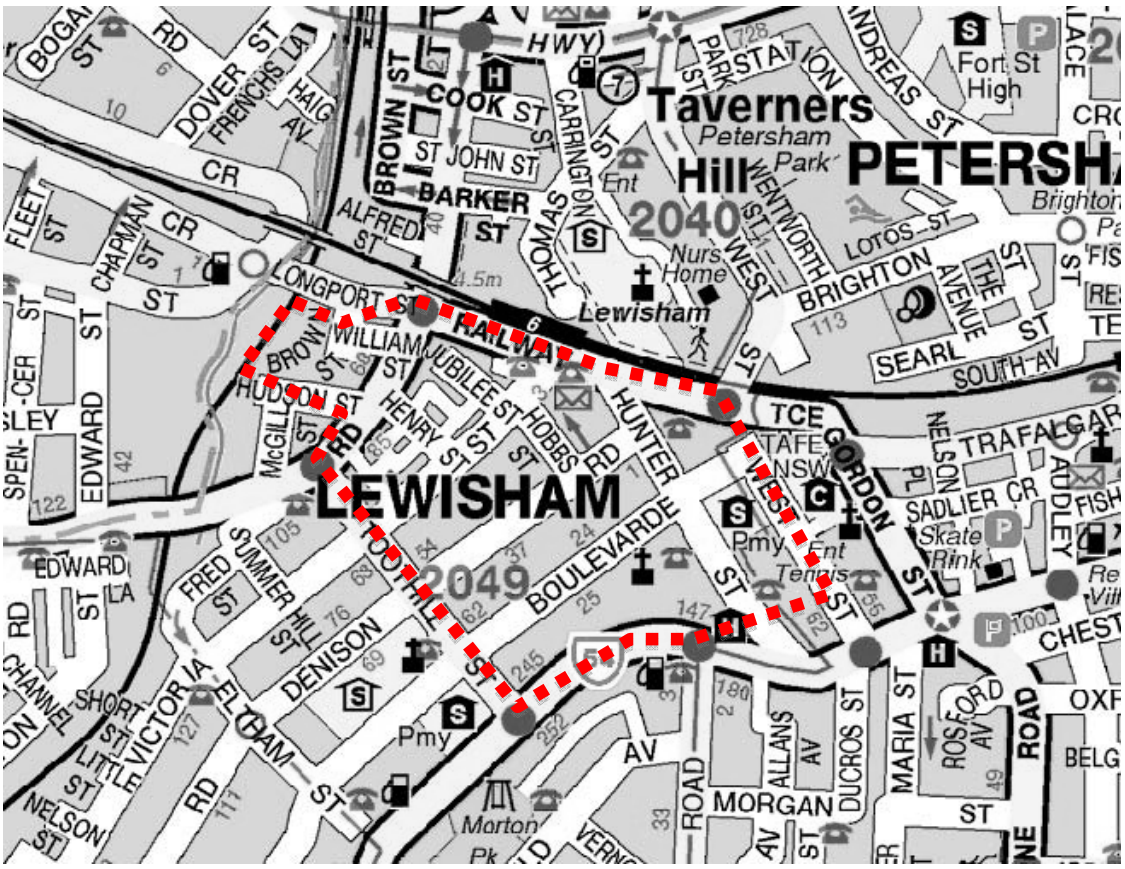
The site is located at the downhill end of the local catchment, draining into the main Hawthorne Canal through the trunk main known as the “Petersham Branch 62D”

The trunk main is a 900mm pipe owned by Marrickville Council. The pipe enters the site from the low point in Old Canterbury Road to the East (opposite Henry Street). The trunk main drains the low point in Brown Street and re-enters the site as 1200mm pipe owned by Sydney Water Corporation.

The trunk main connects to the canal downstream of the Longport Street Bridge at Node F (refer to SWC Capacity Assessment Plan above).

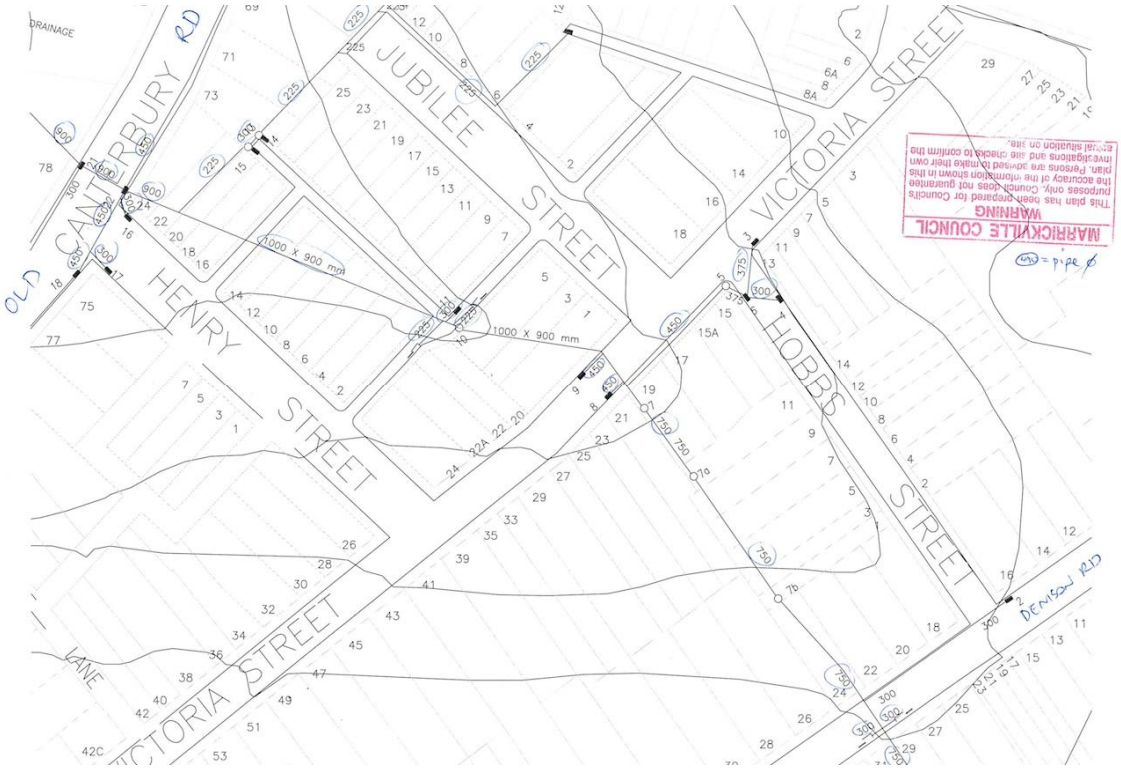
SWC, in the capacity assessment have identified the trunk main as covered with it capacity exceeding the 20-year ARI storm event. The section of the trunk main downstream of the site where it connects to the canal appears to have a lower capacity ranging from 2-5 years ARI.

The trunk main drains a catchment area of 19.7ha extending up to Canterbury Road to the East, Toothill Street to the South, the Goods Railway Corridor to the West, and Railway Terrace and West Street to the North. A copy of the catchment extent is included below.



The catchment is predominately residential. An impervious fraction of 80% has been assigned to the catchment surface coverage percentage.

Council has provided a copy of the in-ground drainage network servicing the catchment. A copy is included below for reference.



Details of the 900mm/1200mm pipes traversing the site have been sourced from the flood assessment done by Meinhardt. These details have been included in a “DRAINS” model, assembled to assess the capacity of the in-ground drainage network and to determine the overland flow through the site.

Two separate models were assembled. The first model replicates the existing site conditions as per the survey plan by StrataSurv. This model considers the overland flow through the site. However, from Brown Street onwards the existing warehouse building is a barrier to the overland flow. The low-lying area in Brown Street becomes inundated until water is able to escape through the bitumen driveway further to the North.

The second model is for the proposed diversion of the trunk main around the proposed mixed-use development. This model considers the blocking of the existing overland flow in Old Canterbury Road and the provision of a new overfland flowpath to the South closer to Hudson Street. However, in this scenario, the flooding in Brown Street is alleviated because the majority of the runoff from the upstream catchment is diverted around the site in a new trunk main with a larger capacity.

The DRAINS model is confined to the upstream pit in Denison Road to the East and to the downstream connection with the canal.

The 100-year ARI flood level determined by Meinhardt has been adopted as the tailwater level for the in-ground network.

3.6.2 Existing Conditions

The simulations carried out in the existing scenario indicate that the trunk main traversing the site does not have the capacity to drain the 100-year ARI flows generated by the catchment. The pipe capacity is limited to 3.3m^3/s.

An additional 3.04m^3/s travels overland from Old Canterbury Road towards Brown Street through the gate servicing the bitumen open space on the site. The 10m wide driveway leading into the site has a level of RL:12.61. Based on the weir flow formula, the depth of flow required for the 3m^3/s to overcome the driveway is 0.36m. The low-lying area of Old Canterbury Road becomes inundated up to a calculated water level of WL:12.97m.

The existing warehouse building wraps around Brown Street and blocks the overland flow, which is exacerbated by the additional overland flows from William Street and Longport Street.

The overland flow can only escape through the driveway from Brown Street further to the North. The driveway entry is approximately 2m higher than the lower point in Brown Street. This means that Brown Street and the adjoining properties will become inundated before water can escape through the site.

The 8m wide driveway leading into the site has an average level of RL:12.80. Based on the weir flow formula, the depth of flow required for the 3.1m^3/s to overcome the driveway is 0.38m. Brown Street becomes inundated up to a calculated water level of WL:13.18m. This indicates that the flooding in Brown Street is worst than the flooding in Old Canterbury Road.

Because the water level in Brown Street is higher than the water level in Old Canterbury Road, it backs up into Old Canterbury Road and increases its flood level to RL:13.18.

The extent of the inundation in the existing conditions is shown in Appendix 4. The details of the DRAINS model results are included in Appendix 3 for reference.

3.6.3 Proposed Site Conditions

In the proposed site conditions, the existing trunk main through the site is diverted around the site from the low point in Old Canterbury Road. The proposed trunk main is larger in size to increase its capacity.

Additional kerb inlet pits are provided in Old Canterbury Road to increase the capacity of the system to convey the overland flow in the trunk main.

A failsafe overland flowpath is provided at the southern end of the development to convey the overland flow when the pipe capacity is exceeded because the existing overland flow path between Old Canterbury Road and Brown Street is removed by the proposed development. Copies of the proposed lower ground floor and ground floor plans are included in Appendix 5 for reference.

In this case, the flooding in Brown Street is alleviated because the majority of the upstream catchment runoff is diverted away from Brown Street and into a purpose built overland flowpath between Hudson Street and the proposed development.

A new stormwater main is proposed to convey the runoff from the rest of the catchment draining into Brown Street. A failsafe overland flowpath is also provided within the proposed development to carry the overland flow in excess of the pipe capacity.

Another DRAINS model was assembled to reflect these changes and to determine the extent of the flooding in Old Canterbury Road.

The results of the simulations indicate that the flow through the proposed 1500mm trunk main has increased to 3.88m^3/s and the overland flow is reduced to 2.49m^3/s. The detailed results of the DRAINS simulations are included in Appendix 6 for details.

An 8m wide overland flow path is proposed south of the low point in Old Canterbury Road. The level in Old Canterbury Road is RL:12.73m. The depth of flow required to drain the 2.49m^3/s overland flow is 0.33m. The depth of inundation in Old Canterbury Road is calculated at RL:13.06m.

This flood level is 0.12m lower than the flood level in the existing site conditions. The properties adjoining the lower point in Old Canterbury Road are higher than the flood level. Reference should be made to the survey plan included in Appendix 8 and the following photos of the adjoining properties showing the properties protected by solid fence walls and steps to the internal habitable areas.

The flooding extent in the proposed site conditions and the proposed overland flowpath are included in Appendix 7.

Photo of No.77 Old Canterbury Road

Photo of No.75 Old Canterbury Road

Photo of No.24 Henry Street

Photo of No.73 Old Canterbury Road

Photo of 71 Old Canterbury Road

In conclusion, the proposed development does not increase the flooding in Old Canterbury Road and in the vicinity of the site because of the following mitigation measures:

- Divert the trunk main around the site;
- Increase the size of the trunk main to 1500mm;
- Increase the number of inlet pits in Old Canterbury Road;
- Provide an overland flow route south of the proposed building; and
- Provide an overland flow route from Brown Street through the proposed development.

APPENDIX 1

Rainfall Data

IFD Table for Marrickville Council

Intensity Frequency Duration (IFD) Rainfall Data

Marrickville

2 year	*50 year*
I_1 *hr : 40.0*	I_1 *hr : 85.0*
I_{12} *hr : 8.0*	I_{12} *hr : 16.0*
I_{72} *hr : 2.5*	I_{72} *hr : 5.0*

AVERAGE RECURRENCE INTERVAL (ARI) years

TIME	2	5	10	20	50	100
5 mins	126.5	160.8	180.4	206.6	240.6	266.3
6 mins	118.7	151.3	170	194.8	227.1	251.6
7 mins	112.1	143.3	161.2	184.9	215.8	239.3
8 mins	106.6	136.4	153.6	176.4	206.1	228.7
9 mins	101.7	130.5	147.1	169	197.6	219.4
10 mins	97.5	125.2	141.3	162.5	190.1	211.2
12 mins	90.3	116.3	131.4	151.3	177.4	197.2
14 mins	84.3	109	123.3	142.1	166.8	185.6
15 mins	81.8	105.8	119.7	138.1	162.2	180.5
16 mins	79.4	102.8	116.5	134.4	157.9	175.8
18 mins	75.1	97.5	110.6	127.7	150.3	167.4
20 mins	71.4	92.9	105.5	121.9	143.6	160.1
25 mins	64	83.6	95.1	110.2	130	145.1
30 mins	58.3	76.4	87.1	101.1	119.5	133.5
40 mins	50.1	66	75.5	87.8	104.1	116.6
50 mins	44.3	58.7	67.3	78.4	93.2	104.6
1 hours	40	53.2	61.1	71.4	85	95.5
1.5 hrs	31	41	47.1	54.9	65.2	73.1
2 hours	25.7	34	38.9	45.3	53.8	60.3
3 hours	19.8	26	29.7	34.5	40.9	45.8
4.5 hrs	15.2	19.9	22.7	26.3	31.1	34.7
6 hours	12.6	16.4	18.7	21.7	25.6	28.5
9 hours	9.6	12.6	14.3	16.5	19.4	21.7
12 hours	8	10.4	11.8	13.6	16	17.8
15 hours	7	9.1	10.3	11.9	14	15.6
18 hours	6.2	8.1	9.2	10.6	12.5	13.9
24 hours	5.2	6.8	7.7	8.9	10.5	11.7
30 hours	4.5	5.9	6.7	7.7	9.1	10.1
36 hours	4	5.2	5.9	6.9	8.1	9
48 hours	3.3	4.3	4.9	5.7	6.7	7.4
72 hours	2.5	3.2	3.7	4.3	5	5.6

Co-efficient G : 0.00 F_2 : 4.29 F_{50} : 15.80

APPENDIX 2

Hawthorne Canal

Flood Extent Plan by Meinhardt

REV	DESCRIPTION	BY	DATE
A	REPORT ISSUE	LC	16.07.10

NODE C

NODE D

NODE E

NODE F

NODE FA

NODE G

NODE H

NODE J

NODE K

HAWTHORNE STREET

LONGPORT STREET

RAILWAY

CANAL

CORRIDOR

SMITH STREET

EDWARD STREET

MUNGO SCOTT BUILDING

TOTAL SITE AREA
24738m²

TABLE OF SHORT LINES

①	A17.15 R65.35 CH77°32" – 17.1
②	87° 15' 20" – 9.715
③	179° 28" – 2.805
④	71° 13' 25" – 0.71
⑤	77° 52' 04" – 2.545
⑥	85° 06' 26" – 7.475
⑦	71° 13' 25" – 2.3
⑧	55° 52' 50" – 5.17
⑨	234° 26" – 7.75
⑩	A21.24 R82.66 CH25°21" – 21.14

(A) – RIGHT OF WAY & EASEMENT FOR ELECTRICITY PURPOSES VARIABLE WIDTH (V/830080)

1 IN 100 YEAR ARI CALCULATED FLOOD EXTENT

1 IN 20 YEAR ARI CALCULATED FLOOD EXTENT

0 5 10 15 20 25m
SCALE BAR @ A1

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PROJECT
SUMMER HILL FLOUR MILLS

CLIENT
EG PROPERTY

TITLE
HAWTHORNE CANAL FLOOD ASSESSMENT - FLOOD EXTENTS MAP

NORTH

DESIGNED	DRAWN	APPROVED	SCALE @ A1
LD	LC	–	N.T.S.

PROJECT No	DRAWING No	REV
3473	00-001	A

APPENDIX 3

DRAINS Model Results

Existing Site Conditions

PIT / NODE DETAILS

Version 9

Name	Type	Family	Size	Ponding Volume (cu.m)	Pressure Change Coeff. Ku	Surface Elev (m)	Max Pond Depth (m)	Base Inflow (cu.m/s)	Blocking Factor	x	y	Bolt-down lid	id	Part Full Shock Loss
1AA.01	Sag	NSW Dept. of	RM10 2.4 m lintel	10	0.5	13.24		0.15	0	0.5	144.866	3.808 No	9	1 x Ku
1A.02	Node					13.47			0		149.028	5.202	60	
1.04	Sag	NSW Dept. of	RM10 2.4 m lintel	20	1.5	12.42		0.19	0	0.5	157.558	24.737 No	5	1 x Ku
1.03	Sag	NSW Dept. of	RM10 2.4 m lintel	10	0	10.37		0.15	0	0.5	108.707	52.294 No	6	1 x Ku
1.02	OnGrade	NSW Dept. of	RM7		0.5	9.8			0	0.2	46.711	89.723 Yes	7	1 x Ku
1.01	Node					9.6			0		34.907	106.166	39	
1A.01	OnGrade	NSW Dept. of	RM10 2.4 m lintel		0.5	13.58			0	0.2	145.569	-6.125 No	10	1 x Ku
1B.01	Sag	NSW Dept. of	RM10 2.4 m lintel	10	0.5	13.05		0.15	0	0.5	160.728	-4.368 No	12	1 x Ku
1B.02	Node					13.1			0		163.514	0.892	74	
1.05	Sag	NSW Dept. of	RM10 2.4 m lintel	15	1.7	12.54		0.1	0	0.5	167.856	20.02 No	4	1 x Ku
1BB.01	Sag	NSW Dept. of	RM10 2.4 m lintel	10	0.5	12.87		0.15	0	0.5	170.33	-2.496 No	13	1 x Ku
1C.01	Sag	NSW Dept. of	RM10 2.4 m lintel	15	0.5	12.74		0.15	0	0.5	169.823	9.013 No	14	1 x Ku
1D.01	OnGrade	Manual	kerb inlet all inflows 0.5cums		0.5	12.89			0	0.2	178.473	44.123 No	16	1 x Ku
1E.02	Sag	NSW Dept. of	RM10 2.4 m lintel	10	0.5	13.35		0.15	0	0.5	202.614	35.946 No	19	1 x Ku
1E.01	Sag	NSW Dept. of	RM10 2.4 m lintel	10	2.5	13.3		0.15	0	0.5	201.804	34.496 No	18	1 x Ku
1.06	Node					13			0		188.758	14.139	81	
1.1	Node					20			0		375.295	-88.987	259	
1.09	Sag	NSW Dept. of	RM10 2.4 m lintel	10	0.7	15.5		0.15	0	0.5	302.447	-12.988 Yes	2	1 x Ku
1.08	Sag	NSW Dept. of	RM10 2.4 m lintel	10	0.5	15.4		0.15	0	0.5	295.702	-8.613 No	1	1 x Ku
1.07	Sag	Manual	kerb inlet all inflows 0.5cums	15	0.5	14		0.15	0	0.5	257.847	-5.086 No	3	1 x Ku
DUMMY 1.09	Node					15.6			0		312.996	0.955	286	

SUB-CATCHMENT DETAILS

Name	Pit or Node	Total Area (ha)	Paved Area %	Grass Area %	Supp Area %	Paved Time (min)	Grass Time (min)	Supp Time (min)	Paved Length (m)	Grass Length (m)	Supp Length (m)	Paved Slope(%) %	Grass Slope %	Supp Slope %	Paved Rough	Grass Rough	Supp Rough	Lag Time or Factor
C 1AA.01	1AA.01	0.01	80	20	0	5		0	0	20	20	0.1	3	3	1 0.013	0.2	0.013	0
C 1.04	1.04	0.133	80	20	0	5		0	0	98	98	0.1	2.4	2.4	1 0.013	0.2	0.013	0
C 1.03	1.03	0.873	80	20	0	5		0	0	116	116	0.1	1.5	1.5	1 0.013	0.2	0.013	0
C 1A.01	1A.01	0.0774	80	20	0	5		0	0	85	85	0.1	3	3	1 0.013	0.2	0.013	0
C 1B.01	1B.01	0.74	80	20	0	5		0	0	151	151	0.1	5.3	5.3	1 0.013	0.2	0.013	0
C 1.05	1.05	0.191	80	20	0	5		0	0	68.8	68.8	0.1	4.9	4.9	1 0.013	0.2	0.013	0
C 1BB.01	1BB.01	0.617	80	20	0	5		0	0	132	132	0.1	5.3	5.3	1 0.013	0.2	0.013	0
C 1C.01	1C.01	0.057	80	20	0	5		0	0	74	74	0.1	5	5	1 0.013	0.2	0.013	0
C 1D.01	1D.01	0.34	80	20	0	5		0	0	83	83	0.1	5	5	1 0.013	0.2	0.013	0
C 1E.02	1E.02	1.04	80	20	0	5		0	0	172	172	0.1	5.2	5.2	1 0.013	0.2	0.013	0
C 1E.01	1E.01	0.2	80	20	0	5		0	0	71.6	71.6	0.1	5.6	5.6	1 0.013	0.2	0.013	0
C 1.10	1.1	8.18	80	20	0	5		0	0	340	340	0.1	5.35	5.35	1 0.013	0.2	0.013	0
C 1.08	1.08	0.035	80	20	0	5		0	0	53	53	0.1	2	2	1 0.013	0.2	0.013	0
C 1.07	1.07	0.296	80	20	0	5		0	0	56	56	0.1	5.35	5.35	1 0.013	0.2	0.013	0
C 1.09	DUMMY 1.09	3.98	80	20	0	5		0	0	238	238	0.1	5.6	5.6	1 0.013	0.2	0.013	0

PIPE DETAILS

Name	From	To	Length (m)	U/S IL (m)	D/S IL (m)	Slope (%)	Type	Dia (mm)	I.D. (mm)	Rough	Pipe Is	No. Pipes	Chg From	At Chg
1AA.01-1A.02	1AA.01	1A.02	4.40577	12.34	12.296	1	Concrete, under roads	300	300	0.013	Existing	1	1AA.01	0
1A.02-1.04	1A.02	1.04	21.0704	12.266	11.52	3.54	Concrete, under roads	300	300	0.013	Existing	1	1A.02	0
1.03-1.04	1.04	1.03	55.6957	7.085	4.209	5.16	Concrete, under roads	900	900	0.013	Existing	1	1.04	0
1.02-1.03	1.03	1.02	71.9131	4.156	2.792	1.9	Concrete, under roads	1200	1200	0.013	Existing	1	1.03	0
1.01-1.02	1.02	1.01	20.1	2.792	2.017	3.86	Concrete, under roads	1200	1200	0.013	Existing	1	1.02	0
1A.01-1A.02	1A.01	1A.02	11.8603	12.68	12.296	3.24	Concrete, under roads	300	300	0.013	Existing	1	1A.01	0
1B.01-1BB.01	1B.01	1B.02	5.96491	12	11.894	1.78	Concrete, under roads	450	450	0.013	Existing	1	1B.01	0
1B.02-1.05	1B.02	1.05	19.4095	11.864	11.49	1.93	Concrete, under roads	450	450	0.013	Existing	1	1B.02	0
1.04-1.05	1.05	1.04	11.2473	7.677	7.115	5	Concrete, under roads	900	900	0.013	Existing	1	1.05	0
1BB.01-1B.02	1BB.01	1B.02	7.61907	11.97	11.894	1	Concrete, under roads	300	300	0.013	Existing	1	1BB.01	0
1C.01-1.05	1C.01	1.05	11.1029	11.84	11.64	1.8	Concrete, under roads	300	300	0.013	Existing	1	1C.01	0
1D.01-1.05	1D.01	1.05	26.1544	11.84	11.49	1.34	Concrete, under roads	450	450	0.013	Existing	1	1D.01	0
1E.01-1E.02	1E.02	1E.01	1.64884	12.45	12.434	0.97	Concrete, under roads	300	300	0.013	Existing	1	1E.02	0
1E.01-1.06	1E.01	1.06	23.9669	12.404	11.206	5	Concrete, under roads	225	225	0.013	Existing	1	1E.01	0
1.05-1.06	1.06	1.05	21.5544	8.785	7.707	5	Concrete, under roads	900	900	0.013	Existing	1	1.06	0
1.09-1.10	1.1	1.09	94.4	18.473	13.753	5	Concrete, under roads	750	750	0.013	Existing	1	1.1	0
1.08-1.09	1.09	1.08	7.98335	13.723	13.324	5	Box Culverts	1W x 0.9H		0.012	Existing	1	1.09	0
1.07-1.08	1.08	1.07	37.7541	13.294	11.406	5	Box Culverts	1W x 0.9H		0.012	Existing	1	1.08	0
1.06-1.07	1.07	1.06	71.2205	11.376	7.815	5	Box Culverts	1W x 0.9H		0.012	Existing	1	1.07	0
DUMMY PIPE	DUMMY 1.09	1.09	10	13.953	13.753	2	Concrete, under roads	750	750	0.013	Existing	1	DUMMY 1.09	0

OVERFLOW ROUTE DETAILS

Name	From	To	Travel Time (min)	Spill Level (m)	Crest Length (m)	Weir Coeff. C	Cross Section	Safe Depth Major Storms (m)	SafeDepth Minor Storms (m)	Safe DxV (sq.m/sec)	Bed Slope (%)	D/S Area Contributing %	id
O 1AA.01	1AA.01	1.04		2			8 m wide road (half section)	0.3	0.15	0.4	3.7	0	185
O 1.04	1.04	1.03		5			Dummy used to model flow across road low points	0.2	0.05	0.6	4.5	0	206
O 1.03	1.03	1.01		5			Dummy used to model flow across road low points	0.2	0.05	0.6	1.1	0	208
O 1A.01	1A.01	1AA.01		1			8 m wide road (half section)	0.3	0.15	0.4	3.9	0	183
O 1B.01	1B.01	1BB.01		1			8 m wide road (half section)	0.3	0.15	0.4	1.9	0	192
O 1.05	1.05	1.04		1			Dummy used to model flow across road low points	0.2	0.05	0.6	2.7	0	181
O 1BB.01	1BB.01	1C.01		1			Dummy used to model flow across road low points	0.2	0.05	0.6	2.8	0	195
O 1C.01	1C.01	1.05		1			8 m wide road (half section)	0.3	0.15	0.4	1.9	0	200
O 1D.01	1D.01	1.05		2			8 m wide road (half section)	0.3	0.15	0.4	1.5	0	157
O 1E.02	1E.02	1E.01		1			Dummy used to model flow across road low points	0.2	0.05	0.6	13.7	0	152
O 1E.01	1E.01	1.05		5			Dummy used to model flow across road low points	0.2	0.05	0.6	2.3	0	154
O 1.09	1.09	1.08		1			Dummy used to model flow across road low points	0.2	0.05	0.6	3.4	0	146
O 1.08	1.08	1.07		5			8 m wide road (half section)	0.3	0.15	0.4	2	0	148
O 1.07	1.07	1E.01		5			8 m wide road (half section)	0.3	0.15	0.4	1.1	0	150

DRAINS results prepared 08 May, 2011 from Version 2011.06

PIT / NODE DETAILS

Name	Max HGL	Max Pond HGL	Max Surface Flow Arriving (cu.m/s)	Max Pond Volume (cu.m)	Min Freeboard (m)	Overflow (cu.m/s)	Constraint
1AA.01	12.42	13.26	0.002	0.7	0.82	0	Inlet Capacity
1A.02	12.37		0				
1.04	11.27	12.61	0.285	17.1	1.15	3.038	Inlet Capacity
1.03	7.31	10.52	0.292	8.6	3.06	3.119	Inlet Capacity
1.02	6.75		0		3.05		None
1.01	6.36		0.157				
1A.01	12.83		0.017		0.75	0.001	Inlet Capacity
1B.01	13.32	13.2	0.159	8.6	-0.27	0.47	Outlet System
1B.02	13.65		0				
1.05	13.68	12.64	0.262	12.9	-1.14	3.166	Outlet System
1BB.01	13.1	13.02	0.176	8.6	-0.23	0.851	Outlet System
1C.01	12.98	12.89	0.087	12.9	-0.24	0.93	Outlet System
1D.01	13.04		0.074		-0.15	0.297	Outlet System
1E.02	13.5	13.5	0.221	8.6	-0.15	0.583	Outlet System
1E.01	13.49	13.45	0.23	8.6	-0.19	2.215	Outlet System
1.06	14.69		0				
1.1	30.21		1.686				
1.09	17.75	15.5	0	0	-2.25	0	Outlet System
1.08	17.32	15.55	0.008	8.6	-1.92	0.83	Outlet System
1.07	16.05	14.15	0.064	12.9	-2.05	1.914	Outlet System
DUMMY 1.09	18.07		0.834				

SUB-CATCHMENT DETAILS

Name	Max Flow Q (cu.m/s)	Paved Max Q (cu.m/s)	Grassed Max Q (cu.m/s)	Paved Tc (min)	Grassed Tc (min)	Supp. Tc (min)	Due to Storm
C 1AA.01	0.007	0.005	0.001	6.21	6.24	0.07	AR&R 100 year, 25 minutes storm, average 145 mm/h, Zone 1
C 1.04	0.076	0.067	0.01	8.36	17.3	0.07	AR&R 100 year, 25 minutes storm, average 145 mm/h, Zone 1
C 1.03	0.481	0.434	0.059	9.28	22.04	0.07	AR&R 100 year, 25 minutes storm, average 145 mm/h, Zone 1
C 1A.01	0.046	0.04	0.007	7.88	14.86	0.07	AR&R 100 year, 25 minutes storm, average 145 mm/h, Zone 1
C 1B.01	0.423	0.374	0.058	8.43	17.68	0.07	AR&R 100 year, 25 minutes storm, average 145 mm/h, Zone 1
C 1.05	0.119	0.099	0.02	7.19	11.3	0.07	AR&R 100 year, 25 minutes storm, average 145 mm/h, Zone 1
C 1BB.01	0.358	0.313	0.05	8.16	16.31	0.07	AR&R 100 year, 25 minutes storm, average 145 mm/h, Zone 1
C 1C.01	0.035	0.03	0.006	7.28	11.73	0.07	AR&R 100 year, 25 minutes storm, average 145 mm/h, Zone 1
C 1D.01	0.208	0.176	0.033	7.44	12.57	0.07	AR&R 100 year, 25 minutes storm, average 145 mm/h, Zone 1
C 1E.02	0.586	0.522	0.077	8.73	19.23	0.07	AR&R 100 year, 25 minutes storm, average 145 mm/h, Zone 1
C 1E.01	0.125	0.104	0.021	7.16	11.12	0.07	AR&R 100 year, 25 minutes storm, average 145 mm/h, Zone 1
C 1.10	4.271	3.931	0.428	10.57	28.7	0.07	AR&R 100 year, 25 minutes storm, average 145 mm/h, Zone 1
C 1.08	0.021	0.018	0.003	7.45	12.64	0.07	AR&R 100 year, 25 minutes storm, average 145 mm/h, Zone 1
C 1.07	0.187	0.155	0.032	6.89	9.72	0.07	AR&R 100 year, 25 minutes storm, average 145 mm/h, Zone 1
C 1.09	2.181	1.973	0.262	9.43	22.85	0.07	AR&R 100 year, 25 minutes storm, average 145 mm/h, Zone 1

PIPE DETAILS

Name	Max Q (cu.m/s)	Max V (m/s)	Max U/S HGL (m)	Max D/S HGL (m)	Due to Storm
1AA.01-1A.02	0.007	0.47	12.419	12.375	AR&R 100 year, 25 minutes storm, average 145 mm/h, Zone 1
1A.02-1.04	0.051	2.21	12.375	11.629	AR&R 100 year, 25 minutes storm, average 145 mm/h, Zone 1
1.03-1.04	3.327	5.23	9.182	7.31	AR&R 100 year, 25 minutes storm, average 145 mm/h, Zone 1
1.02-1.03	3.443	3.04	6.476	6.752	AR&R 100 year, 25 minutes storm, average 145 mm/h, Zone 1
1.01-1.02	3.443	3.04	6.579	6.36	AR&R 100 year, 25 minutes storm, average 145 mm/h, Zone 1
1A.01-1A.02	0.045	2.06	12.784	12.4	AR&R 100 year, 25 minutes storm, average 145 mm/h, Zone 1
1B.01-1BB.01	0.124	0.78	13.641	13.645	AR&R 100 year, 3 hours storm, average 45.8 mm/h, Zone 1
1B.02-1.05	0.249	1.56	13.645	13.683	AR&R 100 year, 3 hours storm, average 45.8 mm/h, Zone 1
1.04-1.05	3.118	4.9	11.604	11.274	AR&R 100 year, 25 minutes storm, average 145 mm/h, Zone 1
1BB.01-1B.02	0.12	1.7	13.628	13.645	AR&R 100 year, 6 hours storm, average 28.5 mm/h, Zone 1
1C.01-1.05	0.12	1.7	13.62	13.683	AR&R 100 year, 10 minutes storm, average 211 mm/h, Zone 1
1D.01-1.05	0.163	1.03	13.644	13.683	AR&R 100 year, 10 minutes storm, average 211 mm/h, Zone 1
1E.01-1E.02	0.083	1.17	13.495	13.495	AR&R 100 year, 3 hours storm, average 45.8 mm/h, Zone 1
1E.01-1.06	0.111	2.79	14.66	14.693	AR&R 100 year, 10 minutes storm, average 211 mm/h, Zone 1
1.05-1.06	3.948	6.21	14.693	13.683	AR&R 100 year, 25 minutes storm, average 145 mm/h, Zone 1
1.09-1.10	4.11	9.3	30.208	17.752	AR&R 100 year, 25 minutes storm, average 145 mm/h, Zone 1
1.08-1.09	6.122	6.8	17.668	17.318	AR&R 100 year, 25 minutes storm, average 145 mm/h, Zone 1
1.07-1.08	5.272	5.86	17.274	16.053	AR&R 100 year, 25 minutes storm, average 145 mm/h, Zone 1
1.06-1.07	4.004	4.45	16.034	14.693	AR&R 100 year, 25 minutes storm, average 145 mm/h, Zone 1
DUMMY PIPE	2.172	4.92	18.067	17.752	AR&R 100 year, 25 minutes storm, average 145 mm/h, Zone 1

OVERFLOW ROUTE DETAILS

Name	Max Q U/S	Max Q D/S	Safe Q	Max D	Max DxV	Max Width	Max V	Due to Storm
O 1AA.01	0	0	0.742	0	0	0	0	
O 1.04	3.038	3.038	13.008	0.101	0.22	24.21	2.23	AR&R 100 year, 1 hour storm, average 95 mm/h, Zone 1
O 1.03	3.119	3.119	8.039	0.136	0.18	31.21	1.34	AR&R 100 year, 1 hour storm, average 95 mm/h, Zone 1
O 1A.01	0.001	0.001	0.722	0.019	0.01	0.16	0.69	AR&R 100 year, 25 minutes storm, average 145 mm/h, Zone 1
O 1B.01	0.47	0.47	0.966	0.171	0.27	5.07	1.55	AR&R 100 year, 25 minutes storm, average 145 mm/h, Zone 1
O 1.05	3.166	3.166	12.595	0.115	0.21	26.9	1.85	AR&R 100 year, 1 hour storm, average 95 mm/h, Zone 1
O 1BB.01	0.851	0.851	12.826	0.066	0.09	17.2	1.33	AR&R 100 year, 25 minutes storm, average 145 mm/h, Zone 1
O 1C.01	0.93	0.93	0.966	0.203	0.39	6.4	1.9	AR&R 100 year, 25 minutes storm, average 145 mm/h, Zone 1
O 1D.01	0.297	0.297	1.073	0.154	0.21	3.94	1.34	AR&R 100 year, 25 minutes storm, average 145 mm/h, Zone 1
O 1E.02	0.583	0.583	9.749	0.042	0.09	12.35	2.07	AR&R 100 year, 25 minutes storm, average 145 mm/h, Zone 1
O 1E.01	2.215	2.215	11.625	0.102	0.16	24.39	1.6	AR&R 100 year, 25 minutes storm, average 145 mm/h, Zone 1
O 1.09	0	0	14.134	0	0	0	0	
O 1.08	0.83	0.83	0.991	0.197	0.37	6.33	1.86	AR&R 100 year, 25 minutes storm, average 145 mm/h, Zone 1

O 1.07		1.914	1.914	1.162	0.268	0.57	6.4	2.12 AR&R 100 year, 25 minutes storm, average 145 mm/h, Zone 1

CONTINUITY CHECK for AR&R 100 year, 25 minutes storm, average 145 mm/h, Zone 1

Node		Inflow (cu.m)	Outflow (cu.m)	Storage Chan((cu.m)	Difference %
1AA.01		5.79	5.82	0	-0.5
1A.02		49.2	49.18	0	0
	1.04	8905.97	8906.09	0	0
	1.03	9395.77	9396.18	0	0
	1.02	6120.23	6120.77	0	0
	1.01	9396.73	9396.73	0	0
1A.01		43.52	43.53	0	0
1B.01		415.71	415.77	0	0
1B.02		120.81	120.53	0	0.2
	1.05	8780.64	8782.14	0	0
1BB.01		689.54	689.47	0	0
1C.01		673.76	673.58	0	0
1D.01		191.35	190.73	0	0.3
1E.02		583.93	583.87	0	0
1E.01		2016.98	2017.18	0	0
	1.06	5755.29	5742.33	0	0.2
	1.1	4578.49	4578.57	0	0
	1.09	6810.35	6811.5	0	0
	1.08	6831.19	6832.7	0	0
	1.07	6999.45	7004.73	0.8	-0.1
DUMMY	1.09	2231.93	2231.8	0	0

Upwelling occurred at 1E.01, 1D.01, 1C.01, 1BB.01, 1B.01, 1.05, 1.07, 1.08
Freeboard was less than 0.15m at 1E.02
The maximum flow exceeded the safe value in the following overflow routes: O 1.07

Numerical damping was applied to: 1AA.01-1A.02, 1C.01-1.05.

APPENDIX 4

Flood Extent Plan – Overland Flow

Existing Site Conditions

WATER PONDING IN BROWN STREET AND CREATING MAJOR FLOODING TO RL:13.18 BEFORE IT ESCAPES THROUGH SITE VIA DRIVEWAY

OVERLAND FLOW ROUTE

EXISTING WAREHOUSE BUILDING OBSTRUCTING THE OVERLAND FLOW FROM BROWN STREET

LOW-LYING AREA IN BROWN STREET WITH NO FAILSAFE OVERLAND FLOW ROUTE

EXTENT OF 100-YEAR ARI STORM EVENT

ADJOINING PROPERTIES NOT AFFECTED BY FLOODING

OVERLAND FLOW THROUGH SITE VIA GATE

WATER PONDING IN STREET BEFORE ESCAPING THROUGH SITE

FLOODED INTERSECTION TO RL:13.18

ADJOINING PROPERTIES NOT AFFECTED BY FLOODING

AMENDMENTS/REVISIONS

Rev	Issue	Description	Initials	Date
01		PLANNING APPLICATION ISSUE	S.H.	09.05.11

CONSULTANT

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PROJECT

78-90 Old Canterbury Rd
Lewisham
NSW

DRAWING TITLE

HYDRAULIC SERVICES
100-YEAR ARI FLOOD EXTENT PLAN
EXISTING SITE CONDITIONS

DRAWN	DESIGNED	CHECKED	SCALE (AT FULL SIZE)
S.H.	S.H.	S.H.	1:250

DATE	DRAWING No.	REVISION
May '11	N09612-DA-SK01	01

May 08, 2011 - 2:45pm J:\SAVE\2009\09115 78-90 Old Canterbury Road, Lewisham\Civil\cad\09115-DIG FLOOD EXTENT.dwg

APPENDIX 5

Proposed Development

Lower Ground and Ground Floor Plans

NOTES:
– ALL OPENINGS WITHIN 3m OF THE SIDE BOUNDARY ARE TO BE PROTECTED IN ACCORDANCE TO BCA CLAUSE C3.4.

BOUNDARY

BOUNDARY

LOBBY

OPEN STORMWATER DRAIN 1.5M WIDE ABOVE

RL 7.20

LOBBY

RL 7.50

DEEP SOIL PLANTING

RL 7.50

LOBBY

OSD TANK 1
178M3
1.6m Deep

OPEN STORMWATER DRAIN 1.5M WIDE ABOVE

LOBBY

RL 8.00

LOBBY

LOBBY

BOUNDARY

PROPOSED STORMWATER DIVERSION

RL 8.00

DEEP SOIL PLANTING

LOBBY

RL 8.00

OSD TANK 2
240M3
1.6m Deep
41000
37830

PROPOSED STORMWATER DIVERSION

PROPOSED STORMWATER DIVERSION

DEEP SOIL PLANTING

BOUNDARY

BOUNDARY

PLANT

RL 8.00

DEEP SOIL PLANTING

LOBBY

LOBBY

LOBBY

RL 8.00

BOUNDARY

BASEMENT 1
233 CAR SPACES

Rev.	Description	Date
A	CONCEPTUAL PLAN SUBMISSION	12/11/10
B	REVISED PLANS	02/03/11
C	REVISED PLANS	17/03/11
D	REVISED PLANS	30/03/11

Disclaimer

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Notes

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WHERE ANY DISCREPANCY EXISTS BETWEEN FIGURED AND SCALED DIMENSIONS, THE FIGURED DIMENSIONS SHALL PREVAIL

BUILDER TO CHECK ALL SITE DIMENSIONS PRIOR TO FABRICATION OF FITMENTS

Legend

Consultants

Client
LEWISHAM ESTATE PTY LTD

Architects
tony owen ptnrs

Project
LEWISHAM INDICATIVE CONCEPTUAL PLAN

Project address
McGILL STREET PRECINCT

Key plan
LONGPORT ST
GREEN WAY
NEW CANTERBURY ROAD

Scale SCALE 1:500 @ A3 — Date Mar 2011
0 2.5 5 7.5 10 12.5

Drawing title
BASEMENT LEVEL 1

Project no. 815 — Drawing no 100 — Rev D
Drawn -

Drawing status
CONCEPTUAL PLAN

Rev.	Description	Date
A	CONCEPTUAL PLAN SUBMISSION	12/11/10
B	REVISED PLANS	02/03/11
C	REVISED PLANS	14/03/11
D	REVISED PLANS	30/03/11

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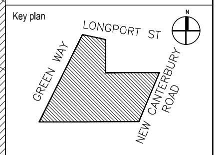
Project: LEWISHAM INDICATIVE CONCEPTUAL PLAN

Project address: McGILL STREET PRECINCT

Key plan



Scale: SCALE 1:500 @ A3 — 0 2.5 5 7.5 10 12.5

Date: Mar 2011

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Drawing title: LOWER GROUND PLAN

Project no. 815 | Drawing no 101 | Rev D

Drawn -

Drawing status: CONCEPTUAL PLAN

NOTES:
– ALL OPENINGS WITHIN 3m OF THE SIDE BOUNDARY ARE TO BE PROTECTED IN ACCORDANCE TO BCA CLAUSE C3.4.

LONGPORT STREET

EXISTING DEVELOPMENT SUBJECT TO SEPERATE APPROVAL

BOUNDARY

OPEN STORMWATER DRAIN 1.5M WIDE

OPEN STORMWATER DRAIN 1.5M WIDE

RAMP

RL 14.00

RL 10.8

RL 10.00

RL 11.00

RL 14.43

RL 15.00

RL 12.00

RL 11.50

RL 14.00

OLD CANTERBURY ROAD

LOBBY

RETAIL

DUAL USE UNITS

SHOP/TOP HOUSING

CAFE

Rev.	Description	Date
A	CONCEPTUAL PLAN SUBMISSION	12/11/10
B	REVISED PLANS	02/03/11
C	REVISED PLANS	14/03/11
D	REVISED PLANS	30/03/11

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WHERE ANY DISCREPANCY EXISTS BETWEEN FIGURED AND SCALED DIMENSIONS, THE FIGURED DIMENSIONS SHALL PREVAIL

BUILDER TO CHECK ALL SITE DIMENSIONS PRIOR TO FABRICATION OF FITMENTS

Legend

Consultants

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Architects
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Project
LEWISHAM INDICATIVE CONCEPTUAL PLAN

Project address
McGILL STREET PRECINCT

Key plan
LONGPORT ST · GREEN WAY · NEW CANTERBURY ROAD

Scale SCALE 1:500 @ A3 · Date Mar 2011

Drawing title
GROUND FLOOR PLAN

Project no. 815 · Drawing no 102 · Rev D

Drawn -

Drawing status
CONCEPTUAL PLAN

APPENDIX 6

DRAINS Model Results

Proposed Site Conditions

PIT / NODE DETAILS

Name	Type	Family	Size	Ponding Volume (cu.m)	Pressure Change Coeff. Ku	Surface Elev (m)	Max Pond Depth (m)	Base Inflow (cu.m/s)	Blocking Factor	x	y	Bolt-down lid	id	Part Full Shock Loss
1A.01	OnGrade	NSW Dept. of Housing RM10 Inlet, 3% crossfall, all grades	RM10 2.4 m lintel		0.5	13.58		0	0.2	145.569	-6.125	No	10	1 x Ku
1.04A	OnGrade	NSW Dept. of Housing RM10 Inlet, 3% crossfall, all grades	RM10 2.4 m lintel		1.5	12.71		0	0.2	153.869	15.868	No	9	1 x Ku
1.04B	OnGrade	NSW Dept. of Housing RM7 Inlet, 3% crossfall, 1% grade	RM7		0.5	11.9		0	0.2	78.837	16.159	Yes	334396	1 x Ku
1.04C	OnGrade	NSW Dept. of Housing RM7 Inlet, 3% crossfall, 1% grade	RM7		2.5	11.28		0	0.2	11.269	16.314	Yes	334395	1 x Ku
1.02	OnGrade	NSW Dept. of Housing RM7 Inlet, 3% crossfall, 1% grade	RM7		2.5	9.8		0	0.2	46.711	89.723	Yes	7	1 x Ku
1.01	Node					9.6		0		34.907	106.166		39	
1B.01	Sag	NSW Dept. of Housing RM10 Inlet, 3% crossfall, all grades	RM10 2.4 m lintel	10	0.5	13.05	0.15	0	0.5	160.728	-4.368	No	12	1 x Ku
1B.02	Node					13.1		0		163.514	0.892		74	
1.05	Sag	NSW Dept. of Housing RM10 Inlet, 3% crossfall, all grades	RM10 2.4 m lintel	15	1.7	12.54	0.1	0	0.5	167.856	20.02	No	4	1 x Ku
1.04	Sag	Manual	kerb inlet all inflows 0.5cums	25	2	12.42	0.21	0	0.5	157.558	24.737	No	5	1 x Ku
1BB.01	Sag	NSW Dept. of Housing RM10 Inlet, 3% crossfall, all grades	RM10 2.4 m lintel	10	0.5	12.87	0.15	0	0.5	170.33	-2.496	No	13	1 x Ku
1C.01	Sag	NSW Dept. of Housing RM10 Inlet, 3% crossfall, all grades	RM10 2.4 m lintel	15	0.5	12.74	0.15	0	0.5	169.823	9.013	No	14	1 x Ku
1D.01	OnGrade	Manual	kerb inlet all inflows 0.5cums		0.5	12.89		0	0.2	178.473	44.123	No	16	1 x Ku
1E.02	Sag	NSW Dept. of Housing RM10 Inlet, 3% crossfall, all grades	RM10 2.4 m lintel	10	0.5	13.35	0.15	0	0.5	202.614	35.946	No	19	1 x Ku
1E.01	Sag	NSW Dept. of Housing RM10 Inlet, 3% crossfall, all grades	RM10 2.4 m lintel	10	2.5	13.3	0.15	0	0.5	201.804	34.496	No	18	1 x Ku
1.06	Node					13		0		188.758	14.139		81	
1.1	Node					20		0		375.295	-88.987		259	
1.09	Sag	NSW Dept. of Housing RM10 Inlet, 3% crossfall, all grades	RM10 2.4 m lintel	10	0.7	15.5	0.15	0	0.5	302.447	-12.988	Yes	2	1 x Ku
1.08	Sag	NSW Dept. of Housing RM10 Inlet, 3% crossfall, all grades	RM10 2.4 m lintel	10	0.5	15.4	0.15	0	0.5	295.702	-8.613	No	1	1 x Ku
1.07	Sag	Manual	kerb inlet all inflows 0.5cums	15	0.5	14	0.15	0	0.5	257.847	-5.086	No	3	1 x Ku
DUMMY 1.09	Node					15.6		0		312.996	0.955		286	
Brown St	Node					10.37		0		108.68	52.495		334403	

SUB-CATCHMENT DETAILS

Name	Pit or Node	Total Area (ha)	Paved Area %	Grass Area %	Supp Area %	Paved Time (min)	Grass Time (min)	Supp Time (min)	Paved Length (m)	Grass Length (m)	Supp Length (m)	Paved Slope(%) %	Grass Slope %	Supp Slope %	Paved Rough	Grass Rough	Supp Rough	Lag Time or Factor
C 1A.01	1A.01	0.0774	80	20	0	5	0	0	85	85	0.1	3	3	1	0.013	0.2	0.013	0
C 1B.01	1B.01	0.74	80	20	0	5	0	0	151	151	0.1	5.3	5.3	1	0.013	0.2	0.013	0
C 1.05	1.05	0.191	80	20	0	5	0	0	68.8	68.8	0.1	4.9	4.9	1	0.013	0.2	0.013	0
C 1.04	1.04	0.133	80	20	0	5	0	0	98	98	0.1	2.4	2.4	1	0.013	0.2	0.013	0
C 1BB.01	1BB.01	0.617	80	20	0	5	0	0	132	132	0.1	5.3	5.3	1	0.013	0.2	0.013	0
C 1C.01	1C.01	0.057	80	20	0	5	0	0	74	74	0.1	5	5	1	0.013	0.2	0.013	0
C 1D.01	1D.01	0.34	80	20	0	5	0	0	83	83	0.1	5	5	1	0.013	0.2	0.013	0
C 1E.02	1E.02	1.04	80	20	0	5	0	0	172	172	0.1	5.2	5.2	1	0.013	0.2	0.013	0
C 1E.01	1E.01	0.2	80	20	0	5	0	0	71.6	71.6	0.1	5.6	5.6	1	0.013	0.2	0.013	0
C 1.10	1.1	8.18	80	20	0	5	0	0	340	340	0.1	5.35	5.35	1	0.013	0.2	0.013	0
C 1.08	1.08	0.035	80	20	0	5	0	0	53	53	0.1	2	2	1	0.013	0.2	0.013	0
C 1.07	1.07	0.296	80	20	0	5	0	0	56	56	0.1	5.35	5.35	1	0.013	0.2	0.013	0
C 1.09	DUMMY 1.09	3.98	80	20	0	5	0	0	238	238	0.1	5.6	5.6	1	0.013	0.2	0.013	0
C 1.03	Brown St	0.873	80	20	0	5	0	0	116	116	0.1	1.5	1.5	1	0.013	0.2	0.013	0

PIPE DETAILS

Name	From	To	Length (m)	U/S IL (m)	D/S IL (m)	Slope (%)	Type	Dia (mm)	I.D. (mm)	Rough	Pipe Is	No. Pipes	Chg From	At Chg
1A.01-1.04A	1A.01	1.04A	28	12.68	11.773	3.24	Concrete, under roads	300	300	0.013	Existing	1	1A.01	0
1.04A-1.04B	1.04A	1.04B	80	6.767	5.167	2	Concrete, under roads	1500	1524	0.013	NewFixed	1	1.04A	0
1.04B-1.04C	1.04B	1.04C	62	5.137	3.897	2	Concrete, under roads	1500	1524	0.013	NewFixed	1	1.04B	0
1.04C-1.02	1.04C	1.02	100.2	3.867	2.792	1.07	Concrete, under roads	1500	1524	0.013	NewFixed	1	1.04C	0
1.01-1.02	1.02	1.01	20.1	2.792	2.017	3.86	Concrete, under roads	1200	1200	0.013	Existing	1	1.02	0
1B.01-1BB.01	1B.01	1B.02	5.96491	12	11.894	1.78	Concrete, under roads	450	450	0.013	Existing	1	1B.01	0
1B.02-1.05	1B.02	1.05	19.4095	11.864	11.49	1.93	Concrete, under roads	450	450	0.013	Existing	1	1B.02	0
1.04-1.05	1.05	1.04	11.2473	7.677	7.115	5	Concrete, under roads	900	900	0.013	Existing	1	1.05	0
1.03-1.04	1.04	1.04A	14.4	7.085	6.797	2	Concrete, under roads	1500	1524	0.013	Existing	1	1.04	0
1BB.01-1B.02	1BB.01	1B.02	7.61907	11.97	11.894	1	Concrete, under roads	300	300	0.013	Existing	1	1BB.01	0
1C.01-1.05	1C.01	1.05	11.1029	11.84	11.64	1.8	Concrete, under roads	300	300	0.013	Existing	1	1C.01	0
1D.01-1.05	1D.01	1.05	26.1544	11.84	11.49	1.34	Concrete, under roads	450	450	0.013	Existing	1	1D.01	0
1E.01-1E.02	1E.02	1E.01	1.64884	12.45	12.434	0.97	Concrete, under roads	300	300	0.013	Existing	1	1E.02	0
1E.01-1.06	1E.01	1.06	23.9669	12.404	11.206	5	Concrete, under roads	225	225	0.013	Existing	1	1E.01	0
1.05-1.06	1.06	1.05	21.5544	8.785	7.707	5	Concrete, under roads	900	900	0.013	Existing	1	1.06	0
1.09-1.10	1.1	1.09	94.4	18.473	13.753	5	Concrete, under roads	750	750	0.013	Existing	1	1.1	0
1.08-1.09	1.09	1.08	7.98335	13.723	13.324	5	Box Culverts	1W x 0.9H		0.012	Existing	1	1.09	0
1.07-1.08	1.08	1.07	37.7541	13.294	11.406	5	Box Culverts	1W x 0.9H		0.012	Existing	1	1.08	0
1.06-1.07	1.07	1.06	71.2205	11.376	7.815	5	Box Culverts	1W x 0.9H		0.012	Existing	1	1.07	0
DUMMY PIPE	DUMMY 1.09	1.09	10	13.953	13.753	2	Concrete, under roads	750	750	0.013	Existing	1	DUMMY 1.09	0

OVERFLOW ROUTE DETAILS

Name	From	To	Travel Time (min)	Spill Level (m)	Crest Length (m)	Weir Coeff. C	Cross Section	Safe Depth Major Storms (m)	SafeDepth Minor Storms (m)	Safe DxV (sq.m/sec)	Bed Slope (%)	D/S Area Contributing %	id
O 1A.01	1A.01		1.04	1			8 m wide road (half section)	0.3	0.15	0.4	3.9	0	183
O 1B.01	1B.01	1BB.01		1			8 m wide road (half section)	0.3	0.15	0.4	1.9	0	192
O 1.05	1.05		1.04	1			Dummy used to model flow across road low points	0.2	0.05	0.6	2.7	0	181
O 1.04	1.04		1.01	5			Dummy used to model flow across road low points	0.2	0.05	0.6	1	0	206
O 1BB.01	1BB.01	1C.01		1			Dummy used to model flow across road low points	0.2	0.05	0.6	2.8	0	195
O 1C.01	1C.01		1.05	1			8 m wide road (half section)	0.3	0.15	0.4	1.9	0	200
O 1D.01	1D.01		1.05	2			8 m wide road (half section)	0.3	0.15	0.4	1.5	0	157
O 1E.02	1E.02	1E.01		1			Dummy used to model flow across road low points	0.2	0.05	0.6	13.7	0	152
O 1E.01	1E.01		1.05	5			Dummy used to model flow across road low points	0.2	0.05	0.6	2.3	0	154
O 1.09	1.09		1.08	1			Dummy used to model flow across road low points	0.2	0.05	0.6	3.4	0	146
O 1.08	1.08		1.07	5			8 m wide road (half section)	0.3	0.15	0.4	2	0	148
O 1.07	1.07	1E.01		5			8 m wide road (half section)	0.3	0.15	0.4	1.1	0	150
O 1.03	Brown St		1.01	5			Dummy used to model flow across road low points	0.2	0.05	0.6	1.1	0	208

DRAINS results prepared 08 May, 2011 from Version 2011.06

PIT / NODE DETAILS

Name	Max HGL	Max Pond HGL	Max Surface Flow Arriving (cu.m/s)	Version 8 Max Pond Volume (cu.m)	Min Freeboard (m)	Overflow (cu.m/s)	Constraint
1A.01	12.83		0.017		0.75	0.001	Inlet Capacity
1.04A	9.75		0		2.96		None
1.04B	9.18		0		2.72		None
1.04C	8.9		0		2.38		None
1.02	8.05		0		1.75		None
1.01	6.36		0.184				
1B.01	13.26	13.2	0.159	8.6	-0.21	0.403	Outlet System
1B.02	13.3		0				
1.05	13.31	12.64	0.216	12.9	-0.77	2.788	Outlet System
1.04	10.24	12.63	0.171	21.4	2.18	2.494	Inlet Capacity
1BB.01	13.08	13.02	0.176	8.6	-0.21	0.749	Outlet System
1C.01	12.96	12.89	0.072	12.9	-0.22	0.813	Outlet System
1D.01	12.97		0.074		-0.08	0.265	Outlet System
1E.02	13.49	13.5	0.221	8.6	-0.14	0.582	Outlet System
1E.01	13.49	13.45	0.208	8.6	-0.19	2.071	Outlet System
1.06	14.4		0				
1.1	30.08		1.686				
1.09	17.62	15.5	0	0	-2.12	0	Outlet System
1.08	17.18	15.55	0.008	8.6	-1.78	0.778	Outlet System
1.07	15.88	14.15	0.064	12.9	-1.88	1.773	Outlet System
DUMMY 1.09	17.94		0.834				

SUB-CATCHMENT DETAILS

Name	Max Flow Q (cu.m/s)	Paved Max Q (cu.m/s)	Grassed Max Q (cu.m/s)	Paved Tc (min)	Grassed Tc (min)	Supp. Tc (min)	Due to Storm
C 1A.01	0.046	0.04	0.007	7.88	14.86	0.07	AR&R 100 year, 25 minutes storm, average 145 mm/h, Zone 1
C 1B.01	0.423	0.374	0.058	8.43	17.68	0.07	AR&R 100 year, 25 minutes storm, average 145 mm/h, Zone 1
C 1.05	0.119	0.099	0.02	7.19	11.3	0.07	AR&R 100 year, 25 minutes storm, average 145 mm/h, Zone 1
C 1.04	0.076	0.067	0.01	8.36	17.3	0.07	AR&R 100 year, 25 minutes storm, average 145 mm/h, Zone 1
C 1BB.01	0.358	0.313	0.05	8.16	16.31	0.07	AR&R 100 year, 25 minutes storm, average 145 mm/h, Zone 1
C 1C.01	0.035	0.03	0.006	7.28	11.73	0.07	AR&R 100 year, 25 minutes storm, average 145 mm/h, Zone 1
C 1D.01	0.208	0.176	0.033	7.44	12.57	0.07	AR&R 100 year, 25 minutes storm, average 145 mm/h, Zone 1
C 1E.02	0.586	0.522	0.077	8.73	19.23	0.07	AR&R 100 year, 25 minutes storm, average 145 mm/h, Zone 1
C 1E.01	0.125	0.104	0.021	7.16	11.12	0.07	AR&R 100 year, 25 minutes storm, average 145 mm/h, Zone 1
C 1.10	4.271	3.931	0.428	10.57	28.7	0.07	AR&R 100 year, 25 minutes storm, average 145 mm/h, Zone 1
C 1.08	0.021	0.018	0.003	7.45	12.64	0.07	AR&R 100 year, 25 minutes storm, average 145 mm/h, Zone 1
C 1.07	0.187	0.155	0.032	6.89	9.72	0.07	AR&R 100 year, 25 minutes storm, average 145 mm/h, Zone 1
C 1.09	2.181	1.973	0.262	9.43	22.85	0.07	AR&R 100 year, 25 minutes storm, average 145 mm/h, Zone 1
C 1.03	0.481	0.434	0.059	9.28	22.04	0.07	AR&R 100 year, 25 minutes storm, average 145 mm/h, Zone 1

PIPE DETAILS

Name	Max Q (cu.m/s)	Max V (m/s)	Max U/S HGL (m)	Max D/S HGL (m)	Due to Storm
1A.01-1.04A	0.045	2.06	12.784	11.877	AR&R 100 year, 25 minutes storm, average 145 mm/h, Zone 1
1.04A-1.04B	3.88	2.13	9.4	9.181	AR&R 100 year, 25 minutes storm, average 145 mm/h, Zone 1
1.04B-1.04C	3.873	2.12	9.067	8.897	AR&R 100 year, 25 minutes storm, average 145 mm/h, Zone 1
1.04C-1.02	3.87	2.12	8.322	8.048	AR&R 100 year, 25 minutes storm, average 145 mm/h, Zone 1
1.01-1.02	3.87	3.42	6.557	6.36	AR&R 100 year, 25 minutes storm, average 145 mm/h, Zone 1
1B.01-1BB.01	0.131	0.83	13.303	13.304	AR&R 100 year, 2 hours storm, average 60 mm/h, Zone 1
1B.02-1.05	0.273	1.71	13.304	13.312	AR&R 100 year, 2 hours storm, average 60 mm/h, Zone 1
1.04-1.05	3.532	5.55	10.659	10.237	AR&R 100 year, 10 minutes storm, average 211 mm/h, Zone 1
1.03-1.04	3.85	2.11	9.785	9.746	AR&R 100 year, 25 minutes storm, average 145 mm/h, Zone 1
1BB.01-1B.02	0.127	1.79	13.297	13.304	AR&R 100 year, 4.5 hours storm, average 34.7 mm/h, Zone 1
1C.01-1.05	0.116	1.64	13.28	13.312	AR&R 100 year, 4.5 hours storm, average 34.7 mm/h, Zone 1
1D.01-1.05	0.182	1.15	13.291	13.312	AR&R 100 year, 10 minutes storm, average 211 mm/h, Zone 1
1E.01-1E.02	0.083	1.17	13.492	13.492	AR&R 100 year, 3 hours storm, average 45.8 mm/h, Zone 1
1E.01-1.06	0.111	2.8	14.38	14.404	AR&R 100 year, 10 minutes storm, average 211 mm/h, Zone 1
1.05-1.06	4.106	6.45	14.404	13.312	AR&R 100 year, 25 minutes storm, average 145 mm/h, Zone 1
1.09-1.10	4.109	9.3	30.081	17.619	AR&R 100 year, 25 minutes storm, average 145 mm/h, Zone 1
1.08-1.09	6.122	6.8	17.528	17.177	AR&R 100 year, 25 minutes storm, average 145 mm/h, Zone 1
1.07-1.08	5.325	5.92	17.129	15.876	AR&R 100 year, 25 minutes storm, average 145 mm/h, Zone 1
1.06-1.07	4.154	4.62	15.854	14.404	AR&R 100 year, 25 minutes storm, average 145 mm/h, Zone 1
DUMMY PIPE	2.172	4.92	17.936	17.619	AR&R 100 year, 25 minutes storm, average 145 mm/h, Zone 1

OVERFLOW ROUTE DETAILS

Name	Max Q U/S	Max Q D/S	Safe Q	Max D	Max DxV	Max Width	Max V	Due to Storm
O 1A.01	0.001	0.001	0.722	0.019	0.01	0.16	0.69	AR&R 100 year, 25 minutes storm, average 145 mm/h, Zone 1
O 1B.01	0.403	0.403	0.966	0.165	0.25	4.73	1.49	AR&R 100 year, 25 minutes storm, average 145 mm/h, Zone 1
O 1.05	2.788	2.788	12.595	0.108	0.2	25.64	1.81	AR&R 100 year, 1 hour storm, average 95 mm/h, Zone 1
O 1.04	2.494	2.494	7.665	0.127	0.15	29.41	1.21	AR&R 100 year, 1 hour storm, average 95 mm/h, Zone 1
O 1BB.01	0.749	0.749	12.826	0.062	0.08	16.48	1.29	AR&R 100 year, 25 minutes storm, average 145 mm/h, Zone 1
O 1C.01	0.813	0.813	0.966	0.197	0.36	6.33	1.82	AR&R 100 year, 25 minutes storm, average 145 mm/h, Zone 1
O 1D.01	0.265	0.265	1.073	0.146	0.2	3.49	1.38	AR&R 100 year, 25 minutes storm, average 145 mm/h, Zone 1
O 1E.02	0.582	0.582	9.749	0.042	0.09	12.35	2.07	AR&R 100 year, 25 minutes storm, average 145 mm/h, Zone 1
O 1E.01	2.071	2.071	11.625	0.099	0.16	23.85	1.57	AR&R 100 year, 25 minutes storm, average 145 mm/h, Zone 1
O 1.09	0	0	14.134	0	0	0	0	
O 1.08	0.778	0.778	0.991	0.193	0.35	6.16	1.83	AR&R 100 year, 25 minutes storm, average 145 mm/h, Zone 1
O 1.07	1.773	1.773	1.162	0.262	0.54	6.4	2.05	AR&R 100 year, 25 minutes storm, average 145 mm/h, Zone 1
O 1.03	0.481	0.481	8.039	0.063	0.05	16.66	0.81	AR&R 100 year, 25 minutes storm, average 145 mm/h, Zone 1

CONTINUITY CHECK for AR&R 100 year, 25 minutes storm, average 145 mm/h, Zone 1

Node		Inflow (cu.m)	Outflow (cu.m)	Storage Change (cu.m)	Difference %
1A.01		43.52	43.52	0	0
1.04A		6613.95	6614.79	0	0
1.04B		6614.79	6615.31	0	0
1.04C		6615.31	6615.72	0	0
	1.02	6615.72	6616.03	0	0
	1.01	9398.2	9398.2	0	0
1B.01		415.71	415.63	0	0
1B.02		222.96	222.78	0	0.1
	1.05	8782.46	8785.48	0	0
	1.04	8860.35	8863.05	0.92	0
1BB.01		624.62	624.54	0	0
1C.01		571.45	571.13	0	0.1
1D.01		191.35	190.67	0	0.4
1E.02		583.93	584	0	0
1E.01		1857.5	1857.71	0	0
	1.06	5929.9	5917.66	0	0.2
	1.1	4578.49	4578.8	0	0
	1.09	6810.59	6811.88	0	0
	1.08	6831.57	6833.08	0	0
	1.07	6999.83	7005.97	0.8	-0.1
DUMMY	1.09	2231.93	2231.8	0	0
Brown St		489.7	489.7	0	0

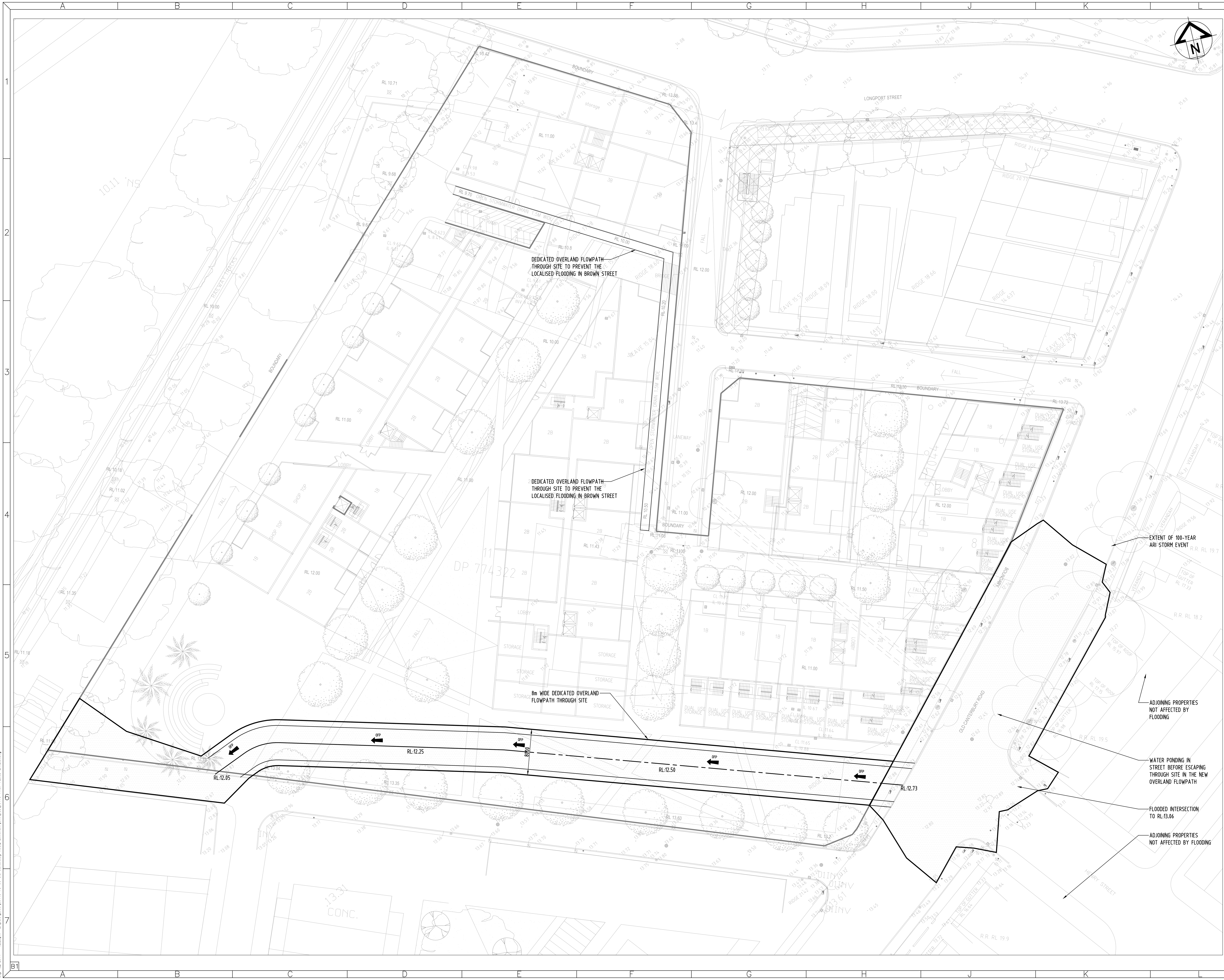
Upwelling occurred at 1E.01, 1D.01, 1C.01, 1BB.01, 1B.01, 1.05, 1.07, 1.08
Freeboard was less than 0.15m at 1E.02
The maximum flow exceeded the safe value in the following overflow routes: O 1.07

APPENDIX 7

Flood Extent Plan – Overland Flow

Proposed Site Conditions

May 12, 2011 – 12:28pm Z:\S&G\2009\09115 78-90 Old Canterbury Road, Lewisham\Civil\cad\09115-PROP FLOOD EXTENT.dwg



AMENDMENTS/REVISIONS

Rev	Issue	Description	Initials	Date
01		PLANNING APPLICATION ISSUE	S.H.	09.05.11

CONSULTANT

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Shaping the Future

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ARCHITECT

tony owen ptnrs

PROJECT

78-90 Old Canterbury Rd
Lewisham
NSW

DRAWING TITLE

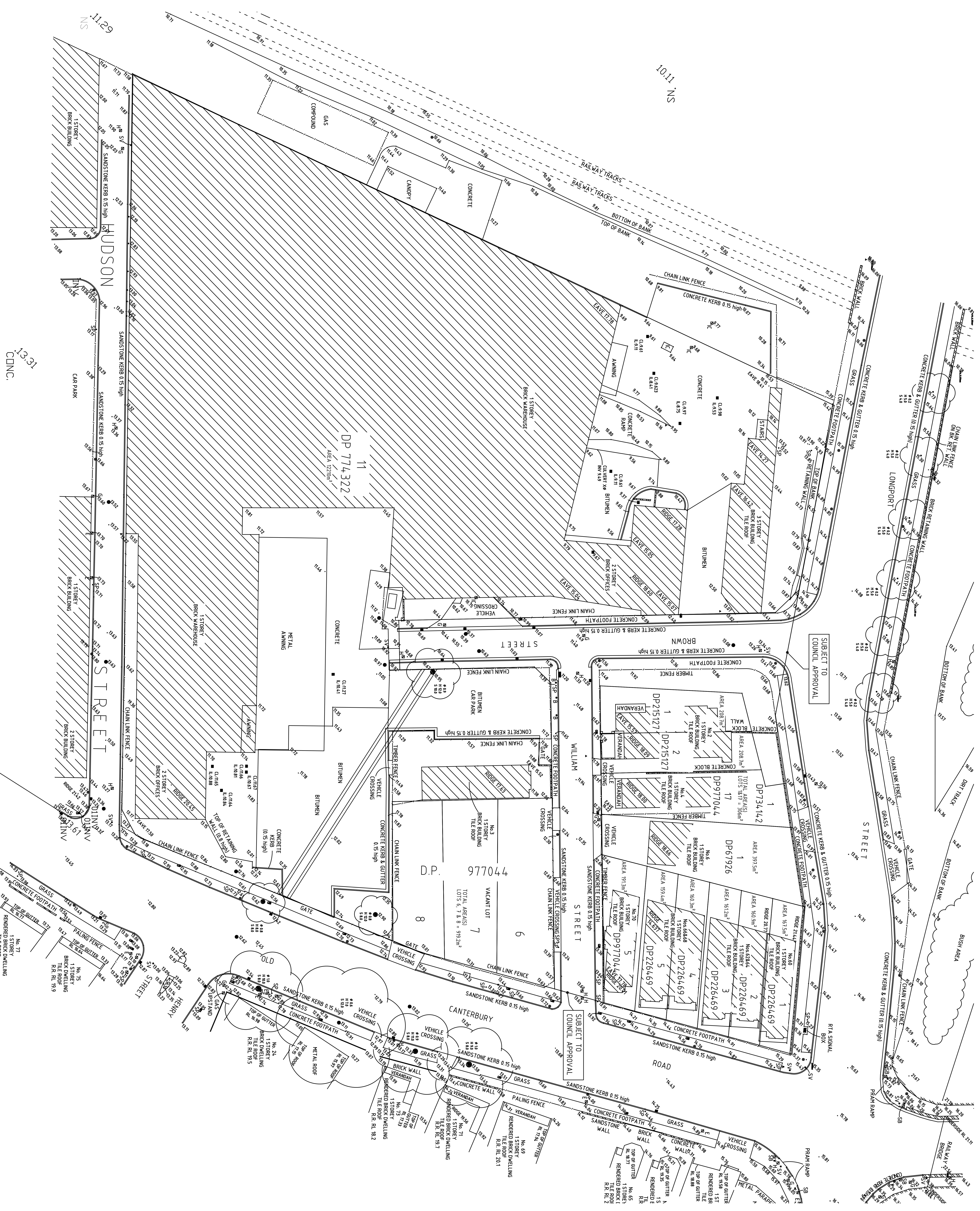
HYDRAULIC SERVICES
100-YEAR ARI FLOOD EXTENT PLAN
PROPOSED SITE CONDITIONS

DRAWN	DESIGNED	CHECKED	SCALE (AT FULL SIZE)
S.H.	S.H.	S.H.	1:250

DATE	DRAWING No.	REVISION
May '11	N09612-DA-SK002	

APPENDIX 8

Survey Plan


HUDSON STREET
CANTERBURY ROAD
WILLIAM STREET
BROWN STREET
LONGPORT STREET
HENRY STREET
RAILWAY TRACKS
RAILWAY TRACKS
BOTTOM OF BANK
TOP OF BANK
GAS COMPOUND
CANOPY
CONCRETE
CHAIN LINK FENCE
CONCRETE KERB 0.15 high
1 STOREY BRICK WAREHOUSE
11
DP 774322
AREA 12210m²
METAL AWNING
BITUMEN
2 STOREY BRICK OFFICES
CAR PARK
BITUMEN CAR PARK
D.P. 977044
VACANT LOT
No.3 1 STOREY BRICK BUILDING TILE ROOF
DP215127
DP97704
DP67926
DP134142
DP226469
SUBJECT TO COUNCIL APPROVAL
SUBJECT TO COUNCIL APPROVAL
SANDSTONE KERB 0.15 high
CONCRETE FOOTPATH
VEHICLE CROSSING
GRASS
BRICK RETAINING WALL
CONCRETE KERB & GUTTER 0.15 high
BUSH AREA
DIRT TRACK
RTA SIGNAL BOX
PRAM RAMP
RAILWAY BRIDGE