APPENDIX F

HERITAGE REGISTER
HAY STREET STORMWATER CHANNEL NO. 30P1

Heritage Item

- Back to the Overview page
- How to search the heritage register (PDF - 61KB)

Hay Street Stormwater Channel No.30P1	
Number:	**4574216**
Current Name:	**Hay Street Stormwater Channel No.30P1**
Other Name:	Hay Street Sewer
Primary Address	Location: Hay St, Sydney. NSW LGA: Sydney City LGA Region: Sydney DUAP Region: Sydney South
Owner:	Sydney Water
Current Use:	Stormwater Drain
Former Use:	Combined Sewer-Stormwater Drain
Item Type:	Built
Item Group:	Utilities - Drainage
Item Category:	Storm Water Drain
Curtilage/Boundary:	The curtilage includes all original fabric and archaeological evidence including, but not limited to, all land within Sydney Water's boundaries, the channel bed, walls and coping, as shown on the curtilage plan. There is no visual curtilage associated with this structure as it is located predominantly underground. To formulate a specific curtilage statement that includes details of surrounding landuse and encroachment of various developments would require further investigations and is beyond the scope of this study.
Statement Of Significance:	The Hay Street Stormwater Channel system is highly significant as it was one of the first five original combined sewers constructed in Sydney around the 1860 period. The other four sewers were; Blackwattle Bay (SHI 4570535), Woolloomooloo (SHI 4570813), Tank Stream (SHI 4573709) and Bennelong (SHI 4570854). These five sewers were responsible for greatly improving public health by diverting stormwater and sewage off the streets and discharging it out into the Harbour. The five sewers are the first examples of sewerage and drainage services to be built in Sydney, and potentially Australia. The subsequent construction of the BOOS (Bondi Ocean Outfall Sewer) in 1889 and the connection of the Hay Street system in 1901 diverted sewer flow from the Harbour and into the ocean. Eventually the drain was used predominantly for stormwater, this further improved public health, hygiene and living standards for the city's residents. The channel is of technological significance as it provides an excellent example of the engineering and

	construction techniques of the late 1800's and of the city's early infrastructure. The numerous extensions and modifications made throughout the years provide and an archaeological record of the advancements made in drainage construction techniques. The operational curtilage for Hay Street SWC includes all original fabric and archaeological evidence including, but not limited to the channel bed, walls and coping. There is no visual curtilage associated with this structure as it is located predominantly underground. To formulate a specific curtilage statement that includes details of surrounding landuse and encroachment of various developments would require further investigations and is beyond the scope of this study.
Endorsed Significance:	Local
Construction Information	
Designer:	Old City Council/ MWS& D Board/ Metropolitan Railway Construction
Builder:	Old City Council/ MWS& D Board/ Metropolitan Railway Construction
Year Started:	1863
Year Completed:	1931
Circa:	No
Physical Description:	The Sydney City Council constructed the Hay Street SWC system in 1863. The channel drained most of the southeastern portion of the city, an area of approximately 142.9 hectares (353 acres) (McIlwraith, 1941). The original catchment was defined by Bourke Street to the east, Bathurst Street to the north and Devonshire Street to the south. The Hay Street system as it is today can be divided into four components: - The main 'Hay Street' artery; - The Liverpool Street branch; - The Goulburn Street branch; - The Foveaux Street branch. The main artery of the channel follows Hay Street and, upon reaching Elizabeth Street, bifurcates into two branches - the Goulburn Street branch which runs to the north and the Foveaux Street which runs to the south. The Liverpool Street branch runs along Liverpool Street from its intersection with the main Hay Street artery and runs eastward to Kent Street. Each of these branches is discussed below. * The Main Artery The main branch follows Hay Street in a westerly direction, from Elizabeth Street then turns north along the former Lackey Street (now the site the Sydney Entertainment Centre), discharging into Darling Harbour. On the south side of this main channel, four offshoot branches are recorded (McIlwraith 1941) - one heading toward Thomas Street, one along George Street to the site of the former Benevolent Asylum, and the remaining two draining Parker Street and Parker Lane. A connecting brick sewer was also constructed to the line of a surface drain in Belmore Gardens (now Belmore Park), this sewer serviced Central Station across Devonshire Street. The north side of the main channel drains areas from Elizabeth Street to the east and Bathurst Street to the north. The historical record indicates that the Hay Street Channel was not well designed from a hydrological perspective. The channel, at its termination point at Darling Harbour, was flat and needed to be regularly raked to ensure flow. An article appearing in the Sydney Morning Herald on 8 January 1873 described the channel as follows: 'This sewer, the largest in the city empties itself into Darling Harbour and drains nearly all of the southeast portion of the city. The outlet of this most important sewer is, unfortunately, very defective, being for a considerable distance on the dead level'. The channel is constructed of stone of approximately 7ft (2.1m) by 10ft (3m). The roof is semi-elliptical. As a result of historical changes

	the main artery has 3 main sections: - Darling Harbour to Pier Street built by the Metropolitan Railway Construction in 1931. - Corner of Hay and Lackey Streets to Hay and Elizabeth Streets built by the Old City Council in 1863. - Pier Street to Hay Street built by the MWS&D Board in 1930. *The Liverpool Street branch This branch runs along Liverpool Street in an easterly direction from its interception with the Hay Street sewer at Darling Harbour. The branch terminates at the interception into the Kent Street sewer, located between Kent and Sussex Streets. This branch drained an area of approximately 6.3 hectares (15 ½ acres) (McIlwarith, 1941). The construction of this branch was undertaken between 1857 and 1931 by the Old City Council and the Metropolitan Railway Construction. * The Goulburn Street branch The Goulburn Street branch commences at the intersection of Hay and Elizabeth Streets. The branch travels along Elizabeth Street to Wentworth Street, where it runs in an easterly direction to Goulburn Street eventually terminating at Crown Street south. This section of the channel drained the main and cross streets south of South Head Road. The channel is oviform in section and varies in size and grade with size of the channel ranging from 0.91m x 0.61m (3'0" x 2'0") to 1.83m x 1.22m (6'0" x 4'0"). The construction of this branch was undertaken from 1963 to 1929 by the old City Council and the MWS&D Board. * The Foveaux Street branch The southern branch follows Elizabeth Street to Foveaux Street (the site of the former Sydney Cemetery) and then travels in an easterly direction terminating at its intersection with Waterloo Street. The Foveaux Street branch drained an area of approximately 42 hectares (104 acres) extending from Campbell Street in the north to Devonshire Street to the south, Bourke Street to the west and the former Darling Harbour rail line to the east. The Foveaux Street branch was constructed by the Old City Council in 1868.
Modifications Made:	In 1886 the Bondi Sewer was constructed within the catchment of the Hay Street Channel. The Bondi Sewer intercepted all of the existing sewers and diverted flows to the Bondi outfall. It was not until 1899 however, that sewage from this system was successfully diverted into the Bondi system. This was due to the fact that sewage in the Hay Street system was too low to be intercepted by the Bondi Sewer. This problem was rectified in 1899 through the construction of Sewage Pumping Station (SPS) No.1 and subsequently SPS No.12 in 1901. The Hay Street Sewer was intercepted at Pier Street by a 0.3m (12 inch) line to divert flows to SPS No.1. Further work was undertaken on the channel during 1931 as a result of the construction of the City Railway. Construction of the City Railway required reclamation of the land around Darling Harbour. As a result of this work, the existing outlet was too low to enable the appropriate hydraulic gradient through the reclaimed land. This required the reconstruction of the line from the outlet to Lackey Street to be reconstructed on a flatter grade. The reconstructed line was 673.91 metres (33 ½ chains) in length – 291.69 metres (14 ½chains) constructed by the Board and the remainder, constructed by the Railway Commissioners (McIlwraith, 1941). The 3 branches of this channel were built at various times between 1857 and 1931. Refer to the "Physical Description" category for further details.

Historical Notes

The Hay Street Stormwater Channel (1863) is one of five original sewers built in Sydney between 1856 and 1867. The others being: - Woolloomooloo Stormwater System (1857-1862) discharging to Woolloomooloo Bay - The Tank Stream Sewer (1862) discharging to Circular Quay - Blackwattle Bay Sewer (1857) discharging to Blackwattle Bay - Fort Macquarie (Bennelong) Sewer (1856-1857) discharging at Bennelong Point. The development of the five combined sewer stormwater systems was facilitated by the incorporation of the Sydney Municipal Council in 1842. The Council, which was formed by an Act of Parliament, had as one of its

principal tasks, the establishment of a drainage system for Sydney. Calls for the development of a drainage system were precipitated by declining public health and hygiene resulting from the lack of appropriate sanitation services (sewage and drainage). Three city commissioners appointed in 1854 commenced the construction of the combined sewers, these were subsequently completed by the City Council. The majority of work was complete by 1867. The drainage system served to collect sewer and stormwater from the city streets and divert it to the Harbour via a series of outfalls associated with each of these systems. The early effort to remedy sanitation problems suffered by the city through the operation of these systems meant that the inner harbour became increasingly polluted and a public health risk. In 1870 the Sewerage and Health Board was commissioned with the principal task of limiting sewage flows to the Harbour and thus achieving further public health reforms. An ocean outfall, which diverted sewer flows to the open ocean, was proposed as a means of addressing this problem. As a result, plans were prepared for the construction of the Bondi Ocean Outfall Sewer (BOOS). The commissioning of the BOOS in 1889 served to divert sewer flows from the city and areas to the city's south to the ocean at Malabar. All flows captured by the five combined sewers were to be diverted into the Bondi system. These systems however, were to be retained to deal purely with stormwater flows.

Themes

National	Economy
State	Environment - cultural landscape
Local	(none)
Local Description	
National	Phases of Life
State	Events
Local	(none)
Local Description	
National	Economy
State	Health
Local	Water Supply
Local Description	
National	Economy
State	Technology
Local	(none)
Local Description	
National	Settlement
State	Utilities
Local	Drainage
Local Description	Relates to the planning, development, expansion and provision of drainage and stormwater services.

SHR Criteria

a) Historical:	As one of the first five combined sewer channels built for Sydney, and potentially the largest of the five, the Hay Street Stormwater Channel is considered to be highly significant. The commissioning of these five systems was significant in improving the standards of hygiene in the city and in demonstrating the technological capability of the burgeoning colony. These five sewers are likely to be the first examples of sewerage and drainage services to be built in Sydney, and potentially Australia.
c) Aesthetic:	The system is predominantly underground and is of little aesthetic significance.

d) Social:	The system is of social significance in that it served to greatly improve public health conditions for the City of Sydney in the latter half of the 19th century. Declining public health and hygiene standards necessitated the commissioning of the five combined sewers for Sydney. Improvements in public health were achieved by diverting sewerage off the streets and into the city's harbour. The subsequent construction of BOOS in 1889 and the connection of the Hay Street system in 1901 meant that further public health improvements were achieved by removing sewer flows from the Harbour and utilising the Hay Street system for stormwater only.
e) Research:	An excellent example of the engineering construction techniques of the late 1800's and of the city's early infrastructure. The numerous extensions and modifications made throughout the years provide an archaeological record of the advancements made in drainage construction techniques.
f) Rarity:	The channel is rare. It is one of the first five original combined sewers constructed in Sydney around the 1860 period.
g) Representative:	Representative of the first example of sewerage and drainage services to be built in Sydney and potentially Australia.
Integrity Assessment:	The channel is substantially intact.

Heritage listings

List Name: **Heritage Act - s.170 NSW State agency heritage register**

Date Listing Listed:	01-01-2000

Images

The physical curtilage plan for Hay Street Stormwater Channel.
Created By: Sydney Water
Creation Date: 29-05-2006

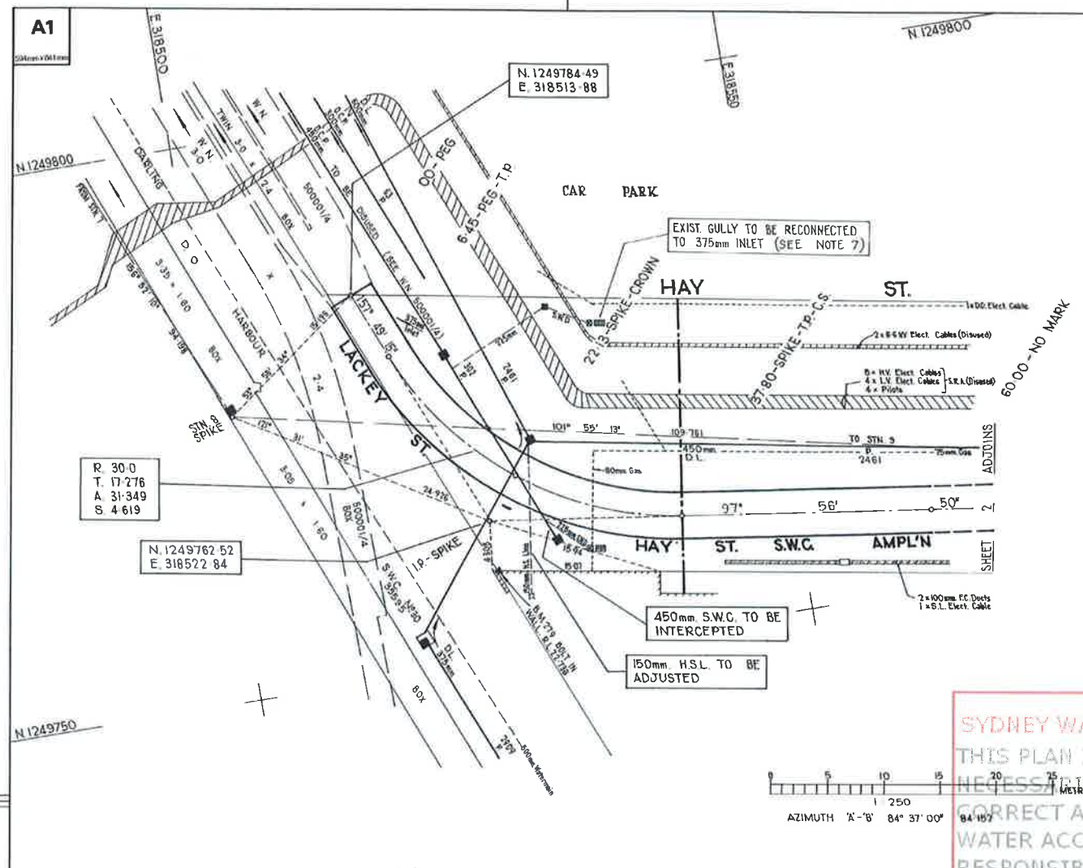
Administration

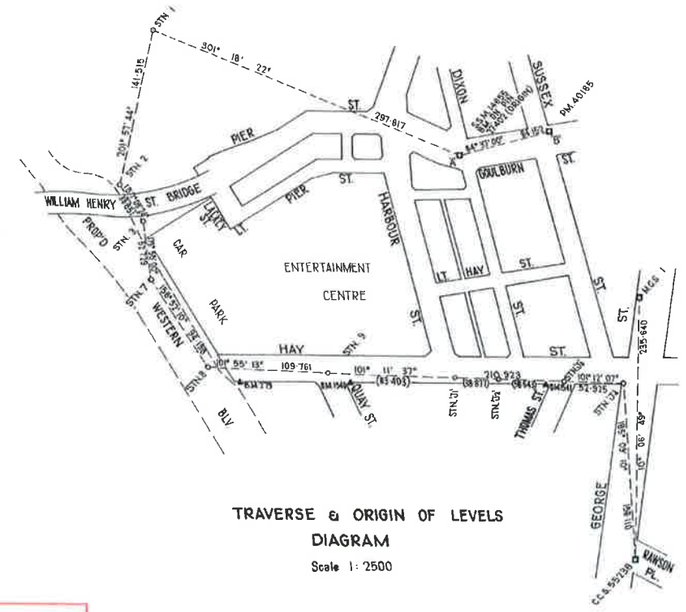
Data Entry Status:	Basic
Entered:	10-03-1999
Updated:	25-11-2010

APPENDIX G

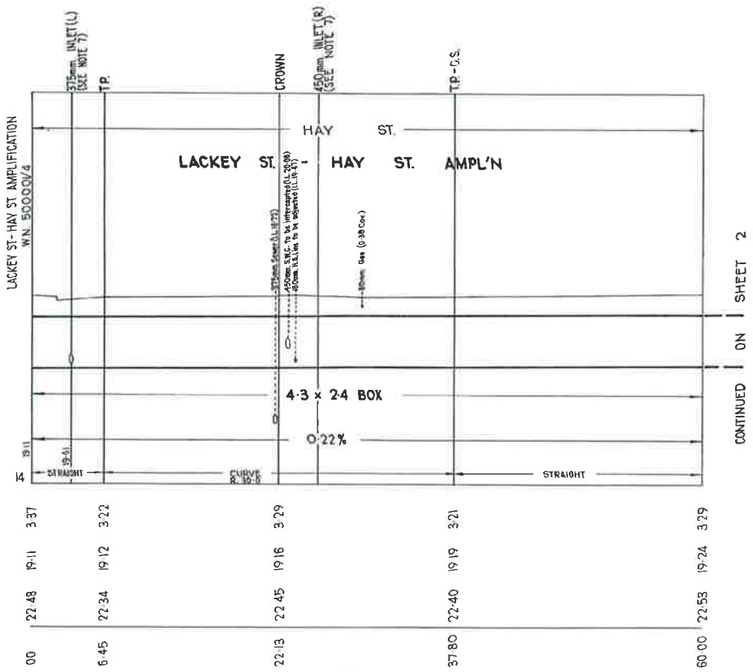
DARLING HARBOUR REDEVELOPMENT
LACKEY STREET – HAY STREET SWC AMPLIFICATION

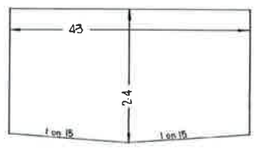
A1





TRAVERSE & ORIGIN OF LEVELS DIAGRAM
Scale 1:2500





TYPICAL CROSS-SECTION
Scale 1:50

NOTES
1) THIS PLAN IS TO BE READ IN CONJUNCTION WITH DESIGN DRAWINGS
2) CO-ORDINATE VALUES ARE ON LOCAL GRID
   CO-ORDINATE ORIGIN { N.1249927·199 / E.318758·785
   SS.M. 14655
   EQUIV. ISG VALUE { N.1249927·224 / E.318758·777
3) CONNECTION TO LIVE SEWERS & M.W.S.&D.B.'s S.W.O.'S TO BE CARRIED OUT BY M.W.S.&D.B. FORCES.
4) EXIST. STORMWATER PIPES TO BE CONNECTED. SEE STANDARD DRAWING
5) BEFORE EXCAVATING IN THE VICINITY OF HIGH OR MEDIUM PRESSURE GAS PIPELINES PLEASE CONTACT THE MAINS ENGINEER - PHONE 736 2120 GIVING AT LEAST 48 HOURS NOTICE.
6) MANHOLE CASTING TO BE RECOVERED
7) FOR INLET & MANHOLE DETAILS SEE DESIGN DRAWINGS S.W.C.-30 61 & S.W.C.-30 62

SHEET 1 OF 5 SHEETS

WORK AS EXECUTED

COMPLETED ..... ENGINEER .....
OVERSEER ..... CONTRACTOR .....
DISTRICT ENGINEER .....
DISTRICT .....

PIPE JOINTING CODE
A COMPO OR CLAY CEMENT C POLYURETHANE
B RUBBER RING D POLYESTER-RUBBER
ALL PIPES ARE GRANULAR BEDDED UNLESS OTHERWISE INDICATED.

NO BOUNDARY TRAPS REQUIRED

NO STANDARD PERMANENT MARKS

SERVICES AS AT 12-8-85
WATER AVAILABLE
RECORD OF ELECTRIC CABLES (S.E.C., S.R.A.) in HAY ST.
RECORD OF GAS (H.P. AND M.P.) PIPELINES, SEE NOTE 5
SITE CHECK NECESSARY

SIDE LINES UNDER 3 METRES IN LENGTH "NOT SURVEYED" TO BE CONSTRUCTED AS SHOWN ON PLAN

SIDE LINES TO BE LAID CLEAR OF KERB WHERE SEWERS ARE LOCATED UNDER SEALED ROADS.

TWO JUNCTIONS MAY BE REQUIRED FOR EACH LOT, ONE AS INDICATED BY ARROW ON PLAN, THE OTHER AS DIRECTED BY THE DISTRICT ENGINEER.

PIPES TO BE CONCRETE ENCASED SHOWN THUS

CONCRETE PROTECTION OTHER THAN SHOWN ON SECTIONS MAY BE REQUIRED FOR SHALLOW TRENCHES, STEEP GRADES, SCOURING, ETC., AS DIRECTED BY THE DISTRICT ENGINEER.

BULKHEADS TO BE CONSTRUCTED TO PREVENT SCOURING AS DIRECTED BY THE DISTRICT ENGINEER.

AREAS HATCHED THUS NOT DRAINED
AREA DRAINED

PIPE DATA

SIZE	TYPE	SURVEYED LENGTH	SIZE	TYPE	SURVEYED LENGTH
4·3 x 2·4	BOX	317·26			
225mm	V.C.P.	6·73			
TOTAL SURVEYED LENGTH 341·73					

ALL SURVEY MARKS ARE PEGS UNLESS OTHERWISE INDICATED.
ALL PIPES ARE VITRIFIED CLAY UNLESS OTHERWISE INDICATED.
FOR PIPE SIZES AND GRADES SEE SECTIONS.
SEWERS ARE LOCATED IN PRIVATE PROPERTY UNLESS OTHERWISE INDICATED.

AMENDMENTS

NO.	LINES	APP'D	DATE	ISSUED

NO AMENDMENTS ARE TO BE MADE TO THIS PLAN WITHOUT REFERENCE TO SURVEY MANAGER DRAINAGE

M.W.S. & D.B. SYDNEY, N.S.W.

CITY OF SYDNEY DRAINAGE

DARLING HARBOUR REDEVELOPMENT LACKEY ST. – HAY ST. S.W.C. AMPLIFICATION

SURVEYED J. WEBSTER 13/6/85
SURVEYOR John J. Webster 28/10/85
DRAWN P.R.T., W.O.W., W.K.G. 26/7/85
EXAMINED A. Wright 22.8.85
FOR SUP. DRAUGHTSMAN

SCALES
PLAN 1:250 SECTION { HOR. 1:250 / VERT 1:125
LENGTHS, DEPTHS & LEVELS ARE IN METRES
ALL LEVELS REFER TO A PLANE 20 BELOW AUSTRALIAN HEIGHT DATUM

LEVEL BOOKS 23093
FIELD BOOKS 9603(R.E.)
2 CHN. SHEET 13J
S.R. SHEETS 3735, 3739, 3740, 3734
FILE NO. 60/30178
CITY N° 3853
SP.
PROG. NO. 4017 1985/86

APPROVED J.C. Loughton 8.11.85
SURVEY MANAGER DRAINAGE

W.N. 500006

U.B.D. DIR. 3 E-4
ISSUED 11/11/85 A. Morrish

SVY LAP 2 Y40

SHEET 1 OF 5 SHEETS W.N. 500006

A1

SHEET 2 OF 5 SHEETS

WORK AS EXECUTED

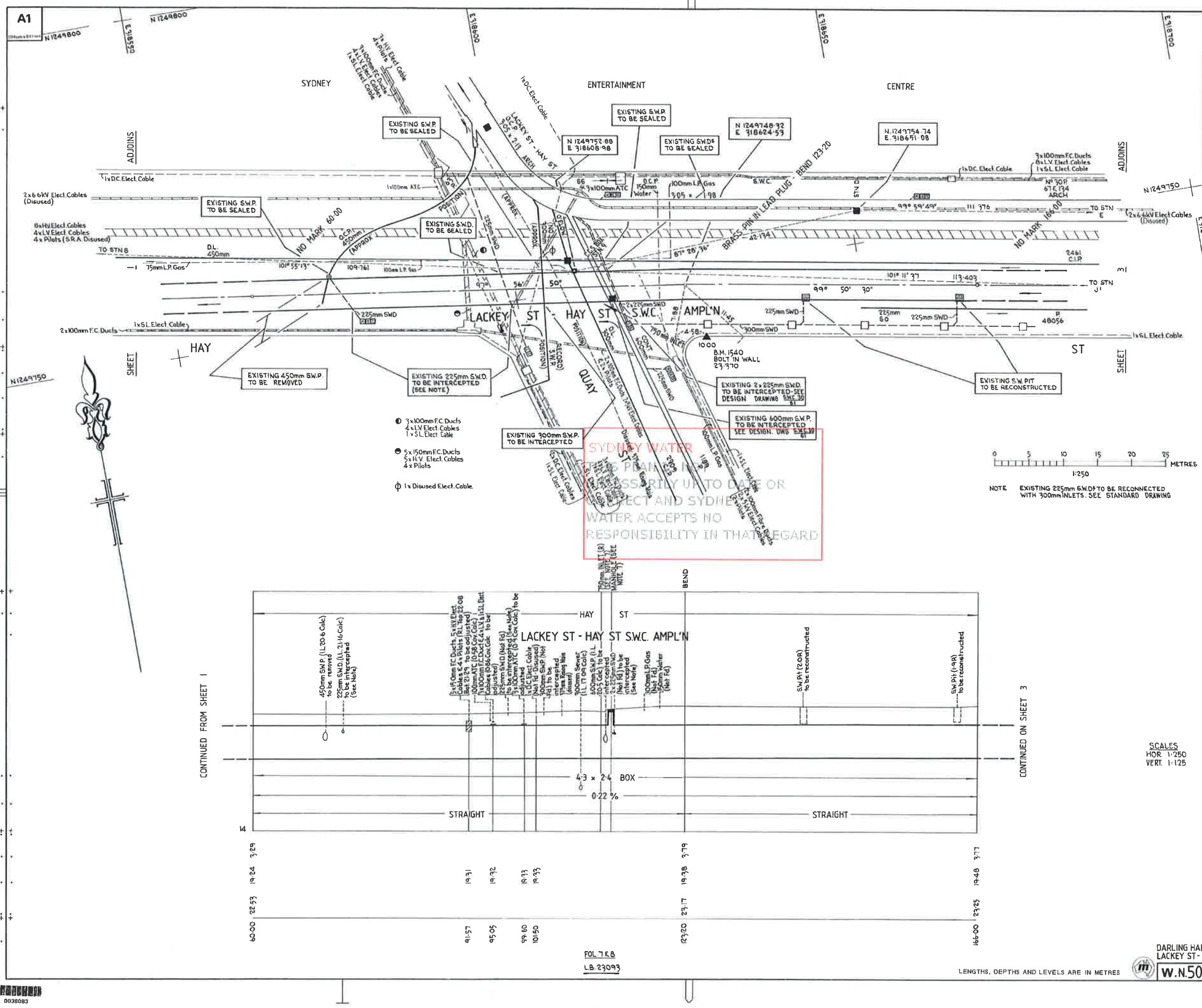
COMPLETED ENGINEER
OVERSEER CONTRACTOR
DISTRICT ENGINEER
DISTRICT

PIPE JOINTING CODE
A COMPO OR CLAY-CEMENT D POLYESTER-RUBBER RING
B RUBBER RING E SOLVENT WELD
C POLYURETHANE
ALL PIPES ARE GRANULAR BEDDED UNLESS OTHERWISE INDICATED.

RECORD OF ELECTRIC CABLES (ECC, SRA, E, DMR.) HAY ST
RECORD OF GAS (H.P. AND M.P.) PIPELINES (SEE NOTE 5)
SITE CHECK NECESSARY

SEWERS ARE LOCATED IN PRIVATE PROPERTY UNLESS OTHERWISE INDICATED.

PIPES TO BE CONCRETE ENCASED SHOWN THUS:



FOL 7 E 8
L.B. 23093

SCALES
HOR 1:250
VERT. 1:125

LENGTHS, DEPTHS AND LEVELS ARE IN METRES

DARLING HARBOUR REDEVELOPMENT
LACKEY ST - HAY ST S.W.C. AMPL'N

W.N.500006

SHEET 2 OF 5 SHEETS W.N.500006

0038083

Created by rka on 9/10/2012

A1

SHEET 3 OF 5 SHEETS

E 318650 E 318700 E 318750

N 1249750 N 1249700

EXIST. M.H. & DROP CHAMBER WITH INTERNAL DROP - EXIST. 225mm INLET TO BE SEALED - PART OF EXIST. CHAMBER & DROP TO BE DEMOLISHED - 225mm. INLET WITH TEE JUNCTION AND 225mm. C.I.P. INTERNAL DROP

N.1249740·46
E. 318689·48

EXIST. S.W.D. TO BE SEALED

EXIST. 225mm. SEWER TO BE REMOVED & RELAID UNDER S.W.C. (SEE L.1)

N.1249733·87
E. 318688·18

EXIST. 225mm. S.W.D. TO BE INTERCEPTED (SEE NOTE)

EXIST. M.H. TO BE DEMOLISHED - M.H. TO BE CONSTRUCTED & 2×225mm. INLETS TO BE RECONNECTED

EXIST. GULLY & TAILPIT TO BE DEMOLISHED - GULLY & TAILPIT TO BE CONSTRUCTED & RECONNECTED WITH 300mm. P.

HAY ST.

LACKEY ST.

HARBOUR ST.

KIMBER LANE

AMPL'N.

S.W.C.

166·00 - NO MARK

240·00 - NO MARK

ADJOINS SHEET 2

ADJOINS SHEET 4

FROM STN. 9

TO STN. 13

SCALE 1:250

0 5 10 15 20 25 METRES

NOTE EXISTING 225mm S.W.D.'s TO BE RECONNECTED WITH 300mm. INLETS SEE STANDARD DRAWING

WORK AS EXECUTED

COMPLETED ENGINEER
OVERSEER CONTRACTOR
DISTRICT ENGINEER
DISTRICT

PIPE JOINTING CODE
A COMPO OR CLAY-CEMENT D POLYESTER-RUBBER RING
B RUBBER RING E SOLVENT WELD
C POLYURETHANE
ALL PIPES ARE GRANULAR BEDDED UNLESS OTHERWISE INDICATED

RECORD OF ELECTRIC CABLES (S.R.A. & SEC HAY ST)
RECORD OF GAS (B.P. AND AUP)
PIPELINES (SEE NOTE 5)
SITE CHECK NECESSARY

SEWERS ARE LOCATED IN PRIVATE PROPERTY UNLESS OTHERWISE INDICATED

PIPES TO BE CONCRETE ENCASED SHOWN THUS

LACKEY ST - HAY ST. S.W.C. AMPLN

HAY ST.

4·3 × 2·4 BOX

0 22 %

STRAIGHT

CONTINUED FROM SHEET 2

CONTINUED ON SHEET 4

14	166·00	23·75	19·48	3·77
	223·00	23·61	19·61	4·00
	240·00	23·74	19·64	4·10

FOLS. 8-9
L.B. 23093

EXIST. M.H. & DROP CHAMBER WITH INTERNAL DROP - EXIST. 225mm INLET TO BE SEALED - PART OF EXIST. CHAMBER & DROP TO BE DEMOLISHED - 225mm INLET WITH TEE JUNCTION AND 225mm C.I.P. INTERNAL DROP

EXIST. M.H. TO BE DEMOLISHED - M.H. TO BE CONSTRUCTED & 2×225mm INLETS TO BE RECONNECTED

HAY ST.

L.1

225mm P.

1·0%

13	00	23·48	18·34	5·14
		6·73	23·45	18·41	5·04

FOL 17
FB 23093

SCALES
HOR 1:250
VERT. 1:125

LENGTHS, DEPTHS AND LEVELS ARE IN METRES

DARLING HARBOUR REDEVELOPMENT
LACKEY ST - HAY ST. S.W.C. AMPLIFICATION

W.N. 500006

SHEET 3 OF 5 SHEETS W.N. 500006

BF 3

A1

SHEET 4 OF 5 SHEETS

WORK AS EXECUTED	
COMPLETED	ENGINEER
OVERSEER	CONTRACTOR
	DISTRICT ENGINEER
	DISTRICT

PIPE JOINTING CODE
A COMPO OR CLAY CEMENT D POLYESTER-RUBBER RING
B RUBBER RING E SOLVENT WELD
C POLYURETHANE
ALL PIPES ARE GRANULAR BEDDED UNLESS OTHERWISE INDICATED.

RECORD OF ELECTRIC CABLES (E.C.C., S.R.A. & D.M.R.) HAY ST
RECORD OF GAS (H.P. AND M.P.) PIPELINES (SEE NOTE 5)
SITE CHECK NECESSARY

SEWERS ARE LOCATED IN PRIVATE PROPERTY UNLESS OTHERWISE INDICATED.

PIPES TO BE CONCRETE ENCASED SHOWN THUS

0 5 10 15 20 25 METRES
1:250

NOTE: EXISTING 225mm S.W.D's TO BE RECONNECTED WITH 300mm INLETS. SEE STANDARD DRAWING

LACKEY ST - HAY ST S.W.C. AMPL'N

CONTINUED FROM SHEET 3

SCALES
HOR. 1:250
VERT. 1:125

FOLS 9, 10 & 12
L.B. 23093

LENGTHS, DEPTHS AND LEVELS ARE IN METRES

DARLING HARBOUR REDEVELOPMENT
LACKEY ST - HAY ST S.W.C. AMPL'N

W.N.500006

SHEET 4 OF 5 SHEETS W.N.500006

0038085

A1
594mm x 841mm

SHEET 5 OF 5 SHEETS

WORK AS EXECUTED

COMPLETED ENGINEER
OVERSEER CONTRACTOR
DISTRICT ENGINEER
DISTRICT

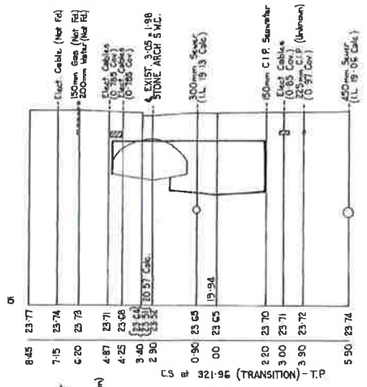
PIPE JOINTING CODE

A COMPO OR CLAY-CEMENT D POLYESTER-RUBBER RING
B RUBBER RING E SOLVENT WELD
C POLYURETHANE
ALL PIPES ARE GRANULAR BEDDED UNLESS OTHERWISE INDICATED.

RECORD OF ELECTRIC CABLES (SEE NOTE) (S.C.I & (SRA) HAY ST
RECORD OF GAS (H.P. AND M.P.) PIPELINES (SEE NOTE 5)
} SITE CHECK NECESSARY

SEWERS ARE LOCATED IN PRIVATE PROPERTY UNLESS OTHERWISE INDICATED

PIPES TO BE CONCRETE ENCASED SHOWN THUS



CROSS SECTIONS
SCALE 1:125 NATURAL

LENGTHS, DEPTHS AND LEVELS ARE IN METRES

DARLING HARBOUR REDEVELOPMENT
LACKEY ST-HAY ST. S.W.C. AMPLIFICATION
W.N. 500006

SHEET 5 OF 5 SHEETS W.N. 500006

APPENDIX H

SYDNEY SEWERAGE WORKS - HAY STREET SEWER

SYDNEY SEWERAGE WORKS

CONTRACT

SECTION Nº 3

HAY STREET SEWER

DRAWING

67

dep. 67

OCP-66

Parish Petersham IX 2-3-74

SYDNEY SEWERAGE WORKS

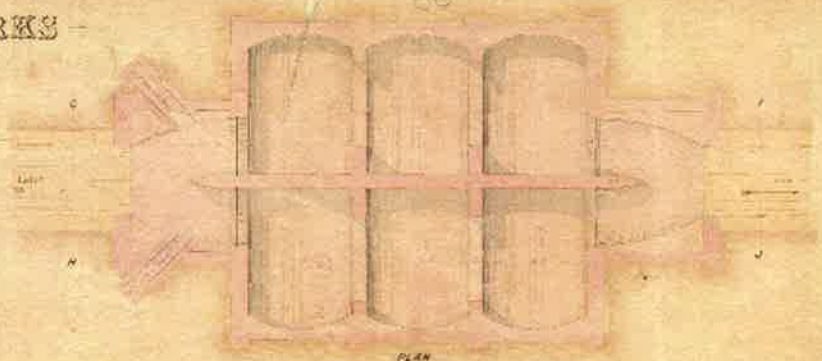
DETAILS OF SILT-PIT FOR 66

EXTENSION OF MAIN ST. SEWER

SHEET 2.

DETAIL OF INLET SEWER

SECTION ON LINE C H



PLAN

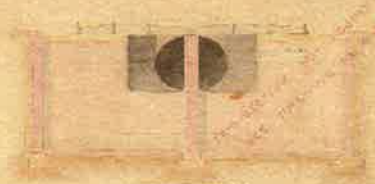
SHOWING CONCRETE ENHANCEMENT

DETAIL OF OUTLET SEWER

SECTION ON LINE I J

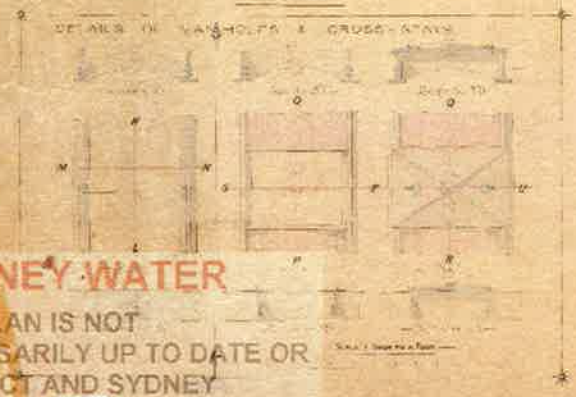
SECTION ON LINE E D

LONGITUDINAL SECTION ON LINE A B

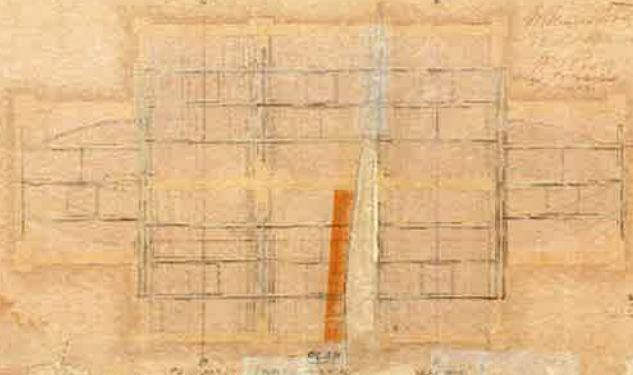


SECTION ON LINE G F

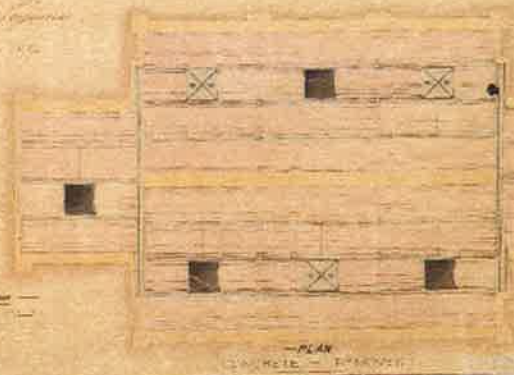
SHOWING CONCRETE REMOVED



DETAILS OF MANHOLES & CROSS-MAIN



PLAN



PLAN

CONCRETE ENHANCEMENT

O.C.P. 66

SYDNEY — SEWERAGE WORKS

Contract Drawing No 1-3-74

66

A GENERAL PLAN & SECTION

OF EXTENSION HAY ST. SEWER

SYDNEY - DARLING - HARBOUR

SHEET 3

59

DETAILS OF SEWER - MANHOLES &C

134

SECTION N° 3

SYDNEY SEWERAGE WORKS

CONTRACT N° 19

DRAWING N° 1

O.C.P. 134

May Street

O.C.P. 134

APPENDIX I

SYDNEY WATER CLOSED CONDUIT INSPECTION REPORT, AUGUST 2003

Sydney WATER

Stormwater Planning, Asset Management

CITY AREA SWC 30

Closed Conduit Inspection Report

Prepared by Sydney Water - Design Services

PIPELINES GROUP
August 2003

CLOSED CHANNEL INSPECTION SHEET

SWC No: 30 **Channel Name: Darling Harbour**
Branch No: DC30 A **Date of Inspection: 20/10/02**

Actual Length of Closed Channel: 665m
Inspected Length of Closed Channel: 390m

Section No.[1]	Inspection Chainage (m)	Internal Observation	Internal Photo[2]	External Landuse	Feature	Defect	Defect		
							Likelihood[3]	Consequence[4]	Action[5]
CP11	0.0	Start of Survey (Node K); Closed section at Hay St, Sydney; Heading downstream along single rectangular channel; Concrete cast in-situ; Blank wall upstream		High traffic road reserve (photo 33)					
CP11	2.0	Cross-connection to parallel channel	1-2	High traffic road reserve (photo 33)					
CP09 & CP10	10.0	Manhole MH10 (Node J); Second step iron from bottom is severely corroded; Incoming channel on right side, 1500mm high x 760mm wide	u/a	High traffic road reserve (photo 34)		✓	Unlikely	Major	Long-term
CP09 & CP10	20.0 - 36.0	100mm - 150mm silt deposit; Cell 1580mm high x 3320mm wide	u/a	High traffic road reserve (photo 34)		✓	Unlikely	Minor	Monitor
CP09 & CP10	67.0 - 239.0	100mm - 150mm silt deposit	u/a	High traffic road reserve (photo 34)		✓	Unlikely	Minor	Monitor
CP09 & CP10	80.0	Large debris in channel	u/a	High traffic road reserve (photo 34)		✓	Unlikely	Minor	Monitor
CP09 & CP10	174.0 - 178.0	Spalling concrete at previous patch around inlet on right side, with exposed reinforcement	3	High traffic road reserve (photo 35)		✓	Unlikely	Major	Long-term
CP08	226.0	Manhole MH08 (Node G); Third step iron from bottom is destroyed	4	Commercial property (photo		✓	Unlikely	Major	Long-term
CP04 to CP07	239.0	Incoming channel on left side (Node F)		Commercial property (photo					
CP04 to CP07	281.0 - 345.0	Deposition of silt and debris	u/a	Commercial property & parkland (photos		✓	Unlikely	Minor	Monitor
CP04 to CP07	345.0 - 390.0	Silt deposition deepens	u/a	Parkland (photos 40-41)		✓	Unlikely	Minor	Monitor
CP04 to CP07	358.0	Sealed inlet on left side, 1250mm high x 2200mm wide; Cell 1680mm high x 3400mm wide, on top of silt deposit; Two rail tracks in base of channel	u/a	Parkland (photos 40-41)	✓				

CLOSED CHANNEL INSPECTION SHEET

SWC No: 30 **Channel Name: Darling Harbour**
Branch No: DC30 A **Date of Inspection: 20/10/02**

Actual Length of Closed Channel: 665m
Inspected Length of Closed Channel: 390m

Section No.[1]	Inspection Chainage (m)	Internal Observation	Internal Photo[2]	External Landuse	Feature	Defect	Defect		
							Likelihood[3]	Consequence[4]	Action[5]
CP03	375.0	Manhole MH03 in roof on left side		Parkland (photos 40-41)					
CP03	385.0	Water 800mm deep		Parkland (photos 40-41)					
CP03	390.0	End of Survey; Water too deep and line of sight back to MH03 lost		Parkland (photos 40-41)					

CLOSED CHANNEL INSPECTION SHEET

SWC No: 30 **Channel Name: Darling Harbour**
Branch No: DC30 A2 **Date of Inspection: 20/10/02**

Actual Length of Closed Channel: 220m
Inspected Length of Closed Channel: 215m

Section No.[1]	Inspection Chainage (m)	Internal Observation	Internal Photo[2]	External Landuse	Feature	Defect	Defect		
							Likelihood[3]	Consequence[4]	Action[5]
CP15 & CP16	0.0	Start of Survey at MH16 (Node L); Closed section at Ultimo Rd, Sydney; Heading downstream along single rectangular channel; Concrete cast in-situ, with corrugated formation in roof; 1600mm high x 2600mm wide		High traffic road reserve (photo 42)					
CP15 & CP16	0.0	Start of transition from upstream 1380mm diameter channel, with incoming box culvert on	5	High traffic road reserve (photo 42)					
CP15 & CP16	5.0	End of transition; Cell 1600mm high x 2580mm wide		High traffic road reserve (photo 42)					
CP15 & CP16	15.0	Roof form changed to flat		High traffic road reserve (photo 42)					
CP15 & CP16	48.0 - 90.0	30mm deposition of silt and debris	u/a	High traffic road reserve (photo 43)		✓	Unlikely	Negligible	Monitor
CP11 to CP14	90.0	Manhole MH13 (Node J); Sealed inlet channel on left side, 800mm high x 1200mm wide		High traffic road reserve (photo 43)					
CP11 to CP14	91.0 - 116.0	Debris in channel floor	6-7	High traffic road reserve (photo 44)		✓	Unlikely	Minor	Monitor
CP11 to CP14	144.0 - 171.0	Debris in channel floor	u/a	High traffic road reserve (photo 44)		✓	Unlikely	Minor	Monitor
CP11 to CP14	171.0	Inlet in roof, 1000mm x 1000mm	u/a	High traffic road reserve (photo 44)	✓				
CP11 to CP14	171.0 - 179.0	Exposed reinforcement bar in roof, 300mm long	u/a	High traffic road reserve (photo 44)		✓	Unlikely	Major	Long-term
CP11 to CP14	179.0	Debris in channel floor	u/a	High traffic road reserve (photo 44)		✓	Unlikely	Minor	Monitor
CP11 to CP14	215.0	End of Survey; Start of transition, with incoming channel on left side; Floor drops away, and water too deep	8	High traffic road reserve (photo 44)					

CLOSED CHANNEL INSPECTION SHEET

SWC No: 30 **Channel Name: Lackey – Hay St**
Branch No: DC30 P1 **Date of Inspection: 20/10/02**

Actual Length of Closed Channel: 670m
Inspected Length of Closed Channel: 450m

Section No.[1]	Inspection Chainage (m)	Internal Observation	Internal Photo[2]	External Landuse	Feature	Defect	Defect		
							Likelihood[3]	Consequence[4]	Action[5]
CP09 to CP12		This sandstone arch section is the subject of a specific and separate investigation. Inspection observations for this section have been excluded from this Inspection Report.							
CP07 & CP08	5.0	Start of Survey at MH08 (Node H), heading downstream; Transition to rectangular channel; Concrete cast in-situ; 2200mm high x 3440mm wide		Footpath in road reserve (photo 45)					
CP07 & CP08	5.0 - 13.0	100mm - 200mm undulating silt deposit	u/a	Footpath in road reserve (photo 45)		✓	Unlikely	Minor	Monitor
CP07 & CP08	13.0	Sandstone boulder in channel	u/a	Footpath in road reserve (photo 45)		✓	Unlikely	Moderate	Long-term
CP07 & CP08	23.0 - 25.0	Honeycombing of concrete in roof; Exposed and corroded reinforcement	u/a	Parking lot in road reserve (photo 45)		✓	Likely	Major	Short-term
CP07 & CP08	28.0 - 30.0	Honeycombing of concrete in roof; Exposed and corroded reinforcement	u/a	Parking lot in road reserve (photo 45)		✓	Likely	Major	Short-term
CP07 & CP08	38.0	Manhole		Parking lot in road reserve (photo 45)					
CP07 & CP08	106.0	Manhole; Exposed and corroded reinforcement in roof, 1000mm long	u/a	Parking lot in road reserve (photo 45)		✓	Likely	Moderate	Long-term
CP07 & CP08	109.0	100mm pipe across roof of channel	u/a	Parking lot in road reserve (photo 45)	✓				
CP07 & CP08	118.0	Spalling concrete patch in roof, with exposed reinforcement; Spalling and drummy joint, across entire width of channel and 40mm long	9	Parking lot in road reserve (photo 45)		✓	Unlikely	Major	Long-term
CP07 & CP08	132.0 - 136.0	Aluminium sheeting in roof	10	Parking lot in road reserve (photo 46)	✓				
CP07 & CP08	149.0 - 160.0	150mm drop in roof		Parking lot in road reserve (photo 46)					

CLOSED CHANNEL INSPECTION SHEET

SWC No: 30 **Channel Name: Lackey – Hay St**
Branch No: DC30 P1 **Date of Inspection: 20/10/02**

Actual Length of Closed Channel: 670m
Inspected Length of Closed Channel: 450m

Section No.[1]	Inspection Chainage (m)	Internal Observation	Internal Photo[2]	External Landuse	Feature	Defect	Defect		
							Likelihood[3]	Consequence[4]	Action[5]
CP07 & CP08	164.0	400mm pipe across roof of channel	u/a	Parking lot in road reserve (photo 46)	✓				
CP07 & CP08	174.0 - 187.0	Aluminium sheeting in roof	u/a	Footpath in road reserve (photo 46)	✓				
CH06	183.0 - 185.0	Manhole chamber CH06 (Node FA), with step irons on each side	11	Footpath in road reserve (photo 46)					
CP06	187.0	Transition to trapezoidal channel; Concrete cast in-situ		Footpath in road reserve (photo 46)					
CP05	208.0	1460mm diameter inlet channel on right (Node F)		Parkland (photo 47)					
CP05	217.0	Inlet channel on left; Cell 2200mm high x 3060mm top width x 3170 bottom width		Parkland (photo 47)					
CP05	306.0	Start of horizontal bend		Parkland (photo 47)					
CP05	312.0	End of horizontal bend		Parkland (photo 47)					
CP05	319.0	Manhole		Parkland (photo 48)					
CP05	332.0	Start of transition to two cells, with weir blocking right cell	12-13	Parkland (photo 48)	✓				
CP05	346.0	End of transition (Node B)		Parkland (photo 48)					
CP04	0.0	Start of Survey (Node B); Heading downstream along trapezoidal right cell; Concrete cast in-situ; Weir blocking upstream end; 2200mm high x 3060mm top width x 2750mm bottom width	14	Parkland (photo 48)					

CLOSED CHANNEL INSPECTION SHEET

SWC No: 30 **Channel Name: Lackey – Hay St**
Branch No: DC30 P1 **Date of Inspection: 20/10/02**

Actual Length of Closed Channel: 670m
Inspected Length of Closed Channel: 450m

Section No.[1]	Inspection Chainage (m)	Internal Observation	Internal Photo[2]	External Landuse	Feature	Defect	Defect		
							Likelihood[3]	Consequence[4]	Action[5]
CP04	0.0 - 125.0	Survey abandoned due to very deep silt; Depth of silt greater than 900mm for full 125.0m length	u/a	Parkland (photo 48-49)		✓	Very likely	Moderate	Short-term
CP02	0.0	Start of Survey (MH02); Heading downstream along trapezoidal right cell; Concrete cast in-situ; 2200mm high x 3060mm top width x 2750mm bottom width; 500mm deep silt deposit	u/a	Parkland (photo 50)		✓	Unlikely	Minor	Monitor
CP02	9.0	Inlet channel on right side		Parkland (photo 50)					
CP01	98.0	Sealed manhole		Commercial property (photos 50-52)					
CP01	104.0	2000mm x 1500mm hole in roof; 160UB steel beams exposed; Roof slab 400mm thick; Sealed inlet on right side	15	Commercial property (photos 50-52)	✓	✓	Likely	Major	Short-term
CP01	105.0	Chainage measurement abandoned due to deep soft silt	u/a	Commercial property (photos 50-52)		✓	Unlikely	Minor	Monitor
CP01		Outlet to Darling Harbour observed		Commercial property (photos 50-52)					

CLOSED CHANNEL INSPECTION SHEET

SWC No: 30 **Channel Name: Lackey – Hay St**
Branch No: DC30 P2 **Date of Inspection: 20/10/02**

Actual Length of Closed Channel: 337m
Inspected Length of Closed Channel: 256m

Section No.[1]	Inspection Chainage (m)	Internal Observation	Internal Photo[2]	External Landuse	Feature	Defect	Defect		
							Likelihood[3]	Consequence[4]	Action[5]
CP01	0.0	Start of Survey (Node B); Heading downstream along trapezoidal left cell; Concrete cast in-situ; 2200mm high x 3060mm top width x 2750mm bottom width	16	Parkland (photo 48)					
CP01	66.0 - 104.0	Deposition of silt and large debris in channel	u/a	Parkland (photo 48-49)		✓	Unlikely	Minor	Monitor
CP01	256.0	End of Survey; Within sight of outlet to Darling Harbour		Commercial property (photos 50-52)					