BRISBANE CITY COUNCIL
BRISBANE WATER

Australia Trade Coast Sewer Project

SP298

Lytton Rd No. 4 Pump Station

Operation & Maintenance Manual

Contract No. BW30137-02/03

Volume No. 4

BRISBANE CITY COUNCIL
Brisbane Water
Lytton Road P/S SP298 Australia Trade Coast Sewer Project

BW30137-02/03

Volume	Section	Description	Pages
1	1	**Table of Contents**	7
		Electronic copy of complete Operation & Maintenance Manual on CD.	
		Hyperlink Files\Title Page Volume 1.doc Hyperlink Files\Title Page Volume 2.doc Hyperlink Files\Title Page Volume 2.1.doc Hyperlink Files\Title Page Volume 3.doc Hyperlink Files\Binder Labels.doc Hyperlink Files\Title Page Volume 4.doc Hyperlink Files\Title Page Volume 5.doc Volume/Title Pages & Binder Labels	
		Hyperlink Files\Revisions Page.xls Revisions	1
	1.1	**Introduction and System Overview Lytton Road No.4 P/S SP298**	
		Hyperlink Files\OMM SP298 Introduction Description Design and Process RevA.doc Subsection 1	6
		Description of System and Overview Locality Keyplan Subsection 1.1	
		Design and Process Subsection 1.2	
		Pumping System Operation Subsection 1.3	
		Inlet Valve Pit at SP298 No.4 Interconnected Rising Mains Subsection 1.4	
		Interconnected Rising Mains Manual Operated Valves Subsection 1.5	
		Flow Diverted from SP298 No.4 to Gibson Island WWTP Subsection 1.6	
		Pump Station SP298 No.4 Layout Subsection 1.7	
	1.2	**Pump Station Equipment Operation**	
		Functional Specification SP298 Lytton Rd 4 described in this document are in addition to the standard functionality detailed in SPSV3 57pages. 1.1 General Process Description 2.1 Standard Equipment 2.2 Non Standard Equipment 2.2.3 Actuated Valves 3.1 Normal Operation Figure 3: SP298 Station Level Set Points 3.4 Non Standard Control 3.6 Non Standard IDTS Picture	18
		Hyperlink Files\SPSV3.doc Standard Functional Specification SPSV3	57
2	2	**Proprietary Equipment Manuals/Maintenance and Service**	
	2.1	**Weir Services: Hydrostal Pumps**	
		Hyperlink Files\Hydrostal Pump I & O manual Lytton Rd - rev A.doc Including the following	52
		Description of Equipment	
		Operation and Maintenance	
		Maintenance and Service	
		Impeller Clearance Adjustment for Wear	
		Recommended Spare Parts	

BRISBANE CITY COUNCIL BW30137-02/03
Brisbane Water
Lytton Road P/S SP298 Australia Trade Coast Sewer Project

Volume	Section	Description	Pages
		Section 1.0 General Description of Operation	
		Section 2.0 General Description of System (Componenets)	
		Hyperlink Files\Common Logic.pdf Section 3.0 As Construction Drawings. Including Door Key Allocation	13
		Hyperlink Files\Drg Transmittal Common Logic.pdf Section 3.1 Drawing Transmittal	3
		Hyperlink Files\Parts List Common Logic.pdf Section 4.0 Part List	3
		Hyperlink Files\Tech Data Sheets Common Logic.pdf Section 5.0 Technical Manuals and Data Sheets	1
		Hyperlink Files\TDS1804S277.pdf Section 5.0 TDS-DinLine Surge Suppressor. Installation Instructions	32
		Hyperlink Files\TDF10A240V.pdf Section 5.0 Transient Discriminating Filter Model Number TDF-10A-240V. Installation Instructions	2
		Hyperlink Files\DAR275V.pdf Section 5.0 DinLine Alarm Relay (DAR) Model Number DAR275v. Installation Instructions.	2
		Hyperlink Files\3000-000-06.pdf Section 5.0 Rotork Circuit Diagram N0-REV 3000-000-06	1
		Hyperlink Files\Rotork Electric E170E2.pdf Section 5.0 Rotork IQ Range Installation and Maintenance Instructions	86
		Hyperlink Files\RWS300 (IQ IQT Remote Control 24Vdc).pdf Section 5.0 Rotork Standard IQ/IQT Remote Control Circuitry (24V DC)	1
		Hyperlink Files\multitrode_mtr_international-datasheet.pdf Section 5.0 Liquid Level Control Relay	2
		Hyperlink Files\Switchboard Electrical Accessories\AustSol\CA10 switches.pdf Section 5.0	56
		Hyperlink Files\Switchboard Electrical Accessories\CROMPTON\analogue244.pdf Section 5.0	21
		Hyperlink Files\Switchboard Electrical Accessories\CROMPTON\din250 trip relay.pdf Section 5.0	8
		Hyperlink Files\Switchboard Electrical Accessories\Mann Ind\MannIndQS_FTXDMV.pdf Section 5.0	2
		Hyperlink Files\Switchboard Electrical Accessories\Phoenix Contact\3004032[1].pdf Section 5.0	7
		Hyperlink Files\Switchboard Electrical Accessories\Phoenix Contact\3004100[1].pdf Section 5.0	7
		Hyperlink Files\Switchboard Electrical Accessories\Phoenix	2

BRISBANE CITY COUNCIL BW30137-02/03
Brisbane Water
Lytton Road P/S SP298 Australia Trade Coast Sewer Project

Volume	Section	Description	Pages
		Contact\uk5n_en.pdf Section 5.0	
		Hyperlink Files\Vegabar27525-EN.pdf Section 5.0 Vegabar 64 Pressure Transmitter 4—20 mA/HART. Operating Instructions	72
		Hyperlink Files\Vegadis20591-EN.pdf Section 5.0 Adjustment Module for Pressure Transmitter. Operating Instructions	16
		Hyperlink Files\Vegawell27630-EN.pdf Section 5.0 Vegawell 72 is a suspension pressure transmitter for level and gauge measurement. Operating Instructions	48
		Hyperlink Files\MagMaster flowmeter.pdf Section 5.0 Instruction Manual	24
		Section 5.1 Contents Sheet	
		Hyperlink Files\mg10p222.pdf Section 6.0 Danfoss VFD Instruction Manual Modbus RTU	33
		Hyperlink Files\SP298 VFD Settings Pump No 1 and No. 2 As Built rev 1.pdf Section 6.1 VFD Settings and Parameters	3
		Hyperlink Files\doc_C_1_MG80A802.pdf Section 6.2 Danfoss VFD Operating Instructions VLT 8000 AQUA	197
		Hyperlink Files\Lytton Rd ITP.pdf Hyperlink Files\Lytton Rd FAT.pdf Section 7.0 ITP Procedure, Test Sheets & Factory Acceptance Test	5 11
		Hyperlink Files\BW Factory Acceptance Test Document Switchboard.pdf BW Factory Acceptance Test Document Switchboard	4
3	3	**Drawings & Drawing Register**	
		Electronic copy of the following drawings on CD. Table of Contents	
	3.1	Hyperlink Files\Drawing Register.xls	7
		Hyperlink Files\486 5 7-TR201 001.pdf Locality Keyplan Drawing	1
		Hyperlink Files\Location Map SP298.doc Street Location Map	1
		As Constructed Drawings Rising Mains	
	3.2	Hyperlink Files\Pages from Rising Main Lindum Rd to Lytton Rd.pdf Sewer Rising Main from Connection to Kiawanah Road P/S SP49 Rising Main at Lindum Road to Lytton Road No 4 Pump Station.	10
	3.3	Hyperlink Files\Pages from Rising Main Prichard St to Lytton Rd.pdf Sewer Rising Main Prichard Street Pumping Station to Lytton Road No.4	13

Volume	Section	Description	Pages
		Pumping Station	
	3.4	Hyperlink Files\Rising Main Drg Lytton Rd to Serpentine Rd.pdf Sewer Rising Main Lytton Road Pump Station (SP298) to Serpentine Road Pump Station (SP300)	16
		As Constructed Drawings Pump Station SP298 Mechanical/Electrical/Switchboard/Generator/Pit Covers	
	3.5	Hyperlink Files\lytton rd.pdf As-constructed drawings Lytton Rd Pump Station SP298. Mechanical/Electrical/Switchboard/Generator/Pit Covers	89
		Weir Services: Pump General Arrangement Drawing	
	3.6	Hyperlink Files\wd8159_2 Layout1 (1).pdf	1
4	4	**Traning/System Testing/Pre-Commissioning/Installation Method Statement/QA Records**	
		BW Site Based Traning Hyperlink Files\BW Site Based Training.pdf	4
	4.1	**BW: System Integration Testing**	
		Hyperlink Files\SP298 SP300 System Integration Testing Procedure Rev 1.doc (BW) System Integration Testing Procedure SP 298 Lytton Rd Pump Station & SP 300 Serpentine Rd Pump Station. Including the following	7
		Hyperlink Files\BW ITP 001 Rev0.pdf (BW) ITP: 001 Rev.0 EQUIPMENT: Sewer RM Pritchard St PS to Lytton Rd PS. Sewer RM from connection to Kiawanah Rd PS SP49 RM at Lindum Rd to Lytton Rd PS.	1
		Hyperlink Files\BW ITP 002 Rev0.pdf (BW) ITP: 002 Rev.0 (Separable Portion 2 SP298 Lytton Rd Pump Station) EQUIPMENT: Pumping Station Site System Commissioning	1
		Hyperlink Files\BW ITP 003 Rev0.pdf (BW) ITP: 003 Rev.0 (Separable Portion 2 SP300 Serpentine Rd Pump Station) EQUIPMENT: Pumping Station Site System Commissioning	1
		Hyperlink Files\Check List 1.pdf (BW) Inspection Check List No1 Lytton Rd	1

Volume	Section	Description	Pages
		Hyperlink Files\Check List 2.pdf (BW) Inspection Check List No 2 Serpentine Rd	1
		Hyperlink Files\SP300 Serpentine Road Functional Spec 1-10.doc Hyperlink Files\SP300 FS Document Signoff Approval.pdf	24 1
		Hyperlink Files\SP300 Functional Specification Rev 3.doc Parsons Brinckerhoff Date of Issue: 4 November 2004	26
		Hyperlink Files\SP298 Lytton Road 4 Functional Spec 1-10.doc Hyperlink Files\SP298 FS Document Signoff Approval.pdf (BW) 1-05. doc	18 1
		Hyperlink Files\SP298 Functional Specification Rev 4.pdf Parsons Brinckerhoff Date of Issue: 5 November 2004	24
		Hyperlink Files\Trends SP298 13-06-2005 (2-6-24 hours).pdf Lytton Rd P/S SP298 No.4 Pump Trends (2/6/24hours)	3
		Hyperlink Files\Trends SP300 - Concrete Main - 06-10-2005 (2-6-24 hours).pdf Serpentine Rd P/S SP300 Pumping into the DN1840 Concrete Rising Main. Eagle Farm at Maximum Flow. Pump Trends (2/6/24hours)	3
		Hyperlink Files\Trends Steel Main SP300 11-06-2005 (2-6-24 hours).pdf Serpentine Rd P/S SP300 Pumping into the DN1370 Steel Rising Main. Pump Trends (2/6/24hours)	3
		Hyperlink Files\BW Site Acceptance Test Document Switchboard.pdf BW Site Acceptance Test Document Switchboard	3
		Hyperlink Files\BW IDTS Point Commissioning Sheet Switchboard.pdf BW IDTS Point Commissioning Sheet Switchboard	5
		Hyperlink Files\BW Site Inspection Report Switchboard.pdf BW Site Inspection Report Switchboard	6
	4.2	**Leighton/Parsons Brinckerhoff: Pre-Commissioning Report**	
		Hyperlink Files\Letter Electrical Installation in accordance with AS3000.pdf Letter from REDILEC (who was working under Leighton direction) to certify that the electrical works is in accordance with AS3000.	1
		Hyperlink Files\RPT020Bvb - Precommissioning Lytton Rd PS.pdf Pre-commissioning Report Lytton Road Pump Station SP298. Including the following.	34
		Introduction	
		Appendix A: Pre-commissioning plan	
		Appendix B: Temporary pre-commissioning pipework arrangement	
		Appendix C: Manufacturers test data	
		Appendix D: Pre-Commissioning test data	

4	4	Traning/System Testing/Pre-Commissioning/Installation Method Statement/QA Records	
		BW Site Based Traning Hyperlink Files\BW Site Based Training.pdf	4
	4.1	**BW: System Integration Testing**	
		Hyperlink Files\SP298 SP300 System Integration Testing Procedure Rev 1.doc (BW) System Integration Testing Procedure SP 298 Lytton Rd Pump Station & SP 300 Serpentine Rd Pump Station. Including the following	7
		Hyperlink Files\BW ITP 001 Rev0.pdf (BW) ITP: 001 Rev.0 EQUIPMENT: Sewer RM Pritchard St PS to Lytton Rd PS. Sewer RM from connection to Kiawanah Rd PS SP49 RM at Lindum Rd to Lytton Rd PS.	1
		Hyperlink Files\BW ITP 002 Rev0.pdf (BW) ITP: 002 Rev.0 (Separable Portion 2 SP298 Lytton Rd Pump Station) EQUIPMENT: Pumping Station Site System Commissioning	1
		Hyperlink Files\BW ITP 003 Rev0.pdf (BW) ITP: 003 Rev.0 (Separable Portion 2 SP300 Serpentine Rd Pump Station) EQUIPMENT: Pumping Station Site System Commissioning	1
		Hyperlink Files\Check List 1.pdf (BW) Inspection Check List No1 Lytton Rd	1
		Hyperlink Files\Check List 2.pdf (BW) Inspection Check List No 2 Serpentine Rd	1
		Hyperlink Files\SP300 Serpentine Road Functional Spec 1-10.doc Hyperlink Files\SP300 FS Document Signoff Approval.pdf	24 1
		Hyperlink Files\SP300 Functional Specification Rev 3.doc Parsons Brinckerhoff Date of Issue: 4 November 2004	26
		Hyperlink Files\SP298 Lytton Road 4 Functional Spec 1-10.doc Hyperlink Files\SP298 FS Document Signoff Approval.pdf (BW) 1-05. doc	18 1
		Hyperlink Files\SP298 Functional Specification Rev 4.pdf Parsons Brinckerhoff Date of Issue: 5 November 2004	24
		Hyperlink Files\Trends SP298 13-06-2005 (2-6-24 hours).pdf Lytton Rd P/S SP298 No.4 Pump Trends (2/6/24hours)	3
		Hyperlink Files\Trends SP300 - Concrete Main - 06-10-2005 (2-6-24 hours).pdf Serpentine Rd P/S SP300 Pumping into the DN1840 Concrete Rising Main. Eagle Farm at Maximum Flow. Pump Trends (2/6/24hours)	3
		Hyperlink Files\Trends Steel Main SP300 11-06-2005 (2-6-24 hours).pdf Serpentine Rd P/S SP300 Pumping into the DN1370 Steel Rising Main. Pump Trends (2/6/24hours)	3
		Hyperlink Files\BW Site Acceptance Test Document Switchboard.pdf BW Site Acceptance Test Document Switchboard	3
		Hyperlink Files\BW IDTS Point Commissioning Sheet Switchboard.pdf BW IDTS Point Commissioning Sheet Switchboard	5

		Hyperlink Files\BW Site Inspection Report Switchboard.pdf BW Site Inspection Report Switchboard	6
	4.2	**Leighton/Parsons Brinckerhoff: Pre-Commissioning Report**	
		Hyperlink Files\Letter Electrical Installation in accordance with AS3000.pdf Letter from REDILEC (who was working under Leighton direction) to certify that the electrical works is in accordance with AS3000.	1
		Hyperlink Files\RPT020Bvb - Precommissioning Lytton Rd PS.pdf Pre-commissioning Report Lytton Road Pump Station SP298. Including the following.	34
		Introduction	
		Appendix A: Pre-commissioning plan	
		Appendix B: Temporary pre-commissioning pipework arrangement	
		Appendix C: Manufacturers test data	
		Appendix D: Pre-Commissioning test data	
		Appendix E: Pump data comparison graphs	
		Conclusion	
	4.3	**Leighton: Work Method Statement**	
		Hyperlink Files\Q1112-CS-701 CMS SP1 Rising Main.pdf Leighton Construction Method Statement: Rising mains from Pritchard St P/S to Lytton Rd P/S and Lytton Rd P/S to Lindum Rd pipeline.	9
		Hyperlink Files\Q1112-CS-703 CMS of SP2 Rising Main.pdf Leighton Construction Method Statement: Rising mains from Lytton Rd P/S to Serpentine Rd P/S.	8
		Hyperlink Files\Q1112-CS-704 CMS of Lytton Road pump station.doc Leighton Construction Method Statement: Lytton Rd P/S	9
	4.4	**Leighton: Installation QA Records**	
		Hyperlink Files\QA Records.zip Open Lytton QA Register (xls) first for Abbreviated Description	

4

PASTEL
MANILLA
DIVIDERS
5 TAB A4

marbig

Ref. No. 37000
Made in China
Distributed by ACCO Australia

9 312311 370002

[redacted]

Australia Trade Coast Sewer Project Contract No.: BW 30137-02/03
BW Site Based Training
Lytton Rd P/S SP298 & Serpentine Rd P/S SP300
Attendance Record

Name	Section	Date	Signature
W. COLLIE	BW - PROJECTS	29-09-05	
T. POWER	BW - MTC Plant	29/09/05	
P. Carpendale	BW - Field	29/09/05	P. Carpendale
J KINNEARD	" VS FIELD	29/9/05	
A. MASON	BW - FIELD	29/9/05	
G. KAMCEV	BW FIELD	29/9/05	
J. Klauss	BW NCS	29/9/05	
G. Andersan	BW NCS	29/9/05	
L Doherty	BW MTC Plant	29/9/05	
S. MORRISON	BW NCS	29/9/05	
M. McPHEAT	BW M+E	29/9/05	
N. STANTON	BW M+E	29-9-05	
L. COMBER	B.W. M+E	29-9-05	
M. Cooper	B.W M+E	29/9/05	M. Cooper
R SEHMISH	B W M&E	29-9-05	
F. SAMAL	B.W Maint. Planning	29/9/05	
L. BREWER	B.W	29/9/05	
N. GLIDDON	BW	29.9.05	
P. KAVANAGH	BW	27306	
P. MORTINO	BW	39292	
S. PEEL	BW	29266	

Australia Trade Coast Sewer Project Contract No.: BW 30137-02/03
BW Site Based Training
Lytton Rd P/S SP298 & Serpentine Rd P/S SP300
Attendance Record

Name	Section	Date	Signature
GARRON LUMLEY	BRIS/Water	6/10/05	
KEITH DAVIS	Bris Water	6/10/05	
ALBERT BORLAND	BRIS WATER	6.10.05	
PAUL YOUNG.	BRIS-WATER	6/10/05.	
Peter Heim	B/W	6/10/05	
LUKE LAKE	B/W	6/10/05	
JON BURTON	BW	6/10/05	
Gregg Buckley	BW	6/10/05	
JAMIE SCHEIWE	B.W.	6/10/05.	
Harish Prakash	B.W	6/10/05	
PETER SWERRIFF	B.W.	6/10/05	
IAN DIXON	BW	6/10/05	
DAVID WILLIAMS	B.W.	6/10/05	D.W.
Karen Burt	BW	6/10/05	

From: Reg McGirr
To: Colston, Jason; Harrison, Shane; Ralph, Noel
Date: Thu, Sep 22, 2005 8:23 am
Subject: Fwd: Re: AUSTRALIAN TRADE COAST SEWER PROJECT. Contract No. BW30137-02/03 On Site Pump Station Traning

Shane/Noel/Jason,

Operational personal site based training at the following two (2) pumping stations.

Lytton Road Pumping Station SP298
Serpentine Road Pumping Station SP300

When: Thursday 29 September 05 Time 9am to 11am.
Where: Lytton Road Pumping Station SP298.
Points to be covered in training:

Handout: Australia Trade Coast **Keyplan Drg** 486/5/7-TR201/001: Overview of Pumping System.

1) Reg McGirr Walkaround site:
Incoming rising mains from Prichard St SP85 & Kianwanah Rd SP49.
Bypass piping arrangement to Gibson Island WWTP.
Inlet valve pit. (Knife Valve Actuated) (Sump Pump).
Grit Collector pit. (Vactor piping).
Pump Wetwell. (Hidrostal Pumps 71Kw) (Vactor piping).
Overflow piping.
Discharge valve pit. (Pressure Transmitter) (Sump Pump).
Flow meter.
Rising Main to Serpentine Rd SP300.

Alex Witthoft - Control System Overview
Standard MITS MD3311 site with GE Fanuc PLC controlling pumps
Pump Control
PID Control
Valve Control - Failure Modes.
a - Normal Mode - Both Open
b - Surcharge Mode - Kianawah Diverted (1 Closed, 2 Open)
c - Failure Mode - (1 Open, 2 Closed).
Peer 2 Peer Comms. - Systemic Control

When: Thursday 29 September 05 Time 12 to 2pm.
Where: Serpentine Road Pumping Station SP300
Points to be covered in training:

2)Reg McGirr Walkaround site:
Incoming rising mains from Lytton Rd SP298 & Kingsford Smith Drive SP146.
Wetwell . (Knife Valves) (Overflow to rising main) (Odour pipework) (Vactor Piping).
Pump Drywell . (Hidrostal Pumps 234Kw) (Sump Pump) (Valving Actuated)(Pressure Transmitter) (Sump Pump).
Drain valve pit.
Flow meters.
Rising Mains to. (1370 Main) (1840 Main) (Isolation Valves).

Alex Witthoft - Control System Overview Standard MITS MD3311 site with GE Fanuc PLC controlling pumps
Pump Control
PID Control
Valve Control - Rising Main Selection
a - DN1370 (1 Closed, 2 Open)
b - DN1840 (1 Open, 2 Closed)

In remote - selected from Control Room, Local - Push buttons - Close before Open
Peer 2 Peer Comms. - Systemic Control.

Regards,
Reg McGirr
Commissioning Manager
Tel: 07 34033349
E-mail: Reg.McGirr@brisbane.qld.gov.au

Regards,
Reg McGirr
Commissioning Manager
Tel: 07 34033349
E-mail: Reg.McGirr@brisbane.qld.gov.au

CC: Bannink, Andrew; Witthoft, Alexander

4.1

System Integration Testing Procedure
SP 298 Lytton Rd Pump Station & SP 300 Serpentine Rd Pump Station

Australian Trade Coast Sewer Project Contract No.: BW 30137-02/03
Project/System Background

1. Lytton Rd Pump Station

1.1 Incoming sewage is pumped through two separate mains one from Pritchard Street PS (SP85) and the other from Kianawah Road PS (SP49). To reference the incoming sewage mains refer to BW drawing numbers 486/5/8-SM20/021 & 486/5/8-SM21/021.
Above section of the mains has been commissioned and Pritchard Street PS (SP85) has been redirected to Gibson Island WWTP.

1.2 Note Pritchard Street PS (SP85) and Kianawah Road PS (SP49) incoming mains into Lytton Rd PS are interconnected by valving at two section within the mains.
Reference drawing 486/5/7-WR101/022 note the three manual valves in the road at the entrance to Lytton Rd PS.
Reference drawing 486/5/7-WR101/030 note Mark No. 34 actuated valve and Mark No. 33 manual valve.
The mains are interconnected for the following reasons.
High flow conditions into Lytton Rd PS: SP49 will be diverted to Gibson Island WWTP.
Failure Condition at Lytton Rd PS: All flow is diverted to Gibson Island WWTP.
For a more detailed description of the bypass system on the incoming mains into Lytton Rd PS refer to Functional Specification page 8.

1.3 To understand the layout of Lytton Rd PS refers to drawings numbers 486/5/7-WR101/030 and 486/5/7-WR101/031.

1.4 The discharge main from Lytton Rd PS refers to drawing number 486/5/8-SM18/021.
The main has been pre-commissioned by pumping water from Lytton Rd PS to Serpentine Road PS.

1.5 Lytton Rd PS has been separately pre-commissioned on clear water using a bypass piping system. All equipment has been tested according to the functional specification.

Issue Date: 27/4/05
Rev No: 1

System Integration Testing Procedure
SP 298 Lytton Rd Pump Station & SP 300 Serpentine Rd Pump Station

2. Serpentine Road Pump Station

2.1 Incoming sewage is pumped through two separate mains one from Lytton Rd PS (drawing No. 486/5/8-SM18/021) and the other from Kingsford Smith Drive PS SP146 (drawing No. 486/5/8-SM17/021).
Note: The Kingsford Smith Drive main into Serpentine Road PS will not be part of this system integration testing.

2.2 To understand the layout of Serpentine Road PS refer to drawings numbers 486/5/7-TR201/031 and 486/5/7-TR201/030.

2.3 The discharge main from Serpentine Road PS refers to drawing number 486/5/7-TR201/021. Note one main has been pre-commissioned by pumping water from Serpentine Road PS into the DN1370 rising main.

2.4 Serpentine Road PS has been separately pre-commissioned on clear water using a bypass piping system. All equipment has been tested according to the functional specification.

System Integration Testing Procedure
SP 298 Lytton Rd Pump Station & SP 300 Serpentine Rd Pump Station

3. Responsibility Codes

The Responsibility Codes used on the ITP and Inspection Check Lists are as followers:

Name	Code	Branch/Section	Required Dates
Andrew Bannink	AB	Project Manager (BW)	Nil
Alex Witthoft	AW	Networks Control Systems (BW)	30/31 May 05 and1 June 05
Geoffrey Timms	GT	Networks Control Systems (BW)	30/31 May 05 and1 June 05
Kerry McGovern	KM	Co-Ordinator Electrical (BW)	31 May 05
Sidney Wain	SW	Hydrotechnic Operation (BW)	30/31 May 05 and1 June 05
Henri Lai	HL	Engineering Manager (BW)	Nil
Ralph Berry	RB	Contracts Manager Electrical (BW)	30/31 May 05
Peter Hague	PH	Construction Manager Electrical (BW)	30/31 May 05
Brian McMahon	BM	Construction Manager (BW)	30/31May 05 and 1 June 05
Reg McGirr	RM	Commissioning Manager (BW)	30/31 May 05 and1 June 05
George Henry	GH	Water & Sewerage Operations Manager (BW)	Nil

4. Attachments:

Inspection & Test Plan No.: 001 Rev.0 Separable Portion 1.
Inspection & Test Plan No.: 002 Rev.0 Separable Portion 2 Lytton Rd PS SP298.
Inspection & Test Plan No.: 003 Rev.0 Separable Portion 2 Serpentine Road PS SP300.
Inspection Check List No 1. Lytton Rd
Inspection Check List No 2. Serpentine Rd
Functional Specification Lytton Rd PS SP298.
Functional Specification Serpentine Road PS SP300.
KEYPLAN Drg No: 486/5/7-TR201/001 Overview of Pumping System.

5. Inspection & Test Plans and Inspection Check Lists

To be signed before proceeding with system integration testing

6. Staff Responsibilities

Commissioning Manager	Reg McGirr/ Henri Lai	To provide direction as required and to insure that all ITP,s and check sheets have been signed before proceeding with system integration testing
Networks Control Systems	Alex Witthoft/ Geoffrey Timms	Responsible for starting/monitoring and controlling the two pumping systems.
Electrical Manager	Ralph Berry/ Peter Hague	Ensure that all electrical equipment is ready for automatic operation.
Field Commissioning Monitoring	Sidney Wain/ Brian McMahon,	Ensure all valving is in the correct position for automatic operation. Once the pumps are started all rising mains to be bleed of air. The above in accordance with Inspection Check Lists 1 & 2. **All Air Valve Manholes to be emptied of water/sewage by 27 May 05.**

System Integration Testing Procedure
SP 298 Lytton Rd Pump Station & SP 300 Serpentine Rd Pump Station

7. System Pre-commissioning Procedure

7.1 Everyone involved in the system integration testing to assemble at Serpentine Road Pumping Station on 30 May 2005 Time 8am.

7.2 **Workplace Health & Safety**

Tool Box talk (8:15am) before the start of the System Integration Testing to cover the following:

- Everyone has a copy and understands the System Integration Testing Procedure/Documentation.
- In case of a emergency (during normal working hours) regarding the System Integration Testing:

First point of contact	**Reg McGirr :**	**Mobile Tel No. 0415293772**
Second point of contact	**Alex Witthoft :**	**Mobile Tel No. 0414236300**
Third point of contact	**Andrew Bannink :**	**Mobile Tel No. 0412178551**

- **Confined Space Entry Permit** will be the responsibility of **Sidney Wain.**
  Note: No entry into a confined space without Authority Card.

7.3 All ITP,s and Inspection Check Lists signed and handed in before automatic operation.

- Inspection & Test Plan No.: 001 Rev.0 Separable Portion 1.
- Inspection & Test Plan No.: 002 Rev.0 Separable Portion 2 Lytton Rd PS SP298.
- Inspection & Test Plan No.: 003 Rev.0 Separable Portion 2 Serpentine Road PS SP300.
- Inspection Check List No 1. Lytton Rd
- Inspection Check List No 2. Serpentine Rd

System Integration Testing Procedure
SP 298 Lytton Rd Pump Station & SP 300 Serpentine Rd Pump Station

8. System Integration Testing – Day 1 (Monday 30 May 2005 Time 8am. Everyone involved in the system integration testing to assemble at Serpentine Road Pumping Station).

8.1 Serpentine Road PS placed in Remote and Lytton Rd PS placed in Remote

! Inlet Valve to SP298 opens allowing flow from SP049 and SP085 to enter SP298 wet well.

8.2 Monitor the operation of the pump systems according to the Functional Specifications SP298 and SP300.

! Monitor the wet well at SP298 and confirm that the duty pump starts at the start level and stops at the stop level.

! Once SP298 has started to cycle, SP300 wet well will start to fill. Monitor the wet well at SP300 and confirm that the duty pump starts at the start level and stops at the stop level.

! Monitor at least 2 cycles for each wet well (each pump has started once).

8.3 Manual Inhibit of SP298 by the control room operator.

! Once the operator has inhibited both pumps at SP298, ensure that the inlet valve (vlv2) to SP298 closes, diverting all inflow to the station to Gibson Island WWTP.

! Once confirmed, un-inhibit all pumps and ensure the inlet valve (vlv2) opens.

8.4 Systemic Control – Power Failure

! Simulate complete power outage at Serpentine Rd SP300 (Both energex and generator failure) and ensure the systemic control from SP300 Serpentine Rd to SP298 Lytton Rd automatically, via peer to peer communications over the Trio radio network, "inhibits" all pumps at Lytton Rd. This will occur once the wet well level rises above the start level.

! Once the systemic control has inhibited both pumps at SP298, ensure that the inlet valve (vlv2) to SP298 closes, diverting all inflow to the station to Gibson Island WWTP.

! Once confirmed, re-establish the power at SP300, enabling both pumps to become available. Ensure that both pumps at SP298 are subsequently un-inhibited and ensure the inlet valve (vlv2) opens. This will occur once the wet well level falls below the start level.

8.5 Systemic Control – Pump Failure

! Repeat the above test, replacing a site power failure with both pump failing (by pressing Emergency Stop on both pumps).

8.6 **The pumping system will be left in the automatic position overnight.** Site Instruction will be left at both SP298 and SP300 that if there is a system failure, SP298 should immediately have both pumps inhibited (if the systemic control has not done so already) to divert all flow to Gibson Island.

8.7 **Pumping trends** of Lytton Rd PS and Serpentine Rd PS to be captured at the end of the day.

! Trends required of Wet Well Levels.

! Trends required of Delivery Flow.

! Trends required of Delivery Pressure.

System Integration Testing Procedure
SP 298 Lytton Rd Pump Station & SP 300 Serpentine Rd Pump Station

! Trends required of Pump Power, Speed and Running Signal.

9. System Integration Testing – Day 2

9.1 **Day 2 Tuesday 31 May 2005 Time 8am**. Everyone involved in the system integration testing to assemble at Serpentine Road Pumping Station.

! Review of previous days work and work to be carried out.
! Signage of Inspection Check Lists and ITP,s.

9.2 **System Integration Testing** – To ensure that the introduction of SP300 does not have a detrimental impact on the operation of Eagle Farm pumping station during high flow conditions, the following flow conditions will be simulated. The performance of both Eagle Farm SP010 and Serpentine Rd SP300 compared at the different flow and pressure conditions. The readings will be provided by either Alex Witthoft (AW) stationed at SP300 or Kerry McGovern (KM) stationed at SP010 and will be recorded by Reg McGirr.

SP300 pumping into the DN1370 steel rising main. (High Pressure)

Eagle Farm at Maximum Flow – SP300 under normal operation.

! Ramp up Eagle Farm pumping to maximum flow rate down the DN1370. (4200 l/s) Time: _____
! Record the Delivery Flow and Pressure at SP300 _____ mAHD _____ l/s (AW)
! Record the Delivery Flow and Pressure at SP010 _____ mAHD _____ l/s (KM)
! Start SP300 under surcharge pumping mode (one pump at 25 Hz).
! Record the Delivery Flow and Pressure at SP300 _____ mAHD _____ l/s (AW)
! Record the Delivery Flow and Pressure at SP010 _____ mAHD _____ l/s (KM)

Eagle Farm at Maximum Flow – SP300 under high flow operation.

! Ramp up Eagle Farm pumping to maximum flow rate down the DN1370. (4200 l/s) Time: _____
! Record the Delivery Flow and Pressure at SP300 _____ mAHD _____ l/s (AW)
! Record the Delivery Flow and Pressure at SP010 _____ mAHD _____ l/s (KM)
! Start SP300 under surcharge pumping mode (one pump at 50 Hz).
! Record the Delivery Flow and Pressure at SP300 _____ mAHD _____ l/s (AW)
! Record the Delivery Flow and Pressure at SP010 _____ mAHD _____ l/s (KM)

Eagle Farm at Maximum Flow – SP300 under surcharge pumping mode.

! Ramp up Eagle Farm pumping to maximum flow rate down the DN1370. (4200 l/s) Time: _____
! Record the Delivery Flow and Pressure at SP300 _____ mAHD _____ l/s (AW)
! Record the Delivery Flow and Pressure at SP010 _____ mAHD _____ l/s (KM)
! Start SP300 under surcharge pumping mode (both pumps at 50 Hz).
! Record the Delivery Flow and Pressure at SP300 _____ mAHD _____ l/s (AW)
! Record the Delivery Flow and Pressure at SP010 _____ mAHD _____ l/s (KM)

System Integration Testing Procedure
SP 298 Lytton Rd Pump Station & SP 300 Serpentine Rd Pump Station

SP300 pumping into the DN1840 concrete rising main. (Low Pressure)

Eagle Farm at Maximum Flow – SP300 under normal operation.

- ! Ramp up Eagle Farm pumping to maximum flow rate down the DN1840. (4200 l/s) Time: _____
- ! Record the Delivery Flow and Pressure at SP300 _____ mAHD _____ l/s (AW)
- ! Record the Delivery Flow and Pressure at SP010 _____ mAHD _____ l/s (KM)
- ! Start SP300 under surcharge pumping mode (one pump at 25 Hz).
- ! Record the Delivery Flow and Pressure at SP300 _____ mAHD _____ l/s (AW)
- ! Record the Delivery Flow and Pressure at SP010 _____ mAHD _____ l/s (KM)

Eagle Farm at Maximum Flow – SP300 under surcharge pumping mode.

- ! Ramp up Eagle Farm pumping to maximum flow rate down the DN1840. (4200 l/s) Time: _____
- ! Record the Delivery Flow and Pressure at SP300 _____ mAHD _____ l/s (AW)
- ! Record the Delivery Flow and Pressure at SP010 _____ mAHD _____ l/s (KM)
- ! Start SP300 under surcharge pumping mode (one pump at 33 Hz).
- ! Record the Delivery Flow and Pressure at SP300 _____ mAHD _____ l/s (AW)
- ! Record the Delivery Flow and Pressure at SP010 _____ mAHD _____ l/s (KM)

9.3 All items on Inspection Check Lists 1 & 2 to be re-checked dated and signed.

- ! Inspection & Test Plan No.: 001 Rev.0 Separable Portion 1.
- ! Inspection & Test Plan No.: 002 Rev.0 Separable Portion 2 Lytton Rd PS SP298.
- ! Inspection & Test Plan No.: 003 Rev.0 Separable Portion 2 Serpentine Road PS SP300.
- ! Inspection Check List No 1. Lytton Rd
- ! Inspection Check List No 2. Serpentine Rd

9.4 **Pumping trends** of Lytton Rd PS and Serpentine Rd PS to be captured at the end of the day.

- ! Trends required of Wet Well Levels.
- ! Trends required of Delivery Flow.
- ! Trends required of Delivery Pressure.
- ! Trends required of Pump Power, Speed and Running Signal.

9.5 **The pumping system will be left in the automatic position overnight.** Site Instruction will be left at both SP298 and SP300 that if there is a system failure, SP298 should immediately have both pumps inhibited (if the systemic control has not done so already) to divert all flow to Gibson Island.

9.6 If required day three system testing.

9.7 System Integration Testing Report – A System Integration Testing report will be produced and distributed to all parties detailed in the responsibilities section (6) for review and acceptance.

Brisbane Water

INSPECTION & TEST PLAN

PAGE: 1

CUSTOMER/PROJECT: Australia Trade Coast Sewer Project (Separable Portion 1)
EQUIPMENT: Sewer RM Pritchard St PS to Lytton Rd PS.
Sewer RM from connection to Kiawanah Rd PS SP49 RM at Lindum Rd to Lytton Rd PS.

ATCSP CONTRACT REF: BW30137-02/03

Date 26/04/05
ITP: 001 Rev. 0

ITEM NO: 1 **Drawing no:** 486/5/8-SM20/021 & 486/5/8-SM21/021 **S/C:** LEIGHTON
COMPONENT: Mechanical System Commissioning
MATERIAL:

KEY TO INSPECTION ACTIVITIES
H-Hold Point W- Witness S-Surveillance R-Review N-Notification DR-Document Reqd

NO	PROCESS DESCRIPTION/ACTIVITY	LOC	PROCEDURE	ACCEPTANCE STANDARD	Certifying Verifying Document	Inspection LEIGHTON Key	LEIGHTON Date	LEIGHTON Sgn	BW Key	BW Date	BW Sgn	BW Code
1	Review of Installation and Test Documentation for: Sewer Rising Main Pritchard Street Pumping Station to Lytton Road No.4 Pump Station. Drg No: 486/5/8-SM20/021	E	Visual Inspection	Contract Document BW30137-02/03	Leighton ITP Check Sheets/Records Sheets/Test Procedure/O&MM	DR			R	18/5/05	B.J. Mc	BM
2	Review of As Constructed Drawings for: Sewer Rising Main Pritchard Street Pumping Station to Lytton Road No.4 Pump Station. Drg No: 486/5/8-SM20/021	E	Visual Inspection	Contract Document BW30137-02/03	BW/Leighton/Cardon MBK Drawings	DR			R	18/5/05	B.J. Mc	BM
3	Review of Installation and Test Documentation for: Sewer Rising Main From Connection To Kiawanah Road P/S SP49 Rising Main at Lindum Road To Lytton Road No.4 Pump Station. Drg No: 486/5/8-SM21/021	E	Visual Inspection	Contract Document BW30137-02/04	Leighton ITP Check Sheets/Records Sheets/Test Procedure/O&MM	DR			R	18/5/05	B.J. Mc	BM
4	Review of As Constructed Drawings for: Sewer Rising Main From Connection To Kiawanah Road P/S SP49 Rising Main at Lindum Road To Lytton Road No.4 Pump Station. Drg No: 486/5/8-SM21/022	E	Visual Inspection	Contract Document BW30137-02/05	BW/Leighton/Cardon MBK Drawings	DR			R	18/5/05	B.J. Mc	BM
5	Commissioning of Rising Main by rediverting Pritchard Street PS through to Lindum Road/Gibson Island WWTP.	E	Visual Inspection	Contract Document BW30137-02/03	BW Report Document				DR	18/5/05		RM
6	Networks Operation Final Acceptance		Visual Inspection	Contract Document BW30137-02/04	BW Procedure				DR			GH

ORIGINAL ISSUE
PREPARED BY: Reg McGirr
APPROVED BY: Andrew Bannink

RELEASED BY: ATCSP

KEY TO LOCATION ACTIVITIES
A-ATCSP S-Supplier C-Sub Contractor E-Site

BRISBANE WATER
T.C. Burnie Building 315 Brunswick St. Mall, Fortitude Valley, Brisbane Qld 4000

Brisbane Water

INSPECTION & TEST PLAN

PAGE: 1

CUSTOMER/PROJECT: Australia Trade Coast Sewer Project (Separable Portion 2 SP298 Lytton Rd Pump Station)
EQUIPMENT: Pumping Station Site System Commissioning

ATCSP CONTRACT REF: BW30137-02/03

Date 26/04/05
ITP: 002 Rev. 0

ITEM NO: 1 Drawing no: 486/5/7-WR101/031 S/C: LEIGHTON
COMPONENT: Mechanical/Electrical System Commissioning
MATERIAL:

KEY TO INSPECTION ACTIVITIES
Hold Point W- Witness S-Surveillance R-Review N-Notification DR-Document Reqd H-

NO	PROCESS DESCRIPTION/ACTIVITY	LOC	PROCEDURE	ACCEPTANCE STANDARD	Certifying Verifying Document	Inspection						
						LEIGHTON			BW			
						Key	Date	Sgn	Key	Date	Sgn	Code
1	Site Induction/Confined Space Training	E	Visual Inspection	Contract Document BW30137-02/03	BW PROCEDURE Doc Id: 002728				DR/R			
2	Review Factory Inspection & Test Documentation Pump	E	Visual Inspection	Contract Document BW30137-02/03	Leighton ITP Check Sheets/Records Sheets/Test Procedure/O&MM	DR			R	25/5/05		HL
3	Review Factory Inspection & Test Documentation Switchboards	E	Visual Inspection	Contract Document BW30137-02/03	Leighton ITP Check Sheets/Records Sheets/Test Procedure & BW Check SheetsO&MM	DR			R	8/6/05		AW/RB
4	Review Factory Inspection & Test Documentation Diesel Generating Unit	E	Visual Inspection	Contract Document BW30137-02/03	Leighton ITP Check Sheets/Records Sheets/Test Procedure & BW Check Sheets O&MM	DR			R	18/5/05		RB
5	Review Mechanical Installation Documentation	E	Visual Inspection	Contract Document BW30137-02/03	Leighton ITP Check Sheets/Records Sheets O&MM	DR			R	18/5/05		RM
6	Review Electrical Installation Documentation	E	Visual Inspection	Contract Document BW30137-02/03	Leighton ITP Check Sheets/Records Sheets O&MM	DR			R	18/5/05		RB
7	Review Functional Specification	E	Visual Inspection	Contract Document BW30137-02/04	LEIGHTON/BW	DR			R DR			AW
8	Review of Pre-Commissioning Test Documentation	E	Visual Inspection	Contract Document BW30137-02/03	Leighton ITP & Check Sheets/Records Sheets/Test Procedure & BW Check Sheets O&MM	DR			R	25/5/05 19/5/05		HL/RM
9	Review of As Constructed Drawings or Marked-up As Installed Drawings: Civil/Mechanical and Electrical	E	Visual Inspection	Contract Document BW30137-02/04	BW/Leighton/PB/Cardno MBK Drawings	DR			R	18/5/05		RB/ BM/ RM/ AW
10	Review Operating & Maintenance Manuals	E	Visual Inspection	Contract Document BW30137-02/04	Leighton ITP & Check Sheets/Records Sheets/Test Procedure	DR			R	3/11/05		RM
11	Fill Grit Collector Pit & Pump with water up to the overflow pipe. Record level of water in both pits and hold for 7 days then record level level of water in both pits.	E	Visual Inspection	Contract Document BW30137-02/04	Leighton ITP & Check Sheets/Records Sheets/Test Procedure & BW Check Sheets O&MM	DR			R	18/5/05	B.J. McMah.	BM
12	Review of System Integration Testing Procedure	E	Visual Inspection	Contract Document BW30137-02/03	BW ITP & Check Sheets/Records Sheets/Test Procedure O&MM				R DR		17/05/05	AB/HL/AW
13	Clearance for use of incoming & discharge sewage mains	E	Visual Inspection	BW	BW PROCEDURE					30/5/05	BJ. McMahon	BM/SW
14	System Integration Testing	E	Visual Inspection	BW	BW PROCEDURE System Integration Testing Report				R DR			AW
15	Networks Operation Final Acceptance		Visual Inspection	Contract Document BW30137-02/03	BW PROCEDURE				R DR			GH

ORIGINAL ISSUE
PREPARED BY: Reg McGirr
APPROVED BY: Andrew Bannink

RELEASED BY: ATCSP

KEY TO LOCATION ACTIVITIES
A-ATCSP S-Supplier C-Sub Contractor E-Site

BRISBANE WATER
T.C. Burnie Building 315 Brunswick St. Mall, Fortitude Valley, Brisbane Qld 4000

Brisbane Water

INSPECTION & TEST PLAN

PAGE: 1

CUSTOMER/PROJECT: Australia Trade Coast Sewer Project (Separable Portion 2 SP300 Serpentine Rd Pump Station)
EQUIPMENT: Pumping Station Site System Commissioning

ATCSP CONTRACT REF: BW30137-02/03

Date 26/04/05
ITP: 003 Rev. 0

ITEM NO: 1 Drawing no: 486/5/7-TR201/030 S/C: LEIGHTON
COMPONENT: Mechanical/Electrical System Commissioning
MATERIAL:

KEY TO INSPECTION ACTIVITIES
H-Hold Point W- Witness S-Surveillance R-Review N-Notification DR-Document Reqd

NO	PROCESS DESCRIPTION/ACTIVITY	LOC	PROCEDURE	ACCEPTANCE STANDARD	Certifying Verifying Document	Inspection						
						LEIGHTON			BW			
						Key	Date	Sgn	Key	Date	Sgn	Code
1	Site Induction/Confined Space Training	E	Visual Inspection	Contract Document BW30137-02/03	BW PROCEDURE Doc Id: 002728				DR/R			
2	Review Factory Inspection & Test Documentation Pump	E	Visual Inspection	Contract Document BW30137-02/03	Leighton ITP Check Sheets/Records Sheets/Test Procedure/O&MM	DR			R	24/5/05		HL
3	Review Factory Inspection & Test Documentation Switchboards	E	Visual Inspection	Contract Document BW30137-02/03	Leighton ITP Check Sheets/Records Sheets/Test Procedure & BW Check SheetsO&MM	DR			R	24/6/05		AW/RB
4	Review Factory Inspection & Test Documentation Diesel Generating Unit	E	Visual Inspection	Contract Document BW30137-02/03	Leighton ITP Check Sheets/Records Sheets/Test Procedure & BW Check Sheets O&MM	DR			R	18/5/05		RB
5	Review Mechanical Installation Documentation	E	Visual Inspection	Contract Document BW30137-02/03	Leighton ITP Check Sheets/Records Sheets O&MM	DR			R	18/5/05		RM
6	Review Electrical Installation Documentation	E	Visual Inspection	Contract Document BW30137-02/03	Leighton ITP Check Sheets/Records Sheets O&MM	DR			R	18/5/05		RB
7	Review Functional Specification	E	Visual Inspection	Contract Document BW30137-02/04	LEIGHTON/BW	DR			R DR			AW
8	Review of Pre-Commissioning Test Documentation	E	Visual Inspection	Contract Document BW30137-02/03	Leighton ITP & Check Sheets/Records Sheets/Test Procedure & BW Check Sheets O&MM	DR			R	24/5/05 19/5/05		HL/RM
9	Review of As Constructed Drawings or Marked-up As Installed Drawings: Civil/Mechanical and Electrical	E	Visual Inspection	Contract Document BW30137-02/04	BW/Leighton/Cardno MBK Drawings	DR			R	18/5/05		RB/ BM/ RM/ AW
10	Review Operating & Maintenance Manuals	E	Visual Inspection	Contract Document BW30137-02/04	Leighton ITP & Check Sheets/Records Sheets/Test Procedure	DR			R	3/6/05		RM
11	Fill Grit Collector Pit & Pump with water up to the overflow pipe. Record level of water in both pits and hold for 7 days then record level level of water in both pits.	E	Visual Inspection	Contract Document BW30137-02/04	Leighton ITP & Check Sheets/Records Sheets/Test Procedure & BW Check Sheets O&MM	DR			R	18/5/05		BM
12	Review of Site System Integration Testing Procedure	E	Visual Inspection	Contract Document BW30137-02/03	BW ITP & Check Sheets/Records Sheets/Test Procedure O&MM				R DR		17/05/05	AB/HL/AW
13	Clearance for use of incoming & discharge sewage mains	E	Visual Inspection	BW	BW PROCEDURE					30/5/05		BM/SW
14	System Integration Testing	E	Visual Inspection	BW	BW PROCEDURE System Integration Testing Report				R DR			AW
15	Networks Operation Final Acceptance	E	Visual Inspection	Contract Document BW30137-02/03	BW PROCEDURE				R DR			GH

ORIGINAL ISSUE
PREPARED BY: Reg McGirr
APPROVED BY: Andrew Bannink

RELEASED BY: ATCSP

KEY TO LOCATION ACTIVITIES
A-ATCSP S-Supplier C-Sub Contractor E-Site

BRISBANE WATER
T.C. Burnie Building 315 Brunswick St. Mall, Fortitude Valley, Brisbane Qld 4000

System Integration Testing Procedure
SP 298 Lytton Rd Pump Station & SP 300 Serpentine Rd Pump Station

Inspection Check List No1 Lytton Rd

The following manual and actuated operated Valving to be inspected and checked for correct position open/closed.
To be signed and dated in the following check list.

Item No	Item Description	BW Drawing No.	Valve Position	Date Checked	Code	Sgn
1	Pritchard Street P/S SP85 VI Flanged sluice valve manual operated. V2 Socketed sluice valve manual operated.	486/5/8-SM20/027	V2 Closed V1 Open	30-5-05	BM/ SW	
1.1	DN300 SV Lindum Road Connection to Kianawah Road Pump Station-Gibson Island Rising Main. Manual operated valve	486/5/8-SM21/025	Opened	30-5-05	BM/ SW	
1.2	Lytton RD to PS SP298 Connection Detail Valve Position manual operated	486/5/8-SM21/025 486/5/7-WR101/022	Open Closed Open	30-5-05	BM/ SW	
1.3	Lytton RD PS Inlet Valve Chamber. RM from Pritchard Street. V3 manual operated	486/5/7-WR101/030	Mark No. 33 (1off) V3 Open	30-5-05	BM/ SW	
1.4	Lytton RD PS Inlet Valve Chamber. RM from Kianawah Road Valve (V1) and Valve (V2) into Grit Collector	486/5/7-WR101/030 **Actuated Valves**	Mark No. 34 (2off) V1 Open V2 Close	30-5-05	AW	
1.5	Lytton RD PS Inlet Valve Chamber. Valve manual operated for Lowpressure Connection Main	486/5/7-WR101/030	Mark No. 33 (1off) Closed	30-5-05	BM/ SW	
1.6	Lytton RD PS Discharge Valve Chamber. Valves manual operated	486/5/7-WR101/030	Mark No. 8 (2off) Open	30-5-05	BM/ SW	
1.7	Sewer Rising Main Pritchard Street Pumping Station To Lytton Road No. 4 Pump Station **Air Released from Main**	486/5/8-SM20/021	Bleed	31-5-05	BM/ SW	
1.8	Sewer Rising Main From Connection To Kiawanah Road P/S SP49 Rising Main at Lindum Road To Lytton Road No. 4 Pump Station **Air Released from Main**	486/5/8-SM21/021	Bleed	30-5-05	BM/ SW	
1.9	Sewer Rising Main Lytton Road Pump Station (SP298) to Serpentine Road Pump Station (SP300) **Air Released from Main**	486/5/8-SM18/021	Bleed	31-5-05	BM/ SW	

Issue Date: 29/4/05
Rev No: 0

SITE SYSTEM COMMISSIONING
LYTTON Road Pump Station SP298
&
SERPENTINE Road Pump Station SP300

Inspection Check List No2 Serpentine Rd

The following manual operated Valving to be inspected and checked for correct position open/closed.
To be signed and dated in the following check list.

Item No	Item Description	BW Drawing No.	Valve Position	Date Checked	Code	Sgn
2	Serpentine Road Overflow DN450 Gate Valve	486/5/7-TR201/043	Open	30-5-05	BM/ SW	B.J. McM.
2.1	DN450 Lugged Kinfe Gate Valve in Serpentine Road Wet Well. Incoming Main from Lytton Road PS	486/5/7-TR201/030 486/5/7-TR201/031	Mark No. 21 Open	30-5-05	BM/ SW	B.J. McM.
2.2	DN315 Lugged Kinfe Gate Valve in Serpentine Road Wet Well. Incoming Main from Kingsford Smith Drive SP146	486/5/7-TR201/030 486/5/7-TR201/031	Mark No. 19 Close	30-5-05	BM/ SW	B.J. McM.
2.3	DN500 Sluice Valves on discharge main from Serpentine Road PS connecting into 1840 Rising Main	486/5/7-TR201/021 486/5/7-TR201/042 Section B	Open	30-5-05	BM/ SW	B.J. M.M.
2.4	DN500 Sluice Valves on discharge main from Serpentine Road PS Connecting into 1370 Rising Main	486/5/7-TR201/021 486/5/7-TR201/042 Section A	Open	30-5-05	BM/ SW	B.J. M.M.
2.5	DN450 Metal Wedge Sluce Valves Dry Well Pump Pit Serpentine Road PS	486/5/7-TR201/031 486/5/7-TR201/030	Mark No. 6 (4off) Open	30-5-05	BM/ SW	B.J. McM.
2.6	DN450 Lugged Knife Gate Vave Dry Well Pump Pit Serpentine Road PS	486/5/7-TR201/031 486/5/7-TR201/030	Mark No. 41 Open	30-5-05	BM/ SW	B.J. M.M.
2.7	DN450 Lugged Actuated Knife Gate Valve V1. Dry Well Pump Pit Serpentine Road PS (RM 1840)	486/5/7-TR201/031 486/5/7-TR201/030	Mark No. 8 V1 Closed	30/5/5	AW	
2.8	DN450 Lugged Actuated Knife Gate Valve V2. Dry Well Pump Pit Serpentine Road PS (RM1370)	486/5/7-TR201/031 486/5/7-TR201/030	Mark No. 8 V2 Open	30/5/5	AW	
2.9	Serpentine Road PS Sewer Discharge Main to 1370/1840 rising mains **Air Released from Main**	486/5/7-TR201/042	Bleed	30/5/05	BM/ SW	B.J. McMahon

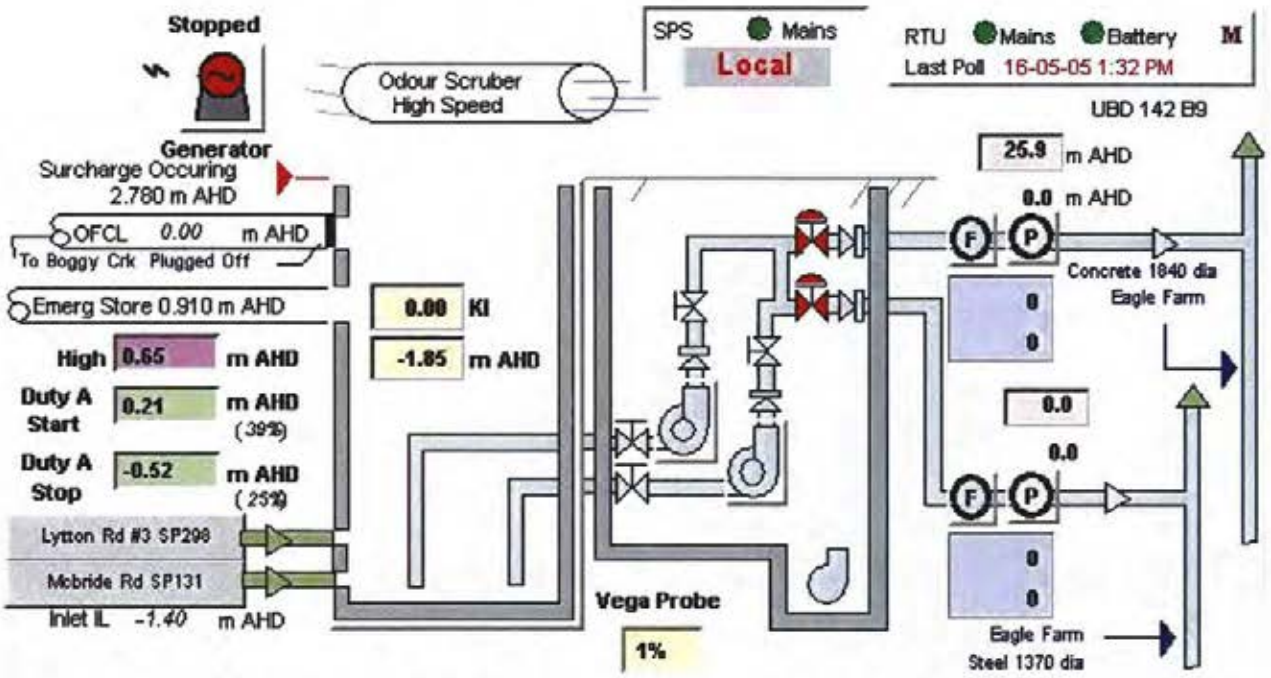
Issue Date: 29/4/05
Rev No: 0

Brisbane City

Brisbane Water

BRISBANE WATER

Network Control Systems



FUNTIONAL SPECIFICATION

SP300 Serpentine Rd

Sewage Pumping Station

Conventional 2 Pumps With VSD and 2 Valves

Document Signoff

Approval

	Name	Role	Signature	Date
Supervising Elec. Eng *Engineering Design Services*	Alan Mooney	Recommend		26/5/05
Supervising Elec. Eng *Engineering Design Services*	Henri Lai	Concur		27/5/05
Team Leader *Network Control Systems*	Peter Sherriff	Concur		
Manager *System Planning*	Peter Casey	Concur		
Manager *Water & Sewerage Operations*	George Henry	Concur		
Manager *Mechanical And Electrical Services*	Michael Greene	Concur		
Project Manager	Andrew Bannik	Approve		17/05/05

Distribution

Name	Role	Section

Document Signoff

Approval

	Name	Role	Signature	Date
Supervising Elec. Eng *Engineering Design Services*	Alan Mooney	Recommend		
Supervising Elec. Eng *Engineering Design Services*	Henri Lai	Concur		
Team Leader *Network Control Systems*	Peter Sherriff	Concur		
Manager *System Planning*	Peter Casey	Concur		
Manager *Water & Sewerage Operations*	George Henry	Concur		
Manager *Mechanical And Electrical Services*	Michael Greene	Concur		
Project Manager	Andrew Bannik	Approve		

Distribution

	Name	Role	Section

Revision Control

Revision Number	Date	Amendment Details	Responsible Officer
Version 0.00	11/11/2004	Original Draft – Developed from Leightons SP300 Revised Functional Spec – Version 3	Alex Witthoft
Version 0.03	26/11/2004	Issued for comment	Alex Witthoft
Version 0.04	29/11/2004	Added Comments by Malcolm Barrett	Alex Witthoft
Version 0.05	08/03/2005	Revised the Valve Control Section	Alex Witthoft
Version 0.06	09/03/2005	Finished 3.2.1 Valve Control	Alex Witthoft
Version 0.10	22/03/2005	Added Comments by Reg McGirr Issued to Reg for distribution to Leightons.	Alex Witthoft
Version 0.20	06/04/2005	Modified wet well levels (section 3) Added emergency storage (section 3.2.3 & 3.3.2) Added systemic control (section 3.3.3) Added Non standard picture sections (3.4.3 & 3.4.4)	Alex Witthoft
Version 1.00	16/05/2005	Minor modification from Reg McGirr	Alex Witthoft
Version 1.10	21/11/2005	Levels modified after official NSM surveying	Alex Witthoft

Document Consultation

Please review the attached document and add your comments where necessary. To ensure that the process is kept within reasonable timeframes, it would be appreciated if you could return this document by the **Requested Return Date** listed below.

Project Sponsor: Andrew Bannik Officer Code: PM13BW Location: T.C.B. Level 2

Author: Alex Witthoft Officer Code: CTAMP12 Location: Cullen Ave

Document Administrator: Alan Mooney Officer Code: SEEPSBW Location: T.C.B. Level 2

Version Number (1,2,3 etc)	Forwarded To: (Name / Officer Code)	Location (eg,TCB, Cullen Ave)	Date Sent	**Requested Return Date**	Date Returned	Comments Received (Y / N)	Comments Incorporated (Y / N)
0.03	Malcolm Barrett	Cullen Ave	26/11/04	03/12/04	03/12/04	Y	Y
0.04	Peter Sherriff	Cullen Ave	29/11/04	06/12/04	06/12/04	Y	Y
0.04	George Henry	Cullen Ave	29/11/04	06/12/04	06/12/04	Y	Y
0.04	Alan Mooney	TCB	29/11/04	06/12/04	06/12/04	Y	Y
0.04	Peter Casey	TCB	29/11/04	06/12/04	06/12/04	Y	Y
0.04	Henri Lai	TCB	29/11/04	06/12/04	06/12/04	Y	Y
0.06	Henri Lai	Cullen Ave	09/03/05	14/03/05	-	N	N
0.06	Kerry McGovern	Cullen Ave	09/03/05	14/03/05	-	N	N

PLEASE RETURN THIS DOCUMENT TO THE ABOVE DOCUMENT ADMINISTRATOR

DO NOT SEND IT ANYWHERE ELSE!

Table of Contents

Table of Figures

Table of Tables

Definitions

IDTS	Integrated Departmental Telemetry System
RTU	Remote Telemetry Unit
SCADA	Supervisory Control And Data Acquisition
MAHD	Metres above Australia Height Datum

1 INTRODUCTION

This document contains the site specific details and describes the non standard functional requirements for control, monitoring and telemetry at sewage pump station SP300 at Serpentine Road Pinkenba. The functional requirements described in the document are in addition to the standard functionality detailed in "SPSV3 SEWAGE PUMPING STATION SUBMERSIBLE 3 PUMPS WITH VFD" [1].

The standard specification was written for a 3 pump station, of which only 2 pumps are allowed to run at any given time. The functionality for SP300 Serpentine Road is identical, except that SP300 only has 2 pumps, both of which can run simultaneously into the DN1370 main and single pump into the DN1840 main.

The site specific details and the non standard functional requirements in this document were derived from the functional specification written by Leighton Contractors Pty Ltd "SP300 FUNCTIONAL SPECIFICATION REV 3" [2].

SP300 is a sewage pump station incorporating two variable speed driven 216 kW dry mounted submersible pumps operating in a duty/standby arrangement. SP300 is located in a Brisbane Water pipeline easement at the western end of Serpentine Road Pinkenba.

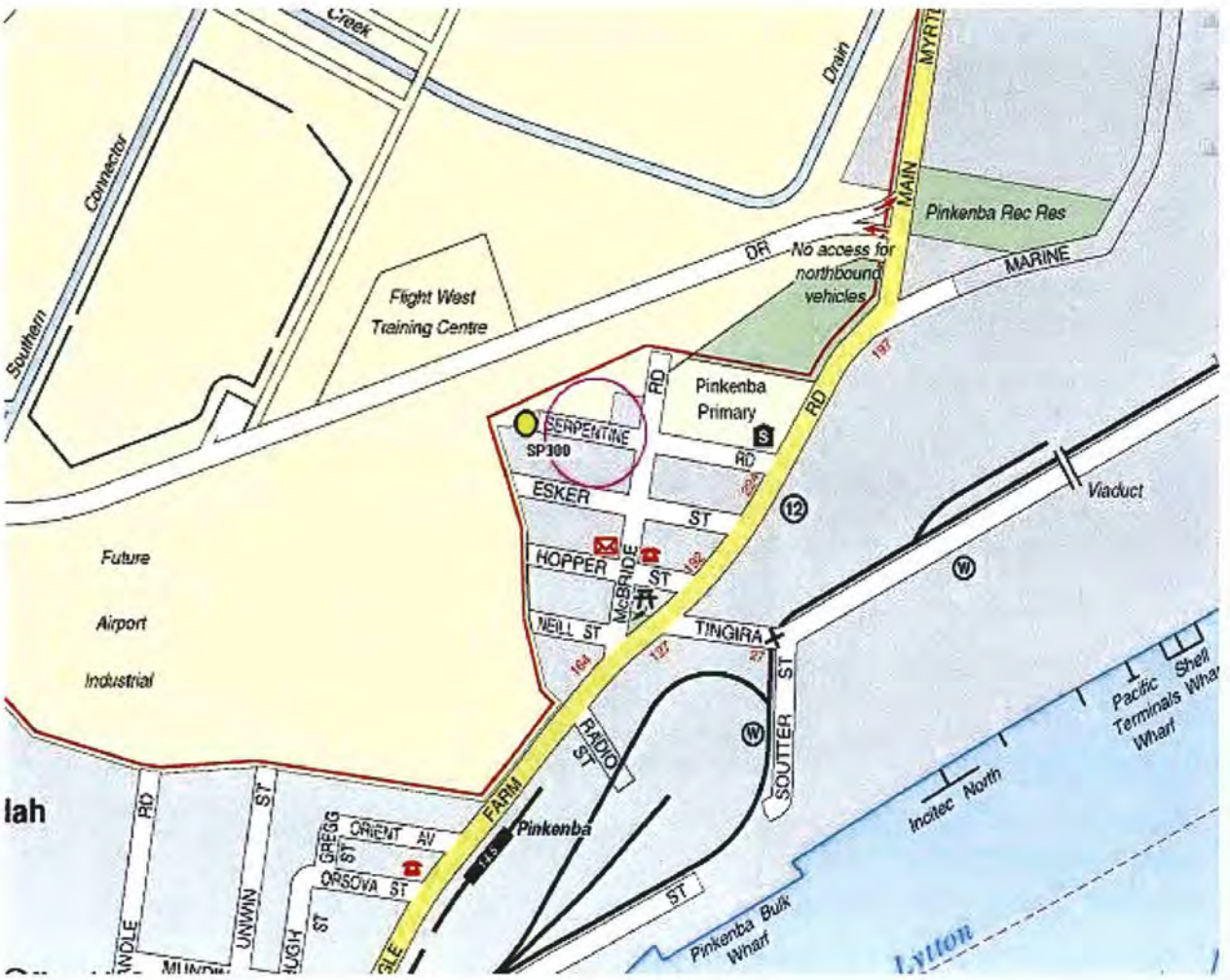


Figure 1: SP300 Location Map

1.1 General Process Description

The incoming flow to SP300 comes from SP298 at Lytton Rd Lytton (South side) and a number of other pumping stations on the north side of the Brisbane River. Sewage is pumped from all locations into the submerged inlet chamber at SP300. From the inlet chamber, the sewage flows directly into the wet well.

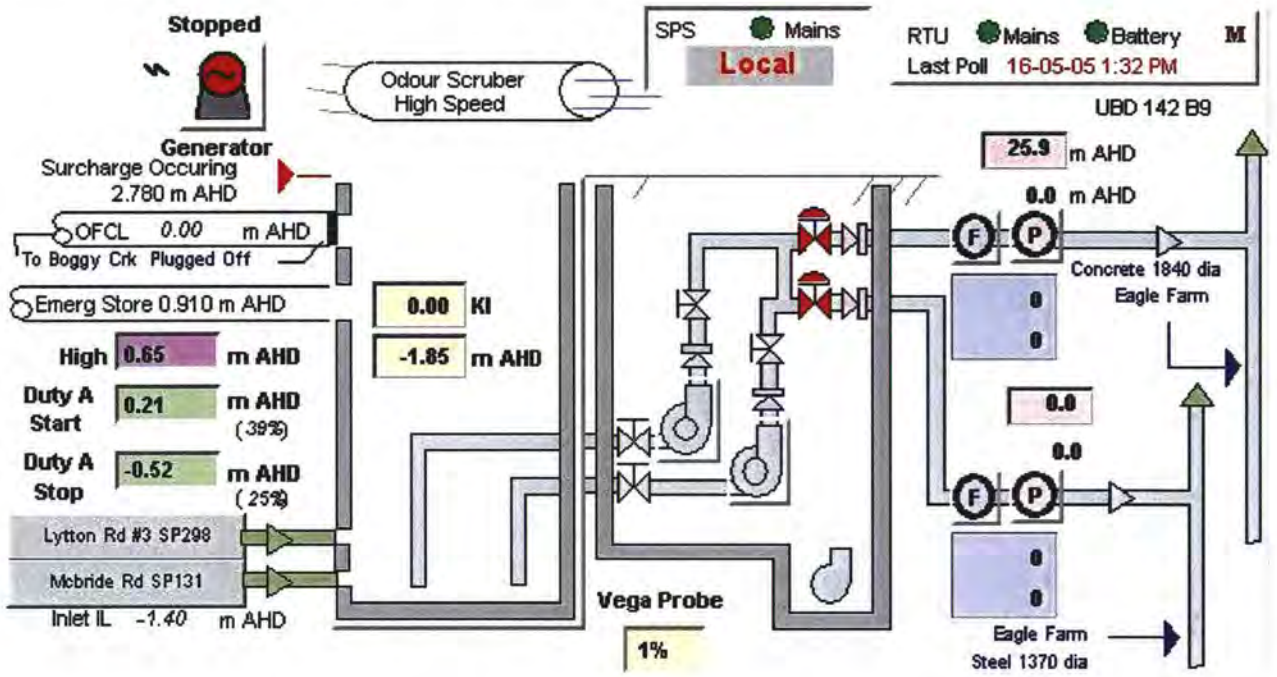


Figure 2: SP300 Process and Instrumentation Overview

SP300 is designed to discharge into one of two 'Eagle Farm to Luggage Point' rising mains

1. Low pressure DN1840 concrete rising main
2. High pressure DN1370 steel rising main.

The Eagle Farm Pump Station (EFPS) actually consists of two pump stations:

1. EFPS#1, which has three 2000 kW pumps in a two duty/one standby arrangement; and
2. EFPS#2, which has two 1850 kW pumps in a duty/standby arrangement.

Both EFPS#1 and EFPS#2 use variable speed pumps and hence the sewage flow in each rising main is variable.

During dry weather, EFPS#1 is normally used in conjunction with the DN1370 main. Under this operating arrangement, EFPS#1 can deliver a maximum of around 4200 L/s through the DN1370 main to the Luggage Point WWTP.

During wet weather events, EFPS#1 is normally used in conjunction with the DN1370 main, and EFPS#2 is brought online to assist, in conjunction with the DN1840 main. Under this operating arrangement, the EFPS can deliver a maximum of around 8000 L/s through both mains to the WWTP.

If the steel rising main DN1370 is offline (for maintenance) then EFPS#2 is operated in conjunction with the DN1840 main. Under this operating arrangement, the operator at Eagle Farm runs EFPS#2 in manual mode to ensure that the pressure remains within acceptable limits.

As SP300 is required to deliver sewage directly into the existing rising mains, its duty head is a strong function of the residual head in the selected discharge main. The maximum and minimum pump duties for SP300 are presented in the table below.

Main in Use	EFPS Flow (L/s)	SP300 Flow (L/s)	SP300 Head (m)
DN1370	4200	348	40.8
	0	348	8.9
DN1840	3800	348	19.2
	0	348	8.9

SP300 Serpentine Road has been designed to operate predominantly with the steel rising main and the pumps and drives have been sized accordingly. If this steel rising main is not in service (as determined by the Eagle Farm pump station operators), then SP300 can utilise the concrete rising main provided that certain limitations are adhered to.

The main two limitations are limiting the station to only run one pump and to restrict the pump running to a maximum speed of 33Hz (to be confirmed after commissioning when pumps run on 1840mm main). Limiting the speed of the drive limits the flow and head pressure to the figures shown in the table below. The limiting of the speed will limit the flow and the head pressure to the limits listed below. These limits will have alarms configured to alert both the Eagle Farm control room and IDTS master station. The max speed of 52 hz will need to be confirmed after commissioning when pumps run on 1370mm main

Main in Use	Maximum Pumps to Run	Maximum Speed (Hz)	Maximum Flow (l/s)	Maximum Head Pressure (m)
DN1370	2	52.0	Unlimited	Unlimited
DN1840	1	33.0	348	10.0

2 EQUIPMENT INSTALLED

2.1 Standard Equipment

SP300 Serpentine Rd pump station has the following standard equipment installed. The functionality for the control, monitoring and alarming for these items is fully described in the standard functional specification.

Pumps	Two Hidrostal I10K submersible pumps with 216 kW four pole electric motors are installed in the dry well. Each pump is fitted with moisture probes in the oil chamber and thermistors in the stator windings.
Pump Starters	Two Danfoss VLT8000 Variable Frequency Drives (VFDs) are installed in the pump station switchboard. The VFDs will also provide soft starting functionality.
Flow meters	Two direct buried DN500 ABB Magmaster electromagnetic flow meters are installed in the DN500 PE100 discharge mains downstream of the valve chamber. The flowmeter will be used in the flow control algorithm (PID Loop) to control the speed of the pumps.
Level Sensors	One Vega hydrostatic level transmitter and one Multitrode level probe are installed in the wet well.
Pressure Transmitters	Two Vega D84 pressure transmitters are installed on the discharge pipe work in the valve chamber.

2.2 Non Standard Equipment

SP300 Serpentine Rd pump station has the following non standard equipment installed. The functionality for the control, monitoring and telemetry for is described in the following sections as these items are NOT described in the standard specification.

Emergency Generator	One SE Power 500 kVA diesel powered backup generator is installed on a slab adjacent to the valve chamber. The generator includes its own GE FANUC PLC mounted in a dedicated control panel inside the generator housing.
Actuated Valves	Two DN450 Keystone Figure 951 knife gate valves with 415 V Rotork actuators are installed in the discharge pipe work in the valve chamber.
Activated Carbon Scrubber	One activated carbon odour scrubber (nominally RKR Engineering Airclenz) to be installed adjacent to the wet well. Provision was made for the starter and controls for the activated carbon unit to be installed in a dedicated control panel adjacent to the scrubber.

2.2.1 Emergency Generator

The emergency generator is designed to the standard functionality as described by "DIESEL STANDBY GENERATOR LOCAL CONTROL PANEL FUNCTIONAL DESCRIPTION". [3] The generator is supplied with the PLC fully configured and loaded with the standard program. The RTU (Logica MD3311) will programmed with the standard interface program that will provide the monitoring, control and telemetry to the IDTS master station.

2.2.2 Activated Carbon Scrubber

SP300 will have an activated carbon scrubber unit installed to eliminate odours. The functional specification for this equipment has not been finalised and will be provided in a separate document.

2.2.3 Actuated Valves

The two actuated knife gate valves are used to control which rising main the station will pump into. The functionality of these valves is detailed in the Control Philosophy section.

2.3 Provision for Future Non-Standard Equipment

Although the project has made civil provision for the following future equipment, no PLC or RTU code has been developed

- Dosing Pump

Any future project to install the above equipment will provide funding for the functional specification and programming of the control, monitoring and telemetry.

2.3.1 Dosing Pumps

Provision was made for two chemical dosing pumps (nominally Alldos 0.18 kW) to be installed adjacent to the dosing slab. Provision was made for VFDs for these pumps to be installed in a dedicated control panel adjacent to the pumps.

3 CONTROL PHILOSOPHY

The station will operate according to the control philosophy detailed in the standard functional specification (SPSV3). The only modification is to the duty rotation algorithm, which will now control only two pumps instead of three. The number of pumps allowed to run remains the same (2) and the initialisation block will be configured with the site specific set points listed in the tables in the next sections.

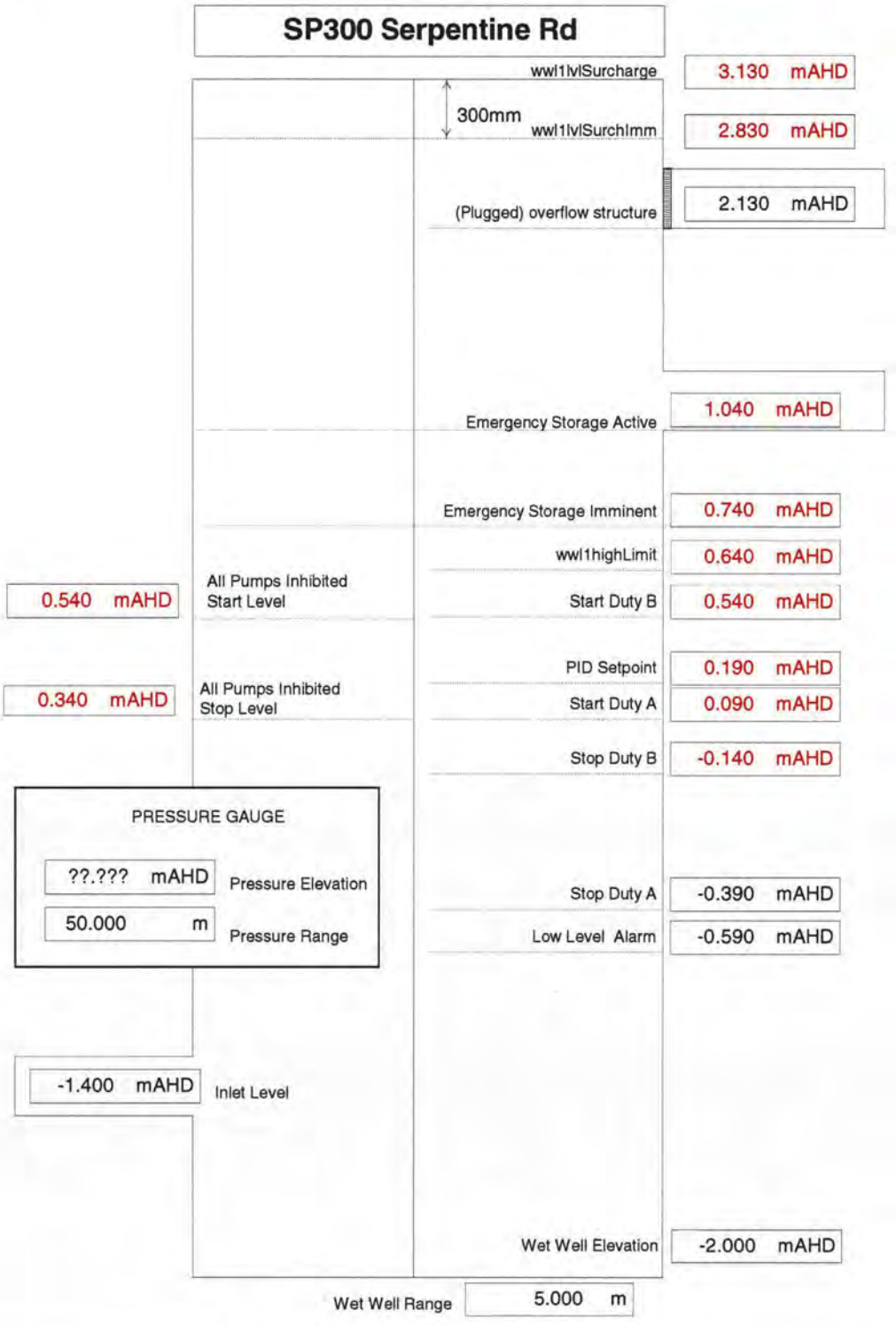


Figure 3: SP300 Station Level Set Points

SOME LEVELS MAY CHANGE ACCORDING TO COMMISSIONING FIGURES

3.1 Site Specific Values

Table 1: Site Specific Constants defined in the PLC

Tag Name	Description	Type	Value	Units
Sewerage Pumping Station				
Stn01grSurchPumpingTime	Surcharge pumping duration [3]	Integer	600	Sec
Delivery flow				
Flw0[x]txRange	Delivery flow – Range	Real	7500	l/s
Stn01grMinFlow1Pmp	Delivery flow – Minimum flow	Real	100	l/s
Stn01grMaxFlow1Pmp	Delivery flow – Maximum flow – 1 Pump	Real	348	l/s
Stn01grMaxFlow2Pmp	Delivery flow – Maximum flow – 2 Pumps	Real	700	l/s
Delivery pressure				
Pre01txRange	Delivery pressure - Range	Real	5000	mmAHD
Pre01txZero	Delivery pressure – Elevation of the transducer	Real	T.B.A	mmAHD
Pump Blockage				
Stn01grPmpBlockFlowKneeSP	Flow blocked limit for flow/level PID control (knee)	Integer	T.B.A	l/s x 100
Stn01grPmpBlockSpeedKneeSP	VFD speed blocked limit for flow/level PID control (knee)	Integer	T.B.A	Hz x 100
Stn01grPmpBlockSpeedMinSP	VFD speed blocked limit for minimum flow PID control	Integer	T.B.A	Hz x 100
Wet well level				
Wwl01txRange	Wet well level range	Integer	5500	mmAHD
Wwl01txSurchImmLevelSP	Wet well surcharge imminent level	Integer	2830	mmAHD
Wwl01txEStorImmLevelSP	Wet well surcharge imminent level	Integer	640	mmAHD
Wwl01grInhStartLevelSP	Wet well inhibit mode start level	Integer	540	mmAHD
Wwl01grInhStopLevelSP	Wet well inhibit mode stop level	Integer	340	mmAHD
Wwl01grRunatMaxLvlSP	Wet well run at maximum speed level	Integer		mmAHD
Wwl01txDtyBStartLevelSP	Wet well duty B pump start level	Integer		mmAHD
Wwl01txPIDLevelSP	Wet well PID set point	Integer		mmAHD
Wwl01txDtyAStartLevelSP	Wet well duty A pump start level	Integer		mmAHD
Wwl01txDtyBStopLevelSP	Wet well duty B pump stop level	Integer		mmAHD
Wwl01txDtyAStopLevelSP	Wet well duty A pump stop level	Integer		mmAHD
Wwl01txZero	Wet well empty level (4mA of Probe)	Integer	-1920	mmAHD
Variable Frequency Drive				
Stn01grMinSpeed	Variable Frequency Drive – Minimum Speed (either mode)	Integer	250	Hz x 100
Stn01grMaxSpeed1	Variable Frequency Drive – Maximum Speed (Mode 1)	Integer	500	Hz x 100
Stn01grMaxSpeed2	Variable Frequency Drive – Maximum Speed (Mode 2)	Integer	330	Hz x 100

Table 2: Site Specific Constants defined in the RTU

Tag Name	Description	Type	Value	Units
flw1almInhibitTm	Delivery flow - Alarm inhibit timer	Integer	15	sec
pre1almInhibitTm	Delivery pressure - Alarm inhibit timer	Integer	15	sec
wwl1surchLvlVol	Wet well volume at surcharge level	Real	46.30	kl
wwl1lvlSurcharge	Wet well surcharge occurring level	Real	1.880	mAHD
Pumps 1 & 2				
Pmp[x]almInhPwrTm	Pump [x] - Motor power alarm inhibit timer.	Integer	15	sec
pmp[x]almInhCrntTm	Pump [x] - Motor current alarm inhibit timer.	Integer	15	sec
pmp[x]currRange	Pump [x] - Motor current range	Real		Amps

Table 3: Site Specific Variable defined in the RTU

Wet well level				
wwl1highLimit	Wet well level - High alarm set point	Integer	510	mmAHD
wwl1lowLimit	Wet well level - Low alarm set point	Integer	-970	mmAHD
Delivery flow				
flw1highLimit	Delivery flow - High alarm set point	Integer	7000	ml/s x 10
flw1lowLimit	Delivery flow - Low alarm set point	Integer	700	ml/s x 10
flw2highLimit	Delivery flow - High alarm set point	Integer	7000	ml/s x 10
flw2lowLimit	Delivery flow - Low alarm set point	Integer	700	ml/s x 10
Delivery pressure				
pre1highLimit	Delivery pressure DN1370 – High alarm set point	Integer		mmAHD
pre1lowLimit	Delivery pressure DN1370 – Low alarm set point	Integer		mmAHD
pre2highLimit	Delivery pressure DN1840 – High alarm set point	Integer		mmAHD
pre2lowLimit	Delivery pressure DN1840 - Low alarm set point	Integer		mmAHD
Pumps 1 & 2				
pmp[x]currHiLimit	Pump [x] - Motor current high alarm set point [4]	Integer		mAmps
pmp[x]currLoLimit	Pump [x] - Motor current low alarm set point [5]	Integer		mAmps
pmp[x]powHiLimit	Pump [x] - Motor power high alarm set point	Integer		Watts
pmp[x]powLoLimit	Pump [x] - Motor power low alarm set point	Integer		Watts

Table 4: Wet Well Level vs Volume Data

	Height (mAHD)	Volume m^3	Remaining Storage m^3	% Level	% Volume
1	-0.720	0.000	60.430	22%	0%
2	-0.270	7.300	53.130	30%	12%
3	-0.120	9.800	50.630	33%	16%
4	0.210	15.100	45.330	39%	25%
5	0.510	20.000	40.430	44%	33%
6	0.660	22.400	38.030	47%	37%
7	0.760	24.000	36.430	49%	40%
8	1.250	32.000	28.430	58%	53%
9	1.450	35.300	25.130	61%	58%
10	1.650	38.500	21.930	65%	64%
11	2.110	46.000	14.430	73%	76%
12	2.130	46.300	14.130	74%	77%
	3.000	60.430	0.000	89%	100%

THESE FIGURES WILL NEED TO BE UPDATED TO INCLUDE THE EMERGENCY STORAGE VOLUME

(TO BE PROVIDED BY SYSTEM PLANNING)

3.2 Non Standard Control

3.2.1 Valve Control

The two knife gate valve which determine which rising main the station is discharging into are not standard equipment and their functionality are not covered by the standard specification. These valves also effect the pump control functionality however this section only covers the valve control functionality.

The two knife gate valves are the mechanism in which the station switches between 2 modes of operation, controlled by the open and close status of valve 1 and valve 2. These modes are:

Rising Main	Valve 1	Valve 2	Description
1 – DN1370	OPEN	CLOSED	SP300 is discharging into the high pressure steel rising main.
2 – DN1840	CLOSED	OPEN	SP300 is discharging into the low pressure concrete rising main.

The rising main can be selected under the following modes of operation

1. Local
2. Remote – Manual
3. Remote – Auto (FUTURE)

Control Modes

Local

The valves can also be controlled locally via hard wiring (independent of the PLC). While in local control, it is the responsibility of the on site technician to ensure the correct rising main is in operation.

Remote – Manual

Under remote-manual mode the valves are controlled by the control room operator via the IDTS master station. The selection of the valve position is done via a selection popup screen in which the operator can choose to select either the DN1370 or the DN1840. The PLC will then operate the valves in the sequence outlined in the following section.

Remote – Auto (FUTURE)

The mode which is selected is governed by which rising main(s) is being used by Eagle Farm. The following table details the active mode depending on the status of the two Eagle Farm pumping stations.

The default mode is mode 1 – DN1370. This has SP300 discharging into the high pressure rising main. This is the safest mode as there are no pressure restriction. Eagle Farm pumping station will communicate, via peer to peer communication over the Trio radio network, the status of both of the Eagle Farm pump stations. If the peer to peer communications fail, then SP300 will revert back to remote-manual mode.

Sequencing

The valves can change position while the pumps are off or while they are running. As the wet well has a very small volume compared with the flow rates, there is minimal retention time in the system while the pumps are off. The most likely change over will therefore occur while the pumps are running. At no stage should both valves be open, as this could lead to the high pressure steel main over pressurising the low pressure concrete main. The change over sequence will be as follows.

Mode 1 → Mode 2

1. Starting conditions are valve 1 open, valve 2 closed, 0 to 2 pumps running at up to 52 Hz.
2. Limit the station to only 1 pump.
3. Clamp the speed of the pump to minimum speed (25 Hz).
4. Close Valve 1.
5. When valve 1 is closed, open valve 2.
6. When valve 2 is open, unclamp the speed of the pump (to a maximum of 33Hz)

Mode 2 → Mode 1

1. Starting conditions are valve 1 closed, valve 2 open, 0 or 1 pump running at up to 33 Hz.
2. Clamp the speed of the pump to minimum speed (25 Hz).
3. Close valve 2.
4. When valve 2 is closed, open valve 1.
5. When valve 1 is open, unclamp the speed of the pump and allow 2 pumps to run (if needed).

Failure States

There are three failure modes that will prevent a successful mode change. These failure modes and their respective recovery procedures are as follows.

Failure Mode	Recovery Process for Failed Valve	Recovery Process for Other (Healthy) Valve
Fail to Close	Command to Open. Can not close until failed to close alarm has been reset.	Stays closed
Fail to Open	Command to Close. Can not open until failed to open alarm has been reset.	Once failed valve has re-closed, then healthy valve is commanded to open.
Failed in Transit (Both Failed to Open and Failed to Close are active)	Stays in current (failed position) until faults have been reset.	The healthy valve will stay in its current position.

3.2.2 Pump Controls

The pump control will be based upon the standard pump control philosophy outlined in the standard specification. This included the wet well to flow to speed cascaded P.I.D. which will be tuned maintain the wet well level yet still provide control over the flow rate. The following sections highlight the specific differences between this site and standard functionality.

Number of Pumps

SP300 is designed to normally operate with the DN1370 steel rising main. In this mode, the station acts as per the functionality outlined in the standard Functional Specification. The duty block is modified to only consider 2 pumps (the standard has 3 pumps).

Interlocking and Speed Limiting

As mentioned in the Valve Control section, if the station is operating with the DN1840 concrete rising main, the station will become interlocked, allowing only one pump to operate at any given time. This interlock is both in the hard wiring as well as in the PLC code. Not only is the station interlocked, the variable speed drives are limited to run at a much lower speed (33Hz). All these limitations are imposed to ensure that the low pressure rising main operates acceptable pressures. These limitations are in effect during both local and remote control modes.

3.2.3 Emergency Storage

Instead of the standard overflow structure, this site will 'overflow' into an emergency storage facility (abandoned eagle farm rising main). This inclusion of this extra storage will significantly increase the time to overflow, in the case of complete station failure.

The system was modelled at ultimate PWWF with a total inflow to Serpentine Rd of 252 l/s. Time to full storage has been calculated to be:

With the rising main shut at Eagle Farm	5 hrs 13 minutes.
With a 100mm Scour Valve (46 l/s)	5 hrs 31 minutes.
With a 150mm Scour Valve (97 l/s)	5 hrs 59 minutes.
With a 225mm Scour Valve (187 l/s)	7 hrs 42 minutes.

The Maximum hydraulic gradient line (HGL) in Serpentine Rd pump station wet well is 2.45 mAHD.

NOTE: Once this level is reached if the inflow is not diverted, higher HGL's will occur in the wet well resulting in an overlfow.

The emergency storage will be connected to the wet well at 0.910 mAHD. This is 1.22 meters below the original overflow structure that has been constructed.

Modelling of the emergency storage has been performed and it was found that the maximum hydraulic gradient of the emergency storage when it is draining into Eagle Farm pumping station SP010) is **higher** (2.45 mAHD) than the overflow structure (2.13 mAHD) that has been constructed. To avoid unnecessary overflow into the environment (Boggy Creek) the existing overflow structure will be 'sealed'.

NOTE: In the unlikely event that the wet well reaches the sealed overflow structure (because the emergency storage is either shut at the Eagle Farm pump station or is blocked) then the level will rise past the sealed overflow structure. The site will then overflow through the wet well lids, over the site and then into the Boggy Creek. The resultant overflow will be uncontrolled. (As opposed to a controlled overflow through the overflow structure.)

To incorporate this emergency storage into the control philosophy the following changes were made to the standard alarms and controls.

- The surcharge imminent electrode will be utilised as the emergency storage imminent electrode, the surcharge imminent alarm will now be only raised by the wet well level sensor (instead of a level sensor AND an electrode).
- The surcharge occurring alarm will be set at the height of the wet well lids instead of the overflow structure (now sealed) as this is the level at which the sewerage will overflow into the environment.
- The 'new' emergency storage imminent probe will be used to active the emergency sewerage imminent alarm (identical functionality to the surcharge imminent alarm detailed in the standard functional specification (Ref1).
- Instead of the surcharge pumping mode, the site will have a emergency storage pumping mode (identical to the surcharge pumping mode detailed in the standard functional specification (Ref1)).

3.2.4 Peer to Peer Comms

To SP298 Lytton Rd #4 - Systemic Control

The majority of the inflow to Serpentine Rd comes from Lytton Rd #4. Lytton Rd #4 has the capability to divert all inflow coming to it, from SP049 Kianawah Rd and SP085 Prichard St, to Gibson Island.

Systemic control from SP300 Serpentine Rd to SP298 Lytton Rd #4 will automatically, via peer to peer communications over the Trio radio network, 'inhibit' all pumps at Lytton Rd #4 if any of the following occurs.

- Emergency Storage Imminent
- Both pump unavailable (for any reason including power outage)

In this mode, Lytton Rd will divert all inflow (from Prichard and Kianawah) to Gibson Island, instead of pumping it to Serpentine Rd. According to figures provided by Brisbane Water Projects Branch, this will alleviate up to 90% of the flow to Serpentine Rd.

In addiction to the Emergency storage imminent (or pumps available) alarm the IDTS master stations will also receive the Pump inhibited alarms for both pumps at Lytton Rd #4. Once the Lytton Rd has been inhibited, it will stay inhibited until the operator manually 'uninhibited' at least one pump at Lytton Rd. The operator will NOT be able to uninhibited the pumps while the conditions at Serpentine Rd that caused the automatic inhibit are still active.

Systemic control can be deactivated by the control room operators via a control button on the IDTS details page for SP300 Serpentine Rd.

An addition alarm will be configured to monitor the status of the communication link between the two RTU's. No systemic control will be possible if the communication link has failed. The control room operator will still be able to manually inhibit both pumps at Lytton Rd #4 at any stage (assuming communications to Lytton Rd #4 are healthy).

From SP010 Eagle Farm ((FUTURE))

To achieve remote-auto mode for the valve control, this site will have to communicate to the Eagle Farm pumping station, to receive the operational status of both the EFPS#1 and EFPS#2. To achieve this, a Logica MD3311 RTU has to be installed at Eagle Farm pumping station to communicate directly via the Trio radio network.

3.3 Non Standard Monitoring and Alarms

3.3.1 Additional Valve Monitoring and Alarms

The following alarms and events are associated with both valves

Plant	Quantity	Priority
Valve	Available	1
Valve	Available_remote	0
Valve	Open	0
Valve	Closed	0
Valve	Fail_open_alarm	1
Valve	Fail_close_alarm	1
Valve_station	Auto_manual	Control
Valve_station	Auto_manual_Fbk	0
Sewage_pumping_station	Mode_control	Control
Sewage_pumping_station	Mode_selected	0

Available

The valve is considered available only when all of the following conditions are present:

- Available for Remote
- Not "Failed to Open"
- Not "Failed to Close"

Available for Remote

The digital input status for "valve available for remote" is transferred directly to the IDTS master station.

Open

The digital input status for "valve open" is transferred directly to the IDTS master station. This is used to animate the valve status on the main IDTS page.

Closed

The digital input status for "valve closed" is transferred directly to the IDTS master station. This is used to animate the valve status on the main IDTS page.

Fail to Open

If the valve is commanded to open and does not reach the open limit within the pre determined time period (set at two times the normal travel time) then the failed to open alarm will be activated. The valve will then revert back to the last heatlhy position (ie pen). This alarm can be reset locally by pressing either of the pump (1 & 2) reset push buttons or remotely by the IDTS master station.

Fail to Close

If the valve is commanded to close and does not reach the close limit within the pre determined time period (set at two times the normal travel time) then the failed to close alarm will be activated. . The valve will then revert back to the last heatlhy position (ie closed). This alarm can be reset locally by pressing either of the pump (1 & 2) reset push buttons or remotely by the IDTS master station.

Valve Station Auto / Manual Control and Feedback

When the sewage pumping station is in remote mode, the valve station (both valve 1 and 2) can be selected to be in either manual or auto mode. The current mode selected is returned back to the IDTS master station via the feedback variable.

Sewage Pumping Station Mode Control / Selected

If the valve station is selected to be in auto mode, then the control room operator is able to select which rising main is to be operational via the 'mode control' control variable. The current mode selection will be returned back to the IDTS master station via the feedback variable.

3.3.2 Additional Wet Well Monitoring and Alarms

Plant	Quantity	Priority
Sewage_pumping_station	Emergency_storage	1
Sewage_pumping_station	Emergency_storage_imminent	1

Emergency Storage Imminent Alarm

The emergency storage imminent alarm is a final warning to the control room operator that the site is at immediate risk of overflowing into the emergency storage. This serves as a reminder to the control room operator in implementing the contingency plans.

As the emergency storage imminent electrode triggers this alarm, it also provides a redundancy to the wet well high alarm that the Vega probe should activate. The emergency storage imminent alarm is the first alarm that the control room operator receives if the wet well level Vega probe is not functioning correctly.

The emergency storage imminent alarm is primarily activated by the emergency storage imminent electrode input. When this signal is active for 10 seconds then the emergency storage imminent alarm is activated. To prevent repetitious alarms due to wave action the signal is kept active for 1 minute after the emergency storage imminent electrode deactivates.

As a backup, a valid wet well level signal exceeding the emergency storage imminent level by 100mm, for 10 seconds, will also trigger the emergency storage imminent alarm while the station is in remote mode. This 100mm is ignored during power outages. The emergency storage imminent electrode is 24VDC and is backed up by the battery system.

Emergency Storage Active Alarm

This alarm is the final alarm that the control room operator will receive as the wet well level rises to the emergency storage level.

When the wet well level is greater than or equal to the surcharge level the surcharge occurring signal is activated. To prevent repetitious alarms due to wave action the signal is kept active for 1 minute after the wet well level falls below the surcharge occurring level.

3.3.3 Systemic Control

Plant	Quantity	Priority
Sewerage_pumping_station	Systemic_control_enable	Control
Sewerage_pumping_station	Systemic_control_enable_Fbk	0
Sewerage_pumping_station	Systemic_control	0

Systemic Control Enable and Feedback

This control point will enable and disable the systemic control of SP298 Lytton Rd #4. The feedback point will be configured to display the current status of the control point.

Systemic Control Active

This event will be configured to indicate to the control room operator whether the systemic control has been activated. The same point will also be configured on the SP298 Lytton Rd #4 site indicate weather that site has currently reveived a request from SP300 to activate the systemic control (inhibit both of its pumps). This will be displayed on the SP298 Lytton Rd #4 details page to indicate the inhibit function has been activated by SP300 Serpentine Rd (rather than by an operator).

3.3.4 Additional RTU Monitoring and Alarms

Plant	Quantity	Priority
Remote_rtu	Comms_fault	1

Remote RTU Comms Fault

The station will monitor the peer communications to all the RTU's that it is configure to communicate with. The alarm will activate if the site has not received a peer communication within the specified time period (site specific peer timeout value set in the initial block).

3.4 Non Standard IDTS Picture

3.4.1 Additional Valves

The two valves will be displayed and will be animated to indicate open, closed and faulted conditions. Double clicking on the valve will bring up the valve control page, on which the following operator controls will be available:

- Individual valve remote resets
- Mode selection (manual/auto)
- Rising Main selection (DN1370 / DN1840)

3.4.2 Additional Pipe Animation

The two rising main pipes (which are connected to the DN1370 and the DN1840) will be animated to show a "filled" condition if their respective valve is open.

3.4.3 Systemic Control

To allow the control room operator to enable and disable the systemic control of SP298 Lytton Rd #4, a control pushbutton will be displayed on a popup screen which can be opened form the SP300 Serpentine Rd details page.

The current status of the systemic control will be displayed next to the control button in the form of a text field with 'On' or 'Off'

3.4.4 Emergency Storage

The emergency storage pipe will be displayed and will have the hydraulic gradient level marked to indicate the level at which the sewerage will start to flow into Eagle Farm.

4 REFERENCES

1

TITLE	SPSV3 Sewage Pumping Station Submersible 3 Pumps With VFD – Functional Specification
DOCUMENT ID	003589
VERSION	0.30
AUTHOR	Alex Witthoft , Brisbane Water – Network Control Systems
DOCUMENT OWNER	Peter Sherriff, Brisbane Water – Network Control Systems

2

TITLE	SP300 Functional Specification
DOCUMENT ID	N/A
VERSION	REVISION 3
AUTHOR	M. BRAND
DOCUMENT OWNER	Leighton Contractors Pty Ltd

3

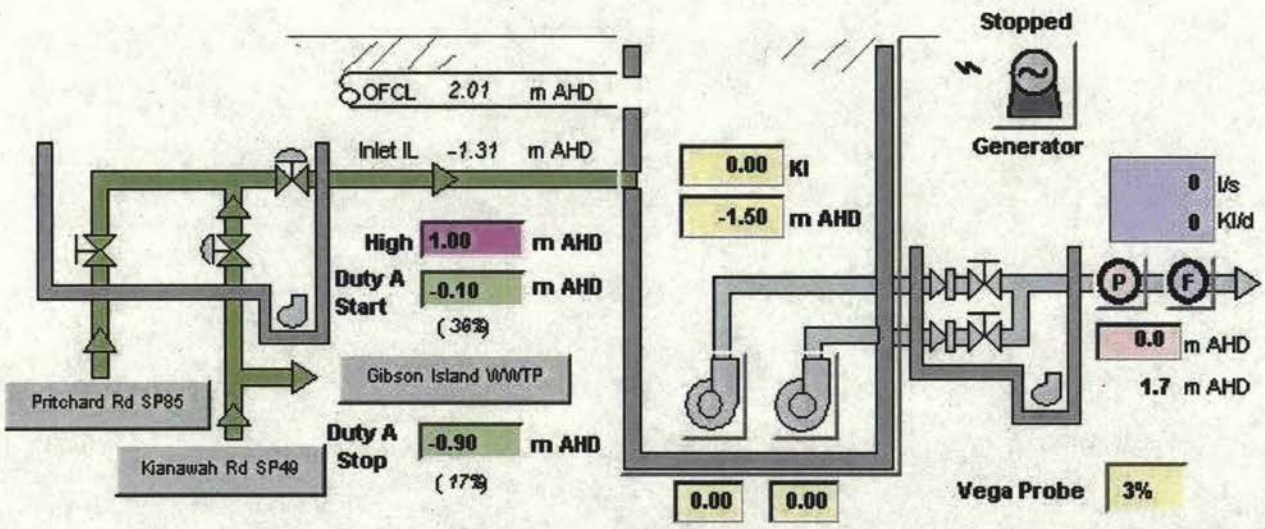
TITLE	Diesel Standby Generator - Local Control Panel - Functional Description
DOCUMENT ID	N/A
VERSION	02
AUTHOR	SOUTH EAST POWER GENERATION
DOCUMENT OWNER	

Brisbane City

Brisbane Water

BRISBANE WATER

Network Control Systems



FUNCTIONAL SPECIFICATION

SP298 Lytton Rd #4

Sewage Pumping Station

Submersible 2 Pumps With VSD

Document Signoff

Approval

	Name	Role	Signature	Date
Supervising Elec. Eng *Engineering Design Services*	Alan Mooney	Recommend		26/5/05
Supervising Elec. Eng *Engineering Design Services*	Henri Lai	Concur		25/5/05
Team Leader *Network Control Systems*	Peter Sherriff	Concur		
Manager *M & E Planning*	Peter Casey	Concur		
Manager *Water & Sewerage Operations*	George Henry	Concur		
Project Manager	Andrew Bannik	Approve		17/05/05

Distribution

Name	Role	Section

Document Signoff

Approval

	Name	Role	Signature	Date
Supervising Elec. Eng *Engineering Design Services*	Alan Mooney	**Recommend**		
Supervising Elec. Eng *Engineering Design Services*	Henri Lai	Concur		
Team Leader *Network Control Systems*	Peter Sherriff	Concur		
Manager *M & E Planning*	Peter Casey	Concur		
Manager *Water & Sewerage Operations*	George Henry	Concur		
Project Manager	Andrew Bannik	**Approve**		

Distribution

	Name	Role	Section

Revision Control

Revision Number	Date	Amendment Details	Responsible Officer
Version 0.00	11/11/2004	Original Draft – Developed from Leightons Revised Functional Spec – Version 4	Alex Witthoft
Version 0.03	26/11/2004	Issued for Comment	Alex Witthoft
Version 0.04	29/11/2004	Added Comments by Malcolm Barrett	Alex Witthoft
Version 1.00	15/02/2005	Added Comments by Leightons and PB	Alex Witthoft
Version 1.01	16/02/2005	Added Comments by Reg McGirr	Alex Witthoft
Version 1.02	16/02/2005	Minor spelling corrections	Alex Witthoft
Version 1.03	08/03/2005	Set points changed after commissioning	Alex Witthoft
Version 1.04	09/05/2005	Changed Lytton Rd #3 to Lytton Rd #4	Alex Witthoft
Version 1.05	13/05/2005	Minor Modifications requested by Reg McGirr	Alex Witthoft
Version 1.10	21/11/2005	Levels modified after official NSM surveying	Alex Witthoft

Document Consultation

Please review the attached document and add your comments where necessary. To ensure that the process is kept within reasonable timeframes, it would be appreciated if you could return this document by the **Requested Return Date** listed below.

Project Sponsor: Andrew Bannik Officer Code: PM13BW Location: T.C.B. Level 2

Author: Alex Witthoft Officer Code: CTAMP12 Location: Cullen Ave

Document Administrator: Alan Mooney Officer Code: SEEPSBW Location: T.C.B. Level 2

Version Number (1,2,3 etc)	Forwarded To: (Name / Officer Code)	Location (eg,TCB, Cullen Ave)	Date Sent	**Requested Return Date**	Date Returned	Comments Received (Y / N)	Comments Incorporated (Y / N)
0.03	Malcolm Barrett	Cullen Ave	26/11/04	03/12/04	03/12/04	Y	Y
0.04	Peter Sherriff	Cullen Ave	29/11/04	06/12/04	06/12/04	Y	Y
0.04	George Henry	Cullen Ave	29/11/04	06/12/04	21/11/04	Y	Y
0.04	Alan Mooney	TCB	29/11/04	06/12/04	06/12/04	N	N
0.04	Peter Casey	TCB	29/11/04	06/12/04	06/12/04	N	N
0.04	Henri Lai	TCB	29/11/04	06/12/04	06/12/04	N	N
0.04	Frank Mitchell	Leightons	29/11/04	21/12/04	21/12/04	Y	Y
0.04	Dean Maguire	Parsons Brinckerhoff	29/11/04	21/12/04	21/12/04	Y	Y

PLEASE RETURN THIS DOCUMENT TO THE ABOVE DOCUMENT ADMINISTRATOR

DO NOT SEND IT ANYWHERE ELSE!

Table of Contents

Table of Figures

Table of Tables

Definitions

IDTS	Integrated Departmental Telemetry System
RTU	Remote Telemetry Unit
SCADA	Supervisory Control And Data Acquisition
mAHD	Metres above Australia Height Datum

1 INTRODUCTION

This document contains the site specific details and describes the non standard functional requirements for control, monitoring and telemetry at sewage pump station SP298 at Lytton Road Lytton. The functional requirements described in the document are in addition to the standard functionality detailed in "SPSV3 SEWAGE PUMPING STATION SUBMERSIBLE 3 PUMPS WITH VFD" [1].

The standard specification was written for a 3 pump station, of which only 2 pumps are allowed to run at any given time. The functionality for SP298 Lytton Road #4 is identical, except that SP298 only has 2 pumps, both of which can run simultaneously.

This site specific details and the non standard functional requirements in this document was derived from the functional specification written by Leighton Contractors Pty Ltd "SP298 FUNCTIONAL SPECIFICATION REV 4" [2].

SP298 Lytton Rd #4 is a sewerage pumping station with two variable speed 68 kW (nominal) submersible pumps operating in a duty/standby arrangement. This station is located on the northwest side of Lytton Road Lytton, approximately 300 m southwest of Freight Street.

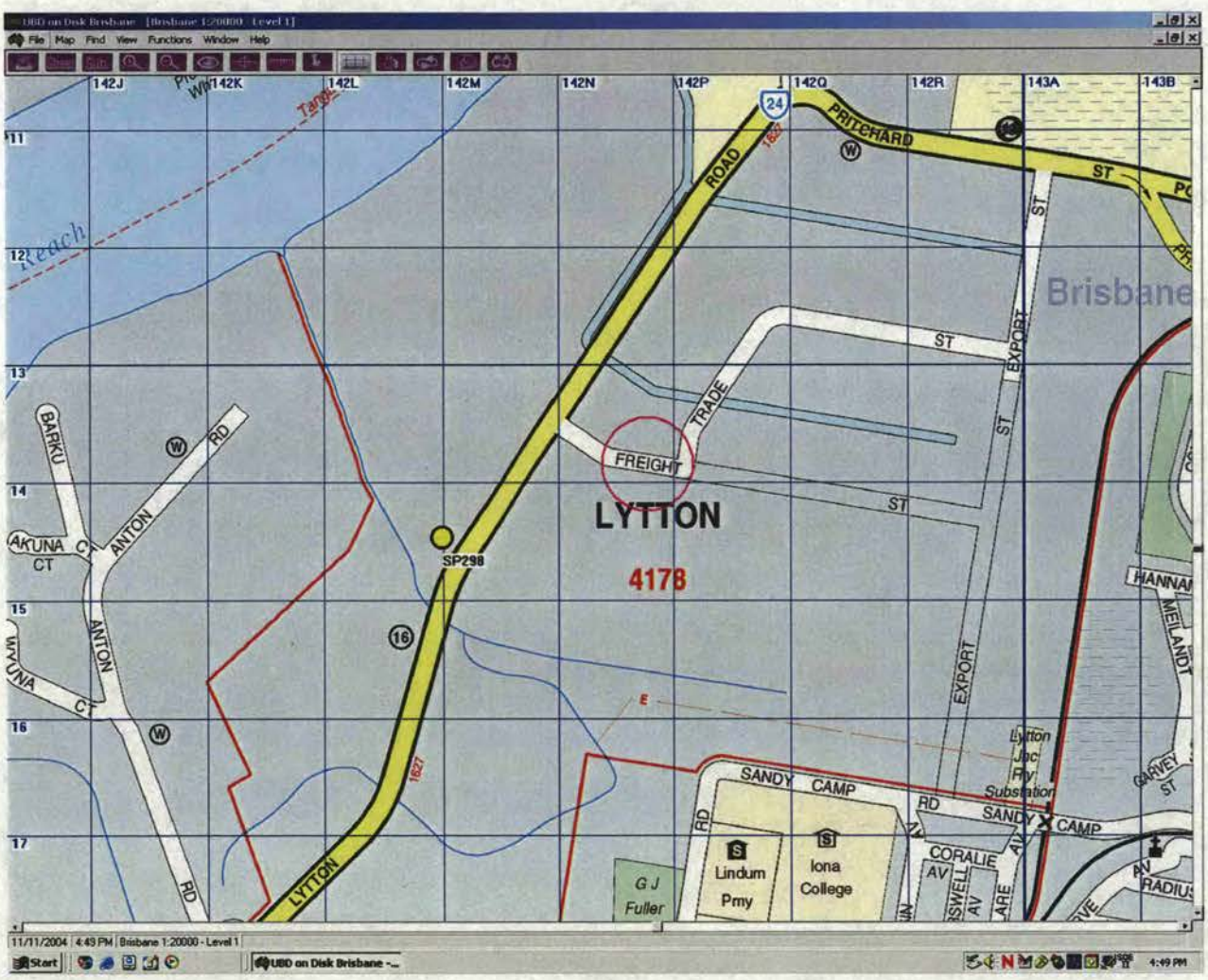


Figure 1: SP298 Location Map

1.1 General Process Description

The incoming sewage at SP298 is pumped from SP049 Kianawah Rd and SP085 Pritchard St. A branch was constructed on the SP049 rising main to allow flow into SP298 from the existing SP049, which originally pumped to Gibson Island WWTP. SP049 is still capable of pumping directly to Gibson Island WWTP when the new branch is isolated at the inlet to SP298. An actuated knife gate valve is installed at the end of the branch to allow this diversion to be triggered remotely. Refer to drawing 486/5/7-WR101/030.

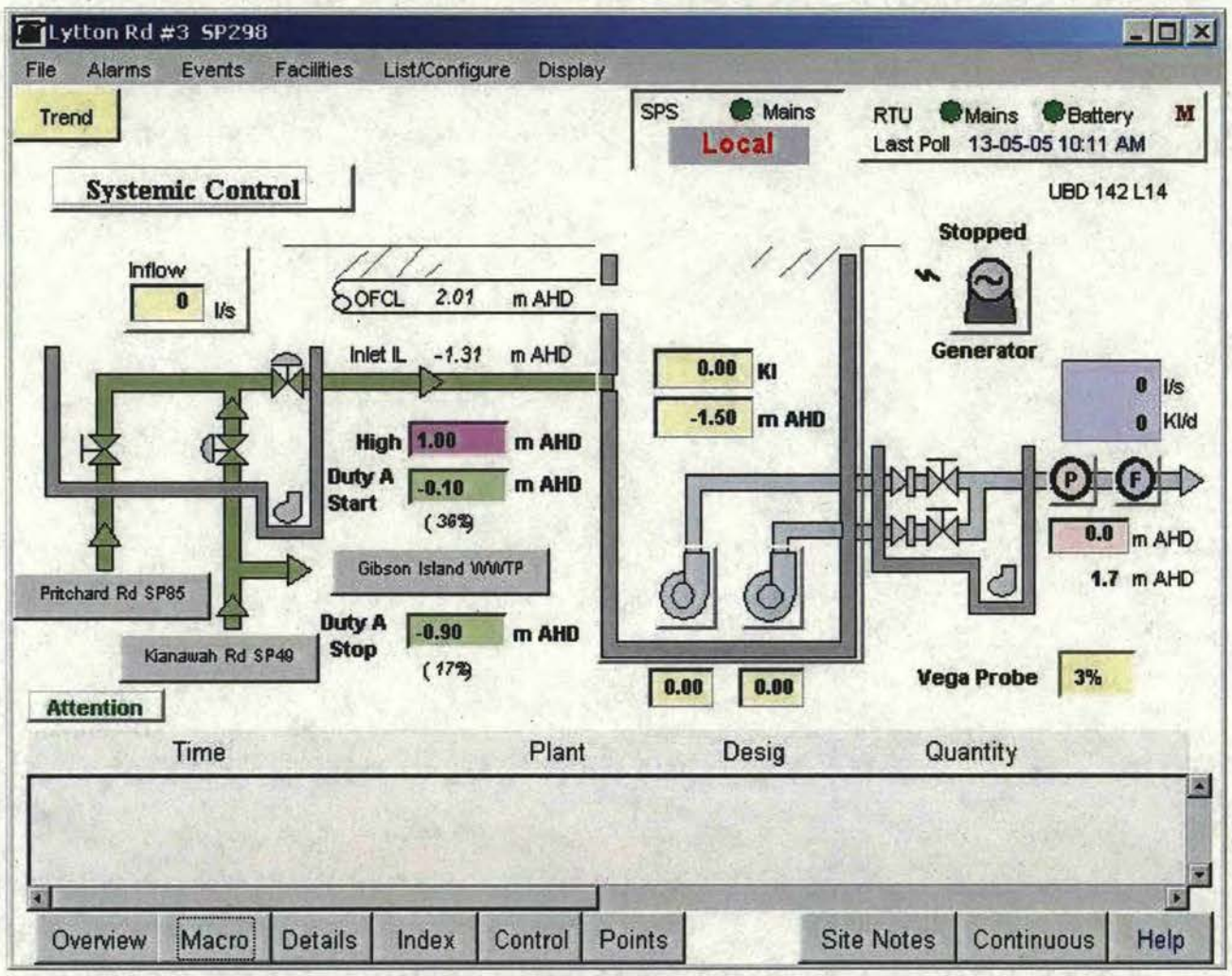


Figure 2: SP298 Process and Instrumentation Overview

The Kianawah Road branch and Pritchard Street rising main are connected in a valve chamber upstream of SP298 and discharge through a common pipe into the SP298 grit collector maintenance hole (GCMH). From the GCMH, the sewage flows directly into the wet well through a submerged pipe.

With one pump running, SP298 discharges a maximum of 160 L/s of raw sewage through an OD450 PE100 and OD400 PE100 rising main to the inlet structure at SP300 at Serpentine Road Pinkenba, approximately 2.6 km to the northwest. This figure increases to 210 l/s when both pumps are running at maximum speed. The rising main includes a Horizontal Directional Drilled (HDD) section under the Brisbane River at approximately RL-50mAHD which is OD400 PE100. A pressure transmitter and flow transmitter are installed in the discharge pipe work.

2 EQUIPMENT INSTALLED

2.1 Standard Equipment

SP298 Lytton Rd #4#4 pump station has the following standard equipment installed. The functionality for the control, monitoring and alarming for these items is fully described in the standard functional specification.

Pumps	Two Hidrostal H08K submersible pumps with 68 kW (nominal) four pole electric motors are installed in the wet well. Each pump is fitted with moisture probes in the oil chamber and thermistors in the stator windings.
Pump Starters	Two Danfoss VLT8000 Variable Frequency Drives (VFDs) are installed in the pump station switchboard. The VFDs will also provide soft starting functionality.
Flowmeters	One direct buried DN450 ABB Magmaster electromagnetic flowmeter is installed in the DN450 PE100 discharge main downstream of the valve chamber. The flowmeter will be used in the flow control algorithm (PID Loop) to control the speed of the pumps.
Level Sensors	One Vega hydrostatic level transmitter and one Multitrode level probe are installed in the wet well.
Pressure Transmitters	One Vegabar 64 pressure transmitter is installed on the discharge pipework in the valve chamber.

2.2 Non Standard Equipment

SP298 Lytton Rd #4#4 pump station has the following non standard equipment installed. The functionality for the control, monitoring and telemetry for is described in the following sections as these items is NOT described in the standard specification. (ref 1: Document ID 003589)

Emergency Generator	One 133kVA diesel powered backup generator is installed on a slab adjacent to the valve chamber. The generator includes its own GE FANUC PLC mounted in a dedicated control panel inside the generator housing.
Manual Valves	A manually operated DN300 Keystone Figure 951 knifegate valve would be installed on the rising main from SP085 (V3). and from future new developments at Lytton Rd
Actuated Valves	Two actuated DN300 Keystone Figure 951 knifegate valves shall be installed at the inlet valve pit. These valves will be located on the rising main from SP049 (V1) and on the common main to SP298 (V2).

2.2.1 Emergency Generator

The emergency generator is designed to the standard functionality as described by "DIESEL STANDBY GENERATOR LOCAL CONTROL PANEL FUNCTIONAL DESCRIPTION". [3] The generator is supplied with the PLC fully configured and programmed with the standard program. The RTU (Logica MD3311) is programmed with the standard interface program that will provide the monitoring, control and telemetry to the IDTS master station.

2.2.2 Manual Valve

A manually operated valve is installed on the rising main from SP085 Prichard Rd to allow the rising main to be isolated in the event of a burst in the rising main.

2.2.3 Actuated Valves

SP298 Lytton Road #4 has two actuated valves (V1 and V2 – refer to Figure 2: SP298 Process and Instrumentation Overview~~Figure 2: SP298 Process and Instrumentation Overview~~~~Figure 2: SP298 Process and Instrumentation Overview~~) installed to allow the inflow to the station to be controlled under high flow and failure conditions.

Normal Flow Conditions

Under normal conditions both of the actuated valves (V1 and V2) will be open and both SP085 Prichard Street and SP048 Kianawah Road will deliver flow to the SP298 Lytton Road #4.

High Inflow Conditions

If SP298 Lytton Road #4 can not keep up with the inflow to the station, the wet well level will rise. Once the surcharge imminent level is reached, the station is deemed to be under high inflow condition. To reduce flow into the station, the flow from SP049 will be diverted to Gibson Island WWTP by closing the actuated valve (V1) fitted to the rising main.

Failure Conditons

IF both pumps are unavailable to run, the site will be deemed to be under failure condition. All flow is diverted to Gibson Island WWTP by closing the actuated valve before the inlet to the wet well (V2) while the actuated valve on the rising main from SP049 Kianawah (V1) is open.

NOTE: Both actuated valves will NOT be able operate during an electrical outage (ie both Energex and generator power is unavailable) under the control of the PLC. It can be only operated manually by an on site operator.

2.3 Provision for Future Non-Standard Equipment

Although the project has made civil provision for the following future equipment, no PLC or RTU code has been developed

- Dosing Pump
- Activated Carbon Scrubber

Any future project to install the above equipment will provide funding for the functional specification and programming of the control, monitoring and telemetry.

2.3.1 Dosing Pumps

Provision was made for two chemical dosing pumps (nominally Alldos 0.09 kW) to be installed adjacent to the dosing slab. Provision was made for VFDs for these pumps to be installed in a dedicated control panel adjacent to the pumps. These will need to be flow paced to allow for the two flow duties. Provision for a 3-phase power supply has been made in the pump station switchboard.

2.3.2 Activated Carbon Scrubber

Provision was made for one activated carbon odour scrubber (nominally RKR Engineering Airclenz) to be installed adjacent to the wet well. Provision was made for the starter and controls for the activated carbon unit to be installed in a dedicated control panel adjacent to the scrubber Provision for a 3-phase power supply has been made in the pump station switchboard.

3 CONTROL PHILOSOPHY

The station will operate according to the control philosophy detailed in the standard functional specification (SPSV3) with the following modifications.

3.1 Normal Operation

In the event of a sudden failure of the SP298 pumps (eg power failure, emergency stop etc), there is some risk of the momentum of the water column to drain the SP298 pump well. Water hammer modelling was undertaken by Parsons Brinckerhoff to identify a solution to this problem.

From these investigations, it was found that the momentum issue would be controlled by ensuring that the volume in the well is sufficient for the current flow rate of the station.

To achieve this the pump station will run a single pump at minimum flow rate of 90 l/s while it is under 0.000mAHD. Above this level a single pump will be controlled to gradually increase the flow rate, via a proportional only control loop, to 160/s at 0.500mAHD. A single pump will be limited to 160 l/s. The second pump will be started at 0.600mAHD and both pumps will be contolled to produce 160 l/s. Above 0.600mAHD the two pumps will be controlled to gradually increase the flow rate, via a proportional only control loop, to 210 l/s at 0.800mAHD. The same proportional loops will reduce the flow rate of the station as the wet well level decreases.

All the above levels and flow rates are displayed graphically in Figure 3: SP298 Station Level Set Points~~Figure 3: SP298 Station Level Set Points~~~~Figure 3: SP298 Station Level Set Points~~

To achieve this change in control philosophy, the PID Loops detailed in the standard specification (ref 1: Document ID 003589) will have an integral coefficient of 0 and a proportional coefficient to provide the necessary flow increase as the wet well level increases.

If the flow meter is invalid, the proportional loop will provide a VFD speed set point equivalent to the desired flow.

Number of pumps running	Flow Rate	Equivalent Speed
1 pump	90 l/s	25 Hz
1 pump	160 l/s	50 Hz
2 pumps	160 l/s	?? Hz ?????????????
2 pumps	210 l/s	50 Hz

3.2 Duty Rotation Algorithm

The duty rotation algorithm will now control only two pumps instead of three. The number of pumps allowed to run remains the same (2) and the initialisation block will be configured with the site specific set points listed in the tables in the next section.

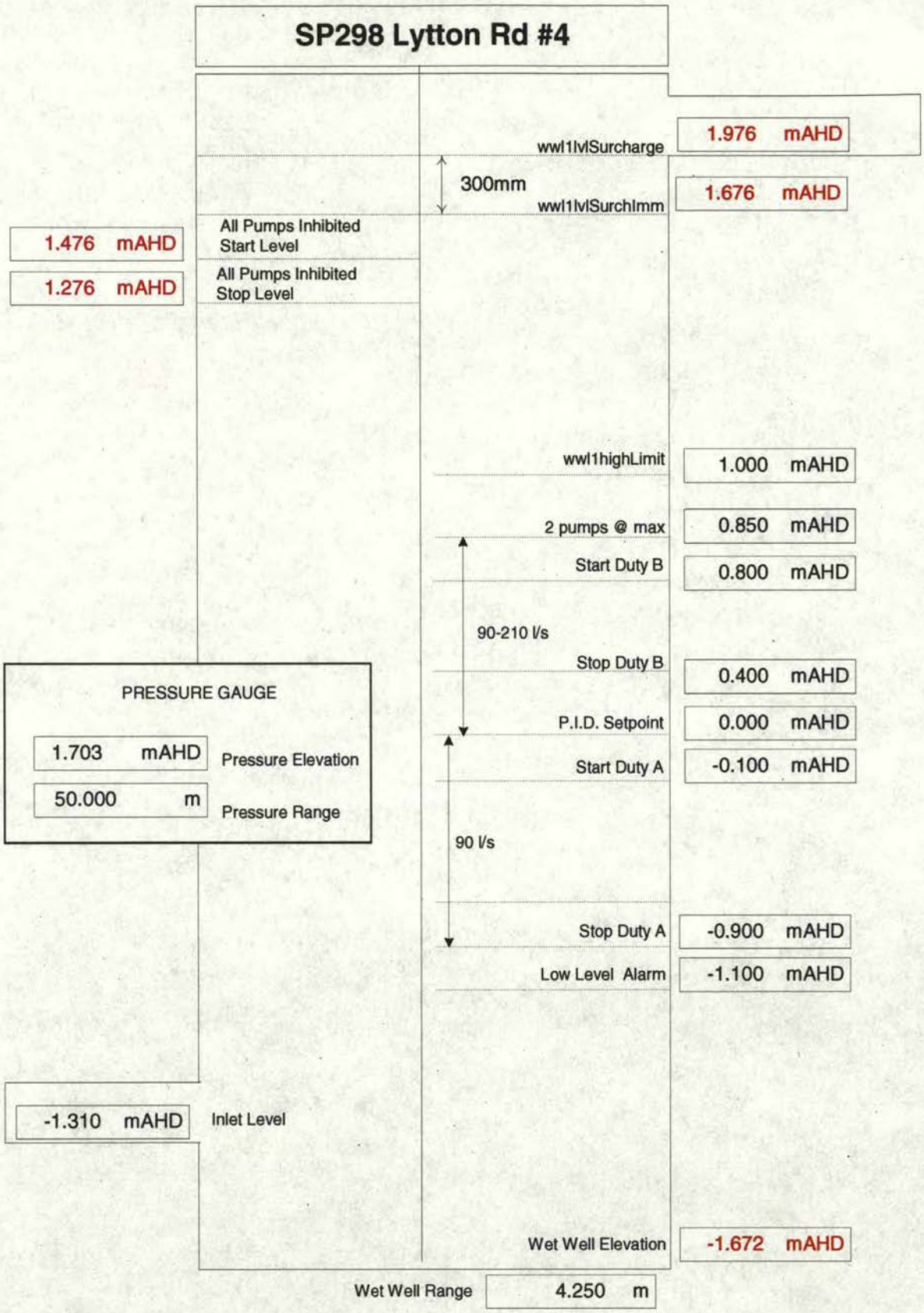


Figure 3: SP298 Station Level Set Points

3.3 Site Specific Values

Table 1: Site Specific Constants defined in the PLC

Tag Name	Description	Type	Value	Units
Sewerage Pumping Station				
Stn01grSurchPumpingTime	Surcharge pumping duration [3]	Integer	45	Sec
Delivery flow				
Flw01txRange	Delivery flow – Range	Real	250.0	l/s
Stn01grMinFlow1Pmp	Delivery flow – Minimum flow	Real	90.0	l/s
Stn01grMaxFlow1Pmp	Delivery flow – Maximum flow – 1 Pump	Real	160.0	l/s
Stn01grMaxFlow2Pmp	Delivery flow – Maximum flow – 2 Pumps	Real	210.0	l/s
Delivery pressure				
Pre01txRange	Delivery pressure - Range	Real	50000	mmAHD
Pre01txZero	Delivery pressure – Elevation of the transducer	Real	1703	mmAHD
Pump Blockage				
Stn01grPmpBlockFlowKneeSP	Flow blocked limit for flow/level PID control (knee)	Integer	1000	l/s x 10
Stn01grPmpBlockSpeedKneeSP	VFD speed blocked limit for flow/level PID control (knee)	Integer	800	Hz x 10
Stn01grPmpBlockSpeedMinSP	VFD speed blocked limit for minimum flow PID control	Integer	900	Hz x 10
Wet well level				
Wwl01txRange	Wet well level range	Integer	4250	mmAHD
Wwl01txSurchImmLevelSP	Wet well surcharge imminent level	Integer	1676	mmAHD
Wwl01grInhStartLevelSP	Wet well inhibit mode start level	Integer	1476	mmAHD
Wwl01grInhStopLevelSP	Wet well inhibit mode stop level	Integer	1276	mmAHD
Wwl01grRunatMaxLvlSP	Wet well run at maximum speed level	Integer	850	mmAHD
Wwl01txDtyBStartLevelSP	Wet well duty B pump start level	Integer	800	mmAHD
Wwl01txPIDLevelSP	Wet well PID set point	Integer	0	mmAHD
Wwl01txDtyBStopLevelSP	Wet well duty B pump stop level	Integer	400	mmAHD
Wwl01txDtyAStartLevelSP	Wet well duty A pump start level	Integer	-100	mmAHD
Wwl01txDtyAStopLevelSP	Wet well duty A pump stop level	Integer	-900	mmAHD
Wwl01txZero	Wet well empty level (4mA of Probe)	Integer	-1672	mmAHD
Variable Frequency Drive				
Stn01grMinSpeed	Variable Frequency Drive – Minimum Speed	Integer	2500	Hz x 100
	Variable Frequency Drive – Maximum Speed (DN1840)	Integer	3300	Hz x 100
Stn01grMaxSpeed	Variable Frequency Drive – Maximum Speed (DN1370)	Integer	5000	Hz x 100

Table 2: Site Specific Constants defined in the RTU

Tag Name	Description	Type	Value	Units
Delivery flow				
flw1almInhibitTm	Delivery flow - Alarm inhibit timer	Integer	15	sec
Delivery pressure				
pre1almInhibitTm	Delivery pressure - Alarm inhibit timer	Integer	15	sec
Wet well level				
wwl1surchLvlVol	Wet well volume at surcharge level	Real	30.50	kl
wwl1lvlSurcharge	Wet well surcharge occurring level	Real	2.014	mAHD
Pumps 1 - 3				
Pmp[x]almInhPwrTm	Pump [x] - Motor power alarm inhibit timer.	Integer	15	sec
pmp[x]almInhCrntTm	Pump [x] - Motor current alarm inhibit timer.	Integer	15	sec
pmp[x]currRange	Pump [x] - Motor current range	Real	115.0	Amps

Table 3: Site specific Variable defined in the RTU

Tag Name	Description	Type	Value	Units
Wet well level				
wwl1highLimit	Wet well level - High alarm set point	Integer	850	mmAHD
wwl1lowLimit	Wet well level - Low alarm set point	Integer	-1100	mmAHD
Delivery flow				
flw1highLimit	Delivery flow - High alarm set point	Integer	250000	ml/s
flw1lowLimit	Delivery flow - Low alarm set point	Integer	0	ml/s
Delivery pressure				
pre1highLimit	Delivery pressure - High alarm set point	Integer	51703	mmAHD
pre1lowLimit	Delivery pressure - Low alarm set point	Integer	1703	mmAHD
Pumps 1 - 2				
pmp[x]currHiLimit	Pump [x] - Motor current high alarm set point	Integer	115000	mAmps
pmp[x]currLoLimit	Pump [x] - Motor current low alarm set point	Integer	0	mAmps
pmp[x]powHiLimit	Pump [x] - Motor power high alarm set point	Integer	68000	Watts
pmp[x]powLoLimit	Pump [x] - Motor power low alarm set point	Integer	0	Watts

Table 4: Wet Well Level vs Volume Data

	Height (mAHD)	Volume m^3	Remaining Storage m^3	% Level	% Volume
1	-0.72	0.0	46.3	0%	0%
2	-0.27	7.3	39.0	16%	16%
3	-0.12	9.8	36.5	21%	21%
4	0.21	15.1	31.2	33%	33%
5	0.51	20.0	26.3	43%	43%
6	0.66	22.4	23.9	48%	48%
7	0.76	24.0	22.3	52%	52%
8	1.25	32.0	14.3	69%	69%
9	1.45	35.3	11.0	76%	76%
10	1.65	38.5	7.8	77%	77%
11	2.11	46.0	0.3	99%	99%
12	2.13	46.3	0.0	100%	100%

Figures in red need to be adjusted for storage in BW overflow pipe.

3.4 Non Standard Control

3.4.1 Valve Control

There are 3 valid modes of operation, controlled by the open and close status of valve 1 and valve 2. These modes are:

Mode	Valve 1	Valve 2	Description
1 – Normal	OPEN	OPEN	Both SP049 and SP085 pump into SP298
2 – Surcharge Pumping	CLOSED	OPEN	Only flow from SP085 will inflow to SP298 Flow from SP049 directed to GI to reduce inflow to SP298
3 – Failure	OPEN	CLOSED	Flow from SP085 directed to GI through valve 1. No flow to SP298 Flow from SP049 also directed to Gibson Island as the pressure from SP085 will be greater than the pressure from SP049.
4 – Invalid	CLOSED	CLOSED	NOT VALID – Flow from SP085 has no destination.

Mode 1 – Normal

In this mode both SP085 and SP049 will contribute flow to SP298. The station will be in this mode unless one of the other modes is activated.

Mode 2 – Surcharge

The flow from Kianawah is to be diverted to Gibson Island when the surcharge pumping mode is active. Surcharge pumping mode is fully explained in the standard specification. By closing valve 1 flow coming from SP049 is stopped which reduces the total inflow to SP298. Once surcharge pumping mode is deactivated, the valves will revert back to Mode 1 – Normal (ie Valve 1 will open).

Mode 3 – Failure

When this mode is active the valves are configure to divert all flow into the station (from Prichard and Kianawah) to Gibson Island. This mode will be active when either of the following conditions are true:

- Both pumps are unavailable and the well has filled to the wet well high level.
- Both pumps are inhibited. (ie all pumps inhibited mode should not start the pumps).

If a pump becomes available (or not inhibited), then once that pump has started and pumped the wet well down below the duty A start level valve 2 will open.

Local Control

The valves can also be controlled locally via hard wiring (independent of the PLC). While in local control, it is the responsibility of the on site technician to ensure the correct position of the valve.

3.4.2 Pump Control

Number of Pumps

The station acts as per the functionality outlined in the standard Functional Specification. The duty block is modified to only consider 2 pumps (the standard has 3 pumps).

All Pumps Inhibit Mode

As mentioned in the Valve Control section, this stations 'All Pumps Inhibit Mode' not only modifies the start and stop level, it also prevents all inflow to the station by diverting the flow to Gibson Island. This mode will be activated, by the control room officer, as part of the SP300 Serpentine Rd contingency plan to reduce the inflow to SP300 Serpentine Rd.

3.5 Non Standard Monitoring and Alarms

3.5.1 Additional Valve Monitoring and Alarms

The following alarms and events are associated with both valves

Plant	Quantity	Priority
Valve	Available	1
Valve	Available_remote	0
Valve	Open	0
Valve	Closed	0
Valve	Fail_open_alarm	1
Valve	Fail_close_alarm	1

Available

The valve is considered available only when all of the following conditions are present:

- Available for Remote
- Not "Failed to Open"
- Not "Failed to Close"

Available for Remote

The digital input status for "valve available for remote" is transferred directly to the IDTS master station.

Open

The digital input status for "valve open" is transferred directly to the IDTS master station. This is used to animate the valve status on the main IDTS page.

Closed

The digital input status for "valve closed" is transferred directly to the IDTS master station. This is used to animate the valve status on the main IDTS page.

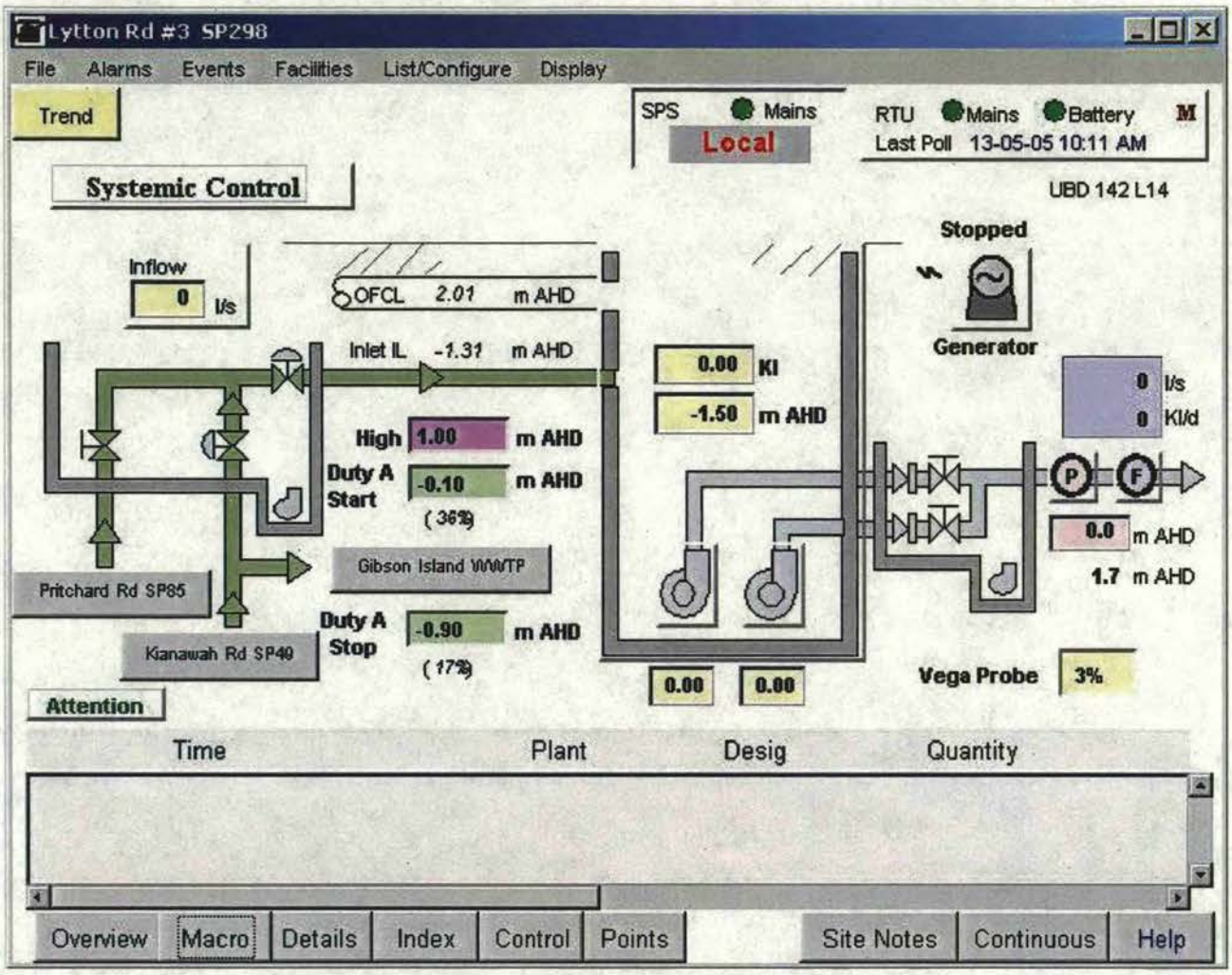
Fail to Open

If the valve is commanded to open and does not reach the open limit within the pre determined time period (set at two times the normal travel time) then the failed to open alarm will be activated. This alarm can be reset locally by pressing either of the pump (1 & 2) reset push buttons or remotely by the IDTS master station.

Fail to Close

If the valve is commanded to close and does not reach the close limit within the pre determined time period (set at two times the normal travel time) then the failed to close alarm will be activated. This alarm can be reset locally by pressing either of the pump (1 & 2) reset push buttons or remotely by the IDTS master station.

3.6 Non Standard IDTS Picture



3.6.1 Additional Valves

The two valves will be displayed and will be animated to indicated open, closed and faulted conditions. Double clicking on the valve will bring up the valve control page, on which the operator will be able to send a remote reset.

3.6.2 Additional Pipe Animation

The two inlet pipes will be animated to show a "filled" condition if their respective valve is open. An arrow on the inlet pipe from SP049 Kianawah will indicate the direction of flow (ie into SP298 or back to Gibson Island).

4 REFERENCES

1

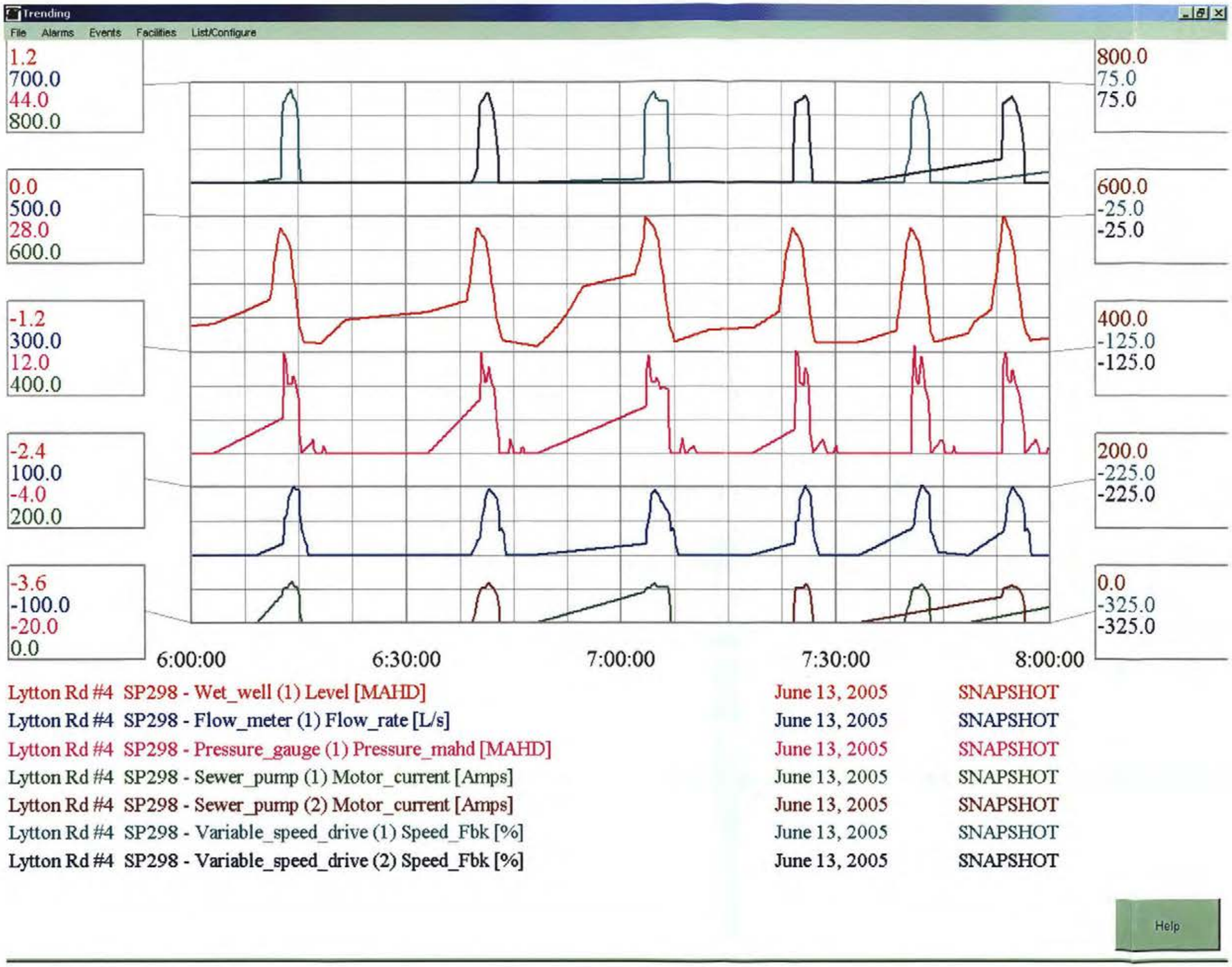
TITLE	SPSV3 Sewage Pumping Station Submersible 3 Pumps With VFD – Functional Specification
DOCUMENT ID	003589
VERSION	0.30
AUTHOR	Alex Witthoft , Brisbane Water – Network Control Systems
DOCUMENT OWNER	Peter Sherriff, Brisbane Water – Network Control Systems

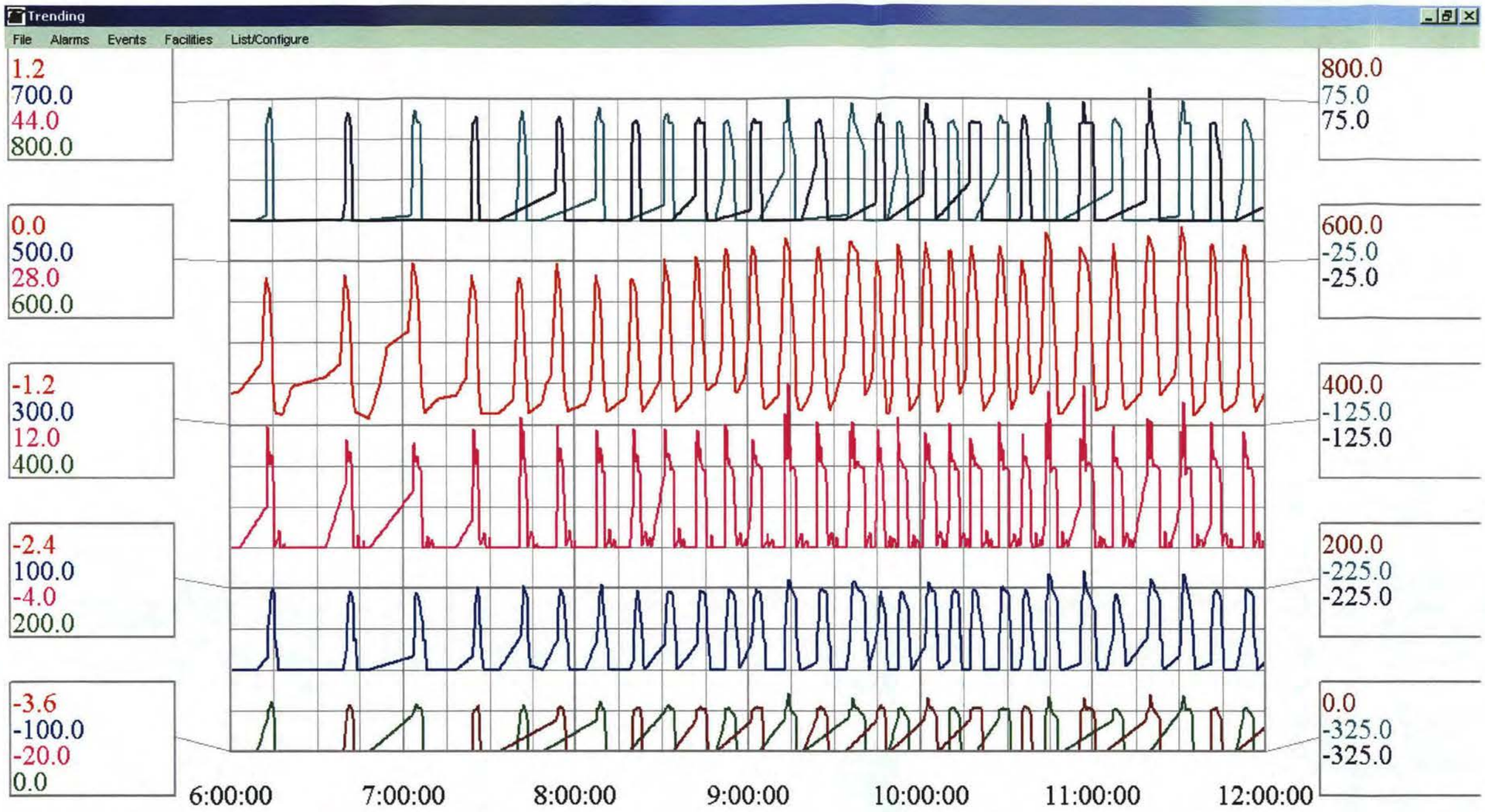
2

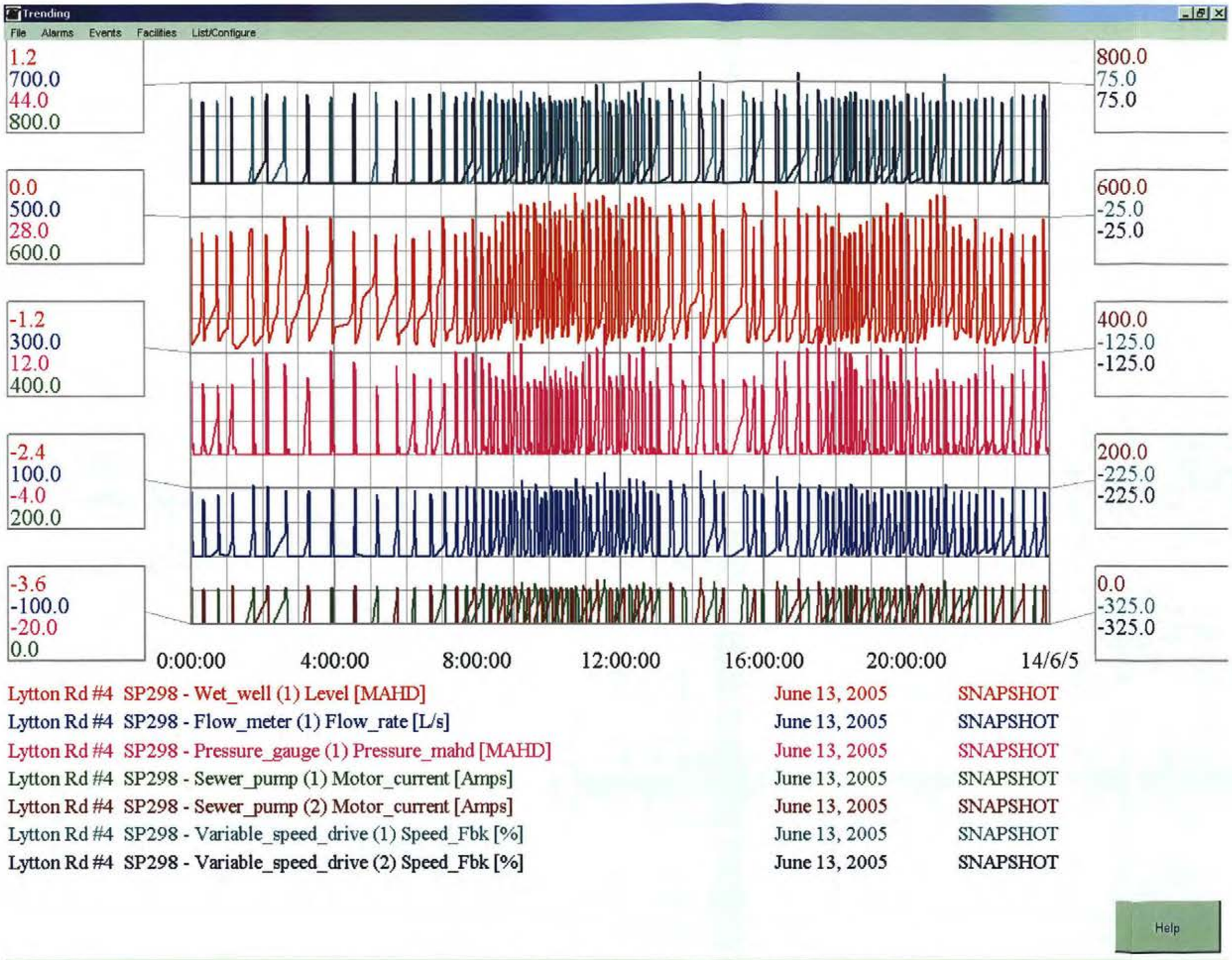
TITLE	SP298 Functional Specification
DOCUMENT ID	N/A
VERSION	REVISION 4
AUTHOR	M. BRAND
DOCUMENT OWNER	Leighton Contractors Pty Ltd

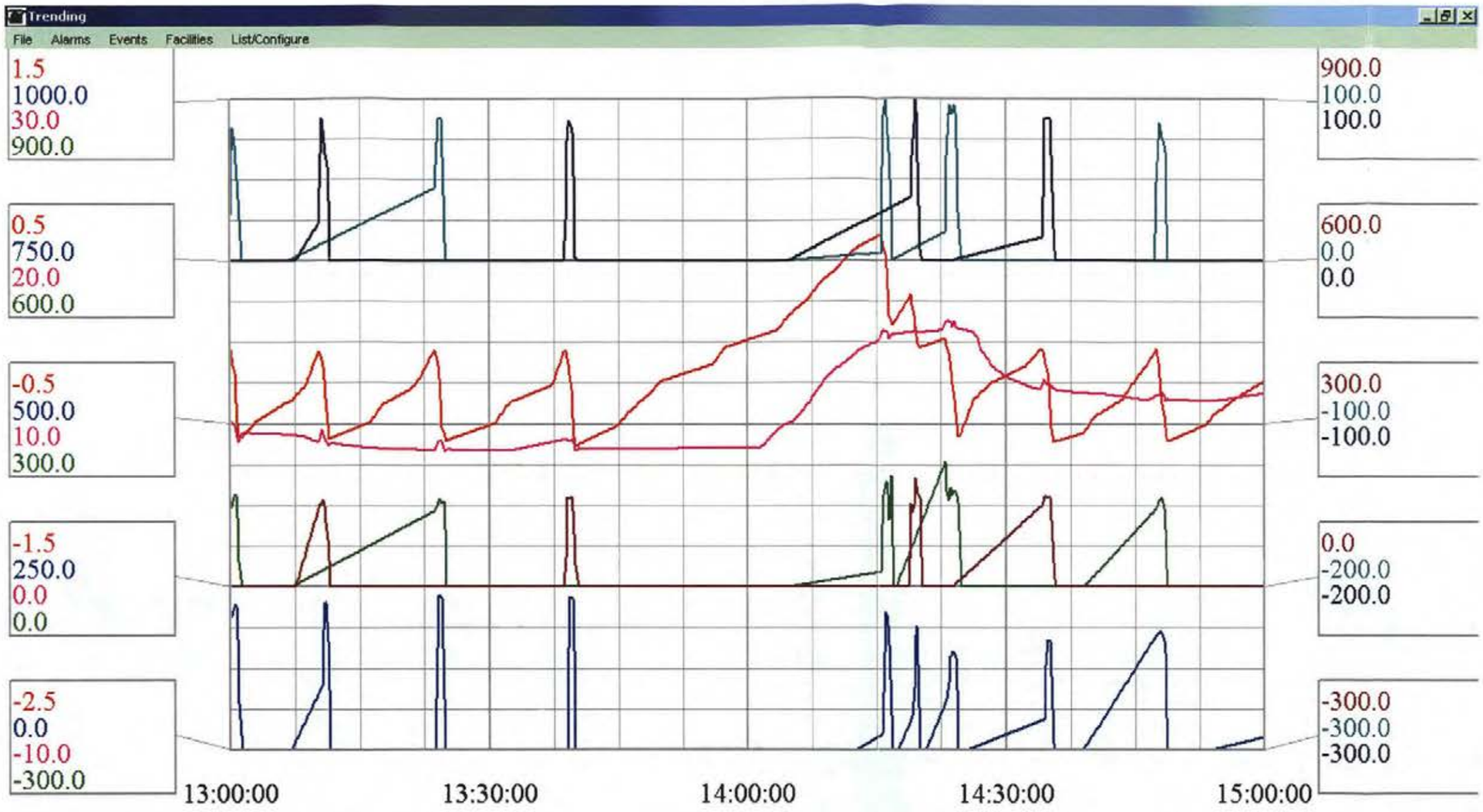
3

TITLE	Diesel Standby Generator - Local Control Panel - Functional Description
DOCUMENT ID	N/A
VERSION	02
AUTHOR	SOUTH EAST POWER GENERATION
DOCUMENT OWNER	


Trending
File Alarms Events Facilities List/Configure
1.2
700.0
44.0
800.0
800.0
75.0
75.0
0.0
500.0
28.0
600.0
600.0
-25.0
-25.0
-1.2
300.0
12.0
400.0
400.0
-125.0
-125.0
-2.4
100.0
-4.0
200.0
200.0
-225.0
-225.0
-3.6
-100.0
-20.0
0.0
0.0
-325.0
-325.0
6:00:00
6:30:00
7:00:00
7:30:00
8:00:00
Lytton Rd #4 SP298 - Wet_well (1) Level [MAHD] June 13, 2005 SNAPSHOT
Lytton Rd #4 SP298 - Flow_meter (1) Flow_rate [L/s] June 13, 2005 SNAPSHOT
Lytton Rd #4 SP298 - Pressure_gauge (1) Pressure_mahd [MAHD] June 13, 2005 SNAPSHOT
Lytton Rd #4 SP298 - Sewer_pump (1) Motor_current [Amps] June 13, 2005 SNAPSHOT
Lytton Rd #4 SP298 - Sewer_pump (2) Motor_current [Amps] June 13, 2005 SNAPSHOT
Lytton Rd #4 SP298 - Variable_speed_drive (1) Speed_Fbk [%] June 13, 2005 SNAPSHOT
Lytton Rd #4 SP298 - Variable_speed_drive (2) Speed_Fbk [%] June 13, 2005 SNAPSHOT
Help

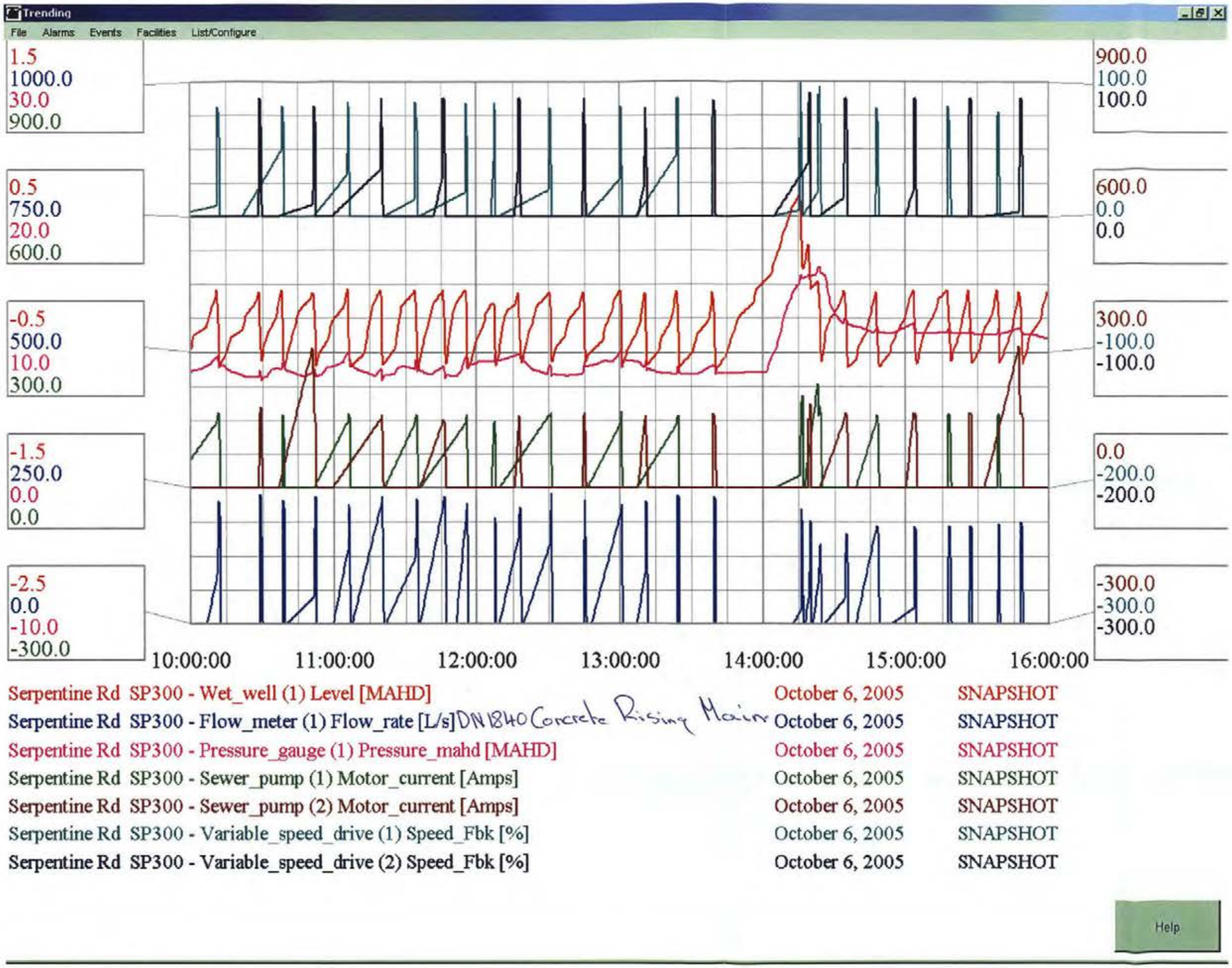

Trending
File Alarms Events Facilities List/Configure
1.2
700.0
44.0
800.0
0.0
500.0
28.0
600.0
-1.2
300.0
12.0
400.0
-2.4
100.0
-4.0
200.0
-3.6
-100.0
-20.0
0.0
800.0
75.0
75.0
600.0
-25.0
-25.0
400.0
-125.0
-125.0
200.0
-225.0
-225.0
0.0
-325.0
-325.0
6:00:00
7:00:00
8:00:00
9:00:00
10:00:00
11:00:00
12:00:00
Lytton Rd #4 SP298 - Wet_well (1) Level [MAHD] June 13, 2005 SNAPSHOT
Lytton Rd #4 SP298 - Flow_meter (1) Flow_rate [L/s] June 13, 2005 SNAPSHOT
Lytton Rd #4 SP298 - Pressure_gauge (1) Pressure_mahd [MAHD] June 13, 2005 SNAPSHOT
Lytton Rd #4 SP298 - Sewer_pump (1) Motor_current [Amps] June 13, 2005 SNAPSHOT
Lytton Rd #4 SP298 - Sewer_pump (2) Motor_current [Amps] June 13, 2005 SNAPSHOT
Lytton Rd #4 SP298 - Variable_speed_drive (1) Speed_Fbk [%] June 13, 2005 SNAPSHOT
Lytton Rd #4 SP298 - Variable_speed_drive (2) Speed_Fbk [%] June 13, 2005 SNAPSHOT
Help

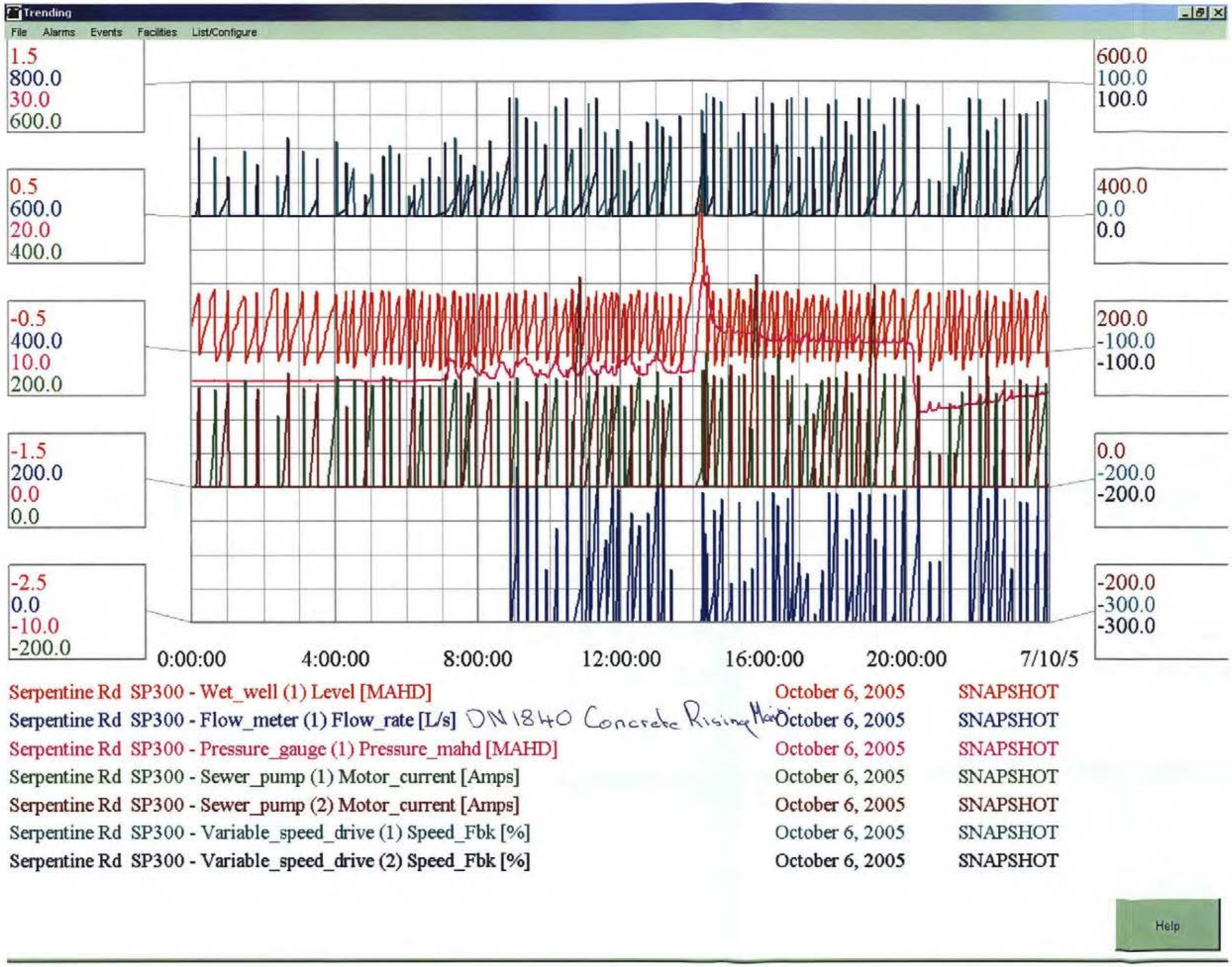

Trending
File Alarms Events Facilities List/Configure
1.2
700.0
44.0
800.0
800.0
75.0
75.0
0.0
500.0
28.0
600.0
600.0
-25.0
-25.0
-1.2
300.0
12.0
400.0
400.0
-125.0
-125.0
-2.4
100.0
-4.0
200.0
200.0
-225.0
-225.0
-3.6
-100.0
-20.0
0.0
0.0
-325.0
-325.0
0:00:00
4:00:00
8:00:00
12:00:00
16:00:00
20:00:00
14/6/5
Lytton Rd #4 SP298 - Wet_well (1) Level [MAHD] June 13, 2005 SNAPSHOT
Lytton Rd #4 SP298 - Flow_meter (1) Flow_rate [L/s] June 13, 2005 SNAPSHOT
Lytton Rd #4 SP298 - Pressure_gauge (1) Pressure_mahd [MAHD] June 13, 2005 SNAPSHOT
Lytton Rd #4 SP298 - Sewer_pump (1) Motor_current [Amps] June 13, 2005 SNAPSHOT
Lytton Rd #4 SP298 - Sewer_pump (2) Motor_current [Amps] June 13, 2005 SNAPSHOT
Lytton Rd #4 SP298 - Variable_speed_drive (1) Speed_Fbk [%] June 13, 2005 SNAPSHOT
Lytton Rd #4 SP298 - Variable_speed_drive (2) Speed_Fbk [%] June 13, 2005 SNAPSHOT
Help

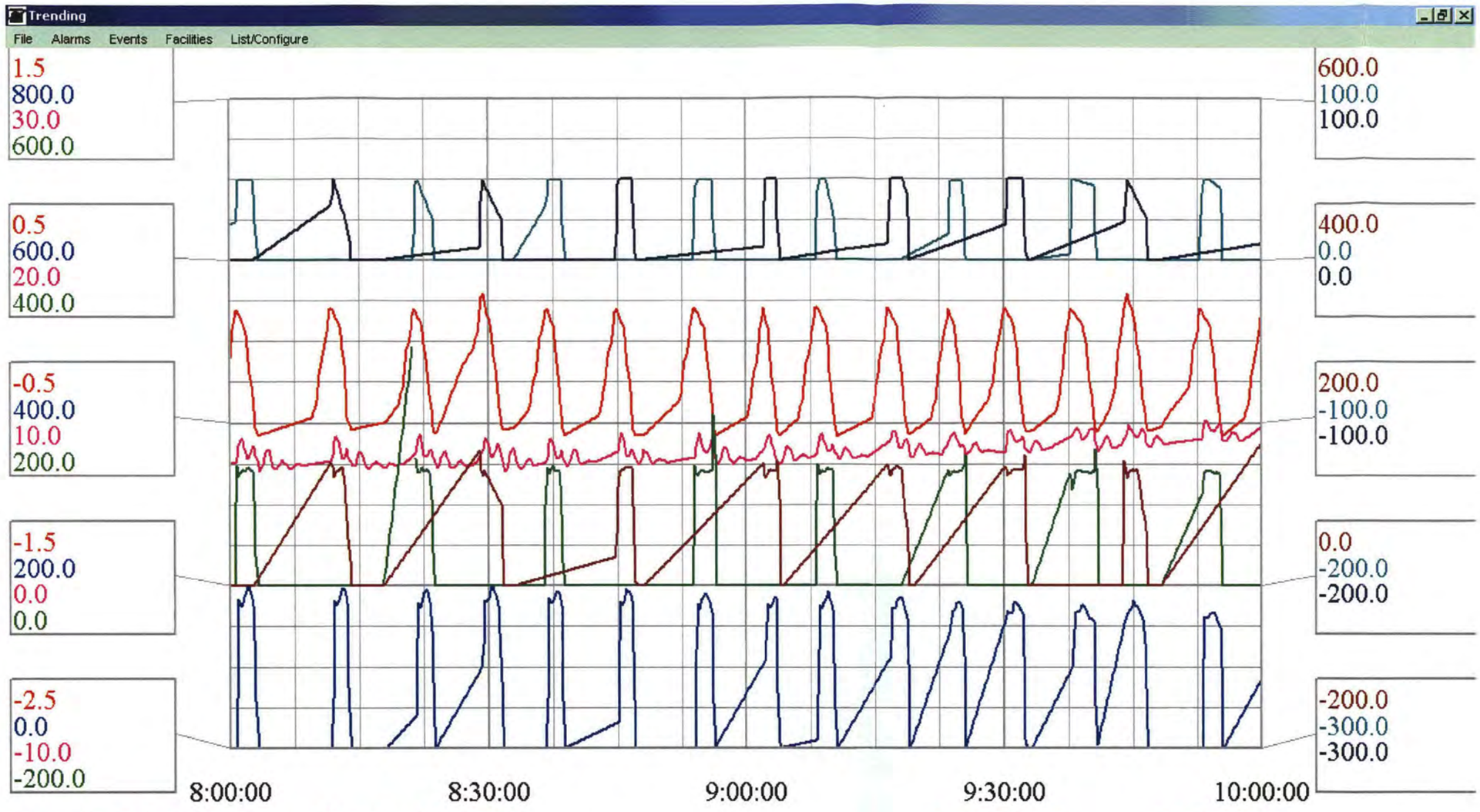


Serpentine Rd	SP300 - Wet_well (1) Level [MAHD]	October 6, 2005	SNAPSHOT
Serpentine Rd	SP300 - Flow_meter (1) Flow_rate [L/s] DN1840 Concrete Rising Main	October 6, 2005	SNAPSHOT
Serpentine Rd	SP300 - Pressure_gauge (1) Pressure_mahd [MAHD]	October 6, 2005	SNAPSHOT
Serpentine Rd	SP300 - Sewer_pump (1) Motor_current [Amps]	October 6, 2005	SNAPSHOT
Serpentine Rd	SP300 - Sewer_pump (2) Motor_current [Amps]	October 6, 2005	SNAPSHOT
Serpentine Rd	SP300 - Variable_speed_drive (1) Speed_Fbk [%]	October 6, 2005	SNAPSHOT
Serpentine Rd	SP300 - Variable_speed_drive (2) Speed_Fbk [%]	October 6, 2005	SNAPSHOT

Help

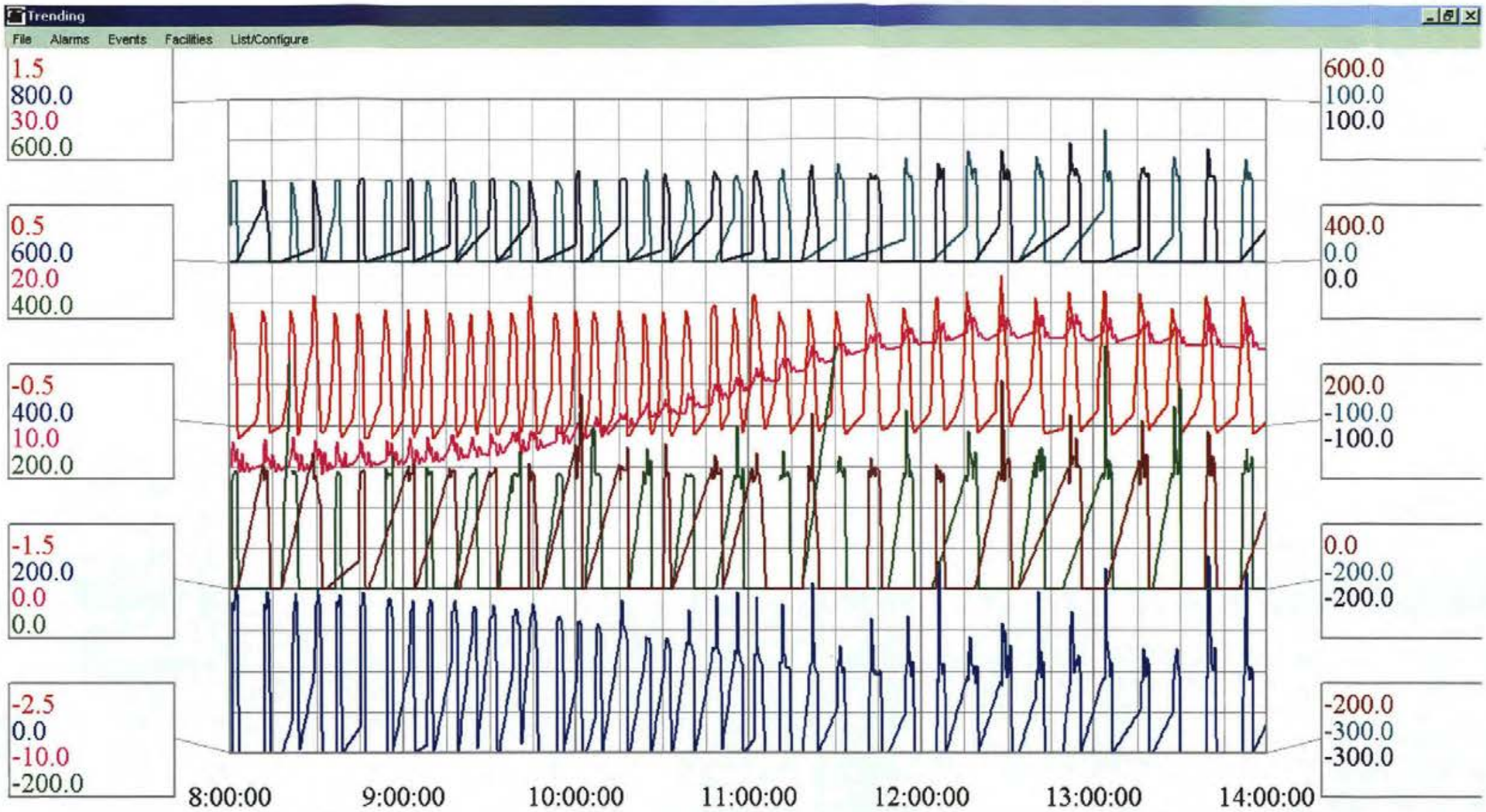

Trending
File Alarms Events Facilities List/Configure
1.5
1000.0
30.0
900.0
0.5
750.0
20.0
600.0
-0.5
500.0
10.0
300.0
-1.5
250.0
0.0
0.0
-2.5
0.0
-10.0
-300.0
900.0
100.0
100.0
600.0
0.0
0.0
300.0
-100.0
-100.0
0.0
-200.0
-200.0
-300.0
-300.0
-300.0
10:00:00
11:00:00
12:00:00
13:00:00
14:00:00
15:00:00
16:00:00
Serpentine Rd SP300 - Wet_well (1) Level [MAHD] October 6, 2005 SNAPSHOT
Serpentine Rd SP300 - Flow_meter (1) Flow_rate [L/s] DN1840 Concrete Rising Main October 6, 2005 SNAPSHOT
Serpentine Rd SP300 - Pressure_gauge (1) Pressure_mahd [MAHD] October 6, 2005 SNAPSHOT
Serpentine Rd SP300 - Sewer_pump (1) Motor_current [Amps] October 6, 2005 SNAPSHOT
Serpentine Rd SP300 - Sewer_pump (2) Motor_current [Amps] October 6, 2005 SNAPSHOT
Serpentine Rd SP300 - Variable_speed_drive (1) Speed_Fbk [%] October 6, 2005 SNAPSHOT
Serpentine Rd SP300 - Variable_speed_drive (2) Speed_Fbk [%] October 6, 2005 SNAPSHOT
Help


Trending
File Alarms Events Facilities List/Configure
1.5
800.0
30.0
600.0
600.0
100.0
100.0
0.5
600.0
20.0
400.0
400.0
0.0
0.0
-0.5
400.0
10.0
200.0
200.0
-100.0
-100.0
-1.5
200.0
0.0
0.0
0.0
-200.0
-200.0
-2.5
0.0
-10.0
-200.0
-200.0
-300.0
-300.0
0:00:00
4:00:00
8:00:00
12:00:00
16:00:00
20:00:00
7/10/5
Serpentine Rd SP300 - Wet_well (1) Level [MAHD] October 6, 2005 SNAPSHOT
Serpentine Rd SP300 - Flow_meter (1) Flow_rate [L/s] DN1840 Concrete Rising Main October 6, 2005 SNAPSHOT
Serpentine Rd SP300 - Pressure_gauge (1) Pressure_mahd [MAHD] October 6, 2005 SNAPSHOT
Serpentine Rd SP300 - Sewer_pump (1) Motor_current [Amps] October 6, 2005 SNAPSHOT
Serpentine Rd SP300 - Sewer_pump (2) Motor_current [Amps] October 6, 2005 SNAPSHOT
Serpentine Rd SP300 - Variable_speed_drive (1) Speed_Fbk [%] October 6, 2005 SNAPSHOT
Serpentine Rd SP300 - Variable_speed_drive (2) Speed_Fbk [%] October 6, 2005 SNAPSHOT
Help



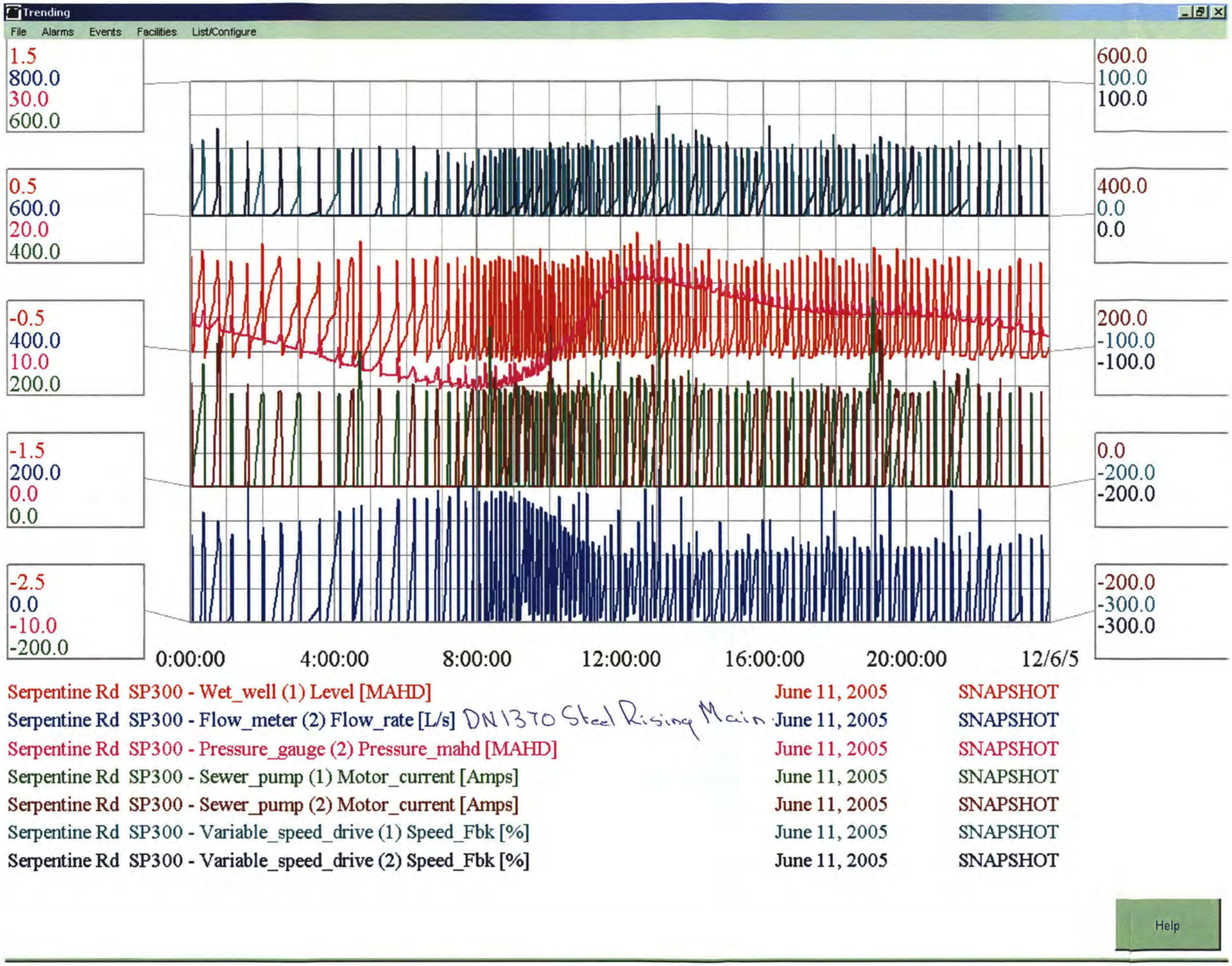
Serpentine Rd SP300 - Wet_well (1) Level [MAHD] June 11, 2005 SNAPSHOT
Serpentine Rd SP300 - Flow_meter (2) Flow_rate [L/s] DN1370 Steel Rising Main. June 11, 2005 SNAPSHOT
Serpentine Rd SP300 - Pressure_gauge (2) Pressure_mahd [MAHD] June 11, 2005 SNAPSHOT
Serpentine Rd SP300 - Sewer_pump (1) Motor_current [Amps] June 11, 2005 SNAPSHOT
Serpentine Rd SP300 - Sewer_pump (2) Motor_current [Amps] June 11, 2005 SNAPSHOT
Serpentine Rd SP300 - Variable_speed_drive (1) Speed_Fbk [%] June 11, 2005 SNAPSHOT
Serpentine Rd SP300 - Variable_speed_drive (2) Speed_Fbk [%] June 11, 2005 SNAPSHOT

Help



Serpentine Rd SP300 - Wet_well (1) Level [MAHD] June 11, 2005 SNAPSHOT
Serpentine Rd SP300 - Flow_meter (2) Flow_rate [L/s] DN 13 TO Steel Rising Main June 11, 2005 SNAPSHOT
Serpentine Rd SP300 - Pressure_gauge (2) Pressure_mahd [MAHD] June 11, 2005 SNAPSHOT
Serpentine Rd SP300 - Sewer_pump (1) Motor_current [Amps] June 11, 2005 SNAPSHOT
Serpentine Rd SP300 - Sewer_pump (2) Motor_current [Amps] June 11, 2005 SNAPSHOT
Serpentine Rd SP300 - Variable_speed_drive (1) Speed_Fbk [%] June 11, 2005 SNAPSHOT
Serpentine Rd SP300 - Variable_speed_drive (2) Speed_Fbk [%] June 11, 2005 SNAPSHOT

Help


Trending
File Alarms Events Facilities List/Configure
1.5
800.0
30.0
600.0
600.0
100.0
100.0
0.5
600.0
20.0
400.0
400.0
0.0
0.0
-0.5
400.0
10.0
200.0
200.0
-100.0
-100.0
-1.5
200.0
0.0
0.0
0.0
-200.0
-200.0
-2.5
0.0
-10.0
-200.0
-200.0
-300.0
-300.0
0:00:00
4:00:00
8:00:00
12:00:00
16:00:00
20:00:00
12/6/5
Serpentine Rd SP300 - Wet_well (1) Level [MAHD] June 11, 2005 SNAPSHOT
Serpentine Rd SP300 - Flow_meter (2) Flow_rate [L/s] DN1370 Steel Rising Main June 11, 2005 SNAPSHOT
Serpentine Rd SP300 - Pressure_gauge (2) Pressure_mahd [MAHD] June 11, 2005 SNAPSHOT
Serpentine Rd SP300 - Sewer_pump (1) Motor_current [Amps] June 11, 2005 SNAPSHOT
Serpentine Rd SP300 - Sewer_pump (2) Motor_current [Amps] June 11, 2005 SNAPSHOT
Serpentine Rd SP300 - Variable_speed_drive (1) Speed_Fbk [%] June 11, 2005 SNAPSHOT
Serpentine Rd SP300 - Variable_speed_drive (2) Speed_Fbk [%] June 11, 2005 SNAPSHOT
Help

BRISBANE WATER

Network Control Systems

SITE ACCEPTANCE TEST (SAT)

TEST DOCUMENT (On Site)

SP298 Lytton Road #3

Submersible 2 Sewage Pumping Station

Pumps With VSD, 2 Valves (Inlet) and Generator

Project & Commissioning Details Feb 28th 2015

Date Commissioned	March 10th 2015
Project Manager	ANDREW BANNIK
Construction Manager	Reg McGIRR
Electrical Inspector	Reg McGIRR
RTU Programmer	Alex Withhoft.
Electricians	David (Leightons)

IDTS COMMISSIONING TEST SHEET

SP298 LYTTON RD #3

The purpose of these tests is to confirm that the new RTU is running and responding to inputs and sending data back to the IDTS master station.

- Notify Control Room that site is being commissioned - ph 340 78414
- Contact IDTS Test Room ph 3407 8477 to confirm receipt of alarms

Action	Observation	Result
Site in remote mode Switch on RTU power	Confirm that RTU ABNORMAL OPERATION alarm is received by IDTS Confirm that operator ajustable alarm setpoints are downloaded on RTU restart.	☑ Yes ☑ Yes
Cycle the Energex power	Confirm that Energex Power Alarm is received by IDTS and no other alarms [alarm suppression] are sent. Ensure that the Generator Starts and transfers before the site mains fail alarm activates	☑ Yes N/A - Gen Set on site See Gen Set Tests.
Switch off RTU mains power	Confirm that RTU MAINS FAIL alarm is received by IDTS.	☑ Yes
Test operation of all pumps in REMOTE mode (Manual)	Each pump starts and stops when commanded by the IDTS picture controls	☑ OK
Activate the probe itself to produce the surcharge imminent alarm.	Confirm that 2 pumps start	☑ Yes
	Confirm that SURCHARGE IMMINENT alarm is received by IDTS	☑ Yes
Switch site to LOCAL and STOP pumps Wait until surcharge pumping timer expires (Record Time). Open Valve 1 via the push buttons.	Confirm that LOCAL mode alarm is received by IDTS	☑ Yes
Test operation of all pumps in LOCAL mode.	Each pump starts and stops when commanded by the site pushbuttons.	☑ OK
Site in Remote mode, RTU operating Test operation of the pump inhibit.	Apply pump inhibit to each pump and confirm that "station inhibit" is active	☑ OK
Fault Pump 1 *Note: not every point that causes an availability alarm is tested, as this linkage is proved by SPSS2 standard code and FAT of switchboard*	Confirm Availability alarm is received by IDTS. Look at the points page and confirm the reason for the fault. Send a remote reset to clear the fault	☑ OK ☑ OK ☑ OK
Fault Pump 2	Confirm Availability alarm is received by IDTS. Look at the points page and confirm the reason for the fault. Send a remte reset to clear the fault	☑ OK ☑ OK ☑ OK
Trigger Wet Well Surcharge Occurring Alarm	Confirm alarm is received by IDTS	☑ OK
Trigger Wet Well High alarm	Confirm alarm is received by IDTS	☑ OK
Trigger Wet Well Invalid Alarm	Confirm alarm is received by IDTS	☑ OK
Allow well to fill.	Observe that the duty pump starts and stops. Only need to test for 1 pump on a slow filling site.	☑ Yes
	Confirm that IDTS is receiving the correct wet well level (%). 38%	☑ Yes
Pump start and stop values shown on the wet well label match the IDTS picture	Duty A start 36 % Duty A stop 17 %	

Site FAT by (RTU Programmer)

Name: Alex Withoft

Signature: A Withoft

Date: 28-02-05

Pre-commissioning Test Sheet checked by NCS Project Officer

Name: Alex Withoft

Signature: A Withoft

Date: 28 02 2005

VALVES

Action	Observation	Result
Local Mode	Ensure that the valves can be opened and closed fully in local mode.	☑ V1 ☑ V2
Remote Mode Mode 1 (Normal)	Ensure that both valves are open under normal conditions	☐ V1 ☐ V2
Remote Mode Mode 1 ←→Mode 2 (Surcharge Pumping Mode)	Ensure that Valve 1 closes if surcharge pumping is activated. Ensure that when surcharge Pumping Mode is deactivated that Valve 1 Opens.	☐ V1 ☐ V2 ☐ V1 ☐ V2
Remote Mode Mode 1 ←→Mode 3 (Both Pumps Faulted)	Ensure that Valve 2 closes if both pumps are faulted. Ensure that when one of the pumps becomes available that Valve 2 Opens	☐ V1 ☐ V2 ☐ V1 ☐ V2
Remote Mode Mode 2 → Mode 3 (Both Pumps Faulted)	Ensure that if while in Surcharge Pumping Mode, both pumps become unavailable, that first Valve 2 Closes and then Valve 1 Opens. Ensure that if a pump becomes available, that the pumps start but the valves do NOT change position unless the duty A start flag is NOT active. Once a pump is healthy and the level is healthy, the system will then open Valve 2. (mode 1)	☐ V1 ☐ V2 ☐ V1 ☐ V2
IDTS POINTS	Close Open Available Available in Remote Fail to Open Fail to Close Valve Reset Command	☑ V1 ☑ V2 ☑ V1 ☑ V2 ☑ V1 ☑ V2 ☑ V1 ☑ V2 ☑ V1 ☑ V2 ☑ V1 ☑ V2 ☑ V1 ☑ V2

To be done (scheduled for same day as sump pumps)

SUMP PUMP

Action	Observation	Result
Fill the sump until the start level is reached.	Ensure Sump Pump Starts	☐ S1 ☐ S2
Before the stop electrode is reached press the stop button.	Ensure the Sump Pump stops Ensure IDTS has the sump running indication off	☐ S1 ☐ S2
Press the start button	Ensure the Sump Pump Starts and runs until the stop level is reached after which it stops	☐ S1 ☐ S2
Sump Running Signal	Start the sump pump and ensure that the IDTS receives the sump running signal and the Picture shows the sump running	☐ S1 ☐ S2
Sump Fault	Turn the Sump pump power off and ensure that IDTS gets the sump fault flag and the picture shows the sump.	☐ S1 ☐ S2
Sump High	With the sump pump off - fill the sump to the high level and ensure that the IDTS receives the sump high alarm and that the picture indicates a full sump pit. (Then turn sump pump back on and drain well).	☐ S1 ☐ S2
Sump Excessice Run	"Force" the escessive run and ensure that the IDTS get the alarm	☐ S1 ☐ S2
Sump Excessive Cycling	Excessicve cycling should be active.	☐ S1 ☐ S2
Sump Reset	Get the IDTS to reset the excessivce alarm remoteley	☐ S1 ☐ S2

Need to get smp2 working before this can be completed

Site FAT by (RTU Programmer)

Name: Alex V. Hlaff

Signature: [signature]

Date: 10-03-05

Pre-commissioning Test Sheet checked by NCS Project Officer

Name: Alex W. Hlaff

Signature: [signature]

Date: 10-03-05

Brisbane City

Brisbane Water

BRISBANE WATER

Network Control Systems

IDTS POINT COMMISSIONING SHEET AND GENERATOR SUPPLY OPERATIONAL CHECKS

Pump Station Generator Connection Project (STTX-I910)

SITE TYPE & NO. SP298

Site Name. Lytton Rd #3

***NOTE:** Some (or all) of the Generator associated IDTS points may be Scan Inhibited in the IDTS system. Remove the Scan Inhibit from these points before proceeding with these tests*

IDTS Point : Generator Offsite

Action	Observation	Result
Connect the Control interface lead to the station	Confirm that GENERATOR OFFSITE alarm return to normal is received by IDTS	☑ Yes
Disconnect the Control interface lead to the station	Confirm that GENERATOR OFFSITE alarm is received by IDTS	☑ Yes
Reconnect the Control interface lead to the station		☑ OK

P)

IDTS Point : Security Door_limit_switch

Action	Observation	Result
Open a canopy door on the Generator	Confirm that SECURITY DOOR_LIMIT_SWITCH alarm is received by IDTS	☑ Yes
Close the canopy door	Confirm that SECURITY DOOR_LIMIT_SWITCH alarm return to normal is received by IDTS	☑ Yes

P

IDTS Point : Generator Low_fuel

Action	Observation	Result
Make the Generator low fuel warning alarm active	Confirm that GENERATOR LOW_FUEL alarm is received by IDTS	☑ Yes
Deactivate the Generator low fuel warning alarm	Confirm that GENERATOR LOW_FUEL alarm return to normal is received by IDTS	☑ Yes

IDTS Point : Generator Warning

Action	Observation	Result
Make the Generator warning alarm active (except by low fuel)	Confirm that GENERATOR WARNING alarm is received by IDTS	☑ Yes
Deactivate the Generator warning alarm	Confirm that GENERATOR WARNING alarm return to normal is received by IDTS	☑ Yes

P

IDTS Point : Generator Common_fault

Action	Observation	Result
Make the Generator common fault alarm active	Confirm that GENERATOR COMMON_FAULT alarm is received by IDTS	☑ Yes
Deactivate the Generator common fault alarm	Confirm that GENERATOR COMMON_FAULT alarm return to normal is received by IDTS	☑ Yes

P

IDTS Point : Generator Automatic

Action	Observation	Result
Turn the generator to ~~local~~ manual mode	Confirm that GENERATOR AUTOMATIC alarm is received by IDTS	☑ Yes
Return the generator to automatic mode	Confirm that GENERATOR AUTOMATIC alarm return to normal is received by IDTS	☑ Yes

P1

IDTS Point : Generator CB_tripped

Action	Observation	Result
Trip the Generator circuit breaker	Confirm that GENERATOR CB_TRIPPED alarm is received by IDTS	☑ Yes
Reset the Generator circuit breaker	Confirm that GENERATOR CB_TRIPPED alarm return to normal is received by IDTS	☑ Yes

P1

IDTS Point : Generator Running

Action	Observation	Result
Start the Generator (off line only)	Confirm that GENERATOR RUNNING alarm is received by IDTS	☑ Yes
Stop the Generator	Confirm that GENERATOR RUNNING alarm return to normal is received by IDTS	☑ Yes

IDTS Control Points : Generator Remote_run_request & Generator Remote_stop_request

Action	Observation	Result
Confirm the Generator is available to run, but not running		☑ OK
Set the IDTS control point GENERATOR REMOTE_RUN_REQUEST and send to the site	Confirm that the Generator starts and runs off-line	☑ Yes
	Confirm that GENERATOR RUNNING alarm is received by IDTS	☑ Yes
Set the IDTS control point GENERATOR REMOTE_STOP_REQUEST and send to the site	Confirm that the Generator stops	☑ Yes
	Confirm that GENERATOR RUNNING alarm return to normal is received by IDTS	☑ Yes

IDTS Point : Power_supply Energex_power

Action	Observation	Result
Turn the generator to local mode		☑ OK
Fail the Energex power	Confirm that POWER_SUPPLY ENERGEX POWER alarm is received by IDTS	☑ Yes
Restore the Energex power	Confirm that POWER_SUPPLY ENERGEX POWER alarm return to normal is received by IDTS	☑ Yes

IDTS Point : Generator Connected, and

Generator supply operational checks

NOTE: The purpose of these operational checks is;

- *to confirm Generator is capable of starting all available pumps on site "simultaneously" (each pump start separated only by the RTU / PLC minimum pump start separation time), and running all pumps continuously for at least one minute.*
- *to confirm the pumps are interlocked under Generator supply (where required)*
- *to confirm the code changes have not interfered with the operation of the Surcharge Imminent probe.*

Action	Observation	Result
Ensure the Generator is in Automatic mode		☑ OK
Ensure the pumps are selected for local mode		☑ OK
Ensure there is enough sewage in the well for the pumps to run continuously for one minute		☑ OK
Fail the Energex power to the Generator	Confirm that the Generator starts and supplies power to the station	☑ Yes
	Confirm that GENERATOR CONNECTED alarm is received by IDTS	☑ Yes
Press all pumps local start buttons together	Confirm that all pumps (available under Generator supply) start	☑ Yes
Sites: Billan St, Musgrave Rd, Centenary Hwy / Kooringal Dr, Manet St, Sanananda St and Sinnamon Rd.	Confirm the RTU will run a maximum of one pump under generator supply.	☑ Yes
Site: Creek Rd	Confirm the RTU will run a maximum of two pumps under generator supply.	☐ Yes X
Restore Energex power and record the time taken for the Generator controller to return the station power to Energex supply	Time for station power to return to Energex supply	150 Secs
	Confirm that GENERATOR CONNECTED alarm return to normal is received by IDTS	☑ Yes
Record time taken for the Generator to stop after station power to returns to Energex supply	Time for Generator to stop after station power to returns to Energex supply	Standard Sec

Pump Automatic operation, and

Surcharge Imminent operation under Generator supply

Action	Observation	Result
Fail the Energex power to the Generator	Confirm that the Generator starts and supplies power to the station	☑ Yes
Ensure the pumps are selected for remote mode	Fixed speed pump sites: Confirm that the duty pump lowers the well to the Duty A stop level and stops	☐ Yes
	Variable speed pump sites: Confirm that the duty pump operates on variable speed control satisfactorily	☑ Yes
Ensure the well level is below the Duty A start level using pump local control as required		☑ OK
Ensure the pumps are selected for remote mode and are stopped		☑ OK
Activate the surcharge imminent probe for at least 10 sec	Confirm that WET_WELL SURCHARGE_IMMINENT alarm is received by IDTS	☑ Yes
	Confirm that all pumps (available under Generator supply) start	☑ Yes
Ensure the well does not fall below the Duty A stop level by selecting local mode for the pumps as required		☑ OK
Return the surcharge imminent probe to normal	Confirm that WET_WELL SURCHARGE_IMMINENT alarm return to normal is received by IDTS	☑ Yes
Restore Energex power indication to the Generator and allow the Generator controller to return the station power to Energex supply		☑ OK

IDTS Points and Generator Supply
Operational Checks commissioned by ..... Date 28-02-05

11-3-05

SIR001

SITE INSPECTION REPORT - SWITCHBOARDS

PROJECT: ATC LYTTON RD

PROJECT No: SQT96226

Inspector: PETER HAGUE

Legend: Acc=Accept Rej=Reject N/A= Not Applicable

Item No.	Activity Description	Comments	Inspection Results			Date Accepted
			Acc	Rej	N/A	
1	Location Correct as per Contract Drawing		✔			21/04/2005
2	Orientation Correct		✔			21/04/2005
3	Material/Finish as per Specification		✔			21/04/2005
4	Unauthorised Modifications				-	21/04/2005
5	Anchor Bolts Fitted / Tight	Tighten all anchor bolts. Ensure adequate packing is installed under switchboard		×		
6	IP Rating as per Specifications		✔			21/04/2005
7	Panel Layout as per Drawings		✔			21/04/2005
8	Labelling - Wording, Size, Fixing, Material, Level	Incomplete *1		×		
9	Enclosure Free of Debris	Final clean req'd		×		
10	Components Fitted are as Specified	Flow Meter range req'd to be zero to 250 L/S FSD		×		
11	Main Switches/Circuit Breakers/Fuses Sizes OK		✔			21/04/2005
12	Thermal Overloads Appropriately Set		✔			21/04/2005
13	CT Ratios are as Specified		✔			21/04/2005
14	Metering Fuses Fed off Line Side Main Sw & CT's		✔			21/04/2005
15	Equip Fed from Line Side is Appropriately Labelled				-	21/04/2005
16	Neutral & Earth Connections not in CT Section		✔			21/04/2005
17	All Neutral Connections are Accessible		✔			21/04/2005
18	MEN Connections Provided		✔			21/04/2005
19	Earth Bar/Earth Connections Fitted & OK		✔			21/04/2005
20	Check Phasing of Circuits		✔			21/04/2005
21	Cores Ferruled & Numbered	Valve cables not numbered		×		
22	Colour Coding of Wiring as per Spec.		✔			21/04/2005
23	Terminals Identified per Dwg. and Spares Provided		✔			21/04/2005
24	Indicators Fitted with Correct Coloured Bezels		✔			21/04/2005
25	Selector Switches Engraved Correctly		✔			21/04/2005
26	Main Switches Lockable/Defeatable as per Spec.		✔			21/04/2005
27	Terminals & Busbar Connections Tight		✔			21/04/2005
28	Busbars appropriately shielded	Remove redundant perspex cover brackets from switchboard		×		
29	Check internal access & routes for field cabling	Seal off all unused cable entries (unused glands)		×		
30	Check Operation of Mech & Key Interlocks		✔			21/04/2005
31	Check Operation and Orientation of Door Handles		✔			21/04/2005
32	Circuit Breakers Isolate Stated Circuits		✔			21/04/2005
33	ELCB's Tested		✔			21/04/2005
34	Test Sheets Provided for Insulation Tests	Provided to BCC	✔			21/04/2005
35	Test Sheets Provided for Earth Continuity Tests	Provided to BCC	✔			21/04/2005
36	"As Built" Drawings Marked Up	Provided to BCC	✔			21/04/2005
37	Legend & Drawings Secured in Enclosure	Not 'As Built' *2		×		
38	Laytop Support Tray Provided		✔			21/04/2005
39	Sunshields Fitted with IP56 Maintained	Sunshield loose - aerial side. Rust on arial base pipework		×		
40	Door Locks as Required	BCC locks not fitted		×		
41	Manual Functions Tested		✔			21/04/2005
42	Outlets fitted to Sw/Bd as required		✔			21/04/2005
43	Surge Diverter earthed to adjacent stud.		✔			21/04/2005
44	Switchboard Lights Operate OK	Don't Turn On, additional switches not fitted		×		
45	Adequate access to RTU comms plugs		✔			21/04/2005

Special Notes:

1 Label over 'L/S' meter required (Flowmeter 1). Wet Well label for levels required.
2 As Built Dwgs not included, Legend Card Incorrect
3 Tie Back Screen on Modbus Cabling at VSD, label cables and core numbers

Signature _____ Date _____

SIR002

SITE INSPECTION REPORT - CABLES

PROJECT: ATC LYTTON RD

PROJECT No: SQT96226

Inspector: PETER HAGUE

Legend: Acc=Accept Rej=Reject N/A= Not Applicable

Item No.	Activity Description	Comments	Inspection Results			Date Accepted
			Acc	Rej	N/A	
1	Cables Sized as per Cable Schedule	See Note *1	✔			21/04/2005
2	Correct Cable Types Installed	See Note *4		×		
3	Cables Glanded/Bushed Satisfactorily	See Note *3		×		
4	Cables Terminated Satisfactorily	See Note *5		×		
5	Sheathes/Insulation not Damaged		✔			21/04/2005
6	Bending Radius not Exceeded				-	21/04/2005
7	Mechanical Protection Provided as Required		✔			21/04/2005
8	Cables Adequately Supported	See Note *5		×		
9	Power & Signal Cable Clearances Adequate		✔			21/04/2005
10	All Cables Identified as per Cable Schedule	Identify Valve cables *2		×		
11	Overall Appearance Satisfactory		✔			21/04/2005
12	Insulation Tests Carried out on all Cables	Test sheets provided	✔			21/04/2005
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						
23	Cable Tests:					

Cable No.	Insulation		Continuity Test
	Voltage	Resistance	

Special Notes:

1 Mains & Generator supply cables down rated. Mains= 8x95mm2 Gen= 50mm2
2 Cable No's and make safe all spare cables
3 Aluminium gland plates to be earthed
4 1 phase supply to generator to be flexible cable
5 VSD cable screening to be earthed adequately. Gen cabling to be dressed & clamped. Pit lid to be fitted

Signature Date

SIR003

SITE INSPECTION REPORT - CABLE LADDER/TRAY/DUCT

PROJECT: ATC LYTTON RD

PROJECT No: SQT96226

Inspector: PETER HAGUE

Legend: Acc=Accept Rej=Reject N/A= Not Applicable

Item No.	Activity Description	Comments	Inspection Results			Date Accepted
			Acc	Rej	N/A	
1	Ladder/Tray/Duct Correct Size/Type as per Spec.	Galv.	✔			21/04/2005
2	Correct Routing as per Specification/Drawings		✔			21/04/2005
3	Sufficient Brackets/Fixings to Suit Span	Add supports valve pit *1		×		
4	Brackets/Fixings Secure	Conduit clamp sump pump		×		
5	Ladder/Tray/Duct Earthed/Bonded Correctly				-	21/04/2005
6	Covers Fitted & Secured Correctly	Concrete pit lids cracked. 40mm gap between cable trench cover and switchboard. All cable trench covers require installation or tightening of screws.		×		
7	Protrusions & Sharp Edges Removed		✔			21/04/2005
8	Dissimilar Metals Not in Contact		✔			21/04/2005
9	Segregation Barriers Fitted Correctly				-	21/04/2005
10	Adequate Mechanical Protection Provided		✔			21/04/2005
11	Integrity of Finish/Coating Maintained	Paint all galv conduit cuts		×		
12	Penetrations Sealed Correctly		✔			21/04/2005
13	Clearance from Other Trades Satisfactory		✔			21/04/2005
14	"As Built" Drawings Marked Up		✔			21/04/2005
15						
16						
17						
18						
19						
20						
21						
22						
23						
24						
25						
26						
27						
28						
29						
30						

Special Notes:

1 Support required for motorised valve conduits

Signature Date

SIR004

SITE INSPECTION REPORT - INSTRUMENTS

PROJECT: ATC LYTTON RD

PROJECT No: SQT96226

Inspector: PETER HAGUE

Legend: Acc=Accept Rej=Reject N/A= Not Applicable

Item No.	Activity Description	Comments	Inspection Results			Date Accepted
			Acc	Rej	N/A	
1	Instrument Types/Models as per Specification		✔			21/04/2005
2	Model Range as per Specification	As per equipment list	✔			21/04/2005
3	Suitably Mounted & Orientation Correct		✔			21/04/2005
4	Clearances Adequate for Correct Operation		✔			21/04/2005
5	Adequate Mechanical Protection Provided		✔			21/04/2005
6	IP Ratings Suitable for Location		✔			21/04/2005
7	Earthing Provided as per Instrument Manual	Checked by ABB	✔			21/04/2005
8	Identification Tags Fitted	Some still to be fitted		×		
9	Termination Covers & Seals Securely Fitted		✔			21/04/2005
10	Data Plate Fitted & Legible		✔			21/04/2005
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						
23						
24						
25						
26						
27						
28						
29						
30						

Special Notes:

Signature Date

SIR005

SITE INSPECTION REPORT - FIELD EQUIPMENT

PROJECT: ATC LYTTON RD

PROJECT No: SQT96226

Inspector: PETER HAGUE

Legend: Acc=Accept Rej=Reject N/A= Not Applicable

Item No.	Activity Description	Comments	Inspection Results			Date Accepted
			Acc	Rej	N/A	
1	Equipment Types/Models as per Specification		✔			21/04/2005
2	Suitably Mounted for Correct Operation		✔			21/04/2005
3	Adequate Mechanical Protection Provided		✔			21/04/2005
4	IP Ratings Suitable for Location		✔			21/04/2005
5	Identification Tags Fitted	Some still to be fitted		×		
6	Termination Covers & Seals Securely Fitted		✔			21/04/2005
7	Limit/Float Arms Adjusted Correctly				-	21/04/2005
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						
23						
24						
25						
26						
27						
28						
29						
30						

Special Notes:

Signature Date

SIR006

SITE INSPECTION REPORT - ELECTRIC MOTORS

PROJECT: ATC LYTTON RD

PROJECT No: SQT96226

Inspector: PETER HAGUE

Legend: Acc=Accept Rej=Reject N/A= Not Applicable

Item No.	Activity Description	Comments	Inspection Results			Date Accepted
			Acc	Rej	N/A	
1	Motors Correct Size/Type as per Drawings	refer note *1		×		
2	Star/Delta Connections Correct				-	21/04/2005
3	Mountings Adequate & Secured		✔			21/04/2005
4	**IP** Ratings Suitable for Location (eg. Hosing)		✔			21/04/2005
5	Termination Covers & Seals Securely Fitted		✔			21/04/2005
6	Isolators Positioned & Sized Correctly				-	21/04/2005
7	Isolators Accessable & Labelled				-	21/04/2005
8	Isolators Function Correctly				-	21/04/2005
9	Overloads Adjusted Correctly		✔			21/04/2005
10	Circuit Breaker Sized Correctly		✔			21/04/2005
11	No Obstructions at Coupling or Fan				-	21/04/2005
12	Motor Test Sheets Completed				-	21/04/2005
13	Identification Tags Fitted	No pump ID Nos fitted		×		
14	Data Plate Fitted & Legible		✔			21/04/2005
15						
16						
17						
18						
19						
20						
21						
22						
23						

Special Notes:

1 Coil excess motor cables appropriately, or leave excess cabling in switchboard cable trench and seal off trench.

Signature Date

4.2

REDILEC

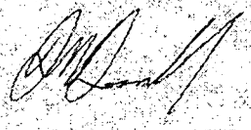
27 Long Street
CLONTARF QLD 4109
Phone 0419 784 770
Fax 07 3283 4421
mcdonalddca@optusnet.com.au

31 August 2005

Re: Australia Trade Coast Sewer Project
SP298 Lytton Road Pump Station

This is to certify that the electrical works have been carried out and tested in accordance with AS3000 and the Electrical Safety Act 2002.

David McDonald
Redilec (Queensland Electrical Contractors Licence No 58331)



4.3

Leighton Contractors
Pty Limited
ACN 000 893 667

Level 3
143 Coronation Drive
MILTON Old 4064
PO Box 288
Toowong Qld 4066

FORM

CONSTRUCTION METHOD STATEMENT

Project:	Australia Trade Coast Sewer	No.:	Q1112

CMS TITLE: **Construction of Separable Portion 1**

CMS No.: **Q1112-CS-701**

START DATE: **27 January 2004**

DURATION: **6 months**

Submit to Client / Nominate for review where specified in contract

? Rejected, resubmit _____ / /

? Accepted, with comments _____ / /

? Accepted _____ / /

Approved: _____ **Date:** _____

Project Manager

IDM Search:	Q1112-CS-701 Rev 1
	Page 1 of 9

Table of Contents

1. SCOPE OF WORK

The following is a method statement for the construction of the pipeline from the existing Pritchard Street Pump, along Lytton Road to the existing Lindum Road pipeline. The pipeline is split into 2 sections as follows:

1. Approximately 1.0 Km of 355 diameter PE100 PN12.5 pipe from Lindum Road to Lytton Road pump station, which includes an under bore across Lytton Road and an under bore across an existing creek.
2. Approximately 1.5 Km of 315 Diameter PE100 PN12.5 pipe from Pritchard Street to Lytton Road pump station which includes an under bore across Lytton Road and 2 under bores across existing creeks.

This statement includes the construction sequencing, associated risks and hazards and identifies critical activities. Supplementary to this will be risk assessments and toolbox talks itemising all safety and environmental hazards and control measures.

2. CONSTRAINTS

Constraints on the project include permit approvals, alignments approvals, "for construction drawings", wet weather and tidal influences.

3. REFERENCES

3.1 Specifications

- Attachment 4 of the contract – Civil Works Construction Specification
- Manual of Uniform Traffic Control Devices 2001 edition Part 3 (MUTCD)

3.2 Drawings

- 486/5/8-SM20/021 to 033 – Drawings for Pritchard Street to Lytton Road Pump Station
- 486/5/8-SM21/021 to 030 – Drawings for Lindum Road to Lytton Road Pump Station

3.3 Management Plans & Documents

- Project Management Plan
- Safety and Health Management Plan
- Environmental Management Plan

4. STAFF RESPONSIBILITIES

Staff will be responsible for all associated work according to their project descriptions which can be found in the Project Management Plan. The Project Engineer will coordinate with the Site Engineer and Foreman the supervision of all direct labour and subcontractors to ensure that all work is completed in a professional manner with no class 1 or 2 safety and environmental incidents. All costs and production will be reviewed on a daily basis to ensure the work is completed on time and to budget.

5. PERMITS / APPROVALS

Prior to commencing construction all relevant permits and approvals are required to be signed and approved for construction. This includes section 86 and 51 permits and also Main Roads alignment approvals. Other approvals that are to be completed are "for construction' drawing approvals from Brisbane City Council, Community consultation to ensure the public are aware of the works and any Traffic Control permits to complete works on or near the road alignment. All of these approvals will be required to be signed off on a works pre-commencement checklist by all associated people looking after each particular area. Construction on site can not commence until this checklist is completely signed off and reviewed and approved by the Project Manager.

6. CONSTRUCTION SEQUENCE

6.1 Previous Works

Previous work to be completed is the approval of all the associated permits and alignments as detailed in section 5. Once this has been achieved construction can commence on site.

6.2 Works to be Completed

All associated work with this section is to be completed by June 30 2004. Once this has been completed works will commence in Separable portions 2 and 3 depending on availability.

7. DETAILED CONSTRUCTION METHODS

Works will be carried out in the following stages:

7.1 Clearing, Grubbing and Topsoil Removal

Once the approvals form has been completed and approved construction can take place. The traffic control plan for this stage will reduce the traffic down to 60km/hr and a delineation fence will be erected as

per the MUTCD 2001 Part 3 section 4.3, option 2. The delineation fence will be erected 1.2m from the edge line of Lytton road to ensure all workers do not go closer than the 1.2m minimum safe distance from the road.

The approved clearance zone as specified in the section 51 and 86 approvals will be pegged out using survey and any trees, shrubs or grass that needs to remain will be clearly marked. A 20 Tonne excavator will use a straight edge batter bucket to remove all vegetation and topsoil. This material will be stockpiled along the edge of the cleared zone. Where drains are present silt fences will be erected between the drain and the stockpile of material to ensure no runoff will take place. Where required the silt fence will have 20mm aggregate or ballast placed at the base to ensure stability problems are overcome. The couch grass will be removed with care so it can be used to reinstate the area.

The areas that have "trapped" water will be pumped out using sump holes and flex drive pumps into grassland so it can be filtered prior to entering any waterways. The water will be tested for pH prior to pumping and neutralised if required. No untreated water will be entering directly into the waterways.

7.2 Deliveries and Welding

Their will be strategic points along the alignment that will be delivery areas and welding bays. The pipe will be delivered in quantities nominated by the Project Engineer and unloaded into the delivery area. All deliveries and unloading will be completed inside the delineation as explained in section 7.1 and there will be no other traffic control required. This area will be free draining and free of rocks, sticks and other foreign material. Once the pipe has been correctly stockpiled a machine will drag the pipe into the welding bay area. This will be completed using a skid or roller system if required so the pipe does not get any defects.

The pipe will be welded into approximately 60m lengths including fittings where required and left in a storage area next to the welding bay. A 60m length of pipe will consist of 3 welds and each one will be completed according to attachment 4 of the contract (Civil Works Construction Specification). This will ensure each weld is consistent and completed free of contamination. Welding will continue in 60m lengths until the delivery has been completed. A typical delivery, welding and storage area can be seen in attachment 1.

7.3 Working Platform

The working platform will be constructed along the entire length of the pipe alignment to enable an all weather access. Prior to any material delivery the foundation will be scarified where required using a grader, trimmed into a rough shape and compacted with a smooth drum roller. Any soft spots that are encountered will be excavated, removed and replaced with road base material. This will be completed inside the delineation from the roadway and there will be a traffic controller or gatekeeper present to ensure safe entry and exit of the material supply trucks. Each truck driver will be inducted prior to entering the work area. The working platform will be constructed in 2 layers of 150mm thick road base. The trucks will be manoeuvred into position using a spotter to release the load. Once the truck has left the area the grader will smooth out the material into a rough formation. The spotter will then check the depth of the

pavement and mark on the ground. The grader will complete a final trim to level, followed by a smooth drum roller to compact it. The material will then be tested for compaction if required. This process will continue until the 2 layers have been completed along the alignment. At each under boring location the working platform will be stopped short of the expected pit location so wastage is kept to a minimum.

7.4 Under boring

Prior to the under boring subcontractor starting on site an entry and exit pit will be excavated using a 20T Excavator by Leighton Contractors. Prior to the excavation an excavation permit is required to be filled out and approved. This will locate any services in the area. The pits will be made safe with battering or benching if required. The bottom of the pits will be 500mm below the survey invert of the pipe. Once the excavation is complete the subcontractor will be inducted and will commence on site. A permit to excavate will be filled in showing all services in the area. Each service that the subcontractor will cross or come near will be located in detail using survey. The permit to excavate will be signed off by the subcontractor ensuring that it has been fully understood. Survey will set out the entry and exit locations and hand over any information required by the subcontractor.

The subcontractor's equipment will be inspected and approved for use prior to commencing works. The machine will be set up in the entry pit and will commence drilling. The drill will be monitored to ensure the correct trajectory under the road or creek is maintained at all times. The under bore across the road easements and under the rail line will be pipe jacked using a steel sleeve. The under bore at the creek locations will be directionally drilled. Both the entry and exit pit will be dewatered and maintained by the Subcontractor. Quality control will be monitored throughout the entire process. Once the under bore has been completed the pipe will be pulled through and any voids filled with Bentonite. The void between the steel liner and the pipe under the road crossings will be fully grouted. Once the grouting has been completed the subcontractor will demobilise the equipment or move onto the next bore location. The entry and exit pits will be partially filled leaving a trench width to enable the connection onto the trenched pipe on either side.

7.5 Excavation, placement and backfill of pipe

For this section of the works traffic barriers will be placed along the edge of the road to ensure that nothing can accidentally be placed on the road surface. The barriers will probably be a Triton barriers system filled with water. These barriers will be placed on night shift using traffic control. The barrier will be setup in approximately 300m sections. Once the process has been completed in the area, the barriers will be emptied and moved up to the next location. This will be completed early one morning under traffic control.

An excavation permit will be completed and approved and all service locations will be marked on the ground to ensure nothing is cut. Service providers will be present if required when trenching is in close proximity.

A 20 Tonne excavator will be used to excavate the trench. The trench will be a nominal 1.5m in depth. The trench will be excavated until a certain point in the day. As the trench is excavated to level a backhoe will place bedding material at a nominal 200mm thick at the base of the trench. The backhoe will level out the

bedding material ready for the placement of the pipe. Survey will check the level of the bedding to ensure it is at the correct level for the pipe. The trench will now be dusted with lime to ensure that no acid sulphate can be produced. The PE pipe will then be dragged into position using a skid arrangement as described before using the backhoe. Once into position beside the trench the excavator and backhoe will lift the pipe using certified lifting slings. Both the backhoe and excavator will be checked for lifting capacities to ensure that they are in lifting range. The pipe will then be placed onto the bedding material. Both machines will straighten the pipe in the trench and start to place the haunch material. This will be compacted to the required compaction standard and tested. Survey will ensure that the pipe is in the correct location and complete an as built. The general excavation material will be used as the backfill material above the haunch zone as the pipe is not in the road reserve. This material will be placed in layers and compacted using a trench roller. These layers will be tested for compaction.

The general material that comes from the trench consists of 200 – 300mm of good fill material and then the rest is potential acid sulphate clay soil. This potential acid sulphate soil that will not be placed as backfill back into the trench will be treated according to the management plan and spread over the work area. The top 200 – 300mm of material will be used to cap the top of the trench so no acid sulphate can be produced.

In areas that are wet there will be a geofabric membrane placed around the bedding and haunch to stop ingress of water into the pipe location. There will also be pits excavated along the trench to allow dewatering. The water will be tested for pH and neutralised prior to any pumping.

The cycle above will be completed on a daily basis. At the end of each day a small pit will be left at the end of the trench with shoring so at the beginning of the following day the cycle can commence at that location. Each joint will be connected using an electro-fusion coupler. This pit will be larger to ensure a safe and clean working area. The electro-fusion coupler will be placed onto one side, the other pipe will be moved into position and some backfill will take place to secure the pipe. Both ends will be cleaned as per the Brisbane specification, the coupler moved into position and welded on. Once the weld has been completed and cooled down, the position of the coupler will be surveyed as a joint and then backfilled as the same procedure above.

7.5 Reinstatement

Once the pipe has been placed and backfilled the stripped material will be reinstated. The 20T excavator will pick up the grass and topsoil from the stockpile and spread it over the cleared area. A good mixture of grass and topsoil will be spread to ensure that the grass can regerminate. A water truck will occasionally water the area to promote the grass to bring the area back close to its original state.

7.6 Air and Scour Pits

Air and scour pits will be completed once the pipe has been installed in the particular area. There will be a Tee section along the main pipe at each location that has been blanked off. Each of these sections will be surveyed so an accurate location can be determined when the pits are to be constructed. Each location will be excavated and benched if applicable to ensure a safe working area. The associated pipes and fitting that

are required to be installed to get to each pit will be placed and backfilled same as the main pipe. Each pit will be formed up and poured. There will be a number of pits poured at similar times to ensure full concrete trucks are utilised. Once curing has taken place the formwork will be removed and used elsewhere. Backfilling around the pits will be completed in layers with material that has no large clumps, sticks or rocks. All backfilling will be tested as required. The pipework, fittings and valves inside each pit will then be installed.

8. PLANT, EQUIPMENT AND MATERIALS

8.1 Plant

- 20 Tonne Excavator
- Backhoe
- Trench roller
- 12 Tonne smooth drum roller
- 140H Grader
- 10m Truck / water Truck combination

8.2 Equipment

- Flex drive pumps and motors
- Wacker Packer
- Small tools
- Welding machines
- Environmental silt fencing

8.3 Materials

- Bedding material – sand or crusher dust
- Lime
- Road base
- 10mm aggregate

9. PARTICULAR HAZARDS / RISKS

9.1 Safety & Health

9.2 Environment

9.3 Community

Please refer to each individual Safe work method Statement and risk assessment to show associated risks and hazards. This includes all environmental risks as well. This statement must be completed and have a tool box talk completed for each activity.

Leighton Contractors
Pty Limited
ACN 000 893 667

Level 3
143 Coronation Drive
MILTON Qld 4064
PO Box 288
Toowong Qld 4066

FORM

CONSTRUCTION METHOD STATEMENT

Project:	Australia Trade Coast Sewer	No.:	Q1112

CMS TITLE: **Construction of Separable Portion 2**

CMS No.: **Q1112-CS-703**

START DATE: **28 June 2004**

DURATION: **6 months**

Submit to Client / Nominate for review where specified in contract

? Rejected, resubmit _____ / /

? Accepted, with comments _____ / /

? Accepted _____ / /

Approved: _____ **Date:** _____

Project Manager

IDM Search:	Q1112-CS-703 Rev 1
	Page 1 of 8

Table of Contents

1. SCOPE OF WORK

The following is a method statement for the construction of the pipeline from Lytton Road pump station (South Side of river) to Serpentine Pump Station (North Side of River). There are multiple sections this can be split into which are as follows:

- 700m of 450-diameter pipe from the Lytton Road pump station to the river crossing.
- River crossing using 400 diameter pipe (separate Construction method statement)
- 1,050m of 450 diameter pipe being placed in open areas.
- 950m of 450 diameter pipe adjacent and in road reserves.

This statement includes the construction sequencing, associated risks and hazards and identifies critical activities. Supplementary to this will be risk assessments and toolbox talks itemising all safety and environmental hazards and control measures.

2. CONSTRAINTS

Constraints on the project include the following:

- Alignment approvals.
- Traffic control permits.
- Permits including CMP (coastal marine permit).
- Interaction with major stakeholders and the community.
- Indigenous community
- "For construction" drawings

3. REFERENCES

3.1 Specifications

- Attachment 4 of the contract – Civil Works Construction Specification
- Brisbane City Council specifications
- Manual of Uniform Traffic Control Devices 2003 edition Part 3 (MUTCD)

3.2 Drawings

- 486/5/8-SM18/021 to 039 – Drawings of trenching works Separable portion 2

3.3 Management Plans & Documents

- Project Management Plan
- Safety and Health Management Plan
- Environmental Management Plan

- Acid Sulphate management plan

4. STAFF RESPONSIBILITIES

Staff will be responsible for all associated work according to their project descriptions, which can be found in the Project Management Plan. The Project Engineer will coordinate with the Site Engineer and Foreman the supervision of all direct labour and subcontractors to ensure that all work is completed in a professional manner with no class 1 or 2 safety and environmental incidents. All costs and production rates will be reviewed on a daily basis to ensure the work is completed on time and to budget.

5. PERMITS / APPROVALS

Prior to commencing construction all relevant permits and approvals are required to be signed and approved for construction. This includes coastal marine permits and also Main Roads alignment approvals. Other approvals that are to be completed are "for construction' drawing approvals from Brisbane City Council, Community consultation to ensure the public are aware of the works and any Traffic Control permits to complete works on or near the road alignment. All of these approvals will be required to be signed off on a works pre-commencement checklist by all associated people looking after each particular area. Construction on site will not commence until this checklist is completely signed off and reviewed and approved by the Project Manager. A dilapidation report and baseline monitoring will be required to be completed prior to and during the construction phase

6. CONSTRUCTION SEQUENCE

6.1 Previous Works

Previous work to be completed is the trenching and pits for Separable portion 1. Practical completion on this section of works is required prior to commencing on this section.

6.2 Works to be Completed

All associated work with this section is to be completed by December 2004.

7. DETAILED CONSTRUCTION METHODS

Works will be carried out in the following stages:

7.1 Clearing, Grubbing and Topsoil Removal

Once the approvals form has been completed and approved, construction can take place. Were required the traffic control plan will reduce the traffic down to 40km/hr with a lane closure. This will mean stop / go in certain sections of the works. This will be completed in accordance with the MUTCD 2003 Part 3.

The approved clearance zone as specified in the appropriate permits and approvals will be pegged out using survey and any trees, shrubs or grass that needs to remain will be clearly marked. A 20 Tonne excavator will use a straight edge batter bucket to remove all vegetation and topsoil. This material will be stockpiled along the edge of the cleared zone. Where drains are present silt fences will be erected between the drain and the stockpile of material to ensure no runoff will take place. Where required the silt fence will have 20mm aggregate or ballast placed at the base to ensure stability problems are overcome. The couch grass will be removed with care so it can be used to reinstate the area.

The areas that have "trapped" water will be pumped out using sump holes and flex drive pumps into grassland so it can be filtered prior to entering any waterways. The water will be tested for pH prior to pumping and neutralised if required. No untreated water will be entering directly into the waterways.

7.2 Deliveries and Welding

There will be strategic points along the alignment that will be delivery areas and welding bays. The pipe will be delivered in quantities nominated by the Project Engineer and unloaded into the delivery area. All deliveries and unloading will be completed under traffic control where required as explained in section 7.1. The working platform will be free draining and free of rocks, sticks and other foreign material. Once stockpiled a backhoe will move the pipes into position for welding and then once the pipe has been welded into strings the backhoe will move the pipe into position. This will be completed using a skid or roller system if required so the pipe does not get any defects.

The pipe will be welded into approximately 60m lengths including fittings where required and left in a storage area next to the welding bay. A 60m length of pipe will consist of 3 welds and each one will be completed according to attachment 4 of the contract (Civil Works Construction Specification). This will ensure each weld is consistent and completed free of contamination. Welding will continue in 60m lengths until the delivery has been completed.

7.3 Under boring

Prior to the under boring subcontractor starting on site an entry and exit pit will be excavated using the 12T Excavator or backhoe by Leighton Contractors. To complete the excavation an excavation permit is required to be completed and approved. This will locate any services in the area. The pits will be made safe with battering or benching if required. The bottom of the pits will be 500mm below the survey invert of the pipe. Once the excavation is complete the subcontractor will be inducted and will commence on site. A permit to excavate will be filled in showing all services in the area. Each service that the subcontractor will cross or come near will be located in detail using survey. The permit to excavate will be signed off by the subcontractor ensuring that it has been fully understood. Survey will set out the entry and exit locations and hand over any information required by the subcontractor.

The subcontractor's equipment will be inspected and approved for use prior to commencing works. The machine will be set up in the entry pit and will commence drilling. The drill will be monitored to ensure the correct trajectory under the road or creek is maintained at all times. The under bore under the rail line will be pipe jacked using a steel sleeve. The under bore at the road and creek locations will be directionally drilled. Both the entry and exit pit will be dewatered and maintained by the Subcontractor. Quality control will be monitored throughout the entire process. Once the under bore has been completed the pipe will be pulled through and any voids filled with Bentonite. The void between the steel liner and the pipe under the rail crossings will be fully grouted. Once the grouting has been completed the subcontractor will demobilise the equipment or move onto the next bore location. The entry and exit pits will be partially filled leaving a trench width to enable the connection onto the trenched pipe on either side.

7.4 Excavation, placement and backfill

Where required works will be completed using traffic control utilising a lane closure. The closure will be delineated using traffic cones or barriers. No one will be allowed to work outside the delineation.

An excavation permit will be completed and approved and all service locations will be marked on the ground to ensure nothing is cut. Service providers will be present if required when trenching is in close proximity.

A 20 Tonne excavator will be used to excavate the trench. This will be reduced to a 12T excavator where tight areas occur. The trench will be a nominal 2m in depth and will be benched, battered or shored accordingly. The trench will be excavated until a certain point in the day. As the trench is excavated to level a backhoe will place bedding material into the trench at a nominal 200mm thick layer. The bedding will then be compacted to specified standards. The bedding layer will be checked with survey to ensure the pipe will be placed in the correct position and level. If required the trench will now be dusted with lime to ensure that no acid sulphate can be produced. The PE pipe will then be moved into position using the backhoe or excavator. Once into position beside the trench the excavator and backhoe will lift the pipe using certified lifting slings. Both the backhoe and excavator will be checked for lifting capacities to ensure that they are in lifting range. The pipe will then be placed onto the bedding material. Both machines will straighten the pipe in the trench and start to place the haunch material. This will be compacted to the required compaction standard and tested. Survey will ensure that the pipe is in the correct location and complete an as built. The general excavation material will be used, as the backfill material above the haunch zone for the pipe is not in the road reserve. Areas that are in the road reserve will be backfilled with material that has been approved and is in accordance to the drawings. This material will be placed in layers and compacted using a trench roller. These layers will be tested for compaction.

The general material that comes from the trench consists of about 1m of good fill material and then the rest is potential acid sulphate clay soil. This potential acid sulphate soil that will not be placed as backfill back into the trench will be treated according to the management plan and spread over the work area. The clean fill will be used to cap the top of the trench so no acid sulphate can be produced.

In areas that are wet there will be a geofabric membrane placed around the bedding and haunch to stop ingress of water into the pipe location. There will also be pits excavated along the trench to allow dewatering. The water will be tested for pH and neutralised prior to any pumping.

The cycle above will be completed on a daily basis. At the end of each day a small pit will be left at the end of the trench with shoring so at the beginning of the following day the cycle can commence at that location. Each joint will be connected using an electro-fusion coupler. This pit will be larger to ensure a safe and clean working area. The electro-fusion coupler will be placed onto one side, the other pipe will be moved into position and clamped into place to secure the pipe. Both ends will be cleaned as per the Brisbane specification, the coupler moved into position and welded on. Once the weld has been completed and cooled down, the position of the coupler will be surveyed as a joint and then backfilled as the same procedure above.

7.5 Reinstatement

Once the pipe has been placed and backfilled the stripped material will be reinstated. The 12T or 20T excavator will pick up the grass and topsoil from the stockpile and spread it over the cleared area. A good mixture of grass and topsoil will be spread to ensure that the grass can regerminate. A water truck will occasionally water the area to promote the grass to bring the area back close to its original state. The salt cooch that has been cleared will be replanted to help with restoration.

7.6 Air and Scour Pits

Air and scour pits will be completed once the pipe has been installed in the particular area. There will be a Tee section along the main pipe at each location that has been blanked off. Each of these sections will be surveyed so an accurate location can be determined when the pits are to be constructed. Each location will be excavated and benched if applicable to ensure a safe working area. All pits have been precast and will be placed onto sand bedding. The associated pipes and fitting will then be installed and the opening will be grouted. All joints of the precast pit will be made watertight. Once in position the pit will be backfilled same as the main pipe. Backfilling around the pits will be completed in layers with material that has no large clumps, sticks or rocks. All backfilling will be tested as required. The pipework, fittings and valves inside each pit will then be installed.

8. PLANT, EQUIPMENT AND MATERIALS

8.1 Plant

- 12 Tonne Excavator
- 20 Tonne Excavator
- Backhoe
- Trench roller
- 10m Truck / water Truck combination

8.2 Equipment

- Flex drive pumps and motors
- Wacker Packer
- Vibratory plate
- Small tools
- Welding machines
- Environmental silt fencing

8.3 Materials

- Bedding material – sand or crusher dust
- Lime
- Road base
- 10mm aggregate

9. PARTICULAR HAZARDS / RISKS

9.1 Safety & Health

9.2 Environment

9.3 Community

Please refer to each individual Safe work method Statement and risk assessment to show associated risks and hazards. This includes all environmental risks as well. This statement must be completed and have a tool box talk completed for each activity.

LEIGHTON	Leighton Contractors Pty Limited ACN 000 893 667 Level 3 143 Coronation Drive MILTON Qld 4064 PO Box 288 Toowong Qld 4066	FORM **CONSTRUCTION METHOD STATEMENT**			
		Project:	**Australia Trade Coast Sewer**	**No.:**	**Q1112**

CMS TITLE: **Construction of Lytton Road Pump Station**

CMS No.: **Q1112-CS-704**

START DATE: **26 July 2004**

DURATION: **3 months**

Submit to Client / Nominate for review where specified in contract

☐	Rejected, resubmit	_____	/ /
☐	Accepted, with comments	_____	/ /
☐	Accepted	_____	/ /

Approved: _____ **Date:** _____

Project Manager

IDM Search:	Q1112-CS-704 Rev 1
	Page 1 of 9

Table of Contents

1. SCOPE OF WORK

The following is a method statement for the construction of Lytton Road Pump Station in separable portion 2. The Lytton Road pump station is made up of civil, concrete, reinforcement and mechanical works.

This statement includes the construction sequencing, associated risks and hazards and identifies critical activities. Supplementary to this will be risk assessments and toolbox talks itemising all safety and environmental hazards and control measures.

2. CONSTRAINTS

Constraints on the project include the following:

- Alignment approvals.
- BACL development application approval
- Interaction with major stakeholders and the community.
- Indigenous community
- "For construction" drawings

3. REFERENCES

3.1 Specifications

- Attachment 4 of the contract – Civil Works Construction Specification
- Attachment 5 of the contract – Mechanical Works
- All associated Brisbane City Council drawings and specifications
- Manual of Uniform Traffic Control Devices 2003 edition Part 3 (MUTCD)

3.2 Drawings

- 486/5/7-WR101/000 to 073 – Lytton Road SP298 pump station
- Associated Brisbane City Council standard drawings
- Associated IPWEAQ standard drawings

3.3 Management Plans & Documents

- Project Management Plan
- Safety and Health Management Plan
- Environmental Management Plan
- Construction Management Plan

4. STAFF RESPONSIBILITIES

Staff will be responsible for all associated work according to their project descriptions, which can be found in the Project Management Plan. The Project Engineer will coordinate with the Site Engineer and Foreman the supervision of all direct labour and subcontractors to ensure that all work is completed in a professional manner with no class 1 or 2 safety and environmental incidents. All costs and production will be reviewed on a daily basis to ensure the work is completed on time and to budget.

5. PERMITS / APPROVALS

Prior to commencing construction all relevant permits and approvals are required to be signed and approved for construction. This includes section 86 and 51 permits and also Main Roads alignment approvals. Other approvals that are to be completed are "for construction' drawing approvals from Brisbane City Council, Community consultation to ensure the public are aware of the works and any Traffic Control permits to complete works on or near the road alignment. All of these approvals will be required to be signed off on a works pre-commencement checklist by all associated people looking after each particular area. Construction on site will not commence until this checklist is completely signed off, reviewed and approved by the Project Manager.

6. CONSTRUCTION SEQUENCE

6.1 Previous Works

Previous work to be completed is Separable portion 1 pipework coming into the pump station area and the approval of all the associated permits and alignments as detailed in section 5. Once this has been achieved construction can commence on site.

6.2 Works to be Completed

Completion of the Lytton Road Pump Station is currently targeted for November 2004.

7. DETAILED CONSTRUCTION METHODS

Works will be carried out in the following stages:

7.1 Clearing, Grubbing and Topsoil Removal

Once the pre-commencement checklist (this includes all external permits and approvals required) has been completed and approved, construction can take place.
The approved clearance zone as specified in the section 51 and 86 approvals will be pegged out using survey and any trees, shrubs or grass that needs to remain will be clearly marked. A 20 Tonne excavator will use a straight edge batter bucket to remove all vegetation and topsoil. This material

will be taken to a dumping area on site. Where drains are present silt fences will be erected between the drain and the work area to ensure no runoff will take place. Where required the silt fence will have 20mm aggregate or ballast placed at the base to ensure stability problems are overcome. Any cooch grass will be removed with care so it can be used to reinstate the area.

The areas that have "trapped" water will be pumped out using sump holes and flex drive pumps into grassland so it can be filtered prior to entering any waterways. The water will be tested for pH prior to pumping and neutralised if required. No untreated water will be entering directly into the waterways.

7.2 Stage 1 (refer to attached drawings)

Q1112-CS-704 Drawings.pdf

The pump station's structures will be marked out using survey on the ground. Once survey has been completed a 20T Excavator will remove material down to approximately RL0.2 as shown on stage 1 drawing. This will be completed using benching, battering or shoring where required.

7.3 Stage 2 (refer to attached drawings)

The excavator will then remove material from the wet well region down to RL –2.7 as shown on the stage 2 drawing. Once the excavation has been completed a steel form will be placed into the excavation. Survey will confirm this is in the correct position. Timber forms will need to be added to the steel form to ensure that the blinding level can be poured for the valve pit area. A timber blockout will be placed on the steel form where the pipe from the grit collector will need to be placed. This is so the concrete will not have to be hammered out at a later stage. Concrete is then pour around the outside of the steel plate to stabilise the excavation and help prevent water entering. This will act as the backform for all subsequent concrete pours. The steel liner is then removed from the pit area.

7.4 Stage 3

Blinding concrete will be placed as soon as possible in the wet well and valve pit area to ensure there is a firm clean environment for the rest of the structure to be constructed on. This concrete is usually 20Mpa and 50mm thick. The blinding layer will incorporate a sump so that all water can be pumped out prior to pouring the concrete.

This stage of the works consists of 2 pours, with the first one being the floor slab in the wet well. The base reinforcement will be tied as a prefabricated cage and lifted into position. The starter bars will then be tied insitu. Once the floor has been poured the reinforcement for the walls and the valve pit floor will be completed. While this is being done the inside form will have the PE liner attached, fitted and cut to size. A specialist subcontractor will complete this. Once the reinforcement is completed the inside form is placed into position ensuring there is adequate cover on all sides. Once all prepour checklists are completed concrete will be poured. The next day after the pour the steel liner will be removed.

7.5 Stage 4

The next section of works is to complete the grit collector base. The backhoe will excavate the remaining material around the grit collector. The base will be tied and poured as quickly as possible as water will be present. While this base is being completed a scaffold / formwork system will be constructed in the wet well ready to complete the next wall pour This scaffold system will be certified if required.

7.6 Stage 5

Once the scaffolding has been placed inside the wet well, the external steel form will be put into position. Reinforcement will be completed and then the internal steel form with the PE liner will be installed. Once cover is adequate and the prepour checklists have been approved the walls will be poured. The top of the steel form will require a working platform so the pour this section can be completed safely. During this process the Grit collector walls will be poured in the same way.

As shown on the drawings some of the pipe work that penetrates the wall in the wet well will be placed and secured in their correct positions prior to the concrete being poured. The penetrations in the grit collector will be completed using a blockout and placed at a later stage. The reinforcement starters, required for the walls attaching the wet well and grit collector together, will be placed prior to the concrete pour. The steel forms will be cut accordingly to suit the starter bars. Once all concrete has cured the steel forms will be removed.

7.7 Stage 6

This stage consists of forming, fixing and pouring the valve pit wall. This is to be completed using standard ply and timber formwork. The penetration will be secured into position prior to pouring. The lower pipe from the grit chamber to the wet well will be placed. Once into position the penetration in the wet well will be poured and completed. Once cured, the area will be backfilled up to the high level pipe. This will be completed in layers and tested to ensure compaction is maintained. The high level pipe will be placed and backfilled using the same method just mentioned.

Once both pipes have been installed and backfilled the inlet valve pit will be completed. A backhoe will excavate the required area. Once the excavation is in the correct position the base will be poured. Once the base is completed the walls will follow the same procedure. Once the inlet valve pit has cured and been stripped the pipe between it and the grit collector will be placed. Backfilling will then be completed using a sand backfill in layers and to the required standards.

7.8 Stage 7

The first section to be completed is the walls connecting the wet well to the grit collector. This will be formed, fixed and poured using conventional methods. While this pour is curing a scaffolding / formwork system will be placed inside the wet well, the valve pit and grit collector where required. Once the formwork is in place the PE liner will be placed and welded to the walls by the subcontractor. Once this is completed the reinforcement is fixed and the concrete is poured. While the roof is curing, the generator slab can be poured.

Once the entire roof has cured, the scaffolding and formwork is removed and everything is backfilled as described earlier. All of the pits will then be cleaned up and made watertight. They will all then have the ladder, lids and any other miscellaneous materials installed. The PE liner will then be cut, patched and welded where required (eg around penetrations) so the pits are completed sealed. The liner will be spark tested and certified that it is sealed.

Any dewatering throughout the entire process will be completed using correct pumps and sizes and the water will be tested prior to being released. It will not be released directly into any waterway unless it has been tested and everything is at acceptable levels.

7.9 Mechanical and Electrical Works

Once all civil works has been completed mechanical, electrical and all miscellaneous works will commence. A separate construction method statement will cover this work.

7.10 General

All works will be carried in daylight hours. There will be exceptions where critical activities will require completion, which could carry into night works. If night works is required all surrounding stakeholders will be notified about the works. The lighting that will be used will be portable lighting towers positioned so not to intrude on anyone's home.

Each of the pump stations will have fencing installed as shown on the drawings. If work commences before the permanent fencing is installed, then temporary fencing will be placed to secure the compound.

8. PLANT, EQUIPMENT AND MATERIALS

8.1 Plant

- 12 and 20 Tonne Excavator
- Backhoe
- Trench roller
- 10m Tip trucks
- Water Truck
- 12 or 20T Franna

8.2 Equipment

- Flex drive pumps and motors
- pumps
- Wacker Packer
- Small tools
- Concreting tools
- Welding machines
- Environmental silt fencing

8.3 Materials

- Bedding material – sand or crusher dust
- Lime
- Road base
- 10mm aggregate
- PE Liner
- Concrete
- Reinforcement
- Formwork

9. PARTICULAR HAZARDS / RISKS

- 9.1 Safety & Health

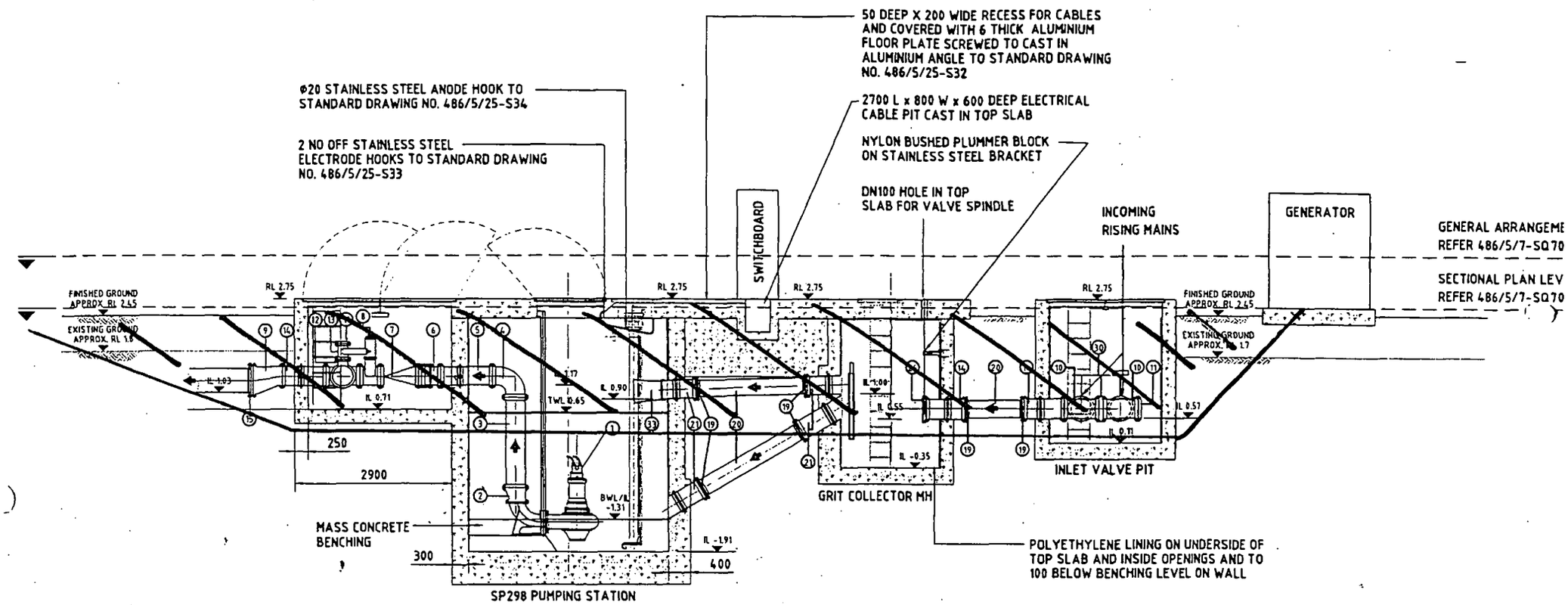
9.2 Environment

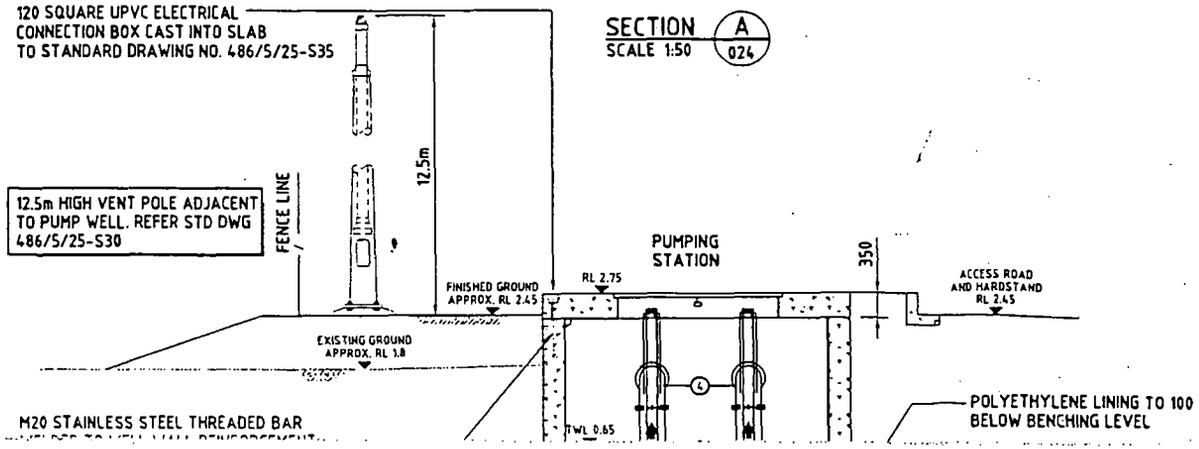
9.3 Community

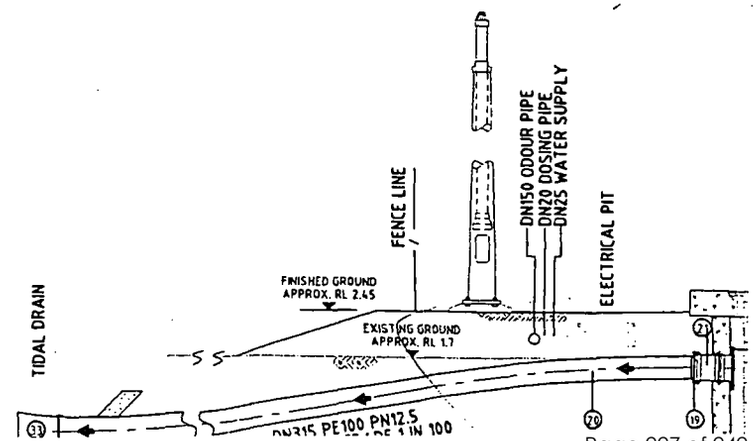
Please refer to each individual Safe work method Statement and risk assessment to show associated risks and hazards. This includes all environmental risks as well. This statement must be completed and have a tool box talk completed for each activity.

st5 concrete pumping -

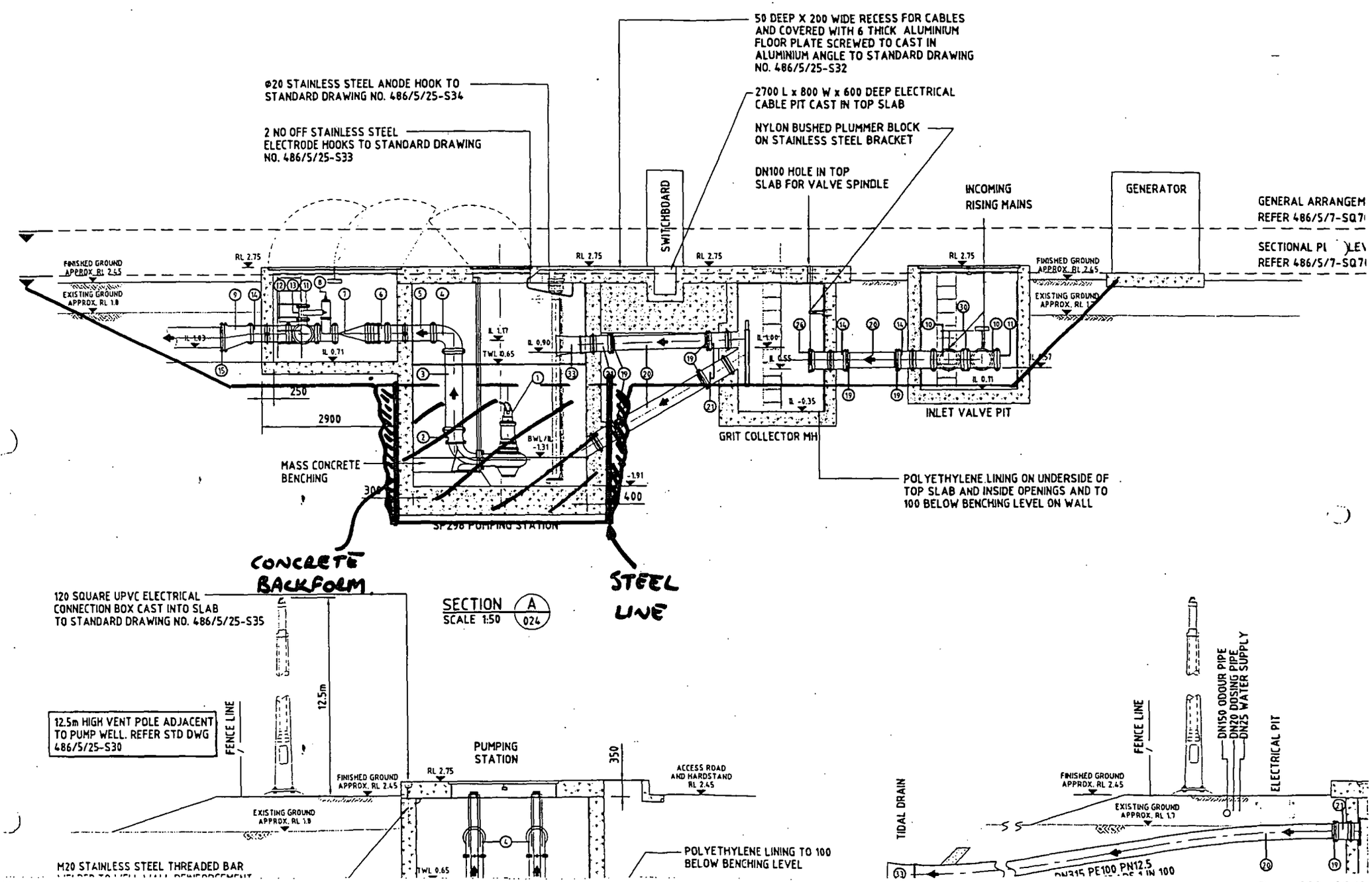
STAGE 1



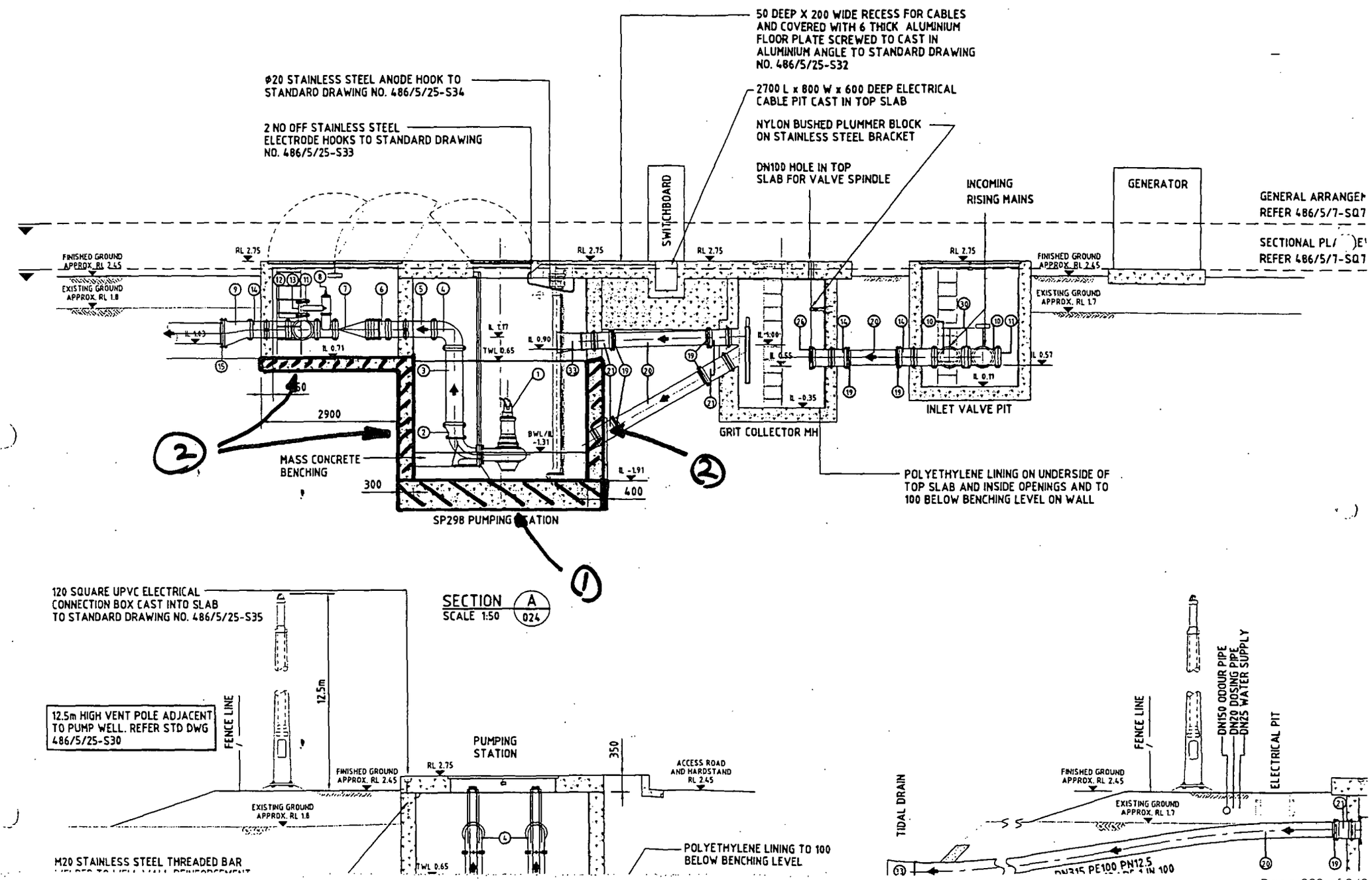




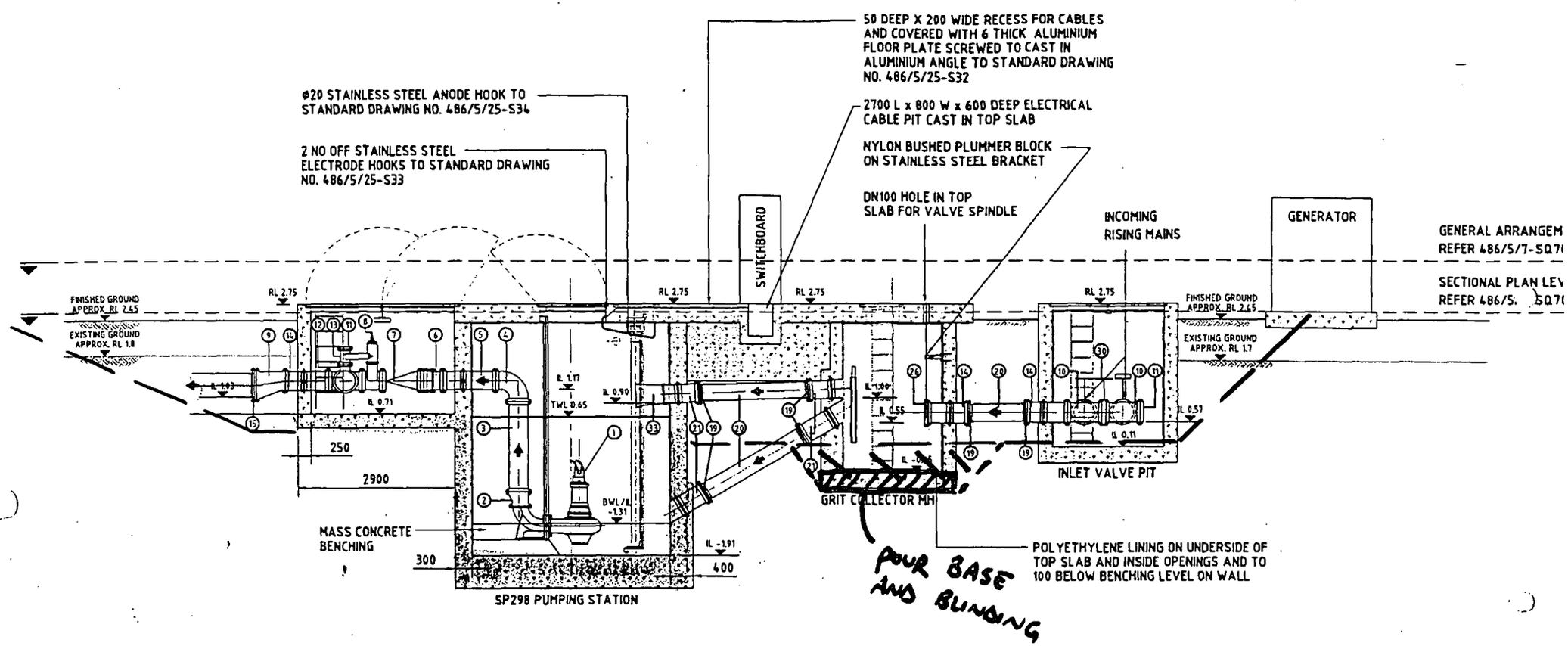
STAGE 2

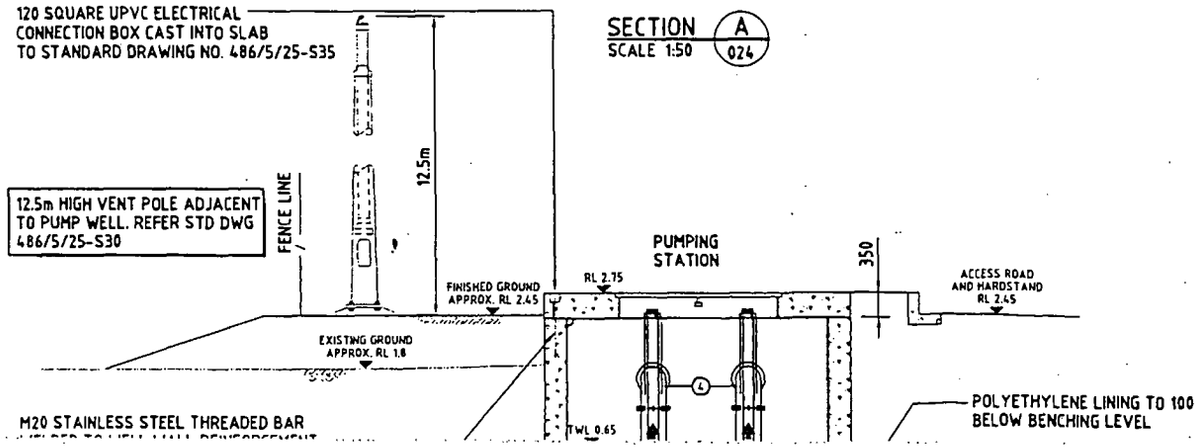

50 DEEP X 200 WIDE RECESS FOR CABLES AND COVERED WITH 6 THICK ALUMINIUM FLOOR PLATE SCREWED TO CAST IN ALUMINIUM ANGLE TO STANDARD DRAWING NO. 486/5/25-S32
ø20 STAINLESS STEEL ANODE HOOK TO STANDARD DRAWING NO. 486/5/25-S34
2700 L x 800 W x 600 DEEP ELECTRICAL CABLE PIT CAST IN TOP SLAB
2 NO OFF STAINLESS STEEL ELECTRODE HOOKS TO STANDARD DRAWING NO. 486/5/25-S33
NYLON BUSHED PLUMMER BLOCK ON STAINLESS STEEL BRACKET
DN100 HOLE IN TOP SLAB FOR VALVE SPINDLE
SWITCHBOARD
INCOMING RISING MAINS
GENERATOR
GENERAL ARRANGEM
REFER 486/5/7-SQ7
SECTIONAL PL LEV
REFER 486/5/7-SQ7
FINISHED GROUND APPROX. RL 2.45
EXISTING GROUND APPROX. RL 1.8
RL 2.75
TWL 0.65
BWL/IL -1.31
250
2900
300
400
MASS CONCRETE BENCHING
SP298 PUMPING STATION
GRIT COLLECTOR MH
INLET VALVE PIT
POLYETHYLENE LINING ON UNDERSIDE OF TOP SLAB AND INSIDE OPENINGS AND TO 100 BELOW BENCHING LEVEL ON WALL
CONCRETE BACKFORM
STEEL LINE
120 SQUARE UPVC ELECTRICAL CONNECTION BOX CAST INTO SLAB TO STANDARD DRAWING NO. 486/5/25-S35
SECTION A 024
SCALE 1:50
12.5m HIGH VENT POLE ADJACENT TO PUMP WELL. REFER STD DWG 486/5/25-S30
FENCE LINE
12.5m
PUMPING STATION
350
ACCESS ROAD AND HARDSTAND RL 2.45
M20 STAINLESS STEEL THREADED BAR
POLYETHYLENE LINING TO 100 BELOW BENCHING LEVEL
TIDAL DRAIN
DN150 ODOUR PIPE
DN20 DOSING PIPE
DN25 WATER SUPPLY
ELECTRICAL PIT
DN315 PE100 PN12.5

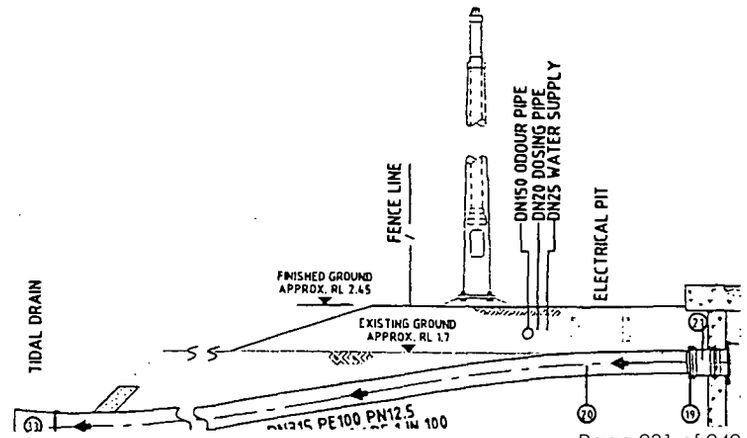
STAGE 3


50 DEEP X 200 WIDE RECESS FOR CABLES AND COVERED WITH 6 THICK ALUMINIUM FLOOR PLATE SCREWED TO CAST IN ALUMINIUM ANGLE TO STANDARD DRAWING NO. 486/5/25-S32
ø20 STAINLESS STEEL ANODE HOOK TO STANDARD DRAWING NO. 486/5/25-S34
2700 L x 800 W x 600 DEEP ELECTRICAL CABLE PIT CAST IN TOP SLAB
2 NO OFF STAINLESS STEEL ELECTRODE HOOKS TO STANDARD DRAWING NO. 486/5/25-S33
NYLON BUSHED PLUMMER BLOCK ON STAINLESS STEEL BRACKET
DN100 HOLE IN TOP SLAB FOR VALVE SPINDLE
SWITCHBOARD
INCOMING RISING MAINS
GENERATOR
GENERAL ARRANGEMENT REFER 486/5/7-SQ7
SECTIONAL PLAN REFER 486/5/7-SQ7
FINISHED GROUND APPROX. RL 2.45
EXISTING GROUND APPROX. RL 1.8
EXISTING GROUND APPROX. RL 1.7
RL 2.75
TWL 0.65
BWL/IL -1.31
2900
MASS CONCRETE BENCHING
300
400
SP298 PUMPING STATION
GRIT COLLECTOR MH
INLET VALVE PIT
POLYETHYLENE LINING ON UNDERSIDE OF TOP SLAB AND INSIDE OPENINGS AND TO 100 BELOW BENCHING LEVEL ON WALL
120 SQUARE UPVC ELECTRICAL CONNECTION BOX CAST INTO SLAB TO STANDARD DRAWING NO. 486/5/25-S35
SECTION A 024
SCALE 1:50
12.5m HIGH VENT POLE ADJACENT TO PUMP WELL. REFER STD DWG 486/5/25-S30
FENCE LINE
12.5m
PUMPING STATION
350
ACCESS ROAD AND HARDSTAND RL 2.45
M20 STAINLESS STEEL THREADED BAR
POLYETHYLENE LINING TO 100 BELOW BENCHING LEVEL
TIDAL DRAIN
DN150 ODOUR PIPE
DN20 DOSING PIPE
DN25 WATER SUPPLY
ELECTRICAL PIT
DN315 PE100 PN12.5

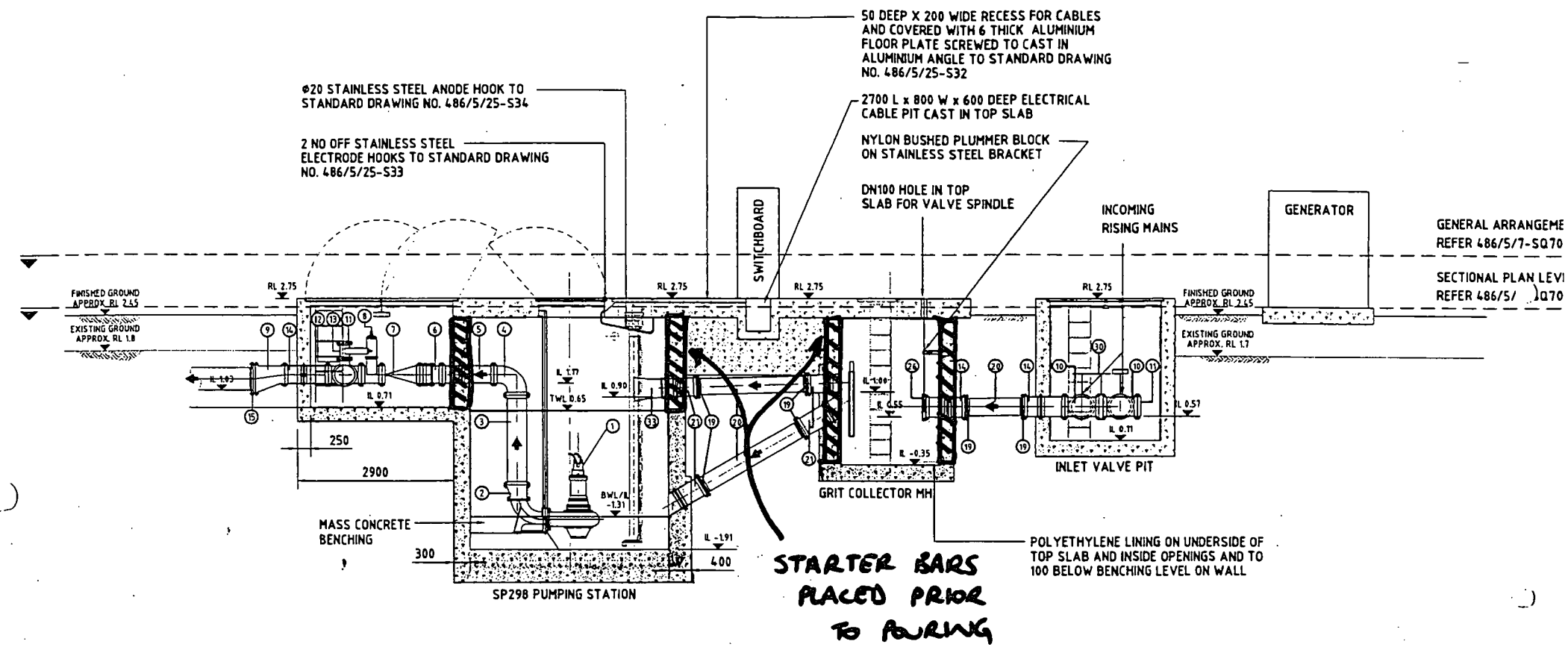
STAGE 4


50 DEEP X 200 WIDE RECESS FOR CABLES AND COVERED WITH 6 THICK ALUMINIUM FLOOR PLATE SCREWED TO CAST IN ALUMINIUM ANGLE TO STANDARD DRAWING NO. 486/5/25-S32
ø20 STAINLESS STEEL ANODE HOOK TO STANDARD DRAWING NO. 486/5/25-S34
2700 L x 800 W x 600 DEEP ELECTRICAL CABLE PIT CAST IN TOP SLAB
2 NO OFF STAINLESS STEEL ELECTRODE HOOKS TO STANDARD DRAWING NO. 486/5/25-S33
NYLON BUSHED PLUMMER BLOCK ON STAINLESS STEEL BRACKET
DN100 HOLE IN TOP SLAB FOR VALVE SPINDLE
SWITCHBOARD
INCOMING RISING MAINS
GENERATOR
GENERAL ARRANGEM
REFER 486/5/7-SQ7
SECTIONAL PLAN LEV
REFER 486/5/
FINISHED GROUND APPROX. RL 2.45
EXISTING GROUND APPROX. RL 1.8
EXISTING GROUND APPROX. RL 1.7
RL 2.75
TWL 0.65
250
2900
300
400
MASS CONCRETE BENCHING
GRIT COLLECTOR MH
INLET VALVE PIT
SP298 PUMPING STATION
POLYETHYLENE LINING ON UNDERSIDE OF TOP SLAB AND INSIDE OPENINGS AND TO 100 BELOW BENCHING LEVEL ON WALL
POUR BASE AND BUNDING

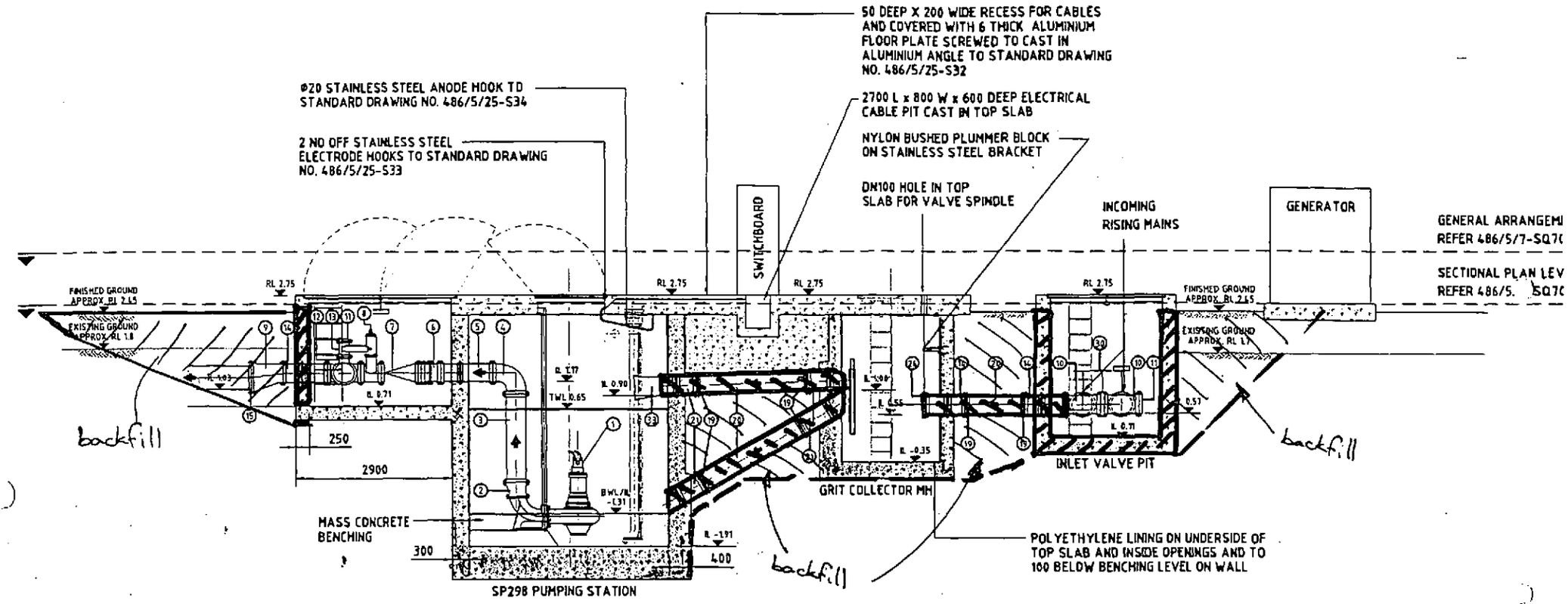

120 SQUARE UPVC ELECTRICAL CONNECTION BOX CAST INTO SLAB TO STANDARD DRAWING NO. 486/5/25-S35
SECTION A
SCALE 1:50
024
12.5m HIGH VENT POLE ADJACENT TO PUMP WELL. REFER STD DWG 486/5/25-S30
FENCE LINE
12.5m
PUMPING STATION
350
ACCESS ROAD AND HARDSTAND RL 2.45
FINISHED GROUND APPROX. RL 2.45
EXISTING GROUND APPROX. RL 1.8
RL 2.75
TWL 0.65
M20 STAINLESS STEEL THREADED BAR
POLYETHYLENE LINING TO 100 BELOW BENCHING LEVEL

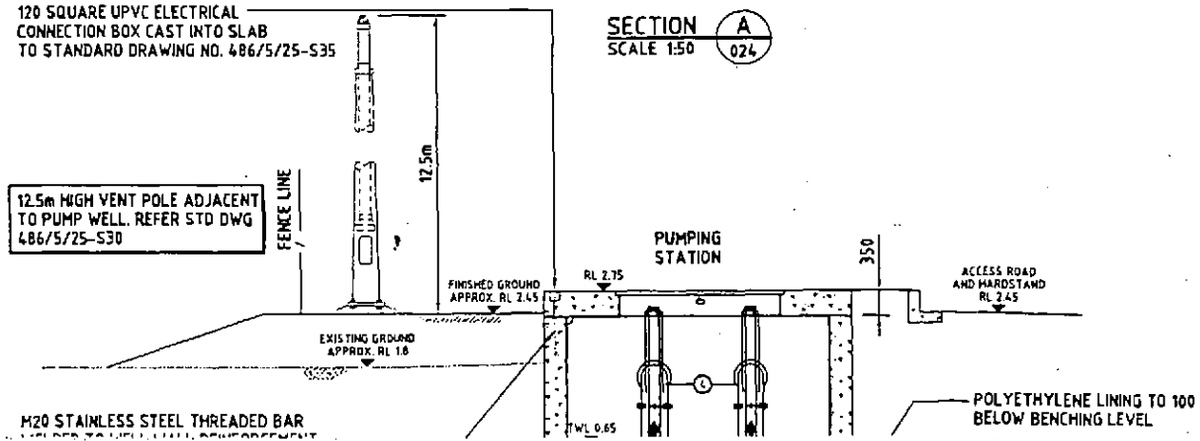

DN150 ODOUR PIPE
DN20 DOSING PIPE
DN25 WATER SUPPLY
ELECTRICAL PIT
FENCE LINE
TIDAL DRAIN
FINISHED GROUND APPROX. RL 2.45
EXISTING GROUND APPROX. RL 1.7
DN315 PE100 PN12.5

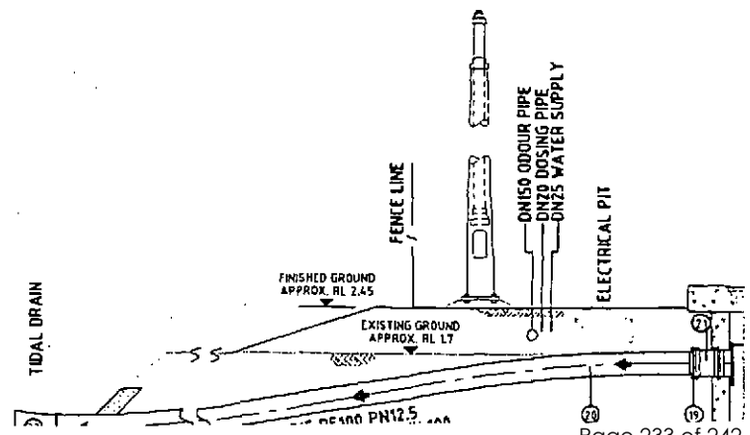
STAGE 5


50 DEEP X 200 WIDE RECESS FOR CABLES AND COVERED WITH 6 THICK ALUMINIUM FLOOR PLATE SCREWED TO CAST IN ALUMINIUM ANGLE TO STANDARD DRAWING NO. 486/5/25-S32
Φ20 STAINLESS STEEL ANODE HOOK TO STANDARD DRAWING NO. 486/5/25-S34
2 NO OFF STAINLESS STEEL ELECTRODE HOOKS TO STANDARD DRAWING NO. 486/5/25-S33
2700 L x 800 W x 600 DEEP ELECTRICAL CABLE PIT CAST IN TOP SLAB
NYLON BUSHED PLUMMER BLOCK ON STAINLESS STEEL BRACKET
DN100 HOLE IN TOP SLAB FOR VALVE SPINDLE
SWITCHBOARD
INCOMING RISING MAINS
GENERATOR
GENERAL ARRANGEME
REFER 486/5/7-SQ70
SECTIONAL PLAN LEVI
REFER 486/5/ SQ70
FINISHED GROUND APPROX. RL 2.45
EXISTING GROUND APPROX. RL 1.8
EXISTING GROUND APPROX. RL 1.7
RL 2.75
IL 1.03
IL 0.71
IL 1.77
TWL 0.65
IL 0.90
IL 1.00
IL 0.55
IL 0.57
IL 0.11
IL -0.35
250
2900
BWL/L -1.31
IL -1.91
300
400
MASS CONCRETE BENCHING
SP298 PUMPING STATION
GRIT COLLECTOR MH
INLET VALVE PIT
STARTER BARS PLACED PRIOR TO POURING
POLYETHYLENE LINING ON UNDERSIDE OF TOP SLAB AND INSIDE OPENINGS AND TO 100 BELOW BENCHING LEVEL ON WALL
120 SQUARE UPVC ELECTRICAL CONNECTION BOX CAST INTO SLAB TO STANDARD DRAWING NO. 486/5/25-S35
SECTION A 024
SCALE 1:50
12.5m HIGH VENT POLE ADJACENT TO PUMP WELL. REFER STD DWG 486/5/25-S30
FENCE LINE
12.5m
PUMPING STATION
350
ACCESS ROAD AND HARDSTAND RL 2.45
M20 STAINLESS STEEL THREADED BAR
POLYETHYLENE LINING TO 100 BELOW BENCHING LEVEL
TIDAL DRAIN
DN150 ODOUR PIPE
DN20 DOSING PIPE
DN25 WATER SUPPLY
ELECTRICAL PIT
PE100 PN12.5

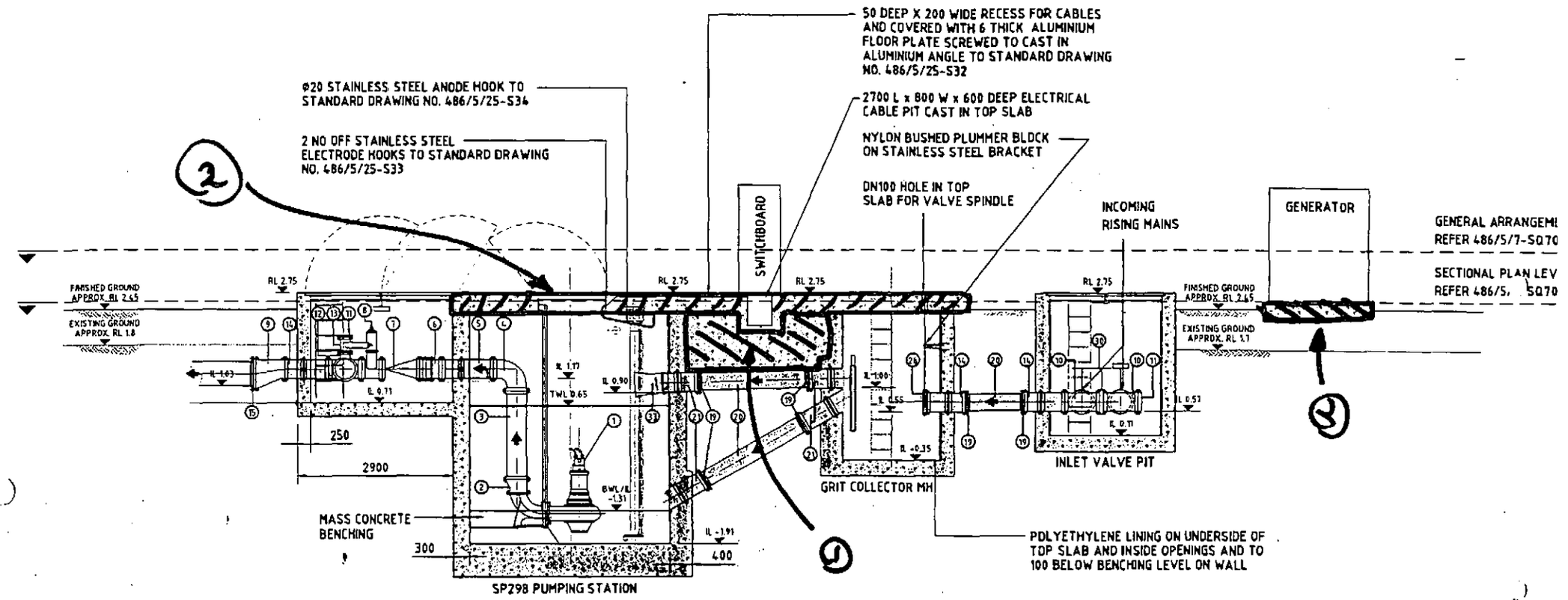
STAGE 6


50 DEEP X 200 WIDE RECESS FOR CABLES AND COVERED WITH 6 THICK ALUMINIUM FLOOR PLATE SCREWED TO CAST IN ALUMINIUM ANGLE TO STANDARD DRAWING NO. 486/5/25-S32
ø20 STAINLESS STEEL ANODE HOOK TO STANDARD DRAWING NO. 486/5/25-S34
2 NO OFF STAINLESS STEEL ELECTRODE HOOKS TO STANDARD DRAWING NO. 486/5/25-S33
2700 L x 800 W x 600 DEEP ELECTRICAL CABLE PIT CAST IN TOP SLAB
NYLON BUSHED PLUMMER BLOCK ON STAINLESS STEEL BRACKET
DN100 HOLE IN TOP SLAB FOR VALVE SPINDLE
SWITCHBOARD
INCOMING RISING MAINS
GENERATOR
GENERAL ARRANGEMI
REFER 486/5/7-SQ7(
SECTIONAL PLAN LEV
REFER 486/5. SQ7(
FINISHED GROUND APPROX. RL 2.45
EXISTING GROUND APPROX. RL 1.8
RL 2.75
backfill
250
2900
MASS CONCRETE BENCHING
300
400
TWL 0.65
BWL/RL -1.31
GRIT COLLECTOR MH
INLET VALVE PIT
POLYETHYLENE LINING ON UNDERSIDE OF TOP SLAB AND INSIDE OPENINGS AND TO 100 BELOW BENCHING LEVEL ON WALL
SP298 PUMPING STATION


120 SQUARE UPVC ELECTRICAL CONNECTION BOX CAST INTO SLAB TO STANDARD DRAWING NO. 486/5/25-S35
SECTION A
SCALE 1:50
024
12.5m HIGH VENT POLE ADJACENT TO PUMP WELL. REFER STD DWG 486/5/25-S30
12.5m
FENCE LINE
PUMPING STATION
350
FINISHED GROUND APPROX. RL 2.45
RL 2.75
ACCESS ROAD AND HARDSTAND RL 2.45
EXISTING GROUND APPROX. RL 1.8
M20 STAINLESS STEEL THREADED BAR
TWL 0.65
POLYETHYLENE LINING TO 100 BELOW BENCHING LEVEL


FENCE LINE
DN150 ODOUR PIPE
DN20 DOSING PIPE
DN25 WATER SUPPLY
ELECTRICAL PIT
FINISHED GROUND APPROX. RL 2.45
EXISTING GROUND APPROX. RL L7
TIDAL DRAIN

STAGE 7


50 DEEP X 200 WIDE RECESS FOR CABLES AND COVERED WITH 6 THICK ALUMINIUM FLOOR PLATE SCREWED TO CAST IN ALUMINIUM ANGLE TO STANDARD DRAWING NO. 486/S/25-S32
Ø20 STAINLESS STEEL ANODE HOOK TO STANDARD DRAWING NO. 486/5/25-S34
2 NO OFF STAINLESS STEEL ELECTRODE HOOKS TO STANDARD DRAWING NO. 486/5/25-S33
2700 L x 800 W x 600 DEEP ELECTRICAL CABLE PIT CAST IN TOP SLAB
NYLON BUSHED PLUMMER BLOCK ON STAINLESS STEEL BRACKET
DN100 HOLE IN TOP SLAB FOR VALVE SPINDLE
INCOMING RISING MAINS
GENERATOR
SWITCHBOARD
GENERAL ARRANGEMI
REFER 486/5/7-SQ70
SECTIONAL PLAN LEV
REFER 486/5/ SQ70
FINISHED GROUND APPROX. RL 2.45
EXISTING GROUND APPROX. RL 1.8
EXISTING GROUND APPROX. RL 1.7
RL 2.75
TWL 0.65
250
2900
300
400
MASS CONCRETE BENCHING
GRIT COLLECTOR MH
INLET VALVE PIT
SP298 PUMPING STATION
POLYETHYLENE LINING ON UNDERSIDE OF TOP SLAB AND INSIDE OPENINGS AND TO 100 BELOW BENCHING LEVEL ON WALL
120 SQUARE UPVC ELECTRICAL CONNECTION BOX CAST INTO SLAB TO STANDARD DRAWING NO. 486/5/25-S35
SECTION A
SCALE 1:50
12.5m HIGH VENT POLE ADJACENT TO PUMP WELL. REFER STD DWG 486/5/25-S30
FENCE LINE
12.5m
PUMPING STATION
350
ACCESS ROAD AND HARDSTAND RL 2.45
M20 STAINLESS STEEL THREADED BAR
POLYETHYLENE LINING TO 100 BELOW BENCHING LEVEL
TIDAL DRAIN
DN150 ODOUR PIPE
DN20 DOSING PIPE
DN25 WATER SUPPLY
ELECTRICAL PIT
PE100 PN12.5

4.4

BRISBANE CITY COUNCIL
Brisbane Water
Australia Trade Coast Sewer Project

BW30137-02/03

QA Register Lytton Road SP298

Lot No.	Description	Chainage From	Chainage To	Date Opened	Date Closed
AS02	Asphalt placement Lytton Road Pump Station			20/12/2004	18/01/2005
AV01	Air Valve Pit Installation SM20 Ch 992	992	990	11/05/2004	5/06/2004
AV02	Air Valve Pit Installation SM20 Ch 933	933	931	13/05/2004	27/07/2004
AV03	Air Valve Pit Installation SM20 Ch 547	547	549	14/05/2004	5/06/2004
AV04	Air Valve Pit Installation SM20 Ch 595	595	592	14/05/2004	27/07/2004
AV05	Air Valve Pit Installation SM20 Ch 121	121	119	14/05/2004	27/07/2004
AV06	Air Valve Pit Installation SM21 Ch 650	650	652	14/05/2004	17/08/2004
AV07	Air Valve Pit Installation SM21 Ch 45	45	45	21/05/2004	17/08/2004
BW01	Butt Welding SM20 Ch 240 - 555	240	555	1/02/2004	2/03/2004
BW02	Butt Welding SM20 Ch 555 - 940	555	940	1/02/2004	22/03/2004
BW03	Butt Welding SM20 Ch 940 - 1532	940	1532	1/02/2004	22/04/2004
BW04	Butt Welding SM21 Ch 241 - 205, 215-10 Sewer	10	241	1/02/2004	22/04/2004
BW05	Butt Welding SM20 Ch 901 - 0 Sewer	902	0	1/02/2004	29/03/2004
BW13	Butt Welding 200dia Lytton Rd PS variation			13/10/2004	15/10/2004
CG01	SM20 Working Platform Pritchard St -	230	1530	9/02/2004	25/02/2004
CG02	SM20 Working Platform Pritchard St -	901	0	9/02/2004	28/05/2004
CG03	SM20 Trench-Boundary Pritchard St -	230	555	4/03/2004	22/05/2004
CG04	SM20 Trench-Boundary First-Second	584	940	18/03/2004	25/05/2004
CG05	SM20 Trench-Boundary Second-Third	992	1530	25/03/2004	27/05/2004
CG06	SM21 Trench-Boundary Third Creek -	771	130	15/04/2004	28/04/2004
CP01	SP298 Lytton Rd Pump Station			19/08/2004	19/08/2004
CW01	SP298 Pumpwell Base			19/08/2004	6/10/2004
CW02	SP298 Pumpwell Walls 1st pour			23/08/2004	6/10/2004
CW03	SP298 Pumpwell Walls 2nd pour, Valve pit base, Grit collector base			2/09/2004	13/10/2004
CW04	SP298 Inlet Valve pit base, Transformer Base			3/09/2004	19/10/2004
CW05	SP298 Valve pit walls, Ferric Chloride Tank Base			9/09/2004	18/10/2004
CW06	SP298 Inlet Valve Pit Walls, Grit Collector Walls			20/06/2004	3/11/2004
CW07	SP298 Ferric Chloride Walls, Beams (grit-pumpwell)			28/09/2004	12/11/2004
CW08	SP298 Roof slab pumpwell, Valve Pit, Gritt collector inlet valve pit			2/11/2004	20/12/2004
CW09	SP298 Kerb in turning bay Lytton RD PS			12/11/2004	12/11/2004
CW10	SP298 Lytton Rd Turning Bay Pour 1			16/11/2004	12/01/2005
CW11	SP298 Driveway Pour 2 Lytton Rd			18/11/2004	12/01/2005
CW17	SP298 Generator slab Lytton Rd			5/01/2005	8/01/2005
CW18	SP298 Overflow Pit Roof Lytton Rd PS			7/01/2005	8/01/2005
EC01	Electrofusion Coupling SM20 Ch297	297	297	10/03/2004	10/03/2004
EC02	Electrofusion Coupling SM20 Ch327	327	327	12/03/2004	12/03/2004
EC03	Electrofusion Coupling SM20 Ch372	372	372	16/03/2004	16/03/2004
EC04	Electrofusion Coupling SM20 Ch432	432	432	17/03/2004	17/03/2004
EC05	Electrofusion Coupling SM20 Ch705	705	705	19/03/2004	19/03/2004
EC06	Electrofusion Coupling SM20 Ch765	765	765	23/03/2004	23/03/2004
EC07	Electrofusion Coupling SM20 Ch825	825	825	24/03/2004	23/03/2004
EC08	Electrofusion Coupling SM20 Ch252	241	252	24/03/2004	26/03/2004
EC09	Electrofusion Coupling SM20 Ch885 &	885	940	25/03/2004	25/03/2004
EC10	Electrofusion Coupling SM20 Ch995	995	995	25/03/2004	26/03/2004
EC11	Electrofusion Coupling SM20 Ch1052	1052	1052	26/03/2004	26/03/2004
EC12	Electrofusion Coupling SM20 Ch1112	1112	1112	30/03/2004	30/03/2004
EC13	Electrofusion Coupling SM20 Ch592 &	592	645	29/03/2004	30/03/2004
EC14	Electrofusion Coupling SM20 Ch550 &	550	490	31/03/2004	2/04/2004

BRISBANE CITY COUNCIL
Brisbane Water
Australia Trade Coast Sewer Project

BW30137-02/03

EC15	Electrofusion Coupling SM20 Ch213	213	213	1/04/2004	1/04/2004
EC16	Electrofusion Coupling SM20 Ch1172	1172	1172	3/04/2004	3/04/2004
EC17	Electrofusion Coupling SM20 Ch180	180	180	3/04/2004	3/04/2004
EC18	Electrofusion Coupling SM20 Ch1232	1232	1232	16/04/2004	16/04/2004
EC19	Electrofusion Coupling SM21 Ch771	771	771	16/04/2004	16/04/2004
EC20	Electrofusion Coupling SM20 Ch123	123	123	17/04/2004	17/04/2004
EC21	Electrofusion Coupling SM20 Ch1292	1292	1292	17/04/2004	17/04/2004
EC22	Electrofusion Coupling SM20 Ch1352	1352	1352	19/04/2004	19/04/2004
EC24	Electrofusion Coupling SM20 Ch63	63	63	17/04/2004	17/04/2004
EC25	Electrofusion Coupling SM20 Ch1412	1412	1412	21/04/2004	21/04/2004
EC26	Electrofusion Coupling SM21 Ch711	711	711	21/04/2004	21/04/2004
EC27	Electrofusion Coupling SM21 Ch651	651	651	22/04/2004	22/04/2004
EC28	Electrofusion Coupling SM20 Ch1472	1472	1472	22/04/2004	22/04/2004
EC29	Electrofusion Coupling SM21 Ch591	591	591	22/04/2004	22/04/2004
EC30	Electrofusion Coupling SM21 Ch531	531	531	27/04/2004	27/04/2004
EC31	Electrofusion Coupling SM21 Ch471	471	471	28/04/2004	31/05/2004
EC32	Electrofusion Coupling SM21 Ch828	828	828	28/04/2004	28/04/2004
EC33	Electrofusion Coupling SM21 Ch860 &	860	910	1/05/2004	1/05/2004
EC34	Electrofusion Coupling SM21 Ch411	411	411	4/05/2004	4/05/2004
EC35	Electrofusion Coupling SM21 Ch351	351	351	5/05/2004	5/05/2004
EC36	Electrofusion Coupling SM21 Ch291	291	291	6/05/2004	27/07/2004
EC37	Electrofusion Coupling SM21 Ch231	231	231	7/05/2004	27/07/2004
EC38	Electrofusion Coupling SM21 Ch171	171	171	19/05/2004	27/07/2004
EC39	Electrofusion Coupling SM21 Ch141	141	141	19/05/2004	27/07/2004
EC40	Electrofusion Coupling SM21 Ch90 & 45	90	45	19/05/2004	27/07/2004
EC41	Electrofusion Coupling SM21 Ch130	130		20/05/2004	27/07/2004
EC42	Electrofusion Coupling SM21 Ch25	25	25	21/05/2004	27/07/2004
EC43	Electrofusion Coupling SM21 Ch6	6	6	22/05/2004	27/07/2004
EC47	Electrofusion Coupling SM21 Ch28 & 29 - Repair	28	29	4/06/2004	27/07/2004
EC48	Electrofusion Coupling SM21 Ch92 & 93 - Repair	92	93	11/06/2004	27/07/2004
EC49	Electrofusion Coupling SM21 Ch7 & 8	7	8	18/06/2004	27/07/2004
EC51	Electrofusion Coupling SM20 Ch7	7	7	23/06/2004	27/07/2004
EL01	Electrical Works SP298			20/11/2004	1/03/2005
ME01	Mechanical Works SP298			15/01/2005	18/02/2005
PJ01	Pipe Jacking SM20 Ch241 - 211 Sewer	241	211	10/03/2004	18/03/2004
PJ02	Pipe Jacking SM21 Ch130 - 90 Sewer	130	90	28/04/2004	4/05/2004
PT01	Pipe testing sewer line DN315 SM20			18/06/2004	25/06/2004
PT02	Pipe testing sewer line DN355 SM21			18/06/2004	25/06/2004
PT08	Pipe testing Reuse line alng Lytton Road			18/01/2004	21/01/2005
SG01	Subgrade in Lytton Rd turning lane & driveway			1/12/2004	20/12/2004
SG03	Subgrade and backfill around Lytton Rd PS			20/09/2004	15/11/2004
ST01	PE liner spark testing Lytton Road P/S			22/08/2004	14/01/2005
SV01	Scour Valve Pit Installation SM21 Ch828	828	830	4/05/2004	28/05/2004
SV02	Scour Valve Pit Installation SM20 Ch1168	1165	1167	12/05/2004	27/07/2004
SV03	Scour Valve Pit Installation SM20 Ch769	769	766	13/05/2004	27/07/2004
SV04	Scour Valve Pit Installation SM20 Ch372			14/05/2004	27/07/2004
SV05	Scour Valve Pit Installation SM21 Ch141 Sewer and Ch 145 Reuse	141	145	20/05/2004	27/07/2004
TB01	Tunnel Boring SM20 Ch942 - 995	942	995	17/03/2004	14/05/2004
TB02	Tunnel Boring SM20 Ch555 - 585	555	585	22/03/2004	14/05/2004
TB03	Tunnel Boring SM21 Ch830 - 771	830	771	26/03/2004	14/05/2004
TW001	Trenching SM20 Ch252 - 297 Sewer	252	297	4/03/2004	5/03/2004
TW002	Trenching SM20 Ch297 - 327 Sewer	297	327	9/03/2004	18/03/2004
TW003	Trenching SM20 Ch327 - 372 Sewer	327	372	11/03/2004	18/03/2004
TW004	Trenching SM20 Ch372 - 432 Sewer	372	432	15/03/2004	24/03/2004

BRISBANE CITY COUNCIL
Brisbane Water
Australia Trade Coast Sewer Project

BW30137-02/03

TW005	Trenching SM20 Ch432 - 492 Sewer	432	492	17/03/2004	24/03/2004
TW006	Trenching SM20 Ch655 - 705 Sewer	655	705	18/03/2004	7/04/2004
TW007	Trenching SM20 Ch705 - 765 Sewer	705	765	19/03/2004	7/04/2004
TW008	Trenching SM20 Ch765 - 825 Sewer	765	825	22/03/2004	26/03/2004
TW009	Trenching SM20 Ch825 - 885 Sewer	825	885	23/03/2004	10/05/2004
TW010	Trenching SM20 Ch885 - 945 Sewer	885	945	25/03/2004	7/04/2004
TW011	Trenching SM20 Ch992 - 1052 Sewer	992	1052	25/03/2004	16/04/2004
TW012	Trenching SM20 Ch240 - 252 Sewer	240	252	23/03/2004	16/04/2004
TW013	Trenching SM20 Ch1052 - 1112 Sewer	1052	1112	26/03/2004	7/05/2004
TW014	Trenching SM20 Ch 594 - 655 Sewer	594	655	27/03/2004	30/04/2004
TW015	Trenching SM20 Ch 1112 - 1172	1112	1172	29/03/2004	7/04/2004
TW016	Trenching SM20 Ch 210 - 180 Sewer	210	180	29/03/2004	16/04/2004
TW017	Trenching SM20 Ch 492 - 550 Sewer	492	550	31/03/2004	7/05/2004
TW018	Trenching SM20 Ch 1172 - 1232	1172	1232	2/04/2004	7/05/2004
TW019	Trenching SM20 Ch 180 - 123 Sewer	180	123	3/04/2004	7/05/2004
TW020	Trenching SM20 Ch1232 - 1292 Sewer	1232	1292	5/04/2004	7/05/2004
TW021	Trenching SM21 Ch771 - 711 Sewer	771	711	15/04/2004	16/04/2004
TW022	Trenching SM20 Ch1292 - 1352 Sewer	1292	1352	16/04/2004	7/05/2004
TW023	Trenching SM20 Ch 123 - 63 Sewer	123	63	17/04/2004	7/05/2004
TW024	Trenching SM20 Ch 63 - 7 Sewer and	63	7	19/04/2004	21/05/2004
TW025	Trenching SM20 Ch 1352 - 1412	1352	1412	20/04/2004	7/05/2004
TW026	Trenching SM20 Ch 1412 - 1472	1412	1472	21/04/2004	27/07/2004
TW027	Trenching SM21 Ch 711 - 651 Sewer	711	651	20/04/2004	17/05/2004
TW028	Trenching SM21 Ch 651 - 591 Sewer	651	591	21/04/2004	27/07/2004
TW029	Trenching SM20 Ch 1472 - 1532	1472	1532	22/04/2004	23/05/2004
TW030	Trenching SM21 Ch 591 - 531 Sewer	591	531	22/04/2004	27/07/2004
TW031	Trenching SM21 Ch 531 - 471 Sewer	531	471	27/04/2004	27/07/2004
TW032	Trenching SM21 Ch 827 - 860 Sewer	827	860	27/04/2004	23/05/2004
TW033	Trenching SM21 Ch 471 - 411 Sewer	471	411	28/04/2004	23/05/2004
TW034	Trenching SM21 Ch 860 - 910 Sewer	860	910	1/05/2004	17/08/2004
TW035	Trenching SM21 Ch 411 - 351 Sewer	411	351	4/05/2004	23/05/2004
TW036	Trenching SM21 Ch 351 - 291 Sewer	351	291	5/05/2004	23/05/2004
TW037	Trenching SM21 Ch 291 - 231 Sewer	291	231	6/05/2004	23/05/2004
TW038	Trenching SM21 Ch 231 - 171 Sewer	231	171	7/05/2004	27/07/2004
TW039	Trenching SM21 Ch 171 - 141 Sewer	171	141	18/05/2004	8/06/2004
TW040	Trenching SM21 Ch 90 - 45 Sewer	90	45	18/05/2004	8/06/2004
TW041	Trenching SM21 Ch 45 - 25 Sewer	45	25	19/05/2004	27/07/2004
TW042	Trenching SM21 Ch 25 - 2 Sewer	25	2	20/05/2004	27/07/2004
TW050	Trenching SM20 Ch 7 - 0 Sewer	7	0	23/06/2004	17/08/2004
UB01	Unbound Pavement under turning bay Lytton PS			7/11/2004	24/12/2005
UB02	Unbound Pavement Lytton RD turning lane & driveway			14/12/2004	21/01/2005
UB03	Unbound Pavement Lytton RD access to the river			4/12/2004	22/12/2004