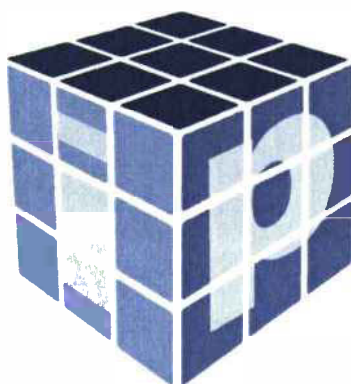


SP378

i Power Solutions Pty Ltd



**Quality
Endorsed
Company**
ISO9001
QEC 14406
Standards
Australia

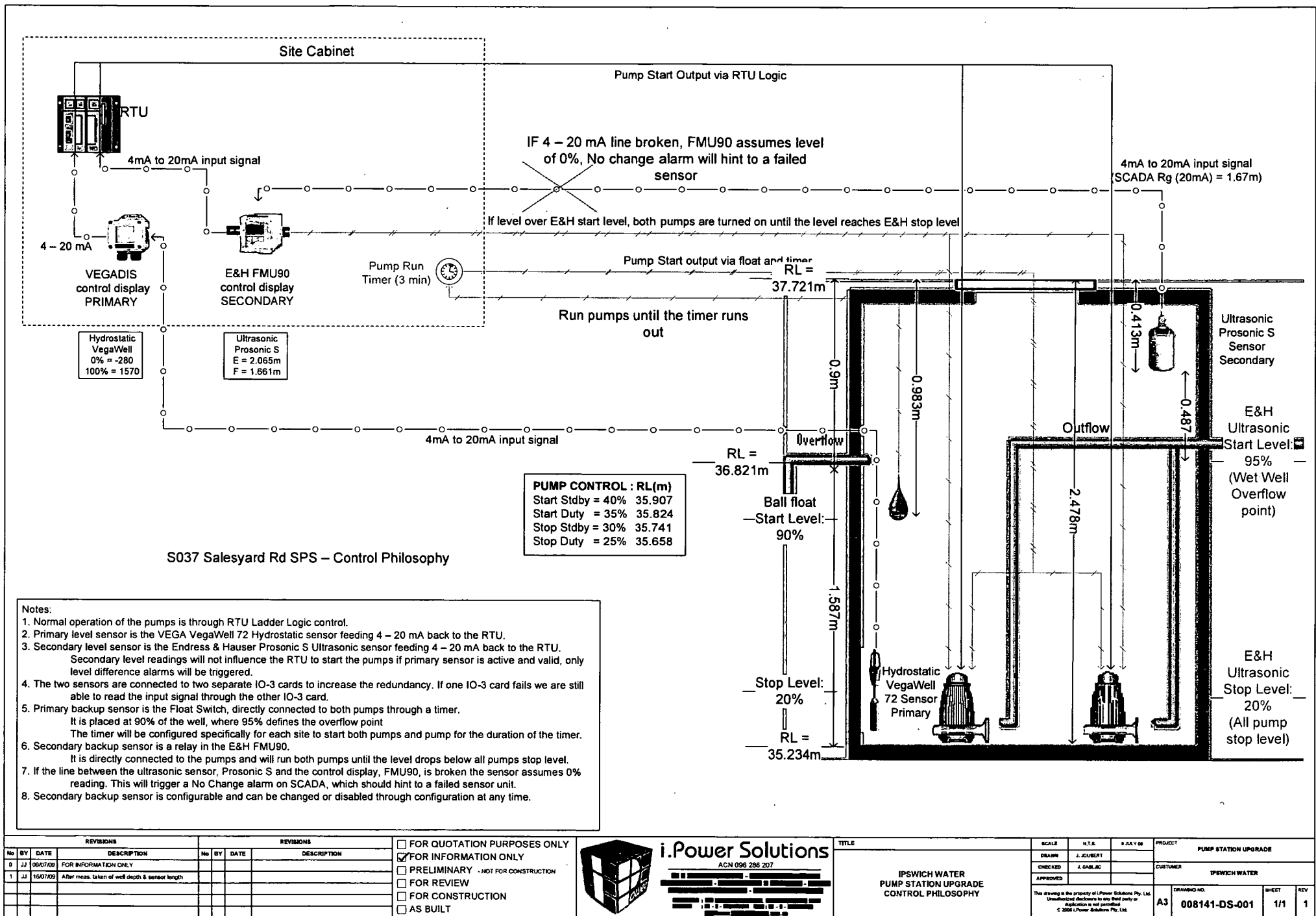
Ipswich Water

**S139 Salesyard Road
Sewerage Pump Station**

Operation & Maintenance

1.

Drawings



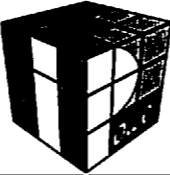
EQUIPMENT LIST

ITEM No	QTY	DESCRIPTION	MANUFACTURER / CATALOGUE No.
1	2	REMOTE DISPLAY	EMSBY 01-3060-00
2	1	VOLTMETER	NHP RQ72E-VAC 0-500V
3	1	VOLTMETER SELECTOR	AUST SOL CA-10-A007-625-FT2
4	1	DIGITAL DISPLAY	AMALGAMATED INSTRUMENTS PM6-LP-4C
5	2	START P/B	NHP D7P-F4 + D7PX10
6	2	STOP P/B	NHP D7P-F4 + D7PX01
7	2	EMERGENCY STOP P/B	NHP D7P-MT34 + D7PX01
8	2	RUNNING INDICATOR	NHP D7P-P3 + D7PN7G
9	2	FAULT INDICATOR	NHP D7P-P4 + D7PN7R
10	1	BACKUP INDICATOR	NHP D7P-P0 + D7PN7Y
11	2	AUTO/OFF/MAN SELECTOR SWITCH	AUST SOL CA10-A212-623-FT2
12	2	HOURS RUN METER	NHP RQ48.0 240VAC
13	2	MAIN SWITCH	NHP ISO363
14	1	MECHANICAL INTERLOCK	NHP ISOCOM
15	1	FLASHING LIGHT	DEEGEE 626-983 + 565-967 + 626-359
16	2	CUBICAL LIGHT	IDEAL BUYN120
17	2	CUBICAL FAN	RITTAL 3322.107
18	6	CUBICAL FILTER	RITTAL 3322.207
19	2	10A 3P CB	NHP DTCB10310C
20	5	6A 1P CB	NHP DTCB10106C
21	1	2A 3P CB	NHP DTCB10302C
22	1	20A 4P CB 30mA	NHP DSRM32303PN + DTCB10320C
23	1	16A 2P CB 30mA	NHP DSRM31630P
24	2	10A 1P CB	NHP DTCB10110C
25	4	SURGE DIVERTERS	CRITEC TDS-MT-277
26	3	32A FUSE	NHP NW32FW + NNS32
27	1	PHASE FAIL RELAY	SCHNEIDER RM84873012
28	1	SURGE REDUCTION FILTER	CRITEC TDF-10A-240V
29	1	12 + 24 VDC POWER SUPPLY	OMNIFLEX C2197B

ITEM No	QTY	DESCRIPTION	MANUFACTURER / CATALOGUE No.
30	8	4A 1P CB	NHP DTCB1014C
31	6	240V RELAY	NHP 55.34.0054 240VAC
32	1	DELAY TIMER 240V	NHP DAA-01-C-M24
33	6	24V RELAY	NHP 55.34.0074 24VDC
34	1	DELAY TIMER 24V	NHP DBB-01-D-M24
35	4	TRANSIENT BARRIERS	CRITEC UTB-30
36	4	CONTACTOR 4kW	NHP CA7-9-10 240VAC + CS7-PV-11
37	2	TOL 1.5kW + MOUNTING BRACKET	NHP CT7-34-4 + CT7-24-P-A
38	2	SOFT STARTER + CT KIT	EMSBY MSF-017 + 01-2020-00
39	1	SUPPLY AUTHORITY METERS	
40	3	METERING ISOLATION LINKS	ALSTOM S71002ABWS + S7A
41	3	LIMIT SWITCH	SCHNEIDER XCJ128
42	1	10A GPO + MOUNTING BLOCK	IDEAL 2015 + 449A
43	3	BATTERY 12V 7Ah	POWERHOUSE CP1270
44	1	FLOWMETER (OPTIONAL)	ABB MACMASTER
45	1	RADIO	TRIO DATACOM ER450
46	1	HYDRO STATIC LEVEL	VEGA VEGADIS 12
47	1	ULTRASONIC LEVEL	E&H FMU-90 & FMU-92
48	1	RTU	RTU KINGFISHER
49			
50	20	TERMINALS	PHEONIX CONTACT UK5N
51	10	TERMINALS	PHEONIX CONTACT D-UK 4/10
52	60	TERMINALS	PHEONIX CONTACT UKK5-MTK-PP
53	1	TERMINALS	PHEONIX CONTACT EB10-6
54	1	TERMINALS	PHEONIX CONTACT 1051016
55	1	3Ø OUTLET	CLIPSAL 56C520
56	1	GENERATOR INLET	MARECHAL 3928017 + 392A027 + 312A126
57	6	TERMINALS	PHEONIX CONTACT 0203250
58	1	TERMINAL BLOCK	NHP OTTAX25PN
59	1	BUSCOMB	NHP ICL213

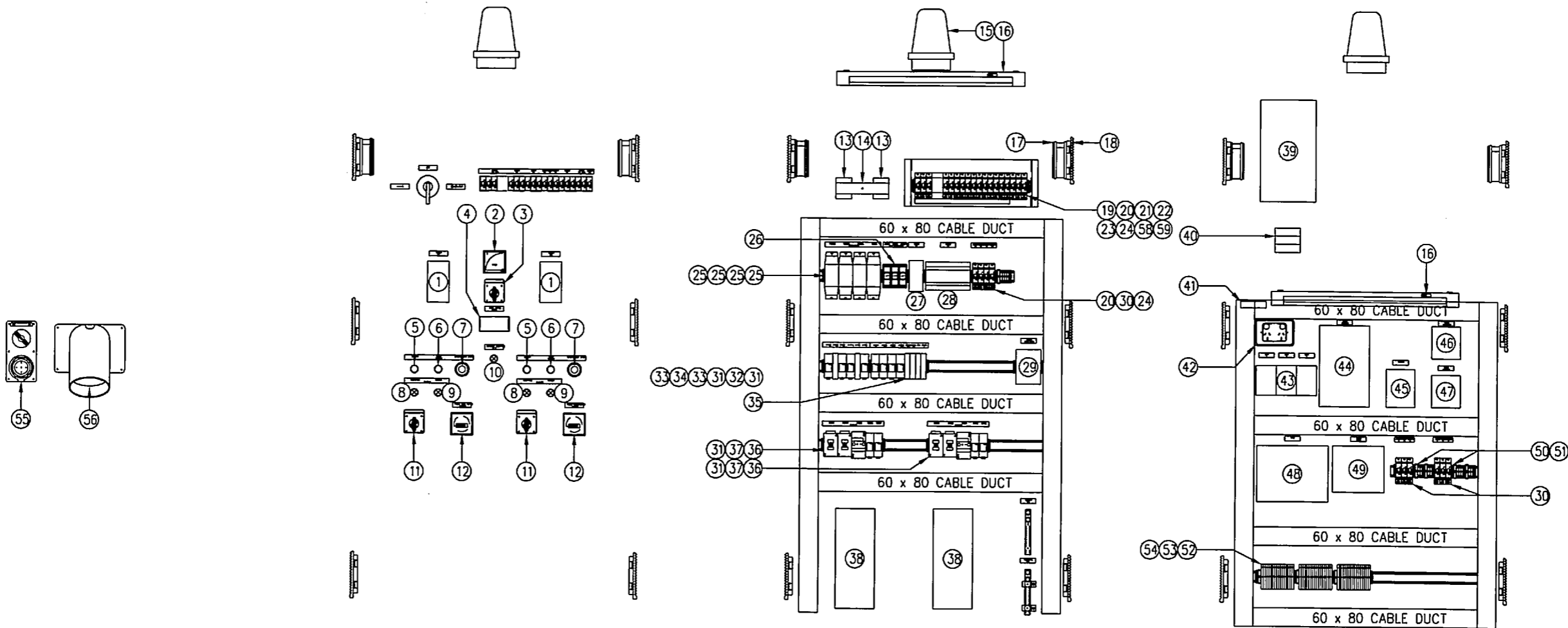
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0	ME	23.07.07	FOR CONSTRUCTION				
1	B.W.	30.06.09	AS BUILT				
2	B.W.	23.04.10	AS INSTALLED				

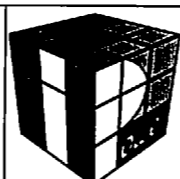
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- ☐ FOR CONSTRUCTION
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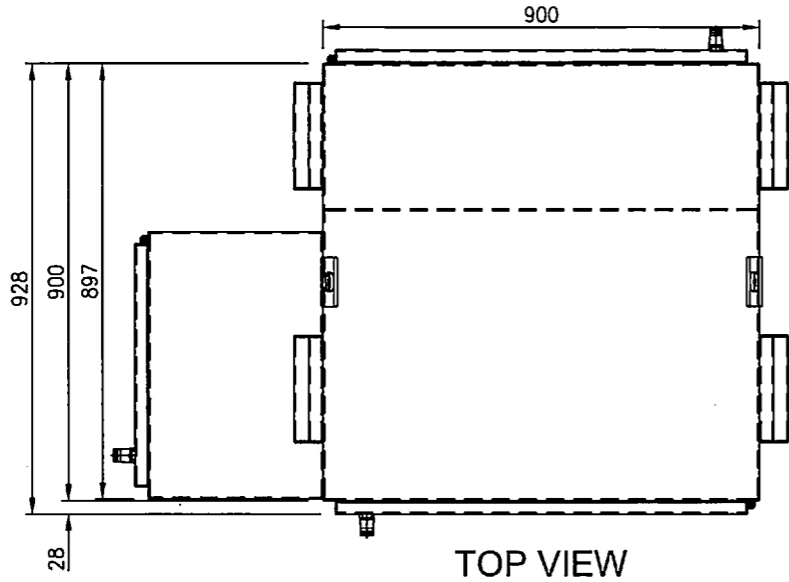


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SWITCHROOMS - AUTOMATION & CONTROL - SCADA
INFORMATION SYSTEMS - TURNKEY SOLUTIONS
FACTORY :- 185 QUEENSPORT RD, MURARRIE, QLD 4172
PHONE :- 61-7-3908 3908 FAX :- 61-7-3908 3909
http://www.ipowersolutions.com.au

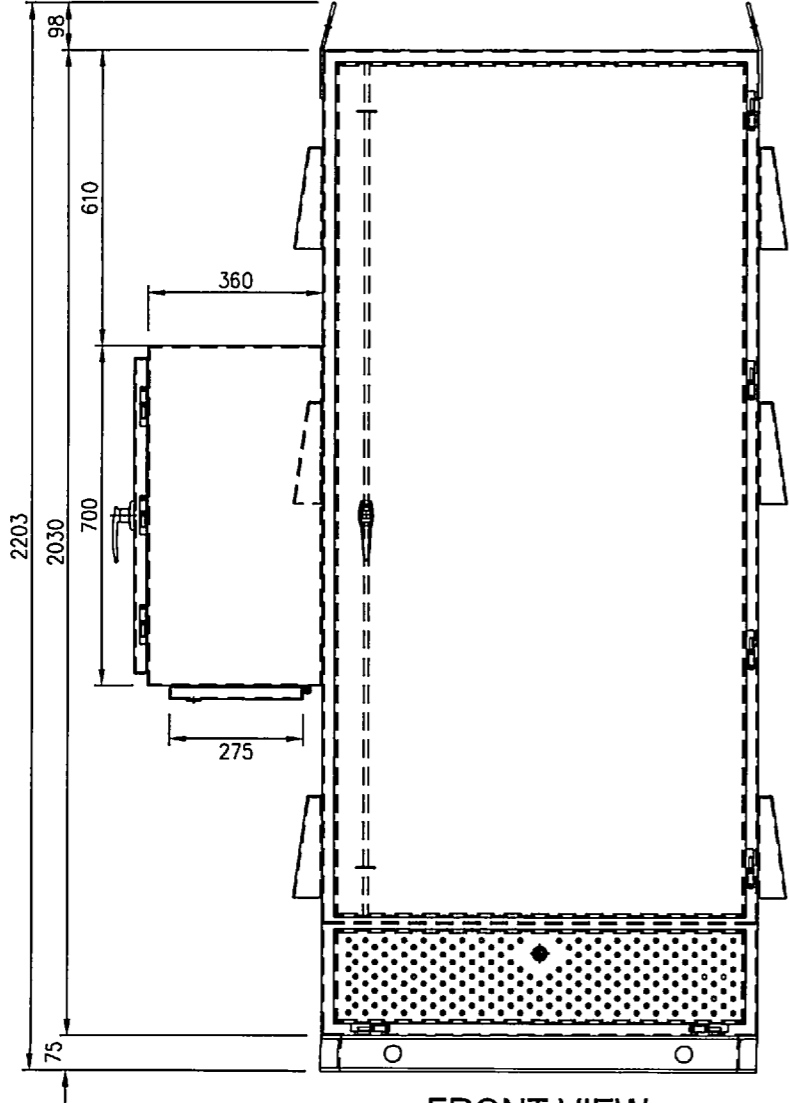
TITLE		SCALE	N.T.S	12 JUNE 07	PROJECT
UP TO 1.7kW SOFT STARTER GENERAL ASSEMBLY		DRAWN	M.ELDER		UP TO 1.7kW SOFT STARTER
		CHECKED	A.GATEHOUSE		CUSTOMER
		DESIGNED	A.GATEHOUSE		IPSWICH WATER
		APPROVED	S.AYRES		
		© 2007 i.Power Solutions Pty Ltd		DRAWING NO.	SHEET
				AC005435-A-01	02
				REV	2



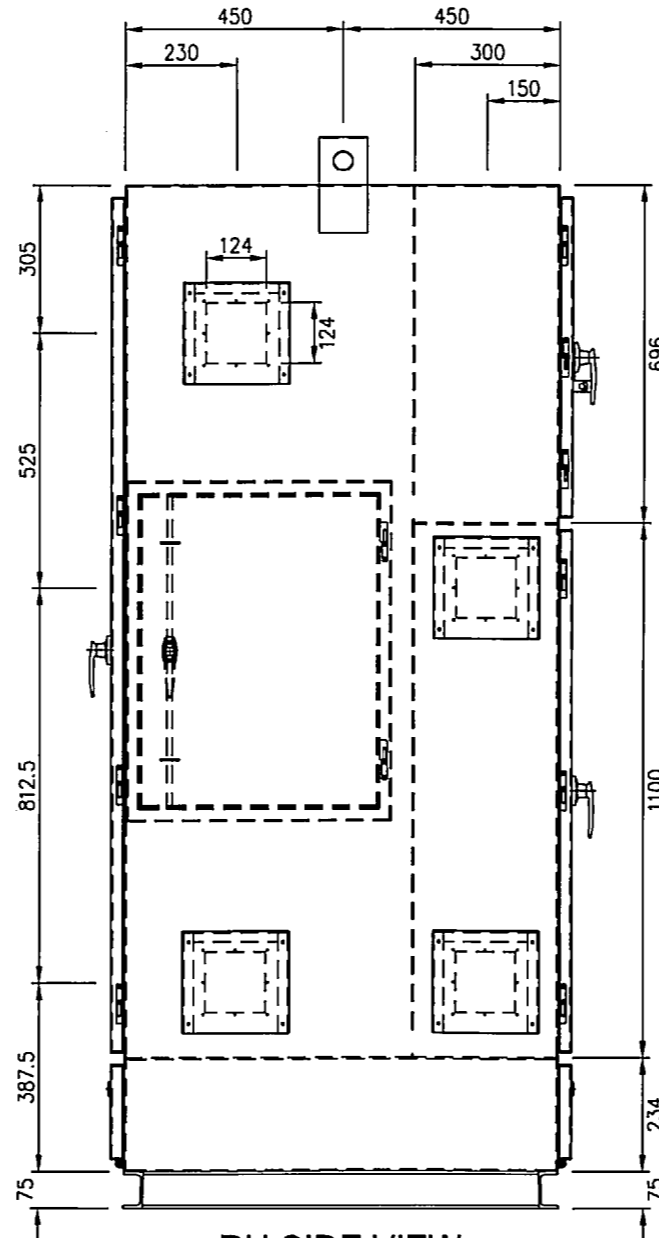
REVISIONS				REVISIONS				<div><div><input type="checkbox"/> FOR QUOTATION PURPOSES ONLY <input type="checkbox"/> FOR INFORMATION ONLY <input type="checkbox"/> PRELIMINARY - NOT FOR CONSTRUCTION <input type="checkbox"/> FOR REVIEW <input type="checkbox"/> FOR CONSTRUCTION <input checked="" type="checkbox"/> AS BUILT</div></div>	<div><div></div><div>i.Power Solutions ACN 096 286 207 LV & MV SWITCHGEAR - MINING SUBSTATIONS SWITCHROOMS - AUTOMATION & CONTROL - SCADA INFORMATION SYSTEMS - TURNKEY SOLUTIONS FACTORY :- 185 QUEENSPORT RD, MURARREE, QLD 4172 PHONE :- 61-7-3908 3908 FAX :- 61-7-3908 3909 http://www.ipowersolutions.com.au</div></div>	TITLE UP TO 1.7kW SOFT STARTER GENERAL ASSEMBLY		SCALE	1:15	12 JUNE 07	PROJECT	
DRAWN	M.ELDER		UP TO 1.7kW SOFT STARTER													
CHECKED	A.GATEHOUSE		CUSTOMER													
DESIGNED	A.GATEHOUSE		IPSWICH WATER													
APPROVED	S.AYRES															
			© 2007 i.Power Solutions Pty Ltd		DRAWING NO.		SHEET	REV								
1	2	3	4	5	6	7	8	9	10	11	12					
										AC005435-A-01	02	2				



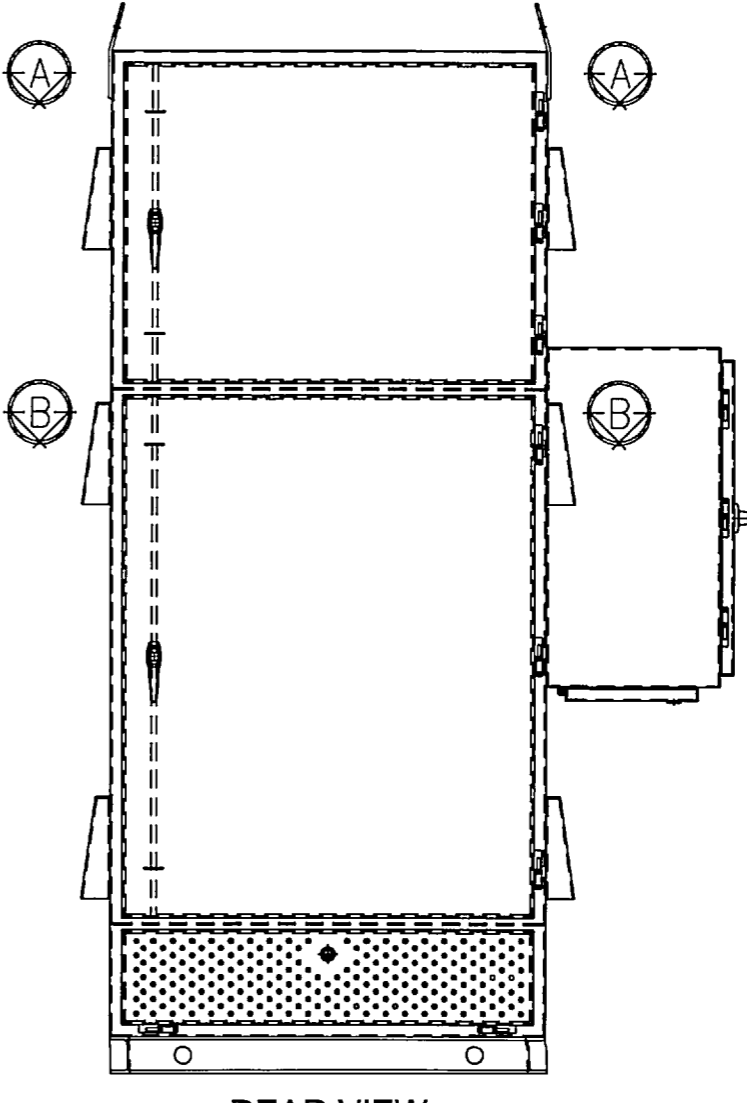
TOP VIEW



FRONT VIEW



RH SIDE VIEW



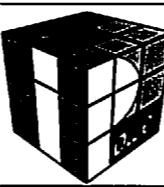
REAR VIEW

CONSTRUCTION NOTES:

1. THE ENCLOSURE IS MANUFACTURED FROM 3.0mm ALUMINIUM, FOLDED AND WELDED, SANDED BACK FLUSH AND CORNERS ROUNDED.
2. ALL METALWORK IS THOROUGHLY REMOVED OF ALL SPLATTERS, OILS AND DIRT AND ALLOWED TO DRY.
3. THE METALWORK IS THEN POWDERCOATED TO A TOTAL THICKNESS OF 70 MICRONS. FINISH COLOUR IS AS FOLLOWS:
ENCLOSURE INTERNAL/EXTERNAL: "NATURAL FINISH".
EXTERNAL DOORS: "NATURAL FINISH"
EQUIPMENT PLATES: "GLOSS WHITE".
ESCUTCHEONS/INTERNAL DOORS: "GLOSS WHITE".
4. PLINTH IS MANUFACTURED FROM 75 PFC AND IS HOT DIPPED GALVANISED.
5. THE ENCLOSURE IS WEATHERPROOF (IP56).
6. OUTER DOORS ARE AFFIXED USING H1 (LONG) PINTLE HINGES AND TO BE FITTED WITH 3 POINT LOCKING MECHANISM, "STANDARD" DOOR STIFFENER, AND KEYLOCKABLE L44 HANDLE (KEY REFERENCE 92268).
7. ESCUTCHEONS ARE AFFIXED USING H1 (SHORT) PINTLE HINGES. ESCUTCHEON CATCHES TO BE QUARTER TURN "SLOTTED INSERT".
8. LIFTING METHOD IS VIA TOP LIFTING LUGS WELDED TO SIDES.
9. THE ENCLOSURE IS CONSTRUCTED IN ACCORDANCE WITH THE FOLLOWING i.POWER SOLUTIONS STANDARD DRAWINGS:
IPS-E-004: WEATHERPROOF RATING IP56 SEALING AND OPENING DETAILS FOR 3.0mm CONSTRUCTED SWITCHGEAR ASSEMBLIES.
IPS-E-020: TYPICAL CONSTRUCTION DETAILS FOR DUSTPROOF AND WEATHERPROOF HORIZONTAL CROSS PANEL RETURNS AND SEALING DETAILS.
IPS-E-024-03: STANDARD DOOR & ESCUTCHEON SEALING AND OPENING DETAILS WEATHERPROOF RATING IP56.
IPS-E-036: REFERENCE TABLE A LATCH REQUIREMENTS AND REFERENCE TABLE B HINGE REQUIREMENTS.
IPS-E-019: DOOR STAYS AND LIMIT SWITCHES FITTING DETAILS.
10. REFER DWG. 5435-C-02 FOR DETAILS OF VENT COVER.
11. DOOR LIMIT SWITCHES ARE TO BE FITTED TO OUTER DOORS

REVISIONS				REVISIONS			
NO	BY	DATE	DESCRIPTION	NO	BY	DATE	DESCRIPTION
A	M.E.	12.06.07	ISSUED FOR CLIENT REVIEW				
0	M.E.	12.07.07	FOR CONSTRUCTION				
1	B.W.	16.03.10	AS BUILT				

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- ☐ FOR CONSTRUCTION
- ☒ AS BUILT

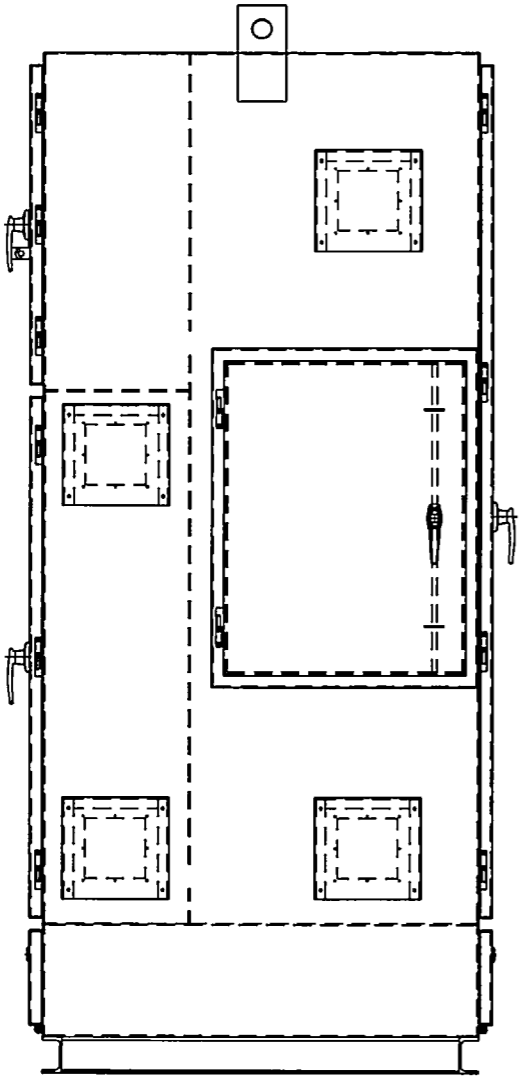
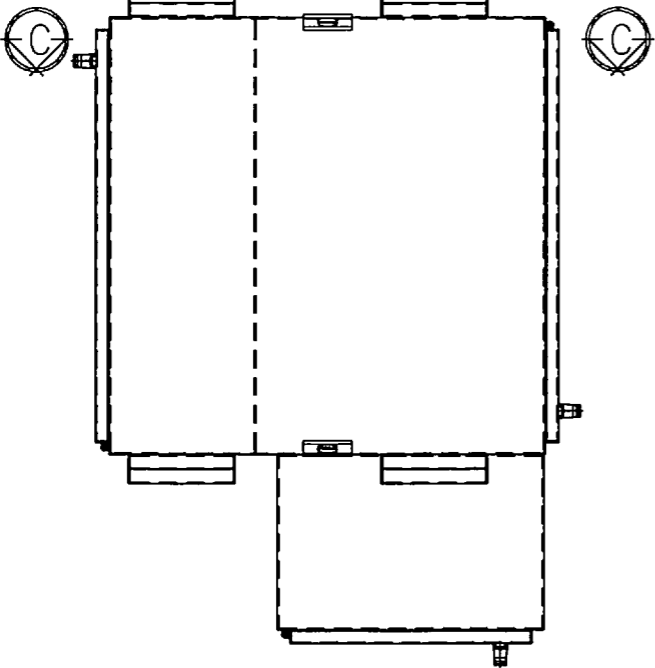


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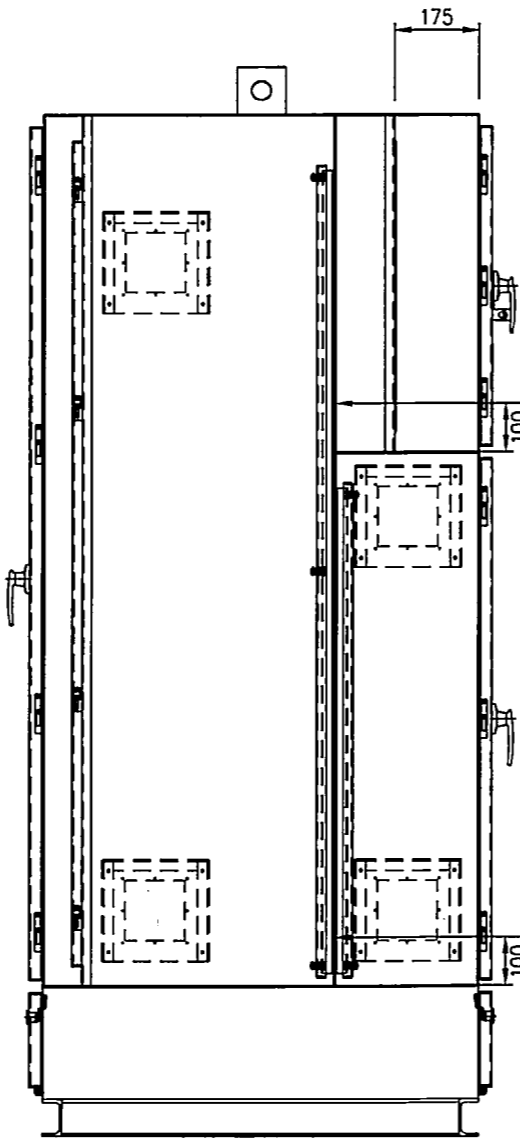
TITLE
**SALESYARD RD, YAMANTO
SEWERAGE PUMP STATION
CONSTRUCTION DETAILS**

SCALE	1:15	12 JUNE 07
DRAWN	M.ELDER	
CHECKED	A.GATEHOUSE	
DESIGNED	A.GATEHOUSE	
APPROVED	S.AYRES	

PROJECT	SALESYARD RD, YAMANTO SEWERAGE PUMP STATION		
CUSTOMER	IPSWICH WATER		
DRAWING NO.	5435-C-01	SHEET	04
REV	1		



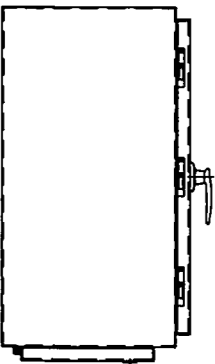
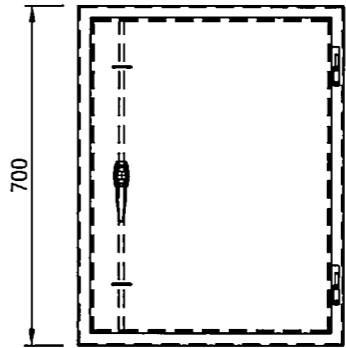
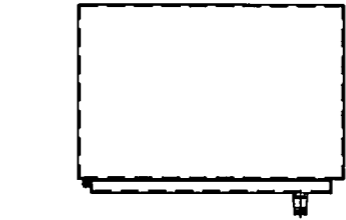
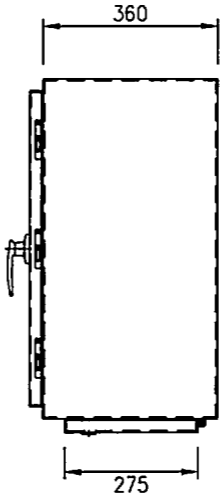
LH SIDE VIEW



RH SIDE VIEW
SECTION C-C

500 HOLE TO BE PUNCHED

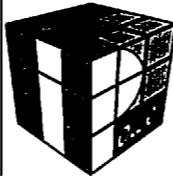
500 HOLE TO BE PUNCHED
ON BOTH SIDES OF GEARTRAY



GENERATOR INLET PLUG
TO BE WELDED TO THE LEFT SIDE OF THE TEIR.
REAR OF BOX TO BE LEFT OPEN.

REVISIONS				REVISIONS			
NO	BY	DATE	DESCRIPTION	NO	BY	DATE	DESCRIPTION
A	M.E	12.06.07	ISSUED FOR CLIENT REVIEW				
D	M.E	12.07.07	FOR CONSTRUCTION				
1	B.W	16.03.10	AS BUILT				

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- ☐ FOR CONSTRUCTION
- ☒ AS BUILT

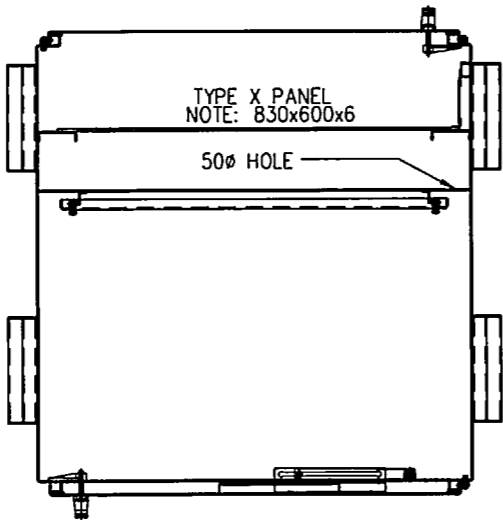


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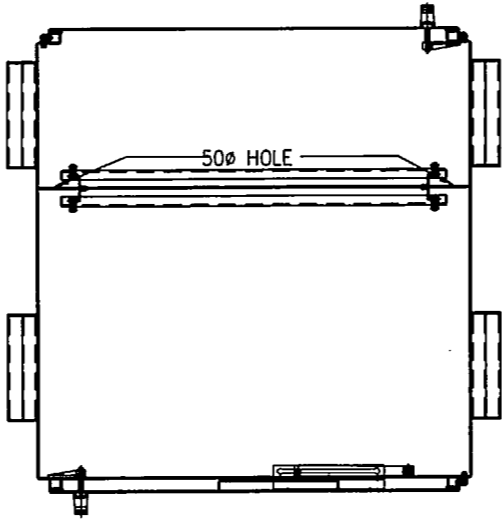
TITLE
**SALEYARD RD, YAMANTO
SEWERAGE PUMP STATION
CONSTRUCTION DETAILS**

SCALE	1:15	12 JUNE 07
DRAWN	M.ELDER	
CHECKED	A.GATEHOUSE	
DESIGNED	A.GATEHOUSE	
APPROVED	S.AYRES	
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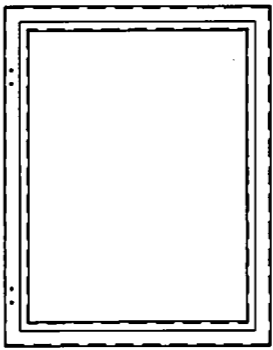
PROJECT	SALEYARD RD, YAMANTO SEWERAGE PUMP STATION		
CUSTOMER	IPSWICH WATER		
DRAWING NO.	AC005435-C-02	SHEET	04
REV	1		



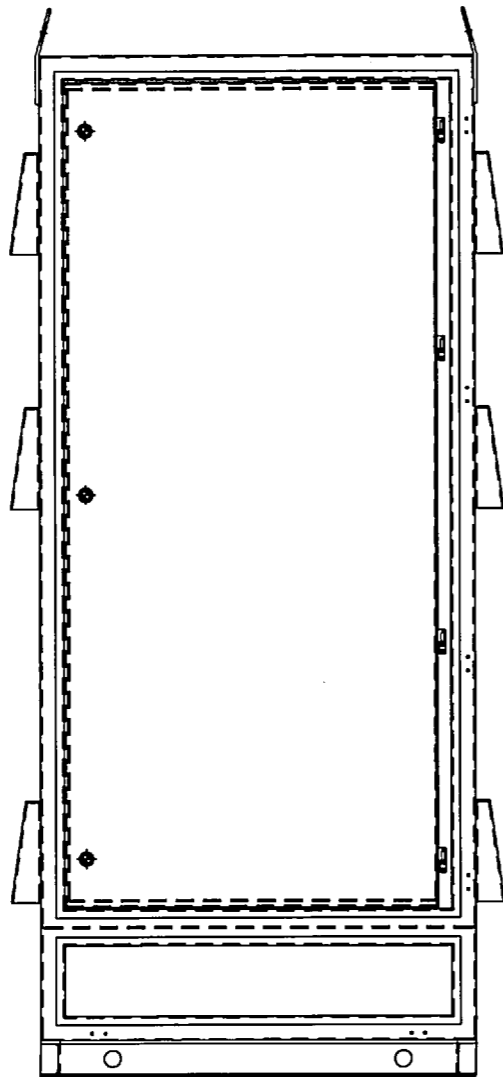
TOP VIEW
SECTION A-A



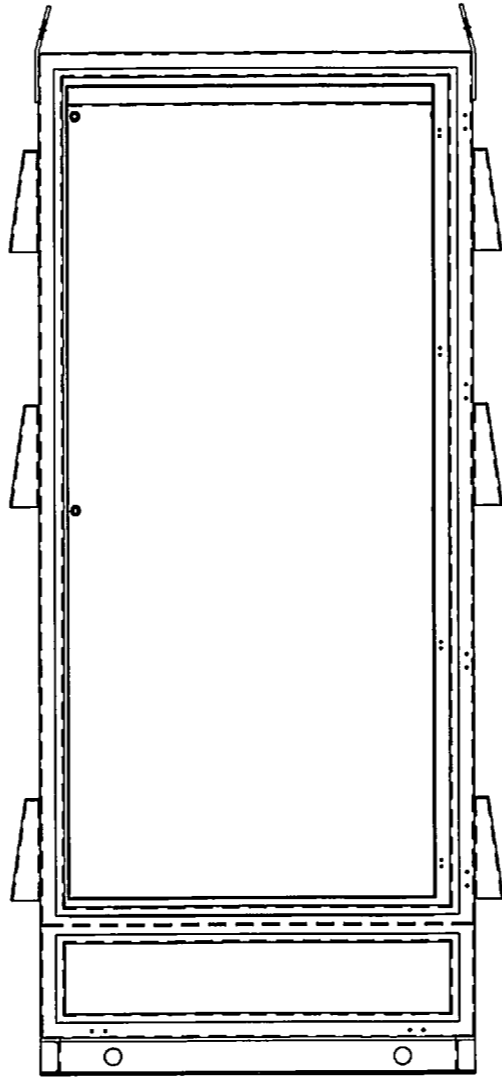
TOP VIEW
SECTION B-B



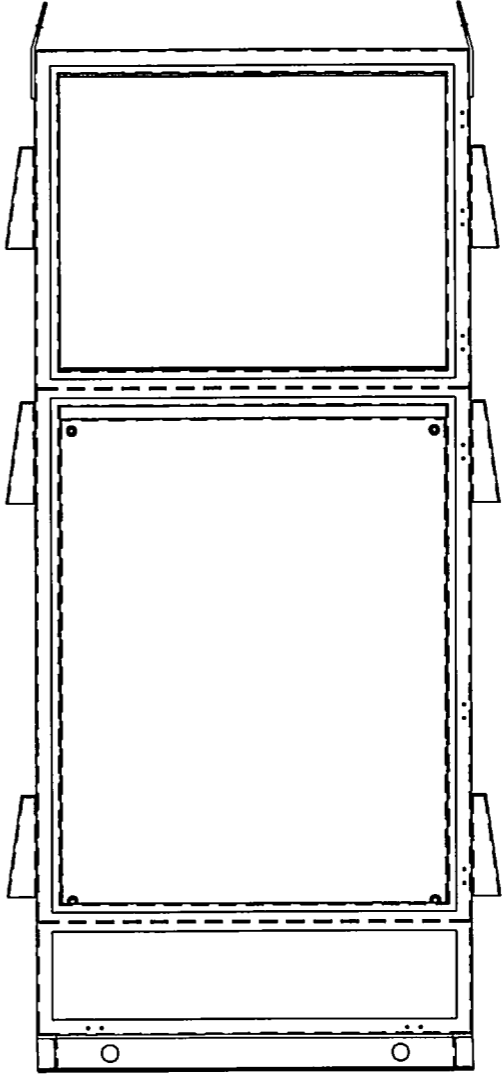
GENERATOR INLET PLUG
(DOOR REMOVED)



FRONT VIEW
(OUTER DOORS REMOVED SHOWING ESCUTCHEON)



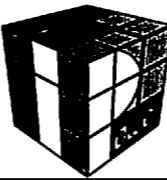
FRONT VIEW
(OUTER DOORS & ESCUTCHEON REMOVED SHOWING GEAR TRAY)



REAR VIEW
(OUTER DOORS REMOVED SHOWING METER PANEL (TOP) & GEAR TRAY (BOTTOM))

REVISIONS				REVISIONS			
NO	BY	DATE	DESCRIPTION	NO	BY	DATE	DESCRIPTION
A	M.E.	12.06.07	ISSUED FOR CLIENT REVIEW				
O	M.E.	12.07.07	FOR CONSTRUCTION				
1	B.W.	16.03.10	AS BUILT				

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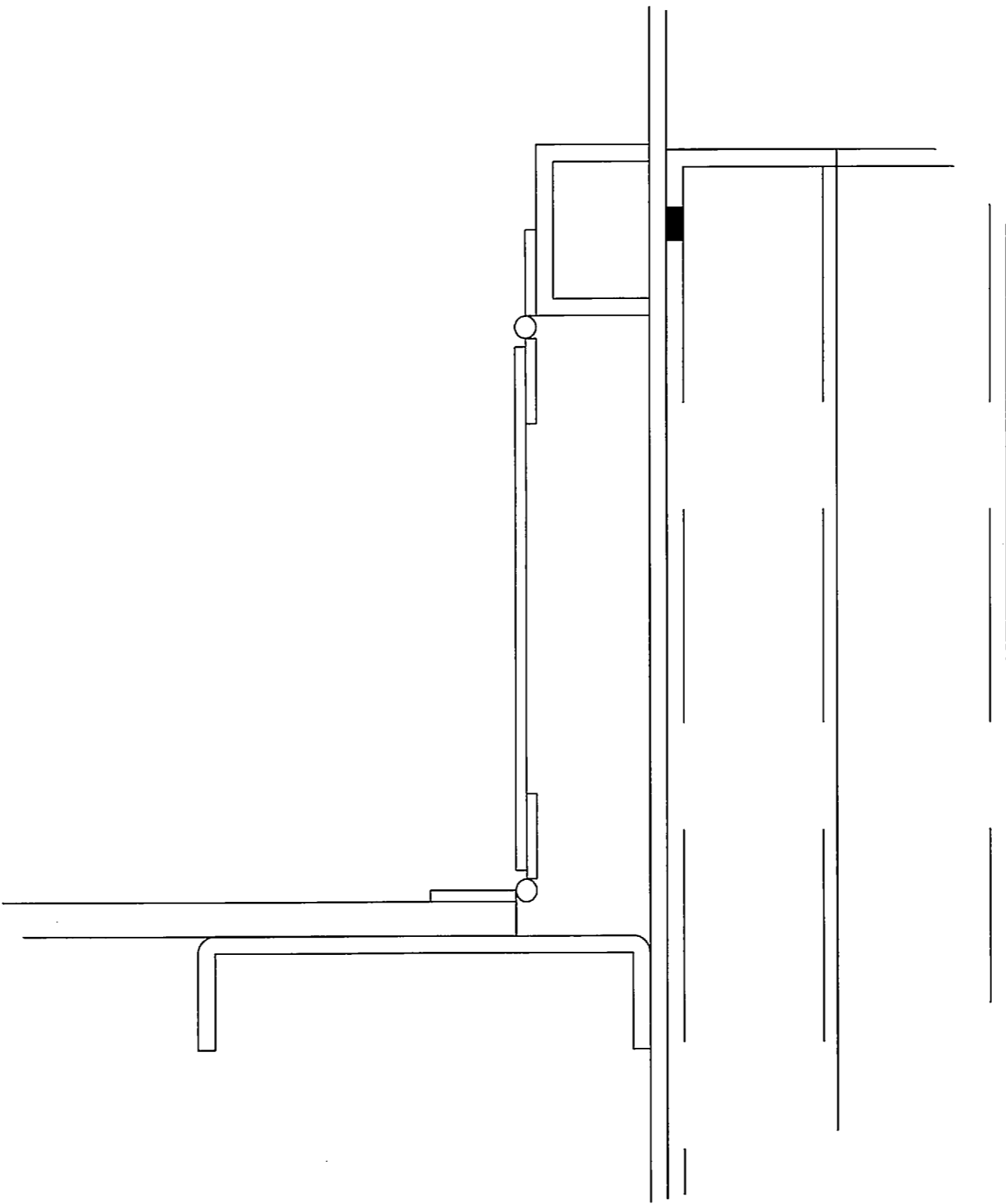


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TITLE
**SALESYARD RD, YAMANTO
SEWERAGE PUMP STATION
CONSTRUCTION DETAILS
SHOWING INTERNAL DOORS
AND EQUIPMENT PLATES**

SCALE	1:15	12 JUNE 07
DRAWN	M.ELDER	
CHECKED	A.GATEHOUSE	
DESIGNED	A.GATEHOUSE	
APPROVED	S.AYRES	
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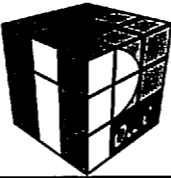
PROJECT		SALESYARD RD, YAMANTO SEWERAGE PUMP STATION	
CUSTOMER		IPSWICH WATER	
DRAWING NO.	SHEET	REV	
A005435-C-08	04	1	



DOUBLE HINGE DETAIL

REVISIONS				REVISIONS			
NO	BY	DATE	DESCRIPTION	NO	BY	DATE	DESCRIPTION
A	M.E	12.06.07	ISSUED FOR CLIENT REVIEW				
0	M.E	12.07.07	FOR CONSTRUCTION				
1	B.W	16.03.10	AS BUILT				

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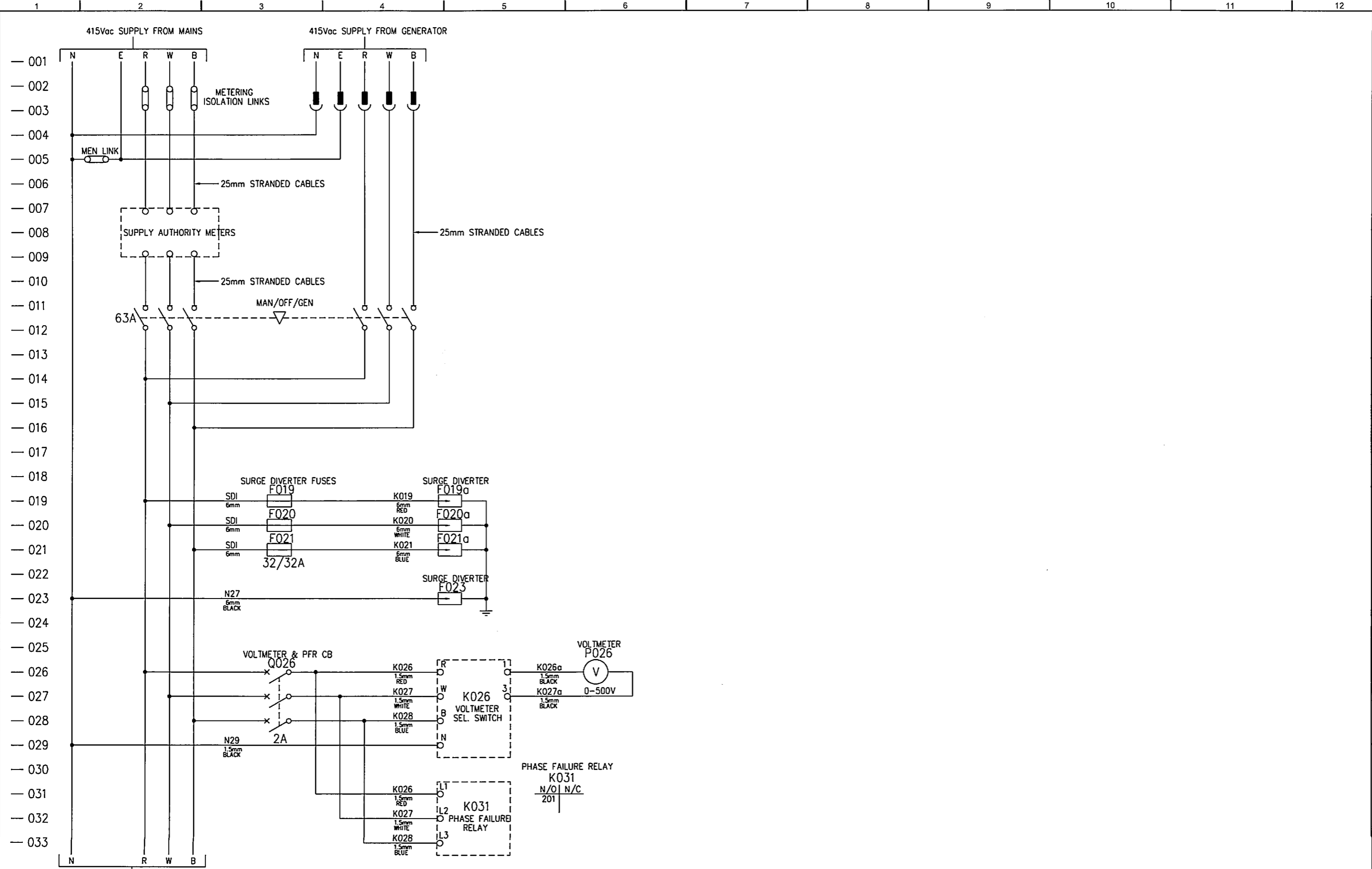


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TITLE
**SALESYARD RD, YAMANTO
SEWERAGE PUMP STATION
CONSTRUCTION DETAILS
DOUBLE HINGE DETAIL**

SCALE	1:1	12 JUNE 07
DRAWN	M.ELDER	
CHECKED	A.GATEHOUSE	
DESIGNED	A.GATEHOUSE	
APPROVED	S.AYRES	
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PROJECT	SALESYARD RD, YAMANTO SEWERAGE PUMP STATION		
CUSTOMER	IPSWICH WATER		
DRAWING NO.	A005435-C-01	SHEET	01
REV			1



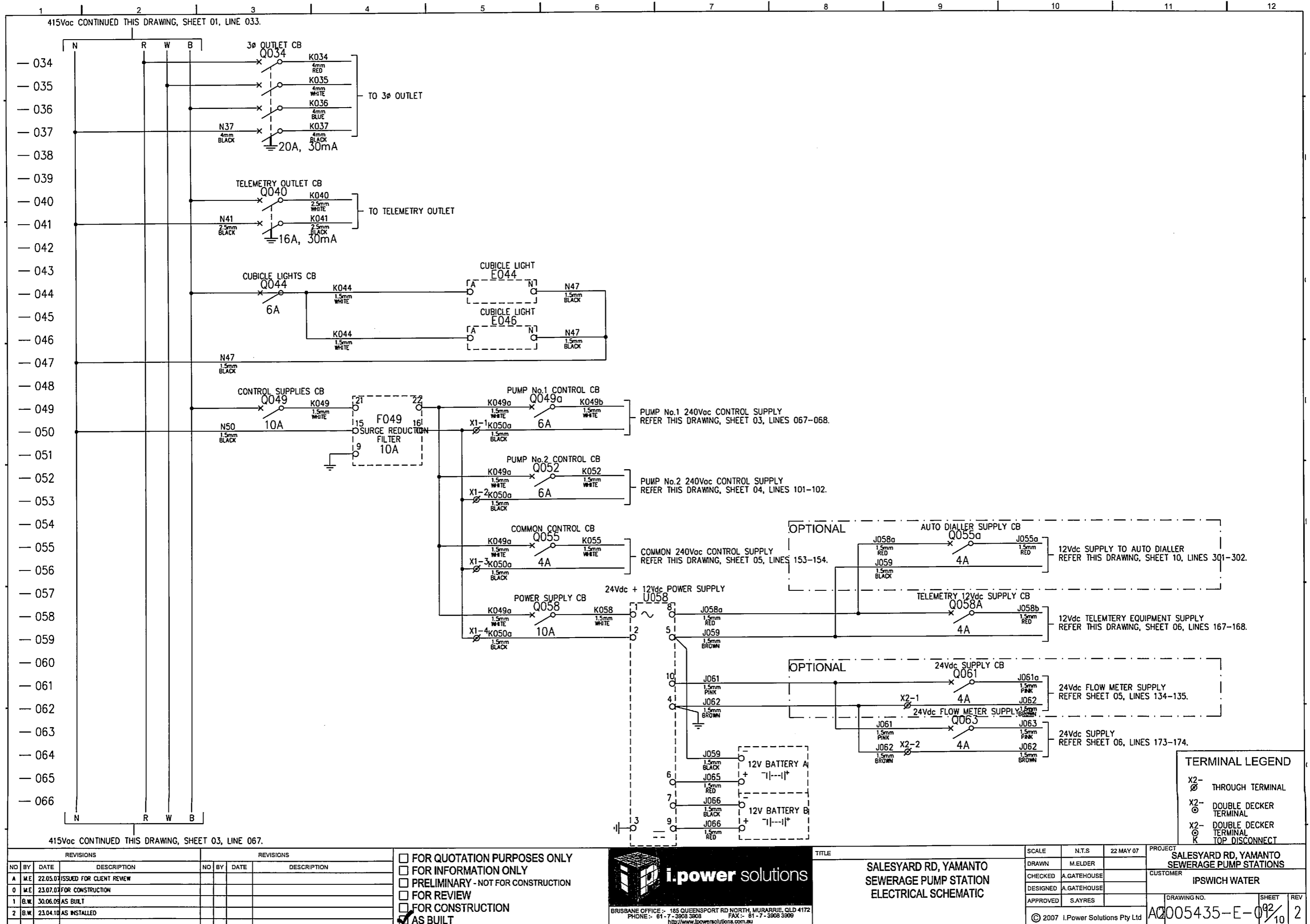
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REVISIONS				REVISIONS				<div>i.power solutions</div> <div>BRISBANE OFFICE :- 185 QUEENSPORT RD NORTH, MURARRIE, QLD 4172 PHONE :- 61 - 7 - 3908 3908 FAX :- 61 - 7 - 3908 3909 http://www.ipowersolutions.com.au</div>				TITLE				SCALE	N.T.S.	22 MAY 07	PROJECT			
NO	BY	DATE	DESCRIPTION	NO	BY	DATE	DESCRIPTION					SALESYARD RD, YAMANTO SEWERAGE PUMP STATION ELECTRICAL SCHEMATIC				DRAWN	M.ELDER		SALESYARD RD, YAMANTO SEWERAGE PUMP STATIONS			
A	M.E.	22.05.07	ISSUED FOR CLIENT REVIEW									CHECKED	A.GATEHOUSE				CUSTOMER					
0	M.E.	23.07.07	FOR CONSTRUCTION									DESIGNED	A.GATEHOUSE				IPSWICH WATER					
1	B.W.	30.06.08	AS BUILT									APPROVED	S.AYRES				DRAWING NO.					
2	B.W.	23.04.10	AS INSTALLED					© 2007 i.Power Solutions Pty Ltd				A2005435-E-01/10				SHEET	REV					
																102						

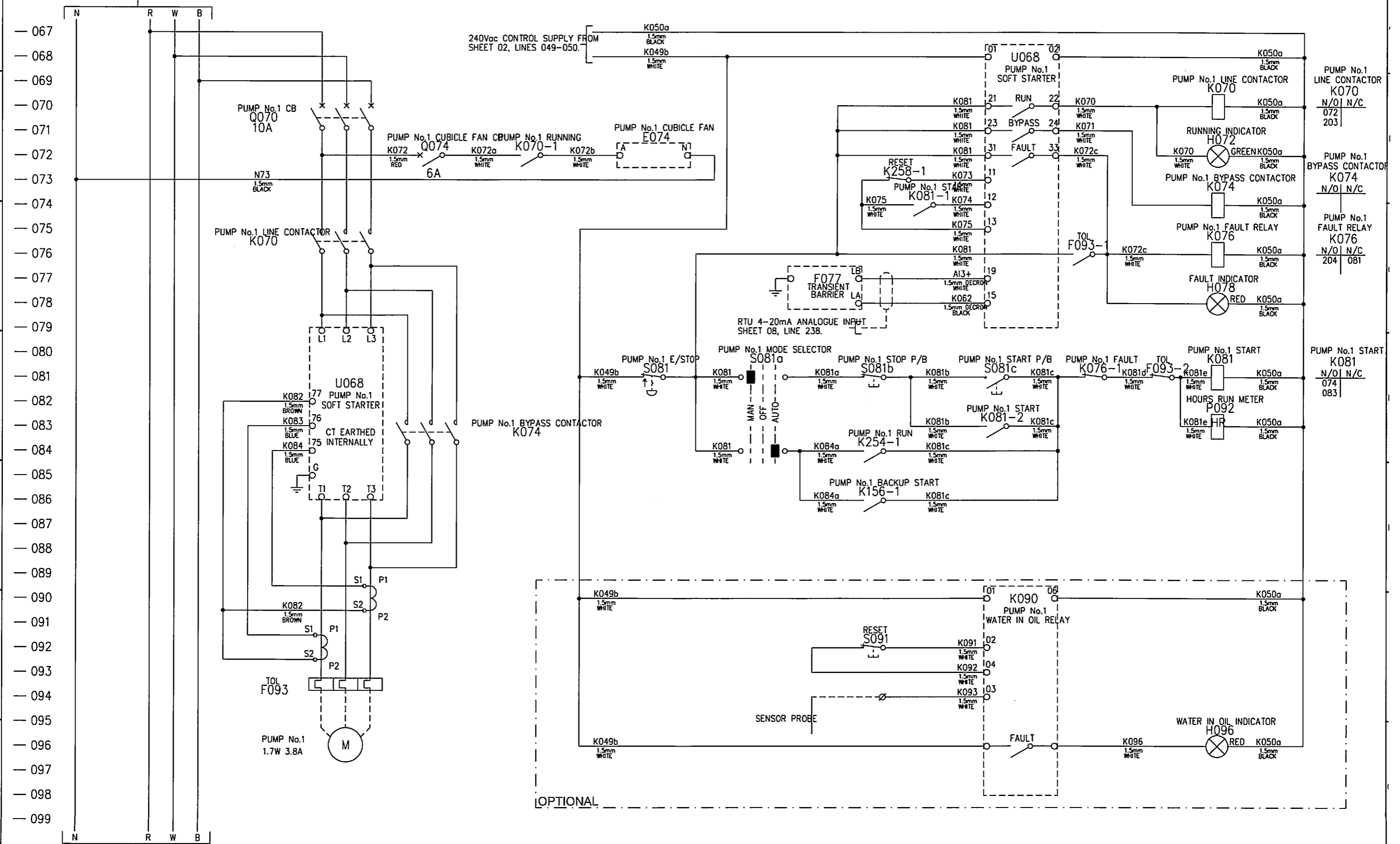
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415Vac CONTINUED THIS DRAWING, SHEET 02, LINE 066.



415Vac CONTINUED THIS DRAWING, SHEET 04, LINE 101.

REVISIONS				REVISIONS			
NO	BY	DATE	DESCRIPTION	NO	BY	DATE	DESCRIPTION
1	ME	22.05.01	ISSUED FOR CLIENT REVIEW				
0	ME	23.07.01	FOR CONSTRUCTION				
1	B.W.	30.06.05	AS BUILT				
2	B.W.	23.04.10	AS INSTALLED				

- ☐ FOR QUOTATION PURPOSES ONLY
☐ FOR INFORMATION ONLY
☐ PRELIMINARY - NOT FOR CONSTRUCTION
☐ FOR REVIEW
☒ FOR CONSTRUCTION
☒ AS BUILT

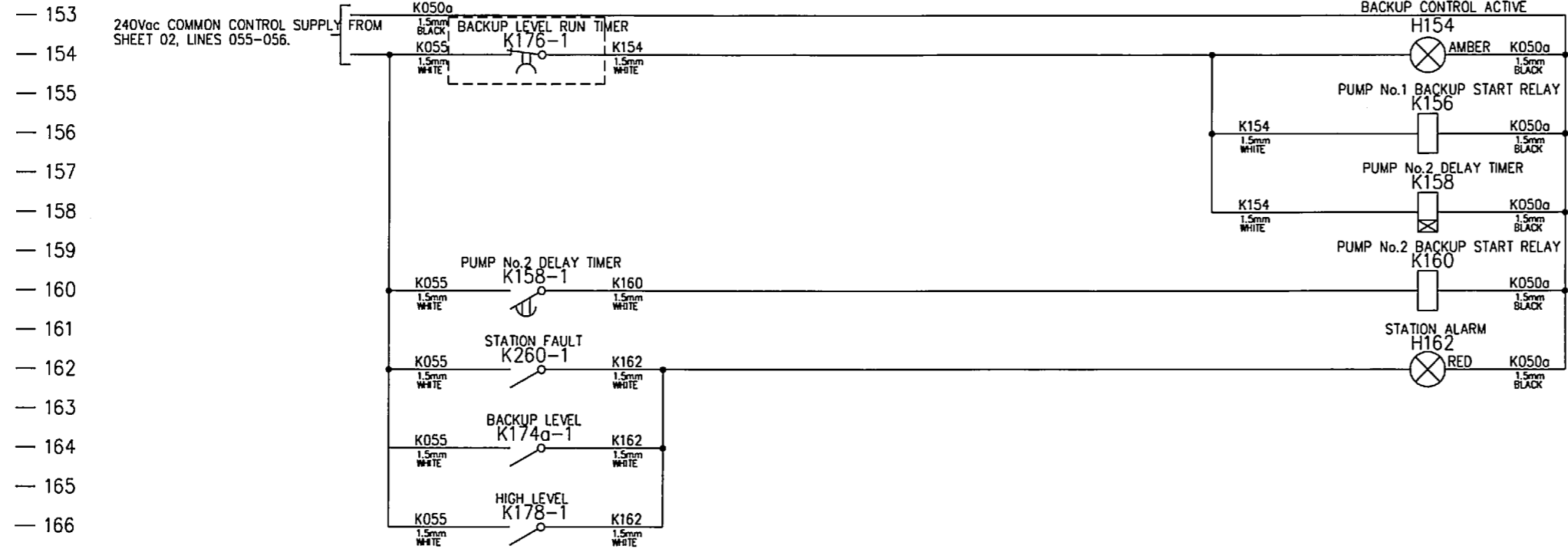
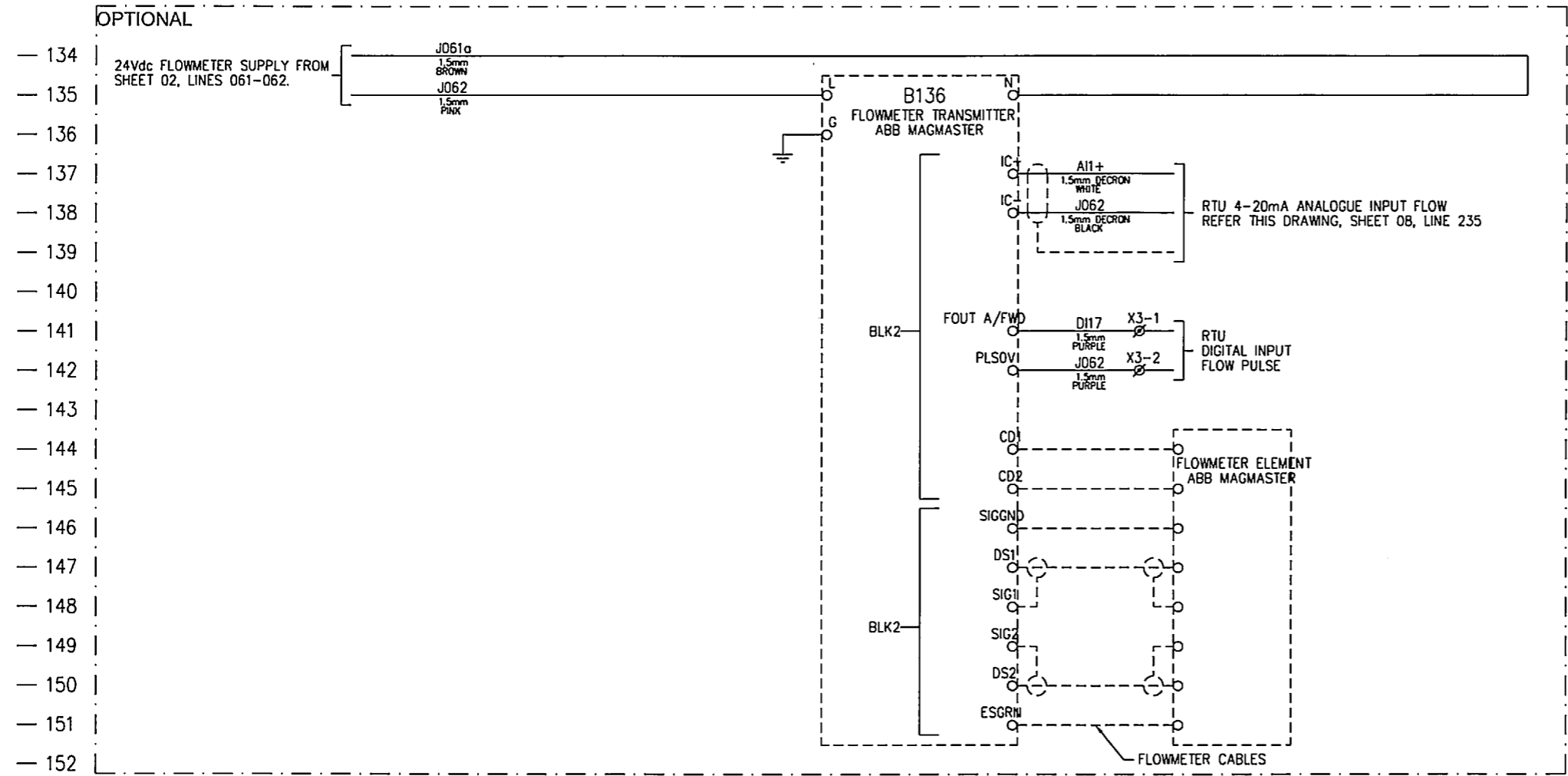


TITLE
 SALESYARD RD, YAMANTO
 SEWERAGE PUMP STATION
 ELECTRICAL SCHEMATIC

SCALE	N.T.S.	22 MAY 07
DRAWN	M.ELDER	
CHECKED	A.GATEHOUSE	
DESIGNED	A.GATEHOUSE	
APPROVED	S.AYRES	

PROJECT	SALESYARD RD, YAMANTO SEWERAGE PUMP STATIONS		
CUSTOMER	IPSWICH WATER		
DRAWING NO.	AC005435-E-01	SHEET	10
REV	2		

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PUMP No.1 BACKUP START K156 N/O N/C 086

PUMP No.2 DELAY TIMER K158 N/O N/C 160 SET AT 30 SECONDS

PUMP No.2 BACKUP START K160 N/O N/C 120

REVISIONS				REVISIONS			
NO	BY	DATE	DESCRIPTION	NO	BY	DATE	DESCRIPTION
A	M.E.	22.05.07	ISSUED FOR CLIENT REVIEW				
B	M.E.	23.07.07	FOR CONSTRUCTION				
1	B.W.	30.06.09	AS BUILT				
2	B.W.	23.04.10	AS INSTALLED				

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- ☐ FOR CONSTRUCTION
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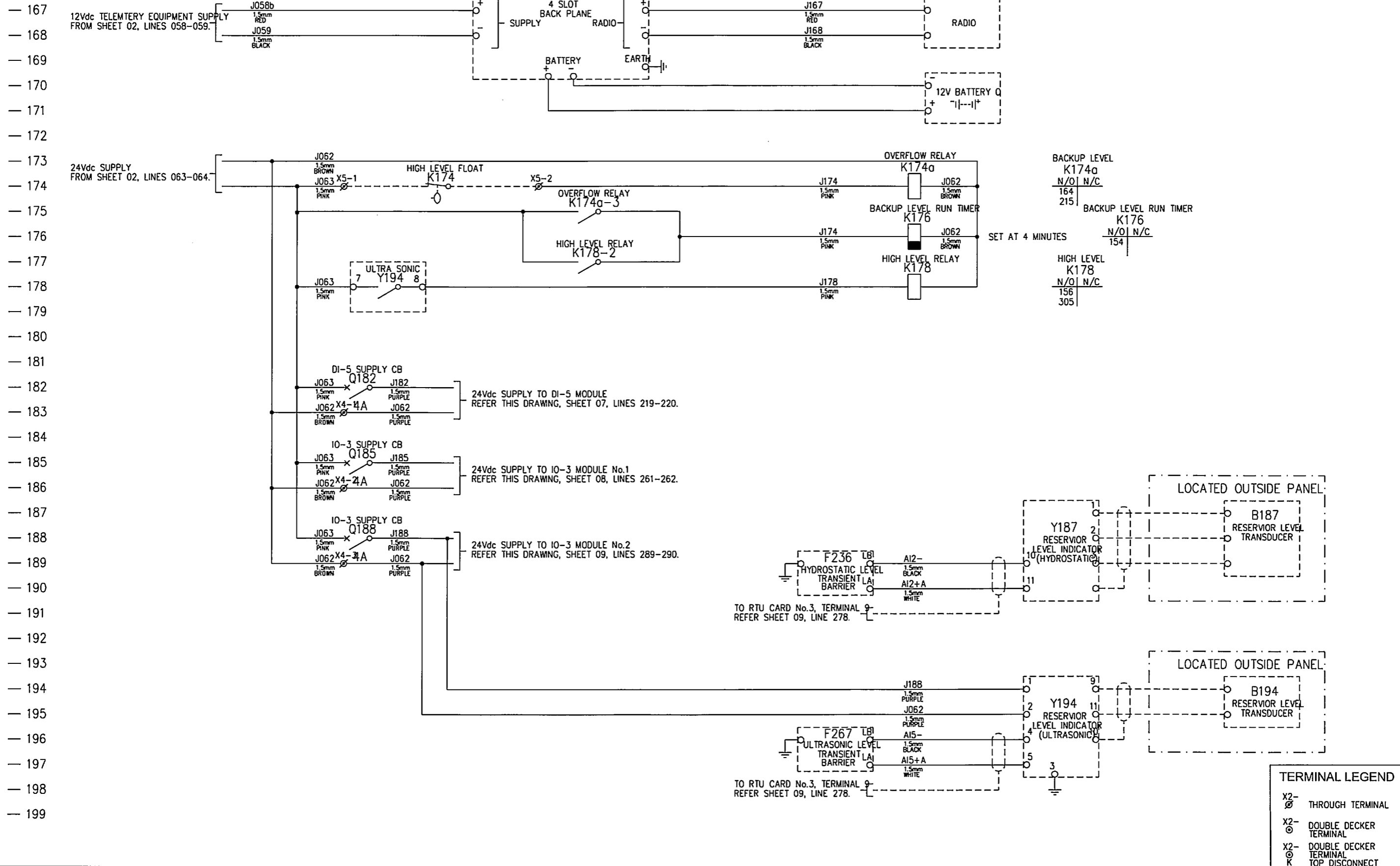
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http://www.ipowersolutions.com.au

TITLE

SALEYARD RD, YAMANTO
SEWERAGE PUMP STATION
ELECTRICAL SCHEMATIC

SCALE	N.T.S.	22 MAY 07	PROJECT	SALEYARD RD, YAMANTO SEWERAGE PUMP STATIONS		
DRAWN	M.ELDER		CUSTOMER	IPSWICH WATER		
CHECKED	A.GATEHOUSE					
DESIGNED	A.GATEHOUSE					
APPROVED	S.JAYRES					
© 2007 I.Power Solutions Pty Ltd			DRAWING NO.	SHEET	REV	
			A2005435-E-01	10	2	

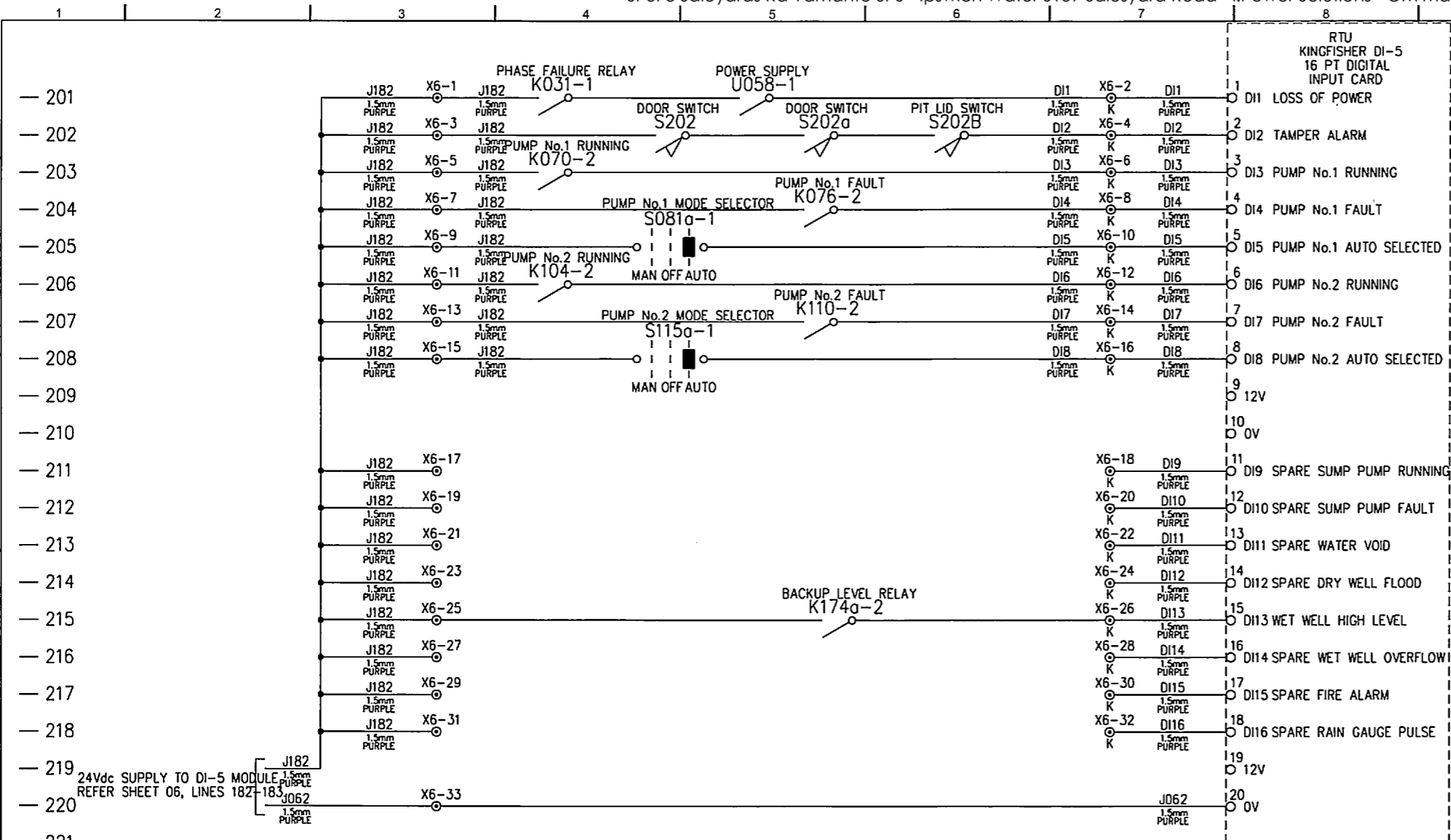


REVISIONS				REVISIONS				TITLE				SCALE				PROJECT			
NO	BY	DATE	DESCRIPTION	NO	BY	DATE	DESCRIPTION	SALEYARD RD, YAMANTO SEWERAGE PUMP STATION ELECTRICAL SCHEMATIC				DRAWN	M.ELDER	N.T.S.	22 MAY 07	SALEYARD RD, YAMANTO SEWERAGE PUMP STATIONS			
A	M.E.	22.05.07	ISSUED FOR CLIENT REVIEW									CHECKED	A.GATEHOUSE			CUSTOMER			
0	M.E.	23.07.07	FOR CONSTRUCTION									DESIGNED	A.GATEHOUSE			IPSWICH WATER			
1	B.W.	30.06.08	AS BUILT									APPROVED	S.AYRES			DRAWING NO.			
2	B.W.	23.04.10	AS INSTALLED													SHEET			
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24Vdc SUPPLY TO DI-5 MODULE
REFER SHEET 06, LINES 182-183



TERMINAL LEGEND	
X2- ⊗	THROUGH TERMINAL
X2- ⊙	DOUBLE DECKER TERMINAL
X2- ⊙ K	DOUBLE DECKER TERMINAL TOP DISCONNECT

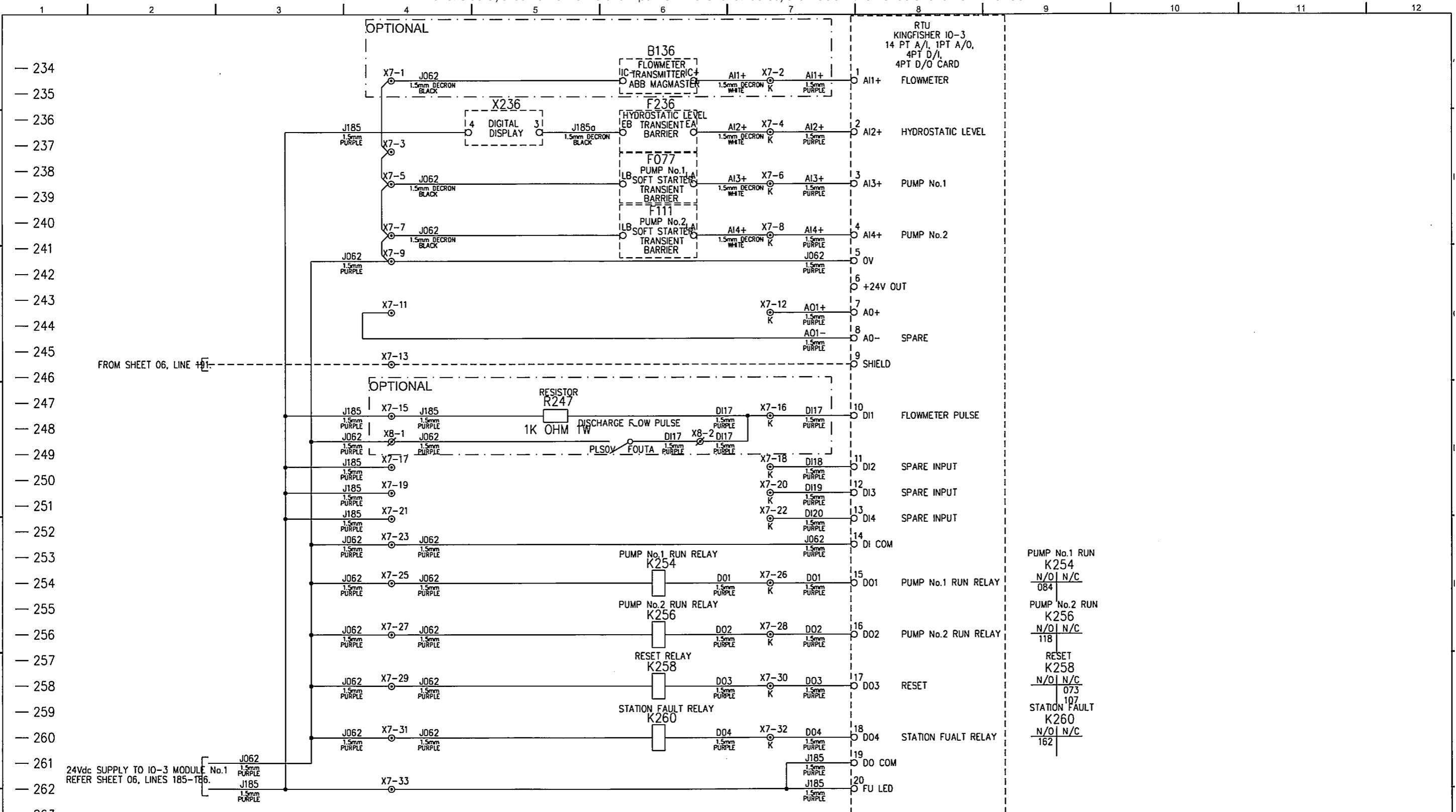
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0	M.E.	23.07.07	FOR CONSTRUCTION				
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2	B.W.	23.04.10	AS INSTALLED				

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☒ AS BUILT



TITLE
SALEYARD RD, YAMANTO
SEWERAGE PUMP STATION
ELECTRICAL SCHEMATIC

SCALE	N.T.S.	22 MAY 07	PROJECT
DRAWN	M.ELDER		SALEYARD RD, YAMANTO SEWERAGE PUMP STATIONS
CHECKED	A.GATEHOUSE		CUSTOMER
DESIGNED	A.GATEHOUSE		IPSWICH WATER
APPROVED	S.AYRES		
© 2007 i.Power Solutions Pty Ltd			DRAWING NO. A2005435-E-097/10
			SHEET REV 2



PUMP No.1 RUN
K254
N/O N/C
084

PUMP No.2 RUN
K256
N/O N/C
118

RESET
K258
N/O N/C
073

STATION FAULT
K260
N/O N/C
107

162

TERMINAL LEGEND

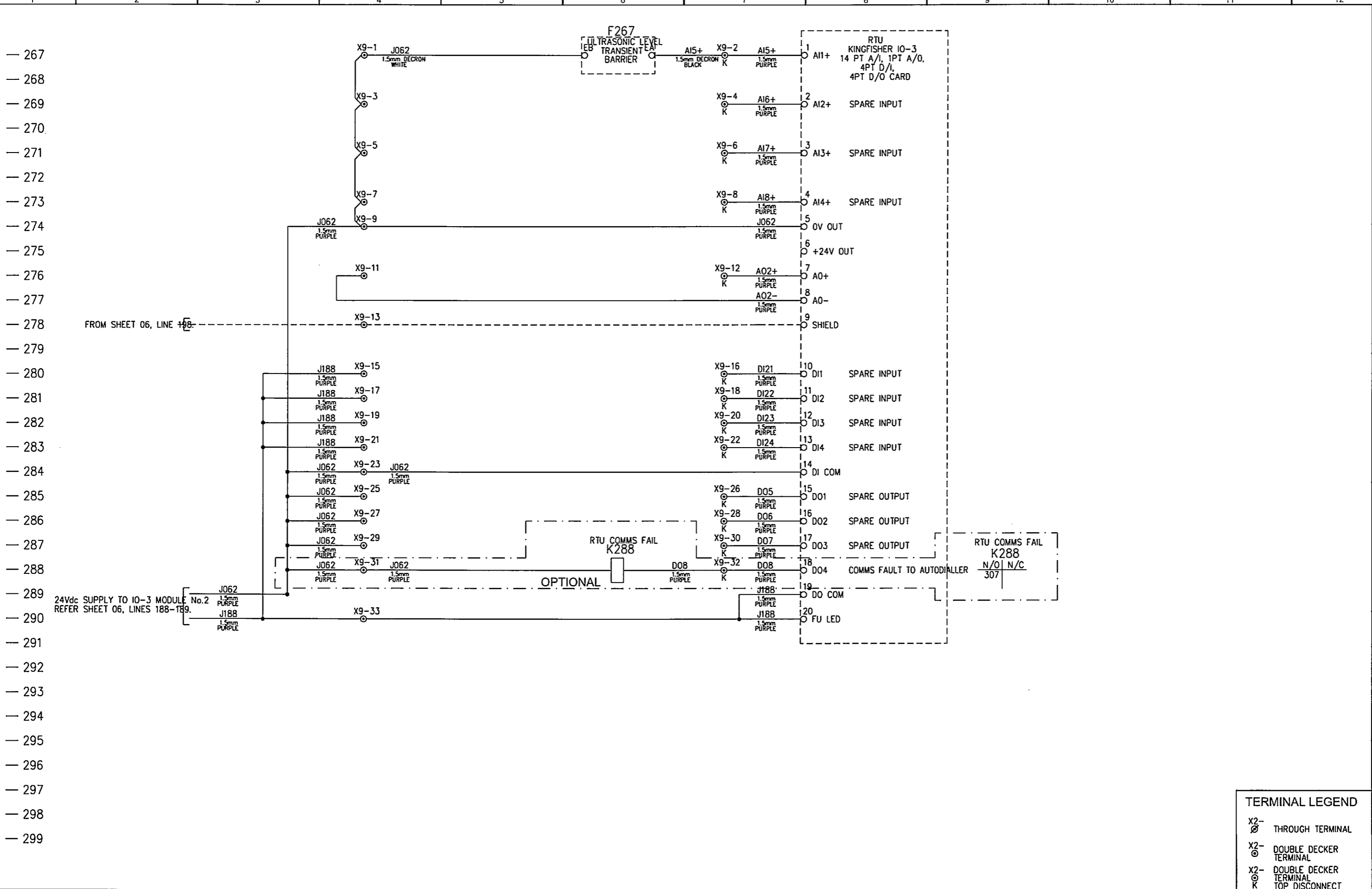
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TERMINAL
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⊙ TOP DISCONNECT

REVISIONS				REVISIONS			
NO	BY	DATE	DESCRIPTION	NO	BY	DATE	DESCRIPTION
A	M.E.	22.05.07	ISSUED FOR CLIENT REVIEW				
0	M.E.	23.07.07	FOR CONSTRUCTION				
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- ☐ FOR CONSTRUCTION
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TITLE				PROJECT			
SALEYARD RD, YAMANTO SEWERAGE PUMP STATION ELECTRICAL SCHEMATIC				SALEYARD RD, YAMANTO SEWERAGE PUMP STATIONS			
SCALE				CUSTOMER			
DRAWN				IPSWICH WATER			
CHECKED				DRAWING NO.			
DESIGNED				SHEET			
APPROVED				REV			
© 2007 i.Power Solutions Pty Ltd				A2005435-E-01/10			

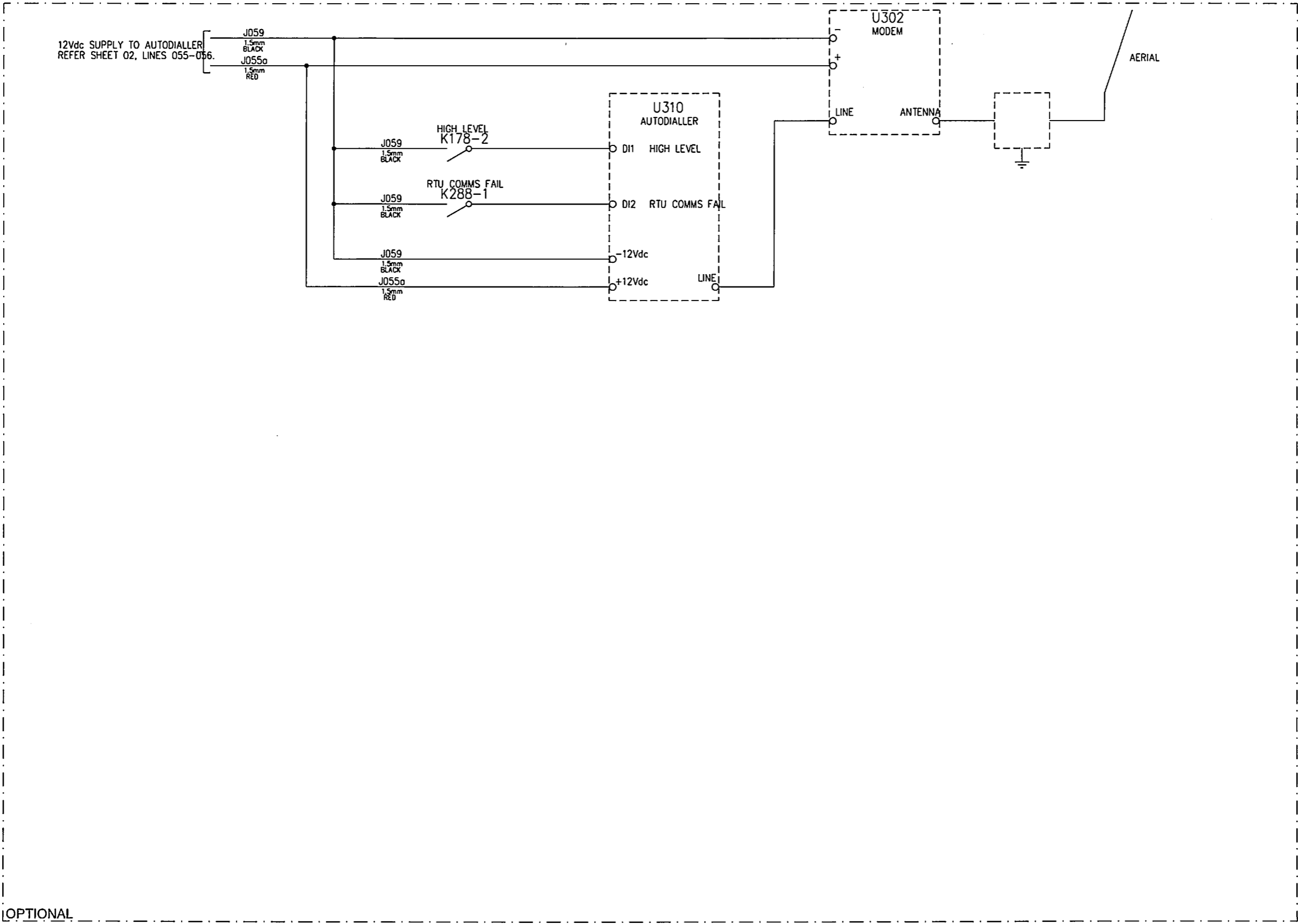


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2	B.W.	23.04.10	AS INSTALLED																												

SCALE	N.T.S.	22 MAY 07	PROJECT	SALEYARD RD, YAMANTO SEWERAGE PUMP STATIONS			
DRAWN	M.ELDER		CUSTOMER	IPSWICH WATER			
CHECKED	A.GATEHOUSE						
DESIGNED	A.GATEHOUSE						
APPROVED	S.AYRES						
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DRAWING NO.				SHEET				REV			
A2005435-E-01				10				2			

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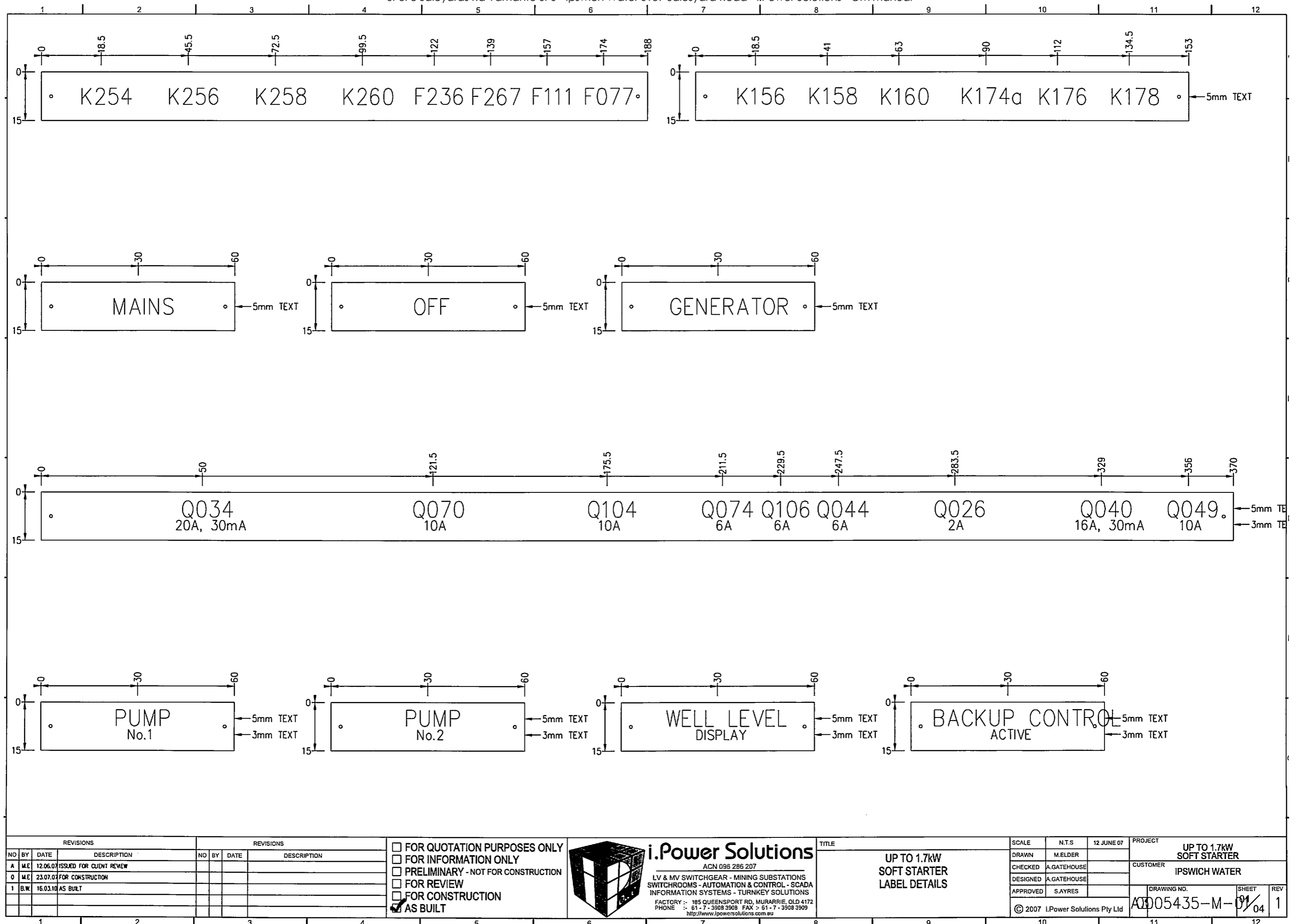


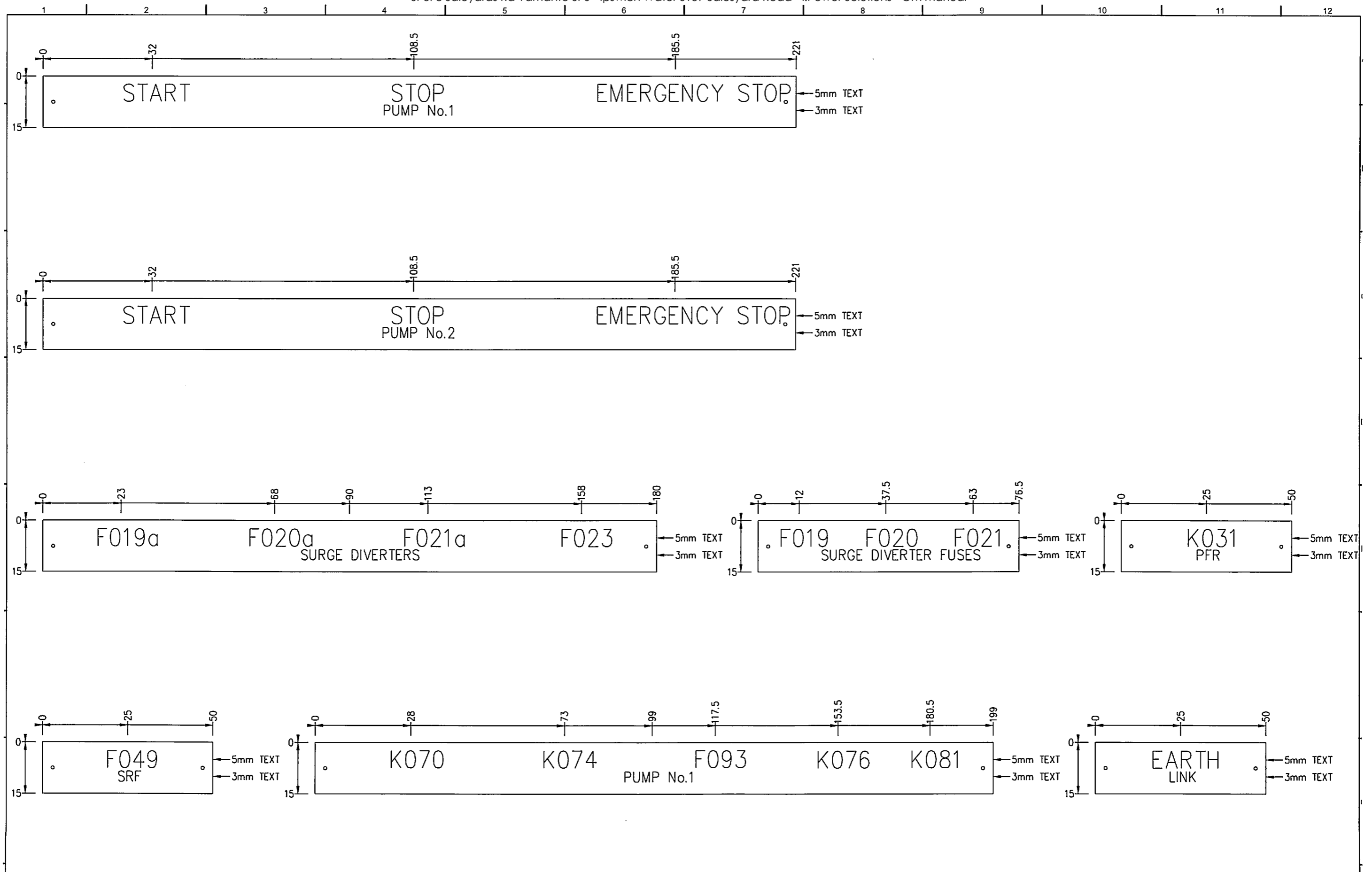
TERMINAL LEGEND	
X2- Ø	THROUGH TERMINAL
X2- ⊙	DOUBLE DECKER TERMINAL
X2- ⊙ K	DOUBLE DECKER TERMINAL TOP DISCONNECT


REVISIONS				REVISIONS				FOR QUOTATION PURPOSES ONLY		FOR INFORMATION ONLY		PRELIMINARY - NOT FOR CONSTRUCTION		FOR REVIEW		FOR CONSTRUCTION		AS BUILT	
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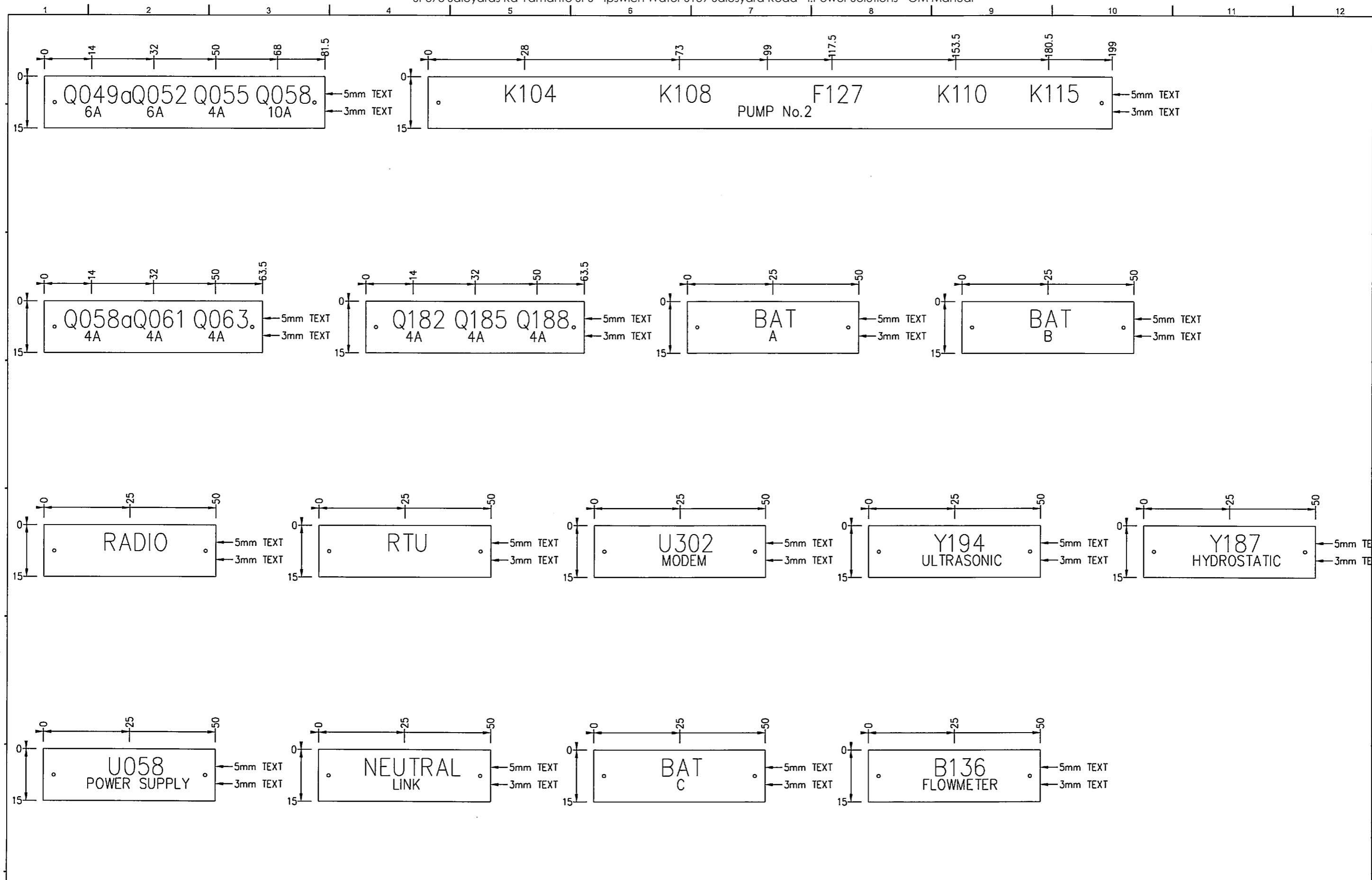
BRISBANE OFFICE:- 185 QUEENSPORT RD NORTH, MURARRIE, QLD 4172
PHONE:- 61-7-3908 3903 FAX:- 61-7-3908 3908
http://www.ipowersolutions.com.au

TITLE		SCALE	N.T.S.	22 MAY 07	PROJECT
SALESYARD RD, YAMANTO SEWERAGE PUMP STATION ELECTRICAL SCHEMATIC					SALESYARD RD, YAMANTO SEWERAGE PUMP STATIONS
		DRAWN	M.ELDER		CUSTOMER
		CHECKED	A.GATEHOUSE		IPSWICH WATER
		DESIGNED	A.GATEHOUSE		
		APPROVED	S.AYRES		
		© 2007 i.Power Solutions Pty Ltd			DRAWING NO.
					AQ005435-E-01/10
					SHEET
					2
					REV





REVISIONS				REVISIONS				<div><input type="checkbox"/> FOR QUOTATION PURPOSES ONLY <input type="checkbox"/> FOR INFORMATION ONLY <input type="checkbox"/> PRELIMINARY - NOT FOR CONSTRUCTION <input type="checkbox"/> FOR REVIEW <input type="checkbox"/> FOR CONSTRUCTION <input checked="" type="checkbox"/> AS BUILT</div>		<div>i.Power Solutions ACN 096 286 207 LV & MV SWITCHGEAR - MINING SUBSTATIONS SWITCHROOMS - AUTOMATION & CONTROL - SCADA INFORMATION SYSTEMS - TURNKEY SOLUTIONS FACTORY :- 185 QUEENSPORT RD, MURARRIE, QLD 4172 PHONE :- 61 - 7 - 3908 3908 FAX :- 61 - 7 - 3908 3909 http://www.ipowersolutions.com.au</div>	TITLE	SCALE	N.T.S	12 JUNE 07	PROJECT																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
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1	B.W.	16.03.10	AS BUILT								

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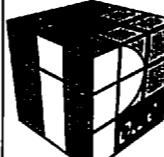
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☐ FOR CONSTRUCTION

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ACN 096 286 207

LV & MV SWITCHGEAR - MINING SUBSTATIONS
SWITCHROOMS - AUTOMATION & CONTROL - SCADA
INFORMATION SYSTEMS - TURNKEY SOLUTIONS

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<http://www.ipowersolutions.com.au>

**UP TO 1.7kW
SOFT STARTER
LABEL DETAILS**

SCALE: N.T.S.

12 JUNE 07

PROJECT: **UP TO 1.7kW
SOFT STARTER**

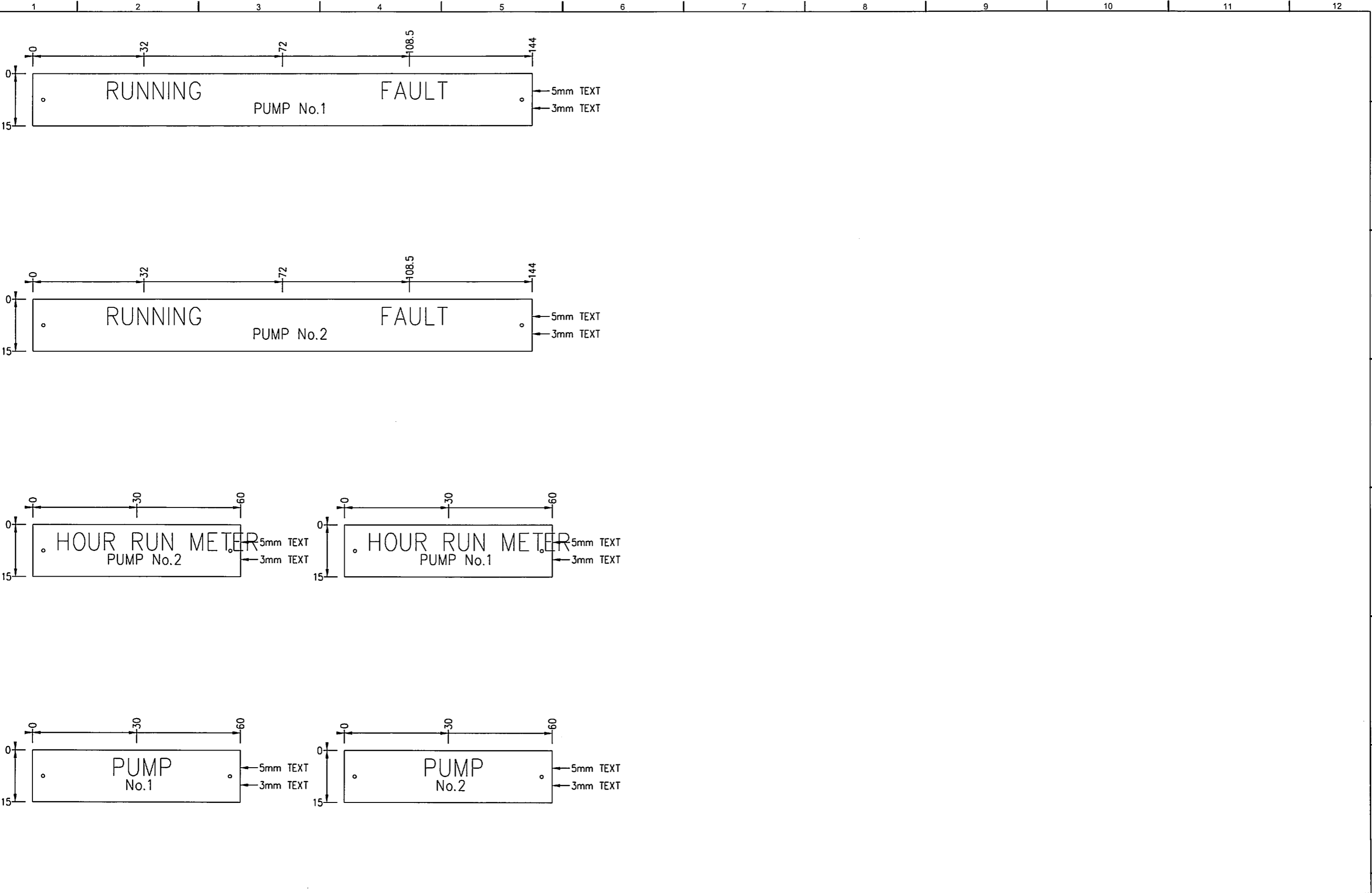
CUSTOMER: **IPSWICH WATER**

DRAWING NO. **A0005435-M-01**

SHEET **01** OF **04**

REV **1**

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REVISIONS				REVISIONS							
NO	BY	DATE	DESCRIPTION	NO	BY	DATE	DESCRIPTION				
A	M.E	12.06.07	ISSUED FOR CLIENT REVIEW								
0	M.E	23.07.07	FOR CONSTRUCTION								
1	B.W	16.03.10	AS BUILT								

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i.Power Solutions
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LV & MV SWITCHGEAR - MINING SUBSTATIONS
SWITCHROOMS - AUTOMATION & CONTROL - SCADA
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FACTORY :- 185 QUEENSPORT RD, MURARRIE, QLD 4172
PHONE :- 61-7-3908 3908 FAX :- 61-7-3908 3909
http://www.ipowersolutions.com.au

TITLE	SCALE	N.T.S	12 JUNE 07	PROJECT
UP TO 1.7kW SOFT STARTER LABEL DETAILS	DRAWN	M.ELDER		UP TO 1.7kW SOFT STARTER
	CHECKED	A.GATEHOUSE		CUSTOMER
	DESIGNED	A.GATEHOUSE		IPSWICH WATER
	APPROVED	S.AYRES		
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				0005435-M-01
				SHEET
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2.

Testing

[illegible]

 i.Power Solutions Electrical Engineers LV & MV Switchgear - Mining Substations Switchgear - Automation & Control - SCADA Information Systems - Site Services - Turnkey Solutions		INSPECTION AND TEST PLAN summary						FAT	
		IPOWER SOLUTIONS PTY LTD QUALITY ASSURANCE DOCUMENT						REVISION:	0.1
CONTRACTOR		IPOWER SOLUTIONS PTY LTD						JOB No.	0005435
ITP DESCRIPTION		Salesyard Rd Pump Station						CONTRACT:	WATR-021368
COMPONENT								PURCHASE ORDER:	
ITEM/TAG No.		Suggested ITP Type Form Number Range:		Manufacturing				CLIENT	Ipswich Water
		F0000		F0099				Inspection Activity Classification: E = Examine S = Surveillance W = Witness Point V = Verification H = Hold I = Inspection D = Document Approval	
FORM NO. OR FORM NAME	PRIMARY INSPECTION AND TESTS FOR EACH OPERATION IN SEQUENCE OF MANUFACTURE/ INSTALLATION OR COMMISSIONING	APPLICABLE STANDARDS	'ACCEPTANCE CRITERIA' QUOTE REF DOCUMENTS & INSPECTION RECORDS	(Checksheet Reference)	IPOWER	VENDOR / SUBCONT	PRINCIPAL	INSTRUCTIONS AND REMARKS	

SHEETMETAL INSPECTION

I347

Job No 5435 Contract / PO Number _____
 Job Name IPSWICH WATER
 ITP Description S/METAL

Component SEWERAGE PUMP PANEL Item / Tag Number / Panel No _____

Drawing Reference 0005435-C-01

Drawing Reference _____

Technical Ref _____

Technical Ref _____

This inspection sheet is to be completed for all Custom switchboards and boiler work manufactured by i Power Solutions.
 The inspecting officer will be one of the following and may be a combination of all:-

Department Leading Hand

Design Engineer

Appropriate Department Manager

It is their responsibility to sign the form on completion of satisfactory inspection & attach to the switchgear in a protective sleeve.
 The switchboard is to be fully assembled before any inspection will proceed.

SWITCHBOARD CONSTRUCTION

No	TO BE CHECKED PRIOR TO PAINTING	Inspection Result Pass (P), Fail (F), Not Applicable (N/A)
1	Overall finish, dimensions and gauge	P
2	Equipment mounting correct & supports sufficient	P
3	Corners fully welded	P
4	Cable entries correct	P
5	Gland plates correct, fitted and number stamped	P
6	All equipment cutouts correct	N/A
7	All studs for gear trays fitted	P
8	Panel wiring supports fitted and inter-tier wiring passages cut	P
9	Door hinge holes correct	P
10	Door latch cutouts correct	P
11	Busbar supports fitted and correct	P
12	All petitions fitted and straight	N/A
13	Earth bar mounts welded in place	P
14	Metal ducting and covers fitted	N/A
15	Lifting points fitted	N/A
16	External weld ground off	P
17	Fixing holes and/or brackets fitted	P
18	Mounting holes for equipment drilled and tapped correct size	P
19	IP rating in accordance with drawing	P
20	Quantity correct	P
21	OTHER CHECKS CARRIED OUT:	P
22		
23		
24		
25		

ESCUTCHEONS

No	TO BE CHECKED PRIOR TO PAINTING	Inspection Result Pass (P), Fail (F), Not Applicable (N/A)
1	Overall finish, dimensions, gauge and number stamped	P
2	Cutouts correct and ground off	P
3	Hinging hardware correct	P
4	Latching hardware correct	P
5	Equipment wiring supports fitted	N/A
6	Earth stud fitted	N/A
7	Correct fit in cubicle	N/A
8	Quantity correct	P
9	OTHER CHECKS CARRIED OUT:	P
10		
11	<u>X TYPE PANEL ESCUTCHEON</u>	P
12		
13		

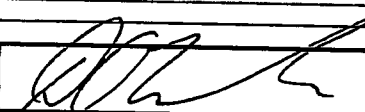
DOORS

No	TO BE CHECKED PRIOR TO PAINTING	Inspection Result Pass (P), Fail (F),
1	Overall finish, dimensions, gauge and number stamped	P
2	Equipment cutouts correct	P
3	Viewing windows made and fitted	N/A
4	Door restraints fitted	P
5	Wiring supports fitted	P
6	Earth stud fitted	P
7	Hinging hardware correct	N/A
8	Latching hardware correct	P
9	IP rating in accordance with drawing	P
10	Quantity correct	P
	OTHER CHECKS CARRIED OUT:	P
11		
12		
13		
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15		

GEAR TRAYS, etc

No	TO BE CHECKED PRIOR TO PAINTING	Inspection Result Pass (P), Fail (F),
1	Overall finish, dimensions, gauge and number stamped	P
2	Mounting holes correct	P
3	Correct fit in cubicle	P
4	Quantity correct	P
	OTHER CHECKS CARRIED OUT:	P
5		
6		
7		
8		
9		

Checked by



Date:

6-8-07

BOILER WORK

No	TO BE CHECKED PRIOR TO PAINTING / GALVANISING	Inspection Results Pass (P), Fail (F)
1	Overall Finish, Dimensions and Gauge / Section	
2	Low Hydrogen Consumables used in all welding of 250 - 350 grade Steel	
3	Lifting Lugs Beveled and welded correct	
4	Rust & Mill Scale removed prior to Welding	
5	Fillet, vertical up, Butt & root welds all display deep penetration, correct size and finish	
6	All welding free of porosity, contamination, splatter and defects	
7	Oil containment bund fully welded and drain valve socket installed	
8	Structure contains drains and vents adequate for galvanising	
9	Structure fully welded to prevent ingress of picking fluid	
10	All mounting holes correct	
11	Earth bar mounting blocks correct	
12	Earth Bar blocks have greased bolts and washers installed prior to galvanising	
13	All Webforge correct	
14	Quantity Correct	
	OTHER CHECKS CARRIED OUT:	
15		
16		
17		
18		

Checked By

Date

Inspecting Officer Comments & Notes:

Inspected By:

Witnessed By: (Client if applicable)

(Name)

(Name)

(Sign)

(Sign)

Date

Date

NOTE: Ensure relevant items or comments are recorded on the Hit List (102)

i361

Drawing Reference	
Drawing Reference	
Technical Ref	
Technical Ref	

Irregularities are to be added to the i102 Hit List attached to each job. No switchboard having incomplete i102 Hit List items is to be released from the factory unless concessional acceptance is obtained from the customer.

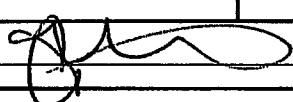
Checked by

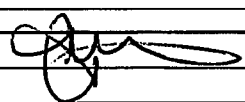
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Checked by

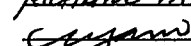
Date:

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No	Inspection Description	Comments	Completed by	Verified by
1	All power cable is correct current rating		CM	RY
2	All power cable is free of sharp bends (minimum bend radius is 6 x diameter of cable)		CM	RY
3	All power cable is phase coloured or marked with band of coloured heatshrink		CM	RY
4	All power and control cable looms are neat		CM	RY
5	All terminations are tight		CM	RY
6	All control wiring is the correct colour and size		CM	RY
7	All terminal bridge links are fitted to terminal strips		CM	RY
8	Control fuse is feed by S.D.I. cable		CM	RY
9	All wire numbers are fitted & Correct		CM	RY
10	All terminals are numbered		CM	RY
11	Door looms are secured at Door & Cell		CM	RY
12	Gland plates are earthed to suit cable size. (Refer to minimum earthing conductor chart)		CM	RY
13	All equipment is correctly earthed		CM	RY
14	All wiring access holes are bushed.		CM	RY
15	Equipment power supplies are correctly wired		CM	RY
16	Test resistors are set to correct OHMs		CM	RY
Checked by 		Date: 20/1/07		

GENERAL ITEMS				
No	Inspection Description	Comments	Completed by	Verified by
1	Switchboard is clean and free of loose objects		CM	RY
2	Paint colour as per general assembly		CM	RY
	Paint thickness is as per Order Acknowledgement		CM	RY
3	Paint finish is an acceptable quality		CM	RY
4	Rubber blanking grommets are fitted to all unused holes		CM	RY
5	Door rubber is correctly secured		CM	RY
6	Correct material is used for gland plates - brass, aluminium, galvanised steel		CM	RY
7	All hinges are tight		CM	RY
8	All cell doors close easily & dust proof		CM	RY
9	All cable zone doors close easily & dust proof		CM	RY
10	Covers are fitted to the ends of the switchboard		CM	RY
11	All cell latches are correct type and move freely		CM	RY
12	Items To Be Sent List is complete, check with Project Officer.		CM	RY
13	Wiring supports are suitable i.e. door and panel		CM	RY
14	All doors that requiring earthing are fitted with earth studs and terminated correctly.		CM	RY
15	Earth studs are fitted to door that require this and are earthed		CM	RY
16	Door escutcheons and cutouts are correct		CM	RY
17	Door stiffeners are fitted where required		CM	RY
18	Overall dimensions are correct		CM	RY
19	All bar work exposed in cells, soft starters etc that is not isolated with a door interlock is shrouded with a PVC cover with a "Danger" label		10/12	
20	All custom bus bars are sufficiently supported		N/A	RY
21	MEN link fitted and marked as per drawing (Main Board only)		N/A	RY
22	Labels fitted on covers with fuses located behind them		N/A	RY
23	Correct Installation of CT's, special note for E/L Toroids.		CM	RY
24	Circuit Schedules are fitted to D.B chassis		N/A	RY
	Brass Nameplates fitted & Correct.		CM	RY
Checked by 		Date: 20/1/07		

Testing Officer Comments & Notes:

Tested By: (IPS Testing Officer)		Witnessed By: (Client if applicable)	
(Name)	RICHARD YAM	(Name)	
(Sign)		(Sign)	
Date	03/06/07	Date	1/1

NOTE: Ensure relevant items or comments are recorded on the Hit List (1102)

1376

CIRCUIT TESTS:

Tests to be carried out in respect to clause 8.3.1 AS/NZS 3439.1 - 2002

The total operation, control and indication of the auxiliary circuits is satisfactory as per the following Drawings:-

TEST EQUIPMENT

Testing Officer Comments & Notes:

NOTE: Ensure relevant items or comments are recorded on the Hit List (1102)

INTERNAL USE ONLY**PRE DESPATCH INSPECTION**

i378

Job No 0005435 Contract / PO Number WATR-021368 //

Job Name Salesyard Rd Pump Station

ITP Description Pump Control Panel

Component _____ Item / Tag Number / Panel No _____

Drawing Reference _____

Drawing Reference _____

Technical Ref _____

Technical Ref _____

The JOB OWNER is to drive this document to avoid despatch hold ups. All sections on this sheet must be completed and checked off prior to product being despatched. In the event some hit list 1102 items are still outstanding but have been catergosed for c

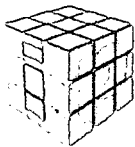
Role / Name	Pre-Despatch Inspection	✓ Checked	Date
Testing Officer			
Name <u>RICHARD YAM</u>	All items on the hits list 1102 are completed unless catergosed for shipment as 1st		
Sign <u>[Signature]</u>	All testing is complete and product is fully operational & tagged inspected		
	All Drawings appropriately Marked up	✓	
	Test Reports & ITP's are complete and entire production package returned to L/Hand		
Programming Engineer			
Name _____	System, I/O and functional tests completed as per the project test sheets		
Sign _____	Test reports forwarded to the Leading Hand		
Projects			
Name _____	IF NOT APPLICABLE, JOB OWNER TO MARK N/A IN CHECK COLUMN.		
Sign _____	ONLY TO BE APPROVED BY PROJECTS IF A DEDICATED PROJECTS JOB.		
	Finished product was inspected by me ans is as per clients requirements and meets specification standards and engineering requirements.		
	Test Reports, Hit Lists, Master Drawings and Schematics reviewed and satisfactory.		
	Delivery arrangements confirmed with client e.g Cranage etc.		
Leading Hands			
Name <u>CHARLIE MCKENZIE</u>	Verify the production Package is returned on completion of any or all of the above.	✓	4/8/07
Sign <u>[Signature]</u>	Ensure all documentation is completed appropriately.	✓	
	All hit lists 1102 items resolved and any Fault/Problem reports 1101 have been actioned re fix	✓	
	Pass all documentation including the full set of test reports to the Job Owner.		
Job Owner			
Name <u>[Signature]</u>	NOT APPLICABLE IF A DEDICATED PROJECTS JOB, PROJECTS TO COMPLETE ABOVE.		
Sign <u>[Signature]</u>	MARK BOX WITH N/A		
	Received the complete production package from the Leading Hand	✓	
	Reviewed the Production Package for completeness and accuracy.	✓	
	Documentation to go out with product compiled and issued to despatch e.g. Test reports etc.	✓	
	1118 Delivery Docket with full despatch details has been issued to despatch.	N/A	PROJECT
Workshop Manager			
Name <u>Martin Nye</u>	Sight Switchgear product before packaging / despatch occurs	✓	4/9/07
Sign <u>[Signature]</u>	Verify with Job Owner the complete production package including test reports was returned	✓	
	Option to review Production Package for completeness	✓	
Manufacturing Systems Manager			
Name _____	Option to sight Switchgear before despatch		
Sign _____	Option to view all Production Package documentation		
	Option to view Test Reports for completeness.		

Product is authorised for despatch without all of the above checks being complete.

Name _____ Signature _____ Date _____

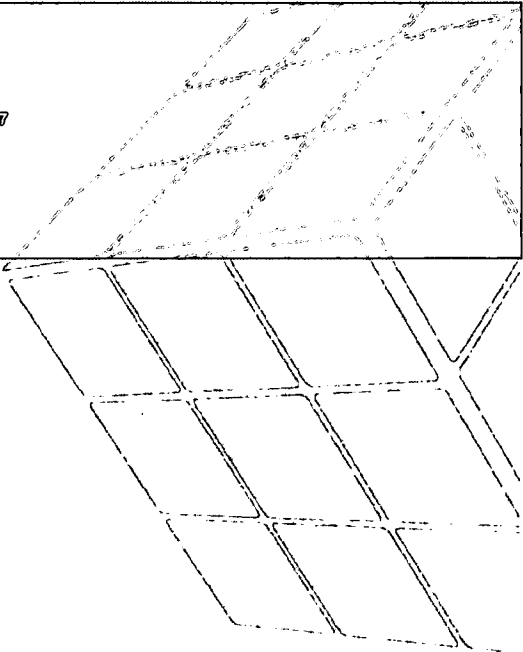
3.

Operation Specification



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SALEYARD RD SPS OPERATORS AND MAINTENANCE MANUAL

Client: Ipswich Water
Project: Salesyard Road SPS Control System Design

Document No:	0005435-DU-001
Revision:	B

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DEFINITIONS

Term	Description
IW	Ipswich Water – owner/operator of system
iPS	i.Power Solutions – Principal Contractor
BW	Brisbane Water – Provider of the Standard Citect Include
BPS	Booster Pump Station
CMF	Central Monitoring Facility
GUI	Graphical User Interface
HMI	Human Machine Interface
I/O	Input/Output
IDC	Internet Display Client
RMF	Remote Monitoring Facility
RTU	Remote Terminal Unit
SCADA	Supervisory Control And Data Acquisition
WTP	Water Treatment Plant
WWTP	Waste Water Treatment Plant
VSD	Variable speed drive
SS	Soft Starter

1 PROJECT SCOPE

1.1 Introduction

The Citect Operators Manual outlines the procedures for operating and interfacing the upgraded Citect system and Switchboard at Salesyard Road SPS.

All required details for managing the day to day operations of the system are included herein such that an operator is able to use the system with minimal input from external sources.

1.2 Project Objectives

This Project consists of S139 being controlled and monitored by a Kingfisher RTU/Citect SCADA system.

2 SYSTEM

2.1 System Topology

Ipswich Water has an existing SCADA system in place. The controls and monitoring equipment for S139 shall be incorporated into the existing SCADA system. The Pump control and level monitoring of S139 is carried out by the Telemetry SCADA system and a Kingfisher RTU is utilised controlling the pump runs and level within the well.

3 CITECT OPERATOR MANUAL

3.1 Introduction

This Operator Manual should be used to change the pump run set points, high level, low level, and overflow set points, to get the site information, to access the site I/O Configuration as well as to monitor the trends. The purpose of this manual is to outline the procedures required to perform the tasks mentioned above.

3.2 Start-up

On Start-up, Open the Navigation Menu in Citect, Sewerage Pump Stations, Bundamba and select SP77 Salesyard Rd as shown in the Figure 1 below.

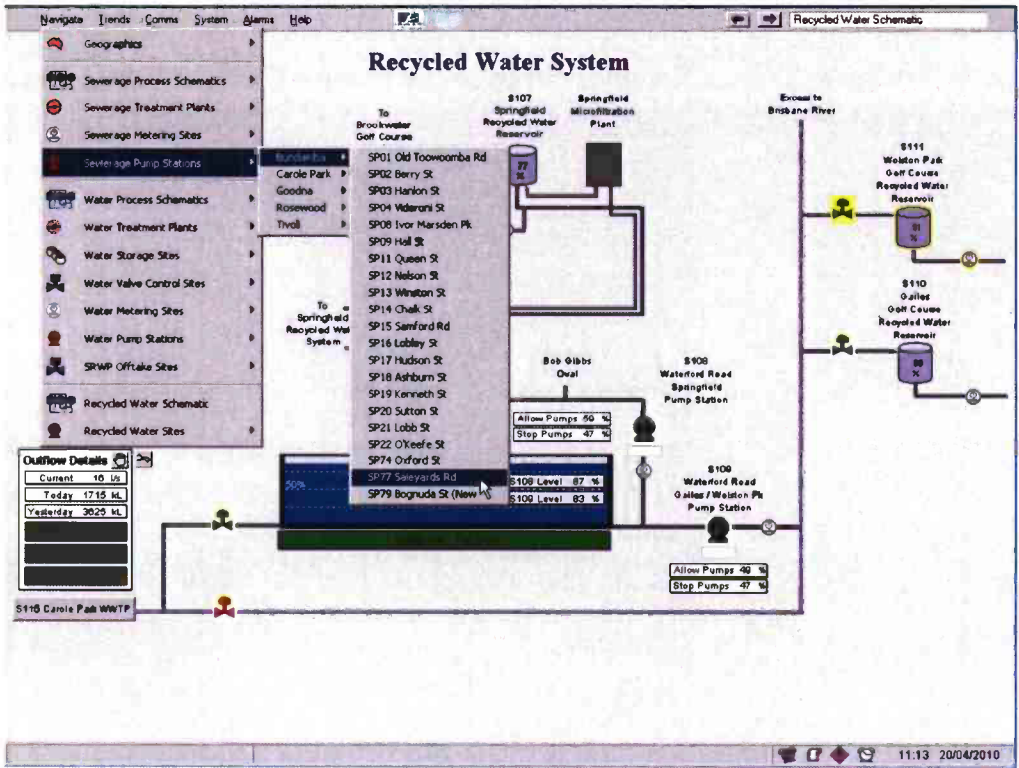


Figure 1 – Citect Navigation to Salesyard Rd SPS

This will open up an additional window as shown in Figure 2 below.

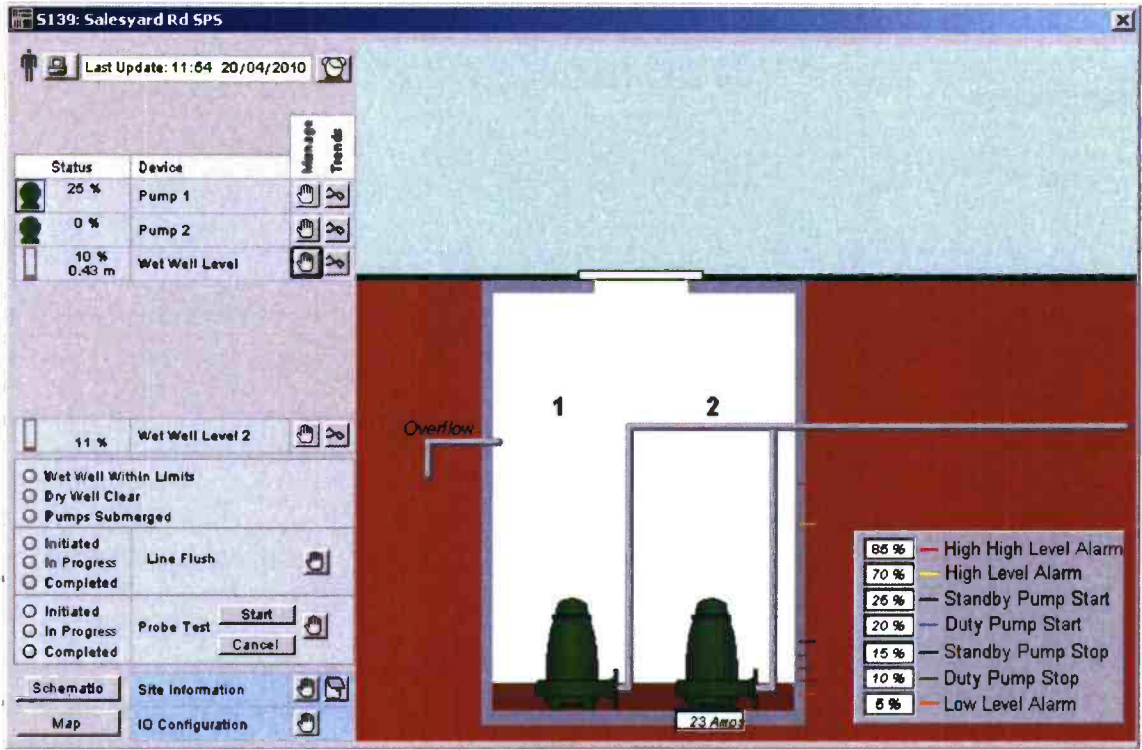


Figure 2 – Salesyard Rd SPS Page

3.3 MANAGEMENT

3.3.1 Pump Management

To see or edit the pump statistics and controls click on 'Manage' button (Hand symbol) as shown in the Figure 3 below.

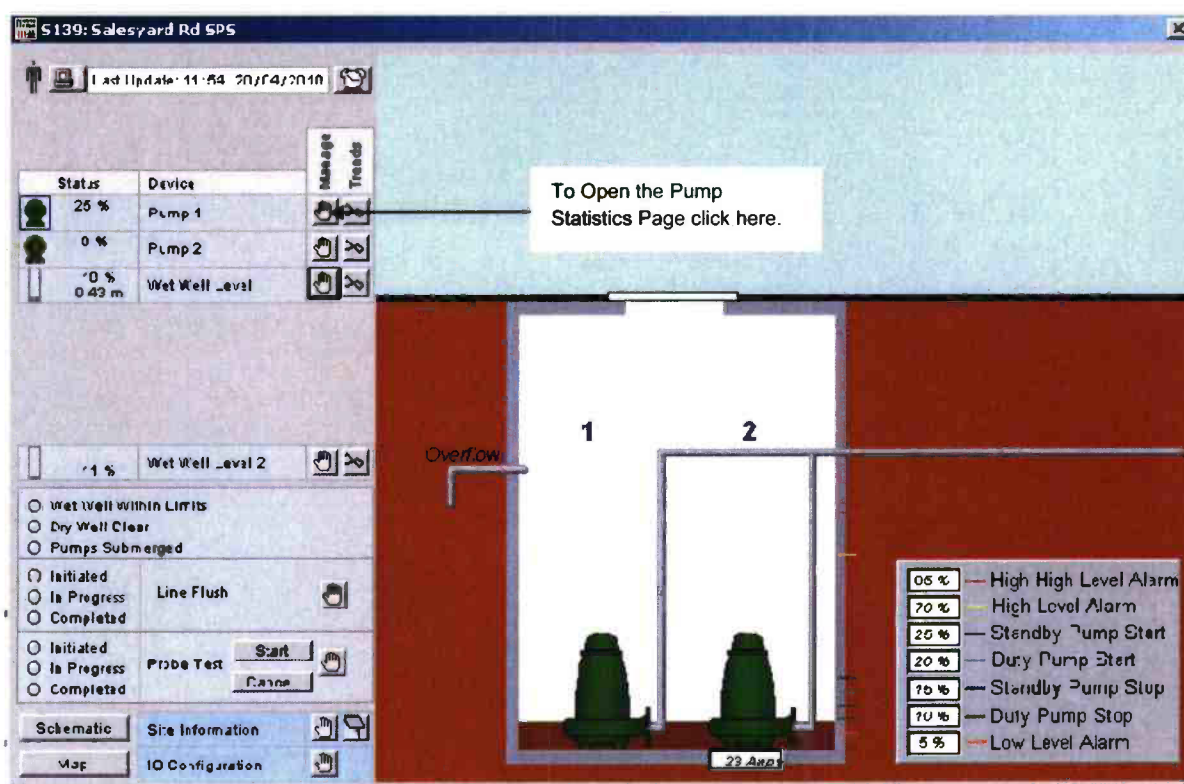


Figure 3 – Salesyard Rd SPS Open Pump Configuration

This will open up the pump statistics page as shown in Figure 4 below to the right of the site window showing the pump statistics.

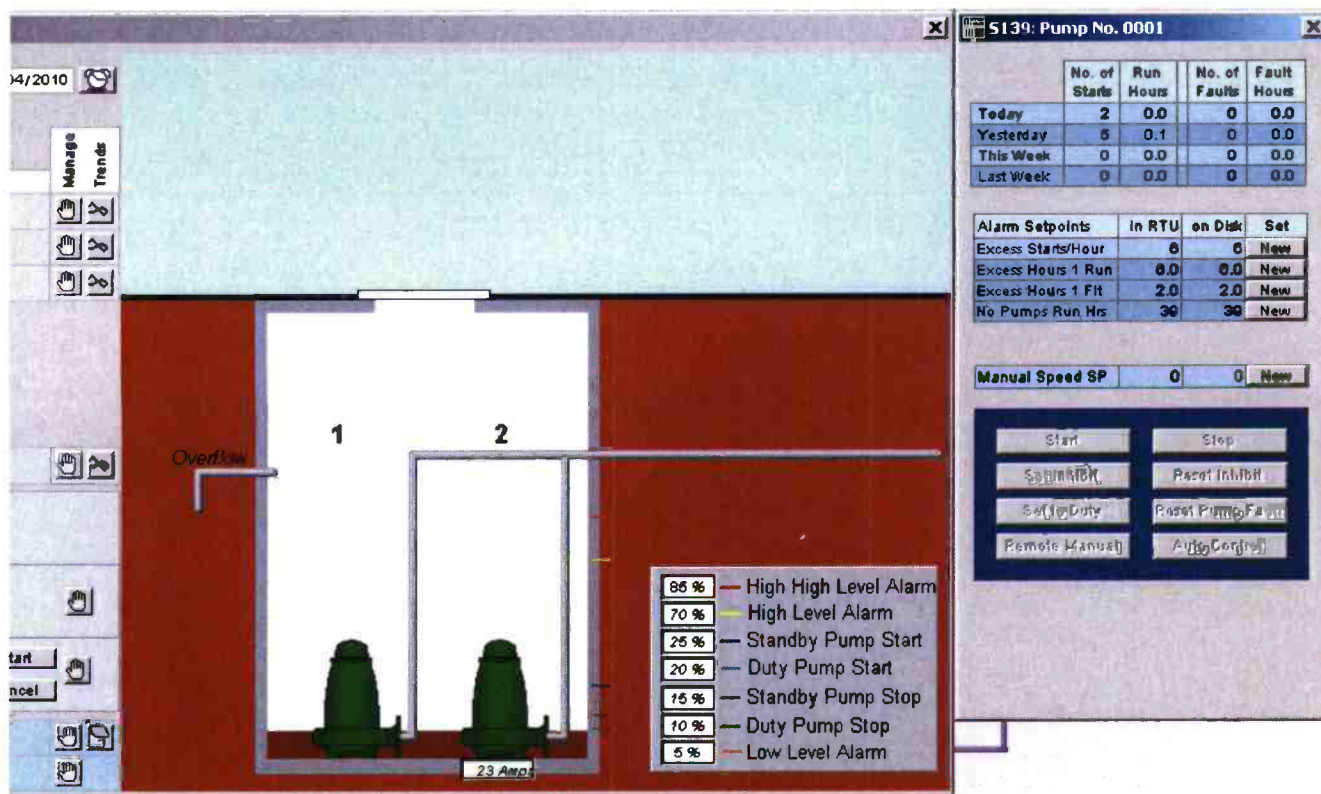


Figure 4 – Salesyard Rd SPS Pump Statistics Page

If an operator is logged in additional control of the pumps will be available as shown below in Figure 5 where the Pump can be taken into "Remote Manual" control and the operator is able to remotely from SCADA start or stop the pump, reset the pump fault or set a desired pump to be the duty pump and can also be inhibited from operation as shown in Figure 5 below.

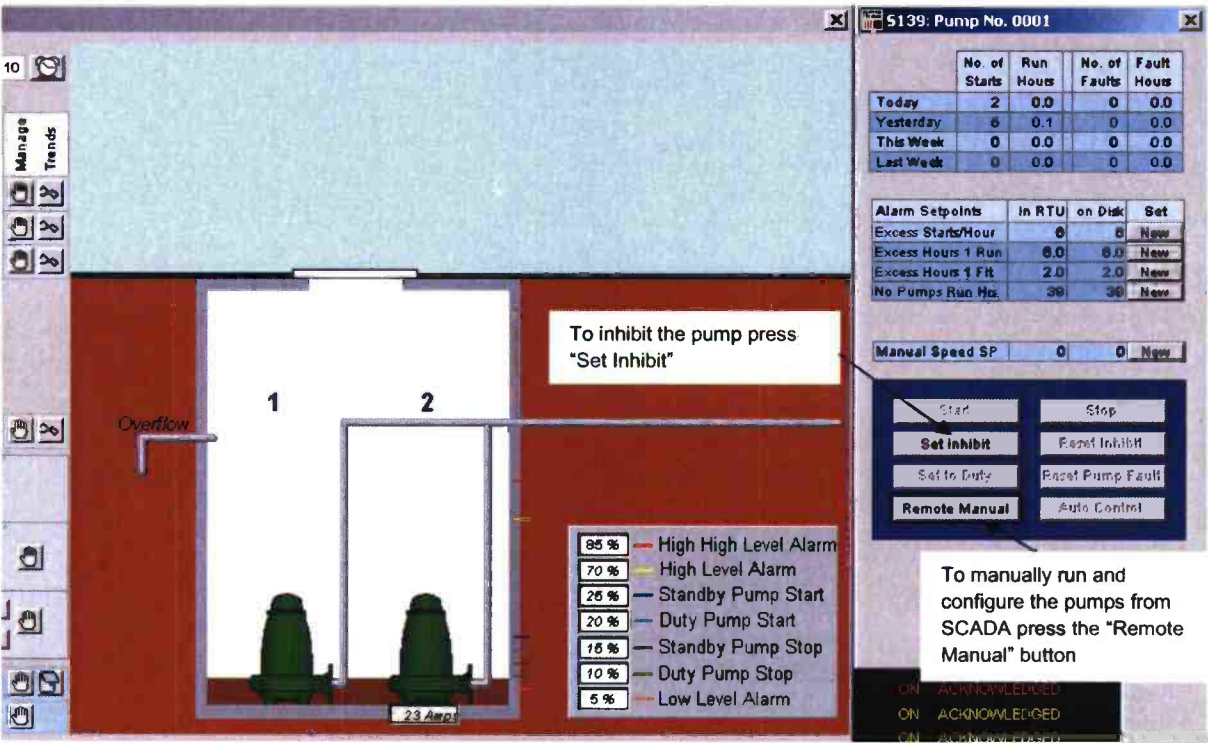


Figure 5 – Salesyard Rd SPS Pump Remote Manual Control

3.3.2Level Management

To see or edit the level statistics and controls click on 'Manage' button (Hand symbol) as shown in Figure 6.

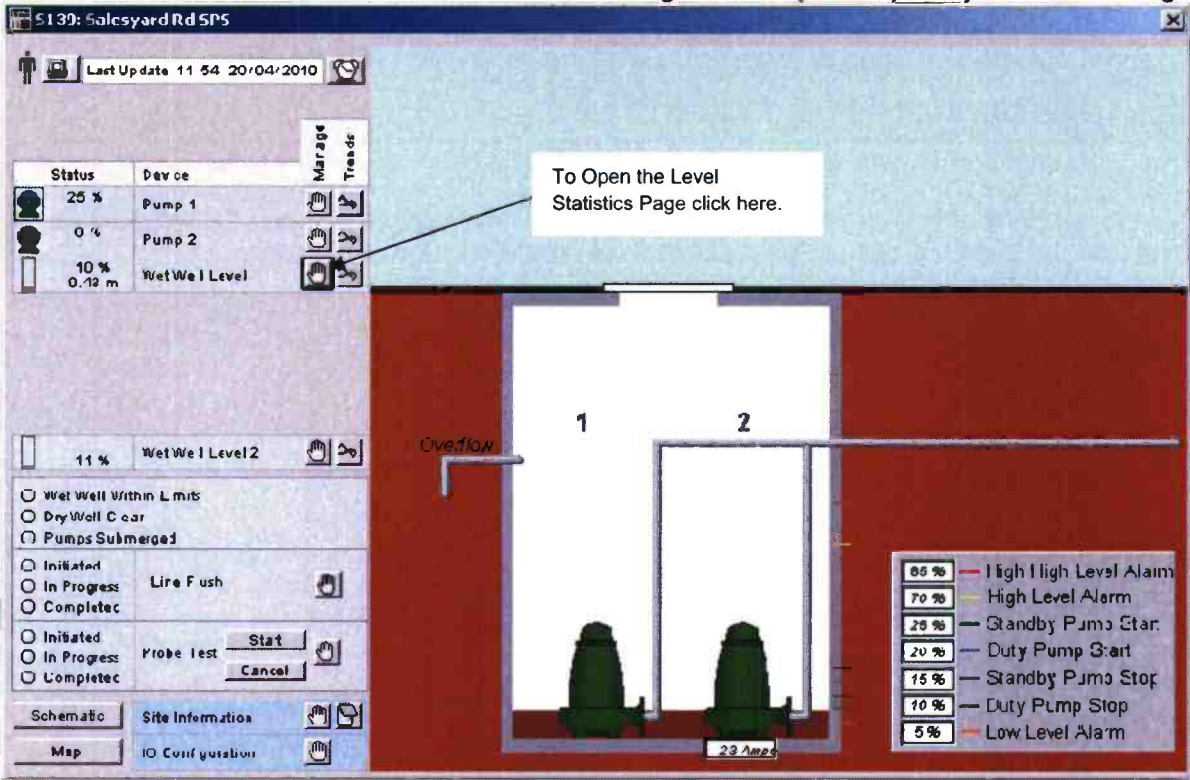


Figure 6 – Salesyard Rd SPS Open Level Configuration

This will open up the level statistics page as shown in Figure 7 below to the right of the site window showing the level statistics.

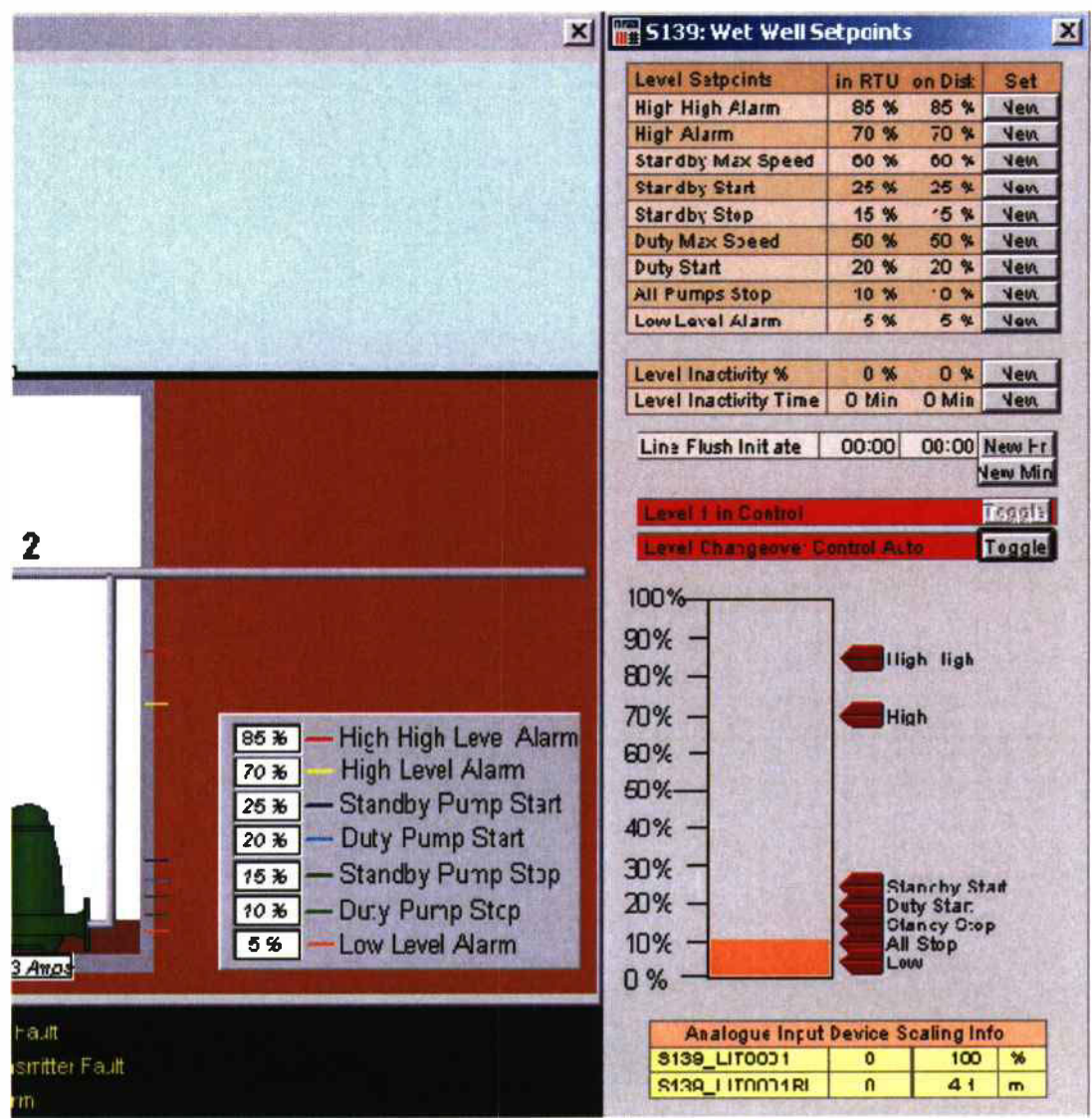


Figure 7 – Salesyard Rd SPS Open Level Configuration

If an operator is logged in additional configuration of the level will be available as shown below in Figure 8 where the Level used for pump control can be changed from Level 1 to Level 2.

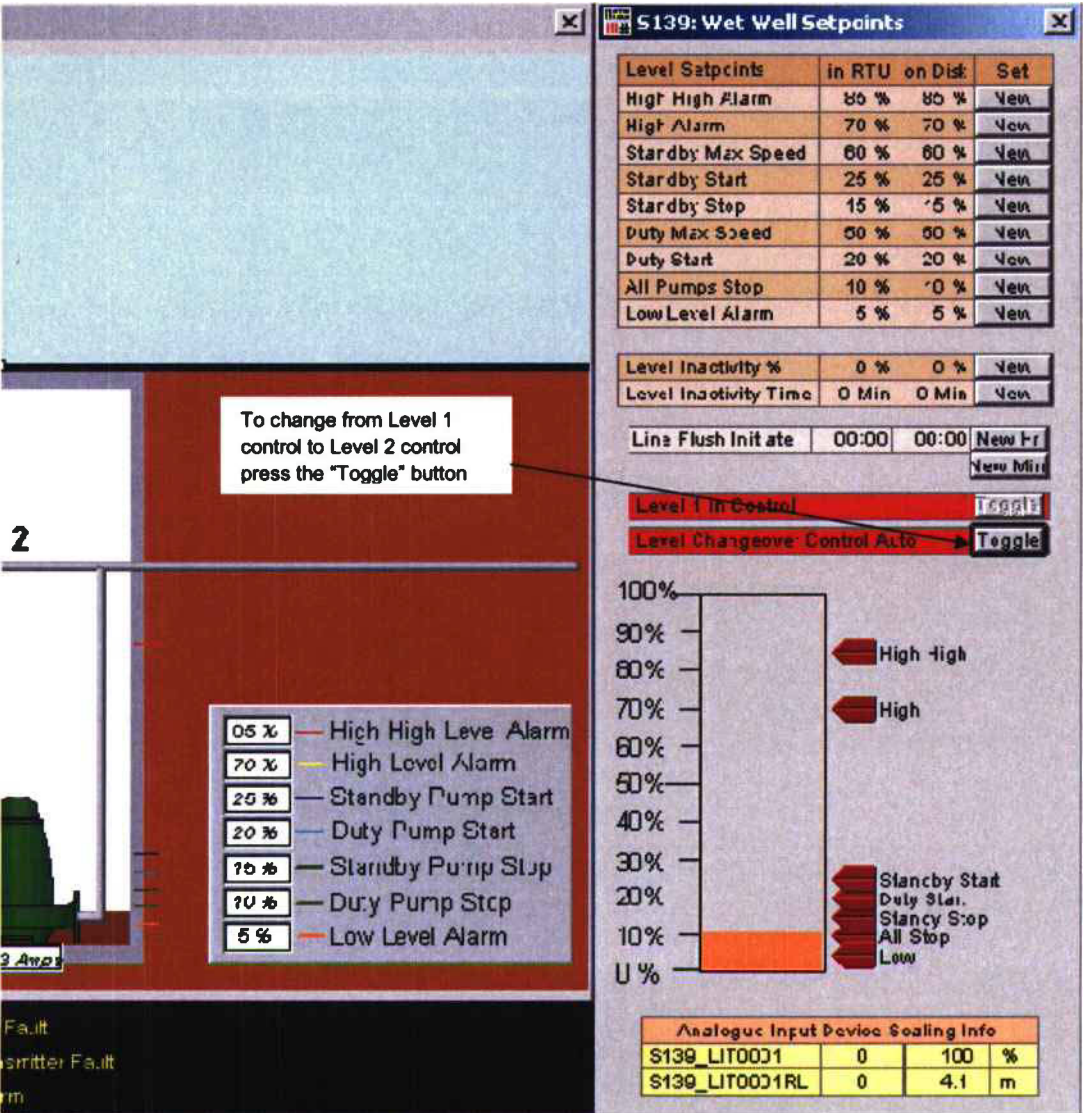


Figure 8 – Saleyard Rd SPS Level Control and Configuration

3.4 SETPOINTS

3.4.1 Pump Alarming Setpoints

To change the set point for pump start and running alarms click on 'New' button in the pump statistics window as shown in the Figure 9 below.

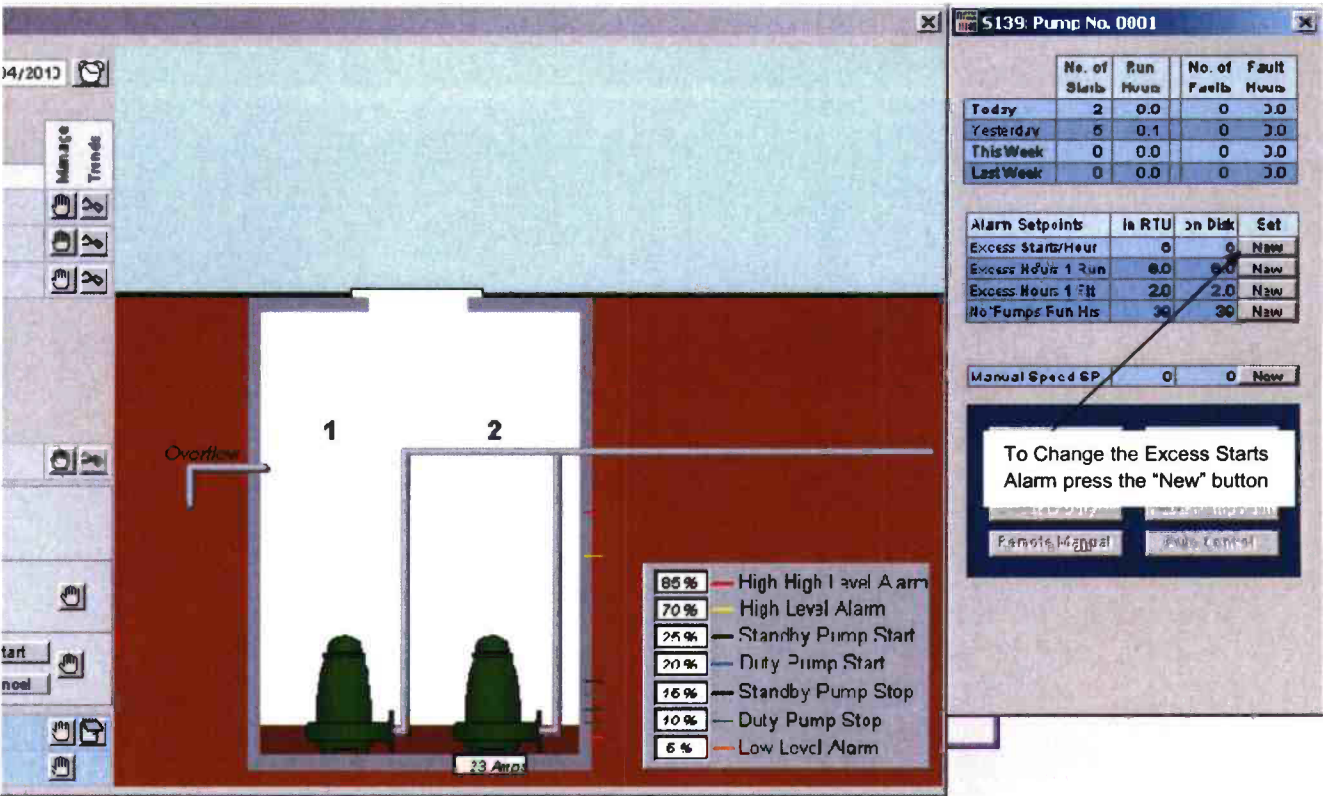


Figure 9 – Salesyard Rd SPS Pump Configuration Setpoint change

This will open up an additional window as shown in Figure 10 below. In this window, the operator can enter the new set point values just by clicking the numbers or typing the numbers in the box using keyboard by placing the cursor in the box.

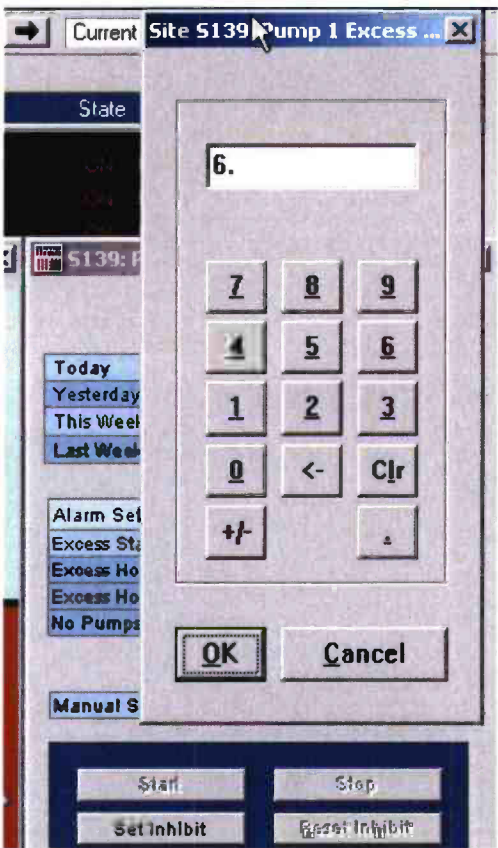


Figure 10 – Salesyard Rd SPS Pump Setpoint Window

3.4.2Wet Well Setpoints

The Wet Well contains a range of setpoints that are configurable by the operator once logged in. These include the alarming levels of quantity of liquid in the well as well as the level of the well at which the pumps are required to start and stop. To change these set points click on 'New' button in the pump statistics window as shown in the Figure 9 below.

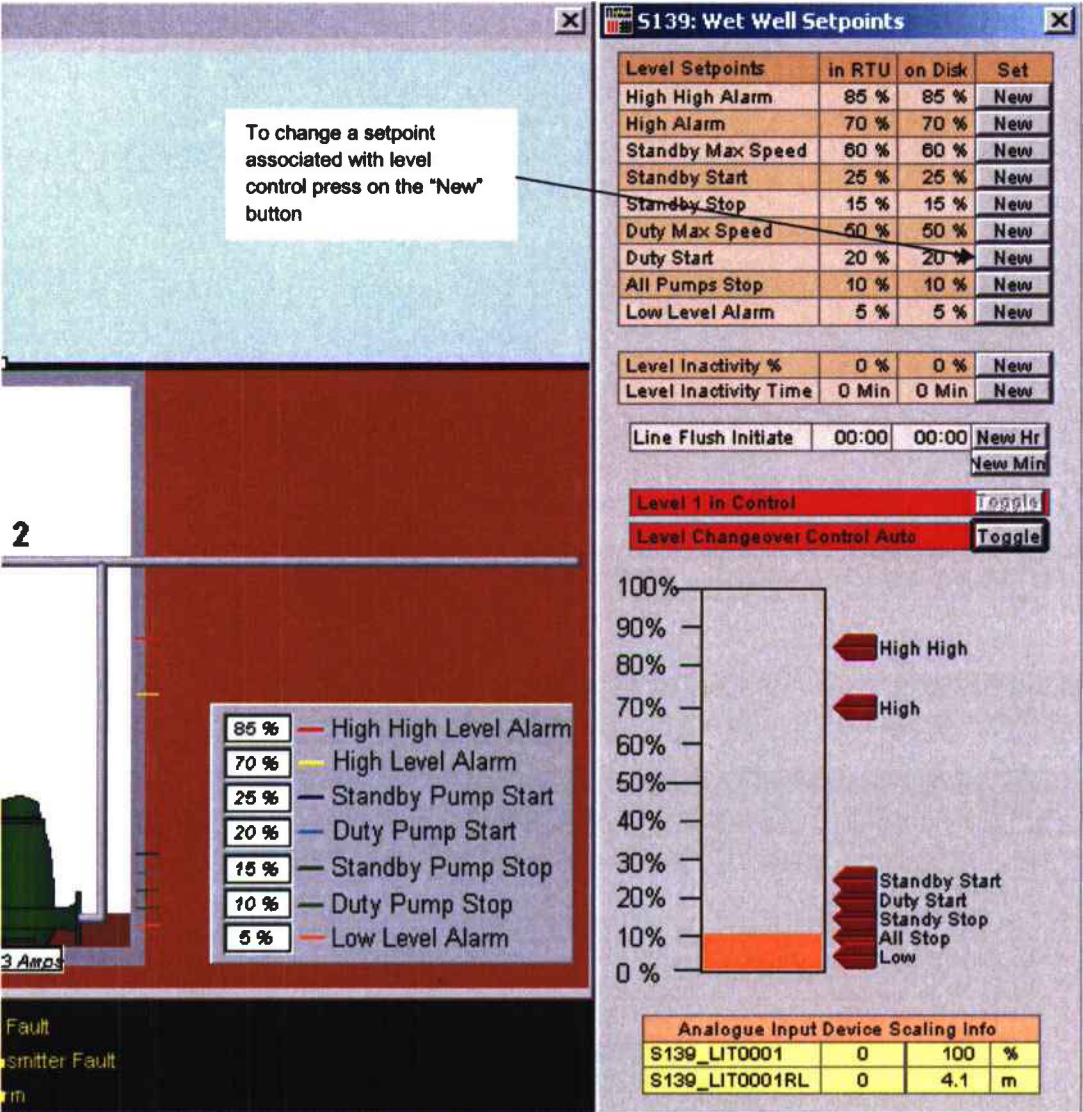


Figure 11 – Salesyard Rd SPS Wet Well Configuration Setpoint change

This will open up an additional window as shown in Figure 12 below. In this window, the operator can enter the new set point values just by clicking the numbers or typing the numbers in the box using keyboard by placing the cursor in the box.

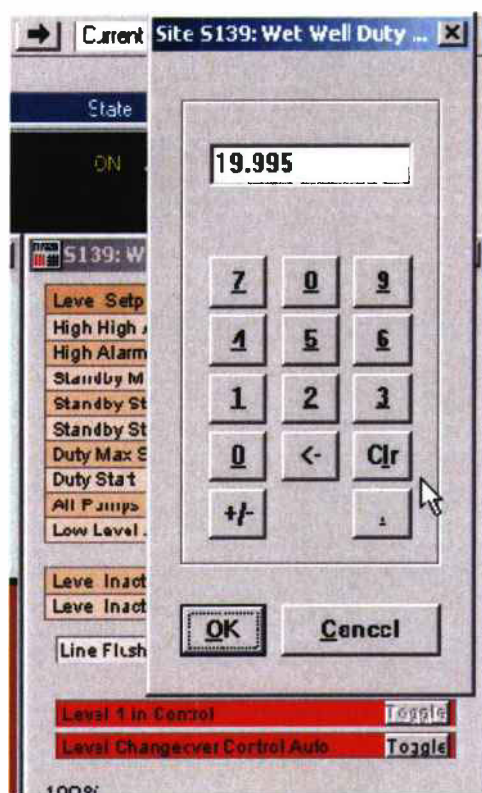


Figure 12 – Saleyard Rd SPS Wet Well Setpoint window

3.5 Site Information / Notes

To open the Site information Notes or to edit the information click on 'Manage' Button (Hand Symbol) on the site window as shown in the Figure 13 below.

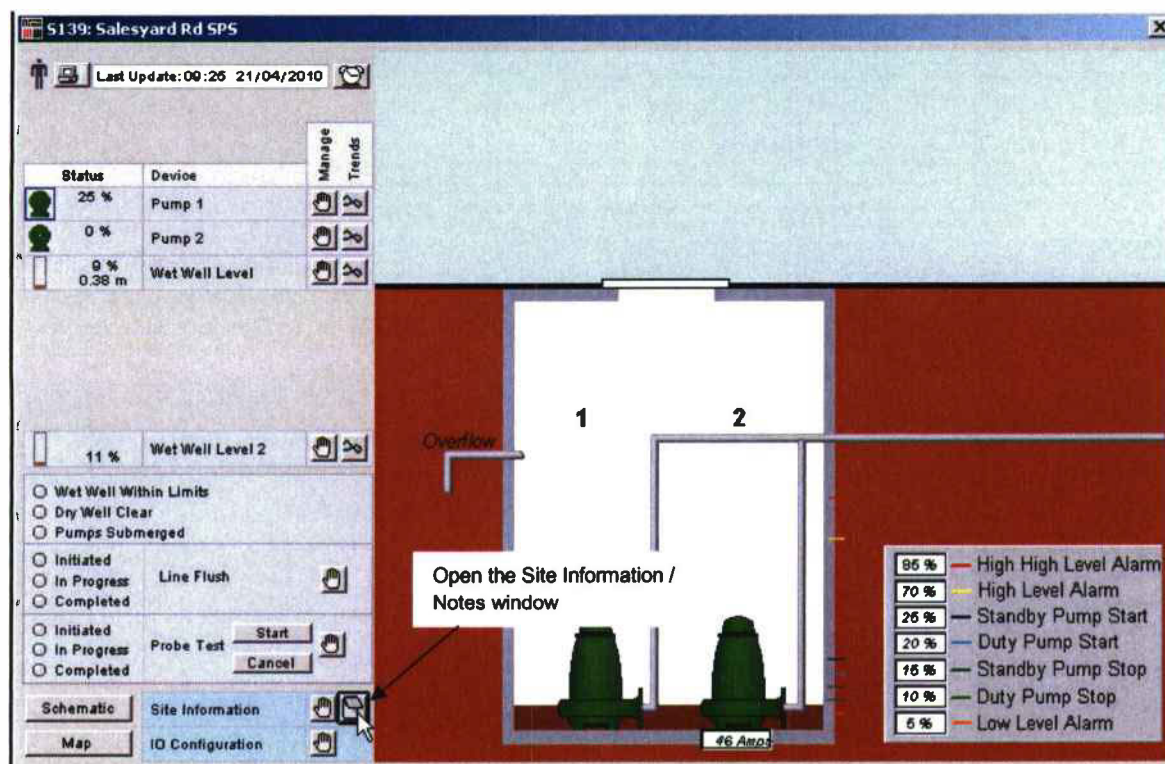


Figure 13 – Saleyard Rd SPS Open Site Information/Notes window

This will open up a window as shown in Figure 14 below.

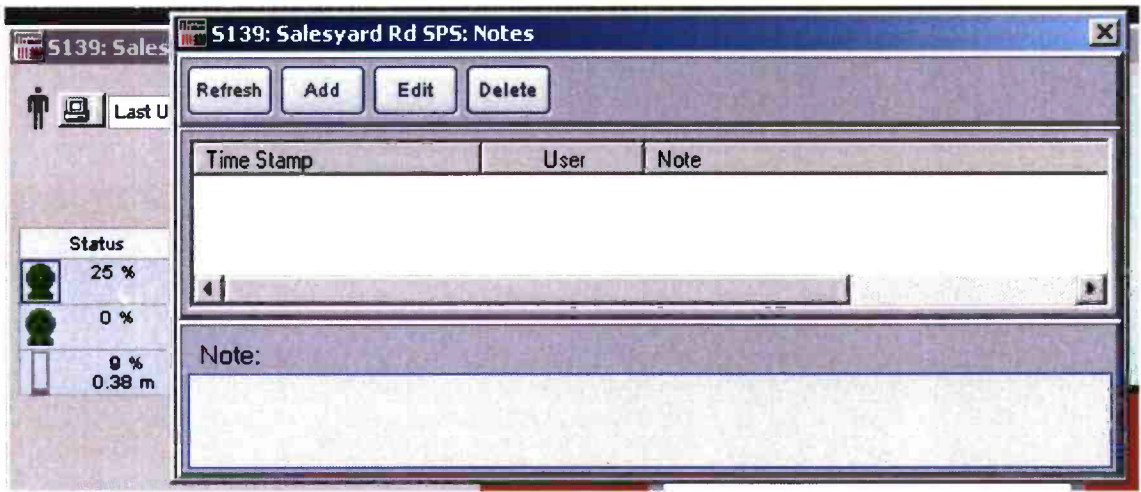


Figure 14 – Salesyard Rd SPS Site Information / Notes Window

3.6 IO Configuration

To view the IO Configuration window click on the 'Manage' Button (Hand Symbol) on the main Salesyard Road window as shown in the Figure 15 below.

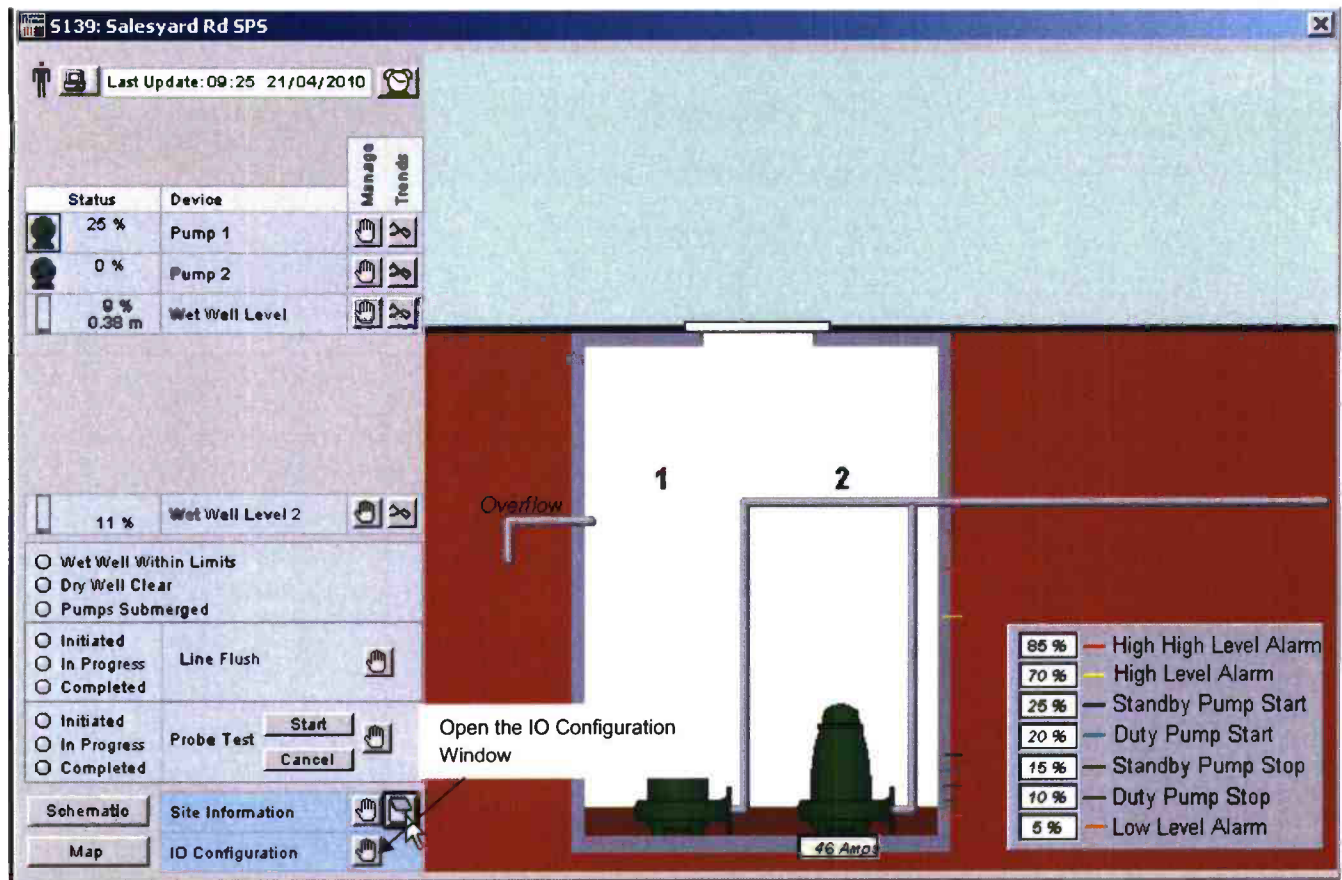


Figure 15 – Salesyard Rd SPS Open IO Configuration

This will open up a window as shown in Figure 16 below.

No		Digital Inputs	No	Digital Inputs cont'd	No	Analog Inputs	
1		Mains Power Healthy	23		1	Flow 1	
2		Tamper Alarm	24		2	Well Level	18 %
3		Pump 1 Running	25		3	Pump 1 Current	
4		Pump 1 Fault	26		4	Pump 2 Current	
5		Pump 1 Remote	27		5	Pump 1 Speed	
6		Pump 2 Running	28		6	Pump 2 Speed	
7		Pump 2 Fault	29		7	Well Level 2	20 %
8		Pump 2 Remote	30		8		
9		Sump Pump Running	31		9		
10		Sump Pump Fault	32		10		
11		Water Void			11		
12		Dry Well Flood	No	Digital Outputs	12		
13		Wet Well High Probe OK1	Pump 1 Start				
14		Wet Well Overflow	2	Pump 2 Start	No	Analog Outputs	
15		Fire Alarm	3	Remote Reset	1	Pump 1 Reference	
16		Rain Gauge Pulse	4	High Level Alarm	2	Pump 2 Reference	
17		Flow Pulse	5		3		
18		Generator Online	6		4		
19		Generator Fault	7		5		
20		Generator Tamper	8		6		
21			9		7		
22			10		8		

85 %	—	High High Level Alarm
70 %	—	High Level Alarm
25 %	—	Standby Pump Start
20 %	—	Duty Pump Start
15 %	—	Standby Pump Stop
10 %	—	Duty Pump Stop
5 %	—	Low Level Alarm

Figure 16 – Saleyard Rd SPS IO Configuration Window

3.7 Trends

To show the trends associated with Saleyard Rd SPS the 'Trends' button needs to be pressed for the device in question. The site has been designed to show all associated devices with the well when the well trends button is pressed. This is represented in Figure 17 below, where the user would click on the "Wet Well Level" button. The next Figure 18 below shows the values of the site graphed over time for the two well levels and the two pump runs that directly impact the level in the well. This way the operator can analyse the performance of the site more efficiently.

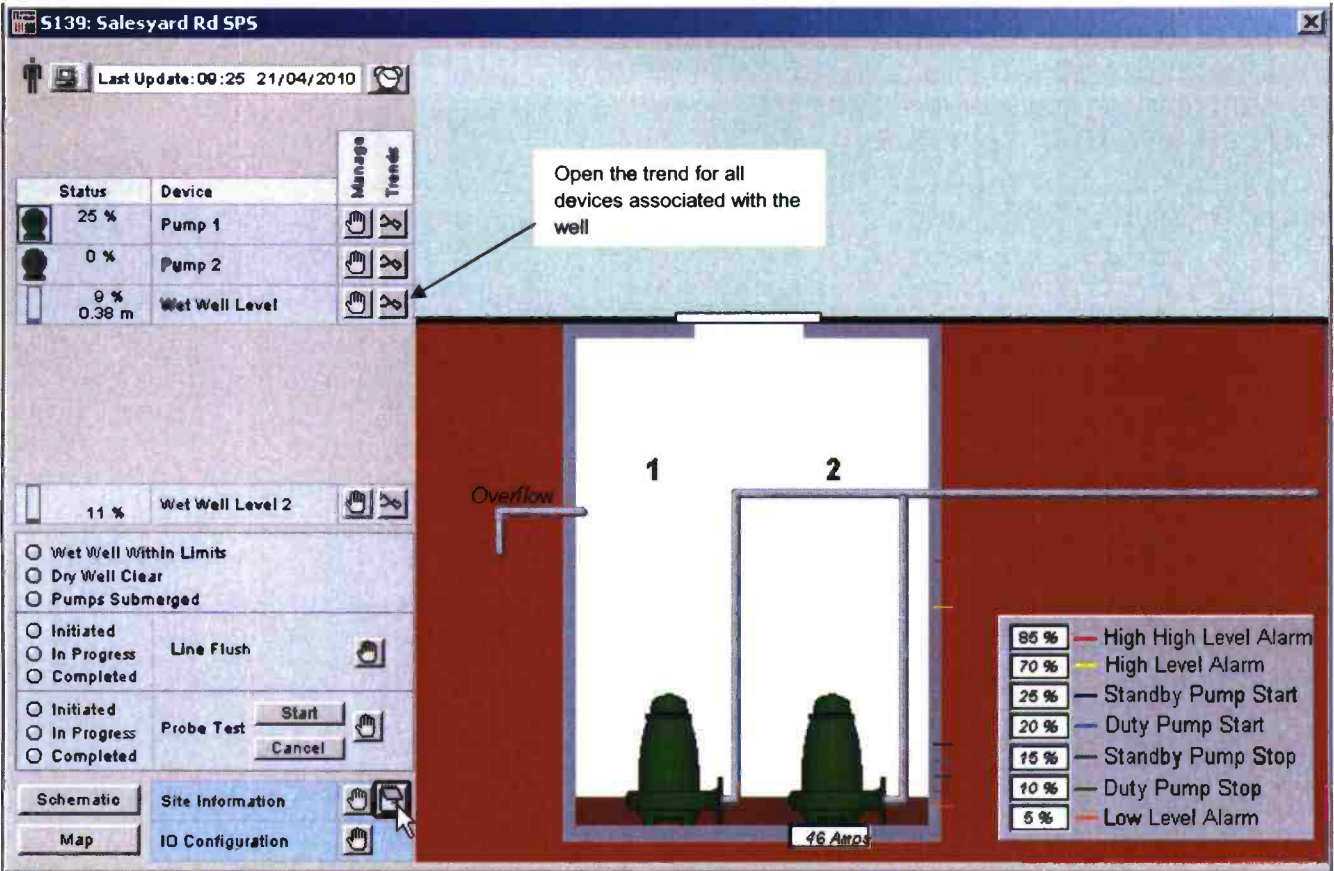


Figure 17 – Salesyard Rd SPS Open Trend Window

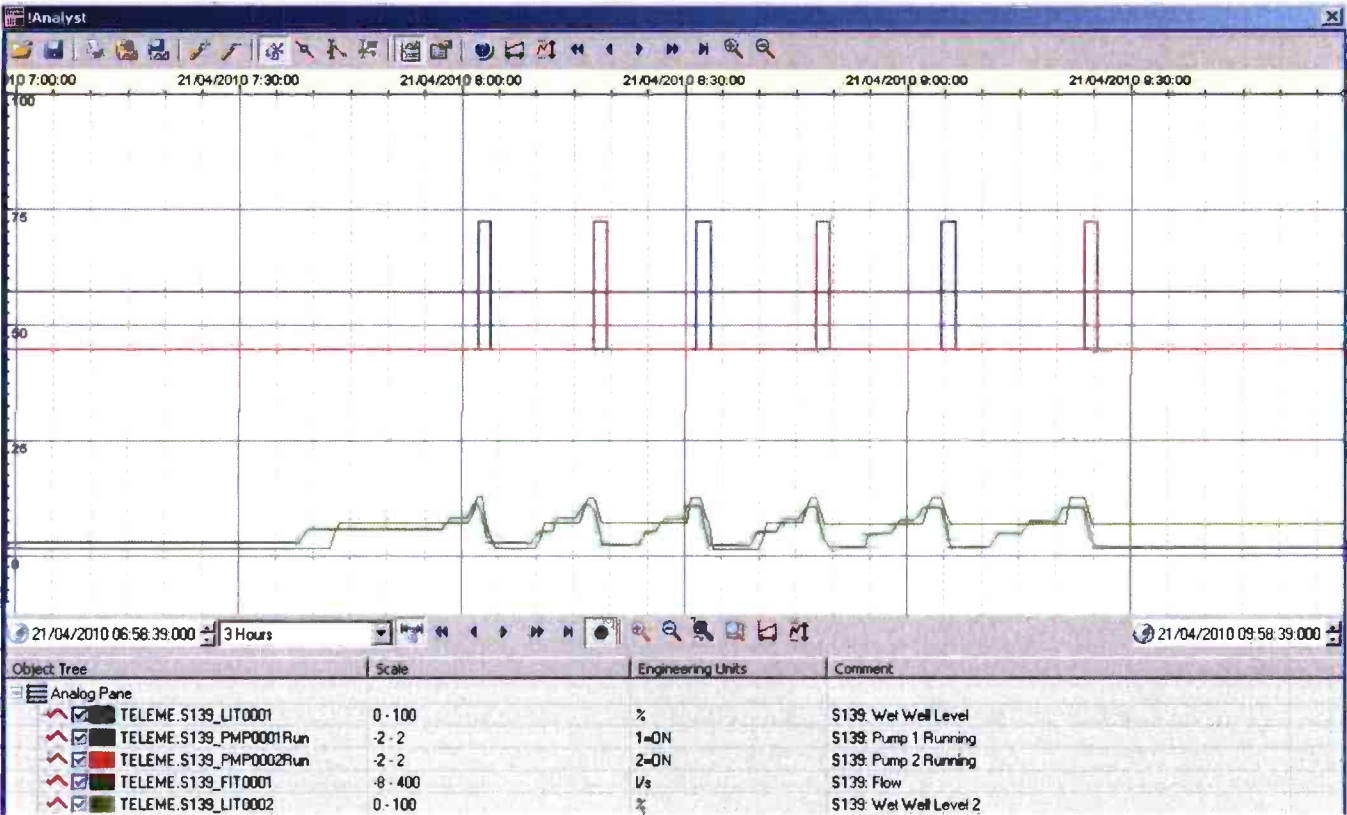


Figure 18 – Salesyard Rd SPS Well Trend Window

4 MAINTENANCE

4.1 Circuit Breaker Schedule

The following Table 1 specifies the details of all the circuit breakers within the Switchboard.

Table 1 – Circuit Breaker Schedule

Circuit Breaker/ Fuse No.	Description	Trip Current	Circuit Voltage
Q026	Voltmeter	2 Amp	415v A.C.
Q034	3 Phase Power Outlet	20 Amp 30ma elcb	415v A.C.
F019	Surge Diverter	32 Amp	240v A.C.
F020	Surge Diverter	32 Amp	240v A.C.
F021	Surge Diverter	32 Amp	240v A.C.
Q040	Telemetry GPO	16 Amp 30ma elcb	240v A.C.
Q044	Cubicle Lights	6 Amp	240v A.C.
Q049	Control Surge Reduction Filter	10 Amp	240v A.C.
Q049a	Pump 1 Control	6 amp	240v A.C.
Q052	Pump 2 Control	6 amp	240v A.C.
Q055	Common 240v Control	4 Amp	240v A.C.
Q058	12/24v D.C. Power Supply	10 Amp	240v A.C.
Q063	D.C. Control	4 amp	24v D.C.
Q182	RTU Di5	4 Amp	24v D.C.
Q185	RTU IO3	4 Amp	24v D.C.
Q188	RTU IO3	4 Amp	24v D.C.
Q058a	Radio	4 amp	12v D.C.

4.2 Electrical Equipment and Routine Maintenance Schedule

The following Table 2 specifies the details of suggested maintenance schedule for the equipment on site. It should be noted that this list is intended only as a guide and is not conclusive.

Table 2 – Electrical Equipment and Routine Maintenance Schedule

Item	Manufacturer	Model	Suggested Routine Maintenance Period	Maintenance Operation
Electrical Terminals	General	N/A	12 Mth	Check for loose or damaged connections
Level Transmitter - Hydrostatic	Vega	Vegawell 72 + Vegadis	6 Mth	Clean and test operation
Level Transmitter - Ultrasonic	Endress & Hauser	FMU90	6 Mth	Clean and test operation
Telemetry Coax Surge Protector			6 Mth	Test for Signal loss
Power Supply	Omniflex	C2177B	3 Mth	Check Output Voltages 12 and 24 volt
Transient Barrier	Critec	UTB-30	3 Mth	Test for Earth Leakage Current
Surge Diverter	Critec	TDS-MT-277	3 Mth	Test for Earth Leakage Current
Battery 12v 7ah	Powerhouse	CP1270	3 Mth	Load test battery
Flashing Light	Deegee	626-983	3 Mth	Test Operation
Cubical Light	Ideal	BUYN120	3 Mth	Test Operation
Cubical Fan	Rittal	3322.107	3 Mth	Test Operation
Cubical Fan Filter	Rittal	3322.207	3 Mth	Clean
Phase Failure Relay	Schneider	RM84873012	3 Mth	Test Operation
RCD Circuit Breakers	NHP	DSRCBH	As per Ipswich Water's Policy	Test Operation
RTU	Kingfisher		N/A	
Radio	Trio	ER450-53A02-DH0	N/A	

4.

Functional Specification

SALESYARD RD SEWAGE PUMP STATION FUNCTIONAL SPECIFICATION

Client: Ipswich Water

Project: Salesyard Rd Sewage Pump Station Upgrade

Document No:	005435-DF-01
Revision:	B

Ipswich Water Salesyard Rd Pump Station Control System Upgrade 5435-DF-01-B- Salesyard Rd SPS FunctionalSpec_20100419.doc	iPS Job: 0010764	Page 1 of 25
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**Salesyard Rd Sewage Pump Station
Functional Specification**

I.Power Solutions – Process Automation

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Rev	Date	Prepared	Checked	Approved	Initials (Hardcopy)
A	30/06/2009	Jasenko Sabljic	Nessan McNamara		
B	19/04/2010	Jasenko Sabljic	Nessan McNamara	Maaran Mutharasa	

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Rev	Author	Date	Comments
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B	Jasenko Sabljic	19-04-2010	Issued for practical completion

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Saleyard Rd Sewage Pump Station
Functional Specification

I.Power Solutions – Process Automation

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DEFINITIONS

Term	Description
IW	Ipswich Water – owner/operator of system
iPS	i.Power Solutions – Principal Contractor
BPS	Booster Pump Station
CMF	Central Monitoring Facility
HMI	Human Machine Interface
I/O	Input/Output
IDC	Internet Display Client
FSP	Multitrode SAFE-FSP Backup Controller
RMF	Remote Monitoring Facility
RTU	Remote Terminal Unit
SCADA	Supervisory Control And Data Acquisition
SPS	Sewage Pump Station
SS	Soft Starter
STP	Sewage Treatment Plant
TFT	Thin Film Transistor
VSD	Variable speed drive
WTP	Water Treatment Plant

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1.0 PROJECT SCOPE OF WORK

1.1 Introduction

The scope of work was for a full upgrade of the Salesyard Rd SPS Switchboard encompassing the following tasks:

- Build of the new Salesyard Rd SPS Switchboard
- Programming of the RTU Ladder Logic
- Installation of the new Salesyard Rd SPS Switchboard on site
- Configuration of all the equipment on site and RTU
- Cutting over from the old Salesyard Rd SPS Switchboard to the new one
- Testing that all the functionality works as expected

2.0 SEWAGE PUMP STATION CONTROL SYSTEM

2.1 System Hardware

The following section outlines the intelligent hardware components covered by this document.

2.1.1 Kingfisher Remote Terminal Unit (RTU)

Remote Terminal Units (RTU) performs the following tasks:

- Interfacing with discrete and analogue signals via industry interface standards
- Processing of Inputs and Outputs
- Manage communications links and real-time data to maximise throughput and minimise transmission time
- Provide control of plant by executing SCADA operator commands and translating this to process outputs.
- Provide automated processing and conditioning of statistics and control systems based on I/O information in real-time.

2.1.1.1 RTU Modules

The following RTU modules are used in the RTU System:

Slot	Component	Description
Backplane	BA-4	4-Slot Backplane
Slot 1	PC-1	Power Supply & Processor Module
Slot 2	DI-5	16 Channel DC Input Module
Slot 3	IO-3	Combination Analog/Digital I/O Module
Slot 4	IO-3	Combination Analog/Digital I/O Module

Table 1 – Module Types used in RTU

The following sections detail the basic functionality of the RTU modules and the backplane.

2.1.1.2 Backplane System – BA4

Backplanes allow the processor module to communicate with all other modules in the RTU. The backplane also allows power to be supplied to each module. The Backplane used is a BA-

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4, a 4-slot backplane. This backplane can only be used with the PC-1 (Power & Processor Module) which has to be installed in the far left slot. Any I/O or communications modules can be used in the other 3 slots.

2.1.1.3 Power Supply & Processor Module – PC-1

The PC-1 combines the functions of a power supply and a processor module. The processor provides all processing, I/O scanning, logic, control and communications functions required. The processor module has Port 1 as a fixed RS323C port while Port 2 can either be a Serial or Radio/Line connection. At Salesyard Road Port 1 is connected to a Card Reader and Port 2 to the Trio Datacom Radio.

The PC-1 has 128K of flash memory for the storage of all operating code and selected system parameters, and 256K of battery backed static RAM for all configuration and event storage data.

The PC-1 Module’s specifications can be found in Appendix A.

2.1.1.4 16-Channel DC Input Module – DI-5

The DI-5 Module provides 16 dry contact input points in one group with common power for field contacts. A wide range of input devices powered by the module are used such as push buttons, limit switches and electronic proximity switches. Inputs also accept 10 to 28 Volts DC from externally powered inputs.

The DI-5 Module’s specifications can be found in Appendix A.

2.1.1.5 Combination Analog/Digital I/O Module – IO-3

This I/O has 4 Analog Inputs, 1 Analog Output, 4 Digital Inputs and 4 Digital Outputs.

Analog I/O – The module has two signal ranges, 0 to 20mA and 4 to 20mA. The default range of 4 to 20mA is used for these cards (link at the back of the card installed). All Analog Inputs are from 4-wire transmitters externally powered using terminal 1 to 4 as the +ve input with terminal 5 the OV common for all the inputs. Nothing is wired to the Analog Outputs.

Digital I/O – Input characteristics are compatible with a wide range of user supplied input devices such as push buttons, limit switches and electronic proximity switches. Outputs can control a wide range of user supplied load devices such as motor starters, solenoids and indicators. Power for the internal relay circuits is provided by the +12VDC bus on the backplane.

The IO-3 Module’s specifications can be found in Appendix A.

2.1.2 Kingfisher Toolbox

Toolbox is a menu-driven software package that allows users to configure and use Kingfisher Series II RTUs. It can also be used to monitor, set and display data values and read and write to/from hardware modules. Diagnostic tools are provided to determine system performance.

Toolbox allows for on-line and off-line configuration, which means that an RTU configuration can be created without a physical connection between the RTU and the PC. Configurations can be downloaded to the RTU remotely over the air or on-site locally. *.sdb and *.ll files source files contain all the necessary configuration information for an RTU.

RTU Configuration Software	Version
Toolbox	1.45d

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Table 2 – RTU Programming Software

2.1.3 RTU Environmental Specifications

Environmental specifications for reliable operation of the RTUs are as follows:

Parameter	Measurement
Ambient Temperature	-20 to 70°C
Storage Temperature	-40 to 85°C
Humidity	5% to 98% RH non-condensing
Dielectric Strength	3000 V, 1 minute
Noise Immunity	IEEE 472

Table 3 – RTU Environmental Specifications

2.1.4 Radio

The Radio performs the following tasks:

- To provide communication to the SCADA and other required RTUs
- To monitor the Radio network (Forward and Reverse power, RSSI, Temperature and Losses)

2.1.4.1 Radio Hardware

The following Radio Hardware has been used at Salesyard Road:

Brand	Model number
Trio Datacom Radio	ER450-53A02-DHO
Trio Datacom Diagnostics	Diags/E
RFI Yagi	YB9-62
RFI Cable	RG 213
Critec Surge arrestor	LCSP-90m

Table 4 – Radio Hardware

2.1.4.1.1 Trio Datacom – ER450

The ER450 is a digital data radio that operates at 19.2k/bits. The ER450 can be programmed locally and remotely.

The following radio frequency used for this outstation is:

Area	Frequencies
Brassall	Tx: 482.35 MHz Rx: 487.55 MHz

Table 5 – Frequencies Used for Salesyard Road

2.1.4.1.2 Trio Datacom – ER450 Firmware

The Radio has been loaded with the following version of firmware:

Module Type	Firmware Version	Description
ER450	4.2.2	Base Firmware

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Table 6 – Radio Firmware Versions

2.1.4.1.3 Trio Datacom – TC-TView

TView is a menu-driven software package used to configure and use ER radio. It can also be used to monitor the radio. Diagnostic tools are provided to determine system performance.

TView allows for local and remote configuration, which means that the Radio can be configured over the radio network. *.cfg files contain all the necessary configuration information.

ER Radio Configuration Software	Version
TView+ E Series Configurator	R3.2.0

Table 7 – Radio Programming Software

2.1.4.1.4 Critec Surge Arrestor – LCSP-90m

LCSP-90m is a Coax Surge protector used to protect the radio from lightning surges. It is very important that the bulkhead is securely attached to the Switchboard and well earthed.

2.1.5 Instrumentation

Instrumentation at Salesyard Road performs the following tasks:

- Monitor the sewer well levels and sewage flow for process control and alarming
- Supply analog and discrete signals to the RTU for processing
- Supply analog and discrete signals for visualization, alarming and control at the SCADA

2.1.5.1 Instrumentation Hardware

The following Instrumentation Hardware is used:

Brand	Model number	Function
Vega	VegaWell 72 & VegaDis 12	Hydrostatic Level Transmitter & Display
Endress & Hauser	FMU-90 & FDU-92	Ultrasonic Level Transmitter/Display & Sensor
ABB	MagMaster	Electromagnetic Flowmeter
ENM	ENM-13 Ball float	High Level Backup Controller

Table 8 – Instrumentation Hardware at Salesyard Road

2.1.5.2 Hydrostatic Level Transmitter – VegaWell 72 and VegaDis 12

The VegaWell 72 Hydrostatic level transmitter using a hart communicator and Pactware Software can be calibrated and scaled from the bottom of the Well at 0% to the Overflow point at 95%.

The Hydrostatic Level Transmitter is the primary process control device and hangs so that it is positioned in an open part of the well. It can be retrieved without entering the confined space. This was done by suspending the device from a mounting bracket on the top of the well and the cable is run via the Field Marshalling Cubicle to the VegaDis 12 connection box

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situated within the switchboard. Configuration parameters have been noted on the Control Philosophy Drawing (Rev 1) in SiteInfo under the Control Drawing folder.

2.1.5.3 Ultrasonic Level Transmitter – E&H FMU-90 & FDU-92

The FDU-90 Ultrasonic level unit can also be calibrated using a hart communicator and Pactware Software. Alternatively, the calibration parameters can be accessed via the keypad on the front of the unit. It is also scaled from the bottom of the Well at 0% and to the Overflow point at 95% and mirrors the Hydrostatic level. A deviation alarm of 5% creates an alarm back at the SCADA.

The Ultrasonic analog signal is the secondary process control device The Ultrasonic FDU-92 sensor has been hung so that it is positioned to get a clear shot of the well. It has been hung 1.81 m below the top of the well and can be retrieved without entering the confined space. The sensor cable is run into the Field Marshalling Cubicle and from there it is connected to the FMU-90 transmitter situated within the switchboard. Configuration parameters for the transmitter have been noted on the Control Philosophy Drawing (Rev 1) in SiteInfo under the Control Drawing folder.

2.1.5.4 Flowmeter – MagMaster (Optional)

The Flowmeter used is an ABB Electromagnetic MagMaster Flowmeter for the measurement of electrically conductive fluids and slurries. It monitors the outflow from the site with the range of the transmitter being 0 – 200 l/sec.

2.1.5.5 Wet Well Backup Controller – ENM-13 Ball Float

The Ball float is configured as the backup control should the RTU fail. The bottom of the ball float has been hung at a distance of 0.983m from the top of the well (Top of well RL = 37.721m). The Controller itself is situated within the switchboard. This system is the backup secondary control and its functionality is explained under section 4.1.4. The ball float can be retrieved without entering the confined space. Its cable has been run into a Field Marshalling Cubicle and from there it has been terminated to the timer.

2.1.6 Motor Control

Motor Control performs the following tasks:

- Used to control the pumps.
- Supplies discrete signals to the RTU for processing
- Supplies discrete signals for visualization, alarming and control at the SCADA
- Reduces Mains Power Current Loading

2.1.6.1 Motor Controllers

At Salesyard Road EMSBY solid state softstarters (Model No. MSF-017) have been installed. The starters are hardwired to start independently from the RTU. The starter must be put into Auto on the front of the panel for control from the RTU.

3.0 RTU CONFIGURATION

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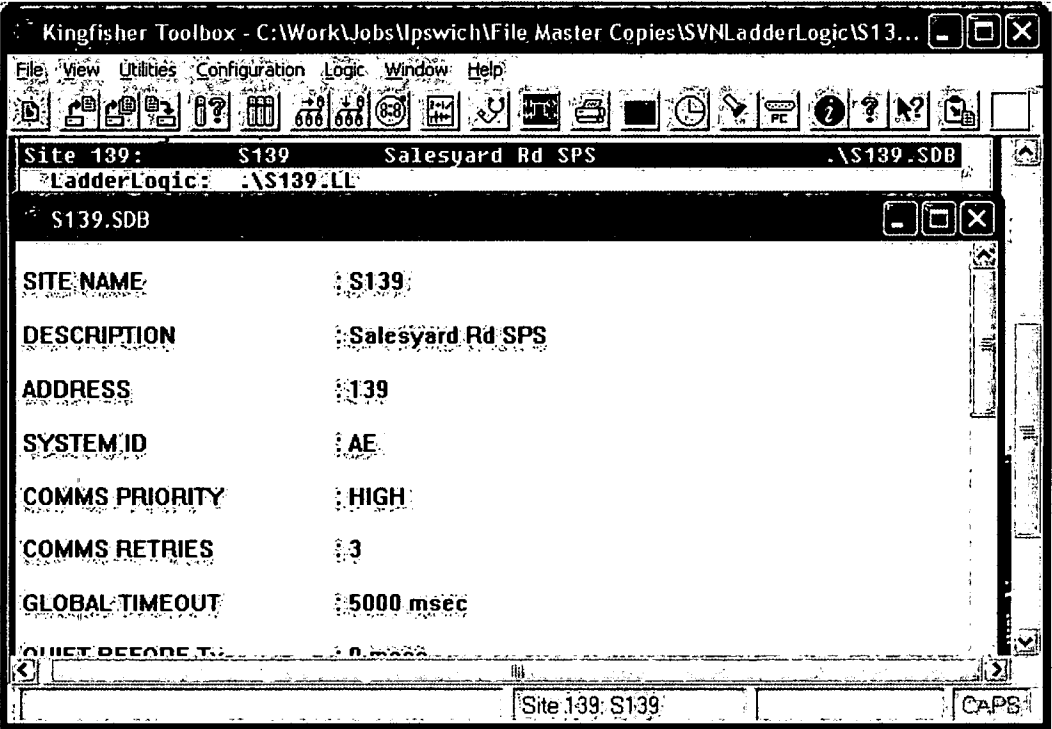


Figure 1 – Kingfisher RTU Toolbox

3.1 RTU LadderLogic: .\S139.LL

This contains the I/O Mapping, Common Start, Devices, Card Reader, Controls, Common End and Functions – i.e. all the RTU functionality.

4.0 SALESYARD ROAD SITE DETAILS

This section details what the SCADA and RTU code was developed and implemented for.

4.1 Sewage Station

4.1.1 General

Two level sensors are used to monitor the well, one Hydrostatic and the other Ultrasonic. The Hydrostatic sensor is the primary control element for the pumps and the Ultrasonic is a standby device. The standby is used to monitor the primary sensor and is programmed to take control if the primary sensor fails. The level sensors are also used to monitor the well level and alarm on either a low, high or a high high level.

A ball float has been installed as the backup to control the pumps regardless of the RTU state. A digital output from the Backup Controller (set at ±90%) is used to start the pumps as the primary backup.

Failing that, should the level continue to rise and activate the Ultrasonic Relay(set at ±95%) a secondary backup relay activates the backup control system. The pumps will continue to run for a predefined period set on the timer located in the panel that has been measured to

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pump the well from the 95% level down to the pump stop level. A detailed explanation can be found in section 4.1.4.

4.1.2 Controls – Sewage Pump Station

4.1.2.1 Remote Manual

In Remote Manual mode on the Citect the pumps are controlled from the Citect and will no longer start automatically on level control. Control is exercised by manually starting and stopping the pumps from the Citect Pump Popup. To prevent the pumps from running dry however, they will still stop when the All Pumps Stop setpoint of 20% is reached providing that at least one of the level transmitters is healthy.

4.1.2.2 Auto Control

In Automatic Control mode the RTU controls the pumps depending well level as given by the Hydrostatic level transmitter (primary process control device). The pumps are arranged as Duty and Standby. The Start/Stop setpoints are set from a popup on Citect. The Duty Pump Start cannot be set above the Standby Start and the Standby Stop cannot be set to below the Duty Stop. Table 10 below shows these operating setpoints.

Device Operation	Parameter	Level Set-Point	RL (m) Value
Duty Pump Stop	Well Level	25 %	35.658
Duty Pump Start	Well Level	30 %	35.741
Standby Pump Stop	Well Level	35 %	35.824
Standby Pump Start	Well Level	40 %	35.907

Table 9 –Salesyard Road Pump Station Operating Set-Points

4.1.2.3 Flowmeter

Salesyard Road SPS **does not** have a physical flowmeter connected to the outflow.

4.1.2.4 Level Control

The control of Salesyard Road Wet Well is graphically represented in Figure 2 below. Figure 2 shows the Start/Stop setpoints for both Duty and Standby pumps under Normal Operating Conditions when the RTU is in control as well the Backup Control should the RTU fail. There are two modes of control namely **Normal Control Mode** and **Backup Control Mode**.

Normal Control Mode - The Hydrostatic Level Transmitter is used as the primary controller to control the pumps. If the Hydrostatic fails and the Ultrasonic is healthy, the control is switched over to the Ultrasonic Level Controller. Once the Hydrostatic recovers from being in fault, it will resume as the primary controller. The Duty/Standby Stop/Start setpoints are set from the SCADA. The Duty pump will alternate each time the Duty pump stops. As the level rises in the Wet Well the Duty pump starts at 30% level and pumps the level down. At 25% level the Duty pump is stopped by the RTU. Should the level continue to rise after the 30% start level, the Standby pump will be started at 40% level and both pumps will run. If the level decreases, the Standby pump will be stopped at 35% level with the Duty pump continuing to run until the All Pumps Stop level of 20% is reached.

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Backup Control Mode is described in section 4.1.4.

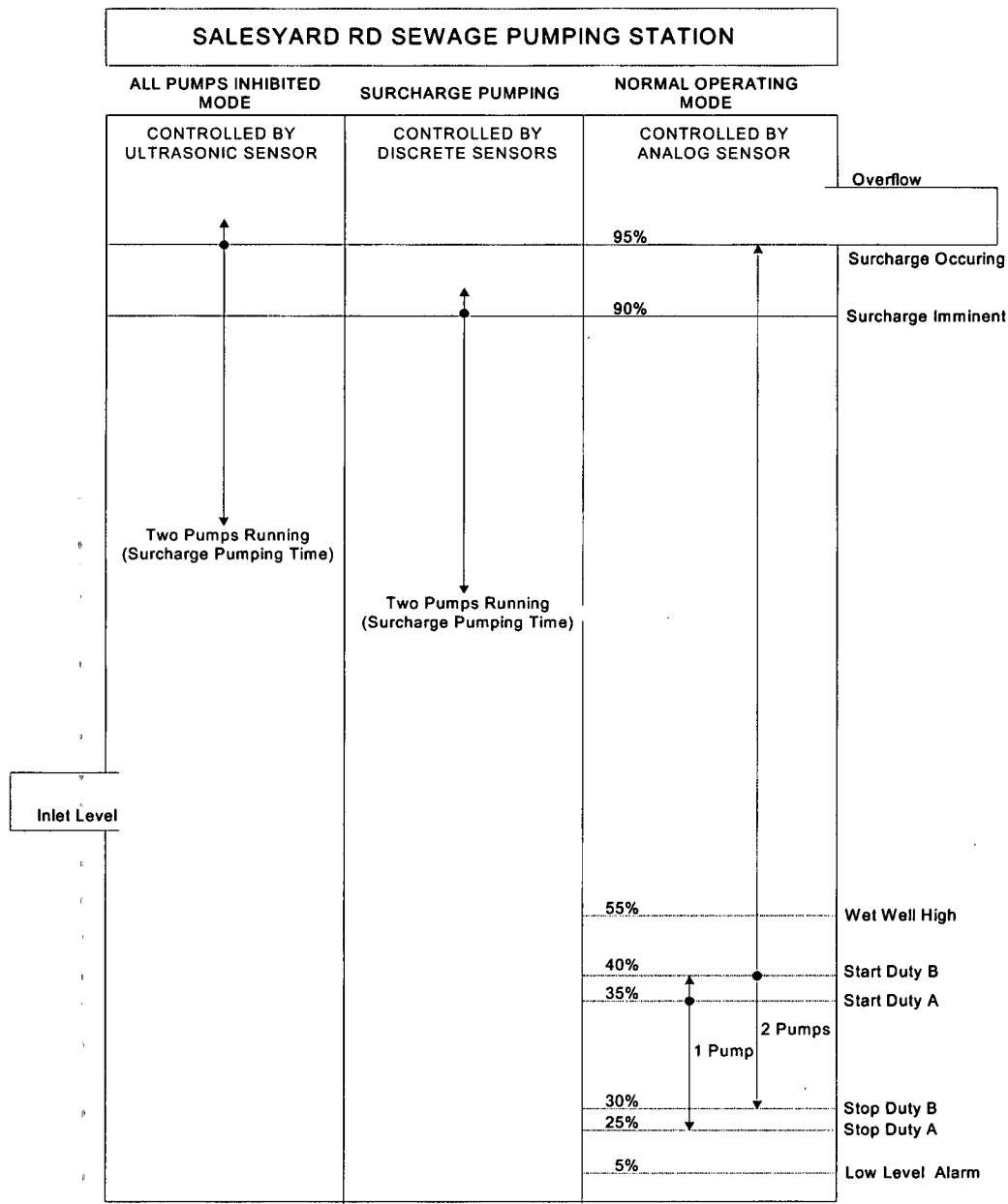


Figure 2 – Salesyard Road Sewage Pumping Station Level control diagram

4.1.2.5 Duty and Standby Arrangement

When the Duty pump is running, or if there is no pump running, the Duty pump will be the next pump to start. The Standby pump will start under the following conditions:

- If the Duty pump cannot discharge the well and the level continues to rise to the Standby Start Level
- If the Duty pump fails to start.
- If the Duty pump has been made unavailable.

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- If the Duty pump has been put into Remote Manual.

In Auto Control the Duty/Standby changes over every time the Duty pump stops after reaching the Duty or All Pumps Stop level. A pump can also be selected as Duty from its Pump Popup.

4.1.2.6 Pump Inhibit

An operator, from CITECT can "inhibit" a pump from the normal Duty/Standby pump cycle. The other pump will become Duty and only that pump will run.

4.1.2.7 Wet Well Wash

A Wet Well Wash solenoid is energized for a period of 2 minutes every time a pump runs. The washer wets the sides of the well as well as the surface of the effluent in an attempt to break down large solids. The washing also helps to aerate the effluent to help to keep it "fresh".

4.1.2.8 Line Flush

The Line Flush sequence at Salesyard Road SPS is initiated daily at 9am. This time is Operator selectable from the Citect. The purpose of the Line Flush is to attempt to clean the rising main of fats and settled debris by increasing the volume and velocity of effluent through the pipes. Both pumps start at the Line Flush Start Level and pump the level down to the All Pumps Stop Level. Should the Line Flush sequence take longer (Operator selectable time from Citect), a Flush Overtime Alarm is generated by the RTU and sent to Citect (Not paged). The Line Flush sequence is then also reset.

4.1.3 Alarms

The RTU monitors the sewer well, pumps and instrumentation and a list of all alarms generated by the RTU and sent to the Citect can be viewed in Appendix B. The following alarms are discussed in more detail are the paged out alarms. Both SCADAs 1 and 2 are configured to page out.

4.1.3.1 Sewer Well - Low Level Alarm

When the well level falls below the Low Level setpoint (set at 10%), the RTU generates Low Level Alarms from both level transmitters which are sent to Citect. Both these Low Level Alarms also serve as backup to stop the pumps whether being controlled in Auto or in Remote Manual. When in MCC Local Manual mode this alarm has no effect on the pump control.

Device Operation	Alarm	Alarm Type	Alarm Setpoint
Hydrostatic Level Transmitter	Low Level Alarm LIT001LA	Category 1 - Paged	10%
Ultrasonic Level Transmitter	Low Level Alarm LIT002LA	Category 1	10%

4.1.3.2 Sewer Well - High Level Alarm

When the well level rises above the High Level setpoint (set at 90%), the RTU generates High Level Alarms from both level transmitters which are sent to Citect.

Device Operation	Alarm	Alarm Type	Alarm Setpoint
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Device Operation	Alarm	Alarm Type	Alarm Setpoint
Hydrostatic Level Transmitter	High Level Alarm LIT001HA	Category 1 - Paged	90%
Ultrasonic Level Transmitter	High Level Alarm LIT002HA	Category 1	90%

4.1.3.3 Sewer Well - High High Level Alarm

When the level rises above the well High High Level setpoint (set at 95%), the RTU generates High High Level Alarms from both level transmitters which are sent to Citect.

Device Operation	Alarm	Alarm Type	Alarm Setpoint
Hydrostatic Level Transmitter	High High Level Alarm – LIT001HHA	Category 1 - Paged	95%
Ultrasonic Level Transmitter	High High Level Alarm – LIT002HHA	Category 1	95%

4.1.3.4 Sewer Well - Transmitter Fault Alarm

When the well level transmitter readings go below 4mA for a period longer than 5 minutes they are in fault and alarms are generated by the RTU and sent to the Citect.

Device Operation	Alarm	Alarm Type
Hydrostatic Level Transmitter	Transmitter Fault Alarm – LIT001LPF	Category 1 - Paged
Ultrasonic Level Transmitter	Transmitter Fault Alarm – LIT002LPF	Category 1

4.1.3.5 Sewer Well - No Change in Level Alarm

Due to the nature of a sewer well, the well level will trend in a repetitive pattern. If the well level doesn't change more than the Change in Level Setpoint in the specified Time Period Setpoint an alarm is sent to Citect. If the Time Period Setpoints is set to 0 then the alarm will be disabled.

Device Operation	Alarm	Alarm Type
Hydrostatic Level Transmitter	No Change Alarm LIT001RNC	Category 1 - Paged
Ultrasonic Level Transmitter	No Change Alarm LIT002RNC	Category 1

4.1.3.6 Sewer Well - Deviation in Level Alarm

With the use of the two level sensors monitoring the well they have the ability to monitor it each other. If the two level sensors levels vary by more than the Level Deviation setpoint (Set at 5%) for longer than 5 minutes, then an alarm will be sent to Citect. If the Level Deviation Setpoint is set to 0 then the alarm is disabled.

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Device Operation	Alarm	Alarm Type
Hydrostatic Level Transmitter	Deviation in Level Alarm – LIT002DIF	Category 1
Ultrasonic Level Transmitter		

4.1.3.7 Pump Alarms - Pump Fault

A fault can be generated from the Softstarter and an alarm is sent to Citect. This alarm will shut down its corresponding pump and will not restart until the problem is rectified and the alarm is reset remotely from Citect.

Device Operation	Alarm	Alarm Type
Pump 1	Fault Alarm – PMP001Flt	Category 1 - Paged
Pump 2	Fault Alarm – PMP002Flt	Category 1 - Paged

4.1.3.8 Pump Alarms - Pump Fail to Start

When the RTU has tried to start the Duty pump and the pump has not returned a running indication in a specified time (60 seconds) an alarm is sent to Citect. The Fail to Start contact will shut down the pump and it will not restart until the problem is rectified and the alarm is reset remotely from Citect. A Duty/Standby changeover will be initiated and the other pump will be started.

Device Operation	Alarm	Alarm Type
Pump 1	Fail to Start Alarm – PMP001FTS	Category 1 - Paged
Pump 2	Fail to Start Alarm – PMP002FTS	Category 1 - Paged

4.1.3.9 Pump Alarms - No Pumps Run

When no pumps are running and the number of hours has passed above the No Pump Run Setpoint (set at 4 hours) an alarm is sent to Citect.

Device Operation	Alarm	Alarm Type
Pumps 1 & 2	No Pump Run Alarm - NoPumpsRun	Category 1 - Paged

4.1.3.10 RTU Module Hardware Alarm

When the RTU detects a hardware error and persists for longer than 30 seconds, a Hardware Alarm is sent to Citect.

Device Operation	Alarm	Alarm Type
RTU Hardware	RTU Module Hardware Alarm - HWAlarm	Category 1 - Paged

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4.1.3.11 Mains Power Fault Alarm

When the RTU loses the Main Power Healthy digital Input, an alarm is sent to Citect.

Device Operation	Alarm	Alarm Type
Mains Power	Main Power Fault Alarm - MainsPwr	Category 1 - Paged

4.1.3.12 Tamper Alarm

All the Tamper switches are wired in series so that when the RTU loses the Digital input an alarm is sent to Citect after a 10 second delay. This alarm will also activate the Station Flashing Alarm Light.

Device Operation	Alarm	Alarm Type
Tamper Switches	Tamper Alarm - Tamper	Category 1 - Paged

4.1.4 Backup Control

The ENM-13 Ball Float is the Backup Control System used at Salesyard Road and works independently of the RTU control. It is wired directly to the pump controls and controls the pumps should a failure occur to the RTU or the level transmitters. The timer has been specifically set to be able to keep the pump running to drain the level down to the pump stop level.

The Backup Control system will automatically start the pumps if the local Man/Off/Auto select switch is in Auto position. A pump will not start if its switch is in the OFF position.

4.1.5 Station Generator

The standby generator changeover connection cabinet has been wired up but the inputs to the RTU have not been wired.

The standby generator should be able to run the station when mains power is not available.

Device Operation	Description
Running	Generator is running
Fault	Generator has Faulted
Tamper	Generator is on site and the supply to the battery charger is functional

Table 10 – Generator Status

On the site page in the Citect popup under the engineering tab, generator on site can be set to 1 and then a generator symbol will appear on the site page i.e. show whether a generator is on site or not.

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4.1.6 Two Pump Sewage Pump Station– Inputs/Outputs

The following RTU Inputs/Outputs are wired. (✓ = Wired)

4.1.6.1 IO List

DI-5	Physical Slot 2	Wired
DI Ch1	S139: Mains Power Healthy	✓
DI Ch2	S139: Tamper Alarm	✓
DI Ch3	S139: Pump 1 Running	✓
DI Ch4	S139: Pump 1 Fault	✓
DI Ch5	S139: Pump 1 Remote	✓
DI Ch6	S139: Pump 2 Running	✓
DI Ch7	S139: Pump 2 Fault	✓
DI Ch8	S139: Pump 2 Remote	✓
DI Ch9	S139: Pump 3 Running	
DI Ch10	S139: Pump 3 Fault	
DI Ch11	S139: Water Void	
DI Ch12	S139: Dry Well Flood	
DI Ch13	S139: Wet Well High	✓
DI Ch14	S139: Wet Well Overflow	✓
DI Ch15	S139: Fire Alarm	
DI Ch16	S139: Rain Gauge Pulse	

IO-3	Physical Slot 3	Wired
AI Ch1	S139: Flow 1	
AI Ch2	S139: Level 1 Percentage	✓
AI Ch3	S139: Pump 1 Motor Current	✓
AI Ch4	S139: Pump 2 Motor Current	✓
AO Ch1	S139: Pump 1 Speed Reference	
DI Ch1	S139: Spare DI17	
DI Ch2	S139: Generator Online/Running	
DI Ch3	S139: Generator Fault	
DI Ch4	S139: Generator Tamper	
DO Ch1	S139: Pump 1 Run Output	✓
DO Ch2	S139: Pump 2 Run Output	✓
DO Ch3	Remote Reset	✓
DO Ch4	Flash Lamp	✓

IO-3	Physical Slot 4	Wired
AI Ch1	S139: Pump 1 Speed Feedback	
AI Ch2	S139: Pump 2 Speed Feedback	

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IO-3	Physical Slot 4	Wired
AI Ch3	S139: Level 2 Percentage	√
AI Ch4	S139: Spare AI 8	
AO Ch1	S139: Pump 2 Speed Reference	
DI Ch1	S139: Wet Well Low Alarm	
DI Ch2	S139: Spare DI22	
DI Ch3	S139: Spare DI23	
DI Ch4	S139: Spare DI24	
DO Ch1	Pump 1 Backup Disable	
DO Ch2	Pump 2 Backup Disable	
DO Ch3	n/a	
DO Ch4	n/a	

Table 11 – 2 Pump Sewage Pump Station RTU I/O

4.1.7 Analogue Measurements Scaling

The scaling for the analogue meters at 2 Pump Sewage Pump Station is:

- Hydrostatic (Level 1) = 0...100%
- Ultrasonic (Level 2) = 0...100%

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5.0 APPENDIX A – RTU MODULE SPECIFICATIONS

5.1 Appendix A1 – PC-1 Processor & Power Supply Module

PROCESSOR	
Processor Type	Intel 80C188
Word Size	16 Bit internal data bus 8 Bit external data bus
Clock Speed	16MHz
BIOS	Yes
Flash Memory	128K Total. 28K for firmware drivers.
Static CMOS RAM	256K
Real-time Clock (RTC)	Yes
Watchdog Timer	Yes
Status Indication	Yes
Battery Type	Lithium. Not rechargeable.
Battery Life - module unpowered	15 Years min. (128K) RAM 10 Years min. (256K) RAM
Battery Replacement	At above intervals
Communication Ports	2
Port 1 (RS232)	Serial, 300 to 115200 Baud
Port 2 (Optional)	Serial, Radio, 2-Wire Line or 4-Wire Line 300 to 115200 Baud (depending on port type)
Modem Port 2 CCITT V23 (Optional)	1200 Baud
Communications	Master / Outstation
Configuration Software	Toolbox
Diagnostics Software	Yes
Basic Configuration	Auto on power-up
Complex Configuration	Toolbox
RTU Address Range	1 – 249
Communications Protocol	Kingfisher, Modbus, + many more
Analog Block Processing	Yes
PID Block Processing	Yes
Logic Processing	Ladder
CPUs per RTU	1
Internal Power Consumption	120mA from +5VDC
Auxiliary 24V Converter	10 Watts, 400mA @ 24VDC
I/O Bus Data Rate	250 kBit/s
CM Bus Data Rate	83 kBit/s
Cyclic Redundancy	Port 1 and 2
Operating Temperature	-20 to 70°C
Storage Temperature	-40 to 85°C
Operating Humidity	5 to 99% RH non-condensing

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PC-1 POWER SUPPLY		
Input Supply to PC-1	11.5-15VDC @ 4A Max (50W) Typically 13.6VDC if backup battery connected	
Outputs From PC-1	+5VDC @ 1A (5W) to Bus* +12VDC @ 4A Max to Bus* +12VDC @ 2A Max to Vr* +24VDC @ 400mA (10W) to Optional Auxiliary Output (3kV Isolation)*	
Backup Battery *	12V, 7AH typical, 26AH max	
Deep Discharge Protection	RTU Shutdown at 10.8V RTU Startup at 11.8V	
Supply Fuse	8A (Maximum Current into the PC-1)	
Battery Fuse	8A (Maximum Current into or out of battery)	
Combined Vr and 24VDC Fuse	3A Polyfuse	
Monitoring	Item	Accuracy
	Battery Current	± 10%
	PC-1 Supply Voltage	± 5%
	PC-1 Supply Current	± 10%
	PC-1 Temperature	± 5%
	Battery low	N/A
	Battery Charging	N/A
	Battery Discharging	N/A
	Aux. 24V present AC present (determined from Battery Discharging signal)	N/A N/A

* Note: power output is dependent on power supply to the PC-1. Most PC-1s are powered using the 35W PSU-3 power supply.
The +24V converter is optional and must be ordered with the PC-1.

Table 12 – PC-1 Processor & Power Supply Module Specifications

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5.2 Appendix A2 – DI-5 16 Channel DC Input Module Specification

Output Power	12VDC @ 80mA (1W) isolated, supplied by module
Input Voltage Range	± 10 to 28 VDC (can use reverse polarity) (0 to 3.5V=OFF, 7.5 to 28V=ON)
Inputs per Module	16
Isolation	1000 Volts RMS between field and logic
Contact Current	4mA (typical)
Input Characteristics:	
On-state Current	4.3mA minimum
Off-state Current	1mA maximum
On response Time	Digital Inputs 1 and 2: 50 μ s maximum Digital Inputs 3 and 4: 500 μ s maximum Digital Inputs 5 to 16: 10ms maximum
Off response Time	Digital Inputs 1 and 2: 50 μ s maximum Digital Inputs 3 and 4: 500 μ s maximum Digital Inputs 5 to 16: 17ms maximum
Operating Temperature	-20 ° to 70 ° C
Storage Temperature	-40 ° to 85 ° C
Operating Humidity	5 to 98% non-condensing
Pulse Totalisation	Digital Inputs 1 to 4: 0-65535 Pulses
Pulse Rates / Frequency	Digital Inputs 1 and 2: 10kHz maximum Digital Inputs 3 and 4: 255 Hz maximum

Table 13 – IO-3 Combination Analog/Digital I/O Module Specifications

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5.3 Appendix A3 – IO-3 Combination Analog/Digital Module Specification

ANALOG INPUTS	
Input Current Ranges	4 to 20mA and 0 to 20mA
Input Voltage Ranges *	1 to 5V and 0 to 5V *
Calibration	Factory calibrated to 5µA
Update Rate	2 msec (all four channels)
Accuracy	± 0.1% @ 25°C. ± 0.25% @ -20 to 70°C
Resolution	12 bit (no sign bit)
Common Mode Voltage	1500 Volts
Linearity	<1 Least Significant Bit
Isolation	1000 Volts RMS between field and logic
Common Mode Rejection	>70 dB at DC; >70 dB at 60 Hz
Cross-Channel Rejection	>60 dB from DC to 1 kHz
Input Impedance	250 ohms (100 ohms optional)
Input Filter Response	325 Hz
ANALOG OUTPUT	
Output Current Range	4 to 20mA and 0 to 20mA
Calibration	Factory calibrated to 69µA per count
Supply Voltage (nominal)	+5V and +12VDC from backplane
Update Rate	250 msec (all channels) Determined by I/O scan time, and is application dependent
Accuracy	± 0.2% @ 25°C. ± 0.5% @ -20 to 70°C
Resolution	12 bit (no sign bit)
User Load	0 to 850 ohms
Output Load Capacitance	2000 pF
Output Load Inductance	1H
Isolation	1000 Volts RMS between field and logic

* Analog inputs can be modified from current inputs to voltage inputs by lifting one leg of the 250 ohm channel resistor. Each channel has its own resistor, so any combination of channels can be converted. If necessary, the response time of the analog input can be improved by replacing the 250 ohm resistor with a 100k resistor. It is recommended that modules be returned to RTU.net for factory conversion if required. No responsibility will be taken by RTU.net for damage caused to boards during modification performed by clients. The circuit board resistors to change are: channels 1 - 4 = R 39, R41, R43 and R45

Table 14 – IO-3 Combination Analog/Digital I/O Module Specifications

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6.0 APPENDIX B – RTU ALARMS TO CITECT

6.1 Appendix B – Alarms from RTU to Citect – Showing which are Paged Out.

Tag	Description	SCADA1 Paged Out	SCADA2 Paged Out
S139_24VoltsOK	24 Volts OK		
S139_CbusFail	Comms Bus Fail		
S139_FIT001HA	Outflow High Alarm		
S139_FIT001LPF	Outflow Transmitter Fault		
S139_FlushFault	Line Flush Fault		
S139_FlushNoProbe	High Probe Alarm Failed During Line Flush		
S139_FlushOTime	Line Flush has run Overtime		
S139_GeneratorFault	Generator Failure (Not available)	Y	Y
S139_GeneratorOnline	Generator Running (Not Available)	Y	Y
S139_GeneratorTamper	Generator On Site		
S139_HWAAlarm	RTU Module Hardware Alarm	Y	Y
S139_HWFItC1	Hardware Fault Card 1		
S139_HWFItC2	Hardware Fault Card 2		
S139_HWFItC3	Hardware Fault Card 3		
S139_HWFItC4	Hardware Fault Card 4		
S139_IOScan	IO Scanning Disabled		
S139_LIT001HA	Wet Well Level High Alarm	Y	Y
S139_LIT001HHA	Wet Well Level Overflow Alarm	Y	Y
S139_LIT001LA	Wet Well Level Low Alarm	Y	Y
S139_LIT001LPF	Wet Well Level Transmitter Fault	Y	Y
S139_LIT001RNC	Wet Well Level No Change Alarm	Y	Y
S139_LIT002DIF	Level 1 and Level 2 are Different by XX%		
S139_LIT002HA	Wet Well Level2 High Alarm		
S139_LIT002HHA	Wet Well Overflow Alarm		
S139_LIT002LA	Level 2 Low Alarm		
S139_LIT002LPF	Level 2 Transmitter Fault		
S139_LIT002RNC	Wet Well Level 2 No Change Alarm		
S139_Llen	Ladder Program Disabled		
S139_LOSAlarm	RTU Battery Not Charging Alarm		
S139_MainsPwr	Mains Power Fault	Y	Y

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Tag	Description	SCADA1 Paged Out	SCADA2 Paged Out
S139_NoPumpsRun	No Pumps Run for XXX Hours Alarm	Y	Y
S139_Person1	CardData(S139_SecurCard1)		
S139_Person2	CardData(S139_SecurCard2)		
S139_Person3	CardData(S139_SecurCard3)		
S139_Person4	CardData(S139_SecurCard4)		
S139_Person5	CardData(S139_SecurCard5)		
S139_PMP001Ctrl	Remote Manual Control		
S139_PMP001Flt	Pump 1 Fault	Y	Y
S139_PMP001FltXE	Pump 1 Fault XS Events Alarm		
S139_PMP001FltXH	Pump 1 Fault XS Hours Alarm		
S139_PMP001FTS	Pump 1 Failed To Start Alarm	Y	Y
S139_PMP001Rem	Pump 1 In Local Alarm		
S139_PMP001RunXE	Pump 1 Run XS Events Alarm		
S139_PMP001RunXH	Pump 1 Run XS Hours Alarm		
S139_PMP002Ctrl	Remote Manual Control		
S139_PMP002Flt	Pump 2 Fault	Y	Y
S139_PMP002FltXE	Pump 2 Fault XS Events Alarm		
S139_PMP002FltXH	Pump 2 Fault XS Hours Alarm		
S139_PMP002FTS	Pump 2 Failed To Start Alarm	Y	Y
S139_PMP002Rem	Pump 2 In Local Alarm		
S139_PMP002RunXE	Pump 2 Run XS Events Alarm		
S139_PMP002RunXH	Pump 2 Run XS Hours Alarm		
S139_Reset Lock	Pump Remote Reset Actuated - Lock Out for 15 Min		
S139_RTCFail	Real Time Clock Fail		
S139_RTU_FailedInd	RTU Comms Fault	Y	Y
S139_SupplyOK	RTU Battery Flat alarm <12.7V		
S139_Tamper	Tamper Alarm	Y	Y
S139_TestVoid	Water Void	Y	Y

Table 15 – All RTU Alarms to Citect Showing Paged Alarms