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Paul O'Kane

Owner/Manager

Paul O'Kane Consultancy Services

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Why have a Standard Switchboard/RTU Panel

TITLE FITS IN WELL WITH THE THEME OF GROUP DISCUSSIONS – 'IMPROVING COSTS, PERFORMANCE, EFFICIENCY & SAFETY.'

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PAUL O'KANE CONSULTANCY SERVICES IS KEY TO AN INTELLIGENT APPROACH IN KEEPING YOUR SWITCHBOARD/PANEL DESIGN COST EFFECTIVE, CONSISTENT & SAFE

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SWITCHBOARD/PANEL MANAGEMENT

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WASTEWATER TREATMENT

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WASTEWATER PUMPING

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CLEAN WATER TREATMENT

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PRESSURE SEWAGE SYSTEM

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BOOSTERS

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GROUND WATER

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WATER INTAKE

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YOUR TRUSTED IMPROVING COSTS, PERFORMANCE, EFFICIENCY & SAFETY.’ PARTNER

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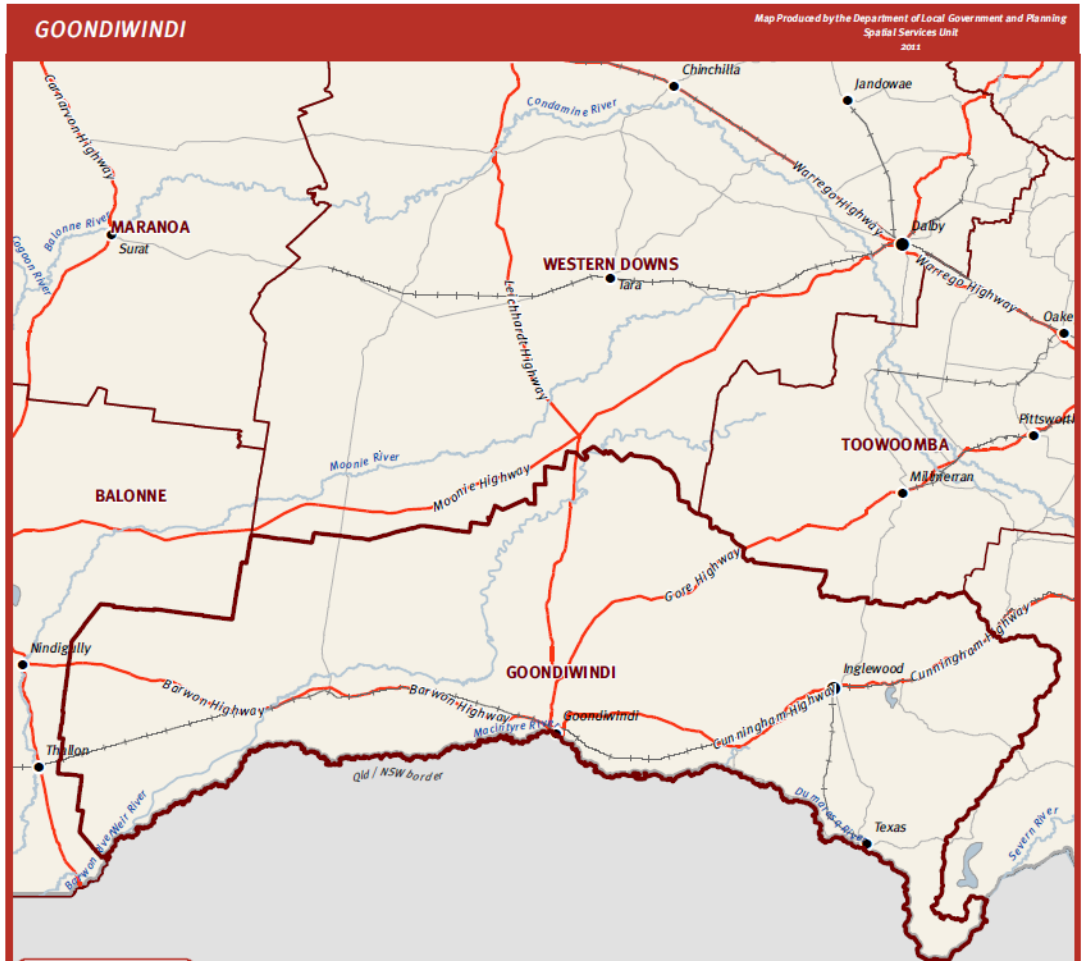
The Project Challenge
Goondiwindi RC Boundaries



• Population	11,413 (2010)[1]
• Density	0.591589/km² (1.53221/sq. mi)
• Area	19,292.1 km² (7,448.7 sq. mi)

Standard Switchboard/Panel Design ensures Monitoring & Control Consistency for every part of the water cycle

MEASURING MONITORING CONTROL SUPERVISION

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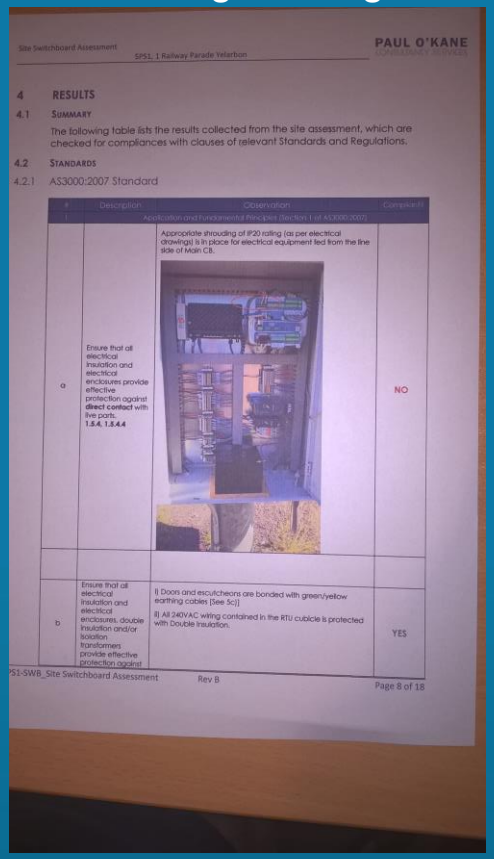
Site Auditing

Condition Assessments
Compliance Auditing
Reverse Engineering



Site Switchboard Assessment — SP51, 1 Railway Parade Yelarbon — PAUL O'KANE CONSULTANCY SERVICES

4 RESULTS

4.1 SUMMARY

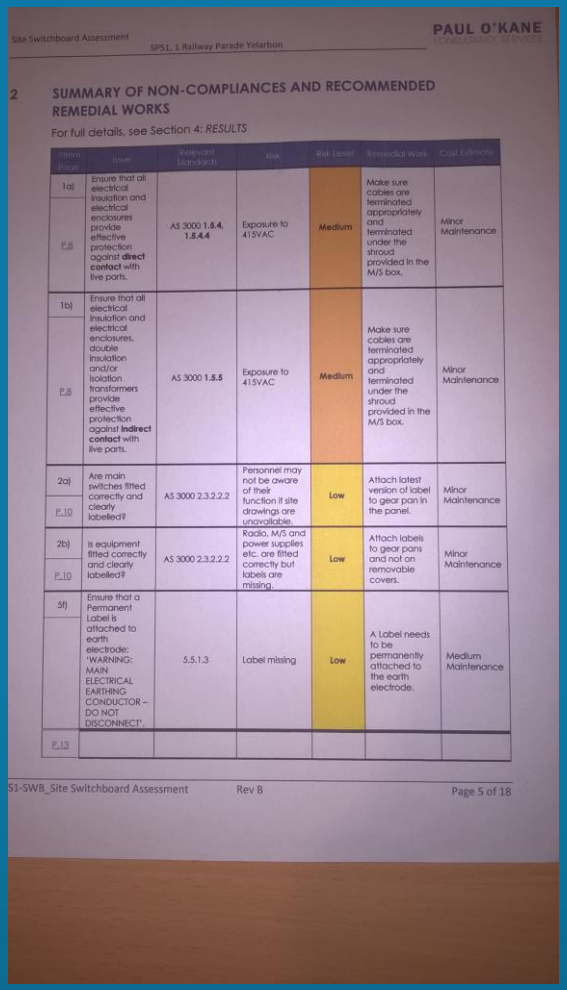
The following table lists the results collected from the site assessment, which are checked for compliances with clauses of relevant Standards and Regulations.

4.2 STANDARDS

4.2.1 AS3000:2007 Standard

#	Description	Observation	Compliant
1	Application and Fundamental Principles (Section 1 of AS3000:2007)		
a	Ensure that all electrical insulation and electrical enclosures provide effective protection against **direct contact** with live parts. **1.5.4, 1.5.4.4**	Appropriate shrouding of IP20 rating (as per electrical drawings) is in place for electrical equipment fed from the line side of Main CB.	NO
b	Ensure that all electrical insulation and electrical enclosures, double insulation and/or isolation transformers provide effective protection against	I) Doors and escutcheons are bonded with green/yellow earthing cables [See 5c)] II) All 240VAC wiring contained in the RTU cubicle is protected with Double Insulation.	YES

S1-SWB_Site Switchboard Assessment Rev B Page 8 of 18



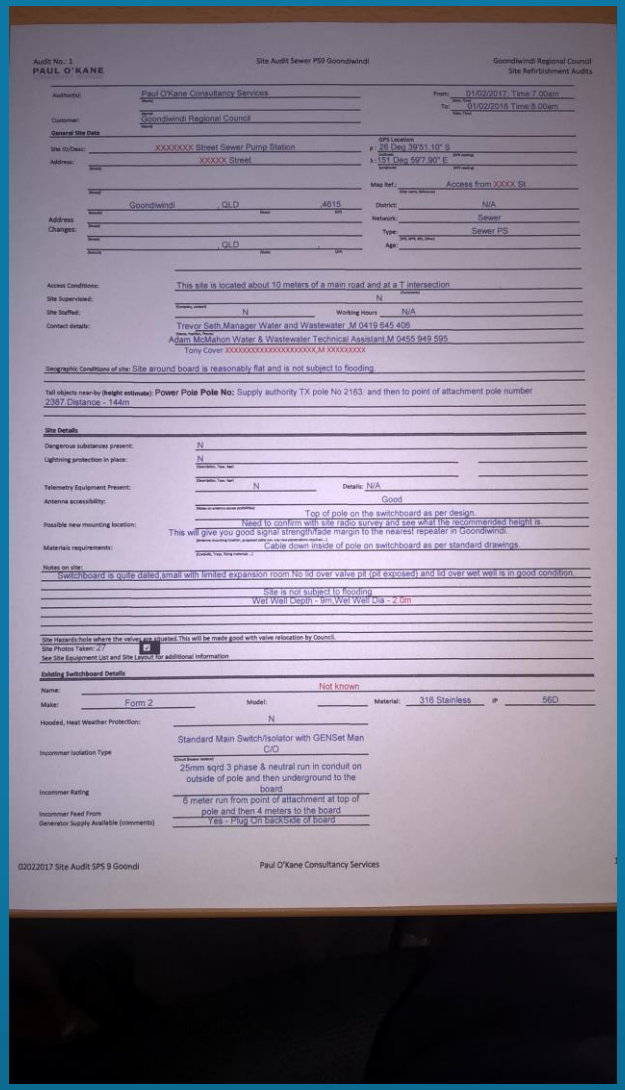
Site Switchboard Assessment — SP51, 1 Railway Parade Yelarbon — PAUL O'KANE CONSULTANCY SERVICES

2 SUMMARY OF NON-COMPLIANCES AND RECOMMENDED REMEDIAL WORKS

For full details, see Section 4: *RESULTS*

Item Page	Issue	Relevant Standards	Risk	Risk Level	Remedial Work	Cost Estimate
1a) P.8	Ensure that all electrical insulation and electrical enclosures provide effective protection against **direct contact** with live parts.	AS 3000 **1.5.4. 1.5.4.4**	Exposure to 415VAC	Medium	Make sure cables are terminated appropriately and terminated under the shroud provided in the M/S box.	Minor Maintenance
1b) P.8	Ensure that all electrical insulation and electrical enclosures, double insulation and/or isolation transformers provide effective protection against **indirect contact** with live parts.	AS 3000 **1.5.5**	Exposure to 415VAC	Medium	Make sure cables are terminated appropriately and terminated under the shroud provided in the M/S box.	Minor Maintenance
2a) P.10	Are main switches fitted correctly and clearly labelled?	AS 3000 2.3.2.2.2	Personnel may not be aware of their function if site drawings are unavailable.	Low	Attach latest version of label to gear pan in the panel.	Minor Maintenance
2b) P.10	Is equipment fitted correctly and clearly labelled?	AS 3000 2.3.2.2.2	Radio, M/S and power supplies etc. are fitted correctly but labels are missing.	Low	Attach labels to gear pans and not on removable covers.	Minor Maintenance
5f)	Ensure that a Permanent Label is attached to earth electrode: 'WARNING: MAIN ELECTRICAL EARTHING CONDUCTOR – DO NOT DISCONNECT'.	5.5.1.3	Label missing	Low	A Label needs to be permanently attached to the earth electrode.	Medium Maintenance
P.13						

S1-SWB_Site Switchboard Assessment Rev B Page 5 of 18



Audit No.: 1 — PAUL O'KANE — Site Audit Sewer PS9 Goondiwindi — Goondiwindi Regional Council Site Refirbishment Audits

Auditor(s): Paul O'Kane Consultancy Services — From: 01/02/2017, Time: 7:00am — To: 01/02/2016 Time: 5:00am

Customer: Goondiwindi Regional Council

General Site Data

Site ID/Desc: XXXXXXX Street Sewer Pump Station — GPS Location: φ: 28 Deg 39'51.10" S — λ: 151 Deg 59'7.90" E

Address: XXXXX Street — Map Ref.: Access from XXXX St

Address Changes: Goondiwindi QLD 4615 — District: N/A — Network: Sewer — Type: Sewer PS — Age:

Access Conditions: This site is located about 10 meters of a main road and at a T intersection

Site Supervised: N

Site Staffed: N — Working Hours N/A

Contact details: Trevor Seth,Manager Water and Wastewater M 0419 645 406
Adam McMahon Water & Wastewater Technical Assistant M 0455 949 595
Tony Cover XXXXXXXXXXXXXXXXXXXXX,M XXXXXXXXX

Geographic Conditions of site: Site around board is reasonably flat and is not subject to flooding

Tall objects near-by (height estimate): Power Pole Pole No: Supply authority TX pole No 2163. and then to point of attachment pole number 2387.Distance - 144m

Site Details

Dangerous substances present: N

Lightning protection in place: N

Telemetry Equipment Present: N — Details: N/A

Antenna accessibility: Good

Possible new mounting location: Top of pole on the switchboard as per design.
Need to confirm with site radio survey and see what the recommended height is.
This will give you good signal strength/fade margin to the nearest repeater in Goondiwindi.

Materials requirements: Cable down inside of pole on switchboard as per standard drawings.

Notes on site: Switchboard is quite dated,small with limited expansion room.No lid over valve pit (pit exposed) and lid over wet well is in good condition.
Site is not subject to flooding
Wet Well Depth - 8m,Wet Well Dia - 2.0m

Site Hazards:hole where the valves are situated.This will be made good with valve relocation by Council.
Site Photos Taken: 27
See Site Equipment List and Site Layout for additional Information

Existing Switchboard Details

Name: Not known

Make: Form 2 — Model: — Material: 316 Stainless — IP 56D

Hooded, Heat Weather Protection: N

Incommer Isolation Type: Standard Main Switch/Isolator with GENSet Man C/O

Incommer Rating: 25mm sqrd 3 phase & neutral run in conduit on outside of pole and then underground to the board

Incommer Feed From: 6 meter run from point of attachment at top of pole and then 4 meters to the board

Generator Supply Available (comments): Yes - Plug On backside of board

02022017 Site Audit SP5 9 Goondi — Paul O'Kane Consultancy Services

MEASURING MONITORING CONTROL SUPERVISION

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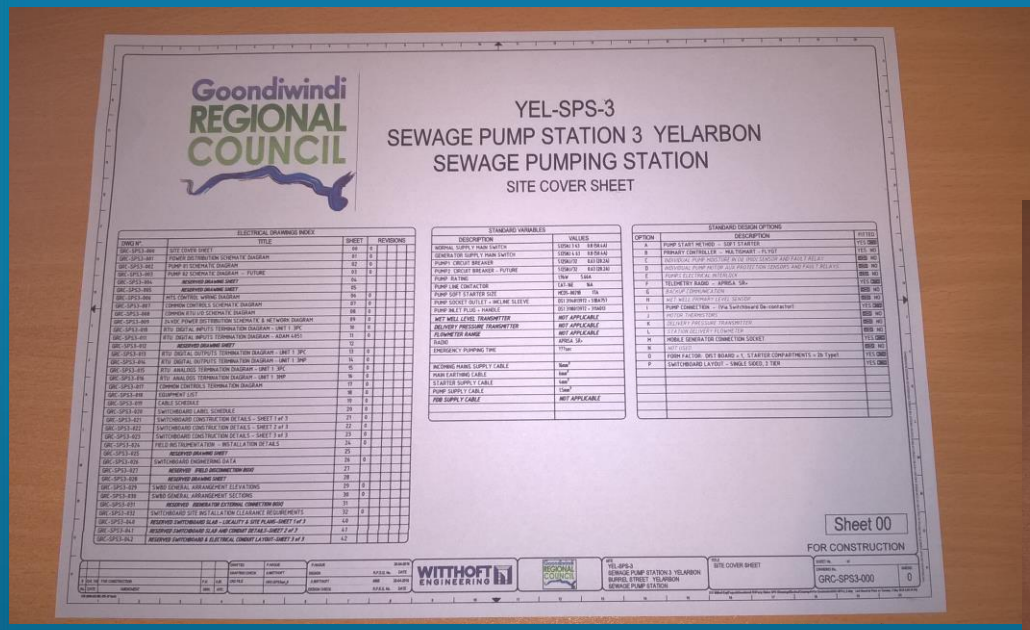
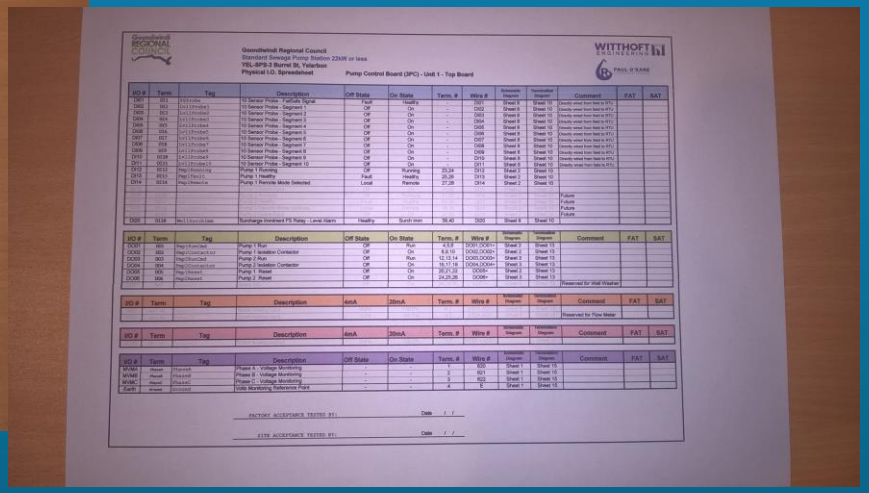
Standards Development

Our engineers have extensive experience in developing organisational standards for electrical design and installation including:

- Standard Drawings
- Standard Specifications
- Drafting Guidelines
- PLC Programming Requirements
- SCADA Standards





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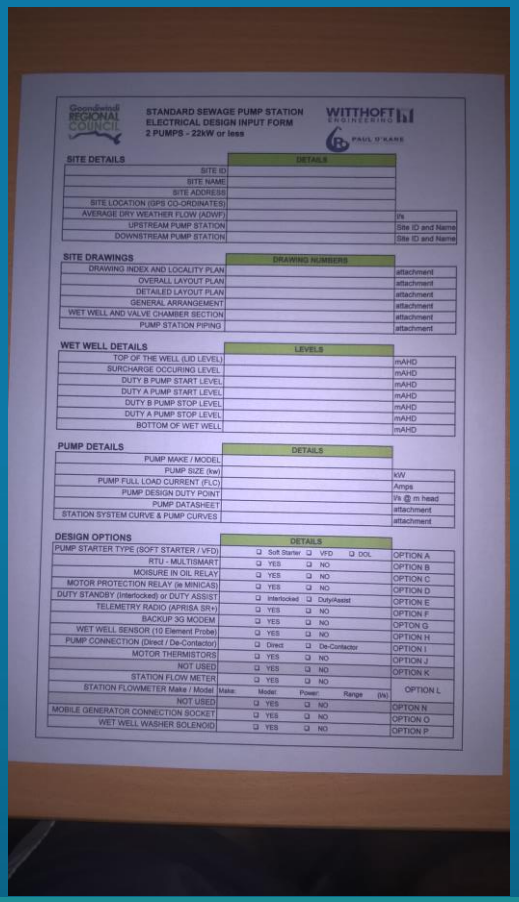
Design

- Concept and Preliminary Design
- Detailed Design
- RPEQ



Goondiwindi REGIONAL COUNCIL

STANDARD SEWAGE PUMP STATION
ELECTRICAL DESIGN INPUT FORM
2 PUMPS - 22kW or less

WITTHOFT ENGINEERING
PAUL O'KANE

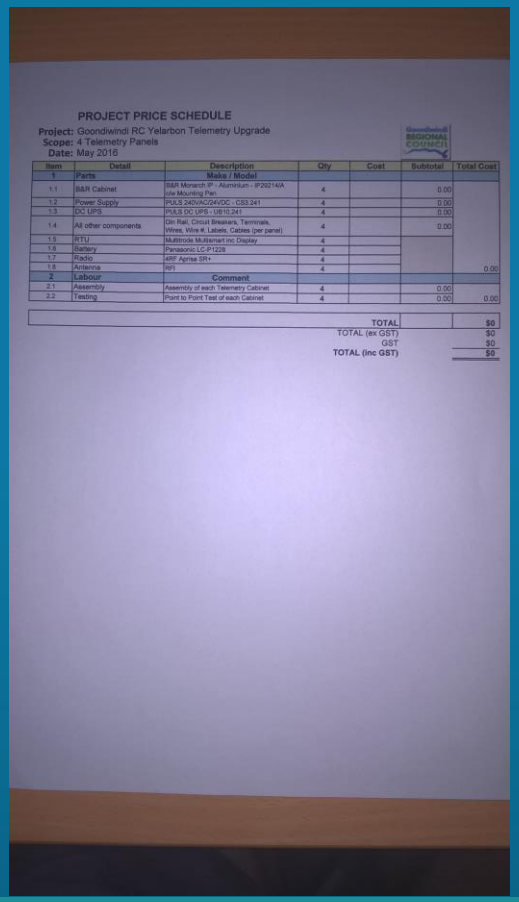
SITE DETAILS	DETAILS	
SITE ID		
SITE NAME		
SITE ADDRESS		
SITE LOCATION (GPS CO-ORDINATES)		
AVERAGE DRY WEATHER FLOW (ADWF)		l/s
UPSTREAM PUMP STATION		Site ID and Name
DOWNSTREAM PUMP STATION		Site ID and Name

SITE DRAWINGS	DRAWING NUMBERS	
DRAWING INDEX AND LOCALITY PLAN		attachment
OVERALL LAYOUT PLAN		attachment
DETAILED LAYOUT PLAN		attachment
GENERAL ARRANGEMENT		attachment
WET WELL AND VALVE CHAMBER SECTION		attachment
PUMP STATION PIPING		attachment

WET WELL DETAILS	LEVELS	
TOP OF THE WELL (LID LEVEL)		mAHD
SURCHARGE OCCURING LEVEL		mAHD
DUTY B PUMP START LEVEL		mAHD
DUTY A PUMP START LEVEL		mAHD
DUTY B PUMP STOP LEVEL		mAHD
DUTY A PUMP STOP LEVEL		mAHD
BOTTOM OF WET WELL		mAHD

PUMP DETAILS	DETAILS	
PUMP MAKE / MODEL		
PUMP SIZE (kw)		kW
PUMP FULL LOAD CURRENT (FLC)		Amps
PUMP DESIGN DUTY POINT		l/s @ m head
PUMP DATASHEET		attachment
STATION SYSTEM CURVE & PUMP CURVES		attachment

DESIGN OPTIONS	DETAILS	
PUMP STARTER TYPE (SOFT STARTER / VFD)	❑ Soft Starter ❑ VFD ❑ DOL	OPTION A
RTU - MULTISMART	❑ YES ❑ NO	OPTION B
MOISURE IN OIL RELAY	❑ YES ❑ NO	OPTION C
MOTOR PROTECTION RELAY (ie MINICAS)	❑ YES ❑ NO	OPTION D
DUTY STANDBY (Interlocked) or DUTY ASSIST	❑ Interlocked ❑ DutyAssist	OPTION E
TELEMETRY RADIO (APRISA SR+)	❑ YES ❑ NO	OPTION F
BACKUP 3G MODEM	❑ YES ❑ NO	OPTION G
WET WELL SENSOR (10 Element Probe)	❑ YES ❑ NO	OPTION H
PUMP CONNECTION (Direct / De-Contactor)	❑ Direct ❑ De-Contactor	OPTION I
MOTOR THERMISTORS	❑ YES ❑ NO	OPTION J
NOT USED	❑ YES ❑ NO	OPTION K
STATION FLOW METER	❑ YES ❑ NO	
STATION FLOWMETER Make / Model	Make: Model: Power: Range (l/s):	OPTION L
NOT USED	❑ YES ❑ NO	OPTON N
MOBILE GENERATOR CONNECTION SOCKET	❑ YES ❑ NO	OPTON O
WET WELL WASHER SOLENOID	❑ YES ❑ NO	OPTION P



PROJECT PRICE SCHEDULE

Project: Goondiwindi RC Yelarbon Telemetry Upgrade
Scope: 4 Telemetry Panels
Date: May 2016

Item	Detail	Description	Qty	Cost	Subtotal	Total Cost
1	Parts	Make / Model				
1.1	B&R Cabinet	B&R Monarch IP - Aluminium - IP20214/A low Mounting Pan	4		0.00	
1.2	Power Supply	PULS 240VAC/24VDC - CS3.241	4		0.00	
1.3	DC UPS	PULS DC UPS - UB10.241	4		0.00	
1.4	All other components	Din Rail, Circuit Breakers, Terminals, Wires, Wire #, Labels, Cables (per panel)	4		0.00	
1.5	RTU	Multitrode Multismart inc Display	4			
1.6	Battery	Panasonic LC-P1228	4			
1.7	Radio	4RF Aprisa SR+	4			
1.8	Antenna	RFI	4			0.00
2	Labour	Comment				
2.1	Assembly	Assembly of each Telemetry Cabinet	4		0.00	
2.2	Testing	Point to Point Test of each Cabinet	4		0.00	0.00

TOTAL	$0
TOTAL (ex GST)	$0
GST	$0
TOTAL (inc GST)	$0

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Power System Analysis, Fault Protection Coordination and Arc Flash Studies.

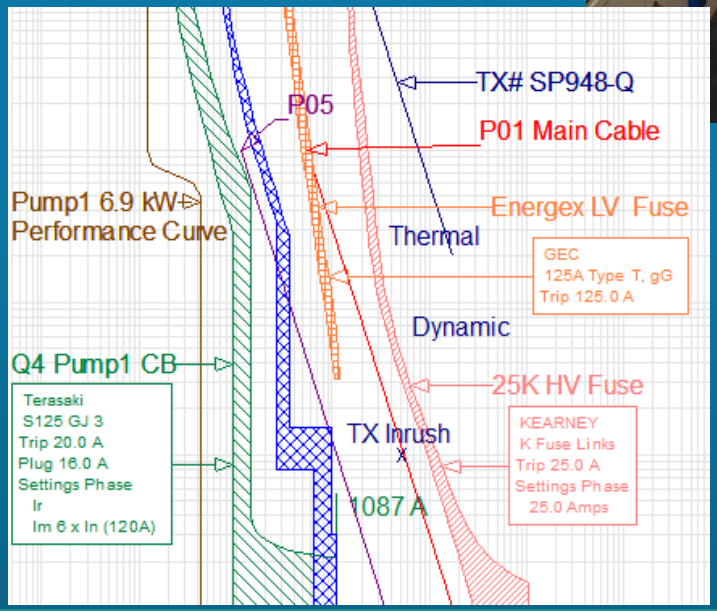
This is dovetailed into our design process to engineer out issues and ensure compliance with AS3000:2007.

We use the following specialised engineering software:

- PowerCAD
- SKM PTW (Power Tools for Windows)

We provide:
- Power System Topology
- Load Flow and Voltage Drop Calculations
- Short Circuit Fault Studies
- Protection System Coordination Study
- Arc Flash Evaluation Study
- A Detailed Report containing:

o Protection Device Settings,
o Time Current Curves
o Switchboard Arc Flash Categorisations



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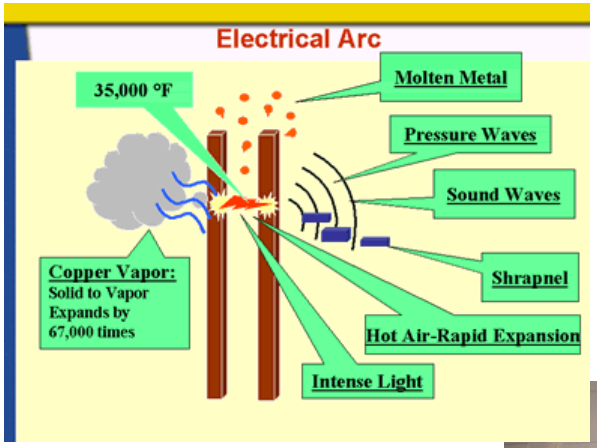
Arc Flash Analysis



Definition

An arc flash happens when electric current flows through an air gap between conductors. Accidents caused by touching a test probe to the wrong surface or slipped tool are the most common cause of an arcing fault. Arc flashes can also be caused by:

- Sparks due to breaks or gaps in the insulation
- Equipment failure due to use of substandard parts, improper installation, or even normal wear and tear
- Dust, corrosion or other impurities on the surface of the conductor

Compilation of Electrical Arc Flash Video

LINK

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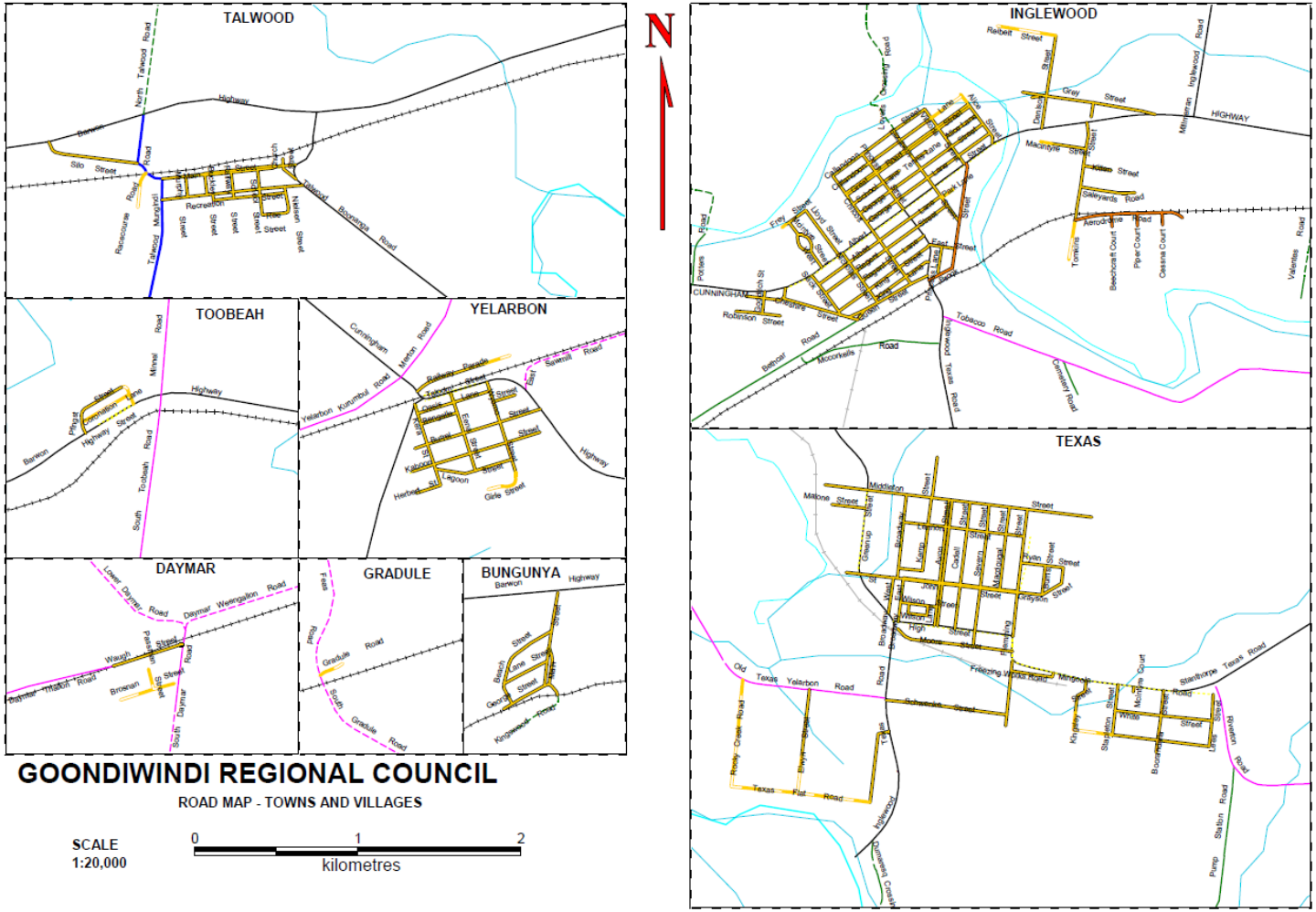
Goondiwindi RC
Next Challenge - Maintenance



MAINTENANCE CHALLENGES

Wasting man hours(internal staff and contractors) due to inconsistent switchboard Standards/Design

Unplanned and nuisance call outs due to differences in switchboard makeup.

Having a Backup Circuit to cope with the loss of the RTU for some reason

Energy waste due to inefficiencies in pump control and pumps not being controlled at the optimal speed.

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DON’T WASTE YOUR TIME,MONEY and COMPROMISE, COST,EFFICIENCIES & SAFETY

LET’S TAKE CONTROL.

Intelligent Treatment Plants & Pump stations with our state-of-the-art Standard Switchboards/Panels,communications & controllers.

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RTU/Pump Station Manager & Pump Station Backup Circuit

- MULTITRODE FSP RELAY AND PROBE AS BACKUP CIRCUIT TO THE RESIDENT RTU

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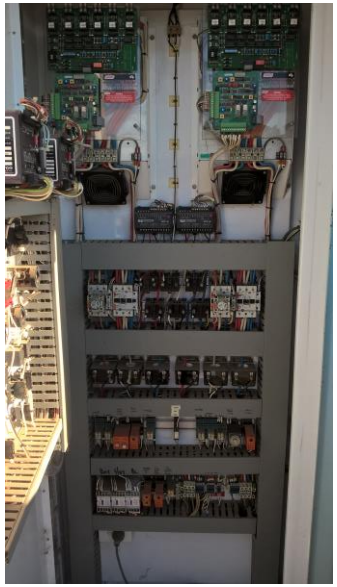
Switchboards / Control Panels



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AC

KNOWLEDGE IS POWER. LET'S SEE THE BIGGER PICTURE.

Intelligent supervision system giving you total control over your complete network

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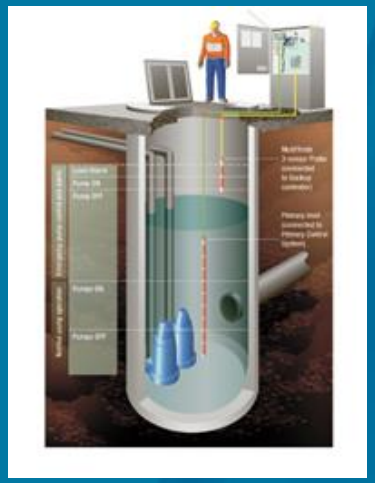
Our endeavour is to solve the Water/Wastewater Challenges Electrically & Hydraulicaly for Goondiwindi RC

- INDUSTRY EXPERIENCE
- PROVIDING A TOTAL SOLUTION
- SITE AUDITING
- PASS ON 100 YEARS OF APPLICATION
- PROJECT PLANNING
- DESIGN
- TENDER/CONTRACT PREPARATION
- POWER SYSTEM ANALYSIS, FAULT PROTECTION COORDINATION AND ARC FLASH STUDIES
- PROGRAMMING(RTU,PLC AND SCADA)
- INSPECTION, TESTING AND COMMISSIONING
- STANDARDS DEVELOPMENT
- PROJECT MANAGEMENT
- EXPERTISE BUILT INTO OUR SOLUTIONS



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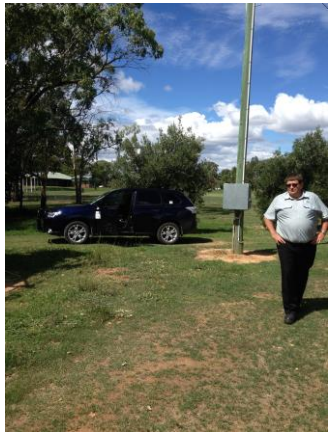
Summary & Conclusion

In conclusion we can see the benefits of Why have a Standard Switchboard/RTU Panel is as follows:

- Additional cost reductions using a formalised set of standards and design and this Pump Station Manager/RTU are:

- Simplified panel construction
- Reductions in board manufacturing costs
- Reductions in installation costs
- Increased reliability and performance due to electronic devices in lieu of electromechanical options
- Reduced maintenance costs
- Improved efficiencies
- Safer environments around switchboards and panels
- Assists in good decision making & vision into all your assets



- Through the Optimisation process at the controller and visibility at both the RTU and the SCADA computer, return on their initial investment in an appreciable period of time. (I.e. Minimum 8 months maximum 18 months)

- Tangible 'Whole of Life Costs' for the enterprise.

- If the system is set up properly initially it will begin to pay for itself immediately.

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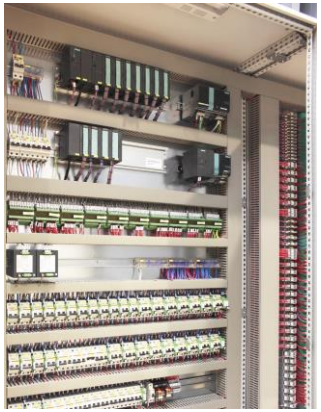
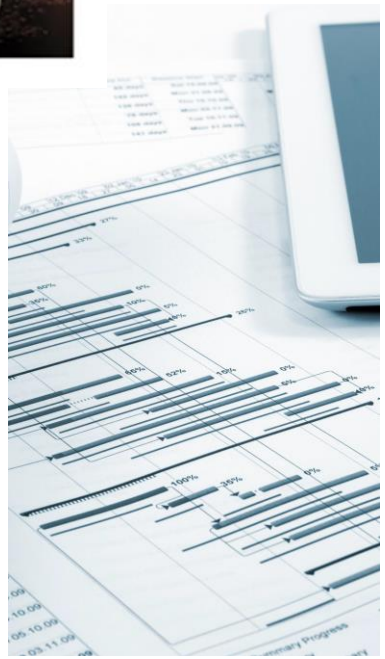
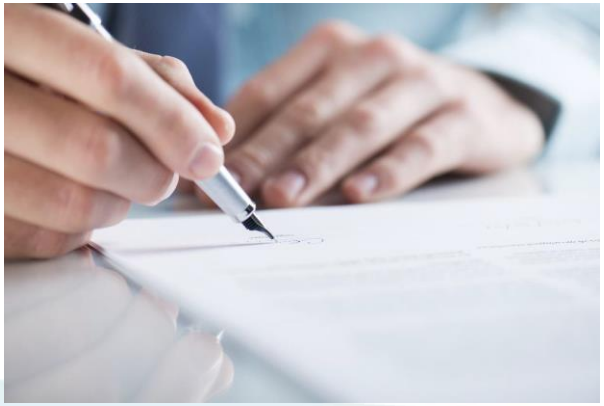
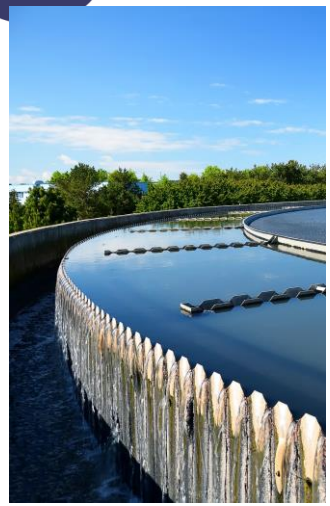
Questions?

Thank you



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