TWEED SHIRE COUNCIL

ELECTRICAL DESIGN SPECIFICATION

EL19

WASTEWATER PUMP STATIONS

Table of Contents

1 CITATION

This document is named "Tweed Shire Council, Electrical Design Specification EL19 - Wastewater Pump Stations"

2 ORIGIN OF DOCUMENT, COPYRIGHT

3 VERSIONS

VERSION	AMENDMENT DETAILS	CLAUSES AMENDED	DATE ISSUED (The new version takes effect from this date)	Authorised by the Director of Engineering Services
1.1	Original version		1 November 2005	

4 STANDARDS

The equipment and materials supplied under this Specification must comply with the latest relevant Australian Standards, or, in their absence, with the latest relevant IEC Standards, together with the requirements of competent Authorities having jurisdiction over all or part of their manufacture, installation and operation.

In particular, all equipment and materials supplied must comply with the relevant requirements of the following Regulations, Standards and Reference Specifications.

AS 1319 Safety Signs for the Occupational Environment

AS 60044 Instrument transformer - Current transformers

AS 1930 Circuit Breakers for Distribution Circuits (up to and including 1000V ac and 1200V dc)

AS 1939 Degrees of Protection Provided by Enclosures for Electrical Equipment (IP Code)

AS 2184 Low Voltage Switchgear and Controlgear - Moulded Case Circuit Breakers for Rated Voltages up to and including 600V ac and 250V dc.

AS 2700 Colour Standards for General Purposes

AS 2768 Electrical Insulating Materials - Evaluation and Classification based on Thermal Endurance

AS 3000 Electrical Installations (Australian Wiring Rules)

AS 3439	Low-Voltage Switchgear and Controlgear Assemblies
Part 1:	Type-Tested and Partially Type-Tested Assemblies
AS 3947	Low Voltage Switchgear and Controlgear
Part 1:	General Rules
Part 3:	Switches, Disconnectors, Switch-Disconnectors and Fuse-Combination Units
Part 4:	Contactors and Motor Starters
Part 5:	Control Circuit Devices and Switching Elements
Part 7:	Ancillary Equipment

5 STANDARD SPECIFICATIONS

Council standard specification listed below shall also apply to supply and installation of equipment for sewage pump stations.

EL01 - General Requirements and Information

EL02 - Equipment Designation

EL03 - Preferred Electrical and Instrument Equipment

EL04 - Installation of Instrument and ELectrical Works

EL06 - Corrosion Protection for Electrical and Mechanical Equipment Structures

EL07 - Electric Motors

EL08 - Field Control Panels

EL09 - Variable Speed Drives

EL10 - Lighting and Small Power

EL12 - Process Control Instruments

EL13 - Electrical Field Equipment

EL14 - General Switchboard Requirements

EL15 - Low Voltage Switchboards

EL18 - Operating and Maintenance Manuals

6 SWITCHBOARDS/MOTOR CONTROL CENTRES.

Where a new motor control centre and/or switchboard is to be installed at the pump station, it shall be constructed, tested, installed and commissioned in accordance with Standard Specifications:

EL01 - General Requirements and Information

EL02 - Equipment Designation

EL03 - Preferred Electrical and Instrument Equipment

EL04 - Installation of Electrical and Instrumentation Works

EL06 - Corrosion Protection for Electrical and Mechanical Equipment Structures

EL09 - Variable Speed Drives

EL10 - Lighting and Small Power

EL14 - General Switchboard Requirements

EL15 - Low Voltage Switchboards

EL18 - Operating and Maintenance Manuals

7 FIELD MOUNTED EQUIPMENT

All field mounted electrical including local control stations for the pump drives shall be constructed, installed and commissioned in accordance with standard specification

EL13 - Electrical Field Equipment

8 WASTEWATER PUMP STATION CONTROL AND OPERATIONAL DATA REQUIREMENTS

8.1 General

All new telemetry equipment supplied for wastewater sites shall be capable of seamlessly integrating in the existing network without redesign of the network communications system, operator interface or control philosophies. No degradation of the communications systems performance will be acceptable. Council uses Multitrode Outpost as its main telemetry SCADA System.

Multitrode MT2PC2 Controllers and Monitor Pro shall be used as a minimum for all 2 pump wastewater pump station control.

Multitrode MT2PC3 Controllers and Monitor Pro shall be used as a minimum for all 3 pump wastewater pump station control.

8.2 Wastewater Pump Control

8.2.1 Normal Control

Normal operation is for two pumps in duty/standby cyclic configuration unless otherwise stated.

8.2.2 Motor starting

Wastewater pump stations shall have solid state soft starters or VSD controllers where specified. DOL, autotransformer, star/delta or any other type of non-electronic motor starter will not be accepted. All soft starters shall have a bypass contactor installed, either integral to the unit or external.

8.2.3 Level sensing

All wastewater pump stations shall use a standard Multitrode level probe connected to the MT2PC or MT3PC controller as the primary level sensing device. On large or regional pump stations an additional ultrasonic level transmitter shall be installed to monitor the full level of the well and for backup alarms. This device shall be wired to the Monitor Pro as per standard drawing E_901_04 *Ray, need correct drawing number here*. An additional Multitrode single sensor shall be fitted to all wastewater pump stations and installed at the design overflow level. The sensor shall be connected to the MT2PC controller as drawing E_901_03 *Ray, need correct drawing number here*

8.2.3.1 Flow sensing

The use of proximity or limit switches for flow/no flow applications will not be acceptable. Where flow/no flow indication is required a separate flow sensor/amplifier combination to IFMV2000 shall be used. Plug in cables shall be used where practicable.

8.2.4 Oxygen Injection Stations

A Run/OFF/Auto selector switch shall control oxygen Injection as follows:-

Auto RTU controls O_2 injection

OFF O_2 injection isolated from all control signals

Run O_2 injection run on selection.

9 REMOTE TELEMETRY UNIT (RTU) FOR WASTEWATER PUMP STATIONS

9.1 Antenna Installation

Where the telemetry unit is mounted inside a secure building the antenna may be mounted on the building structure. Mounting the antenna on the building structure will only be acceptable provided the antenna is a minimum of four (4) metres above ground level (or as determined by the radio survey, whichever the greater) and cannot be easily accessed by the public. Additionally the antenna shall not be greater than 1.5m above the bracket attachment point. If this type of installation is not possible the antenna shall be mounted on a galvanised/powder coated tapered steel pole as above.

Antenna cables shall be joined with an approved weatherproof connector and protected with self-fusing splicing tape.

The antenna must not be installed upside down; care must be taken to ensure water drains are on the bottom.

9.1.1 Single Pair Instrument Cables

Instrument signal cables shall be twisted individually PVC coated, overall screened and overall PVC sheathed, i.e. PVC/Screen/PVC type cable with multi-strand copper conductors. The minimum size of the conductors shall be 0.5mm^2 (7/0.30) with black and white cores.

9.1.2 Multi-pair instrument cables

Instrument signal cables shall be twisted individually PVC coated, overall screened and overall PVC sheathed, i.e. PVC/Screen/PVC type cable with multi-strand tinned copper conductors. The minimum size of the conductors shall be 7/0.30 with black and white cores. Cores shall be individually numbered (number and text) along the entirety of the cable.

9.2 Radio Equipment

The radio shall meet the following specifications

9.2.1 Radio

Frequency Range	370-520 MHz
Channel Selection	Fully programmable
Frequency Splits	Tx/Rx frequency splits available including simplex
Frequency Stability	±1 kHz (-10 to 60ºC ambient, opt. -30 to 70ºC) digital temperature compensation
Aging	<= 1ppm/annum
RF Channel	Audio / 2400 bps / 4800 bps
Configuration	All configuration via Windows 2000/NT software

9.2.2 Transmitter

Tx Power	0.1 to 5 Watts (programmable)
Modulation	Direct FM DC to 25 kHz
Occupied Bandwidth	In accordance with international regulatory guidelines for point-to-point and point-to-multipoint

Tx/Rx Turnaround Time	< 30 mSecond
Timeout Timer	Disabled or programmable 1 to 60 seconds
Tx Spurious	<= -65 dBc

9.2.3 Receiver

Sensitivity	118 dBm for 12 dB SINAB
Blocking	> 75 db (EIA)
Intermodulation	<= 70 dB (EIA)
Spurious Response	<= 70 dB (EIA)
Select. and Desense	Better than 70 dB (EIA)
AFC Tracking	±3 kHz tracking @ -90 dBm/attack time <10 mS
Mute	Fully open to -60 dBm programmable

9.2.4 Connections

User Data and Power	DB15 female port
Antenna	BNC female bulkhead

9.2.5 Controls and Telemetry

Serial Coms. Interface	Direct processor communications to reconfigure / request diagnostic information
Tx Enable	TTL active low (0.1 mA)
RSSI Output	20 dB/V (ref. 2 v @ -90 dBm)
Rx AFC Error Voltage	2.5 kHz/V ref. 2 Vdc Via 1k
Rx CD (RSSI) Output	TTL active low (programmable 120 to -70 dBm)
Tx Power Sense Out.	Analog dc square law output Po(watt)-0.02 x (7 x (Vsens+0.15))2
Temp. Sense Output	Analogue dc voltage proportional to absolute temperature Tº (Kelvin) = Vsens x 100

9.2.6 General

Power Supply	13.8 Vdc nominal (6-16 Vdc,)‘
Transmit Current	800 mA max. @ 1 W (7.2 Vdc)
	650 mA max. @ 1 W (13.8 Vdc)
	1600 mA max. @ 5 W (13.8 Vdc)
Receive Current	70 mA (sleep <1mA)

10 DRAWINGS TO ACCOMPANY THIS SPECIFICATION

E_901-00	Project Title Page
E_901-01	Incoming Supply and Power Distribution
E_901-02	Pump No1 and No 2 Power and Control
E_901-03	Multitrode MT2PC Pump Controller
E_901-04	Multitrode Monitor Pro, Telemetry and ELV Supply
E_901-05	Switchboard General Arrangement and Equipment List

E_901-06 Switchboard Cabinet Details

E_901-07 Switchboard Cabinet Details

Ray, need correct drawing numbers here