

TECHNICAL SUBMISSION

PROJECT

Town Dam Lane, Donington, Phase 2

CLIENT

Ashwood Homes

PROJECT REFERENCE

PR11140

ISSUE

C

Change History

Issue	Revision Description	Date	Engineer	Approved
A	Initial submission to Anglian Water for approval / comment	17.03.2020	E. Weeks	I. Handem
B	Cover level at pump station updated	09.04.2020	E. Weeks	I. Handem
C	Pump specification amended	06.05.2020	E. Weeks	I. Handem

CONTENTS

- 1: Specification
- 2: Design Inflow and Proposed Discharge
- 3: Emergency Storage
- 4: Rising Main / Surge Analysis
- 5: Retention Times
- 6: Pump Duty and Selection
- 7: Pump Station Layout
- 8: Pump and Level Control Cabling
- 9: Control Equipment
- 10: Telemetry Equipment
- 11: Access Covers
- 12: Lifting Equipment
- 13: Baffle Plate
- 14: Sludge Valve
- 15: Valve Chamber Access Ladder
- 16: Floodlight
- 17: Services
- 18: Appendices
 - A. Summary
 - B. Hydraulic Calculations, System and Performance Curves and Pump Dimensions
 - C. Storage Calculations
 - D. Pump Station Drawings
 - E. Wiring Diagrams
 - F. Floodlight Details
 - G. Anglian Water Adoptable Pump Station Addendum Version 1.3 Dated November 2015

1: Specification

Our proposal is based on equipment providing compliance with the Sewers for Adoption 6th Edition Specification as amended by the Anglian Water Version 1.3 addendum to this document dated November 2015 as obtained from the Anglian Water website at the time of this proposal. A copy of this is attached for your reference in Appendix G.

2: Design Inflow and Proposed Discharge

The pump station is handling the foul water flow from 65 domestic dwellings.

Based on the Anglian Water criteria of dry weather inflow equalling 125 litres per person with 2.35 persons per property plus a 25% allowance for infiltration we calculate the DWF per property to be 367.19 litres which for 65 properties equals 0.28L/sec. Anglian Waters new required pump rate is 4 times DWF which equates to a minimum discharge rate of 1.10L/sec.

For reliability in dealing with this development size we propose to discharge at a minimum 4.75L/sec self-cleansing discharge in a 110mm OD PE100 SDR11 rising main with an 89.1mm bore.

We are proposing fixed speed pumps so there will be a variance in discharge across the operating range. We would refer you to Section 6 which details the actual discharge rate from the pumps at key operating levels.

3: Emergency Storage

The Anglian Water design criteria requests the emergency storage be 4 hours at Dry Weather Flow. For 65 dwellings, this equates to 3.978m³.

Anglian Water recently have been requesting the emergency storage in a combination of the wet well and incoming sewer network above high-level alarm and below level of the lowest private sewer entering the adoptable manhole system at the downstream end. From the site data provided at the time of this submission this occurs at manhole FP220 which has an invert level of private sewer at -0.295m, we have utilised this level as the maximum storage level.

We would refer you to our calculation sheet in Appendix C which shows there is actually 4.892m³ of storage within the system between this maximum storage level and high-level alarm which is approximately 23% in excess of is required.

4: Rising Main and Surge Analysis

Our proposal is based on the use of a 110mm OD PE100 SDR11 pressure pipe with an 89.1mm nominal bore installed with a fully ascending profile from the pump station to the discharge manhole.

A rising main long section drawing to be provided by the Engineer under a separate header.

The rising main 181.2m long. As it is less than 500m we don't intend to prepare a surge analysis report in this instance.

5: Retention Time

Our calculations indicate that with the development half completed the retention time in the system is 4.75 hours and when fully completed 2.38 hours.

Both are less than the 6-hour period after which septicity is considered an issue, so we do not intend to install any septicity suppression equipment on this site. If problems are encountered with septicity in the early stages of the development, then they will be dealt with by temporary measures.

6: Pump Duty and Selection

From the information provided we calculate the pump duty to be a self-cleansing flow rate of 4.75L/sec against a total head of 5.72m at mid water for which we have selected submersible sewage pumps from the Sulzer XFP80C-VX range which are fitted with 2.2kW explosion-proof motors designed to operate from a 400V, three phase and neutral power supply.

The pumps would provide the following theoretical discharge rates from key operating levels.

Operating Level	Discharge Rate (L/sec)
Pump Stop	5.0
Mid Water	5.2
Duty Pump Start	5.4
Standby Pump Start	5.5
High Level Alarm	5.6
Wet Well Inlet	5.8
Maximum Storage	6.2

These pumps are supplied with seal leakage detection system as standard which will be monitored at the control panel.

Both pumps would be supplied with the Anglian Water's approved nylon rope lifting system. One pump would be fitted with a Flush Valve.

We have attached our hydraulic calculations, system curves and pump performance details in Appendix B.

7: Pump Station Layout

The pumps, pipework and valves would be installed within concrete chambers constructed by others to a layout as shown on drawings PR11140-001 to 004. Please refer to Appendix D for drawings.

The non return valves would be fitted with levers, weights and guards and the gate valves would be fitted with extension spindles.

The pump station pipework would terminate a short distance outside the valve chamber in an 80mm nominal bore plain ended pipe from where provision of the rising main and connecting it to the pump station pipework would be the responsibility of the scheme Contractor.

8: Pump and Level Control Cabling

Pumps and level controls would be wired back to the control panel via above an above ground termination box as shown on our attached drawings.

9: Control Equipment

Automatic Level Control would be via a Pulsar Ultralite ultrasonic level controller augmented by 2 separate float switches for high level and back up control, all wired back to a multi compartment control panel complying with the Anglian Water Addendum to the Sewers for Adoption 6th Edition Specification.

The Control Panel would be installed within a roadside GRP kiosk of dimensions 2500mm wide x 750mm deep x 1750 high which would have a separate compartment to house the electricity board meters.

Please refer to Appendix E for wiring diagrams and kiosk layout.

10: Telemetry Equipment

Anglian Waters latest Telemetry Outstation would be installed prior to adoption. Subject to a radio survey proving the use of this type of system is suitable for transmitting the alarms for this site it is proposed to install a 6m radio telemetry mast.

11: Access Covers

Steelway Prolift FACTA B access covers and frames would be provided for the wet well and valve chamber of the following sizes.

<i>Chamber</i>	<i>Clear Opening</i>
Wet Well	1500 x 900mm
Valve Chamber	2400 x 1800mm

12: Lifting Equipment

A Lloyds Rota type davit socket would be installed by others adjacent to the pump access opening. We do not propose to supply a dedicated Lloyds Rota davit for the site as we understand these are carried on Anglian Waters service vans.

13: Baffle Plate

A stainless steel baffle plate will be installed over the inlet sewer in the wet well.

14: Sludge Valve

An 80mm valve chamber drain would be installed with a sludge valve located over this within the valve chamber.

15: Valve Chamber Access Ladder

A stainless steel access ladder complete with retractable handhold would be installed in the valve chamber.

16: Floodlight

An energy efficient floodlight mounted on a 4m pole would be supplied and positioned as shown on our drawings. Please see Appendix F for details. We are proposing the floodlight pole would be of the hinged type to ease ongoing maintenance.

17: Services

It would be the responsibility of our client to provide a suitably rated 400 volt 3 Phase and neutral power supply to the control panel and a PSTN line for the telemetry outstation if the radio survey indicates a radio mast is not suitable for this site.

18: Appendices

Appendix A Summary

Technical Summary

Liquid Handled	Foul Water
Number of Pumps	2
Control Philosophy	Duty / Standby
Capacity per Pump (L/sec)	4.75
Head Generated (m)	5.72
Pump Manufacturer	Sulzer
Pump Type	XFP80C-VX PE22/4
Impeller Type / Reference	Vortex / VX.4 (171mm)
Solids Handling (mm)	80
Hazardous Area Rating of Pump	EXP
Motor Rating (kW)	2.2
Speed (rpm)	1440
Electric Supply	230/400V 50Hz, 3 Phase
Full Load Current (Amps)	4.6
Method of Starting	Direct On Line
Length of Cables	20
Level Controls	Pulsar Ultra Lite Ultrasonic plus high level and back up float switches
Wet Well Diameter (mm)	2400
Wet Well Depth (m)	5.2
Station Pipes and Valves (mm)	80
Station Final Discharge Pipe (mm)	80
Pump Station Pipe Material	Ductile Iron
Rising Main (By Others)	110mm OD PE100 SDR11 (89.1mm Bore)
Access Covers (Supply Only)	Manufacturer: Steelway Prolift Rating: FACTA B Wet Well 1500 x 900mm Valve Chamber 2400 x 1800mm
Inlet Diameter (mm)	150
Penstock (Supply Only)	Isolation of incoming sewers by others
General Arrangement Drawings	PR11140-001 to 004

Materials Specification

Pump Station Type	Submersible – Guiderail Mounted Pumps
Base Specification	Sewers For Adoption 6th Edition
Addendum	Anglian Water Version 1.3 dated November 2015

PUMP:

Single stage fully submersible pump with cast iron case and impeller, which is securely locked to the fully protected motor shaft extension. Impeller as data section.

SEAL CHAMBER:

Buffer chamber between pump and motor, charged with oil retained by opposing seals.

MOTOR:

Squirrel cage induction motor of watertight IP68 enclosure suitable for continuous service and having Klaxon lock out circuit for over-temperature protection on Explosion Proof motors.

CABLE:

Suitable length(s) of multi-core VRI PCP sheathed flexible cable connected through watertight gland(s) to the motor windings.

DUCKFOOT:

Cast iron floor fixing duckfoot bend (or pedestal with elbow) incorporating guiderail socket(s) and self locating boltless pump quick release coupling.

GUIDERAILS:

Galvanised Mild Steel rail(s) for attachment to cover slab or ground level steelwork and extending to duckfoot sockets. Complete with necessary location brackets.

LIFTING LOCATION SYSTEM:

Nylon lifting rope for pulling into position certified lifting chains carried by Anglian Water personnel.

REFLUX VALVE:

Fullway pattern delivery non-return valve.

SLUICE VALVE:

Fullway pattern isolating sluice valve with non-rising spindle and cap top.

PIPES:

From duckfoot through to defined point for rising main connection, incorporating the valves and, in case of multi-pump system, an appropriately sized manifold. All fitting connections appropriate to materials employed.

LEVEL CONTROLS:

Pulsar Ultralite ultrasonic level control unit as data sheet complete with submersible transducer, bracket and cable to control panel, with float switches for ultrasonic backup control and high level alarm functions.

ACCESS COVERS: (Supply Only)

Steelway Prolift FACTA B Access Covers and Frames complete with safety grids and demountable barrier system.

Wet Well	1500 x 900mm clear opening
Valve Chamber	2400 x 1800mm clear opening

LIFTING EQUIPMENT: (Supply Only)

1 – Cast in Type Davit Socket and cover plate to suit Lloyds ROTA Davit for in situ casting by others.

KIOSK:

GRP, floor fixing, three roadside type weatherproof lockable enclosure in deep green textured finish, provisional dimensions 1750H x 2500W x 750D containing a full sized backboard on which would be mounted / provided:-

- a) Anglian Water DOL Control panel as specified.
- b) Anti condensation heater and thermostat.
- c) Interior light and switch.
- d) Set of suitably rated double insulated cable tails for connection to Electricity Board meters.
- e) Space for the mounting of Electricity Board meters.
- f) Telemetry

The whole of the above being suitably interconnected and earth bonded extended to all non-conductive steelwork within the pump station in 16mm² cable to provide a complete PME system.

GENERATOR EARTH:

Comprising a copper electrode to be driven into the ground adjacent to the control kiosk, a concrete inspection pit and interconnecting cable to the panel.

ANCILLARY EQUIPMENT:

1. 6m high radio mast subject to site survey
2. Lever arm and weights on non-return valves complete with guards
3. Pressure tappings on pump discharge leg non-return valves
4. 100mm female Bauer coupling on over pumping tee
5. Weatherproof and lockable pump and level control cable termination box
6. Rubber matting in control panel kiosk
7. Sign indicating pump station data fitted within the control kiosk
8. Supply only of a 500 watt energy efficient flood light mounted on a 4m high hinged lamp post complete with cabling back to the control panel a maximum 5m away
9. Stainless Steel Valve Chamber Access Ladder c/w Retractable Hand Hold.
10. Stainless Steel Baffle Plate for fixing over the 150mm inlet sewer.
11. Three copies of operating and maintenance manuals plus drawings or one electronic copy prepared in PDAS standard format

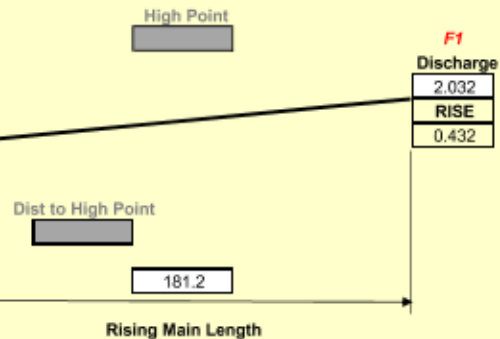
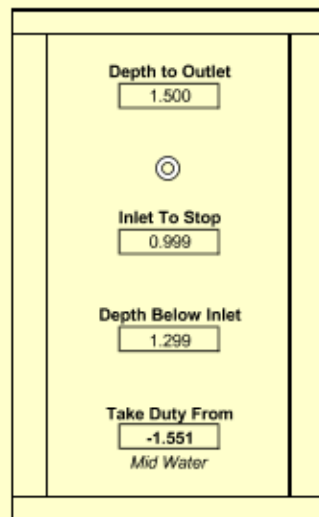
Appendix B
Hydraulic Calculations, System Curves and Performance Curves and Dimensional Data

Clients Name	Ashwood Homes
Site Address	Town Dam Lane, Dorington, Phase 2

Adopting Authority	Anglian Water
Pump Station Type	Foul
Number of Dwellings	65
Non Domestic Area (m2)	
Non Domestic Rate (L/s Hectare)	
Number of Pumps	2
Number of Duty Pumps	1

Design Flow / Rising Main	
Design Flow (& SFA 6 Discharge)	3.01 L/sec
Pump Discharge Rate AWA	1.10 L/sec
Pump Discharge Rate	4.75 L/sec
Rising Main Material	PE100
Rising Main Pressure Rating	SDR11
Rising Main O.D.	110 mm
Rising Main I.D.	89.1 mm
Velocity in Main	0.76 m/sec
Surge Analysis	NOT REQUIRED

Cover Level	3.100
VC Outlet	1.600
Max Storage	-0.295
Inlet	-0.801
HLA	-1.101
P2 Start	-1.201
P1 Start	-1.301
Mid Water	-1.551
Stop Level	-1.800
Dead Area	300
Base Level	-2.100



Notes:

Wet Well	
Wet Well Diameter	2400 mm
Calc Chamber Depth	4.827 m
Volume Per M	4,523.89 litres
Depth Between Starts	100 mm
Actual Chamber Depth	5.200 m
Theoretical Op Volume	570.00 litres
Actual Op Volume	1,234.14 litres
Max Theoretical Starts	7.50
Actual Starts	3.79

Retention Calculations	
Dwf Inflow Per Day	23,867.19 litres
Rising Main Volume	1,129.99 litres
Combined Main and Op Vol	2,364.12 litres
No. of Main Clears per Day	10.10
Retention Full Usage	2.38 Hours
Retention Half Usage	4.75 Hours

Retention calcs assume ascending rising main

Storage	
Domestic @ AWA Rates	3.978 m³
Industrial 1 Hr @ Design Flow	0.000 m³
Total Required Storage	3.978 m³
Capacity in Gravity System	1,246 m³
Capacity between HLA & inlet	1,357.17 litres

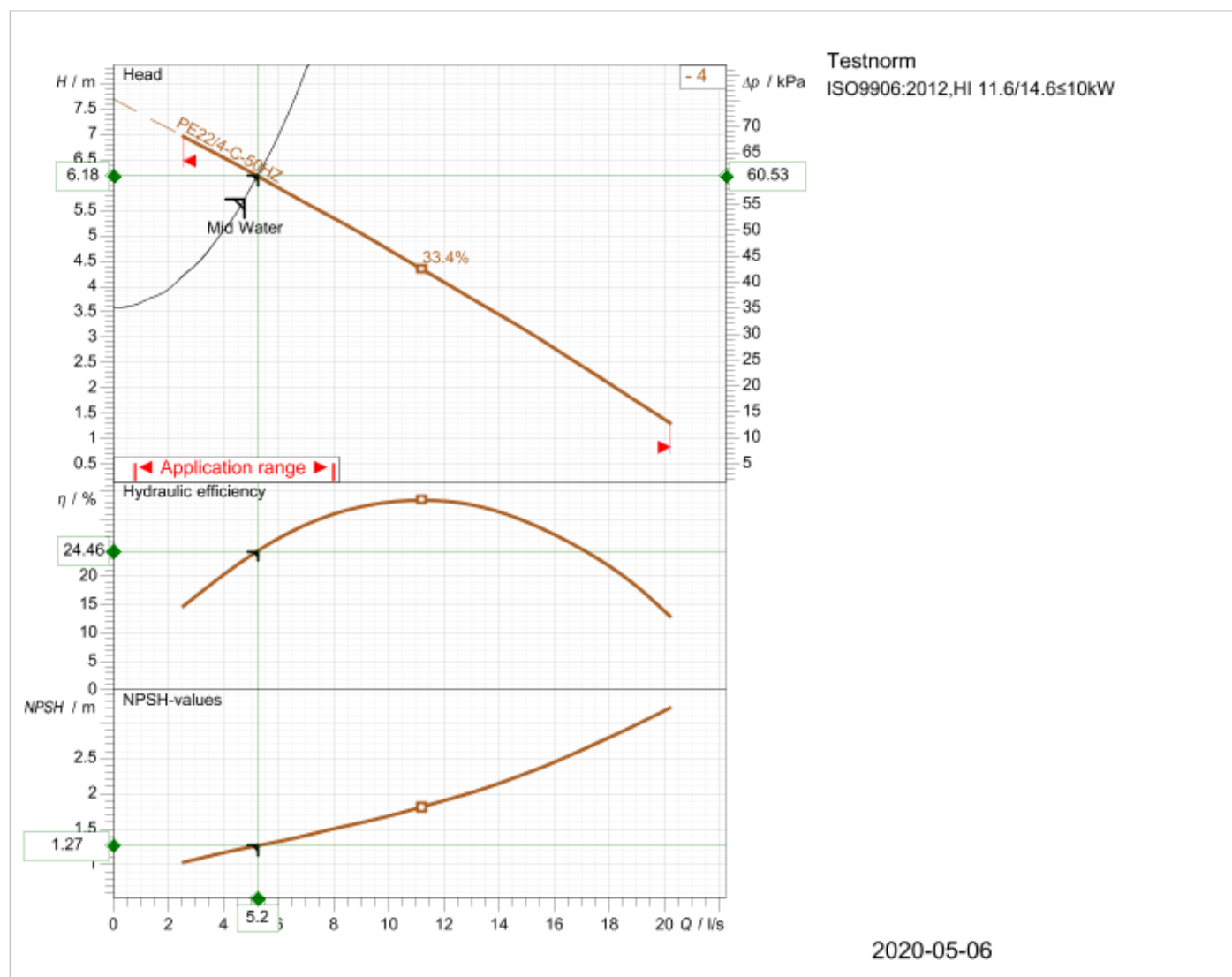
	Rising Main	Common 3	Common 2	Common 1	Individual 3	Individual 2	Individual 1
Flow Rate (L/sec)	4.75	4.75	4.75	4.75	4.75	4.75	4.75
Static Head (m)	3.58						
Pipe Diameter (mm)	89.10	80	80	80	80	80	80
Velocity (m/sec)	0.76	0.94	0.94	0.94	0.94	0.94	0.94
Roughness Factor	0.30	0.30	0.30	0.30	0.30	0.30	0.30
Pipe length (m)	181.229					8.700	
Duckfoot Bend							1
Short Radius Bends						1	
Long Radius Bends						1	
Tee Straight through						2	
Tee through branch							
Radial Tee thro Branch							
Sluice Valve						1	
Non Return Valve						1	
Bellmouth inlet							
Sharp Taper							
Standard Taper							
Equivalent Pipe Length (m)	181.229	0.000	0.000	0.000	0.000	18.780	2.720
Reynolds Number	5.9E+04	6.6E+04	6.6E+04	6.6E+04	6.6E+04	6.6E+04	6.6E+04
Darcy-Weisbach Friction Factor	0.0290	0.0296	0.0296	0.0296	0.0296	0.0296	0.0296
Velocity Head	0.030	0.045	0.045	0.045	0.045	0.045	0.045
Hydraulic (Piezometric) gradient	0.0096	0.0168	0.0168	0.0168	0.0168	0.0168	0.0168
Friction Head Loss	1.746	0.000	0.000	0.000	0.000	0.316	0.046

Calc Duty Point	
Flow	4.75 L/sec
Static Head	3.58 m
Total Head	5.72 m

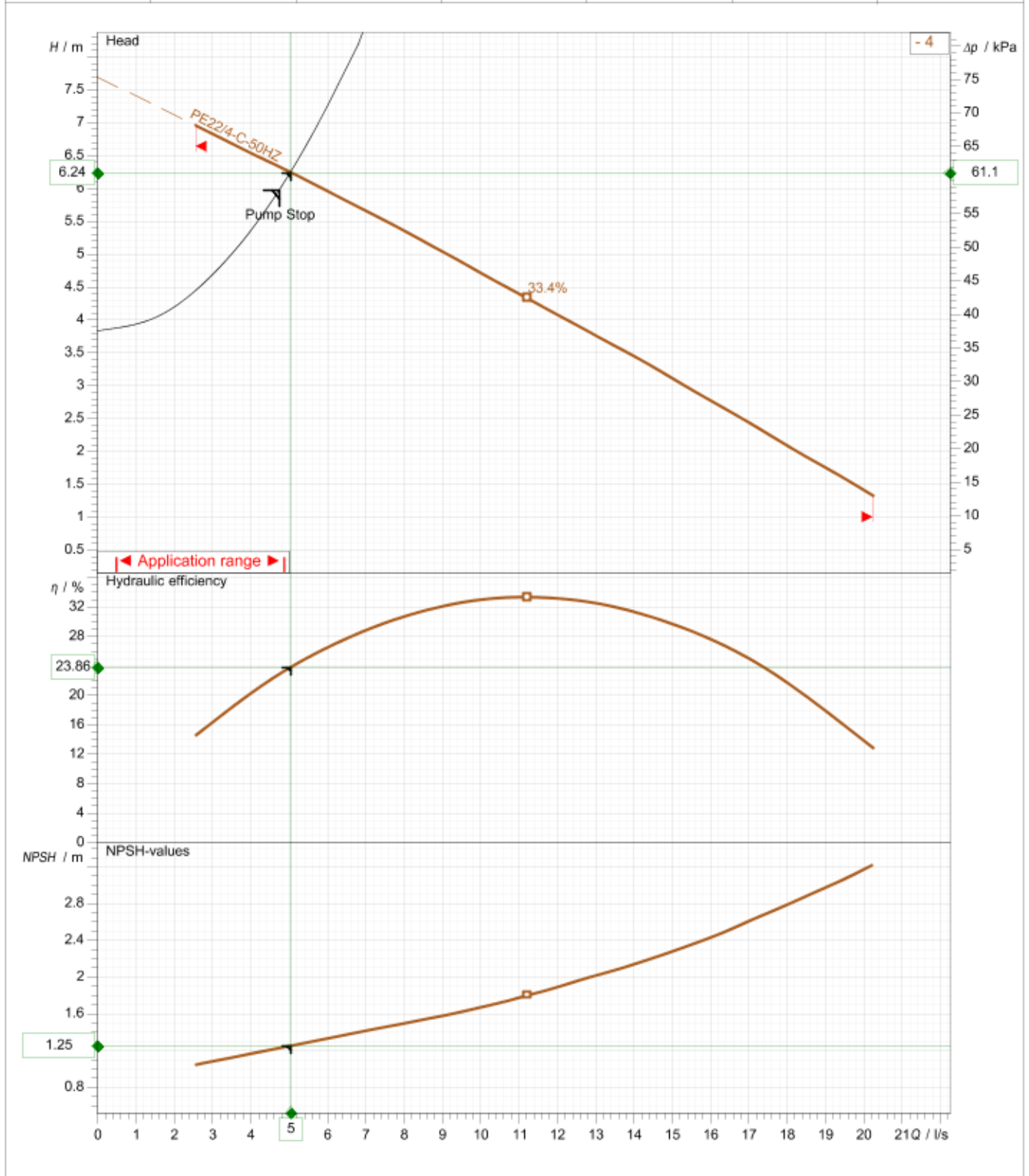
Pump Selection	
Pump Type	XFP80C-VX P22/4
Impeller	VX.4 (171mm)
Kw Rating	2.2

Actual Duty	
Flow	5.20 L/sec
Head	6.18 m

XFP 80C VX 50HZ



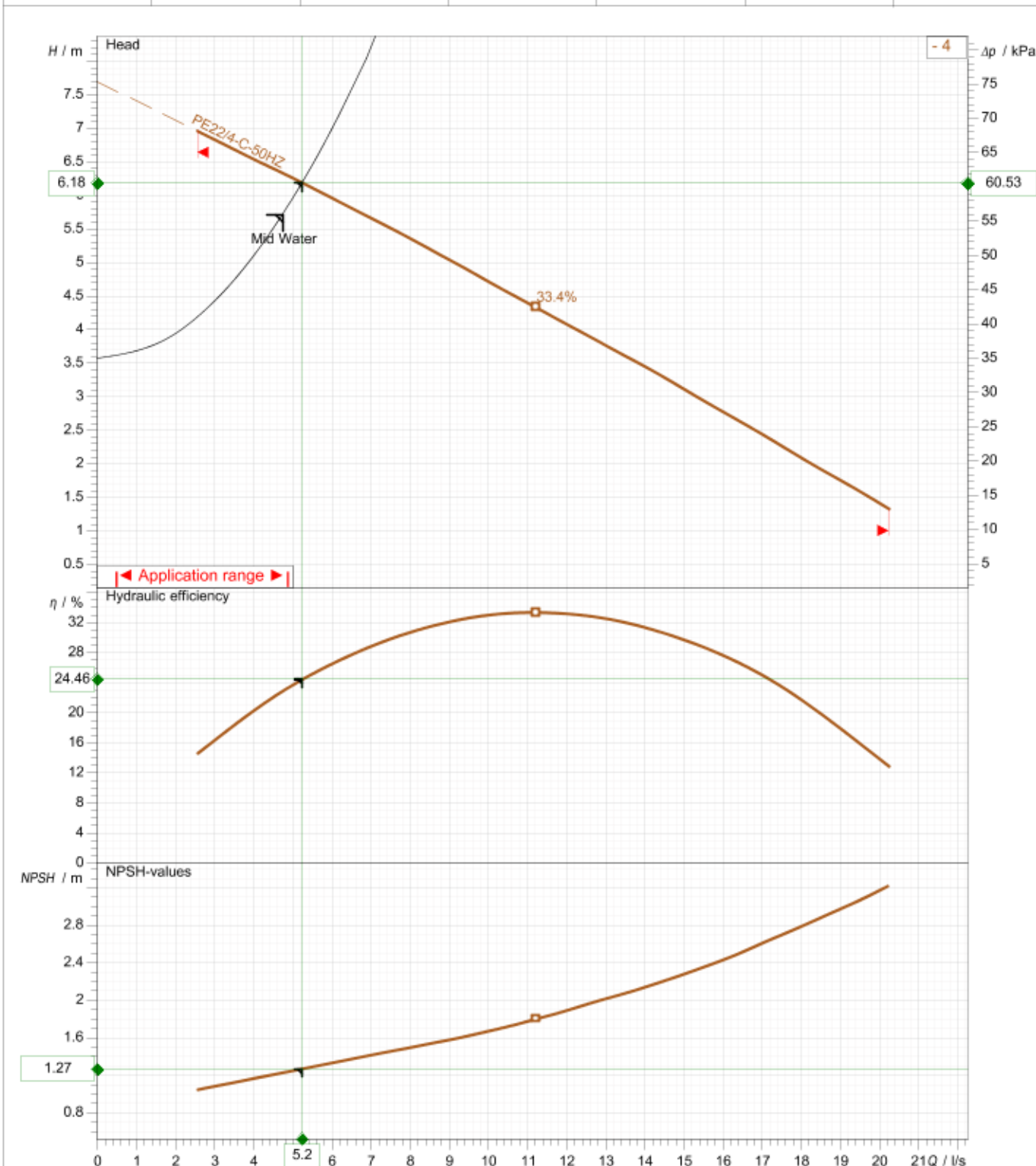
Operating data specification		Power input		1.41 kW
Flow	5.236 l/s	Head		6.18 m
Efficiency	24.5 %	Rated power		1.23 kW
NPSH	1.27 m	Fluid		Water
Temperature	20 °C	Nature of system		Single head pump
No. of pumps	1			
Pump data				
Type	XFP 80C VX 50HZ	Make		SULZER
Series	XFP PE1-PE3	Impeller		Vortex impeller
N° of vanes	6	Impeller size		171 mm
Free passage	80 mm	Suction flange		DN80
Discharge flange	DN80	Type of installation		Wet Well installation with pedestal
Moment of inertia	0.006 kg m²			
Motor data				
Rated voltage	400 V	Frequency		50 Hz
Rated power P2	2.2 kW	Nominal Speed		1440 1/min
Number of poles	4	Efficiency		86.8 %
Power factor	0.8	Rated current		4.6 A
Starting current	29.8 A	Rated torque		14.6 Nm
Starting torque	21.2 Nm	Degree of protection		IP 68
Insulation class	H	No. starts per hour		15



Impeller size 171 mm	N° of vanes 6	Impeller Vortex impeller	Solid size 80 mm	Revision
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Curve number	Pump performance curves XFP 80C VX 50HZ				SULZER	
Reference curve XFP80C-VX 50HZ						

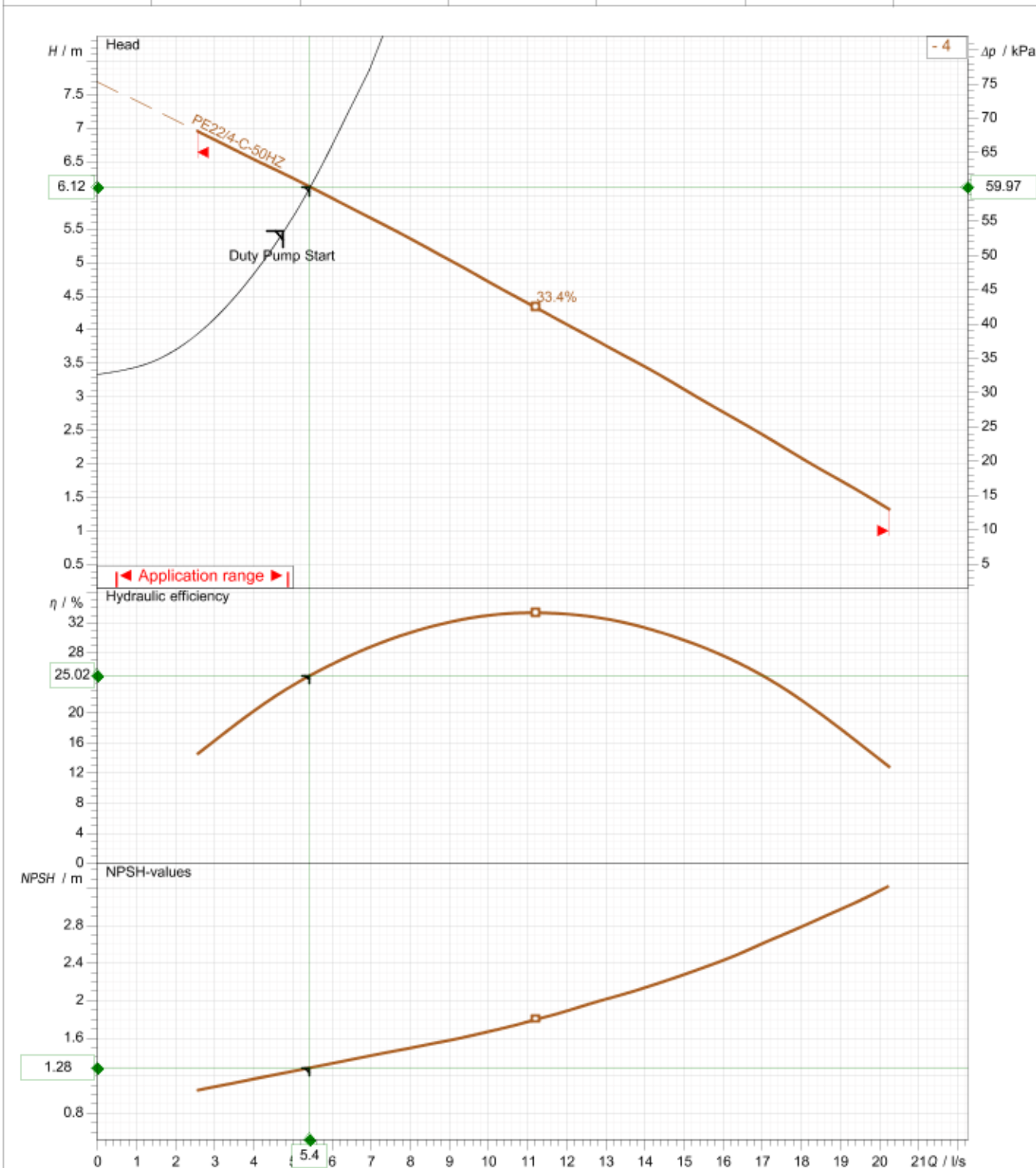
			Discharge DN80		Frequency 50 Hz	
Density 998.3 kg/m ³	Viscosity 1.005 mm ² /s	Testnorm ISO9906:2012,HI 11.6/14.6≤10kW		Rated speed 1470 1/min	Date 2020-05-06	
Flow 5.236 l/s	Head 6.18 m	Shaft power 1.23 kW	Power input 1.41 kW	Rated power P2 2.2 kW	Hydraulic efficiency 24.5 %	NPSH 1.27 m



Impeller size 171 mm	N° of vanes 6	Impeller Vortex impeller	Solid size 80 mm	Revision
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Curve number	Pump performance curves XFP 80C VX 50HZ				SULZER	
Reference curve XFP80C-VX 50HZ						

			Discharge DN80		Frequency 50 Hz	
Density 998.3 kg/m ³	Viscosity 1.005 mm ² /s	Testnorm ISO9906:2012,HI 11.6/14.6≤10kW		Rated speed 1470 1/min	Date 2020-05-06	
Flow 5.427 l/s	Head 6.12 m	Shaft power 1.24 kW	Power input 1.42 kW	Rated power P2 2.2 kW	Hydraulic efficiency 25 %	NPSH 1.28 m



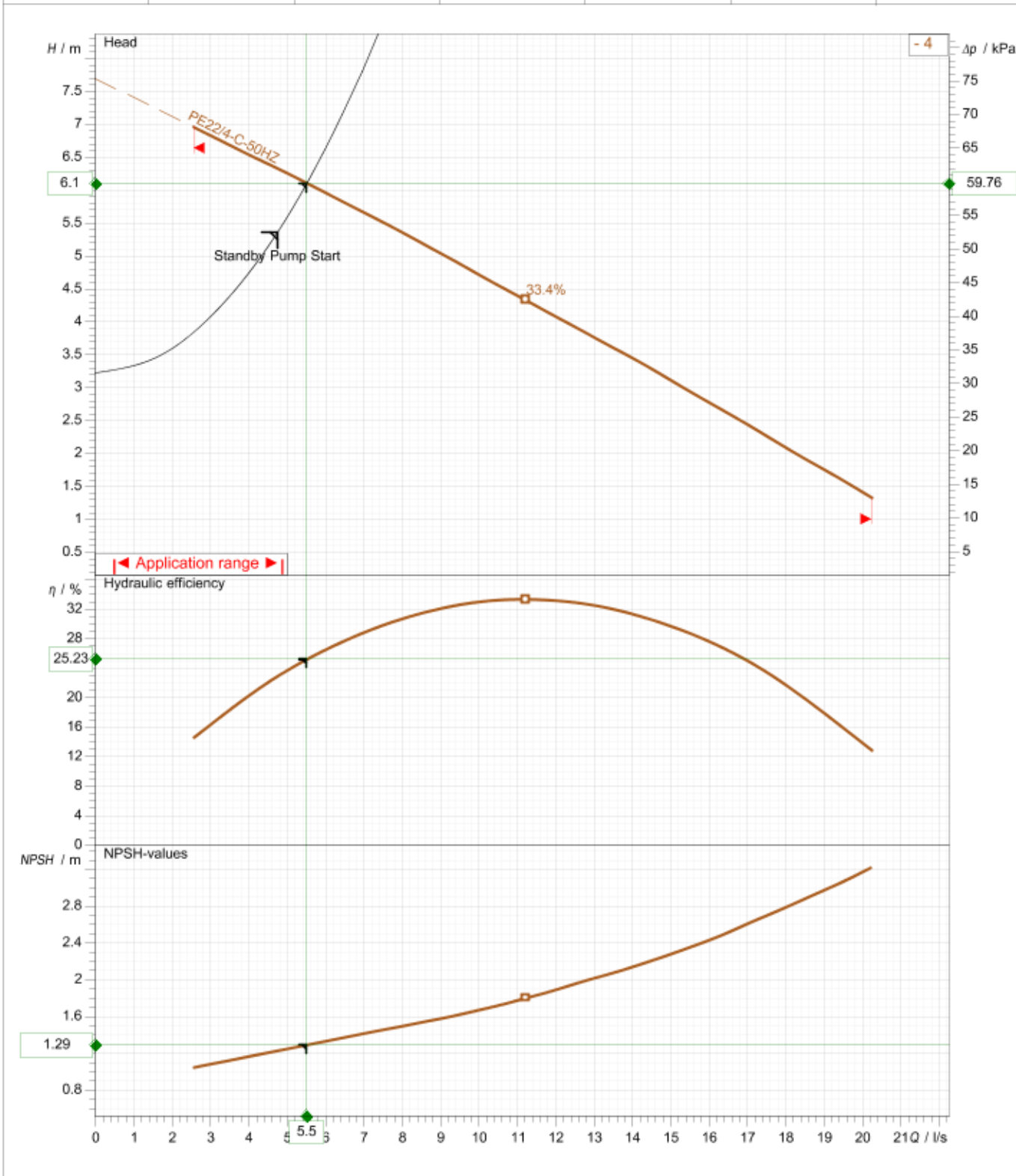
Impeller size 171 mm	N° of vanes 6	Impeller Vortex impeller	Solid size 80 mm	Revision
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Data version Jan 2020

Curve number	Pump performance curves XFP 80C VX 50HZ				SULZER	
Reference curve XFP80C-VX 50HZ						

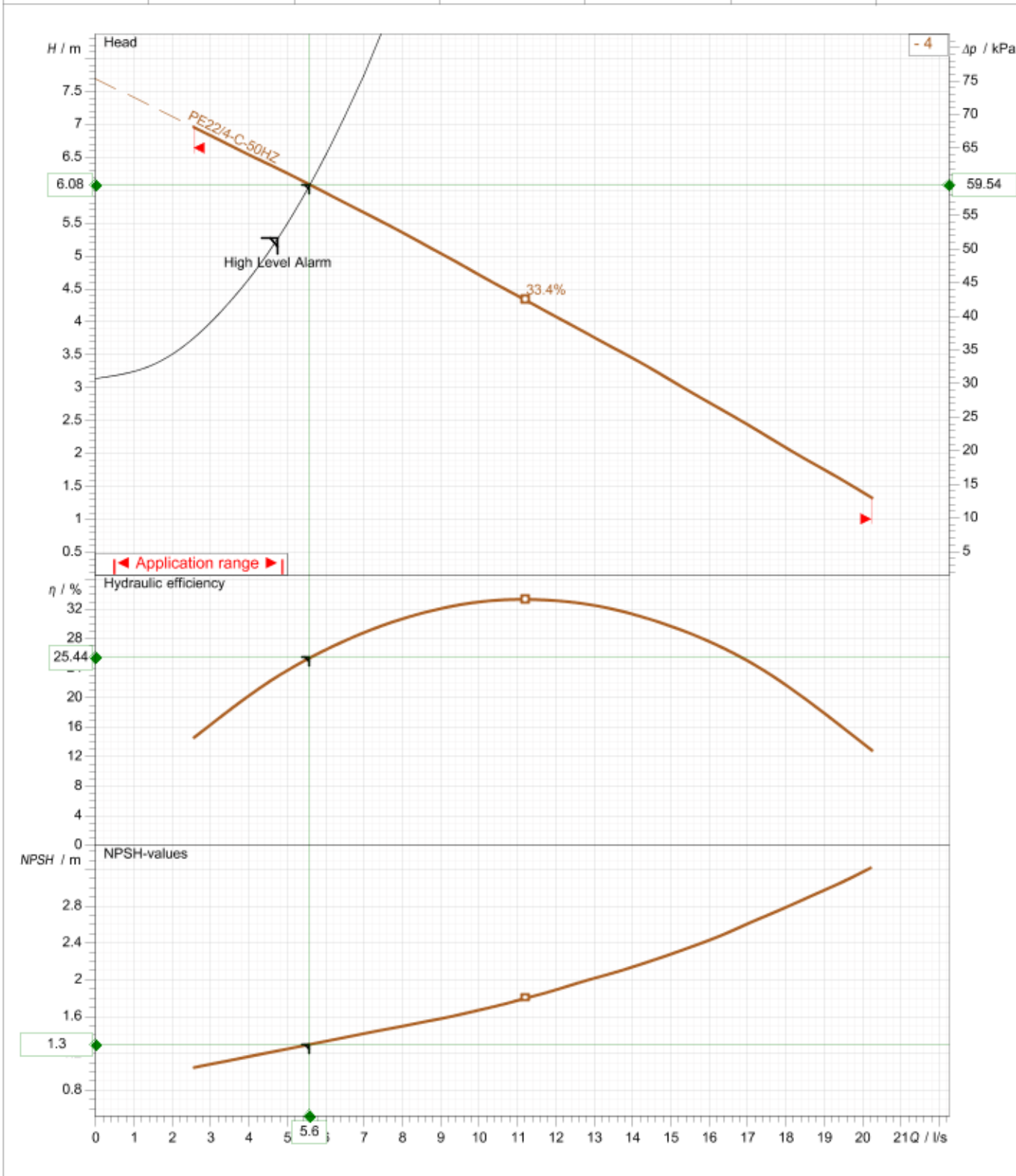
			Discharge DN80		Frequency 50 Hz	
Density 998.3 kg/m ³	Viscosity 1.005 mm ² /s	Testnorm ISO9906:2012,HI 11.6/14.6≤10kW		Rated speed 1470 1/min	Date 2020-05-06	
Flow 5.502 l/s	Head 6.1 m	Shaft power 1.24 kW	Power input 1.42 kW	Rated power P2 2.2 kW	Hydraulic efficiency 25.2 %	NPSH 1.29 m



Impeller size 171 mm	N° of vanes 6	Impeller Vortex impeller	Solid size 80 mm	Revision
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Curve number	Pump performance curves XFP 80C VX 50HZ				SULZER	
Reference curve XFP80C-VX 50HZ						

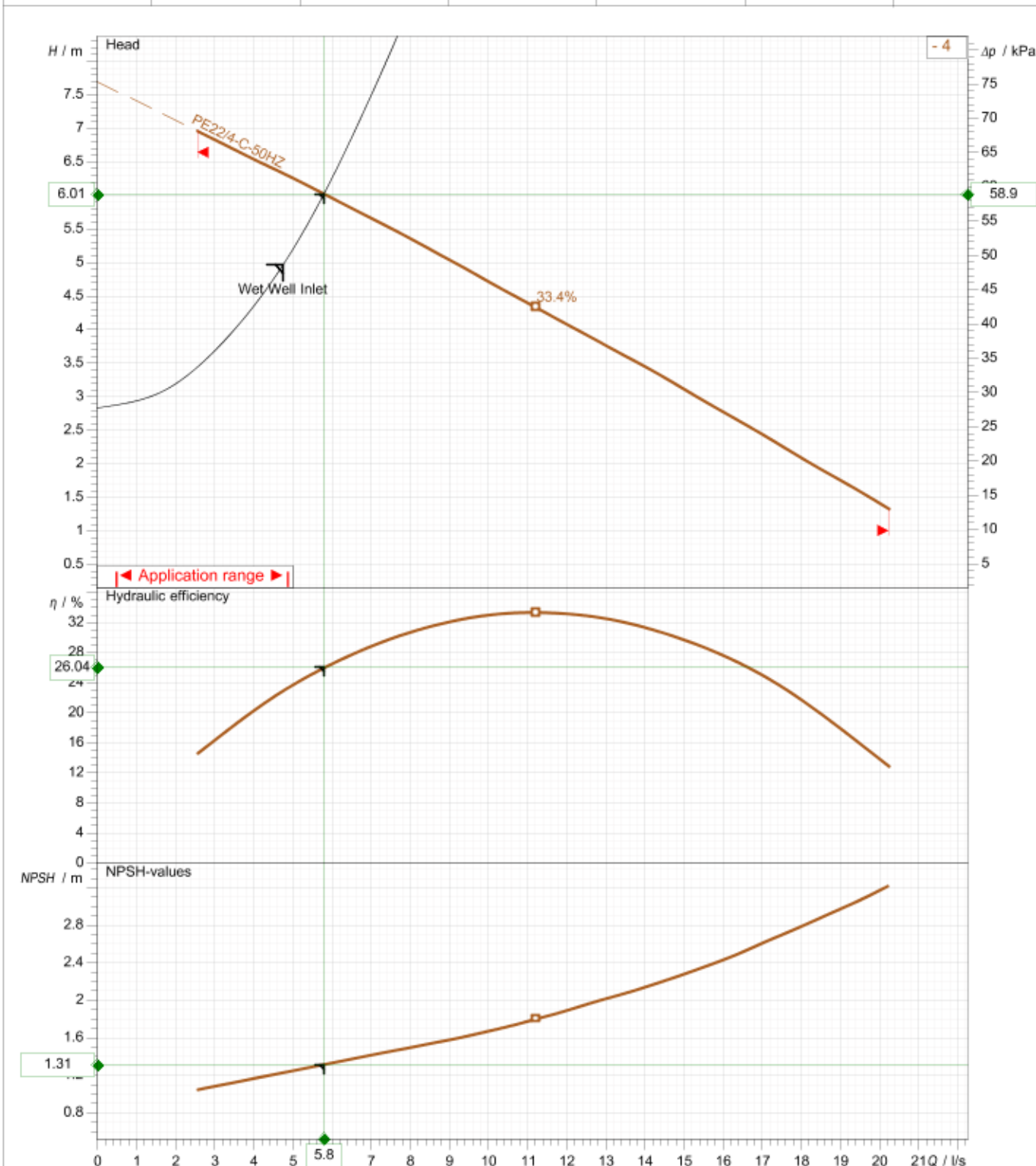
			Discharge DN80		Frequency 50 Hz	
Density 998.3 kg/m ³	Viscosity 1.005 mm ² /s	Testnorm ISO9906:2012,HI 11.6/14.6≤10kW		Rated speed 1470 1/min	Date 2020-05-06	
Flow 5.576 l/s	Head 6.08 m	Shaft power 1.24 kW	Power input 1.43 kW	Rated power P2 2.2 kW	Hydraulic efficiency 25.4 %	NPSH 1.3 m



Impeller size 171 mm	N° of vanes 6	Impeller Vortex impeller	Solid size 80 mm	Revision
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Curve number	Pump performance curves XFP 80C VX 50HZ	SULZER
Reference curve XFP80C-VX 50HZ		

			Discharge DN80	Frequency 50 Hz
Density 998.3 kg/m ³	Viscosity 1.005 mm ² /s	Testnorm ISO9906:2012,HI 11.6/14.6≤10kW	Rated speed 1470 1/min	Date 2020-05-06
Flow 5.794 l/s	Head 6.01 m	Shaft power 1.25 kW	Power input 1.44 kW	Rated power P2 2.2 kW
			Hydraulic efficiency 26 %	NPSH 1.31 m



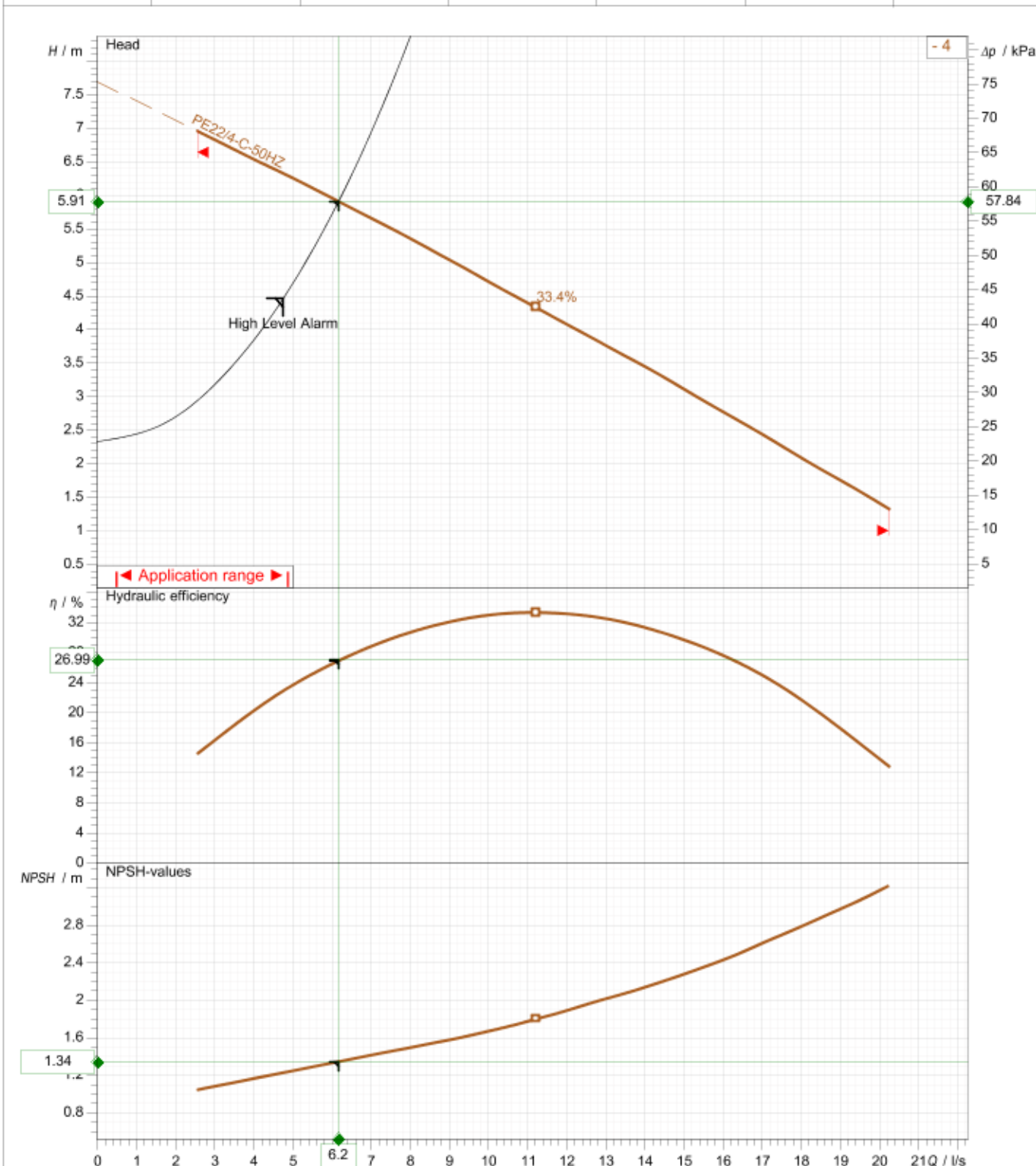
Impeller size 171 mm	N° of vanes 6	Impeller Vortex impeller	Solid size 80 mm	Revision
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Data version Jan 2020

Curve number	Pump performance curves XFP 80C VX 50HZ	SULZER
Reference curve XFP80C-VX 50HZ		

			Discharge DN80	Frequency 50 Hz
Density 998.3 kg/m ³	Viscosity 1.005 mm ² /s	Testnorm ISO9906:2012,HI 11.6/14.6≤10kW	Rated speed 1469 1/min	Date 2020-05-06
Flow 6.155 l/s	Head 5.91 m	Shaft power 1.27 kW	Power input 1.46 kW	Rated power P2 2.2 kW
			Hydraulic efficiency 27 %	NPSH 1.34 m



Impeller size 171 mm	N° of vanes 6	Impeller Vortex impeller	Solid size 80 mm	Revision
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Data version Jan 2020

Frequency
50 Hz

PE1

Motor performance curve

SULZER

PE22/4-C-50HZ

Rated power
2.2 kW

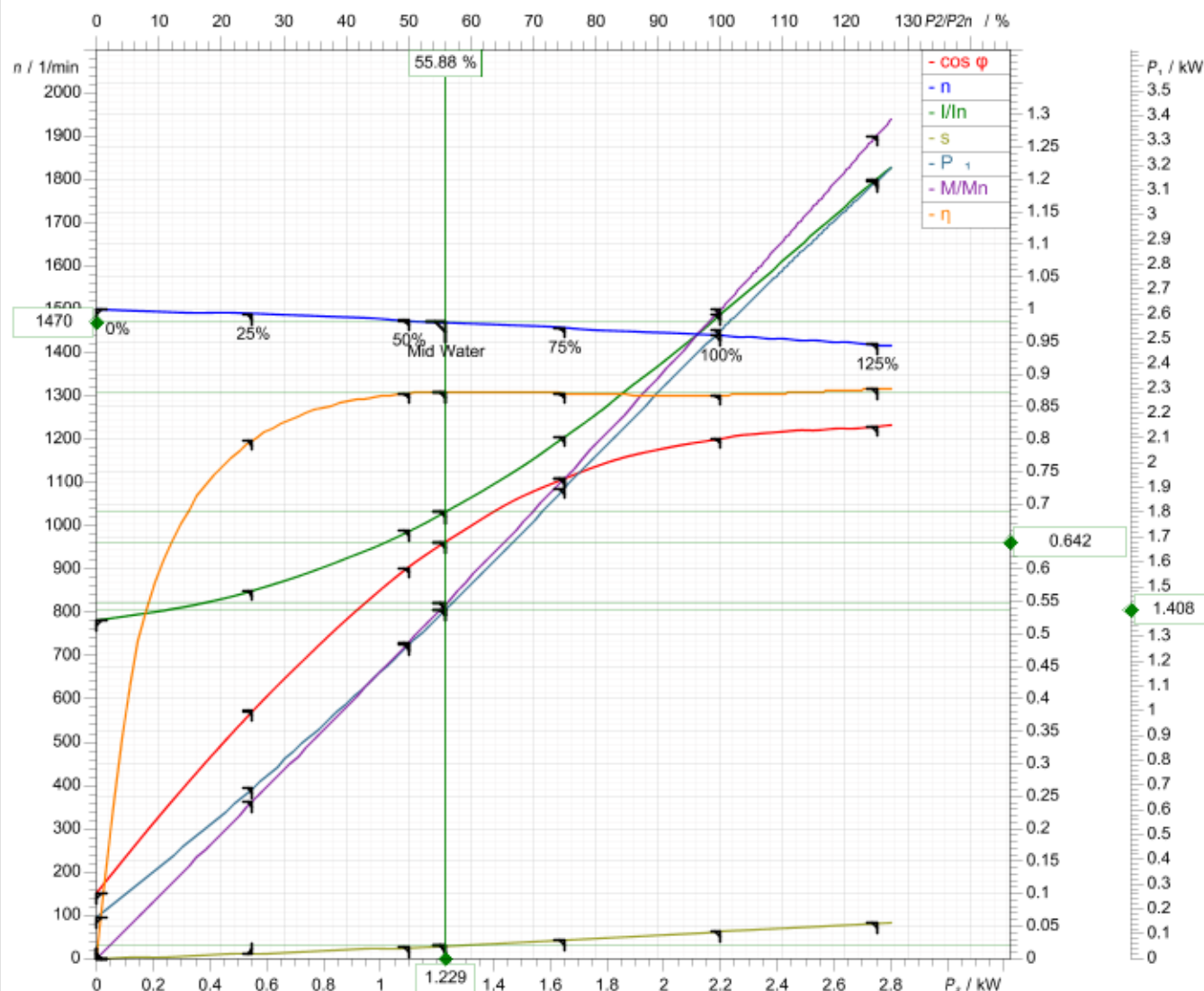
Service factor
1

Nominal Speed
1440 1/min

Number of poles
4

Rated voltage
400 V

Date
2020-05-06



Symbol	No loac	25 %	50 %	75 %	100 %	125 %
P_2 / kW	0	0.55	1.1	1.65	2.2	2.75
P_1 / kW	0.1646	0.6889	1.264	1.895	2.534	3.135
η / %	0	79.84	87.05	87.08	86.81	87.74
n / 1/min	1500	1489	1474	1457	1439	1419
$\cos \phi$	0.09926	0.3813	0.6017	0.7398	0.8016	0.8195
I / A	2.394	2.608	3.031	3.697	4.564	5.52
s / %	0	0.7635	1.719	2.839	4.09	5.418
M / Nm	0	3.528	7.125	10.81	14.6	18.51

Tolerance according to VDE 0530 T1 12.84 for rated power

Starting current 29.8 A	Starting torque 21.2 Nm	Moment of inertia 0.008 kg m ²	No. starts per hour 15
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Data version Jan 2020

SULZER

Massblatt XFP 80C-VX Twin Guide Rail
Dimension Sheet XFP 80C-VX Twin Guide Rail
Dimensioni Installazione sommersa
Hoja de dimensiones Instalacion sumergida
Plan d'encombrement Installation noyée

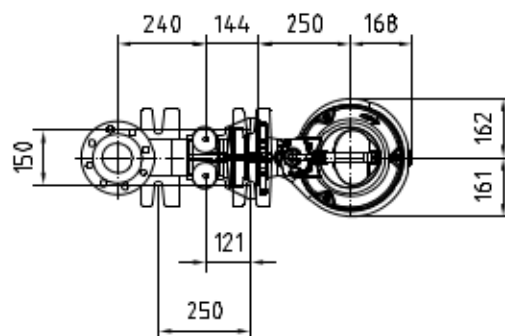
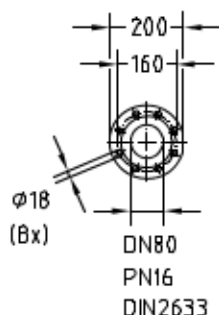
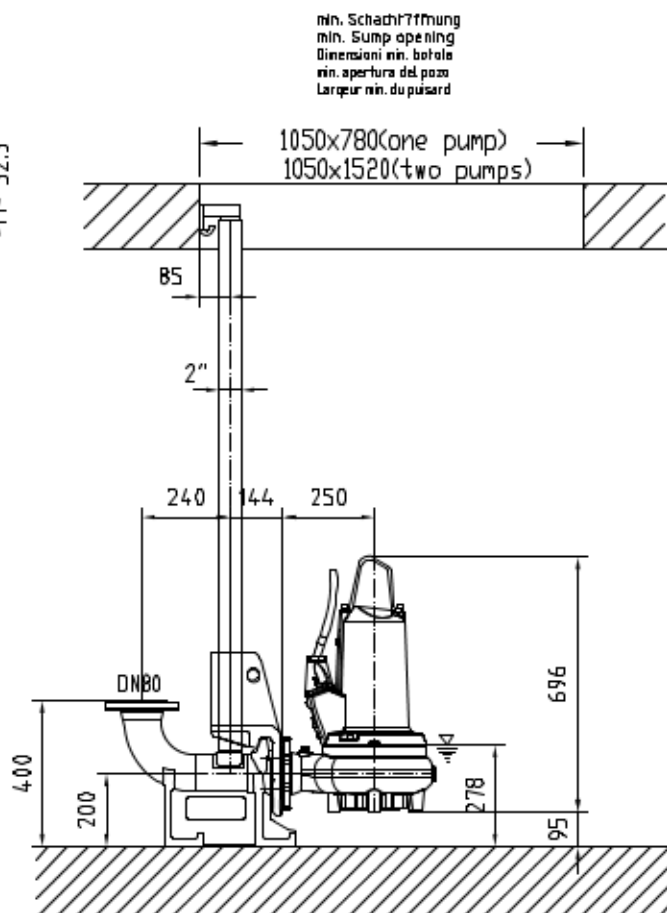
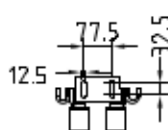
No: AN-M.22.610 - 03
Drawn: 11.08.10 / D.Wheeler
Issue Date: 30/03/2011
Änderungen vorbehalten
Technical changes reserved
Con riserva di modifiche
Con reserva de modificaciones
Sous réserve de modification

50 Hz**S.I.**

Typ Type Tipo	Gewicht Weight Poids Peso (kg)
PE 15/4	95.5
PE 22/4	97.5
PE 29/4	100.0

60 Hz

Typ Type Tipo	Gewicht Weight Poids Peso (kg)
PE 18/4W	95.5
PE 22/4	97.5
PE 28/4W	97.5
PE 35/4	100.0



Gewicht: Beinhaltet Pumpe und Halterung
Weight: Includes pump and slider bracket
Il peso include il pezzo intermedio
Peso: Incluye bomba y una
Poids: Pompe et coulisseau

Guss-Allgemeintoleranzen nach DIN1680 - GTB16
General tolerances for castings in acc. to DIN1680-GTB16
Tolleranze generali delle fusioni secondo DIN1680-GTB16
Tolerancias generales para la fundición seg. de DIN1680-GTB16
Tolérance générale de la fonderie selon DIN1680-GTB16

Appendix C

Storage Calculations

Pump Design and Services Ltd
Building 4.6 HiTECH
Frimley 4 Business Park
Frimley, Camberley
Surrey GU16 7SG



Tel: 01483 930 520
Email: info@pdasltd.co.uk

Quote Reference	Q11901
Date	17/03/20
Project Reference	PR11140
Date	17/03/20

Clients Name	Ashwood Homes
Site Address	Town Dam Lane, Donington, Phase 2

Storage Requirement	
Number of Dwellings	65
Non Domestic Design Flow	0 L/sec
Domestic @ AWA Rates	3.978 m ³
Industrial 1 Hr @ Design Flow	0.000 m ³
Total Required Storage	3.978 m ³
Location of Lowest Private Manhole	0
Invert Level of Lowest Private Manhole	-0.295 m

Notes:

Only ontributing manholes and pipe runs shown

Storage in Gravity Manholes					
Manhole Reference	Manhole Diameter (mm)	Max Storage Level (m)	Cover Level (m)	Invert Level (m)	Storage Volume (m ³)
		-0.295			0.000
FP222	1200	-0.295	3.100	-0.701	0.459
FP221	1200	-0.295	2.799	-0.486	0.216
FP220	1200	-0.295	3.287	-0.295	0.000
Total storage in manholes below detailed maximum storage level					0.675

Private Manhole Invert (m)
1.135
-0.295

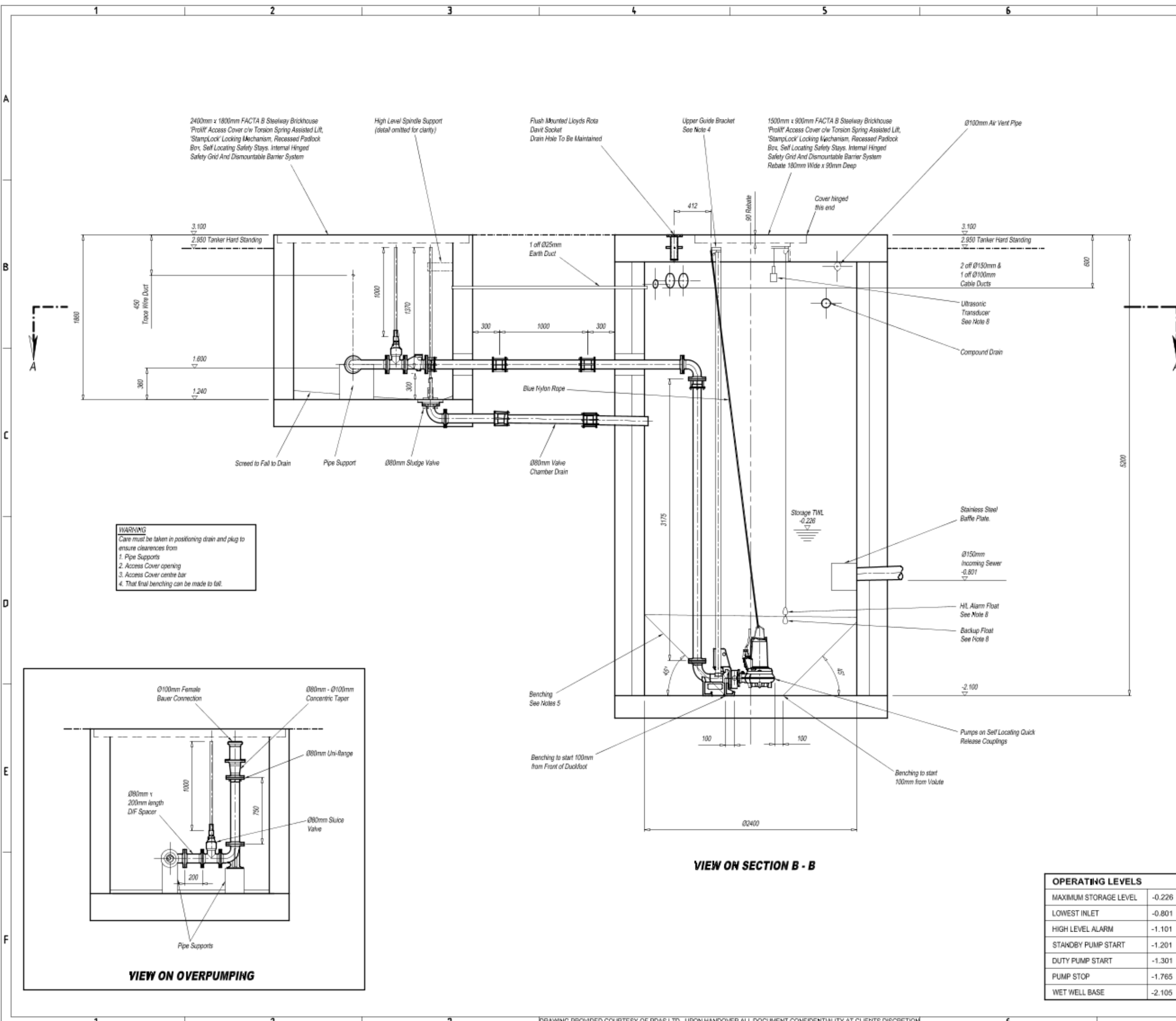
Base of VC

Storage in Gravity Sewer Pipes					
Sewer Pipe Run	Sewer Diameter (mm)	Max Storage Level (m)	Length (m)	Upper Invert (m)	Storage Volume (m ³)
FP220 - FP221	150	-0.295	26.010	-0.295	0.000
FP221 - FP222	150	-0.295	29.290	-0.486	0.518
FP222 - WW	150	-0.295	3.000	-0.701	0.053
Total storage in sewers below detailed maximum storage level					0.571

Storage in Wet Well					
	Wet Well Diameter (mm)	Max Storage Level (m)		High Level Alarm (m)	Storage Volume (m ³)
Pump Station	2400	-0.295		-1.101	3.646
Total storage in wet well below detailed maximum storage level					3.646

Summary	
Manholes	0.675 m ³
Sewers	0.571 m ³
Pump Station	3.646 m ³
Total Provided	4.892 m ³
Total Required	3.978 m ³

Appendix D
Pump Station Drawings



- NOTES**
- DO NOT SCALE.
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 - LEVEL CONTROL POSITIONS ARE SHOWN DIAGRAMMATICALLY ONLY. THEY WILL BE POSITIONED AWAY FROM OBSTRUCTIONS AND BE READILY ADJUSTABLE AFTER INSTALLATION.

STATION INFORMATION					
PUMP TYPE	SULZER	XFP80C-VX PE22/4			
IMPELLER		VX.4 (171mm)			
MOTOR RATING		2.2 kW			
FULL LOAD CURRENT		4.6 A FLC			
ZONE RATING		EXP			
DUTY FLOW		4.75 L/Sec			
HEAD GENERATED		5.72 m			
LEVEL CONTROLS		PULSAR ULTRA LITE ULTRASONIC C/W HIGH LEVEL ALARM AND BACK UP FLOAT SWITCHES			
PIPE / VALVE SIZE		Ø80mm			
FINAL DISCHARGE					
INTERNAL DIAMETER		Ø80mm			
MATERIAL		DUCTILE IRON			
TERMINATION		PLAIN ENDED			
PIPE OD		Ø98mm			
FLANGE DATA		N/A			
RISING MAIN		110mm OD PE100 SDR11 (89.1mm BORE)			
RISING MAIN COUPLER		BY THE DEVELOPER OR CONTRACTOR			
B	06/05/20	Pump specification and detail updated	E.W.	-	I.H.
A	09/04/20	Cover level updated. Wet well depth & VC levels amended.	E.W.	-	I.H.
REV	DATE	DESCRIPTION	DR'n	CHK'd	APPR'd

FOR APPROVAL

PDAS DESIGN INSTALL PROACTIVE
TOTAL WATER EXPERTISE

BUILDING 4.6, HITECH, FRIMLEY 4 BUSINESS PARK, FRIMLEY, CAMBERLEY, SURREY, GU15 7SG OFFICE TEL: 01483 506520 WEBSITE: WWW.PDAS.CO.UK

PROJECT: TOWN DAM LANE DONINGTON, PHASE 2

TITLE: FOUL WATER PUMP STATION ELEVATION VIEW

CLIENT: ASHWOOD HOMES

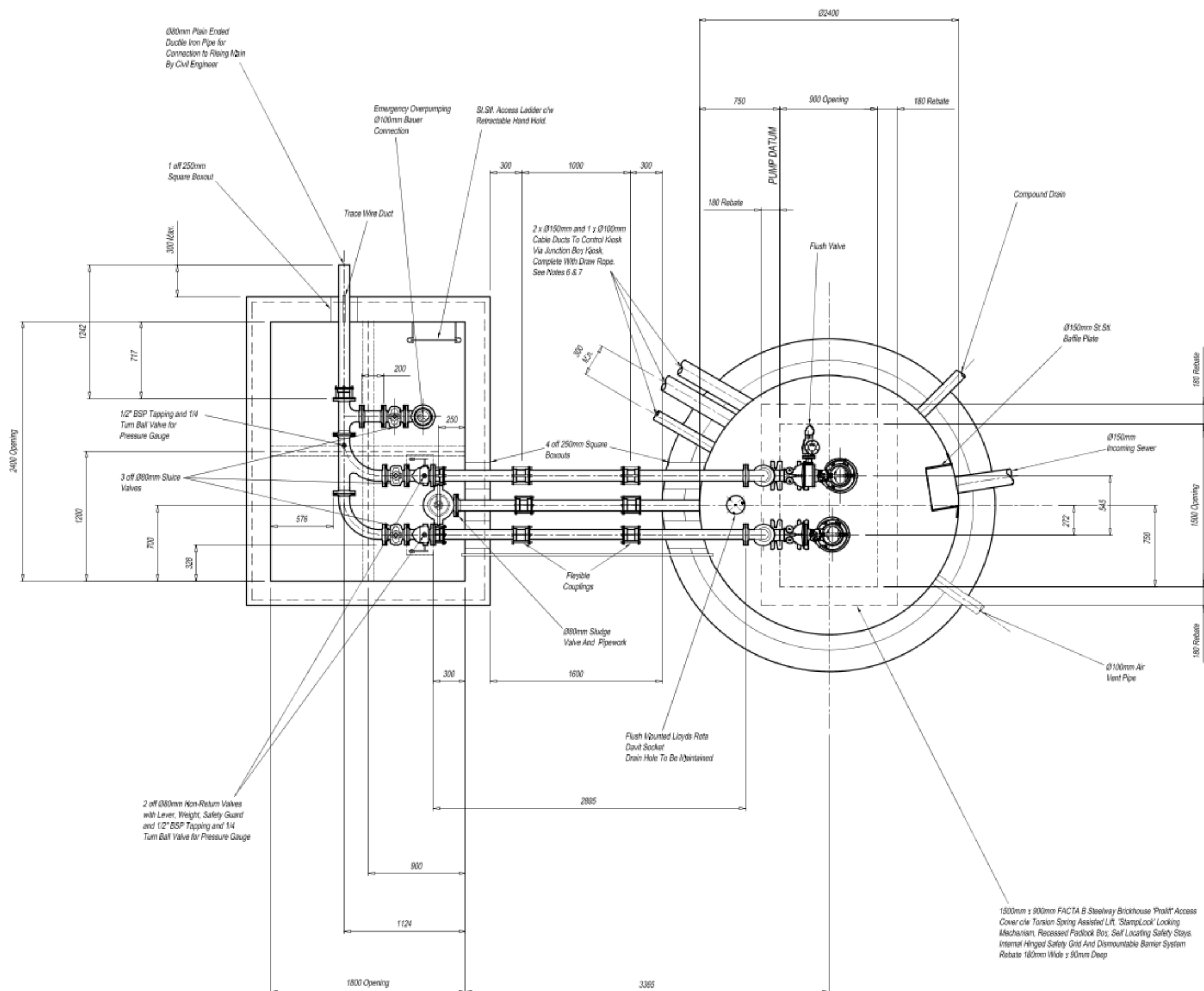
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QUOTE NUMBER: Q11901 APP'D: I.H. DATE: 10-03-2020

PROJECT REF: PR11140 DRG'D: I.H. DATE: 10-03-2020

DRAWING NUMBER: PR11140 - 001 DR'n: E.W. DATE: 10-03-2020

OPERATING LEVELS	
MAXIMUM STORAGE LEVEL	-0.226
LOWEST INLET	-0.801
HIGH LEVEL ALARM	-1.101
STANDBY PUMP START	-1.201
DUTY PUMP START	-1.301
PUMP STOP	-1.765
WET WELL BASE	-2.105

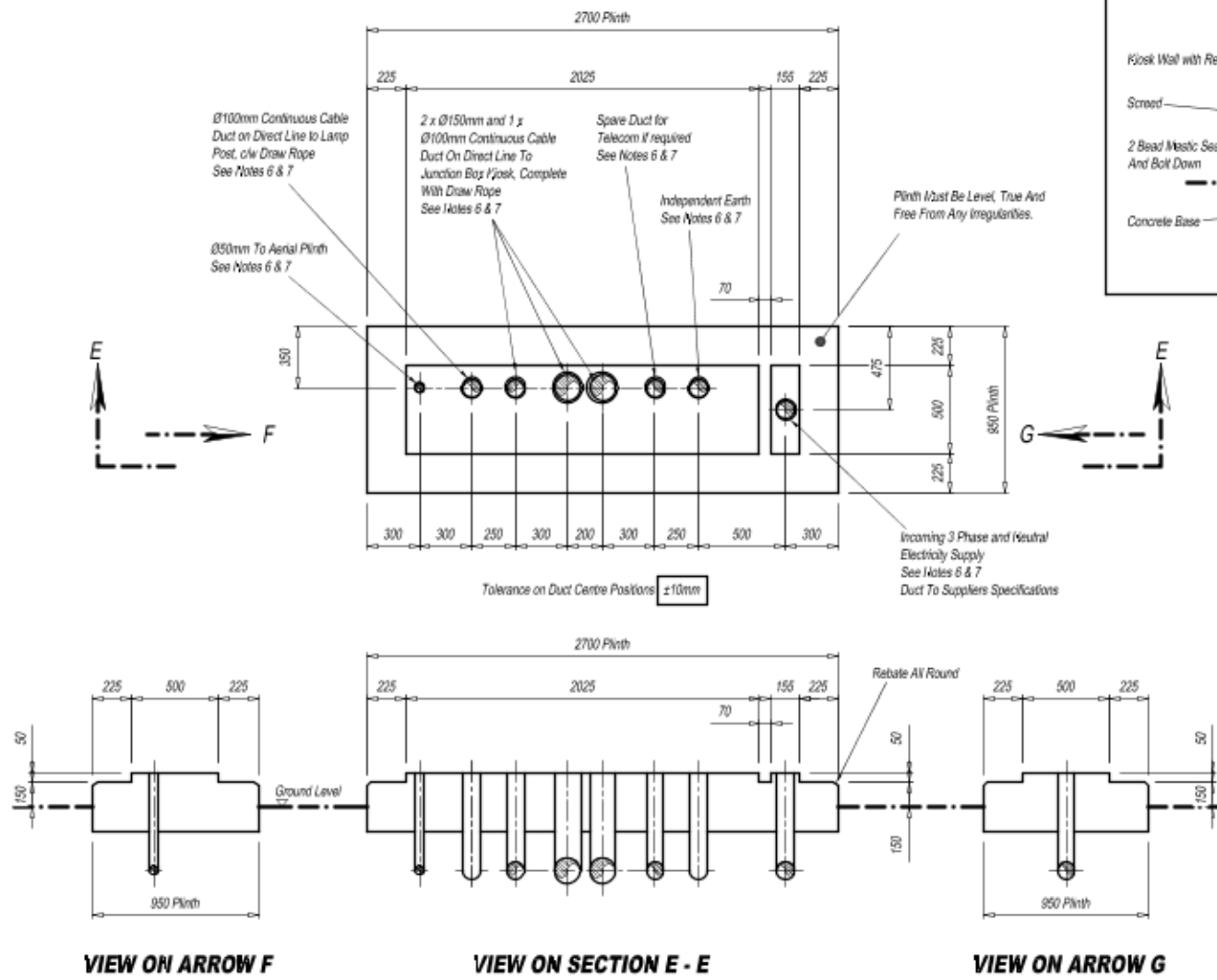
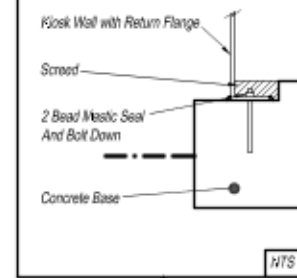


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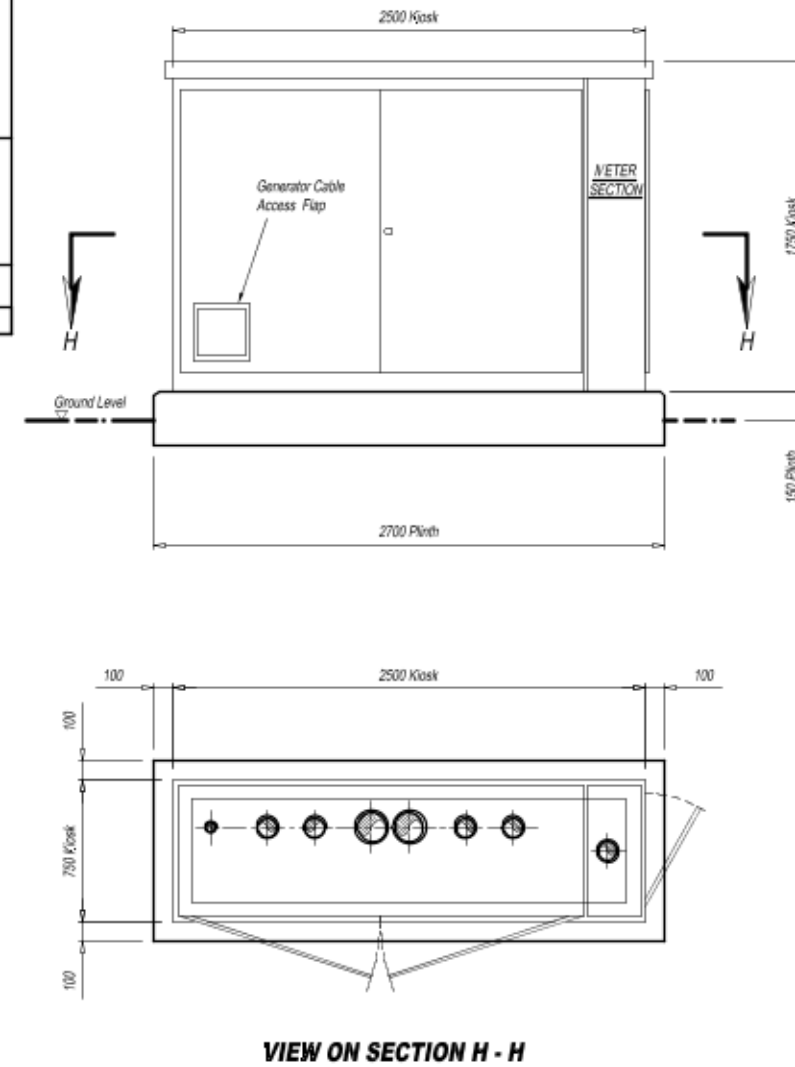
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FOR APPROVAL					
 DESIGN INSTALL PROACTIVE					
BUILDING 4.0, HITECH, FRIMLEY 4 BUSINESS PARK, FRIMLEY, CAMBERLEY, SURREY, GU15 7SG OFFICE TEL: 01480 506520 WEBSITE: WWW.PDAS.CO.UK					
PROJECT: TOWN DAM LANE DONINGTON, PHASE 2					
TITLE: FOUL WATER PUMP STATION PLAN VIEW					
CLIENT: ASHWOOD HOMES					
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QUOTE NUMBER	Q11901	APPR	I.H.	DATE	10-03-2020
PROJECT REF.	PR11140	CHG'd	I.H.	DATE	10-03-2020
DRAWING NUMBER	PR11140 - 002	DR'n	E.W.	DATE	10-03-2020

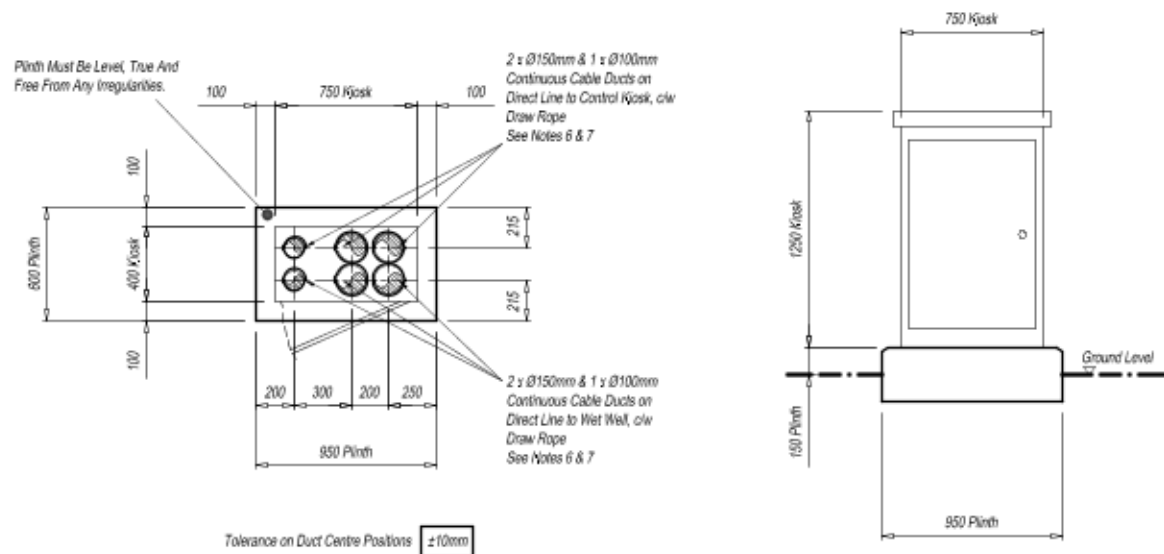
KIOSK PLINTH DETAIL

**MCC KIOSK
REBATE DETAIL**

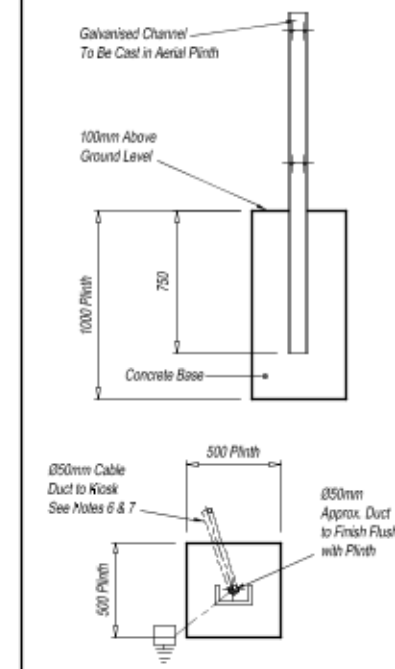
CONTROL KIOSK PLAN & ELEVATION VIEW



JUNCTION BOX KIOSK PLINTH DETAIL



AERIAL PLINTH DETAIL

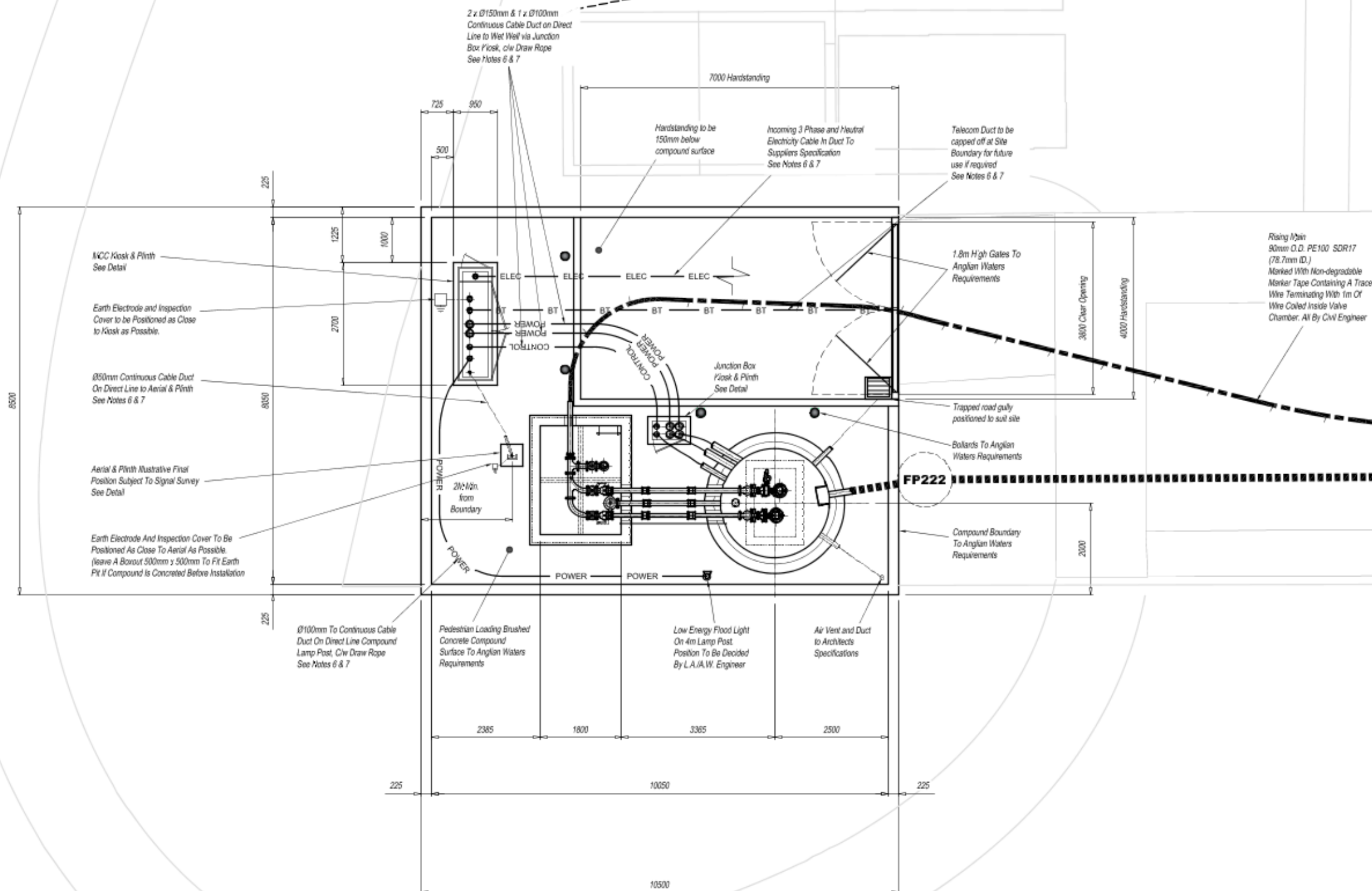


- ## NOTES

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REV	DATE	DESCRIPTION	DR'n	CHK'd	APPR
FOR APPROVAL					
 TOTAL WATER EXPERTISE		DESIGN INSTALL PROACTIVE			
BUILDING 4.6, HTECH, FRIMLEY 4 BUSINESS PARK, FRIMLEY, CAMBERLEY, SURREY, GU10 1SD			OFFICE TEL: 044 (01483) 506503		WEBSITE WWW.PDAS.TD.CO.UK
PROJECT TOWN DAM LANE DONINGTON, PHASE 2					
TITLE FOUL WATER PUMP STATION KIOSK AND PLINTH DETAIL					
CLIENT ASHWOOD HOMES					
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DRAWING NUMBER PR11140 - 003		DRN E.W.		DATE 10-03-2020	

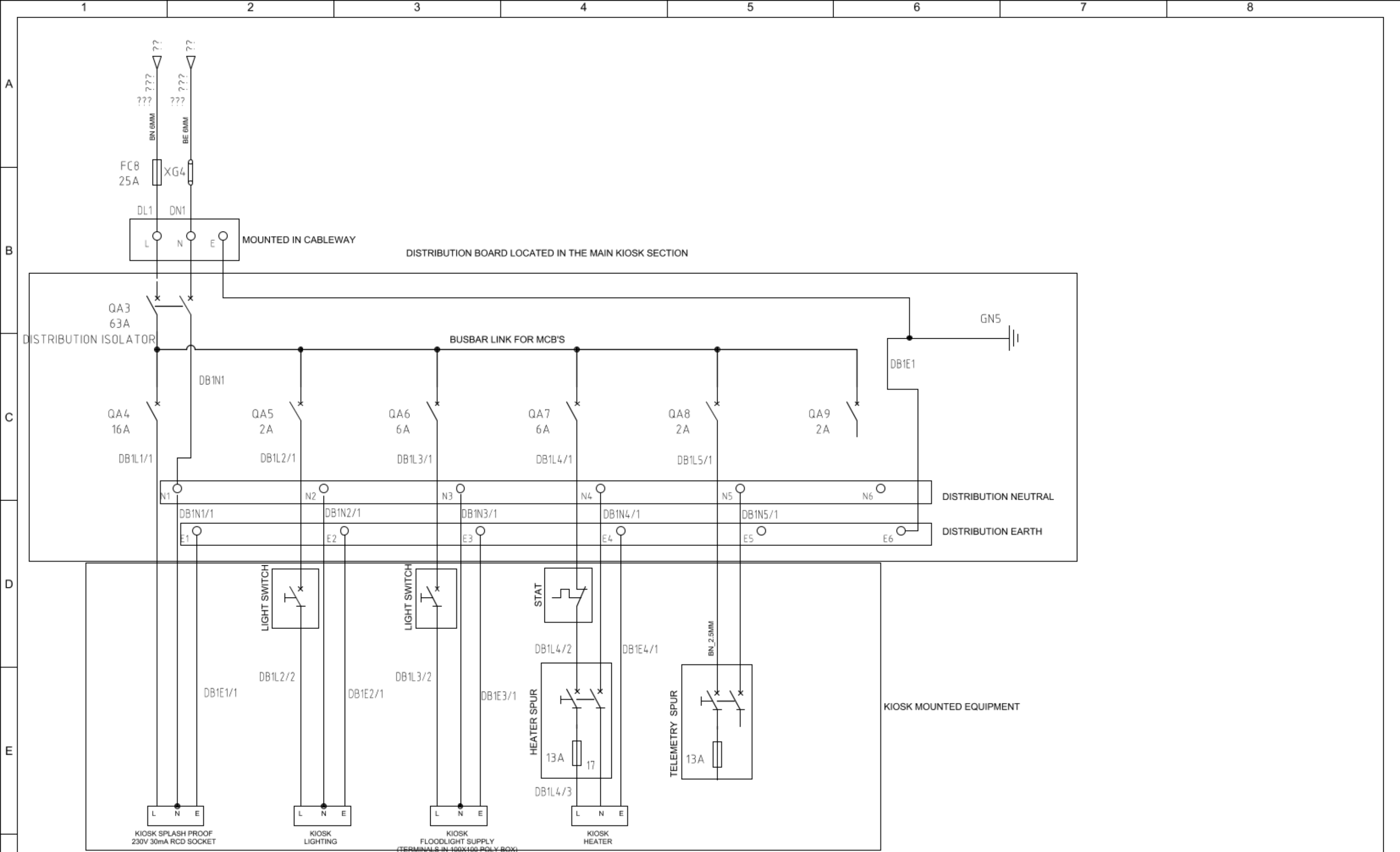
- NOTES**
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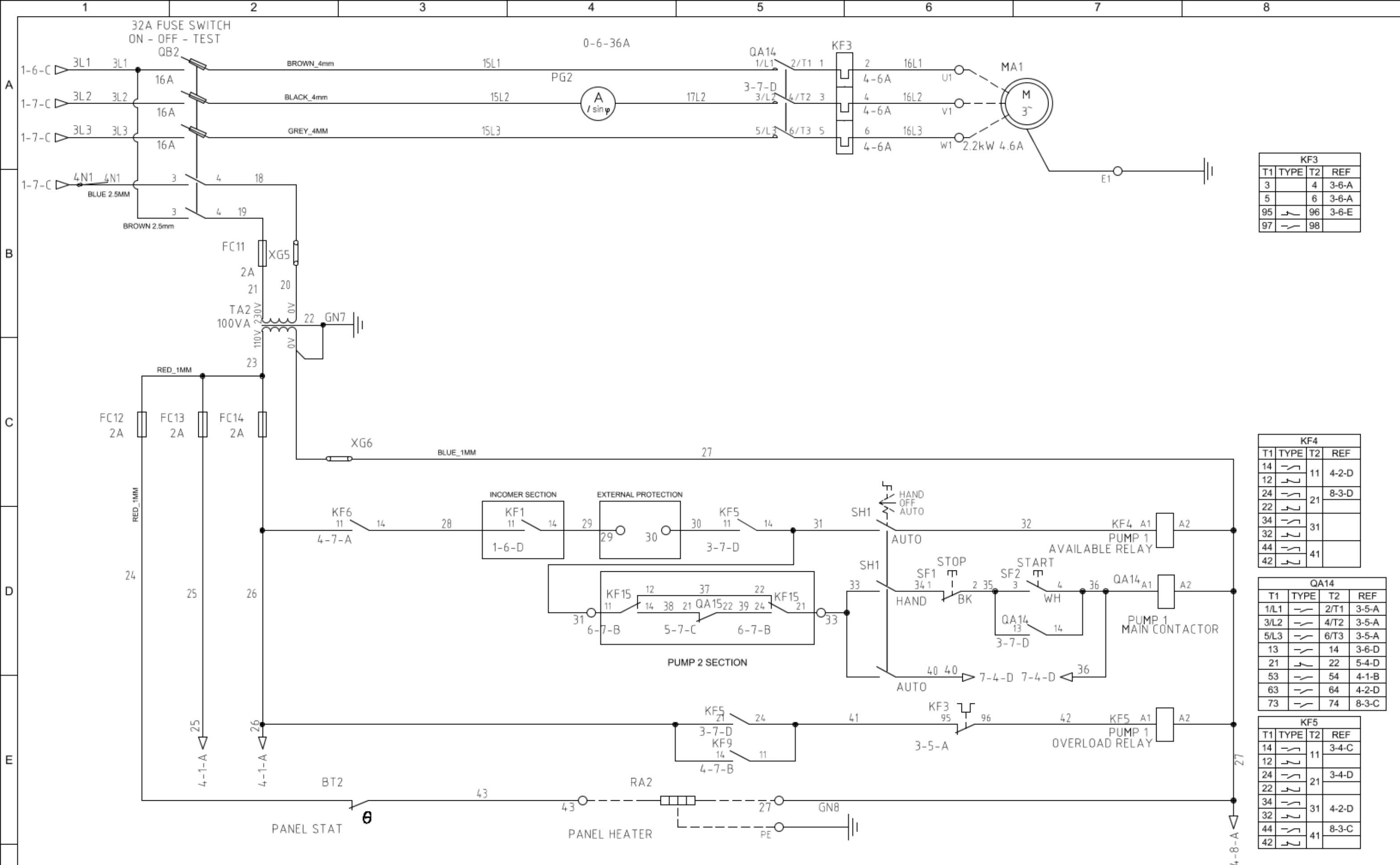
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OFFICE TEL: 01482 505520					
WEBSITE: WWW.PDAS.CO.UK					
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TITLE FOUL WATER PUMP STATION SITE PLAN					
CLIENT ASHWOOD HOMES					
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PROJECT REF.	PR11140	CHKD	I.H.	DATE	10-03-2020
DRAWING NUMBER	PR11140 - 004	DR'n	E.W.	DATE	10-03-2020

Appendix E

Wiring Diagrams



F					Client Name Ashwood Homes		 gemini control systems ltd designers and manufacturers	 APPROVED CONTRACTOR GEMINI CONTROL SYSTEMS LTD TEL: 0844 800 4250 FAX: 0844 800 4251 WWW.GEMINI-CONTROLS.COM	 interface ISO 9001 CERTIFICATION	 PDAS TOTAL WATER EXPERTISE	 Sheet No 2 of 12
					Title SFA6 & ANGLIAN WATER SPEC DUAL DOL CONTROL PANEL DISTRIBUTION IN MOUNTED IN KIOSK						
					Drawn By JH	Project Code PR11140					
	A	FIRST ISSUE	06/05/20	JH	JH						
	Rev	Description	Date	Drn	Apprv	Drawing No PR11140					



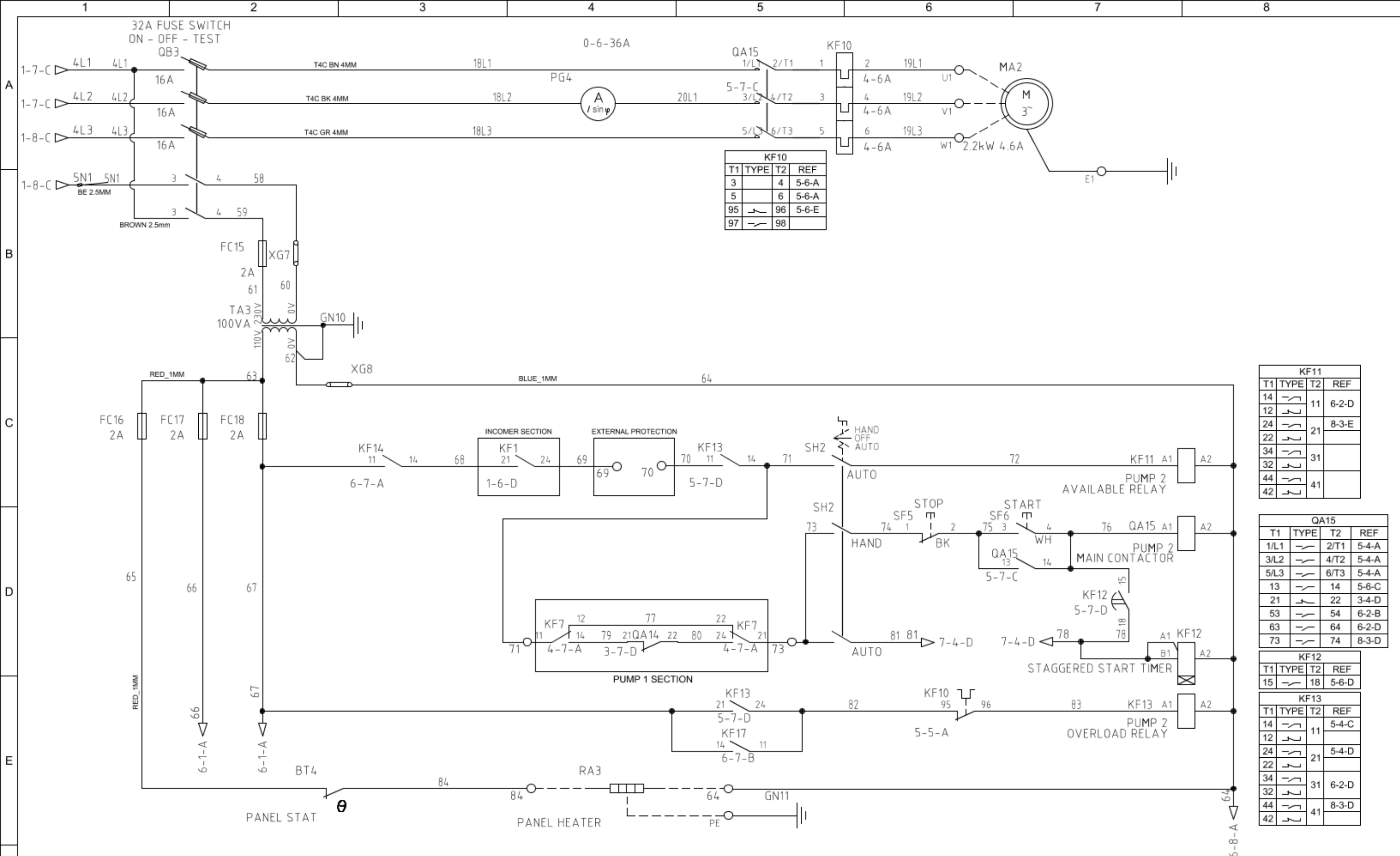
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42			

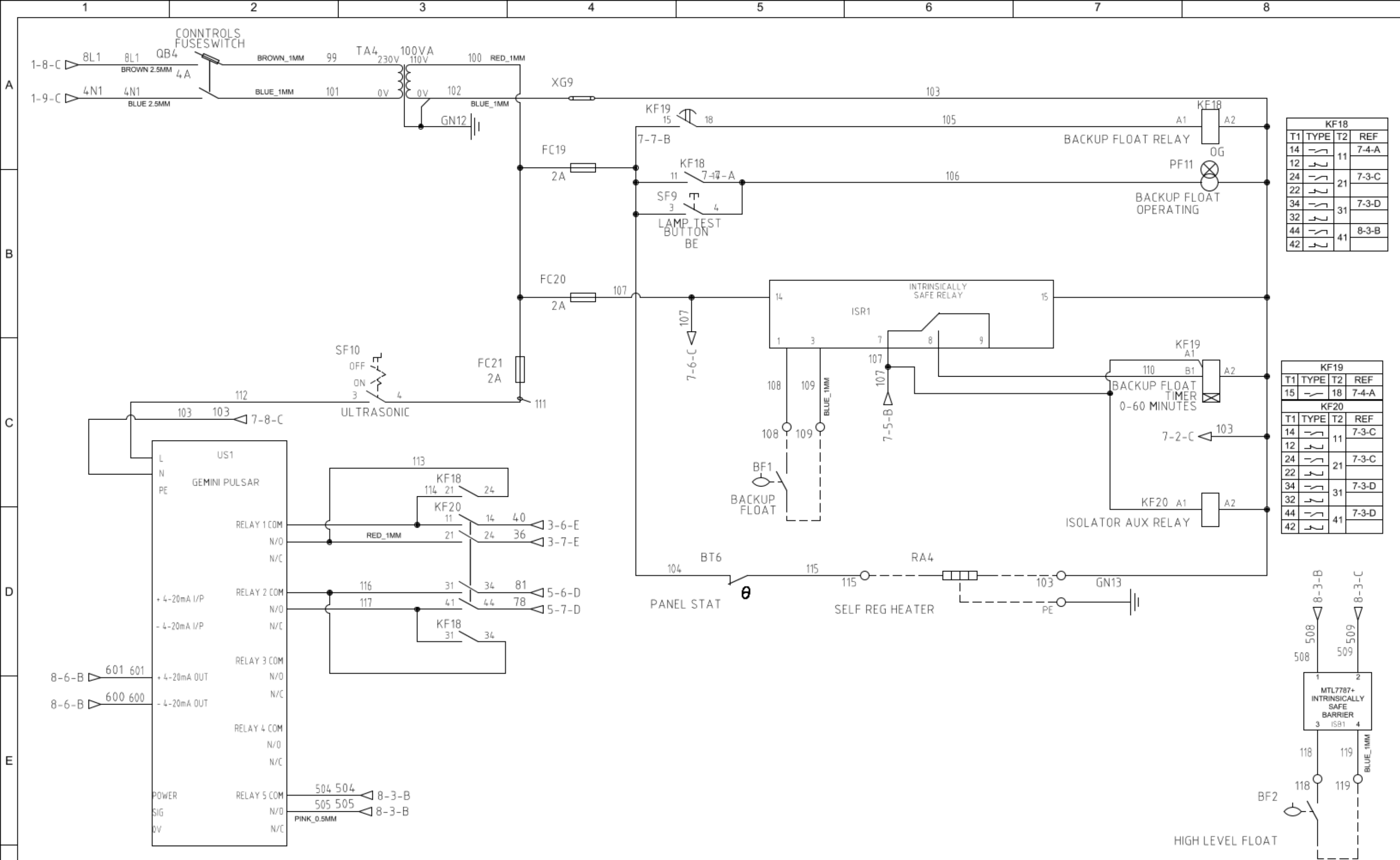
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21		22	5-4-D
53		54	4-1-B
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73		74	8-3-C

T1	TYPE	T2	REF
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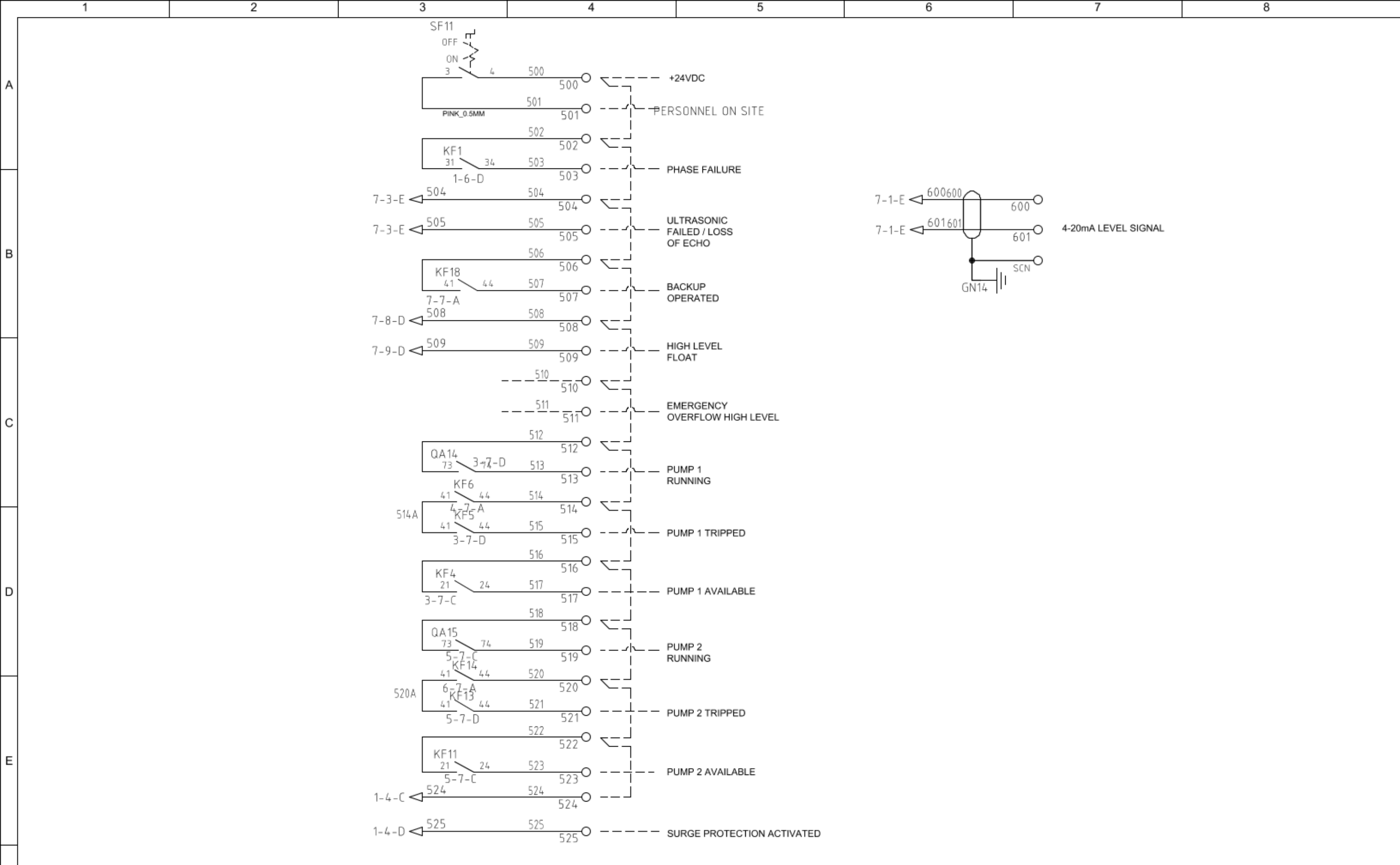
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					Title DUAL DOL CONTROL PANEL SFA6 & ANGLIAN WATER SPEC PUMP 1 STARTER						
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	A	FIRST ISSUE	06/05/20	JH	JH						
	Rev	Description	Date	Drn	Apprv	Drawing No PR11140					



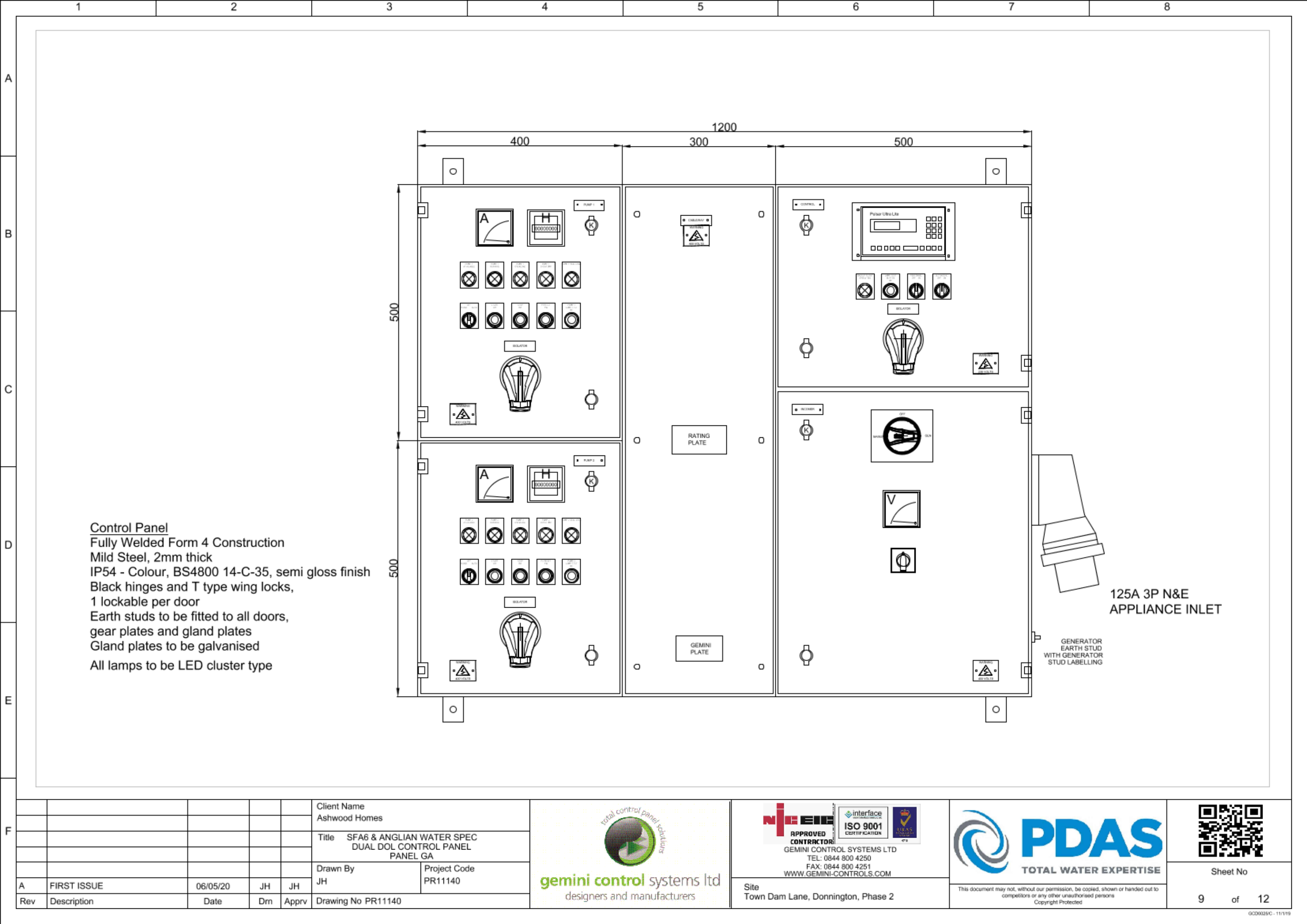
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	A	FIRST ISSUE	06/05/20	JH	JH							
	Rev	Description	Date	Drn	Apprv	Drawing No PR11140						
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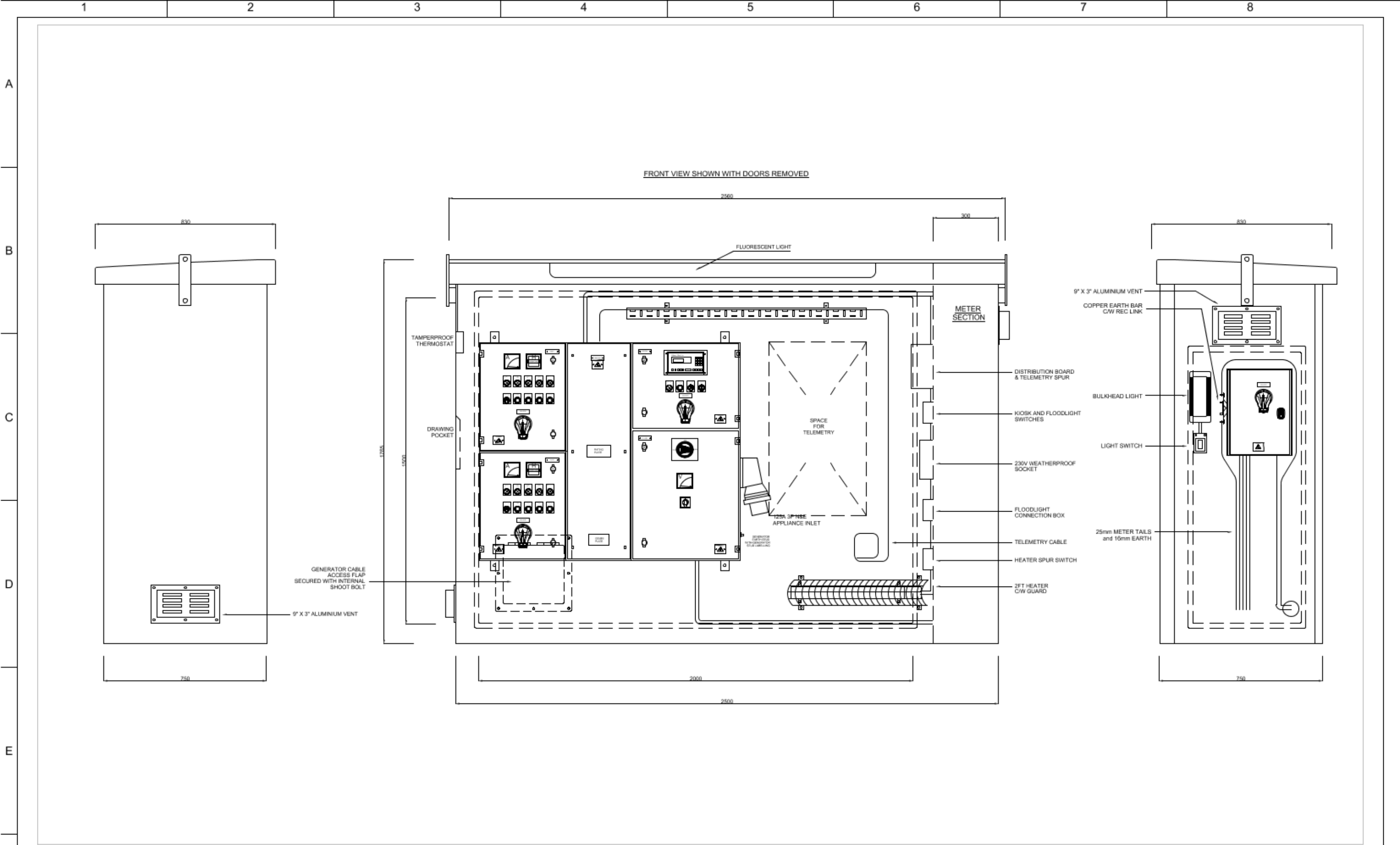


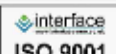
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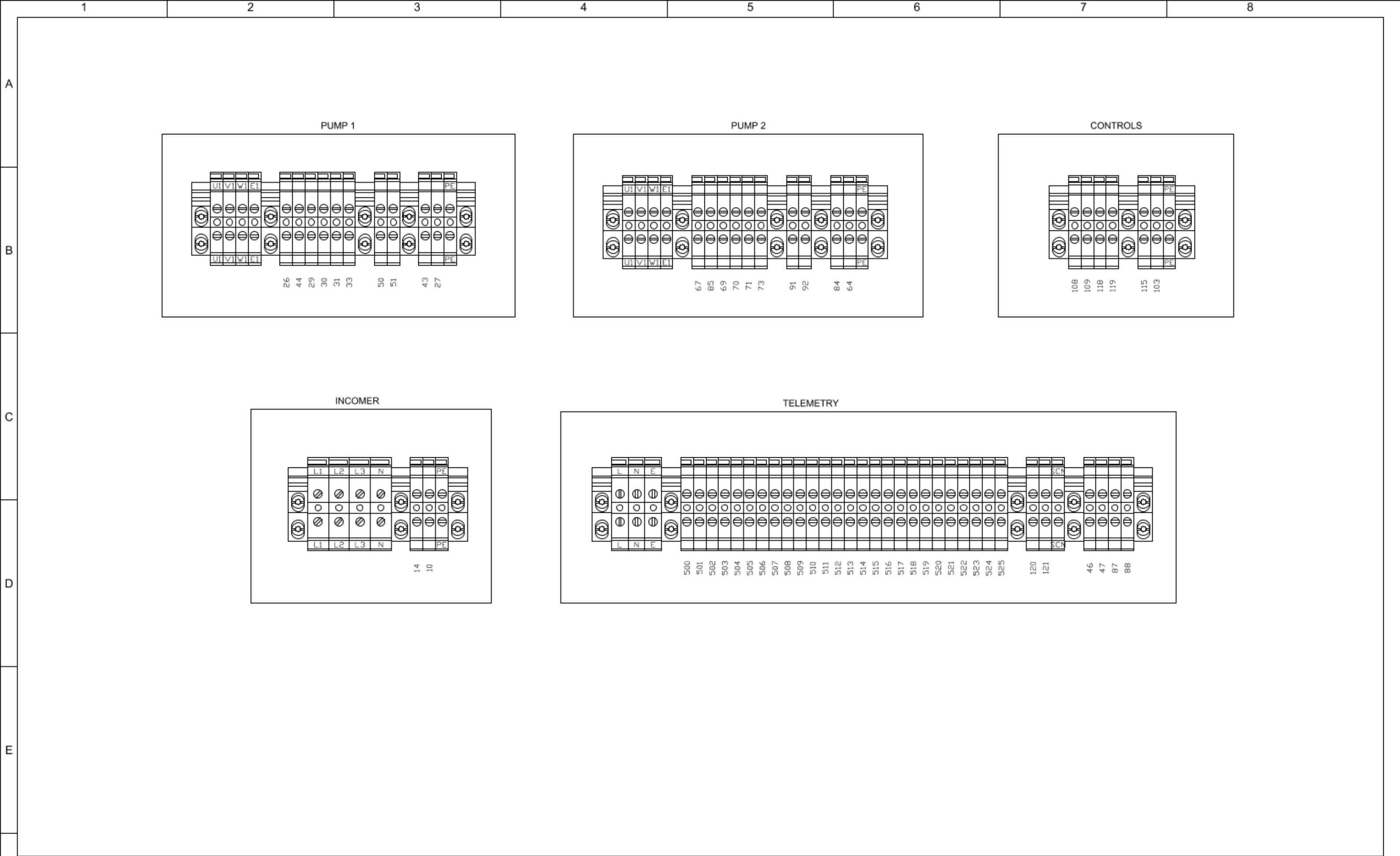


F					Client Name Ashwood Homes		 gemini control systems ltd designers and manufacturers	 interface ISO 9001 CERTIFICATION  GEMINI CONTROL SYSTEMS LTD TEL: 0844 800 4250 FAX: 0844 800 4251 WWW.GEMINI-CONTROLS.COM	 PDAS TOTAL WATER EXPERTISE	 Sheet No 8 of 12	
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					Drawn By JH	Project Code PR11140					
	A	FIRST ISSUE	06/05/20	JH	JH						
	Rev	Description	Date	Drn	Apprv	Drawing No PR11140					
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					Drawn By JH	Project Code PR11140						
	A	FIRST ISSUE	06/05/20	JH	JH							
	Rev	Description	Date	Drn	Apprv	Drawing No PR11140		Site Town Dam Lane, Donnington, Phase 2	This document may not, without our permission, be copied, shown or handed out to competitors or any other unauthorised persons Copyright Protected			



					Client Name Ashwood Homes
					Title SFA6 & ANGLIAN WATER SPEC DUAL DOL CONTROL PANEL TERMINAL FOOTPRINT
					Drawn By JH
					Project Code PR11140
A	FIRST ISSUE	06/05/20	JH	JH	
Rev	Description	Date	Drn	Apprv	Drawing No PR11140

total control panel solutions

gemini control systems ltd
designers and manufacturers

NICEIC
APPROVED CONTRACTOR

interface
ISO 9001 CERTIFICATION

UKAS
QUALITY MANAGEMENT SYSTEMS

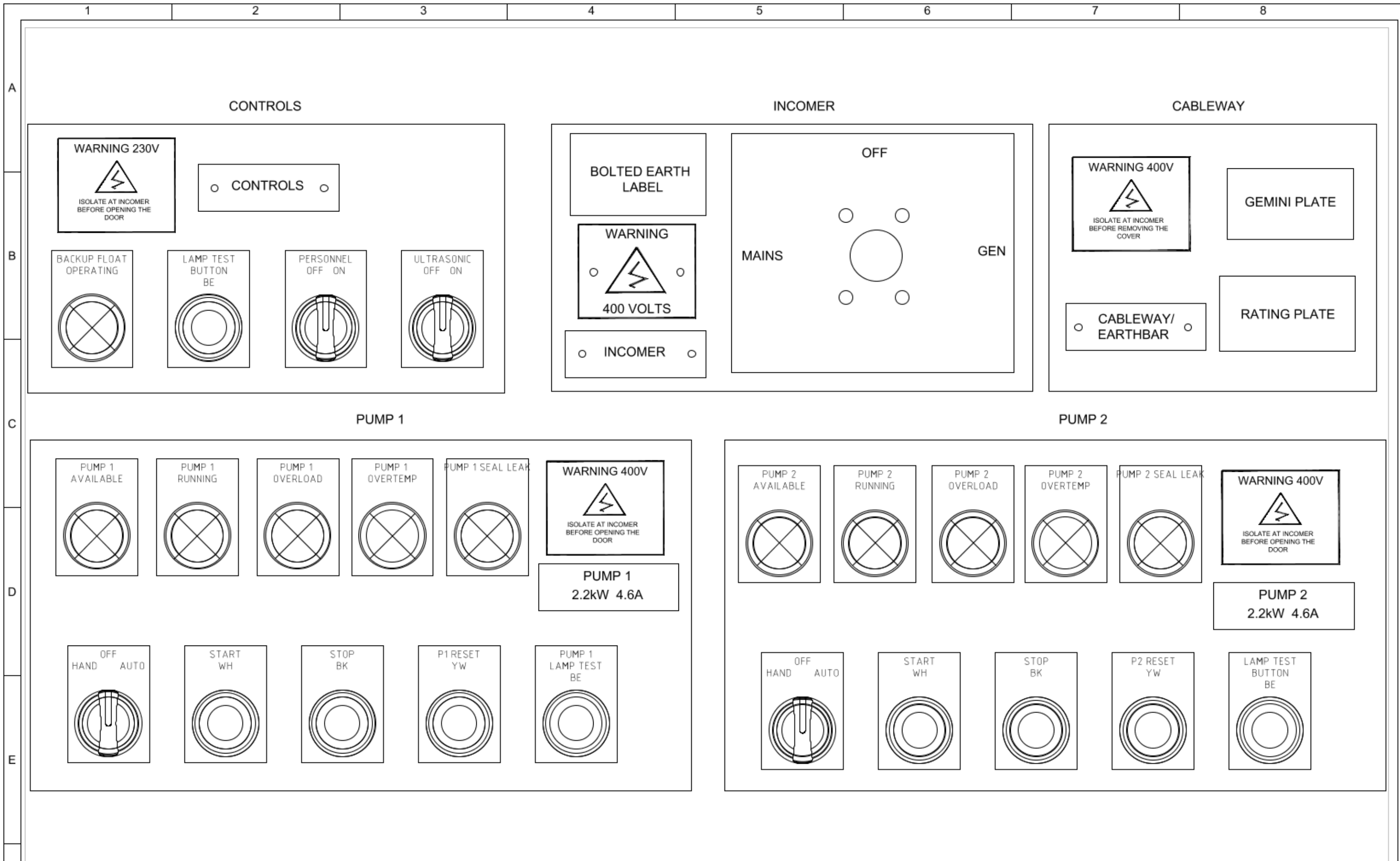
GEMINI CONTROL SYSTEMS LTD
TEL: 0844 800 4250
FAX: 0844 800 4251
WWW.GEMINI-CONTROLS.COM

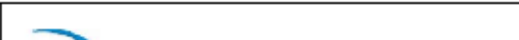
Site
Town Dam Lane, Donnington, Phase 2

PDAS
TOTAL WATER EXPERTISE

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Sheet No
11 of 12



F						Client Name Ashwood Homes	 gemini control systems ltd designers and manufacturers	 APPROVED CONTRACTOR GEMINI CONTROL SYSTEMS LTD TEL: 0844 800 4250 FAX: 0844 800 4251 WWW.GEMINI-CONTROLS.COM	 	 PDAS TOTAL WATER EXPERTISE	 Sheet No 12 of 12
					Title SFA6 & ANGLIAN WATER SPEC DUAL DOL CONTROL PANEL LABEL LAYOUT						
					Drawn By JH	Project Code PR11140					
	A	FIRST ISSUE	06/05/20	JH	JH						
	Rev	Description	Date	Drm	Apprv	Drawing No PR11140		Site Town Dam Lane, Donnington, Phase 2	This document may not, without our permission, be copied, shown or handed out to competitors or any other unauthorised persons Copyright Protected		

Appendix F Floodlight



Kingfisher Lighting Datasheet

Columns

A comprehensive range of tubular, conical and hinged columns, for road & transport, car parks, residential and urban landscapes.



Experts in columns

- Over 25 years' experience
- Lighting design facility to help you specify
- Support to match the columns with luminaires & brackets

Maintained stock levels

- Extensive stock of most columns held at our warehouse
- In-house fabrication and finishing options

Nation-wide delivery

- Hi-ab equipment to enable fast and safe off-loading
- Fleet fitted with trackers to monitor deliveries
- Helpful drivers who handle the on-site deliveries
- Free delivery on orders over £300 within mainland GB

High quality standards

- Designed in accordance with BS EN40
- Manufactured from steel tube to either EN10210 or EN10219

What to consider when designing with columns

BS EN40 provides a detailed framework for the design of a lighting column and provides key considerations when designing an exterior lighting scheme to ensure the structural integrity of the column.

A lighting column design must take into account (in relationship to mounting height):

- Weight and windage of the luminaire and bracket
- Wind speed
- Site altitude
- Site terrain and topography

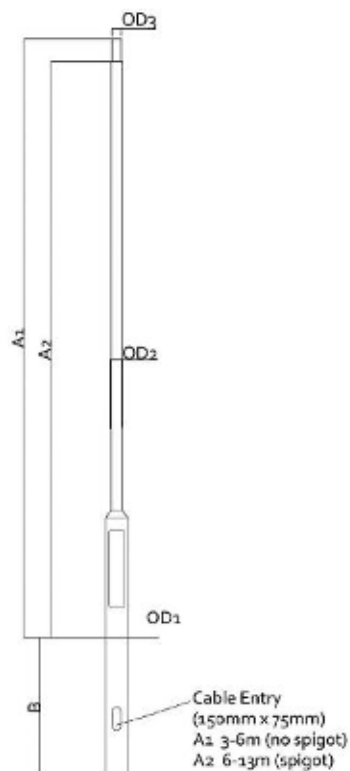
When this information is not readily available, PD 5647:2004 may be used for guidance.

This document contains informative data relating to the administrative areas of the UK, providing a rationalised wind loading factor (RWF) for each location. Please contact us for more information.

Tubular columns (3m - 12m)

A range of tubular lighting columns suitable for road, residential and general amenity areas. Available root mounted or flange plated.

Tubular

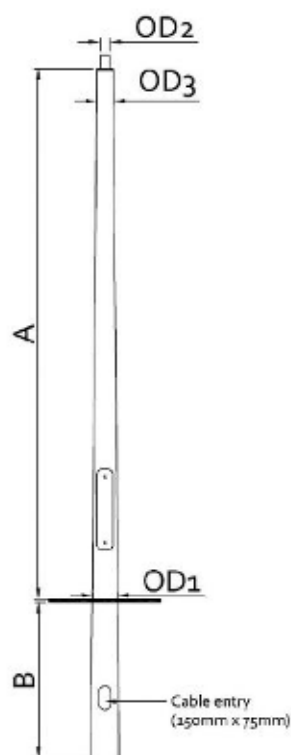


Conical lighting columns (4m - 8m)

An aesthetic range of conical lighting columns suitable for residential and amenity areas.

Available root mounted or flange plated.

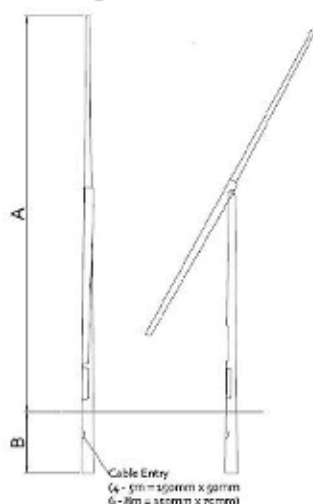
Conical



Mid-hinged columns (4m - 15m)

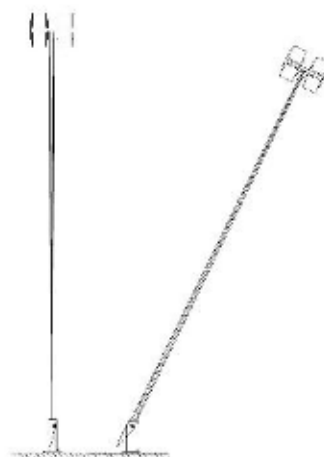
An easy-access range of mid-hinged columns suitable for residential, amenity, rail and industrial areas where conventional access platforms are unsafe or unsuitable. Available root mounted or flange plated. When installing mid-hinged columns, minimum head load is required for the column to hinge.

Mid-Hinged



Base-hinged columns

Base-hinged columns are an option for cost effective, safe and easy maintenance. The lowering of the column is done quickly and safely using a raising and lowering tool specific to the column. This lowers the column to ground level for easy access to the luminaire. Base-hinged columns are best suited to sites with tight access and where mobile platforms cannot be used such as sports facilities, car parks and footpaths.



Tubular columns (3–12m)

A range of tubular lighting columns suitable for road, residential and general amenity areas. Available root mounted or flange plated.

Tubular columns (root mounted)

Code	A	OD1	OD2	OD3	Door Openings	B	Terrain Category	Max Head Load
3CT76	3m	Ø140	Ø76	N/A	500 x 100	800	3	50kg/0.90m²
4CT76	4m	Ø140	Ø76	N/A	500 x 100	800	3	50kg/0.50m²
5CT76	5m	Ø140	Ø76	N/A	500 x 100	800	3	50kg/0.50m²
6CT76	6m	Ø140	Ø76	N/A	500 x 100	1000	3	50kg/0.50m²
6CTH89	6m	Ø168	Ø89	Ø76	600 x 115	1000	3	50kg/0.75m²
8CT89	8m	Ø168	Ø89	Ø76	600 x 115	1200	2	50kg/0.36m²
8CTM114	8m	Ø168	Ø114	Ø101	600 x 115	1200	2	60kg/0.55m²
10CT114	10m	Ø168	Ø114	Ø101	600 x 115	1500	2	50kg/0.50m²
10CTH140	10m	Ø192	Ø140	Ø127	600 x 115	1500	2	80kg/1.00m²
12CTH140	12m	Ø192	Ø140	Ø127	600 x 115	1700	2	70kg/0.85m²

Tubular columns (flange plated)

Code	A	OD1	OD2	OD3	Door Openings	Terrain Category	Max Head Load	Hole Centres C	Slot Size H	Bolt Code
3CT76FP	3m	Ø140	Ø76	N/A	500 x 100	3	50kg/0.90m²	200	20 x 50	FB001
4CT76FP	4m	Ø140	Ø76	N/A	500 x 100	3	50kg/0.50m²	200	20 x 50	FB001
5CT76FP	5m	Ø140	Ø76	N/A	500 x 100	3	50kg/0.50m²	200	20 x 50	FB001
6CT76FP	6m	Ø140	Ø76	N/A	500 x 100	3	50kg/0.50m²	200	20 x 50	FB001
6CTH89FP	6m	Ø168	Ø89	Ø76	600 x 115	3	50kg/0.75m²	200	24 x 50	FB007
8CT89FP	8m	Ø168	Ø89	Ø76	600 x 115	2	50kg/0.36m²	300	29 x 64	FB004
8CTM114FP	8m	Ø168	Ø114	Ø101	600 x 115	2	60kg/0.55m²	300	29 x 64	FB004
10CT114FP	10m	Ø168	Ø114	Ø101	600 x 115	2	50kg/0.50m²	300	29 x 64	FB004
10CTH140FP	10m	Ø192	Ø140	Ø127	600 x 115	2	80kg/1.00m²	300	29 x 64	FB004
12CTH140FP	12m	Ø192	Ø140	Ø127	600 x 115	2	70kg/0.85m²	300	29 x 64	FB004

Conical lighting columns (4–6m)

An aesthetic range of conical lighting columns suitable for residential and amenity areas. Available root mounted.

Code	A	B	OD1	OD2	OD3	Door Size	Terrain Category	Max Head Load	Max Windage
4CCS60L	4m	800mm	133mm	60mm	60 x 85	500 x 100	3	30kg	0.5m²
5CCS60L	5m	800mm	145mm	60mm	60 x 85	500 x 100	3	35kg	0.5m²
6CCS60L	6m	800mm	157mm	60mm	60 x 85	500 x 100	3	40kg	0.5m²
8CCS60L	8m	1200mm	168mm	60mm	76mm	500 x 100	2	40kg	0.45m²

Mid-hinged columns (4–8m)

An easy-access range of mid-hinged columns suitable for residential, amenity, rail and industrial areas where conventional access platforms are unsafe or unsuitable for use. Available root mounted or flange plated.

Code	A	Description - Mid-hinged octagonal	B	Max Head Load *	Max Windage	Hole Size L	Flange Size/ Code	Bolt Code	Bolt	Winch
Rope Operated										
4MHRL	4m	Root mounted	800	20kg	0.5m²					Rope
4MHFPL	4m	Flange plated		20kg	0.5m²	200	300mm/18mm	M16 x 500	FB001	Rope
5MHRL	5m	Root mounted	800	20kg	0.5m²					Rope
5MHFPL	5m	Flange plated		20kg	0.5m²	200	300mm/18mm	M16 x 500	FB001	Rope
6MHRL	6m	Root mounted	1000	20kg	0.5m²					Rope
6MHFPL	6m	Flange plated		20kg	0.5m²	200	300mm/18mm	M16 x 500	FB001	Rope
Winch Operated										
4MHRL	4m	Root mounted	800	35kg	0.5m²					KLWINCHL
4MHFPL	4m	Flange plated		35kg	0.5m²	200	300mm/18mm	M16 x 500	FB001	KLWINCHL
5MHRL	5m	Root mounted	800	35kg	0.5m²					KLWINCHL
5MHFPL	5m	Flange plated		35kg	0.5m²	200	300mm/18mm	M16 x 500	FB001	KLWINCHL
6MHRL	6m	Root mounted	1000	35kg	0.5m²					KLWINCHL
6MHFPL	6m	Flange plated		35kg	0.5m²	200	300mm/18mm	M16 x 500	FB001	KLWINCHL
8MHF1	8m	Flange plated		70kg	0.98m²	300	420mm/25mm	M24 x 820	FB004	KLWINCHSD
8MHRL1	8m	Rooted mounted	1200	135kg	0.70m²					KLWINCHSD <100kg KLWINCHSD2 >100kg

Above weight and windage area figures are based on a medium terrain category. Other sizes & variations available on request.

*Please note maximum carrying weight of a 4m - 6m mid - hinged column is 20kg with a rope or 35kg with a winch



**Kingfisher
Lighting**

Datasheet

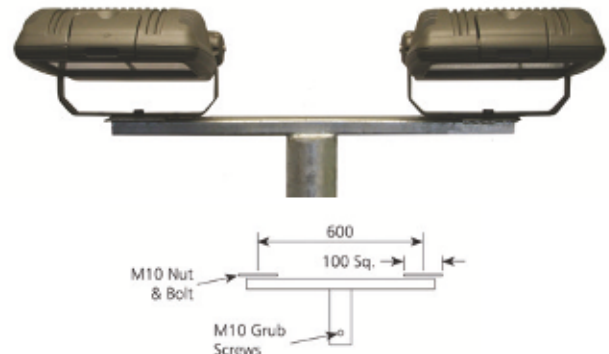
Floodlight Brackets

Our floodlight brackets ensure your floodlight is securely mounted onto the column. Each bracket has a top plate of 100mm square with a M10 zinc plated bolt, allowing full orientation of the floodlight. All brackets are supplied in a hot dip galvanised finish and are complete with the necessary bolts for mounting to the column.

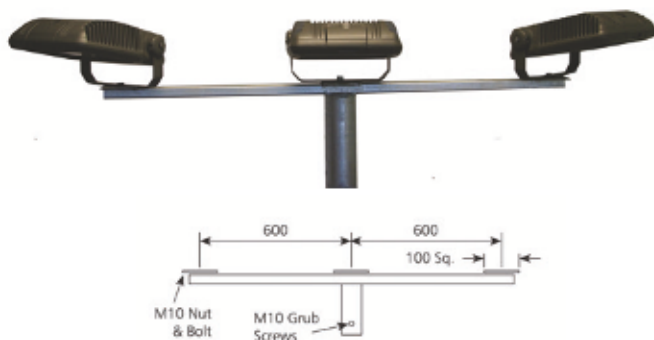
STM1 Single floodlight mounting bracket



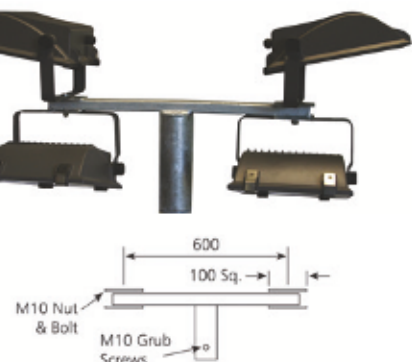
STM2 Twin floodlight mounting bracket



STM3 Triple floodlight mounting bracket



STM4 Four floodlight mounting bracket



Code	Luminaire Type
Single floodlight mounting bracket	
STM176	To over fit a column with a 60mm dia spigot/shaft
STM189	To over fit a column with a 76mm dia spigot/shaft
STM1114	To over fit a column with a 89 or 101mm dia spigot/shaft
STM1140	To over fit a column with a 127mm dia spigot/shaft
Twin floodlight mounting bracket	
STM276	To over fit a column with a 60mm dia spigot/shaft
STM289	To over fit a column with a 76mm dia spigot/shaft
STM2114	To over fit a column with a 89 or 101mm dia spigot/shaft
STM2140	To over fit a column with a 127mm dia spigot/shaft

Code	Luminaire Type
Triple floodlight mounting bracket	
STM376	To over fit a column with a 60mm dia spigot/shaft
STM389	To over fit a column with a 76mm dia spigot/shaft
STM3114	To over fit a column with a 89 or 101mm dia spigot/shaft
STM3140	To over fit a column with a 127mm dia spigot/shaft
Four floodlight mounting bracket	
STM476	To over fit a column with a 60mm dia spigot/shaft
STM489	To over fit a column with a 76mm dia spigot/shaft
STM4114	To over fit a column with a 89 or 101mm dia spigot/shaft
STM4140	To over fit a column with a 127mm dia spigot/shaft

Most columns of 8 metres and above have a column spigot; we will ensure that the brackets ordered will fit your columns. Where brackets are purchased alone for existing columns please indicate the diameter of the column spigot. The four-way brackets are to mount two floodlights on top of the cross arm and two underneath using the same bolts. Fittings to fix at the same level above the cross arm facing North, South, East, West are also available, add suffix NSEW to STM4 reference. These brackets are only suitable for mounting flood lights up to 400W. For 1000W and above suffix with 'H' for heavy duty e.g STM2H89.

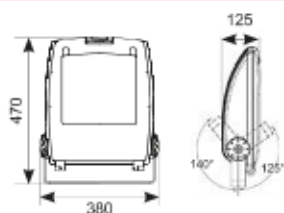
- Architectural slim die-cast LED floodlight
 - 100W LED exceeds performance of 150W HQL
 - 200W LED comparable performance to 400W HQL
 - Optically textured glass for enhanced light output
 - Heat sink design provides optimum LED life
 - Graphite textured paint finish
 - Pre-wired with 1 metre of rubber insulated cable for ease of installation
 - PIR versions complete with manual override facility
 - LED lifespan L70 50,000 hours
 - Non-dimmable
- Note: 100W and 200W versions are not suitable for interior use*



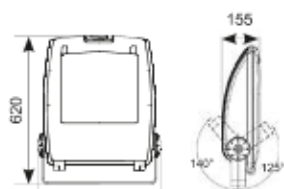
AMLED100



AMLED200



AMLED100



AMLED200

LED Information

Total (Watts)	100W
	200W
Lumens Delivered	
100W	7850lm
200W	17380lm
Lm/W 100W	78lm
Lm/W 200W	87lm
CRI	Ra 70
CCT	4750K
Input	230V

Code	Lamp	Description	Windage
AMLED100	LED	100W - Cool White	0.18
AMLED200	LED	200W - Cool White	0.30

Options	/PC	Electronic Photocell
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Appendix G
Anglian Water Adoptable Pump Station Design Criteria



APPENDIX TO SEWERS FOR ADOPTION – 6TH EDITION ADDENDUM TO PUMPING STATIONS

This document sets out specific requirements where there is a need for guidance which is outside the scope of Sewers for Adoption 6th Edition. The page numbers and references shown below refer to the relevant sections of the Sewers for Adoption 6th Edition. Additional clauses are shown in *italics*.

Pump station design criteria

In order to achieve consistency between flow assessments made as part of our pre-planning process and adoptable pumping stations delivered by developers, the following actual water consumption figures should be used to calculate the dry weather flow:

- ❖ 2.35 persons per property
- ❖ 125 litres per head per day
- ❖ 25% infiltration

The use of realistic criteria also leads to smaller pumps and reduced power costs, smaller rising mains and a lower emergency storage requirement.

- ❖ Pump rate = $4 \times \text{DWF}$ (increased if necessary to achieve velocity between 0.75-1.8m/s)
- ❖ Emergency storage is 4 hours at 1DWF
- ❖ The peak inflow is considered to be $2.12 \times \text{DWF}$

General notes:

Vesting: Anglian Water promotes the policy that the adoption process, where possible, is completed within the timescales given in the national document. Should the developer fail to complete the Agreement within the timescales AW may complete the works and charge all costs to the developer or where applicable recover costs from the bond. Once completed, the works will be Vested and a Vesting declaration completed.

Surety: The Surety will be reduced on pumping stations to 15% of the value of the pumping station upon issue of the Provisional Certificate.

Fees: Anglian Water will produce annually a schedule of rates to be used to calculate the costs of the works. If the submission/construction of the works is not of a conventional nature or changes are made to the design/layout of the site and re-checking/re-inspections are required, additional charges may be made in accordance with our current charges document.

Additional Services: Anglian Water can provide monitoring of the pumping station via telemetry. Please liaise with our Telemetry Coordinator at the appropriate time who can confirm monitoring costs.

Acknowledgements: This appendix has been produced by the Developer Services Drainage Team. If you have any questions relating to the content, please contact us on 03456 066087.

<u>Page</u>	<u>Clause</u>	<u>Description</u>
30	2.16.5	<i>The use of staged start and stop routines on the motor drives should be explored to avoid high surge pressures on long rising mains.</i>
41	2.17.2	Surface water pumping stations should only be used where there is no other practicable method of surface water drainage and an exceedance flood route is provided in the event of failure of the pumping station.
41	2.17.7	Emergency storage for domestic foul flows should be calculated as per 'pump station design criteria' shown on Page 1 of this document.
41	2.17.8	For surface water pumping stations, 125m ³ of additional storage should be provided above that required for the critical 1in30yr storm event, per hectare of impermeable surface drainage to the pumping station.
41	2.17.10	<i>All pipework within the pumping station and valve chamber shall be ductile iron and the preferred material for the rising main shall be black polyethylene.</i>
41	2.17.11	<i>Arrangements need to be made to transfer the energy supplier to AW's supplier at the time of vesting.</i>
42	2.18.2	The hard standing areas shall be concrete slab or tarmac. The tanker hard standing should drain to the wet well.
42	2.18.6	<i>Secure Sites: Unless otherwise agreed the site should have a boundary brick wall with a minimum height of 1.8m, 225mm width and have an Engineering Brick DPC. The type of brick shall be matched to the surround buildings. The gates should be clear 3.8m opening with galvanised mild steel vertical bars 1.8m high or match the height of the boundary wall.</i> <i>Open sites: (special circumstances only or where local planning restrictions are imposed, subject to agreement with AW) The size and layout shall be similar to that shown for secure sites and demarcated.</i>
42	2.18.7	<i>The station compound, primarily the wet well/valve chamber shall be illuminated with an energy efficient floodlight (5,000 lumen minimum) mounted on a pole, that can be lowered for maintenance purposes, from an approximate height of 4m above the working area.</i>

<u>Page</u>	<u>Clause</u>	<u>Description</u>
43	2.21.3	A hand-operated gate or plug valve with extension spindle is required.
43	2.21.5	The depth of the valve chamber should not exceed 2.0m. The type of cover should be as per 2.22.3 or galvanised mild steel interlocking open mesh with hinged sections to provide access and holes/slots to allow operation of valves from ground level (to be agreed in discussion with the Engineer). Covers to be flush with a recessed 14mm padlock. Where the valve chamber depth is 1.5m or more and has mesh covers, permanent or temporary hand railing must be provided, where practicable. Hand railing must be a minimum height of 1100mm with no gaps greater than 470mm between the top rail, intermediate rail and platform. Access should be via a stainless steel ladder with retractable top section (or using hand railing in place of top section).
44	2.22.4	The venting arrangement shall be type (c) positioned adjacent the compound wall at a height no greater than the compound wall.
<u>Part 3 – M&E Specification for Small Pumping Stations:</u>		
57	3.3.11	The wet well flushing device shall be type b) a hydraulically actuated valve fitted to one of the pumpsets.
57	3.3.13	A synthetic (non corrosive and smooth) loop of line/rope shall be fitted to all pumps and terminate on wall mounted hooks accessible at the cover level. Pumps shall have a minimum-lifting loop of 120mm diameter to facilitate the use of this lifting methodology.
58	3.4.1	Pumps of any KW rating shall have the motor protection fitted as recommended by the pumpset manufacturer
59	3.8.3.4	Pump cables shall terminate in a weatherproof (see clause 3.8.3.4 (b)) and lockable pump cable termination junction box above ground at the wellhead, with facilities for glanding incoming and outgoing cables. The outgoing cable ducts shall be sealed with foam after installation of the cables. A notice shall be fixed to the front of the door stating, "Isolate elsewhere before opening". Ensure cross-ventilation as per clause 3.11.2.10.
61	3.10.1.2	>4kw DOL and above 4kw star delta or other method as required i.e. inverter drive
63	3.10.3	2 copies (1 paper copy and 1 electronic) of Operation and Maintenance manuals shall be provided during the maintenance period including an inventory of all electrical and mechanical items installed together with 2 sets of keys.
63	3.11.2.4	A separate compartment but within the main kiosk construction shall be provided with external access for the regional electricity supplier's meter, fuses etc.

<u>Page</u>	<u>Clause</u>	<u>Description</u>
64	3.11.2.12	All doors shall be fitted with Abloy locks.
64	3.11.3.1	The kiosk should be mounted on a re-batted concrete plinth.
65	3.11.7	Telemetry shall be in accordance with Anglian Water's manual of telemetry and process control. No part of the aerial installed within the compound may extend beyond the boundary of the compound.
70	3.13.1.3(a)	The switch shall be interlocked in the 'off' position and the compartment remain closed when secured by means of a padlock.
71	3.13.2.2	Lamps shall be LED with integral lamp test facility.
71	3.13.3.3(b)	With auto available lamp.
72	3.13.3.8	Emergency Stopping devices are not required.
72	3.13.4.1(c)	The ultra sonic level controller mounted on the front of the common control compartment/fixed to the back board and the transducer mounted on flexible conduit easily accessible for maintenance/cleaning within the wet well and shall comply with the following (for small pumping stations):- (i) Operating minimum range of 0.30-15 metres. The developer to select the appropriate transducer for the duty required. (ii) The controller to have a real time clock with facility to automatically correct for GMT/BST and clear visual display of settings and conditions using standard engineering units. The display must be visible during times of low light (e.g. by means of a back light.) (iii) Capable of accurately gathering total pumped volume data efficiency, hours run, starts, etc. (iv) Controller suitable for rack, panel and wall mounted applications. Wall mounted version to be enclosed to I.P. 65 standards. Transducer to be IP 68 ingress protection. (v) Enable restricted access only to parameter settings (e.g. by means of password protection). (vi) Continually monitor pumps performance and alarm deterioration. (vii) Capable of switching to a second pump after a predetermined period regardless of the liquid level being at the off position to provide even pump wear. (viii) Level control system to be Zone 1 hazardous area with the option of Zone 0 where a risk assessment deems necessary. (ix) Output from controller to be 4-20mA as standard with options for additional outputs, where required. (x) On storm/surface water pumping stations the controller shall have the facility to start a pump during long periods of dry weather or inactivity to check pump operation provided a selected minimum head is available and alarm on failure.

<u>Page</u>	<u>Clause</u>	<u>Description</u>
<u>Part 4 – M&E Specification for Micro Pumping Stations:</u> as per 'Part 3' above with the addition of:-		
83	4.2.1	The maximum operating speed shall be 2900 rpm.
89	4.7.2	The electrical supply may be 230v single phase where applicable.
91	4.9.1(h)	<i>A separate distribution board after the incoming supply to feed the control panel, telemetry and other services i.e. lighting, heating, 13amp socket.</i>
101	4.13.4.1(c)	As clause 3.13.4.1(c) but delete (ii), (iii), (vi), (vii) & (x)
<u>Part 5 – Civil Engineering Specification:</u>		
142	5.7.9.8 & 5.7.10.2	Pumping mains are to be subjected to and pass a 10-bar Type 2 water pressure test.