

TECHNICAL SUBMISSION

PROJECT

One Horton Heath – Southern Pump Station

CLIENT

PFA Consulting

PROJECT REFERENCE

PR16103

ISSUE

A

Change History

Issue	Revision Description	Date	Engineer	Approved
A	Initial submission for submission to Southern Water for approval	30.05.2022	P. Warner	P. Warner

CONTENTS

- 1: Drainage Strategy
- 2: Specification.
- 3: Hazardous Area Classification
- 4: Design Inflow and Proposed Discharge.
- 5: Rising Main / Surge Analysis
- 6: Emergency Storage
- 7: Retention Times and Chemical Dosing
- 8: Pump Duty and Selection
- 9: Pump Station Layout
- 10: Pump and Level Control Cabling
- 11: Control Equipment
- 12: Telemetry Equipment
- 13: Access Covers
- 14: Lifting Equipment
- 15: Penstock Valve
- 16: Baffle Plate
- 17: Services
- 18: Appendices
 - A. Summary
 - B. Hydraulic Calculations, System and Performance Curves and Pump Dimensions
 - C. Surge Analysis (To Follow)
 - D. Emergency Storage Calculations
 - E. Storage Chamber – Manufacturers Details (To Follow)
 - F. Hazardous Area Certification
 - G. Pump Station Drawings
 - H. Structural Design (To Follow)
 - I. Wiring Diagrams
 - J. Junction Box Stand Details
 - K. Southern Water Telemetry Schedule
 - L. Design Flow Criteria Extracts
 - M. Southern Water Addendum Issue 4 Dated May 2021 to DCG

1: Drainage Strategy

The development as a whole will be served by 2 pump stations.

The Southern Pump Station serves the following elements and will discharge to the gravity system feeding to the Northern Pump Station

- 1191 Residential dwellings.
- School – 3 Form Entry, 630 pupils and 90 staff (720 Persons total)
- 18581m² of Employment area
- 4900m² Mixed use area

The Northern Pump Station deals with the following elements which comprises elements via gravity plus the pumped flows from the Southern Pump Station that enter the gravity system draining to the pump station. The Northern Pump Station discharges all the flows off site.

- 1175 Residential dwellings.
- 5500m² of Employment area
- 2787m² Mixed use area
- Pump flows entering the gravity system from the Southern Pump Station

It is proposed to link the pump stations via a GSM system to inhibit the Southern Pump Station from operation when there is a failure condition at the Northern Pump Station thus isolating the emergency storage at the individual pump stations.

A GD04 GSM transmitter will be installed in the control kiosk at the Northern Pump Station which will send a signal to a GD04 receiver unit installed in the control kiosk at the Southern Pump Station to inhibit the station from operation on receipt of a failure condition until the condition passes. The failure signal at the Northern Pump Station will be derived from the circuitry in the control panel.

There is around 350m of gravity pipeline from the discharge point of the Southern Pump Station to the Northern Pump Station which will smooth out the instantaneous nature of the pumped flows arriving at that station. Our calculations are therefore based on flows being treated as those that would arrive via gravity at the Northern Pump Station rather than considering them as instantaneous.

This submission is for the Southern Pump Station. A separate submission is being prepared for the Northern Pump Station and will be sent under separate cover.

2: Specification

Our proposal is based on equipment providing compliance with the Design and Construction Guidance (DCG) Approved Version 2.1, dated 25th May 2021 document as amended by the Southern Water Local Practice MED4006 Issue 4 document dated May 2021 which was downloaded from the Water UK website at the time of this submission. A copy of this addendum is attached in Appendix M for clarity.

3: Hazardous Area Applications

Application - Pumping Station

The proposed pumping station is designed to serve the domestic foul inflow from

- 1191 Residential dwellings.
- School – 3 Form Entry, 630 pupils and 90 staff (720 Persons total)
- 18581m² of Employment area
- 4900m² Mixed use area

Sewage enters the pump station wet well via a foul water gravity network as designed by PFA Consulting Engineers. Details of the foul water drainage including location of the foul water pumping station can be found on drainage layouts supplied under separate cover by them.

Surface water run-off from impermeable areas is being handled by a separate storm water drainage system.

The pumping station transfers the sewage/foul water via a rising main to the gravity system feeding to the Northern Pump Station which in turn discharges all flows off site.

The pumping station compound will have an area designed for the parking of maintenance vehicles/tankers. The pumping station hardstanding is designed to drain to the inlet manhole.

Flammable atmospheres

Decomposition of raw sewage is not considered a source of explosive atmosphere. The worst-case flammable atmosphere that may possibly exist in a sewage pumping station is hydrocarbon contamination from industrial discharges or tanker spillages. As the actual contaminant is not known the content of the flammable atmosphere cannot be specific but will typically be the lighter more volatile hydrocarbons such as pentane from petrol.

Hazardous area classification

Southern Water are requesting the pump station is zoned in accordance with the requirements of DCG Clause D7.2 which details in sub section 3 that

“Wet wells should be assumed to be a Zone 1 atmosphere, unless the risk assessment (taking into account any guidance from the sewerage company) shows that protection to a less hazardous zone is appropriate for compliance with the Dangerous Substances and Explosive Atmospheres Regulations 2002 (DSEAR)”.

The electrical equipment located in the chambers is as follows

- Pumps
- Ultrasonic Level Control Transducer
- Float Switches

All of these have a Zone 1 rating. See Appendix F

As the default standard of the equipment supplied is Zone 1 then compliance with the aforementioned DCG clause is provided and it is therefore not proposed to undertake a site specific DSEAR assessment to derate these areas.

As the wet well and valve chamber are linked via the drainpipe as is the storage chamber and can potentially share an atmosphere, we have also classified these area also as Zone 1 environments although there is no electrical equipment installed in this area.

A Zoning Plan is shown on drawing 1641-16103-006

Equipment Certification

As detailed above the station has been classified as a Zone 1 environment in line with the requirements of the DCG document.

All new equipment intended to be located in an area classified as zone 1, has to be certified as equipment **Group II category 2 G** equipment (or better). Please refer to Appendix F for the manufacturer's certificates for the equipment proposed within the Hazardous Area confirming they meet this requirement.

4: Design Inflow and Proposed Discharge

The following elements drain to the pump station.

- 1191 Residential dwellings.
- School – 3 Form Entry, 630 pupils and 90 staff (720 Persons total)
- 18581m² of Employment area
- 4900m² Mixed use area

Criteria

The Design and Construction Guidance document details the following criteria for residential and commercial / industrial developments which have been used to determine design flows and pump rates from these elements. For the school we have used the flows as outlined in the British Water Flows and Loads Document - 4.

We have attached relevant extracts of these documents in Appendix L for reference.

Residential Dwellings

4000 litres per dwelling per day design flow

School

We have used the figures outlined in the British Water Flows and Loads Document - 4.

A dry weather flow of 90l/person per day has been used for a school with canteen. We have applied a 6x peak factor and added a 10% allowance for infiltration and apportioned this over an 8-hour day

Commercial /Industrial

Design flows for industrial and commercial developments can contain two elements: domestic flows (flows from toilets and kitchens, etc.) and trade effluent flow (wastewater from industrial processes). The total peak design flow is the sum of the domestic design flow and the trade effluent design flow.

The domestic design flow should be calculated in accordance with BS EN 12056-2 System II (see also BS EN 16933-2) or, in the absence of appropriate information, 0.6 litres per second per hectare of developable land.

The trade effluent design flow should be based on a metered discharge from premises similar to that proposed or assumed as 0.5 litres per second per hectare for normal industry and 1 litre per second per hectare for wet industry. Where the proportion of wet industry is unknown, an average flow of 0.7 litres per second per hectare should be used.

For this design we have based our assessment on the average 0.7l/s per hectare for the trade effluent element and 0.6l/s per hectare for the domestic element as per the above. This gives a total of 1.3l/s/ha.

Design Flow Calculations

Dwellings

For 1191 dwellings at 4000 litres per day per dwelling we calculate the design flow to be 55.139l/s.

School

This has a 3-form intake comprising 630 pupils and 90 staff (720 Persons total)

Applying the above criteria, we calculate the design flow for this element to be 14.850l/s

Employment Area

This element has an area of 200000ft² which equates to 18580.61m²

Using the 1.3l/s/ha criteria and applying this to the area of 18580.61m² we get a calculated peak flow according to DCG criteria of 2.416l/s.

Mixed Use Area

This element has an area of 4900m²

Using the 1.3l/s/ha criteria and applying this to the area of 4900m² we get a calculated peak flow according to DCG criteria of 0.637l/s.

In summary this gives total design flows as follows

Element	Design Flows (l/s)
Dwellings	55.139
School	14.850
Employment Area	2.416
Mixed Use Area	0.637
Total	73.041

Pump Rate Calculations

Clause D5.6 of the DCG specification details that the pump discharge rate is to be at least half the design flow (36.52l/s) or that to provide a self-cleansing velocity in the rising main. We are proposing the rising main is a 250mm OD PE100 SDR11 pressure pipe with a 202.8mm bore through which a minimum 24.22l/s would be required. The highest of the requirements is the calculated rate and it is on a rounded 36.5l/s that our duty calculations and pump selections are prepared.

The actual discharges at key operating levels are detailed in the relevant section below which also show the velocities in the pump station pipework at the varying discharges all of which fall within the velocity range detailed in Clause D7.3 of the Southern Water MED4006 local practice document.

5: Rising Main and Surge Analysis

The use of a 250mm OD PE100 SDR11 pressure pipe with a 202.8mm bore is proposed.

The rising main is 764.722m long and has an undulating profile. As the rising main is longer than 500m then a surge analysis report will be required to comply with the requirements of the DCG. This would be instigated once we have approval in principle to the pump station design to avoid abortive works and costly reruns and will be contained in Appendix C when available.

The rising main has a high point at the valve chamber and chainages 460m and 739.169m where air valve assemblies would be installed and low points at chainages 429.000m and 464.712m where washout assemblies would be installed. Please refer to the drawings in Appendix G for details of these.

6: Emergency Storage

Emergency storage has been calculated in accordance with the Design and Construction Guidance document at 160 litres dwelling for the residential element and 1 hour at design flow for the non-residential.

Dwellings

The pump station is dealing with the inflow from 1191 dwellings.

Based on the 160 litres per day criteria detailed above this equates to a requirement of 190.560m³

School

The design flow for this element is 14.850l/s. One hour at design flow equates to 53.460m³.

Employment Area

The design flow for this element is 2.416/s. One hour at design flow equates to 8.696m³.

Mixed Use Area

The design flow for this element is 0.637l/s. One hour at design flow equates to 2.293m³.

In summary this gives total emergency storage as follows

Element	Storage (m ³)
Dwellings	190.560
School	53.460
Employment Area	8.696
Mixed Use Area	2.293
Total	255.009

Clause D5.5.1 & 2 in the CDG details that storage can be provided within any upstream public sewers and public lateral drains and associated manholes and inspection chambers above high-level alarm and up to the upstream end of the lowest public lateral drain. The lowest connected inspection chamber has been advised by PFA Consulting as having a site-specific level of 17.300m. The valve chamber base in this instance has a level of 15.966m and is lower. To avoid surcharging this in an emergency event this has been taken as the maximum storage level.

There is limited storage in the system, so it's proposed to provide the bulk of the emergency storage in a twin leg, 3000mm diameter Weholite storage tank with 375mm dry weather flow channel.

Referring you to the calculations in Appendix D there is 14.961m³ of storage in the main manholes, 14.243m³ in the pipe runs, 222.387m³ in the Weholite chamber and 28.522m³ in the wet well. This totals 280.112m³ which is 9.84% more than required.

Manufacturers drawings for the storage chamber will be contained in Appendix E when available

7: Retention Time and Septicity Control Equipment

Our calculations indicate that with the housing development half completed the retention time in the system is 1.94 hours and when fully completed 0.97 Hours. Both are less than the 6-hour figure after which septicity is considered to be a problem, so we don't propose a permanent chemical dosing system for this site.

In the period leading up to full or even half occupancy inflows could however be low leading to an increased risk of septicity occurring. Should problems be encountered then we have shown facilitating works to allow future fitting of a chemical dosing unit should it be required. This would involve construction of the plinth, ducts and ensuring there is an electrical feed and spare signals at the telemetry for the unit.

Any unit installed would only be temporary and be removed as soon as septicity ceased to be an issue and before any adoption. Our drawings in Appendix G show the sizing of a typical unit.

8: Pump Duty and Selection

From the site data available we calculate the pump duty from mid water level to be 36.5l/s against a total head of 12.01m for which we have selected submersible sewage pumps from the Xylem NP3153MT range fitted with 434 impellers and 9kw explosion proof motors.

The pumps would provide the following theoretical discharge rates from key operating levels all of which fall within the velocity range in the pump station pipework detailed in Clause D7.3 of the Southern Water Issue 4 Addendum to the DCG.

Operating Level	Discharge Rate (l/s)	Velocity in Pump Station Pipework (m/s)	Velocity in Rising Main (m/s)
Pump Stop	36.2	1.15	1.12
Mid Water Level	37.4	1.19	1.16
Duty Pump Start	38.6	1.23	1.19
Standby Pump Start	39.0	1.24	1.20
High Level Alarm	39.2	1.25	1.21
Inlet	40.0	1.27	1.24
Maximum Storage Level (15.966m)	47.9	1.52	1.48

Each pump would be provided with the SWS 6mm diameter nylon rope lifting system

The pumps are rated in excess of 7.5kw and as such would be fitted with an FLS seal leakage detection system which would be monitored via Minicas relays in the control panel.

We propose that the benching in the Wet Well is laid with a self-cleaning profile and as such it is not proposed to fit a Flush Valve to the Pumps.

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

9: Pump Station Layout

The pumps, pipework and valves would be installed within concrete chambers constructed by others to a layout as shown on our drawings 1641-16103-001 to 011 contained in Appendix G.

When we have outline approval for the design as laid out in the document we will prepare a structural design which will be contained in Appendix H when available.

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

The valve chamber is a high point and a double orifice stub type air valve would be installed in the confines of the valve chamber complete with 80mm isolating valve and bevel gearbox.

The pump station pipework would terminate a short distance outside the valve chamber in a 200mm PN16 flange from where provision of the rising main and connecting it to the pump station pipework would be the responsibility of others.

A 100mm valve chamber drain would be installed with a flap valve over the pipe in the wet well to prevent reflux.

10: Pump and Level Control Cabling

Pumps would be wired back to the control panel via intermediate junction boxes mounted on stands at waist height as shown in the details in Appendix J and as illustrated on our drawings.

We have allowed for sealing the two 150mm pump cable ducts at the junction box stand end only with a RISE cable transit system.

The levels controls would be wired back directly to the kiosk as requested within the Southern Water addendum clause F3.4.1.5.7. The 100mm level control cable duct would be sealed at the kiosk end with a RISE cable transit system.

Refer to the drawings which show 300mm face to face between power ducts and level control ducts.

11: Control Equipment

Automatic level control would be via a Siemens Hydromat 200 ultrasonic level controller augmented by 2 separate float switches for high level (high-high level if DCG terminology used) and back up control (high level if DCG terminology used), all wired back to a multi compartment control panel complying with the SWS MED4006 Issue 4 Local Practice Document to the DCG Specification.

Should a failure occur at the Northern Pump Station then an inhibit signal would be sent via a GD04 GSM transmitter located in the Northern Pump Station control kiosk to a GD04 GSM receiver unit installed within the control panel kiosk at this pump station to inhibit operation until such time the condition passes.

The control panel would be installed within a floor fixing GRP kiosk of dimensions 2500mm wide x 1750mm high x 750mm deep. The GRP kiosk has a meter compartment with a separate lockable door. Please refer to Appendix I for wiring diagrams and kiosk layout.

There have been past non compliances reported regarding the telemetry signals offered. We remain convinced what has previously been offered is what Southern Water require. The issue we believe is the difference in terminology used in the DCG documents, MED4006 and MED4008. We have shown on the wiring diagrams the different terminologies which we trust clears up any ambiguity.

12: Telemetry Equipment

A Seprol S2000 Telemetry Outstation would be installed. It is proposed to use ADSL communications in line with the Southern Water Issue 4 Addendum to the DCG.

A telemetry schedule provided by Southern Waters telemetry systems integrator Multiform has been attached in Appendix K.

Configuration on to the Southern Water network would be organised by the developer, at their expense direct with Southern Water.

13: Access Covers

We are proposing Steelway Facta B access covers for the inlet manhole, wet well and valve chamber. The access covers have torsion spring assisted lift lids, internal safety grids for fall protection and demountable barriers and posts. The wet well cover would be of a Twin Lid design as preferred by Southern Water.

Sizes are as follows

Chamber	Size	Type
Inlet Manhole	1000 x 1000mm (Single Lid)	Prolift
Wet Well	1800 x 900mm (Twin Lid)	Prolift
Valve Chamber	3300 x 2400mm (Multi Lid)	Defender

14: Lifting Equipment

Pumps weigh 218kg

We propose that a REID Porta lifting davit be provided complete with a single cast in type davit socket all rated for 500kg SWL with the davit socket in the position as shown on the PDAS drawings.

15: Penstock Valve

A wall mounting penstock valve would be mounted in the inlet manhole over the outgoing 375mm foul sewer to the wet well. The penstock will be complete with a non-rising spindle, spindle support brackets, tee key and top box.

16: Baffle Plate

A galvanised steel baffle plate would be fitted over the 375mm diameter incoming sewer in the wet well

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 an ADSL line for the telemetry outstation.

18: Appendices

Appendix A Summary

Data Summary

Liquid Handled	Foul Water
Number of Pumps	2
Control Philosophy	Duty / Standby
Capacity per Pump (l/s)	36.5
Head Generated (m)	12.01
Pump Manufacturer	Xylem
Pump Type	NP3153MT
Impeller Type / Reference	N / 434
Solids Handling (mm)	N/A
Hazardous Area Rating of Pump	EXP
Motor Rating (kw)	9
Speed (rpm)	1460
Electric Supply	230/400V 50Hz, 3 Phase
Full Load Current (Amps)	19
Method of Starting	Star Delta
Length of Cables	30
Level Controls	Siemens Hydromanager Plus Ultrasonic plus high level and back up float switches
Wet Well Diameter (mm)	3000
Wet Well Depth (m)	7.500
Station Pipes and Valves (mm)	200
Station Final Discharge Pipe (mm)	200 terminating in 200mm PN16 Flange
Pump Station Pipe Material	Ductile Iron
Rising Main(By Others)	250mm OD PE100 SDR11 (202.8mm Bore)
Access Covers (Supply Only)	Manufacturer: Steelway Rating: FACTA B Inlet Manhole 1000 x 1000mm (Prolift - Single Lid) Wet Well 1800 x 900mm (Prolift - Twin Lid) Valve Chamber 3300 x 2400mm (Defender - Multi Lid)
Inlet Diameter (mm)	375
Penstock (Supply Only)	375mm Cast Iron in inlet manhole
General Arrangement Drawings	1641-16103-001-011

Materials Specification

Pump Station Type	Submersible – Guiderail Mounted Pumps
Base Specification	Design and Construction Guidance Approved Version 2.0 Dated 10.03.2020
Local Practice Document	Southern Water MED4006 Issue 4, May 2021

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 Klixon 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:

Stainless 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 Southern 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:

Siemens Hydromanager 200 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.

JUNCTION BOXES AND STAND:

75mm box section stand for each pump with Junction box and glands. Ducts to junction boxes would be sealed at its exit from the wet well at the stand plinth and Non ATEX rated junction boxes with appropriately rated glands utilised.

- a) Individual junction box and stand for Pump 1
- b) Individual junction box and stand for Pump 2

CONTROL PANEL KIOSK:

GRP, floor fixing three door 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) 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) Minimum 600 x 450 clear space for the mounting of Electricity Board meters.
- f) Seprol S2000 Telemetry Outstation suitable for ADSL communications.
- g) GD04 GSM Receiver
- h) Low energy floodlight fitted to kiosk

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.

ACCESS COVERS: (Supply Only)

Inlet Chamber – Steelway FACTA B Pro Lift Access Cover and Frame providing a clear opening of 1000mm x 1000mm complete with torsion spring assisted lift galvanised steel lids, self-locating safety stays, recessed pad lock facility, 2 no turn catch locking devices, hinged internal safety grids for fall protection, demountable barriers and posts.

Pump Chamber – Steelway FACTA B Pro Lift Access Cover and Frame providing a clear opening of 1800mm x 900mm complete with torsion spring assisted lift galvanised TWIN steel lids, self-locating safety stays, recessed pad lock facility, 2 no turn catch locking devices, hinged internal safety grids for fall protection, demountable barriers and posts.

Valve Chamber – Steelway FACTA B Defender Access Cover and Frame providing a clear opening of 3300mm x 2400mm complete with torsion spring assisted lift galvanised steel lids, self-locating safety stays, recessed pad lock facility, 2 no turn catch locking devices, hinged internal safety grids for fall protection, demountable barriers and posts.

LIFTING EQUIPMENT: (Supply Only)

- 1 - Reid Porta Davit 500kg SWL
- 1 - Reid davit socket to suit the above lifting davit

NOTE:

If lifting equipment is supplied site load testing of items cast into cover slab by ground-workers is excluded from our offer.

INLET MANHOLE PENSTOCK VALVE: (Supply Only)

375mm Cast iron wall fixing penstock in accordance with BS7775 with copper alloy faces, rebate invert and stainless steel non rising screw stem terminating in a cap direct on frame. Plated mild steel construction bolts/nuts with Galvanised Mild Steel extension spindle and support brackets and surface box. Clockwise closing. Bitumen coated.

BAFFLE PLATE: (Supply Only)

Galvanised mild steel baffle plate of size to suit 375m incoming sewer.

ANCILLARY EQUIPMENT:

1. Lever arm and weights on non-return valves
2. Guards on non-return valves
3. Sewage rated stub type air valve in valve chamber complete with 80mm isolating valve with bevel gearbox
4. Extension spindles with brackets on all valve chamber isolating valves
5. Pressure tappings on valve chamber pipe work
6. 150mm Bauer coupling on over pumping tee
7. Rubber matting in control panel kiosk
8. 100mm valve chamber drain with gate valve located over it in valve chamber and flap valve in wet well
9. Washout assembly at chainage 429.000m as shown on drawing 1641-16103-008
10. Air valve assembly at chainage 460.000m as shown on drawing 1641-16103-009
11. Washout assembly at chainage 464.712m as shown on drawing 1641-16103-010
12. Air valve assembly at chainage 739.169m as shown on drawing 1641-16103-011
13. 2500 Litre temporary dosing unit as required. Removed prior to adoption
14. 3 Hard copies of operating and maintenance manuals or one electronic copy in PDAS Ltd standard format

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

PDAS Ltd
Building 4.6 HiTech
Frimley 4 Business Park
Frimley, Camberley
Surrey GU16 7SG



Tel: 01483 930520

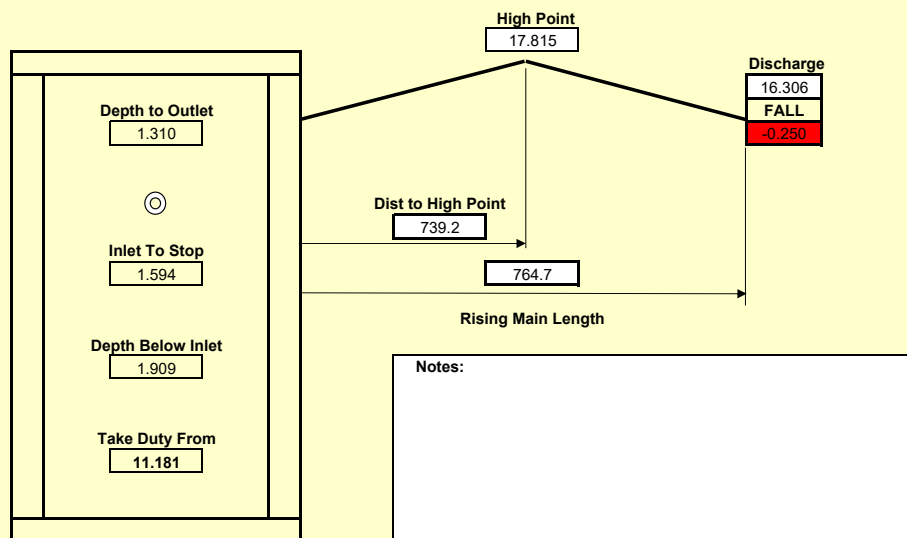
Site Reference	1641
Date	30.05.2022
Project Reference	PR16103
Date	30.05.2022

Clients Name	Eastleigh Borough Council
Site Address	One Horton Heath - Southern Pump Station

Adopting Authority	Southern Water
Pump Station Type	Foul
Number of Dwellings	1191
School Pupils and Staff	720
School DWF Per Person	90
School Hours	8
Employment Area (M2)	18581
Mixed Use Area (M2)	4900
Non Domestic Rate (l/s Hectare)	1.3
Number of Pumps	2
Number of Duty Pumps	1

Design Flow / Rising Main		
Design Flow Dwellings	55.139	l/s
Design Flow School	14.850	l/s
Design Flow Employment	2.416	l/s
Design Flow Mixed Use	0.637	l/s
Total Design Flow	73.041	l/s
Pump Discharge Rate DCG	36.52	l/s
Pump Discharge Rate	36.5	l/s
Rising Main I.D	202.8	mm
Velocity in Main	1.13	m/sec
Surge Analysis	REQUIRED	

Cover Level	17.866
VC Outlet	16.556
Max Storage	15.966
Inlet	12.275
HLA	11.931
P2 Start	11.831
P1 Start	11.681
Mid Water	11.181
Stop Level	10.681
Dead Area	315
Base Level	10.366



Wet Well		
Wet Well Diameter	3000	mm
Calc Chamber Depth	6.811	m
Volume Per M	7,068.58	litres
Depth Between Starts	100	mm
Actual Chamber Depth	7.500	m
Theoretical Op Volume	4,380.00	litres
Actual Op Volume	4,431.89	litres
Max Theoretical Starts	7.50	
Actual Starts	7.59	

Retention Calculations		
Dwf Inflow Per Day	721,818.18	litres
Rising Main Volume	24,701.84	litres
Combined Main and Op Vol	29,133.73	litres
No. of Main Clears per Day	24.78	
Retention Full Usage	0.97	Hours
Retention Half Usage	1.94	Hours

Retention calcs assume ascending rising main

Storage		
Domestic @ 160L / Dwelling	190.560	m3
School 1 Hr @ Design Flow	53.460	m3
Employment 1 Hr @ Design Flow	8.696	m3
Mixed Use 1 Hr @ Design Flow	2.293	m3
Total Required Storage	255.009	m3
Capacity in Gravity System	255.009	m3
Capacity between HLA & inlet	2,431.59	litres

	Rising Main	Common 3	Common 2	Common 1	Individual 3	Individual 2	Individual 1
Flow Rate (l/sec)	36.50	36.50	36.50	36.50	36.50	36.50	36.50
Static Head (M)	6.63						
Pipe Diameter (mm)	202.80	200	200	200	200	200	150
Velocity (M/sec)	1.13	1.16	1.16	1.16	1.16	1.16	2.07
Roughness Factor	0.15	0.15	0.15	0.15	0.15	0.15	0.06
Pipe length (M)	739.169					10	
Duckfoot Bend							1
Short Radius Bends						1	
Long Radius Bends	2					1	
Tee Straight through		4				3	
Tee through branch							
Radial Tee thro Branch							
Sluice Valve						1	
Non Return Valve						1	
Bellmouth inlet							
Sharp Taper							
Standard Taper							1
Equivalent Pipe Length (M)	746.4698	8.8	0	0	0	37.4	8.4
Reynolds Number	2.0E+05	2.0E+05	2.0E+05	2.0E+05	2.0E+05	2.0E+05	2.7E+05
Darcy-Weisbach Friction Factor	0.0199	0.0200	0.0200	0.0200	0.0200	0.0200	0.0177
Velocity Head	0.065	0.069	0.069	0.069	0.069	0.069	0.217
Hydraulic (Piezometric) gradient	0.0064	0.0069	0.0069	0.0069	0.0069	0.0069	0.0257
Friction Head Loss	4.774	0.060	0.000	0.000	0.000	0.257	0.216

Calc Duty Point		
Flow	36.50	l/s
Static Head	6.63	m
Total Head	12.01	m

Pump Selection	
Pump Type	NP3153MT
Impeller	434
Kw Rating	9

Actual Duty		
Flow	37.40	l/s
Head	12.30	m

NP 3153 MT 3~ 434

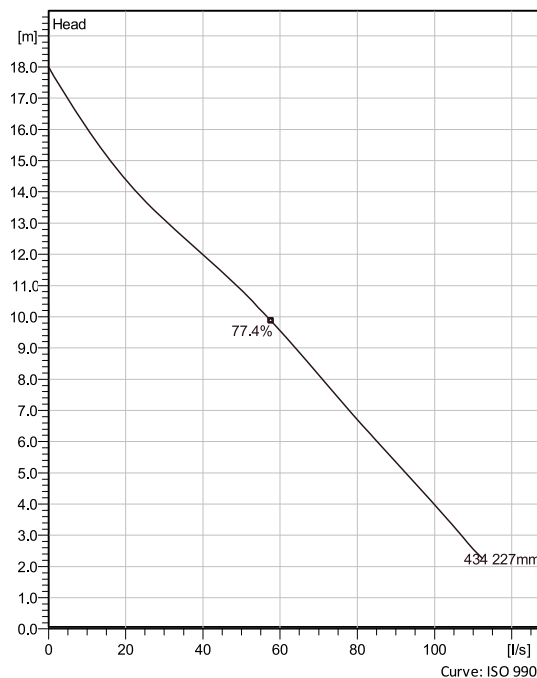
Patented self cleaning semi-open channel impeller, ideal for pumping in most waste water applications. Modular based design with high adaptation grade.



Technical specification



Curves according to: Water, pure Water, pure [100%], 4 °C, 1000 kg/m³, 1.569 mm²/s



Configuration

Motor number N3153.091 21-15-4AA-W 9KW	Installation type P - Semi permanent, Wet
Impeller diameter 227 mm	Discharge diameter 150 mm

Pump information

Impeller diameter 227 mm
Discharge diameter 150 mm
Inlet diameter 150 mm
Maximum operating speed 1460 rpm
Number of blades 2
Max. fluid temperature 40 °C

Materials

Impeller Grey cast iron

Project

Block 0

Created by

Created on 5/30/2022 Last update 5/30/2022

NP 3153 MT 3~ 434

Technical specification



Motor - General

Motor number N3153.091 21-15-4AA-W 9KW	Phases 3~	Rated speed 1460 rpm	Rated power 9 kW
Approval EN	Number of poles 4	Rated current 19 A	Stator variant 1
Frequency 50 Hz	Rated voltage 400 V	Insulation class H	Type of Duty S1
Version code 091			

Motor - Technical

Power factor - 1/1 Load 0.80	Motor efficiency - 1/1 Load 86.0 %	Total moment of inertia 0.0773 kg m ²	Starts per hour max. 30
Power factor - 3/4 Load 0.74	Motor efficiency - 3/4 Load 87.0 %	Starting current, direct starting 107 A	
Power factor - 1/2 Load 0.61	Motor efficiency - 1/2 Load 86.5 %	Starting current, star-delta 35.7 A	

Project

Block 0

Created by

Created on 5/30/2022 **Last update** 5/30/2022

NP 3153 MT 3~ 434

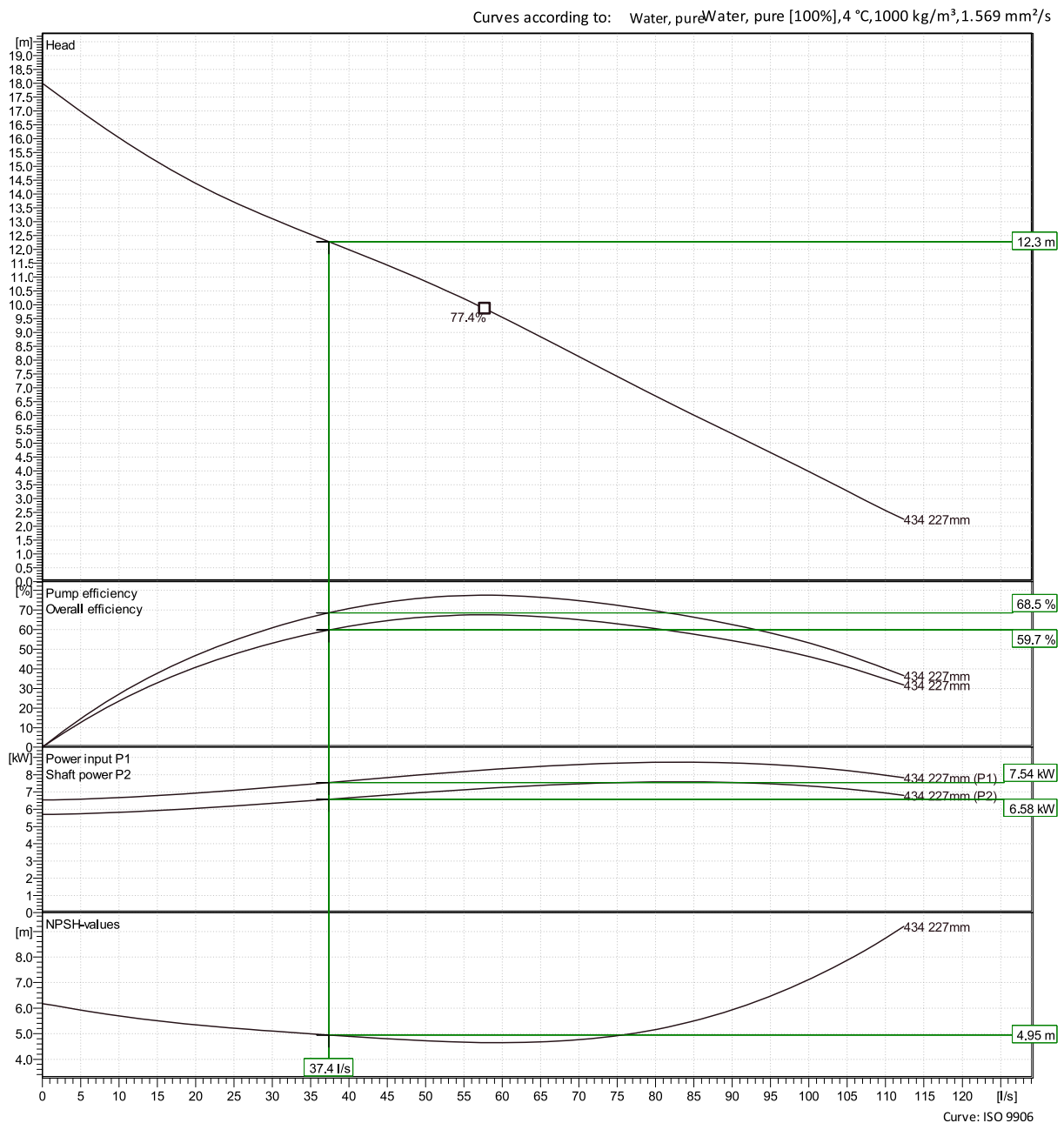
Performance curve



Duty point

Flow
37.4 l/s

Head
12.3 m



0

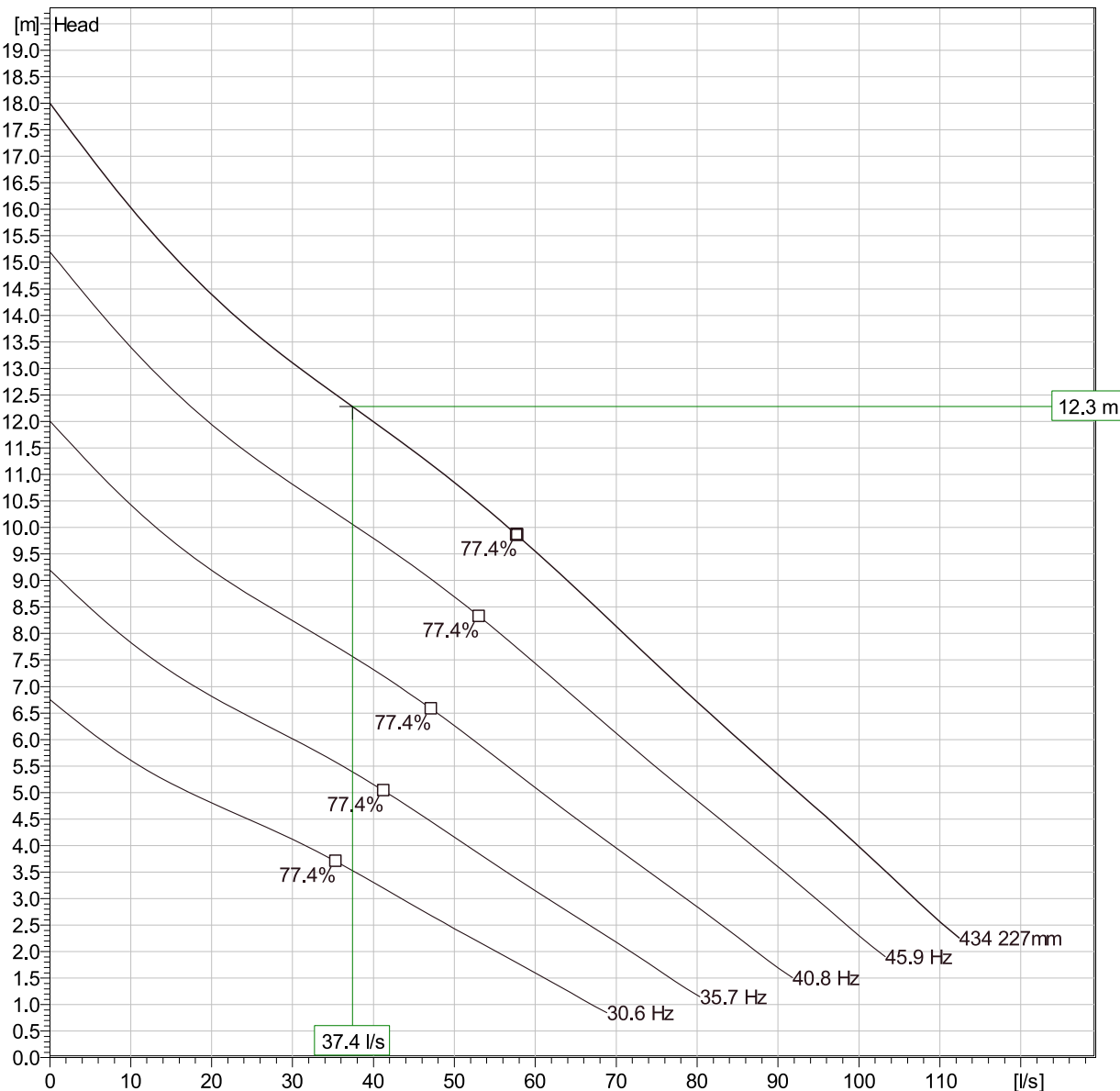
Created on 5/30/2022 Last update 5/30/2022

NP 3153 MT 3~ 434

Duty Analysis



Curves according to: Water, pure [100%] ; 4°C; 1000kg/m³; 1.569mm²/s



Operating characteristics

Pumps / Systems	Flow l/s	Head m	Shaft power kW	Flow l/s	Head m	Shaft power kW	Hydr. eff.	Spec. Energy kWh/m³	NPSHre m
Max Storage	47.9	11.1	6.92	47.9	11.1	6.92	75.3 %	0.046	4.75
Inlet	40	12	6.67	40	12	6.67	70.6 %	0.0531	4.9
High Level Alarm	39.2	12.1	6.64	39.2	12.1	6.64	70 %	0.0539	4.91
Standby Pump Sta	39	12.1	6.63	39	12.1	6.63	69.8 %	0.0542	4.92
Duty Pump Start	38.6	12.1	6.62	38.6	12.1	6.62	69.5 %	0.0546	4.92
Mid Water Level	37.4	12.3	6.58	37.4	12.3	6.58	68.5 %	0.056	4.95

Project

Block

Created by

Created on

5/30/2022

Last update

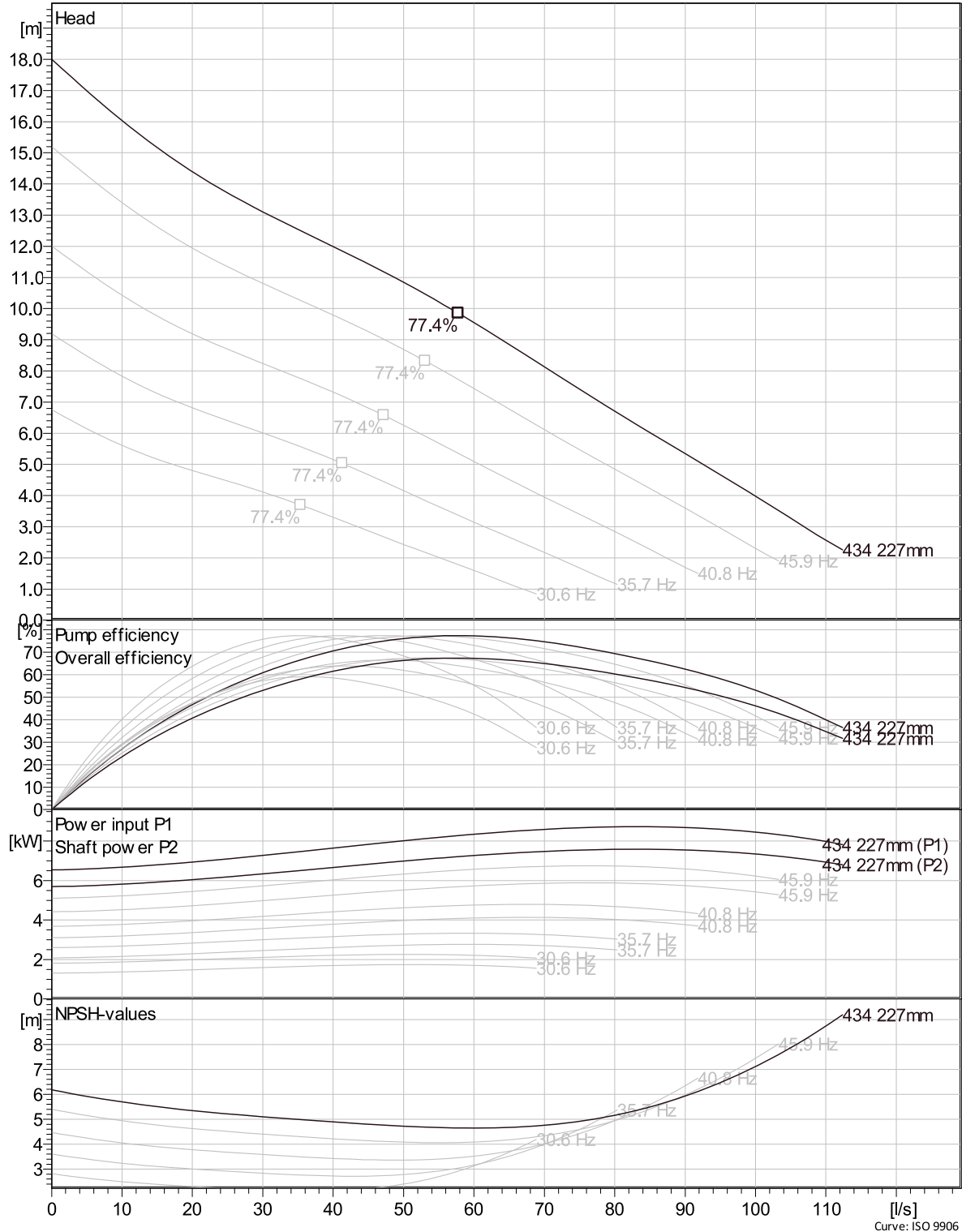
5/30/2022

NP 3153 MT 3~ 434

VFD Curve



Curves according to: Water, pure, 4 °C, 1000 kg/m³, 1.569 mm²/s



Project

Block 0

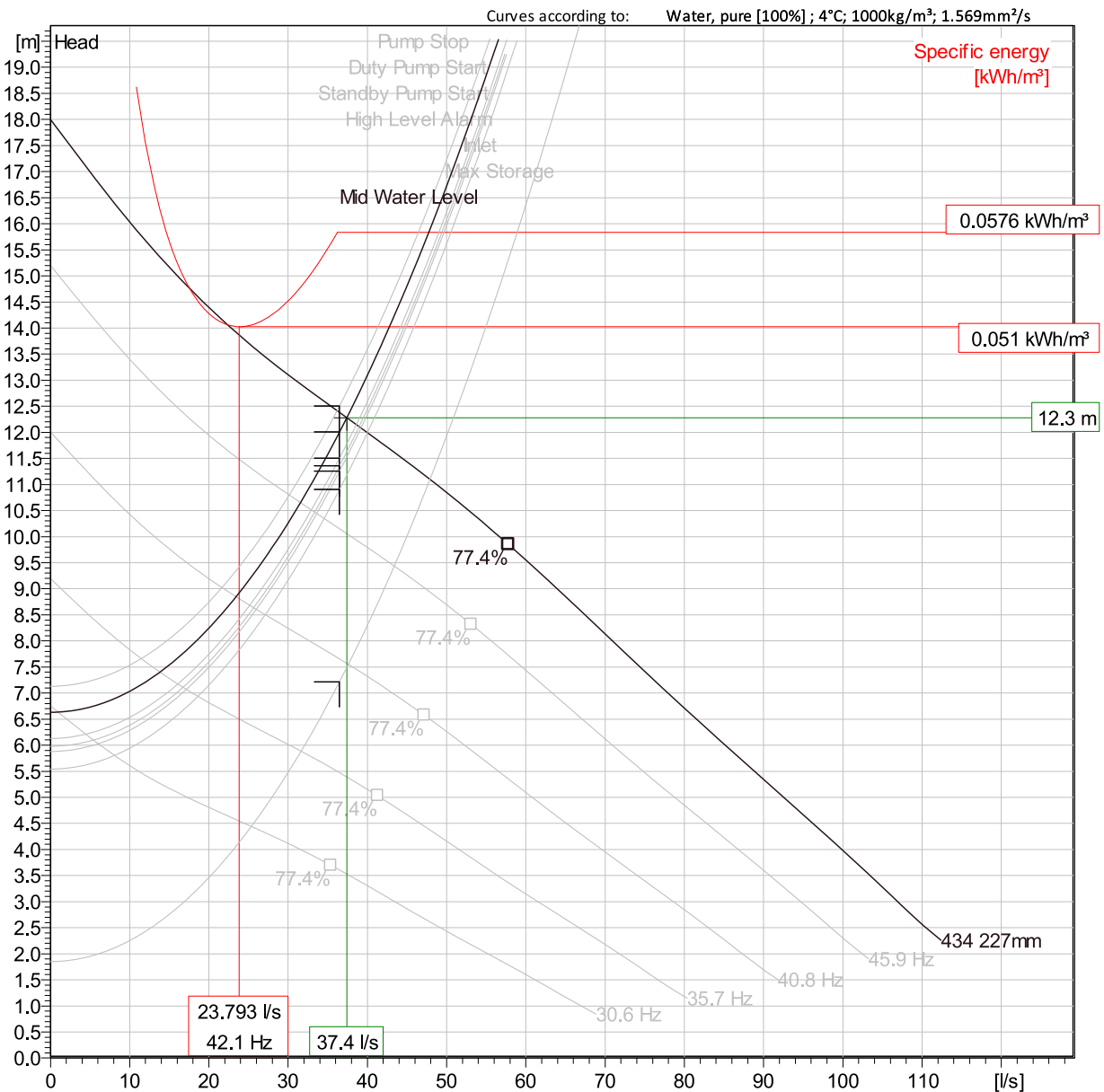
Created by

Created on 5/30/2022 Last update 5/30/2022

Curve: ISO 9906

NP 3153 MT 3~ 434

VFD Analysis



Operating Characteristics

Pumps / Systems	Frequency	Flow	Head	Shaft power	Flow	Head	Shaft power	Hydr. eff.	Specific energy	NPSHre
		l/s	m	kW	l/s	m	kW		kWh/m³	m
Max Storage	50 Hz	47.9	11.1	6.92	47.9	11.1	6.92	75.3 %	0.046	4.75
Max Storage	45.9 Hz	43.4	9.44	5.35	43.4	9.44	5.35	75 %	0.0498	4.16
Max Storage	40.8 Hz	37.6	7.55	3.74	37.6	7.55	3.74	74.5 %	0.0558	3.46
Max Storage	35.7 Hz	31.6	5.88	2.48	31.6	5.88	2.48	73.5 %	0.0644	2.81

Project

Block 0

Created by

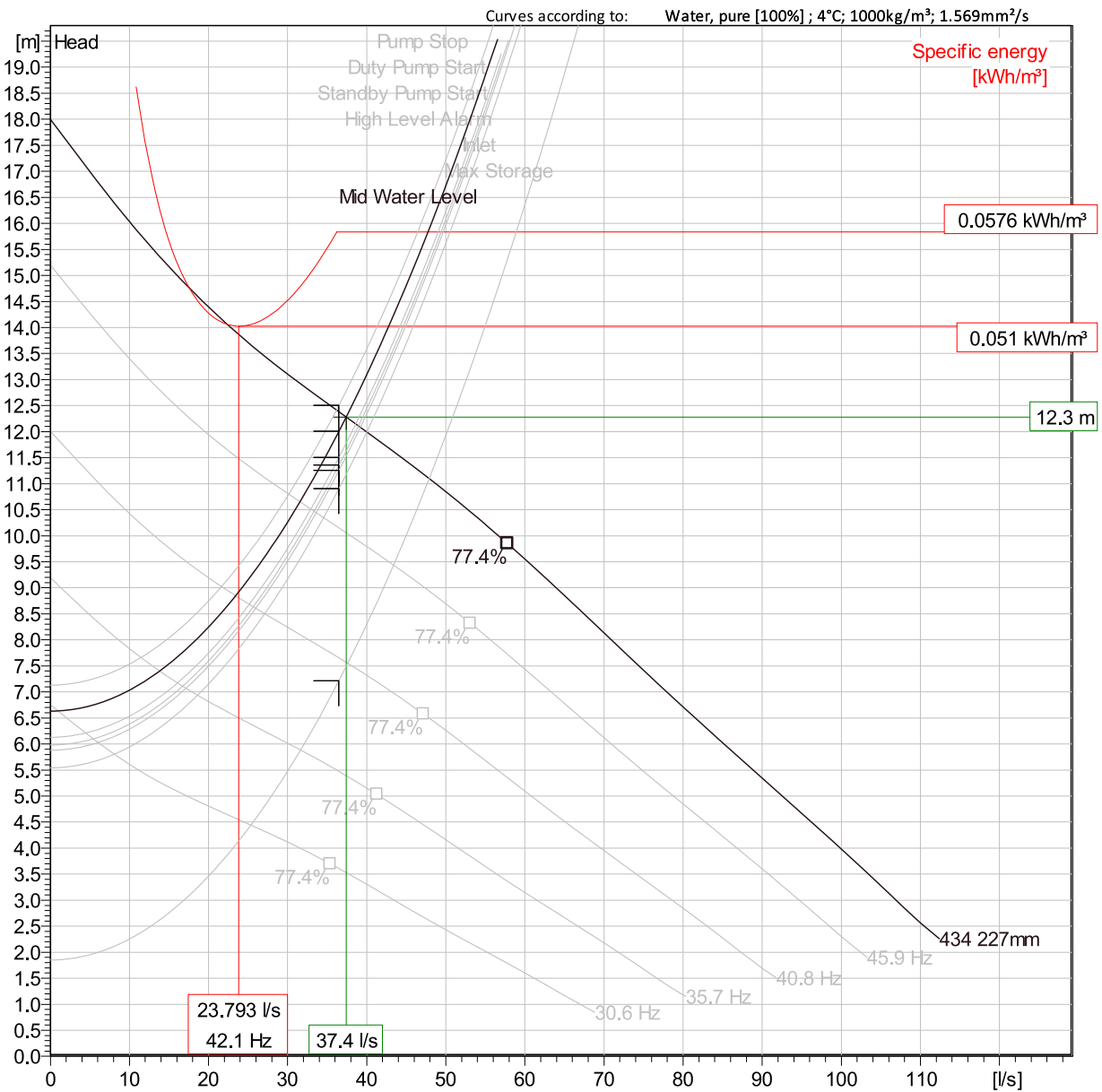
Created on 5/30/2022

Last update

5/30/2022

NP 3153 MT 3~ 434

VFD Analysis



Operating Characteristics

Pumps / Systems	Frequency	Flow	Head	Shaft power	Flow	Head	Shaft power	Hydr. eff.	Specific energy	NPSHre
		l/s	m	kW	l/s	m	kW		kWh/m³	m
Max Storage	30.6 Hz	25.4	4.44 m	1.54	25.4	4.44	1.54	71.6 %	0.0779	2.22
Inlet	50 Hz	40	12	6.67	40	12	6.67	70.6 %	0.0531	4.9
Inlet	45.9 Hz	34.5	10.3	5.11	34.5	10.3	5.11	68.6 %	0.0598	4.32
Inlet	40.8 Hz	27.1	8.5	3.51	27.1	8.5	3.51	64.4 %	0.0735	3.64

Project

Block 0

Created by

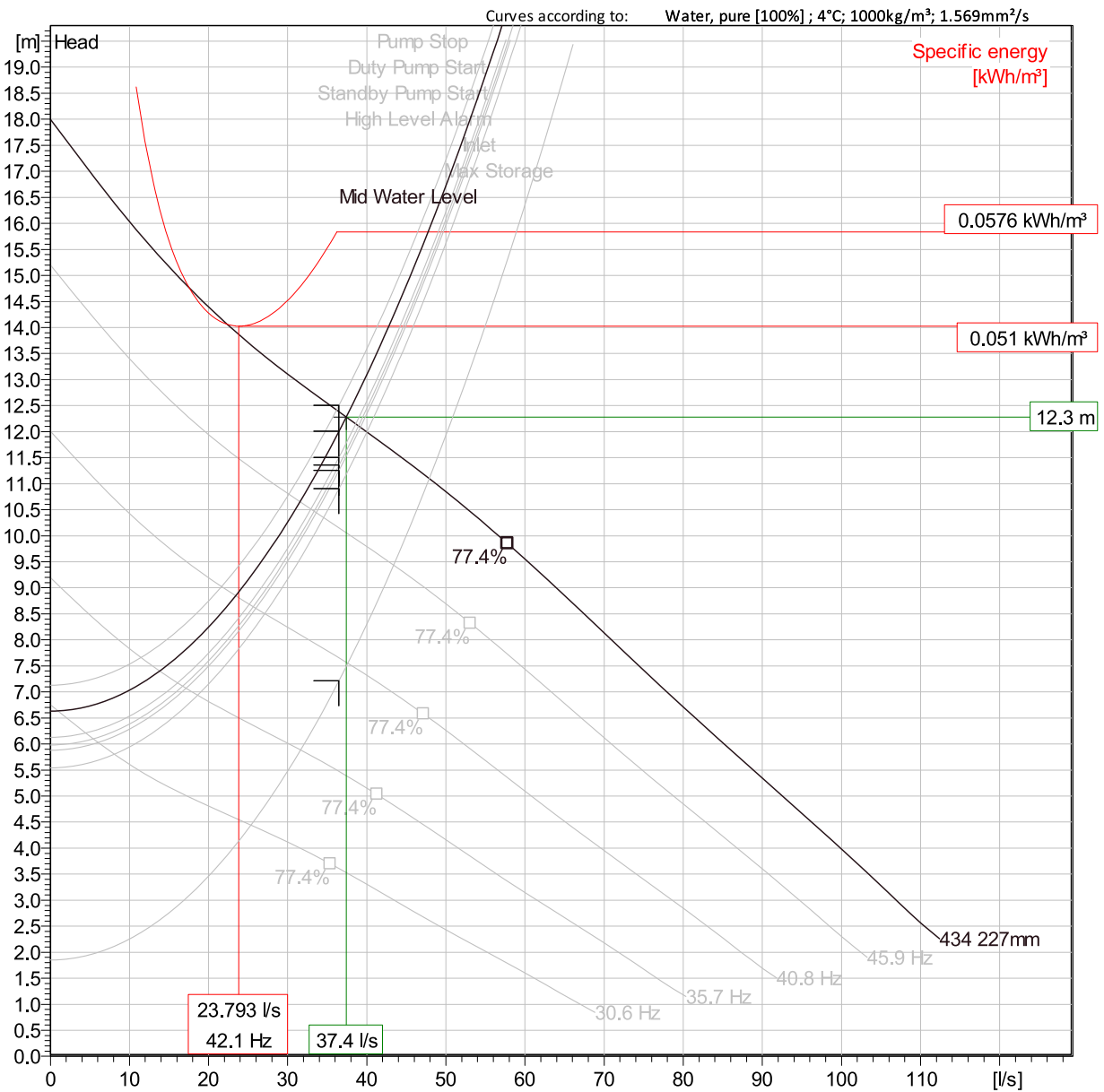
Created on 5/30/2022

Last update

5/30/2022

NP 3153 MT 3~ 434

VFD Analysis



Operating Characteristics

Pumps / Systems	Frequency	Flow	Head	Shaft power	Flow	Head	Shaft power	Hydr. eff.	Specific energy	NPSHre
		l/s	m	kW	l/s	m	kW		kWh/m³	m
Inlet	35.7 Hz	18.6	6.94	2.27	18.6	6.94	2.27	55.8 %	0.103	3.03
Inlet	30.6 Hz	8.09	5.8	1.35	8.09	5.8	1.35	34.1 %	0.228	2.54
High Level Ala	50 Hz	39.2	12.1	6.64	39.2	12.1	6.64	70 %	0.0539	4.91
High Level Ala	45.9 Hz	33.6	10.4	5.08	33.6	10.4	5.08	67.7 %	0.0612	4.34

Project

Block 0

Created by

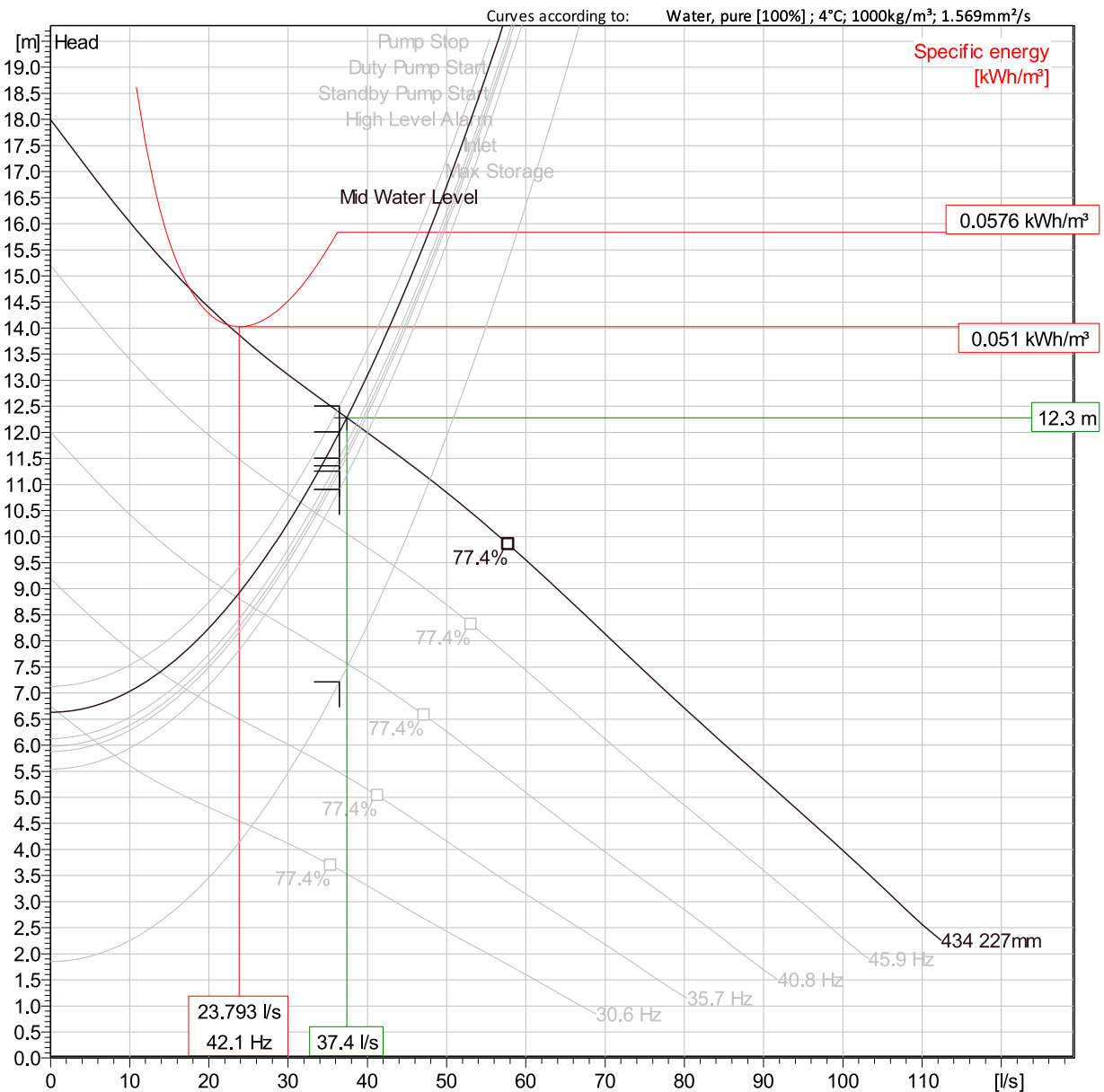
Created on 5/30/2022

Last update

5/30/2022

NP 3153 MT 3~ 434

VFD Analysis



Operating Characteristics

Pumps / Systems	Frequency	Flow	Head	Shaft power	Flow	Head	Shaft power	Hydr. eff.	Specific energy	NPSHre
		l/s	m	kW	l/s	m	kW		kWh/m³	m
High Level Ala	40.8 Hz	26	8.61	3.48	26	8.61	3.48	62.9 %	0.0762	3.66
High Level Ala	35.7 Hz	17.2	7.07	2.25	17.2	7.07	2.25	53 %	0.111	3.06
High Level Ala	30.6 Hz	6.04	6.03	1.34	6.04	6.03	1.34	26.7 %	0.304	2.6
Standby Pump	50 Hz	39	12.1	6.63	39	12.1	6.63	69.8 %	0.0542	4.92

Project

Block 0

Created by

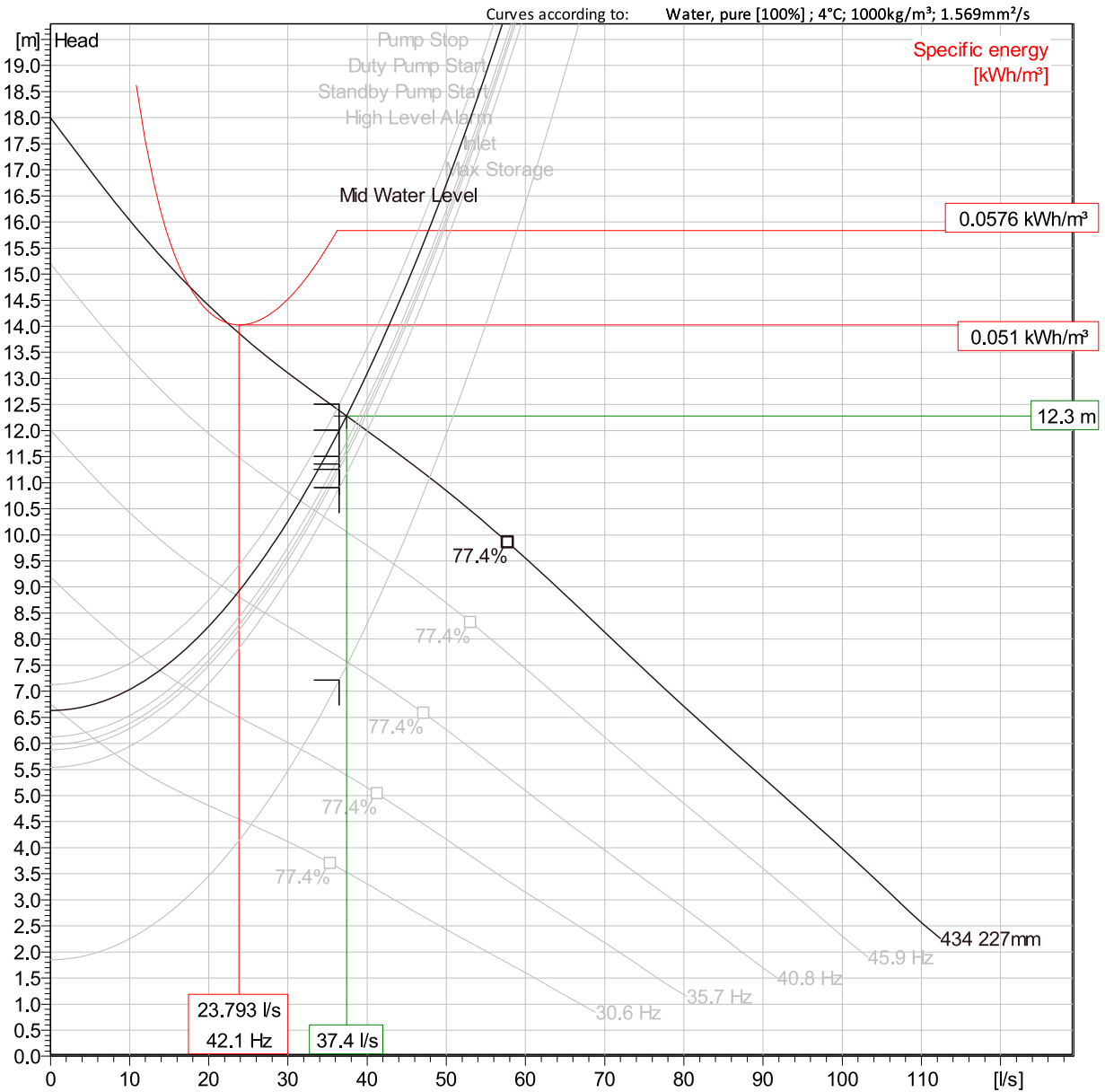
Created on 5/30/2022

Last update

5/30/2022

NP 3153 MT 3~ 434

VFD Analysis



Operating Characteristics

Pumps / Systems	Frequency	Flow	Head	Shaft power	Flow	Head	Shaft power	Hydr. eff.	Specific energy	NPSHre
		l/s	m	kW	l/s	m	kW		kWh/m³	m
Standby Pump	45.9 Hz	33.3	10.5	5.08	33.3	10.5	5.08	67.5 %	0.0616	4.34
Standby Pump	40.8 Hz	25.6	8.64	3.48	25.6	8.64	3.48	62.5 %	0.0771	3.67
Standby Pump	35.7 Hz	16.7	7.11	2.24	16.7	7.11	2.24	52.1 %	0.114	3.07
Standby Pump	30.6 Hz	5.41	6.1	1.33	5.41	6.1	1.33	24.3 %	0.338	2.62

Project

Block 0

Created by

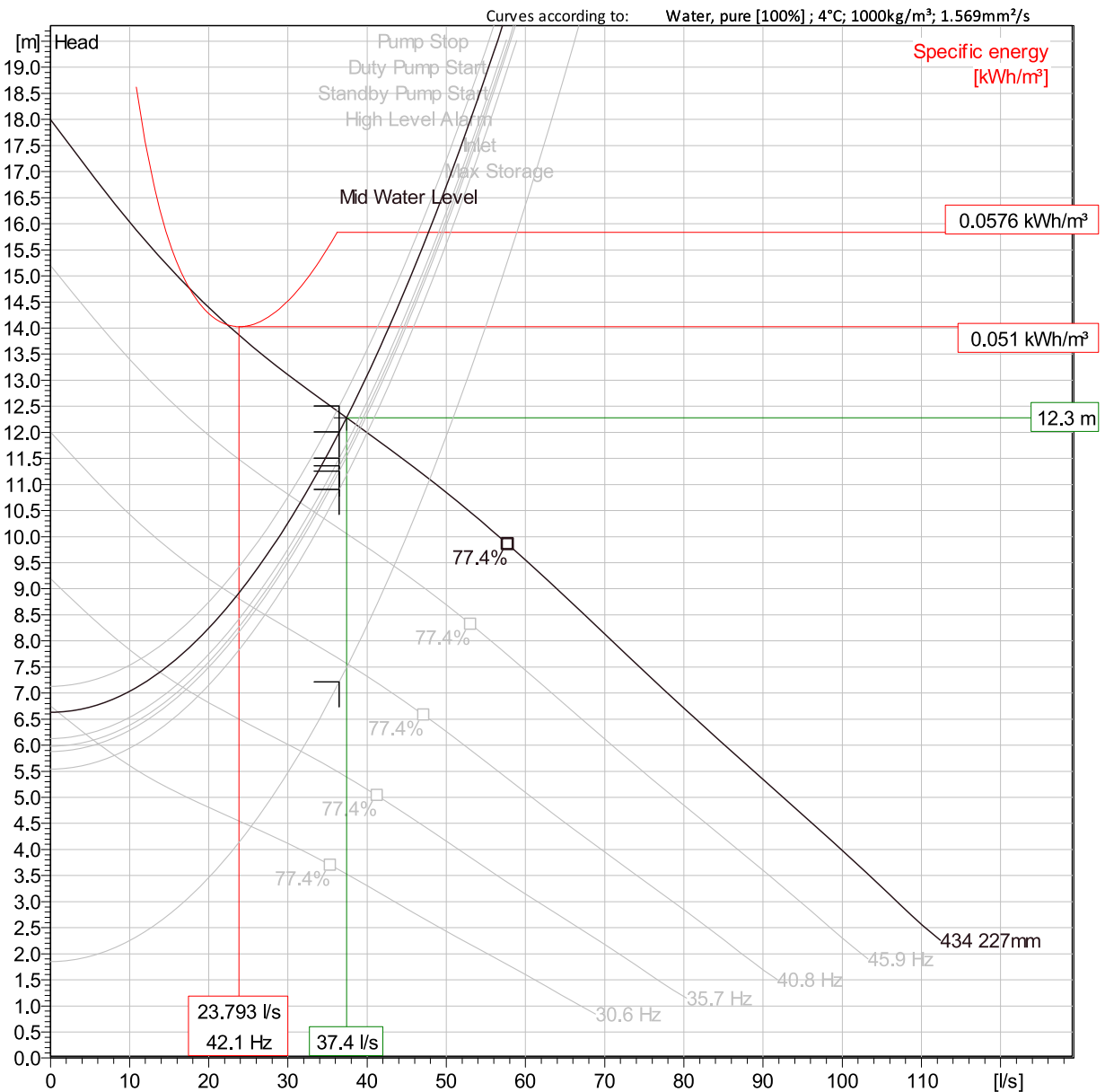
Created on 5/30/2022

Last update

5/30/2022

NP 3153 MT 3~ 434

VFD Analysis



Operating Characteristics

Pumps / Systems	Frequency	Flow	Head	Shaft power	Flow	Head	Shaft power	Hydr. eff.	Specific energy	NPSHre
		l/s	m	kW	l/s	m	kW		kWh/m³	m
Duty Pump St	50 Hz	38.6	12.1	6.62	38.6	12.1	6.62	69.5 %	0.0546	4.92
Duty Pump St	45.9 Hz	32.9	10.5	5.06	32.9	10.5	5.06	67.1 %	0.0622	4.35
Duty Pump St	40.8 Hz	25.1	8.68	3.47	25.1	8.68	3.47	61.8 %	0.0785	3.68
Duty Pump St	35.7 Hz	16.1	7.17	2.23	16.1	7.17	2.23	50.7 %	0.118	3.09

Project

Block 0

Created by

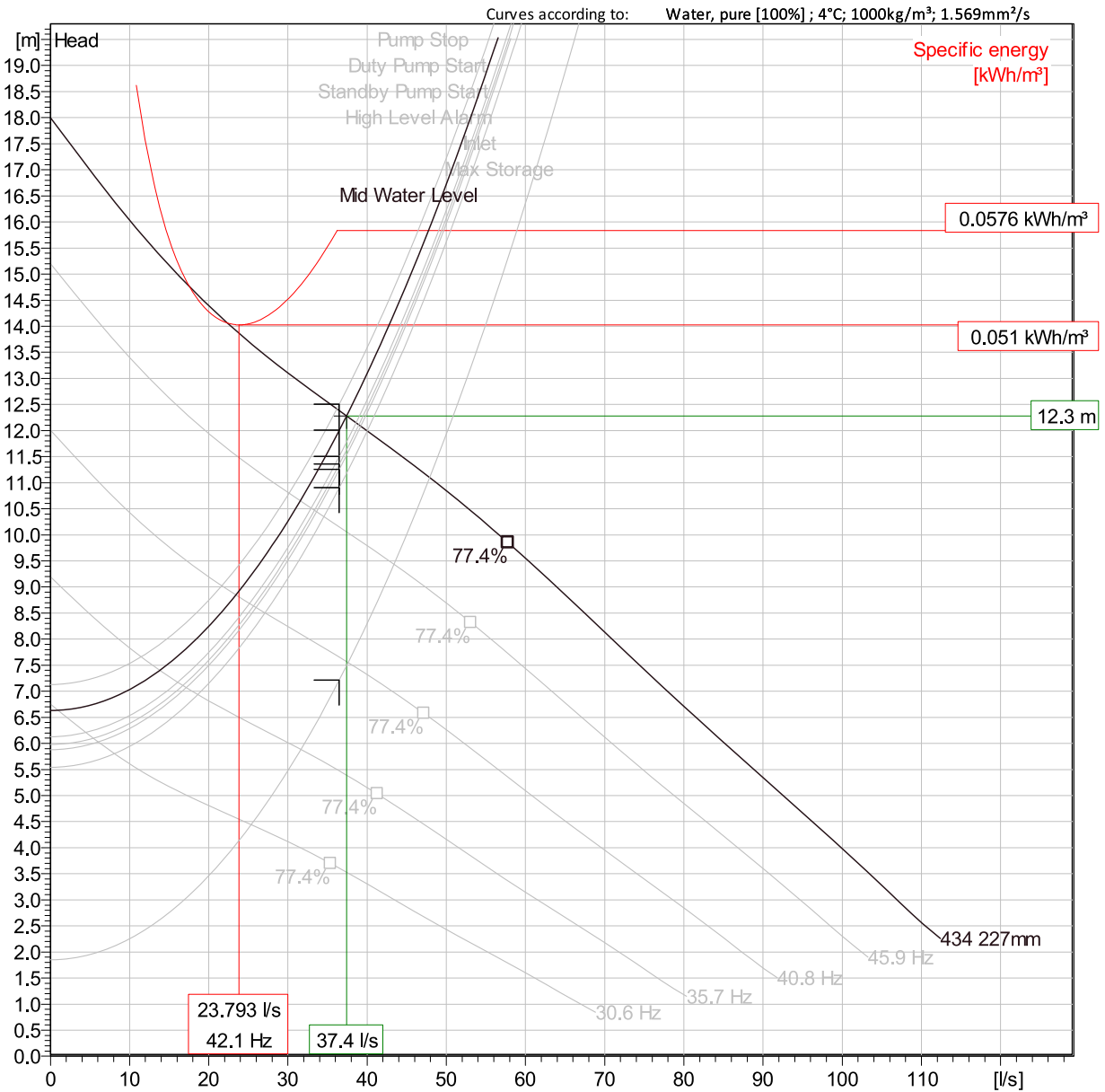
Created on 5/30/2022

Last update

5/30/2022

NP 3153 MT 3~ 434

VFD Analysis



Operating Characteristics

Pumps / Systems	Frequency	Flow	Head	Shaft power	Flow	Head	Shaft power	Hydr. eff.	Specific energy	NPSHre
		l/s	m	kW	l/s	m	kW		kWh/m³	m
Duty Pump St	30.6 Hz	4.45	6.21	1.33	4.45	6.21	1.33	20.5 %	0.41	2.65
Mid Water Le	50 Hz	37.4	12.3	6.58	37.4	12.3	6.58	68.5 %	0.056	4.95
Mid Water Le	45.9 Hz	31.6	10.7	5.03	31.6	10.7	5.03	65.6 %	0.0645	4.38
Mid Water Le	40.8 Hz	23.4	8.85	3.43	23.4	8.85	3.43	59.3 %	0.0835	3.71

Project

Block 0

Created by

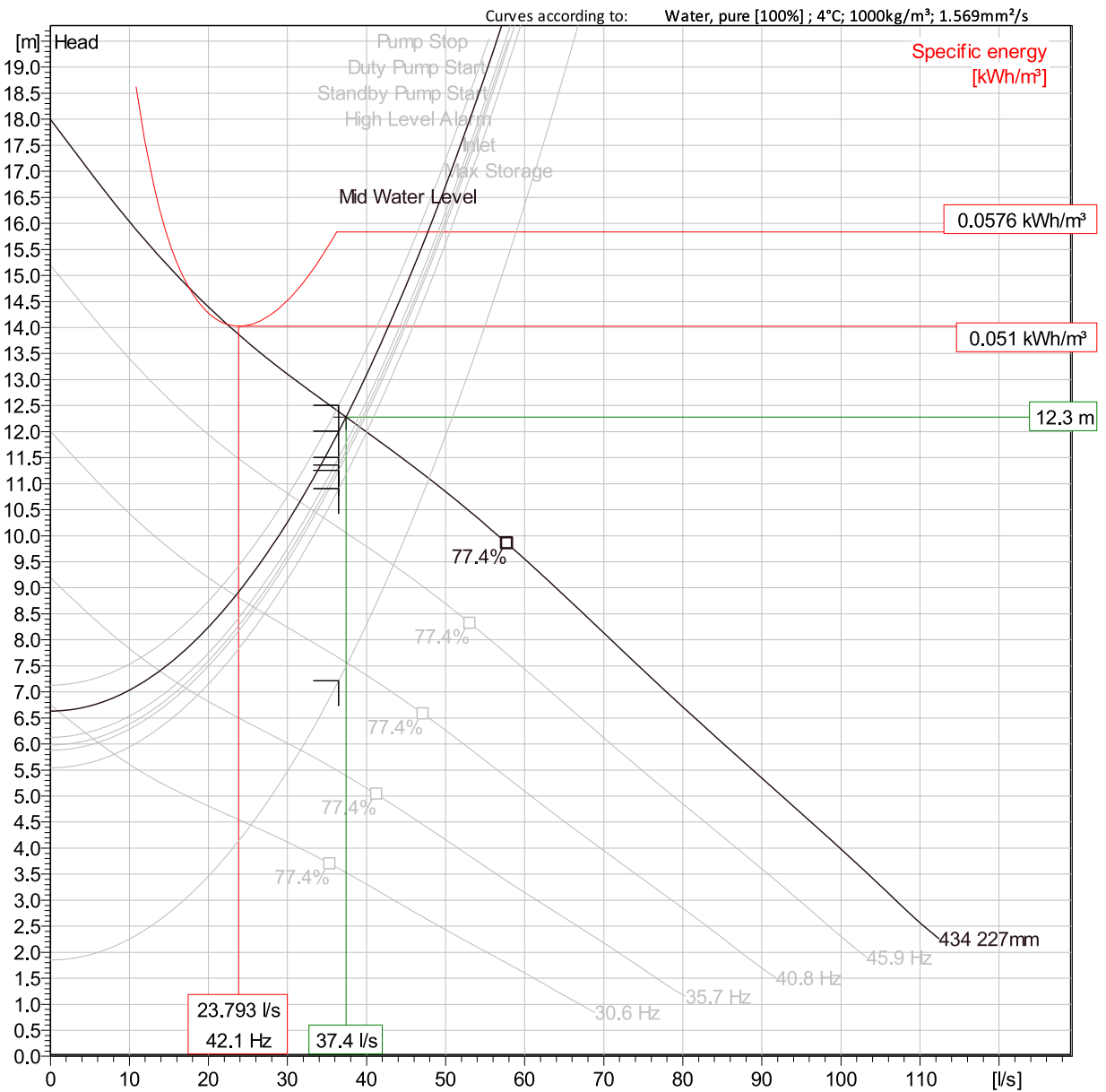
Created on 5/30/2022

Last update

5/30/2022

NP 3153 MT 3~ 434

VFD Analysis



Operating Characteristics

Pumps / Systems	Frequency	Flow	Head	Shaft power	Flow	Head	Shaft power	Hydr. eff.	Specific energy	NPSHre
		l/s	m	kW	l/s	m	kW		kWh/m³	m
Mid Water Le	35.7 Hz	13.8	7.4	2.2	13.8	7.4	2.2	45.6 %	0.136	3.14
Mid Water Le	30.6 Hz	0.97	6.63	1.31	0.97	6.63	1.31	4.82 %	1.88	2.78
Pump Stop	50 Hz	36.2	12.4	6.54	36.2	12.4	6.54	67.4 %	0.0576	4.97
Pump Stop	45.9 Hz	30.1	10.8	4.99	30.1	10.8	4.99	64 %	0.0671	4.4

Project

Block 0

Created by

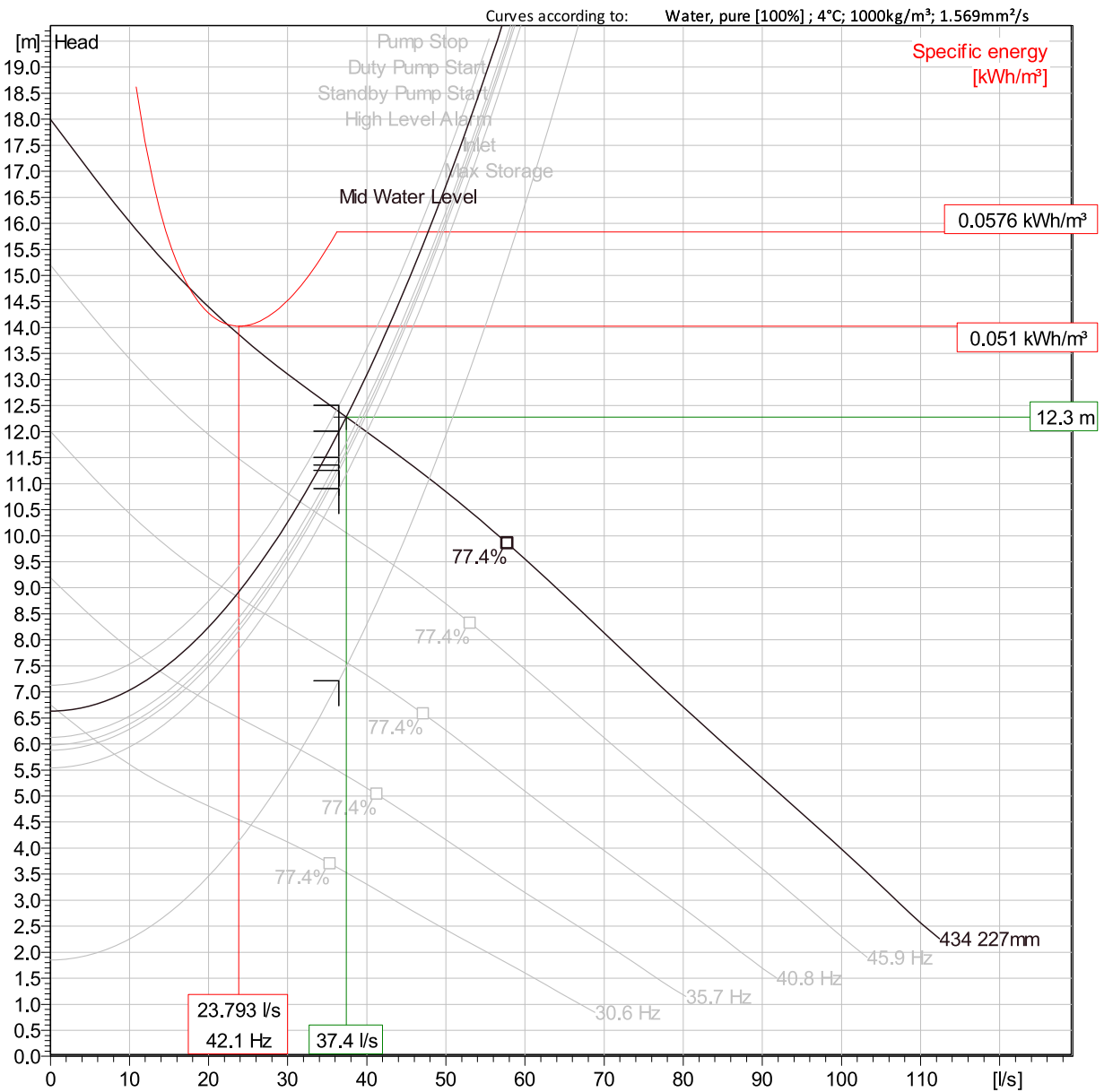
Created on 5/30/2022

Last update

5/30/2022

NP 3153 MT 3~ 434

VFD Analysis



Operating Characteristics

Pumps / Systems	Frequency	Flow	Head	Shaft power	Flow	Head	Shaft power	Hydr. eff.	Specific energy	NPSHre
		l/s	m	kW	l/s	m	kW		kWh/m³	m
Pump Stop	40.8 Hz	21.6	9.02	3.39	21.6	9.02	3.39	56.5 %	0.0897	3.75
Pump Stop	35.7 Hz	11.5	7.66	2.17	11.5	7.66	2.17	39.7 %	0.163	3.19
Pump Stop	30.6 Hz									

Project

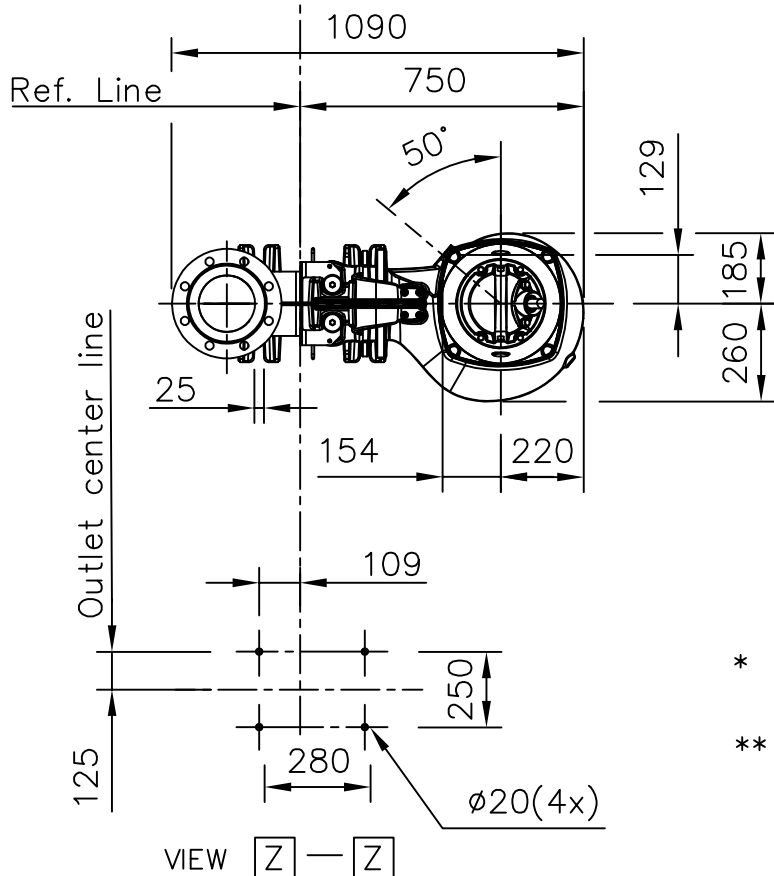
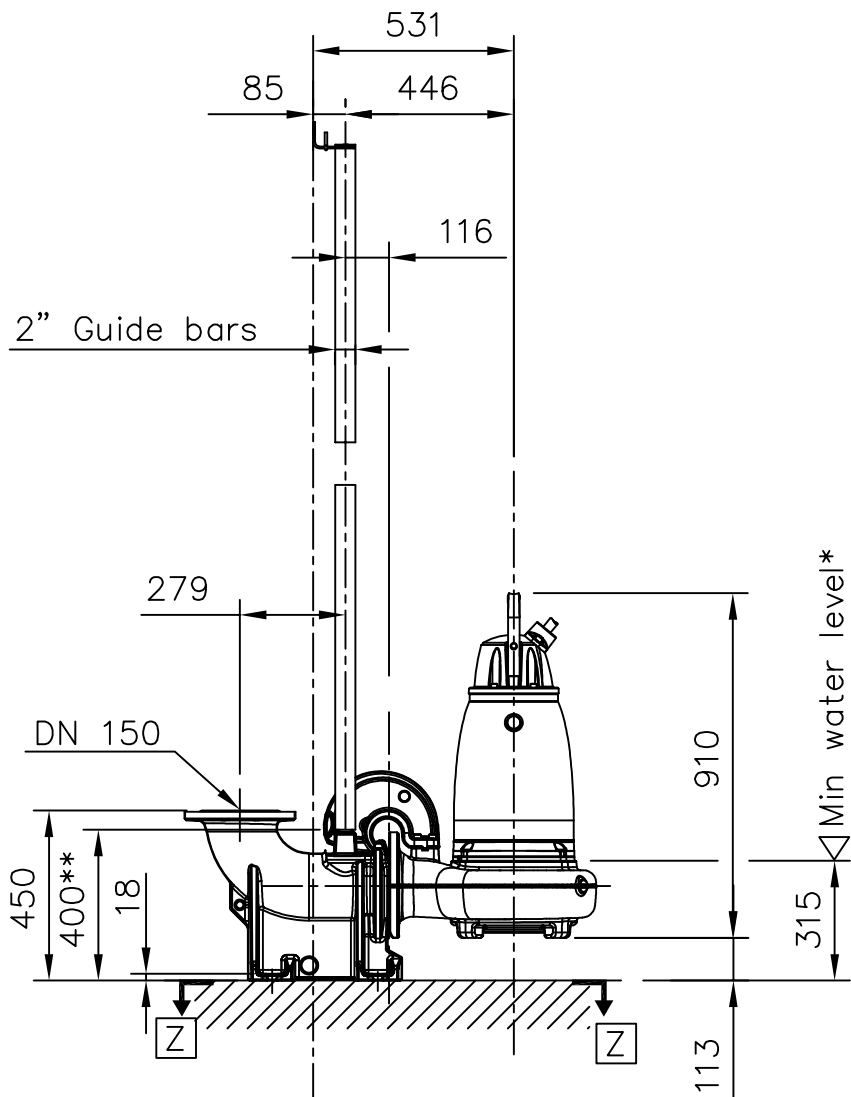
Block 0

Created by

Created on 5/30/2022

Last update

5/30/2022



* Only applicable for intermittent duty.
Consult the IOM for more info
** Dimension to Ends of Guide Bar.

Weight	Pump	Disch
kg	218	79
Discharge outlet DN 150		Scale
Pump outlet DN 150		1:20
Pump inlet		Date
Suction inlet		220321
Drawing number		Revision
6504300		13

	NP,FP	3153	MT	

To whom it may concern

November 22, 2012

Flygt products for use in pump stations

According to a statement made by the European Pump Manufacturer's Association (Europump), a submersible pump shall not run dry. This has been determined based on risk analyses made for the directive on "Products for use in potentially explosive environment" (ATEX).

In the care of maintenance manuals for our Ex products, we state that the stop level in an installation with regards to our products should be above the pump housing.

However, in certain installations, it is safe to run the "Ex" pump to a stop level equal to the pump inlet level "snore" for a short period, not exceeding 3 seconds, to perform a cleaning function in the pump sump.

The reason for this statement is that during such short periods there is always the presence of liquid around and in the inlet to the pump thus making it safe from the emergence of sparks and heat.

It is not however, permissible to allow a pump to run for extended periods on "snore" The control system should initiate a stop condition once "snore" has been detected.

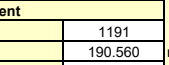
Xylem Water Solutions AB
Approval Coordinator

Anders Edh

Appendix C
Surge Analysis
(To Follow)

Appendix D

Emergency Storage Calculations

PDAS Ltd Building 4.6 HiTech Frimley 4 Business Park Frimley, Camberley Surrey GU16 7SG		 PDAS Pump Design and Services Ltd Tel 01483 930520	
		Quote Reference Date Project Reference Date	1641 30.05.2022 PR16103 30.05.2022

Clients Name	Eastleigh Borough Council		
Site Address	One Horton Heath - Southern Pump Station		

Storage Requirement			
Number of Dwellings	1191		
Domestic @ 160L / Dwelling	190.560		m3
Non Domestic - 1 Hr @ Design Flow	64.449		m3
Total Required Storage	255.009		m3
Location of Lowest Private Manhole	VC Base		
Invert Level of Lowest Private Manhole	15.966		m

Notes:
 Only pipe runs that contribute are included in the pipe run section

Storage in Gravity Manholes					
Manhole Reference	Manhole Diameter (mm)	Max Storage Level (m)	Cover Level (m)	Invert Level (m)	Storage Volume (m3)
Inlet	1800	15.966	17.866	12.325	9.265
107	1350	15.966	18.148	14.521	2.068
106	1200	15.966	18.863	15.332	0.717
105	1200	15.966	20.768	19.418	0.000
104	1200	15.966	19.003	15.614	0.398
103	1200	15.966	18.590	15.877	0.101
102	1200	15.966	18.421	16.187	0.000
101	1200	15.966	18.216	16.866	0.000
100	1200	15.966	18.757	17.406	0.000
99	1200	15.966	19.620	18.270	0.000
98	1200	15.966	20.296	18.439	0.000
97	1200	15.966	20.630	19.281	0.000
96	1200	15.966	21.532	20.182	0.000
95	1200	15.966	22.112	20.761	0.000
94	1200	15.966	22.737	21.387	0.000
93	1200	15.966	20.696	18.614	0.000
92	1200	15.966	20.191	18.841	0.000
91	1200	15.966	21.226	19.426	0.000
90	1200	15.966	21.751	19.658	0.000
89	1200	15.966	21.292	19.941	0.000
88	1200	15.966	22.599	21.249	0.000
87	1200	15.966	18.793	15.089	0.992
86	1200	15.966	20.194	18.843	0.000
85	1200	15.966	21.029	19.679	0.000
84	1200	15.966	22.400	20.839	0.000
83	1200	15.966	22.510	21.161	0.000
82	1200	15.966	19.031	15.260	0.798
81	1200	15.966	20.294	15.553	0.467
80	1200	15.966	20.876	15.846	0.136
79	1200	15.966	19.582	17.650	0.000
78	1200	15.966	19.614	17.732	0.000
77	1200	15.966	20.259	18.909	0.000
76	1200	15.966	20.875	19.525	0.000
75	1200	15.966	21.197	19.847	0.000
74	1200	15.966	20.544	18.203	0.000
73	1200	15.966	21.615	19.932	0.000
72	1200	15.966	21.849	20.005	0.000
71	1200	15.966	21.876	20.227	0.000
70	1200	15.966	21.751	20.401	0.000
69	1200	15.966	21.590	20.240	0.000
68	1200	15.966	21.907	20.557	0.000
67	1200	15.966	20.945	18.470	0.000
66	1200	15.966	21.000	18.612	0.000
65	1200	15.966	21.252	18.828	0.000
64	1200	15.966	21.899	19.070	0.000
63	1200	15.966	23.013	21.663	0.000
62	1200	15.966	21.331	19.981	0.000
61	1200	15.966	21.257	15.950	0.018

40	1200	15.966	23.216	21.866	0.000
39	1200	15.966	23.990	22.640	0.000
38	1200	15.966	24.670	23.320	0.000
37	1200	15.966	25.623	24.273	0.000
36	1200	15.966	25.392	24.042	0.000
35	1200	15.966	25.866	24.516	0.000
34	1200	15.966	26.374	25.024	0.000
33	1200	15.966	26.585	25.235	0.000
32	1200	15.966	28.569	27.219	0.000
31	1200	15.966	20.975	18.683	0.000
30	1200	15.966	20.890	19.136	0.000
29	1200	15.966	22.214	20.477	0.000
28	1200	15.966	22.127	20.777	0.000
27	1200	15.966	23.774	22.424	0.000
26	1200	15.966	20.844	19.495	0.000
25	1200	15.966	22.157	19.936	0.000
24	1200	15.966	21.687	20.338	0.000
23	1200	15.966	23.881	21.255	0.000
22	1200	15.966	23.040	21.690	0.000
21	1200	15.966	25.067	23.717	0.000
20	1200	15.966	21.670	20.320	0.000
19	1200	15.966	23.947	21.246	0.000
18	1200	15.966	24.244	21.376	0.000
17	1200	15.966	25.548	24.199	0.000
16	1200	15.966	25.791	24.441	0.000
15	1200	15.966	26.597	25.247	0.000
14	1200	15.966	25.583	21.890	0.000
13	1200	15.966	26.918	25.565	0.000
12	1200	15.966	26.956	25.606	0.000
11	1200	15.966	27.098	25.748	0.000
10	1200	15.966	27.921	26.571	0.000
9	1200	15.966	26.032	22.196	0.000
8	1200	15.966	26.486	22.395	0.000
7	1200	15.966	26.522	22.619	0.000
6	1200	15.966	27.041	25.691	0.000
5	1200	15.966	28.690	27.340	0.000
4	1200	15.966	26.833	22.904	0.000
3	1200	15.966	27.543	23.754	0.000
2	1200	15.966	25.603	24.253	0.000
1	1200	15.966	25.784	24.434	0.000
		15.966			0.000
Total storage in manholes below detailed maximum storage level					14.961

Storage in Gravity Sewer Pipes

Sewer Pipe Run	Sewer Diameter (mm)	Max Storage Level (m)	Length (m)	Upper Invert (m)	Storage Volume (m3)
60-61	300	15.966	59.608	16.221	0.000
61-80	300	15.966	22.733	15.950	0.000
79-80	150	15.966	86.847	17.650	0.000
80-81	300	15.966	64.554	15.846	0.000
81-82	300	15.966	64.554	15.553	4.563
82-87	300	15.966	37.629	15.260	2.660
86-87	150	15.966	54.834	18.843	0.000
87-107	300	15.966	35.480	15.089	2.508
102-103	150	15.966	46.472	16.187	0.000
103-104	150	15.966	39.584	15.877	0.000
104-106	150	15.966	42.304	15.614	0.748
105-106	150	15.966	40.938	19.418	0.000
106-107	150	15.966	87.325	15.332	1.543
107-INLET	375	15.966	9.141	14.521	1.010
INLET - VVV	375	15.966	1.250	12.325	0.138
		15.966			0.000
STORAGE TANK	2947.681712	15.966	32.588	12.966	222.387
STORAGE - INLET	375	15.966	9.722	12.840	1.074
		15.966			0.000
Total storage in sewers below detailed maximum storage level					236.630

Storage in Wet Well

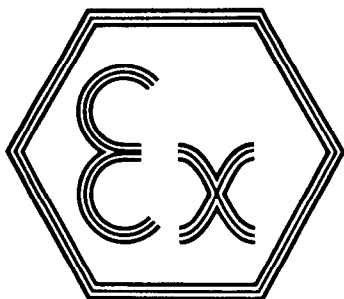
	Wet Well Diameter (mm)	Max Storage Level (m)		High Level Alarm (m)	Storage Volume (m3)
Pump Station	3000	15.966		11.931	28.522
Total storage in wet well below detailed maximum storage level					28.522

Summary

Manholes	14.961 m3
Sewers	236.630 m3
Pump Station	28.522 m3
Total Provided	280.112 m3
Total Required	255.009 m3

Appendix E
Storage Chamber – Manufacturers Drawings
(To Follow)

Appendix F
Hazardous Area Certification



(2) **Equipments and protection systems intended for use in potentially explosive atmospheres**
Directive 94/9/CE

(1) **EC-TYPE EXAMINATION CERTIFICATE**

(3) Number of the EC type examination certificate: **INERIS 00ATEX0012 X**

(4) Protection apparatus or system:

PUMP TYPE 3153

(5) Manufacturer: **ITT FLYGT AB**

(6) Address: Svetsarvägen 12,
Box 1309
17125 SOLNA
SWEDEN

(7) This protection system or equipment and any other acceptable alternative of this one are described in the annex of this certificate and the descriptive documents quoted in this annex.

(8) The INERIS, notified body and identified under number 0080, in accordance with article 9 of Council Directive 94/9/CE 23 the Mars 1994, certifies that this protection system or equipment fulfills the Essential of Health and Safety Requirements relating to the design and construction of equipments and protection systems intended for use in potentially explosive atmospheres, described in appendix II of the Directive.

The examinations and the tests are consigned in official report N°15498/00.

(9) The respect of the Essential Health and Safety Requirements is ensured by:

- conformity with:

EN 50 014 of June	1997
EN 50 018 of August	1994
EN 1127-1 of June	1997

- specific solutions adopted by the manufacturer to meet the Essential Health and Safety Requirements described in the descriptive documents.

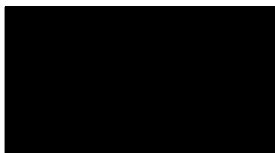
(10) Sign X, when it is placed following the Number of the EC type examination certificate, indicates that this equipment and protection system is subjected to the special conditions for safe use, mentioned in the annex of this certificate.

- (11) This certificate of examination EC of the type refers only to the design and the construction of the apparatus or protection system specified. If necessary, other requirements of this Directive will be imposed on the manufacture and the supply of this apparatus or protection system.
- (12) The marking of the equipment or the protection system will have to contain:

 II 2 G

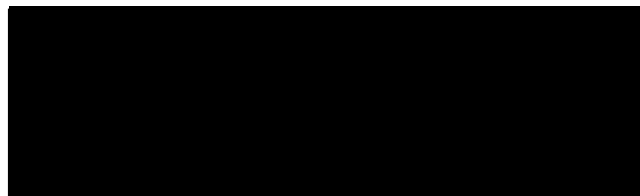
EEx d IIB T4 (Tamb = 25°C) or EEx d IIB T3

Verneuil-en-Halatte, 2000 09 11

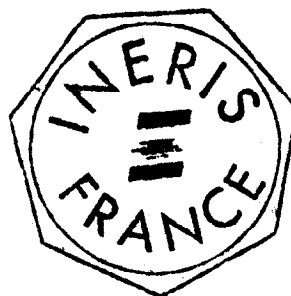


X. LEFEBVRE

Project Manager
Laboratory for Certification of ATEX equipment



The Director of the Organization Certifier,
By delegation
B. PIQUETTE
Deputy manager of Certification



(13)

ANNEX

(14)

EC TYPE EXAMINATION CERTIFICATE N INERIS 00ATEX0012 X

(15)

DESCRIPTION OF THE EQUIPMENT OR THE PROTECTION SYSTEM

Electric pump motor intended to equip an immersed mixer. The motor is fitted with thermal contacts in windings which ensure its temperature classification.

According to the type of the pump the length of the motor housing differs.

Connection with the external electric circuits is ensured by the intermediary of cable entries having a certificate of equipment or the certificate of component Ex following:

- Certificate INERIS 94.D 9034 U type 597 63 00X.

Parameters relating to the safety

- . Supply voltage : up to 1000 Volts.
- . Frequency : until 60 Hz.
- . Power according to version : from 9.3 kW to 15.9 kW

Characteristics of protections :

- Threshold of release of the probe : 140C °±6% for a Temperature class T3.
- Threshold of release of the probe : 125C °±6% for a Temperature class T4 (Tamb = 25°C).

MARKING

Marking must be readable and indelible; it must comprise the following indications:

- ITT FLYGT AB
Svetsarvägen 12,
Box 1309
17125 SOLNA
SWEDEN
- 3153
- INERIS 00ATEX0012X
- (serial number, if any)
- (year of construction)
- **Ex II 2 G EEx d IIB T4 (Tamb = 25°C) or EEx d IIB T3**
- DO NOT OPEN WHEN AN EXPLOSIVE GAS ATMOSPHERE MAY BE PRESENT
- DO NOT OPEN WHEN ENERGIZED
- CONNECT THERMAL CONTACTS

The whole of marking can be carried out in the language of the country of use.

The protection apparatus or system must also carry the marking normally envisaged by the standards of construction which relate to it.

ROUTINE EXAMINATIONS AND TESTS

The equipment is exempted of the routine test in accordance with 16.2 of the standard EN50018. The prototype having successfully undergone a static overpressure test of 28 bar, corresponding to 4 times the reference pressure.

(16) DESCRIPTIVE DOCUMENTS

The technical report is composed of the documents quoted hereafter, constituting the descriptive file of the apparatus, object of this certificate.

- Official report N°15498/00 of the 30.08.2000
- Descriptive notice (2 pages) signed on 21.06.2000
- Instructions contents signed on 21.06.2000
- Drawing N° 642 03 00 of the 16.09.1999 Rev.0 signed on 21.06.2000

(17) SPECIAL CONDITIONS FOR SAFE USE

In order to respect the classification in temperature, the thermal contacts equipping the engine must be connected to a device cutting of the voltage supply of the engine when the probes reach their threshold of operation, defined above.

The yield stress of the fastener elements of the envelope must be in conformity with the regulations of 11.3 of EN 50 018(1994).

The pump should be cut off from voltage supply by a cut off device following the section 17.1 of EN 50 018 (1994).

(18) ESSENTIAL REQUIREMENTS OF SAFETY AND HEALTH

The respect of the Essential Health and Safety Requirements is ensured by:

- conformity to the European standards EN 50 014, 50 018 and EN 1127-1.
- the whole of the provisions adopted by the manufacturer and described in the descriptive documents.

ADDITION

INERIS 00ATEX0012 X/01

PUMP TYPE 3153

Made by ITT FLYGT AB

(15) - PURPOSE OF THE ADDITION

Modifications of mechanical nature.

MARKING

Marking defined in the basic certificate is unchanged.

ROUTINE EXAMINATIONS AND TESTS

The routine verifications and tests stipulated by the basic certificate are unchanged.

(16) - DESCRIPTIVE DOCUMENTS

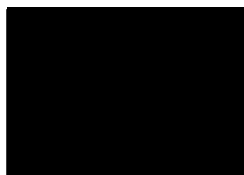
The document referred to below, constitutes the file describing the modifications of the apparatus and forming the subject of the present addition.

- Drawing No 642 03 00 rev 02. of 2001.09.11 signed on 2001.09.11

(17) - SPECIAL CONDITIONS FOR SAFE USE

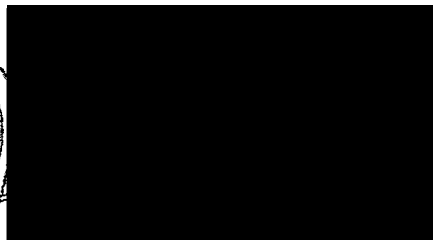
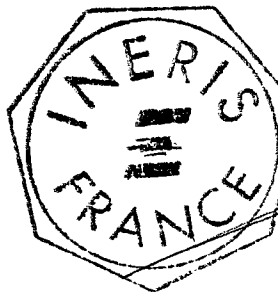
The special conditions for safe use defined in the basic certificate are unchanged.

Verneuil-en-Halatte, 2001 11 14



X. LEFEBVRE

Engineer at the Laboratory of Certification
of Materials ATEX



Director of the Certifying Body,
By delegation
B. PIQUETTE
Deputy manager of Certification

COMPLEMENT

INERIS 00ATEX0012 X/02

POMPE TYPE 3153

Construite par ITT FLYGT AB

(15) - OBJET DU COMPLEMENT

Mise à jour de document descriptif relative à une modification d'ordre mécanique.

En variante, le matériel peut être équipé de l'entrée de câble type 597 63 00 X certifiée INERIS 02ATEX9008 U.

MARQUAGE

Le marquage prévu dans l'attestation de base est inchangé.

EXAMENS ET ESSAIS INDIVIDUELS

Les examens et essais individuels prévus par l'attestation de base sont inchangés.

(16) - DOCUMENTS DESCRIPTIFS

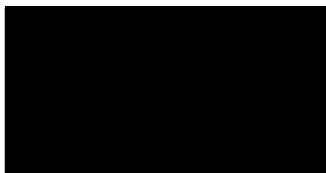
Le document, cité ci-après, constitue le dossier descriptif des modifications apportées au matériel et faisant l'objet du présent complément.

- Plan N°597 63 00 X rév. 7 du 07.05.2002 signé le 07.05.2002.

(17) - CONDITIONS SPECIALES POUR UNE UTILISATION SURE

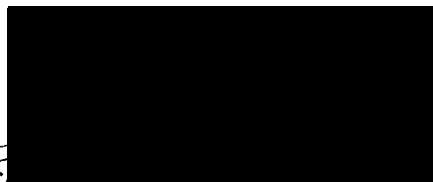
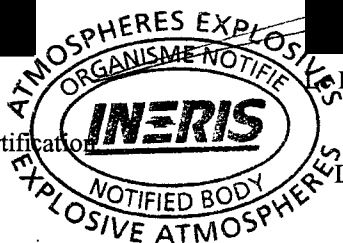
Les conditions imposées par l'attestation de base sont inchangées.

Verneuil en Halatte, 2002 12 20



X. LEFEBVRE

Ingénieur au Laboratoire de Certification
des Matériels ATEX



Directeur de l'Organisme Certificateur,
Par délégation
B. PIQUETTE
Directeur Adjoint de la Certification

ADDITION

INERIS 00ATEX0012 X/03

POMPE TYPE 3153

Made by ITT FLYGT AB

(15) - PURPOSE OF THE ADDITION

Update of descriptive documents in view to introduce a mechanical modification.

MARKING

Marking defined in the basic certificate is unchanged.

ROUTINE EXAMINATIONS AND TESTS

The routine verifications and tests stipulated by the basic certificate are unchanged.

(16) - DESCRIPTIVE DOCUMENTS

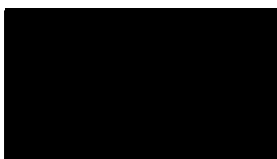
The document referred to below, constitutes the file describing the modifications of the apparatus and forming the subject of the present addition.

- Drawing N° 608 26 00 rev.03 of 2002.10.07 signed on 2002.10.07.

(17) - SPECIAL CONDITIONS FOR SAFE USE

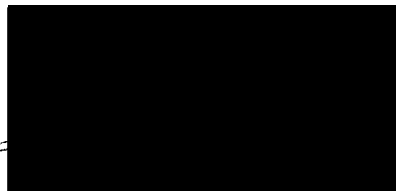
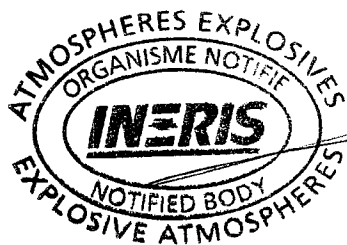
The special conditions for safe use defined in the basic certificate are unchanged.

Verneuil-en-Halatte, 2003 02 12



X. LEFEBVRE

Engineer at the Laboratory of Certification of ATEX
Equipment



Director of the Certifying Body,
By delegation
B. PIQUETTE
Deputy manager of Certification

ADDITION

INERIS 00ATEX0012 X/04

POMPE TYPE 3153

Made by ITT FLYGT AB

(15) - PURPOSE OF THE ADDITION

Update of descriptive documents in view to introduce a new pump and mechanical modification.

Parameters relating to the safety

- . Supply voltage : up to 690 Volts.
- . Frequency : until 60 Hz.
- . Power according to version : from 9.3 kW to 19.2 kW

MARKING

Marking defined in the basic certificate is unchanged.

ROUTINE EXAMINATIONS AND TESTS

The routine verifications and tests stipulated by the basic certificate are unchanged.

(16) - DESCRIPTIVE DOCUMENTS

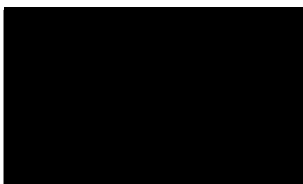
The documents referred to below, constitutes the file describing the modifications of the apparatus and forming the subject of the present addition.

- Drawing No 642 03 00 rev 03. of 2003.03.13 signed on 2003.03.13

(17) - SPECIAL CONDITIONS FOR SAFE USE

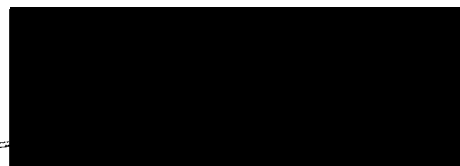
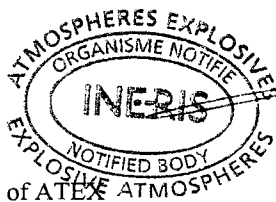
The special conditions for safe use defined in the basic certificate are unchanged.

Verneuil-en-Halatte, 2003 08 12



X. LEFEBVRE

Engineer at the Laboratory of Certification of ATEX
Equipment



Director of the Certifying Body,
By delegation
B. PIQUETTE
Deputy manager of Certification

ADDITION

INERIS 00ATEX0012 X/05

PUMP TYPE 3153

Made by ITT FLYGT AB

(15) - PURPOSE OF THE ADDITION

Update of descriptive documents in view to introduce mechanical modifications.

PARAMETERS RELATING TO THE SAFETY

The parameters relating to the safety are modified as follow :

- . Supply voltage : until 1000 Volts,
- . Frequency : until 60 Hz,
- . Power according to version : until 19.2 kW.

MARKING

Marking defined in the basic certificate and its additions is unchanged.

ROUTINE EXAMINATIONS AND TESTS

The routine verifications and tests stipulated by the basic certificate and its additions are unchanged.

(16) - DESCRIPTIVE DOCUMENTS

The documents referred to below, constitute the file describing the modifications of the apparatus and forming the subject of the present addition.

- Drawing N° 597 63 00 X rev. 8 of 2003.06.30. signed on 2003.06.30
- Drawing N° 597 63 35 X rev. 0 of 2003.06.03. signed on 2003.06.03
- Drawing N° 597 63 70 X rev. 0 of 2003.06.05. signed on 2003.06.05

(17) - SPECIAL CONDITIONS FOR SAFE USE

The special conditions for safe use defined in the basic certificate and its additions are unchanged.

(18) - ESSENTIAL REQUIREMENTS OF SAFETY AND HEALTH

The respect of the Essential Health and Safety Requirements is ensured by:

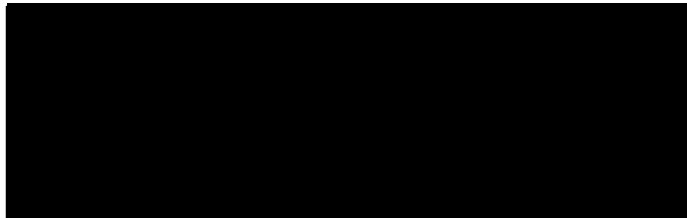
- Conformity to the European standards EN 50 014, EN 50 018, EN 1127-1 and EN 13463-1.
- The whole of the provisions adopted by the manufacturer and described in the descriptive documents.

Verneuil-en-Halatte, 2003 11 07



X. LEFEBVRE

Engineer at the Laboratory of Certification
of Materials ATEX



Director of the Certifying Body,
By delegation
B. PIQUETTE
Deputy manager of Certification



ADDITION

INERIS 00ATEX0012 X/06

PUMP TYPE 3153

Made by ITT FLYGT AB

(15) - PURPOSE OF THE ADDITION

Update of descriptive documents in view to introduce mechanical modifications.

The maximum input power of the motor type 21-15-2 has been changed to 17.4 kW (50 Hz) and to 21 kW (60 Hz).

PARAMETERS RELATING TO THE SAFETY

The parameters relating to the safety are modified as follow :

- . Supply voltage : until 1000 Vols,
- . Frequency : until 60 Hz,
- . Power according to version : until 21 kW.

MARKING

Marking defined in the basic certificate and its additions is unchanged.

ROUTINE EXAMINATIONS AND TESTS

The routine verifications and tests stipulated by the basic certificate and its additions are unchanged.

(16) - DESCRIPTIVE DOCUMENTS

The document referred to below, constitutes the file describing the modifications of the apparatus and forming the subject of the present addition.

- Drawing N° 642 03 00 rev. 4 of 01.21.2004 signed on 01.21.2004

(17) - SPECIAL CONDITIONS FOR SAFE USE

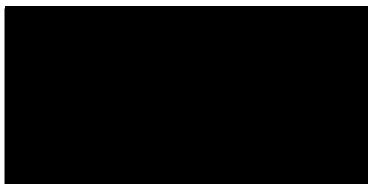
The special conditions for safe use defined in the basic certificate and its additions are unchanged.

(18) - ESSENTIAL REQUIREMENTS OF SAFETY AND HEALTH

The respect of the Essential Health and Safety Requirements is ensured by:

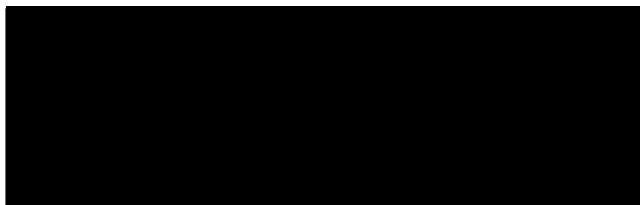
- Conformity to the European standards EN 50 014, EN 50 018, EN 1127-1 and EN 13463-1.
- The whole of the provisions adopted by the manufacturer and described in the descriptive documents.

Verneuil-en-Halatte, 2004 03 03



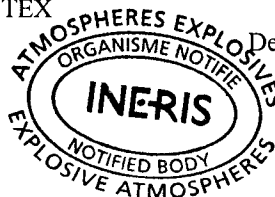
X. LEFEBVRE

Engineer at the Laboratory of Certification of ATEX
Equipment



Director of the Certifying Body,
By delegation
B. PIQUETTE

Deputy manager of Certification



ADDITION

INERIS 00ATEX0012 X/07

PUMP TYPE 3153

Made by ITT FLYGT AB

(15) - PURPOSE OF THE ADDITION

Update in group I application.
New adress : SE-174 87 SUNDBYBERG.

PARAMETERS RELATING TO THE SAFETY

The parameters relating to the safety are modified as follow :

. Supply voltage	:	until 1000 Volts,
. Frequency	:	until 60 Hz,
. Power according to version	:	until 19.2 kW.

Characteristics of protections :

- Limit of release of the probe : 140°C ±6% for a Temperature class T3 and/or group I.

- Limit of release of the probe : 125°C ±6% for a Temperature class T4 with Tamb = 25°C.

MARKING

Marking defined in the basic certificate and its additions is completed by:

-  I M2
- EEx d I

ROUTINE EXAMINATIONS AND TESTS

The routine verifications and tests stipulated by the basic certificate and its additions are unchanged.

(16) - DESCRIPTIVE DOCUMENTS

None.

(17) - SPECIAL CONDITIONS FOR SAFE USE

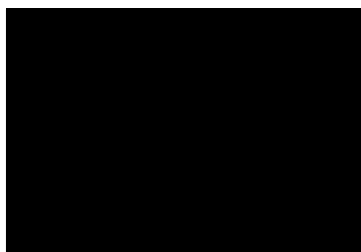
The special conditions for safe use defined in the basic certificate and its additions are unchanged.

(18) - ESSENTIAL REQUIREMENTS OF SAFETY AND HEALTH

The respect of the Essential Health and Safety Requirements is ensured by:

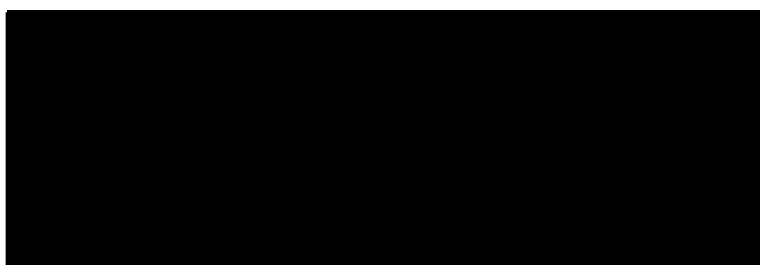
- Conformity to the European standards EN 50 014, EN 50 018, EN 1127-1, EN 1127-2 and EN 13463-1.
- The whole of the provisions adopted by the manufacturer and described in the descriptive documents.

Verneuil-en-Halatte, 2004 08 08

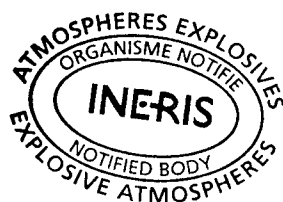


X. LEFEBVRE

Engineer at the Laboratory of Certification
of ATEX equipment



Director of the Certifying Body,
By delegation
B. PIQUETTE
Deputy manager of Certification



ADDITION

INERIS 00ATEX0012 X/08

PUMP TYPE 3153

Made by ITT FLYGT AB

(15) - PURPOSE OF THE ADDITION

Update of descriptive documents in view to introduce mechanical modifications.

The maximum input power of the motor type 21-18-4 has been changed to 15.8 kW (50 Hz) and to 17.1 kW (60 Hz).

New address : SE-174 87 SUNDBYBERG.

PARAMETERS RELATING TO THE SAFETY

The parameters relating to the safety defined in the basic certificate and its additions are unchanged.

MARKING

Marking defined in the basic certificate and its additions is unchanged.

ROUTINE EXAMINATIONS AND TESTS

The routine verifications and tests stipulated by the basic certificate and its additions are unchanged.

(16) - DESCRIPTIVE DOCUMENTS

The documents referred to below, constitute the file describing the modifications of the apparatus and forming the subject of the present addition.

- Drawing No 597 63 35 X rev. 1 of 2004.06.17 signed on 2004.06.17
- Drawing No 642 03 00 rev. 5 of 2004.09.03 signed on 2004.09.03
- Drawing No 642 09 01 X rev. 3 of 2004.08.12 signed on 2004.08.12

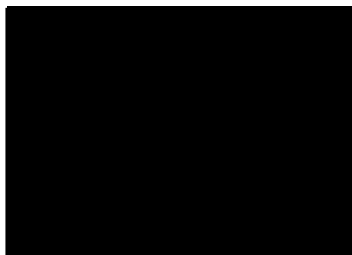
(17) - SPECIAL CONDITIONS FOR SAFE USE

The special conditions for safe use defined in the basic certificate and its additions are unchanged.

(18) - ESSENTIAL REQUIREMENTS OF SAFETY AND HEALTH

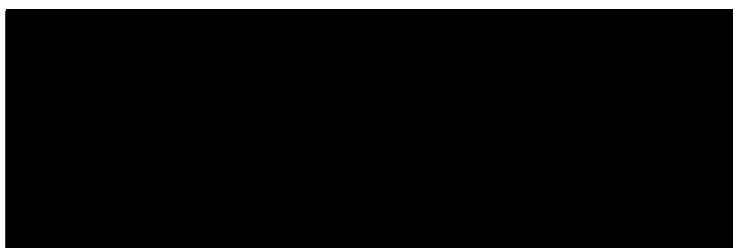
The respect of the Essential Health and Safety Requirements defined in the basic certificate and its additions is unchanged.

Verneuil-en-Halatte, 2004 11 19

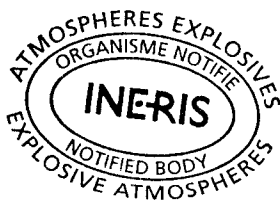


X. LEFEBVRE

Engineer at the Laboratory of Certification of ATEX
Equipment



Director of the Certifying Body,
By delegation
B. PIQUETTE
Deputy manager of Certification



ADDITION

INERIS 00ATEX0012 X/09

PUMP TYPE 3153

Made by ITT FLYGT AB

(15) - PURPOSE OF THE ADDITION

Introduction of 2 new versions : 3153-091 and 5100-221

For those new versions, the maximum input power of the motor type 21-18-4 has been changed to 17.3 kW (50 Hz) and to 18.9 kW (60 Hz).

Update of a descriptive document in view to introduce a mechanical modification.

PARAMETERS RELATING TO THE SAFETY

The parameters relating to the safety defined in the basic certificate and its additions are unchanged.

MARKING

Marking defined in the basic certificate and its additions is unchanged.

ROUTINE EXAMINATIONS AND TESTS

The routine verifications and tests stipulated by the basic certificate and its additions are unchanged.

(16) - DESCRIPTIVE DOCUMENTS

The document referred to below, constitutes the file describing the modifications of the apparatus and forming the subject of the present addition.

- Drawing N° 642 03 00 rev. 6 of 2004.12.17 signed on 2004.12.17

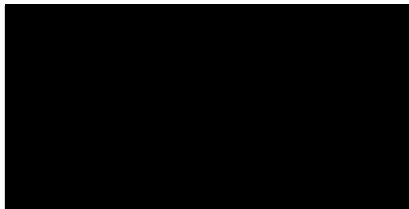
(17) - **SPECIAL CONDITIONS FOR SAFE USE**

The special conditions for safe use defined in the basic certificate and its additions are unchanged.

(18) - **ESSENTIAL REQUIREMENTS OF SAFETY AND HEALTH**

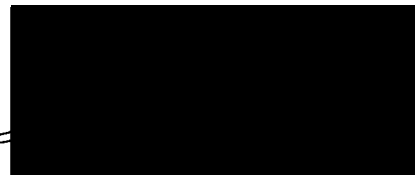
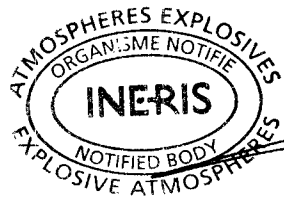
The respect of the Essential Health and Safety Requirements defined in the basic certificate and its additions is unchanged.

Verneuil-en-Halatte, 2005 05 02



X. LEFEBVRE

Engineer at the Laboratory of Certification of ATEX
Equipment



Director of the Certifying Body,
By delegation
B. PIQUETTE
Deputy manager of Certification

ADDITION

(3) **INERIS 00ATEX0012 X/10**

(4) **PUMP TYPE 3153**

(5) **Made by ITT FLYGT AB**

(15) - **PURPOSE OF THE ADDITION**

Update of descriptive documents.

PARAMETERS RELATING TO THE SAFETY

The parameters relating to the safety defined in the basic certificate and its additions are unchanged.

MARKING

Marking defined in the basic certificate and its additions is unchanged.

ROUTINE EXAMINATIONS AND TESTS

The routine verifications and tests stipulated by the basic certificate and its additions are unchanged.

(16) - **DESCRIPTIVE DOCUMENTS**

The document referred to below, constitute the file describing the modifications of the apparatus and forming the subject of the present addition.

- Drawing n° 630 68 00 rev. 5 of 2005.01.14. signed on 2005.01.14

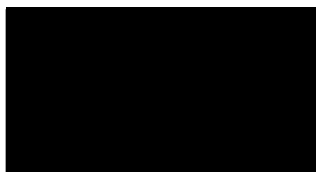
(17) - SPECIAL CONDITIONS FOR SAFE USE

The special conditions for safe use defined in the basic certificate and its additions are unchanged.

(18) - ESSENTIAL REQUIREMENTS OF SAFETY AND HEALTH

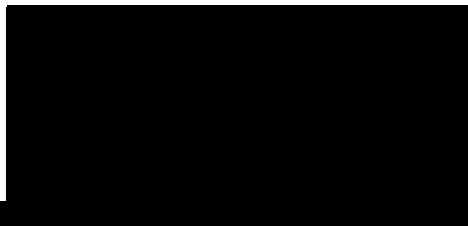
The respect of the Essential Health and Safety Requirements defined in the basic certificate and its additions is unchanged.

Verneuil-en-Halatte, 2005 11 29



X. LEFEBVRE

Engineer at the Laboratory of Certification of ATEX
Equipment



Director of the Certifying Body,
By delegation
B. PIQUETTE
Deputy manager of Certification

ADDITION

(3) **INERIS 00ATEX0012X/11**

(4) **Pump TYPE 3153**

(5) **Made by ITT FLYGT AB**

(15) **PURPOSE OF THE ADDITION**

Mechanical modifications.
Addition of two new versions.

PARAMETERS RELATING TO THE SAFETY

The parameters relating to the safety mentioned in the basic certificate are unchanged.

MARKING

The marking defined in the basic certificate is unchanged.

ROUTINE EXAMINATIONS AND TESTS

The routine examinations and tests stipulated by the basic certificate are unchanged.

(16) **DESCRIPTIVE DOCUMENTS**

The descriptive document quoted hereafter constitutes the technical documentation describing the modification of the equipment, subject of this present addition.

- Drawing n° 642 03 00 rev.7

dated and signed on 2006.06.15

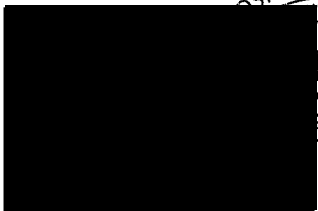
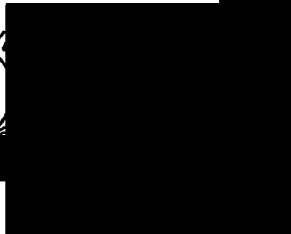
(17) **SPECIAL CONDITIONS FOR SAFE USE**

The special conditions defined in the basic certificate are unchanged.

(18) **ESSENTIAL SAFETY AND HEALTH REQUIREMENTS**

The respect of the Essential Health and Safety Requirements defined in the basic certificate is unchanged.

Verneuil-en-Halatte, 2006.09.21

	
X. LÉFEBVRE	Director of the Certifying Body, By delegation B. PIQUETTE
Project Manager at the ATEX Equipment Certification Laboratory	Deputy Manager of Certification



ADDITION

(3) **INERIS 00ATEX0012X/12**

(4) **PUMP TYPE 3153**

(5) **Made by ITT FLYGT AB**

(15) **PURPOSE OF THE ADDITION**

Mechanical modifications.

PARAMETERS RELATING TO THE SAFETY

The parameters relating to the safety are unchanged.

MARKING

The marking is unchanged.

ROUTINE EXAMINATIONS AND TESTS

The routine examinations and tests are unchanged.

(16) **DESCRIPTIVE DOCUMENTS**

The descriptive document quoted hereafter constitutes the technical documentation describing the modification of the equipment, subject of this present addition.

- Drawing n°642 03 00 rev.8

dated and signed on 2007.06.14

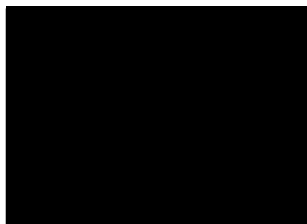
(17) **SPECIAL CONDITIONS FOR SAFE USE**

The special conditions are unchanged.

(18) **ESSENTIAL SAFETY AND HEALTH REQUIREMENTS**

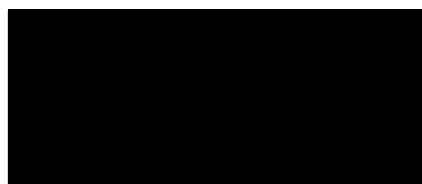
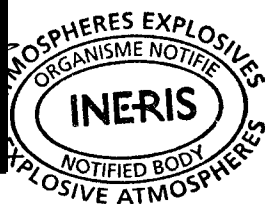
The respect of the Essential Health and Safety Requirements is unchanged.

Verneuil-en-Halatte, 2007 10 24



X. LEFEBVRE

Project Manager at the ATEX
Equipment Evaluation Laboratory



Director of the Certifying Body,
By delegation
T. HOUÉIX
Certification Officer
Certification Division

ADDITION

(3) INERIS 00ATEX0012X/13

(4) PUMP TYPE 3153

(5) Made by ITT FLYGT AB

(15) PURPOSE OF THE ADDITION

- Application of the standards EN 60079-0 : 2006 and EN 60079-1 : 2004.
- Change of the manufacturer name from ITT FLYGT AB to ITT Water & Wastewater AB.
- Change of the manufacturer adress : S-17487 Sundbyberg.

PARAMETERS RELATING TO THE SAFETY

The parameters relating to the safety are unchanged.

MARKING

The marking is modified as follow :

ITT Water & Wastewater AB

S-17487 Sundbyberg

3153

INERIS 00ATEX0012 X

(Serial number)

(Year of construction)

 II 2 G Ex d IIB T4 (Tamb.=25°C) or T3

 I M2 Ex d I

WARNINGS:

DO NOT OPEN WHEN AN EXPLOSIVE GAZ ATMOSPHERE MAY BE PRESENT.

DO NOT OPEN WHEN ENERGIZED.

CONNECT THERMAL CONTACTS.

The whole of marking can be carried out in the language of the country of use.

The protection apparatus or system must also carry the marking normally envisaged by the standards of construction which relate to it.

ROUTINE EXAMINATIONS AND TESTS

The routine examinations and tests are unchanged.

(16) DESCRIPTIVE DOCUMENTS

The descriptive documents quoted hereafter constitute the technical documentation describing the modifications of the equipment, subject of this present addition.

- Descriptive note VPSA09002EDH dated and signed on 2009.03.03
- Drawing n°642 03 00 rev.08 dated and signed on 2007.06.14

(17) SPECIAL CONDITIONS FOR SAFE USE

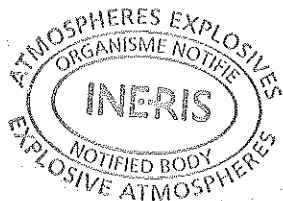
The special conditions for safe use are unchanged.

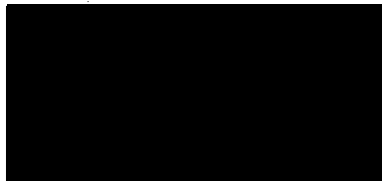
(18) ESSENTIAL SAFETY AND HEALTH REQUIREMENTS

The respect of the Essential Health and Safety Requirements is assured by :

- ☒ Conformity to the European standards indicated in the paragraph 15 and the standard EN 1127-1 : 1997.
- the whole of the provisions adopted by the manufacturer and described in the descriptive documents.

Verneuil-en-Halatte, 2009 03 27




Director of the Certifying Body,
By delegation
D. CHARPENTIER
Deputy Manager of Certification

ADDITION

(3) **INERIS 00ATEX0012X/14**

(4) **PUMP TYPE 3153**

(5) **Made by ITT WATER & WASTEWATER AB**

(15) **PURPOSE OF THE ADDITION**

- Mechanical modifications.
- Application of the standard EN 1127-1 : 2007.

PARAMETERS RELATING TO THE SAFETY

The parameters relating to the safety are unchanged.

MARKING

The marking is unchanged.

ROUTINE EXAMINATIONS AND TESTS

None.

(16) **DESCRIPTIVE DOCUMENTS**

The descriptive documents quoted hereafter constitute the technical documentation describing the modifications of the equipment, subject of this present addition.

- | | |
|---------------------------------|--------------------------------|
| - Descriptive note VPSA10008EDH | dated and signed on 2010.03.15 |
| - Drawing n° 642 03 09 rev.9 | dated and signed on 2009.04.07 |

(17) **SPECIAL CONDITIONS FOR SAFE USE**

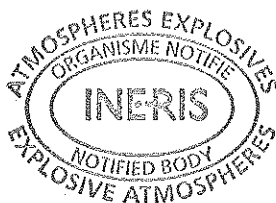
The special conditions for safe use are unchanged.

(18) **ESSENTIAL SAFETY AND HEALTH REQUIREMENTS**

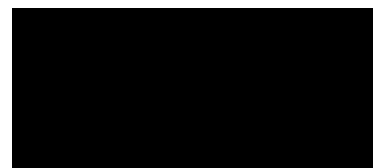
The respect of the Essential Health and Safety Requirements is assured by :

- Conformity to the standards EN 60079-0 : 2006, EN 60079-1 : 2004 and EN 1127-1 : 2007.
- The whole of the provisions adopted by the manufacturer and described in the descriptive documents.

Verneuil-en-Halatte, 2010 05 10



Director of the Certifying Body,
By delegation
T. HOUËIX
Certification Officer
Certification Division



ADDITION

- (3) INERIS 00ATEX0012X/15
- (4) PUMP TYPE 3153 and 5100
- (5) Made by ITT WATER & WASTEWATER AB

(15) PURPOSE OF THE ADDITION

- Updating of manufacturer documents.
- Addition of new pump 8148.190.

PARAMETERS RELATING TO THE SAFETY

The parameters relating to the safety are unchanged.

MARKING

The marking is unchanged.

ROUTINE EXAMINATIONS AND TESTS

None.

(16) DESCRIPTIVE DOCUMENTS

The descriptive documents quoted hereafter constitute the technical documentation describing the modifications of the equipment, subject of this present addition.

- Change description of EN-approved products 3153.090, 3153.091, 3153.095, 3153.390,
5100.220, 5100.221, 5100.261, 5100.310 dated on 2010.03.15
- Drawing n°642 03 00 rev.10 dated and signed on 2009.04.07

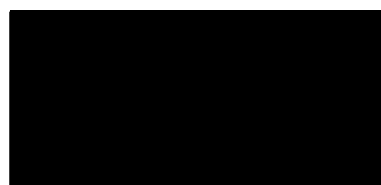
(17) SPECIAL CONDITIONS FOR SAFE USE

The special conditions for safe use are unchanged.

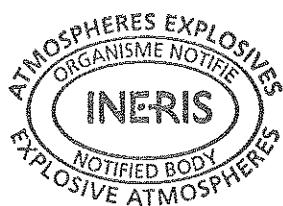
(18) ESSENTIAL SAFETY AND HEALTH REQUIREMENTS

The respect of the Essential Health and Safety Requirements is unchanged.

Verneuil-en-Halatte, 2011.02.08



Director of the Certifying Body,
By delegation
T. HOUËIX
Certification Officer
Certification Division



ADDITION

(3) INERIS 00ATEX0012X/16

(4) PUMP TYPE 3153 and 5100

(5) Made by Xylem Water Solutions AB

(15) PURPOSE OF THE ADDITION

- Updating of the manufacturer's documents.
- Mechanical modifications.
- New adapters 608 22 11 X and 608 22 13 X added.
- New pumps 3153.830, 3153.810 and 3153.850 added.
- New motor, 2 poles 21-18-2BS and 4 poles 21-18-4XS introduced.
- Application of the standards EN 60079-0 : 2009, EN 60079-1 : 2007, EN 13463-1 : 2009 and 13463-5 : 2011.
- Change of the manufacturer name from "ITT Water & Wastewater AB" to "Xylem Water solutions AB".
- Possibility to install FLS, Level Sensor inside the flame proof enclosure.
- The range of ambient temperature becomes -20°C to +60°C.

PARAMETERS RELATING TO THE SAFETY

The parameters relating to the safety are unchanged.

MARKING

The marking is modified as follows:

Xylem Water solutions AB

S-17487 Sundbyberg

3153 and 5100

INERIS 00ATEX0012X

(Serial number)

(Year of construction)

 II 2 G c Ex d IIB T3 Gb

 I M 2 c Ex d I Mb

Tamb. : -20°C to +60°C

WARNINGS:

DO NOT OPEN WHEN AN EXPLOSIVE GAZ ATMOSPHERE MAY BE PRESENT.

DO NOT OPEN WHEN ENERGIZED.

CONNECT THERMAL CONTACTS.

The whole of marking can be carried out in the language of the country of use.

The protective system or equipment has also to carry the marking normally stipulated by its construction standards.

ROUTINE EXAMINATIONS AND TESTS

None.

(16) DESCRIPTIVE DOCUMENTS

The descriptive document quoted hereafter constitutes the technical documentation describing the modifications of the equipment, subject of this present addition.

- | | |
|---|---------------------|
| - Change description for EN-approved products | dated on 2012.01.03 |
| - CRITICAL PARTS | dated on 2012.01.03 |
| - REVISION REPORT | dated on 2012.01.03 |
| - FLS Float switch n°RSA12009EDH | dated on 2012.01.30 |
| - DESCRIPTIVE NOTE n°RSA12057EDH | dated on 2012.12.18 |
| - Text in the manual n°RSA12058EDH | dated on 2012.12.18 |
| - RSA11072EDH | dated on 2012.01.03 |
| - Drawing n°642 03 00 / 11 | dated on 2011.12.13 |

(17) SPECIAL CONDITIONS FOR SAFE USE

The special conditions for safe use are modified as follows:

- The width of flameproof joints is more than the values specified in the tables of the standard EN 60079-1.

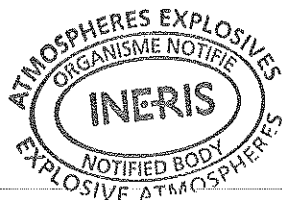
(18) ESSENTIAL SAFETY AND HEALTH REQUIREMENTS

The respect of the Essential Health and Safety Requirements is completed as follows:

- Conformity to the European standards quoted on clause (15).
- All provisions adopted by the manufacturer and defined in the descriptive documents.

Verneuil-en-Halatte, 2013.02.25

Dominique CHARPENTIER
Certification Division
Manager



The Chief Executive Officer of INERIS
By delegation
T. HOUEIX
Ex Certification Officer

[1] EC-TYPE EXAMINATION CERTIFICATE

[2] Equipment or Protected System Intended for use
in Potentially explosive atmospheres
Directive 94/9/EC

[3] EC-Type Examination Certificate Number: Nemko10ATEX 1082 Issue 1

[4] Equipment or Protective System: Level Switch

[5] Applicant/ Manufacturer: Xylem Water Solutions
Global Services AB

[6] Address: Gesällvägen 33
174 87 Sundbyberg,
Sweden

[7] This equipment or protective system and any acceptable variation thereto is specified in the schedule to this certificate and the documents therein referred to.

[8] Nemko AS, notified body number 0470 in accordance with Article 9 of Council Directive 94/9/EC of 23 March 1994, certifies that this equipment or protective system has been found to comply with the Essential Health and Safety requirements relating to the design and construction of equipment and protective systems intended for use in potentially explosive atmospheres given in Annex II to the Directive.

The examination and test results are recorded in confidential report no. D0001769

[9] Compliance with the Essential Health and Safety Requirements has been assured by compliance with:

EN 60079-0: 2012, EN 60079-11: 2012

[10] If the sign "X" is placed after the certificate number, it indicates that the equipment or protective system is subject to special conditions for safe use specified in the schedule to this certificate.

[11] This EC-TYPE EXAMINATION CERTIFICATE relates only to the design, examination and tests of the specified equipment or protective system in accordance to the directive 94/9/EC.

Further requirements of the Directive apply to the manufacturing process and supply of this equipment or protective system. These are not covered by this certificate.

[12] The marking of the equipment or protective system shall include the following:



II 1G

Ex ia IIC T4 Ga -20° C ≤ Ta ≤ 60°C

Oslo, 2015-11-12

Bjørn Spongsveen
Certification Manager, Ex-products

[13] Schedule

[14] **EC-TYPE EXAMINATION CERTIFICATE No** **Nemko 10ATEX1082** **Issue 1**

[15] **Description of Equipment or Protective System**

ENM-10 is a level switch for use to control of pumps and valves. The regulator casing is made of conductive polypropylene with a maximum 20m permanently mounted cable.

Type Designations

ENM-10

Technical Data

Maximum input voltage:	Ui: 30V
Maximum input current:	Ii: 100mA
Maximum input power:	Pi : 1.2W
Maximum capacitance:	Ci: 1.6nF
Maximum inductance:	Li: 11.6µH

[16] **Report No. D0001769**

Descriptive Documents

Name/Number	Rev.	Date	Title/Description	Sheets
5947910	0	1992-04-16	Level switch unit ENM-10	-
5947910X	0	1992-04-16	Level switch unit ENM-10	-
4668902	1	2012-12-06	Marking tape	-

Certificate History and Associated Nemko Reports

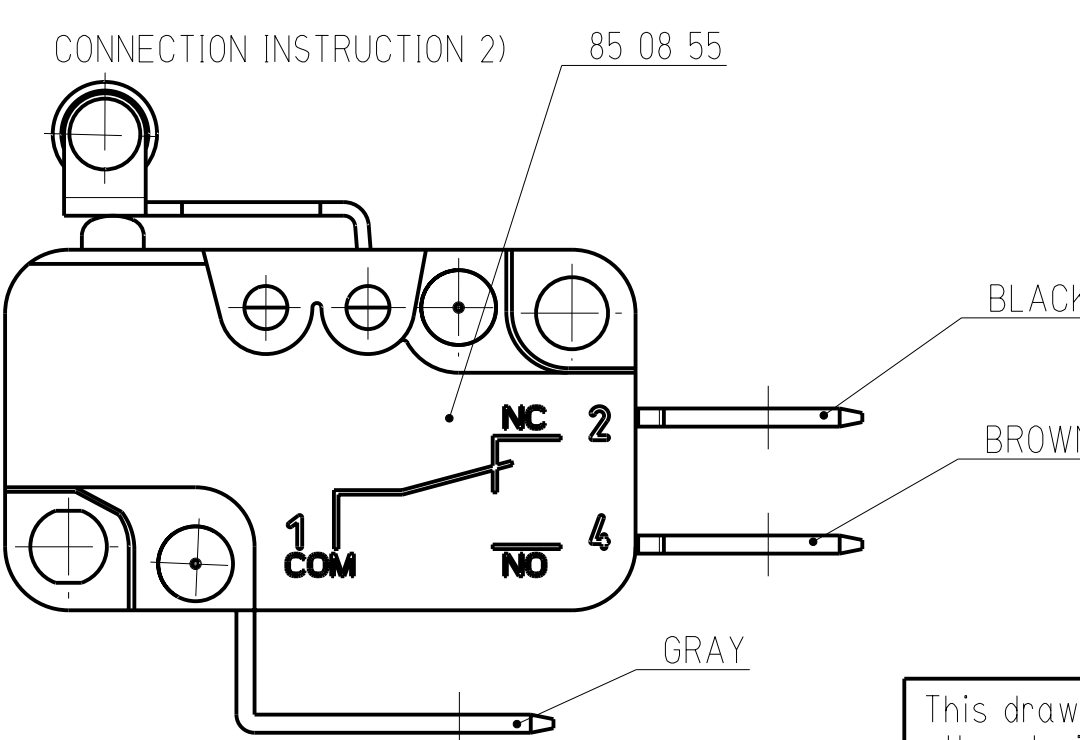
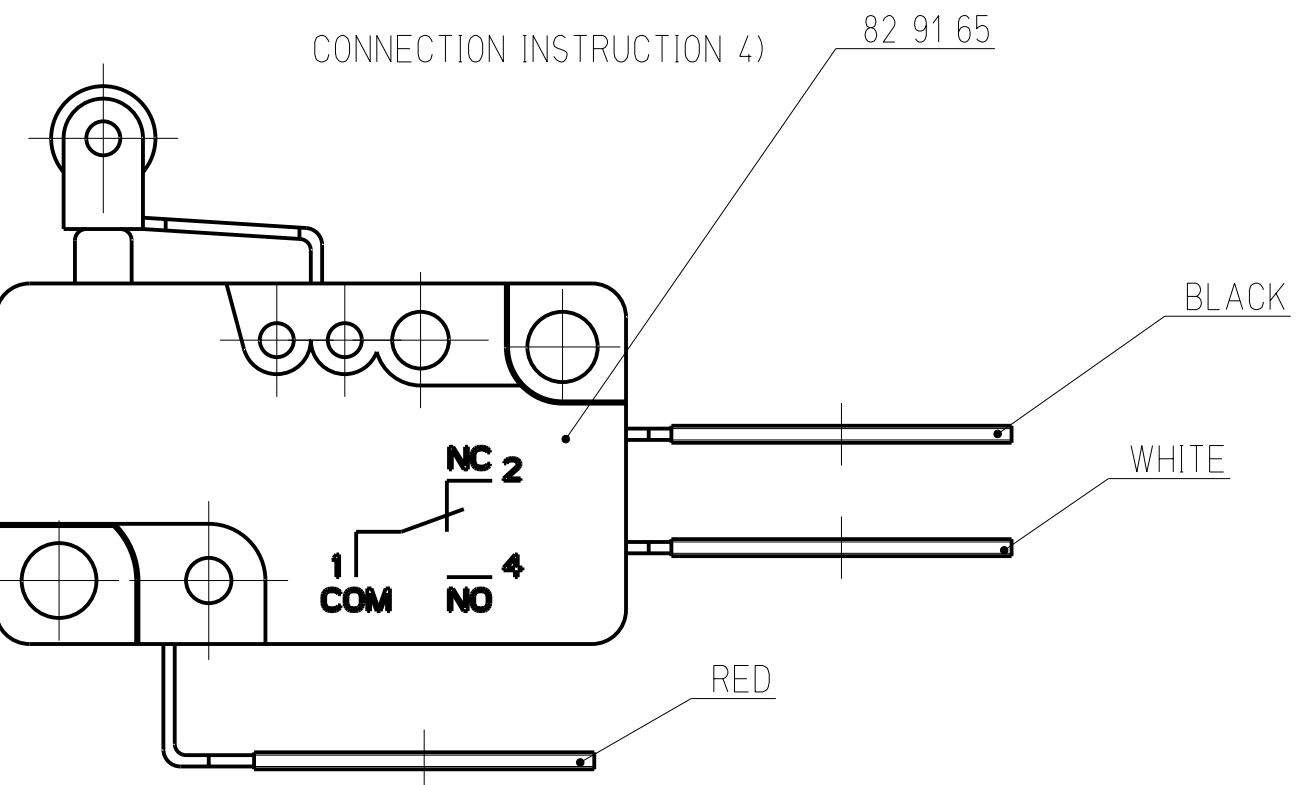
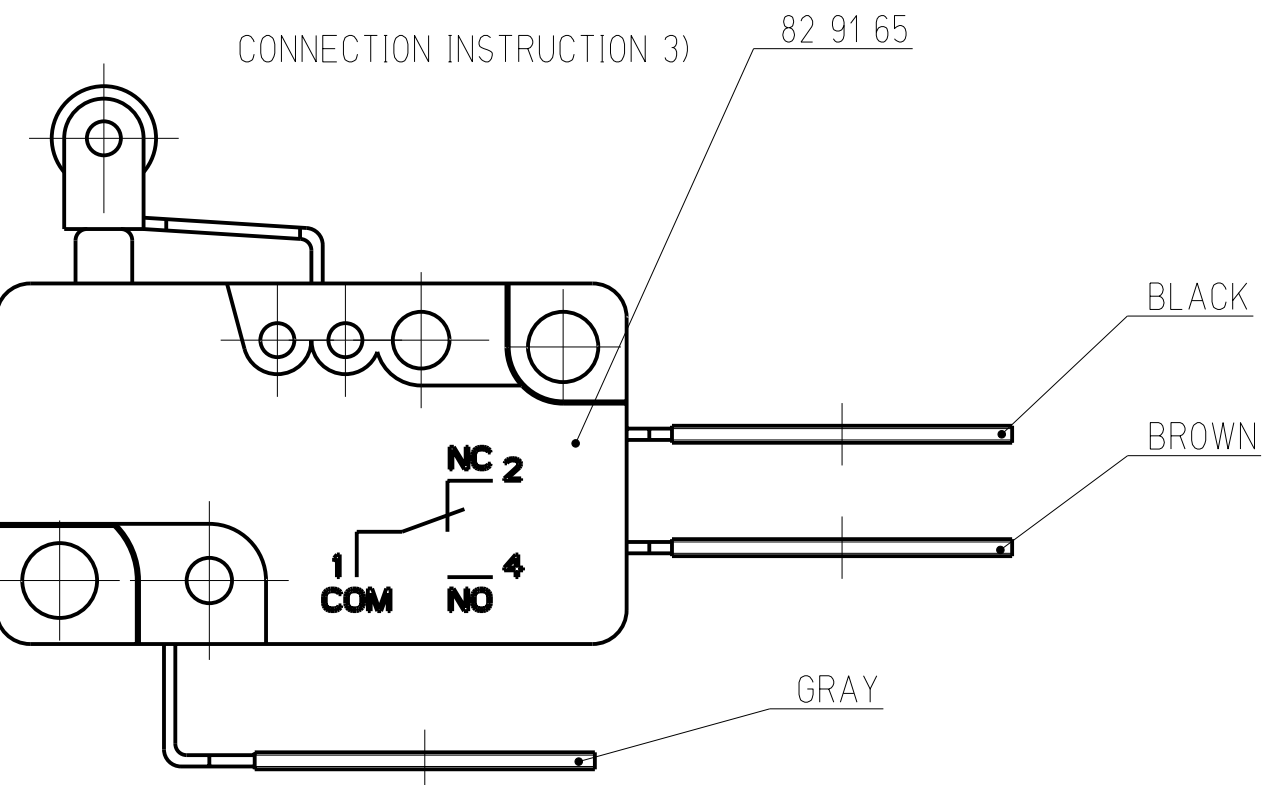
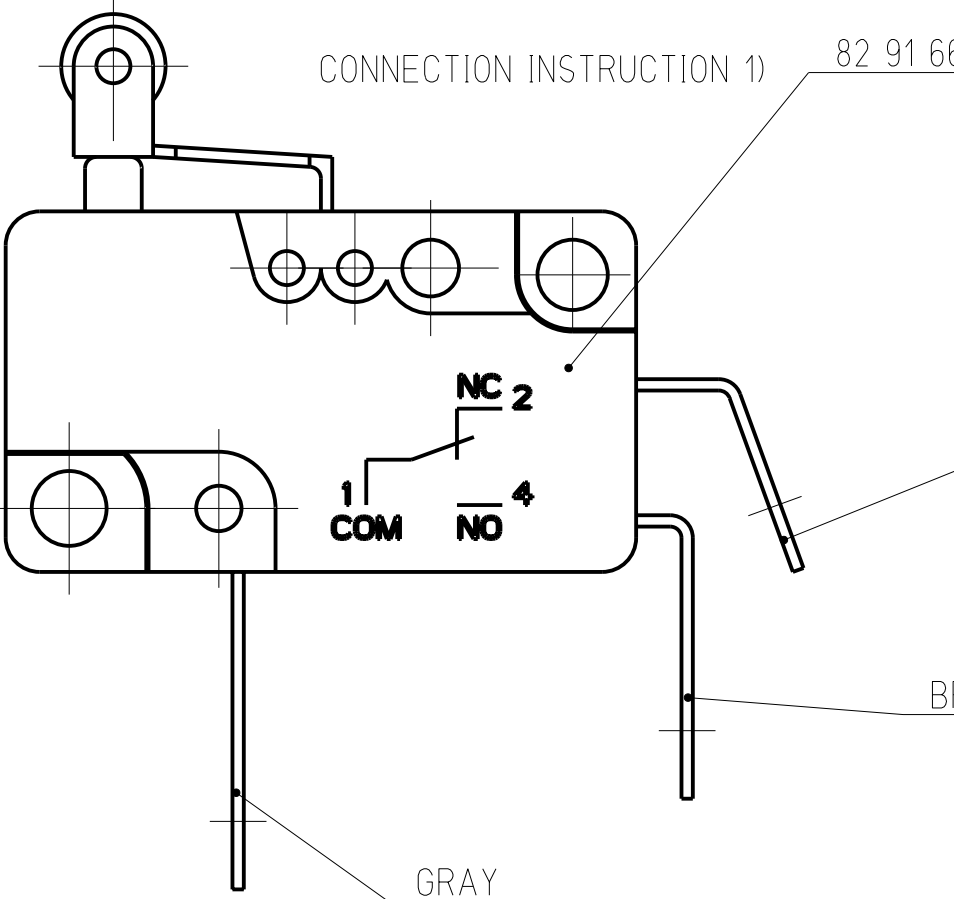
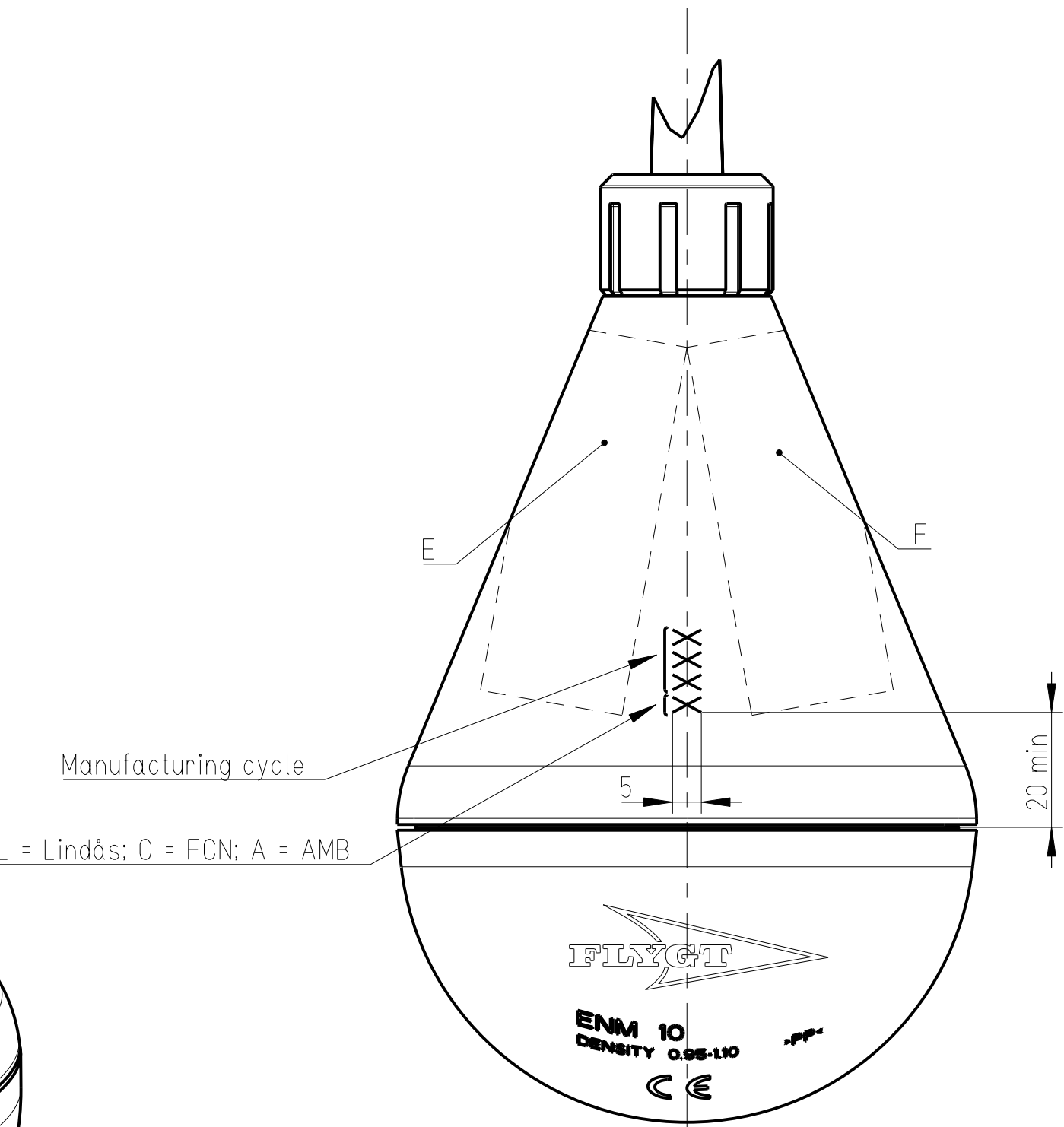
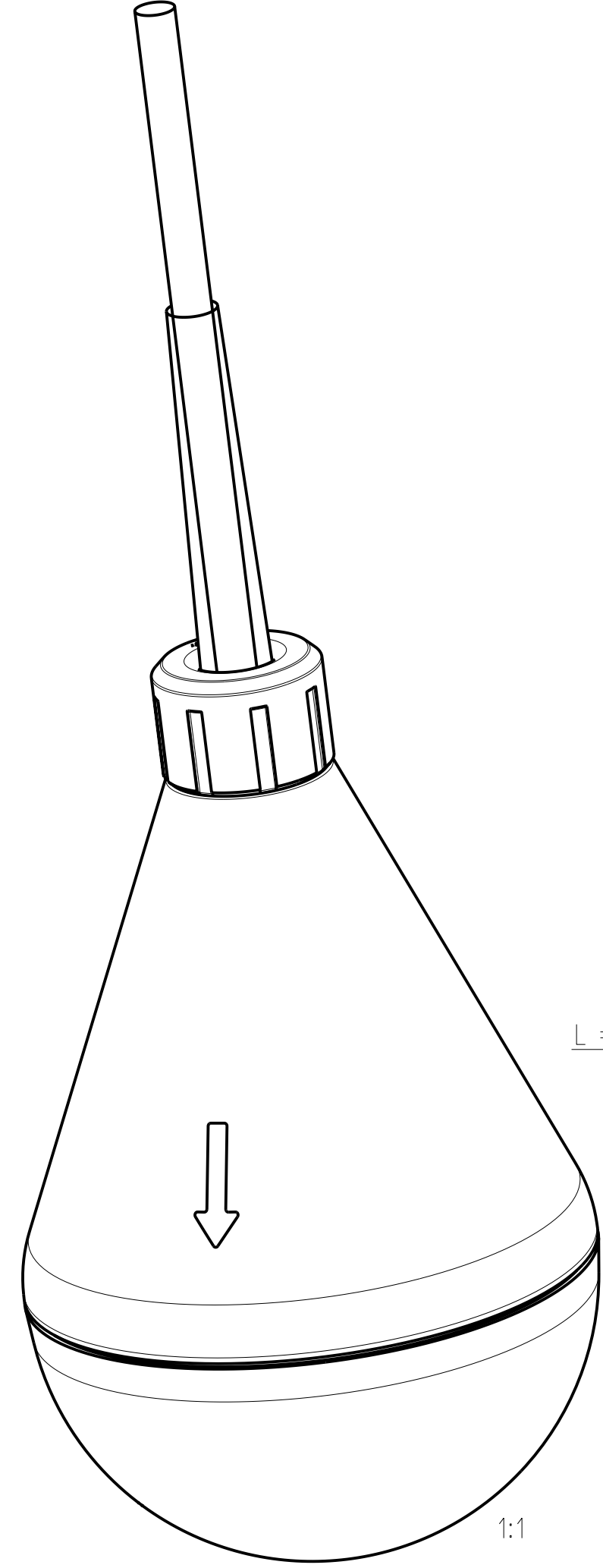
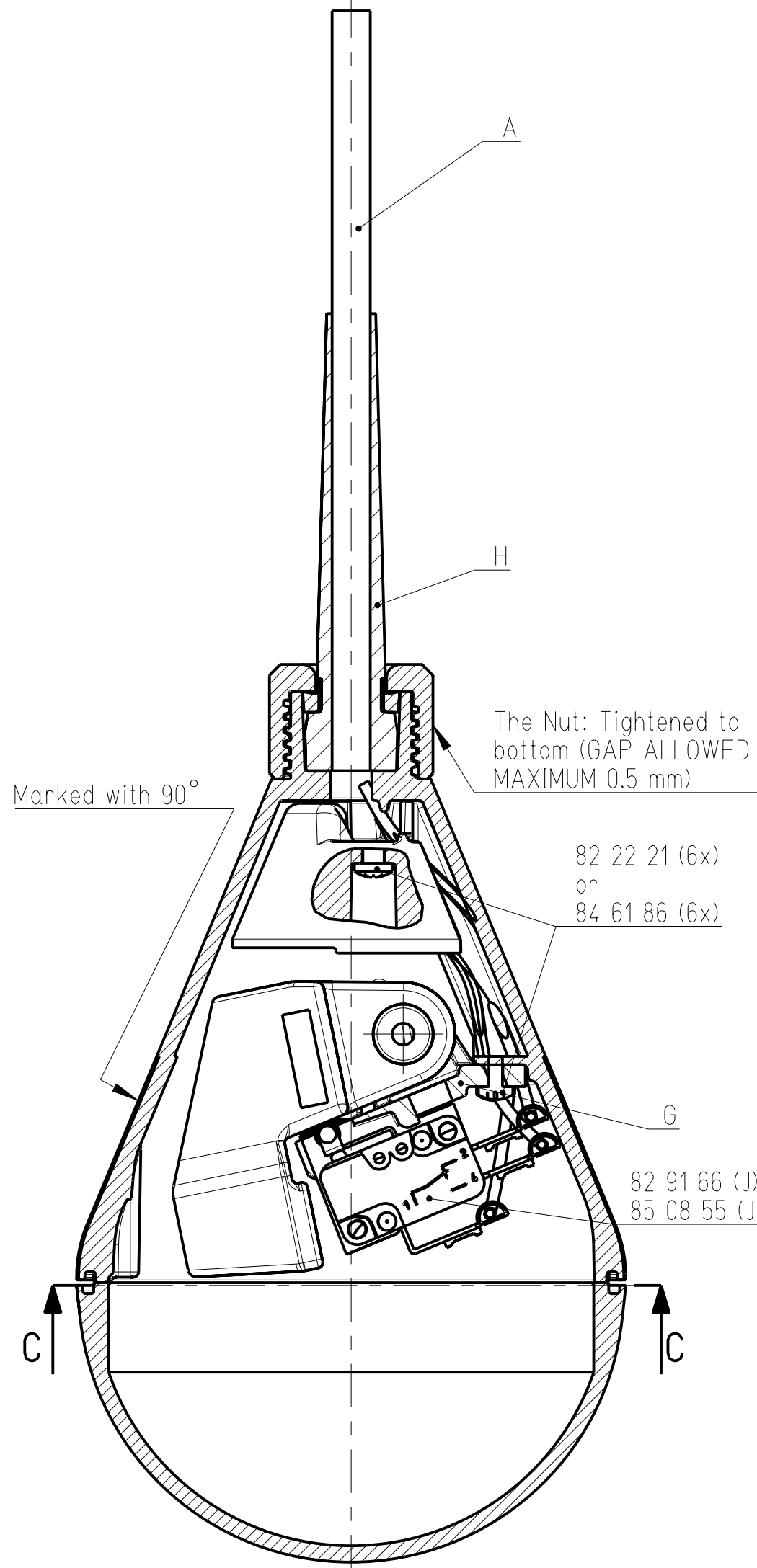
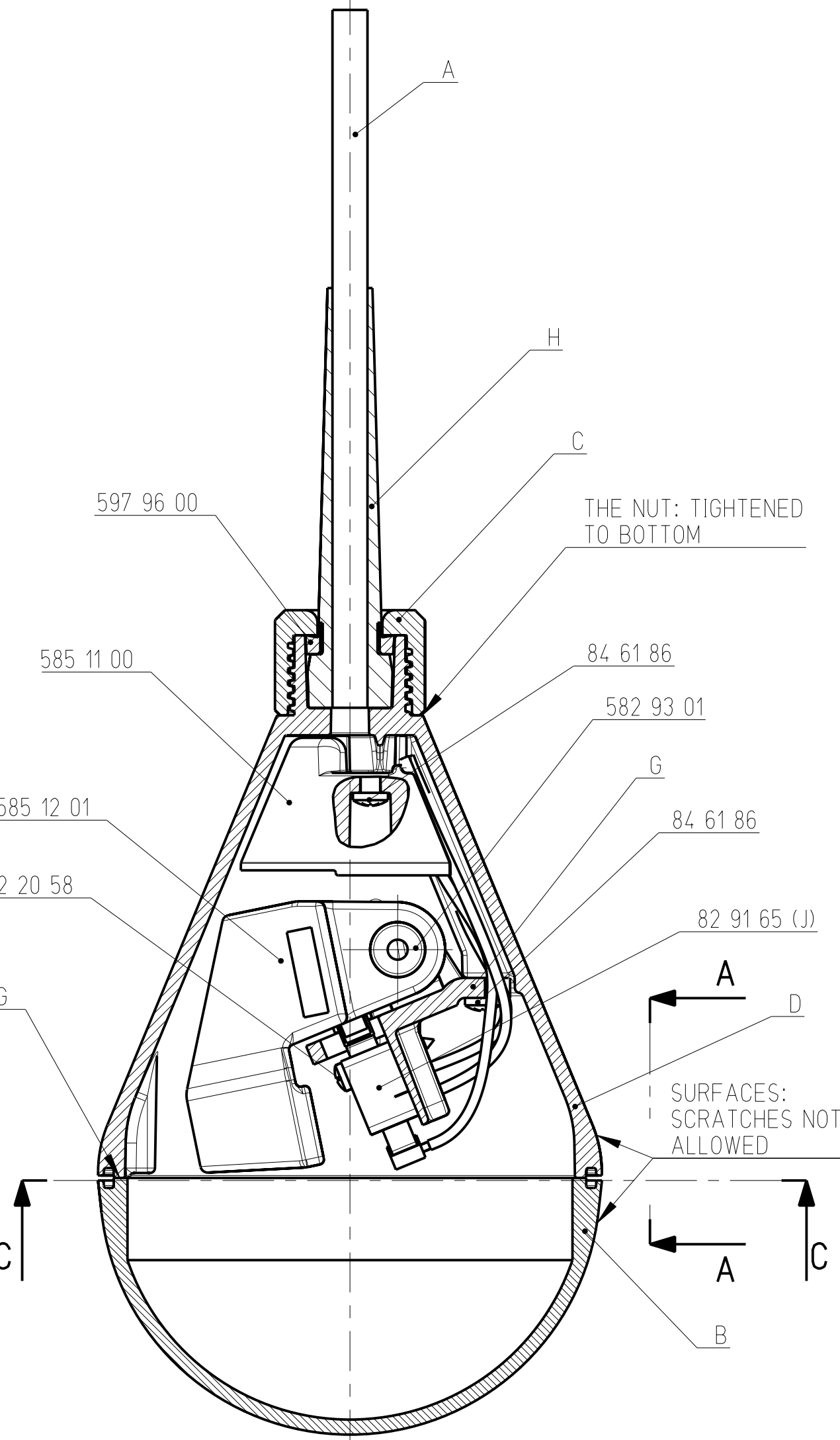
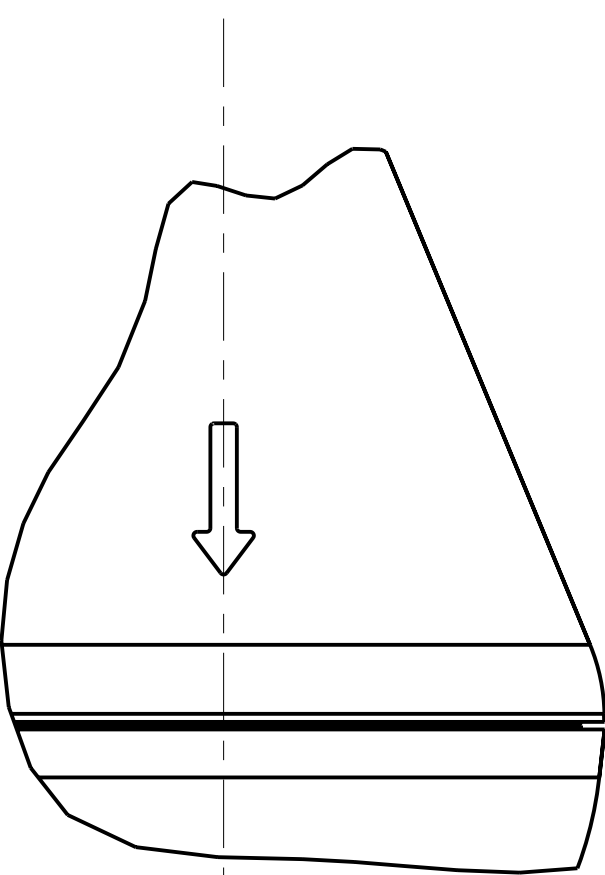
Issue	Date	Report	Description
0	2010-05-05	124397	Prime Certificate released
1	2015-11-12	D0001769	Update to latest edition of standards EN60079-0:2012 and EN60079-11:2012 and change of company name

[17] **Specific Conditions of Use**

None

[18] **Essential Health and Safety Requirements**

See item 9



94 20 30	NBR/PVC	H05RN-F 3x0,75 mm ² (Black)
94 16 89 S	PVC	NSC S2070-R80B (Blue) (RAL5002)
94 16 85	PVC	NSC S2070-R80B (Blue) (RAL5002)
A	Cable type	Colour of sheath

SEE-FLYGT STD:A4090.01	Material	—
	M class	4300
	Weight (Kg)	—
	Treatment	—
	Applicable to Approved Products	(*)
ENM 10	Blank	—

	Denomination: Level switch unit ENM-10		
	Sheet 1 of 1	Drawing No. 594 79 10	Rev. 11
	Released		

Level Measurement

Continuous level measurement - Ultrasonic transducers

EchoMax XRS-5

Overview



EchoMax XRS-5 ultrasonic transducer provides reliable, continuous level monitoring of liquids and slurries in narrow lift stations/wet wells, flumes, weirs and filter beds using a beam angle of just 10° and a CSM rubber face.

Benefits

- Narrow beam angle of only 10°
- Chemically resistant PVDF copolymer enclosure and CSM rubber face
- Measuring range: 8 m (26 ft) for measurement of liquids and slurries
- Fully submersible: IP68 degree of protection
- Easy installation with 1" NPT or R 1" BSPT connection

Application

The XRS-5 is non-contacting with a measuring range from 0.3 ... 8 m (1 ... 26 ft). Advanced echo processing ensures reliable data even in conditions with obstructions, turbulence and foam.

The hermetically sealed CSM rubber face and the PVDF copolymer enclosure are designed for maximum resistance to methane, salt water, caustics and harsh chemicals common to wastewater installations. With an IP68 degree of protection, this rugged sensor is fully submersible in the event of flood conditions. Use a submergence shield if full submergence is possible in the application. A submergence shield will maintain a high level reading output during submerged conditions.

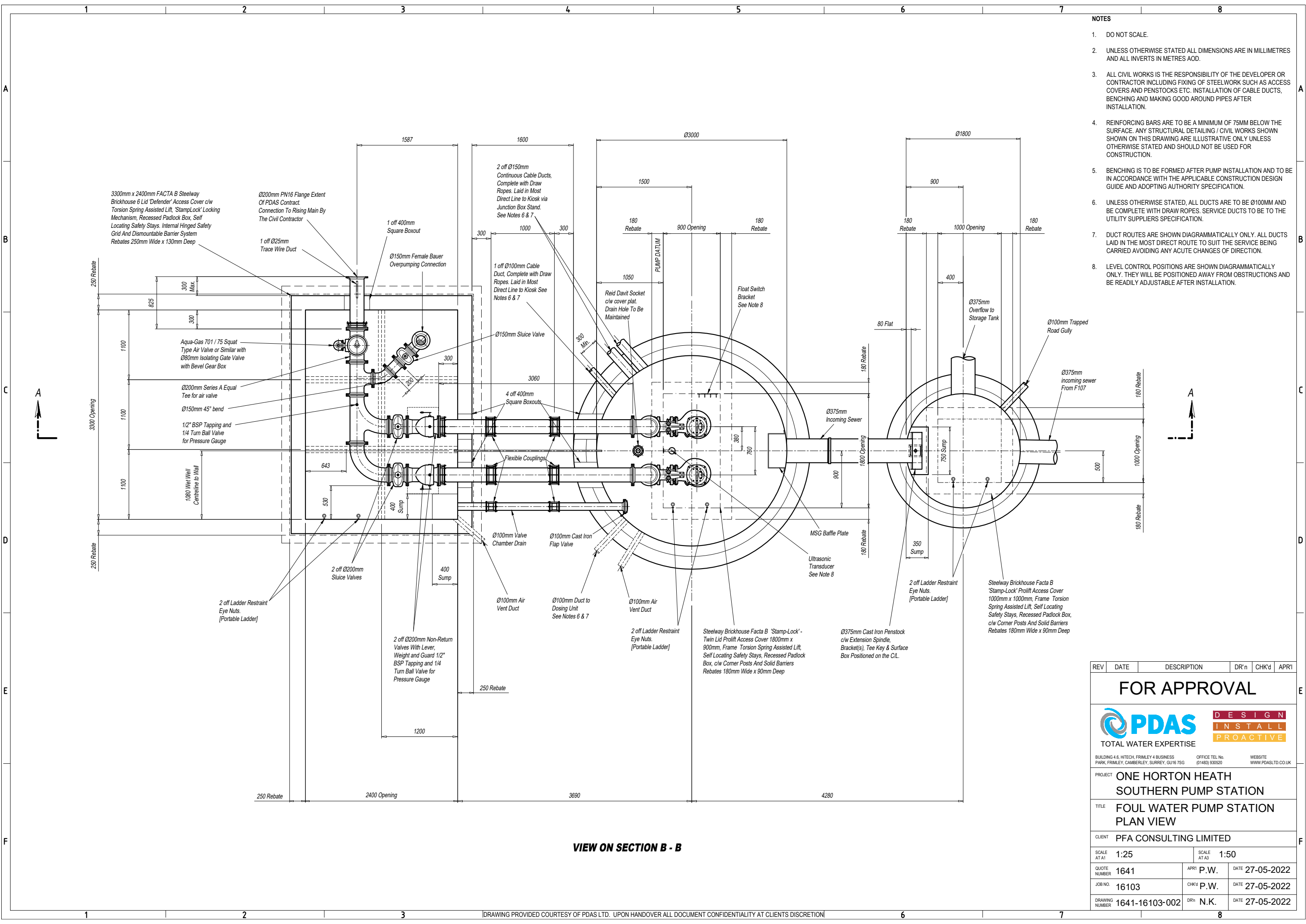
The low-cost XRS-5 transducer is compatible with a full range of Siemens controllers, from a basic system for high/low alarm or simple pump control, up to advanced control systems with communications, telemetry and SCADA integration capabilities.

- Key Applications: wet wells, flumes, weirs, filter beds

Technical specifications

Mode of operation	
Measuring principle	Ultrasonic transducer
Input	
Measuring range	0.3 ... 8 m (1 ... 26 ft), dependent on application
Output	
Frequency	44 kHz
Beam angle	10°
Accuracy	
Temperature error	Compensated by integral temperature sensor
Rated operating conditions	
Vessel pressure	Normal atmospheric pressure
Ambient conditions	
• Ambient temperature	-20 ... +65 °C (-4 ... +149 ° F)
Design	
Weight (approximate shipping weight of sensor with standard cable length)	1.2 kg (2.6 lb)
Material (enclosure)	PVDF copolymer enclosure and CSM face
Process connection	1" NPT [(Taper), ANSI/ASME B1.20.1] or R 1" [(BSPT), EN 10226]
Degree of protection	IP65/IP68
Cable connection	2-core shielded/twisted, 0.5 mm ² (20 AWG), PVC sheath
Cable (max. length)	• 365 m (1 200 ft) with RG 62 A/U coaxial cable • 365 m (1 200 ft) with 2-core twisted pair, foil shield, 0.5 mm² (20 AWG), PVC sheath, only for MultiRanger 100/200
Options	
Flange version	Factory flange with PTFE face for ASME, EN or JIS configuration
Submergence shield	For applications with flooding possible
Certificates and approvals	
CE, RCM, KCC	
CSA Class I, Div. 2, Groups A,B,C,D, Class II, Div. 1 Groups E,F,G	
FM Class I, Zone 1, AEx m IIC, T6 Class II, III, Div. 1, Groups E,F,G T6	
ATEX II 2GD / IECEx / INMETRO Ex mb IIC T6 Gb, Ex tb IIIC T85 °C Db	

Appendix G
Pump Station Drawings

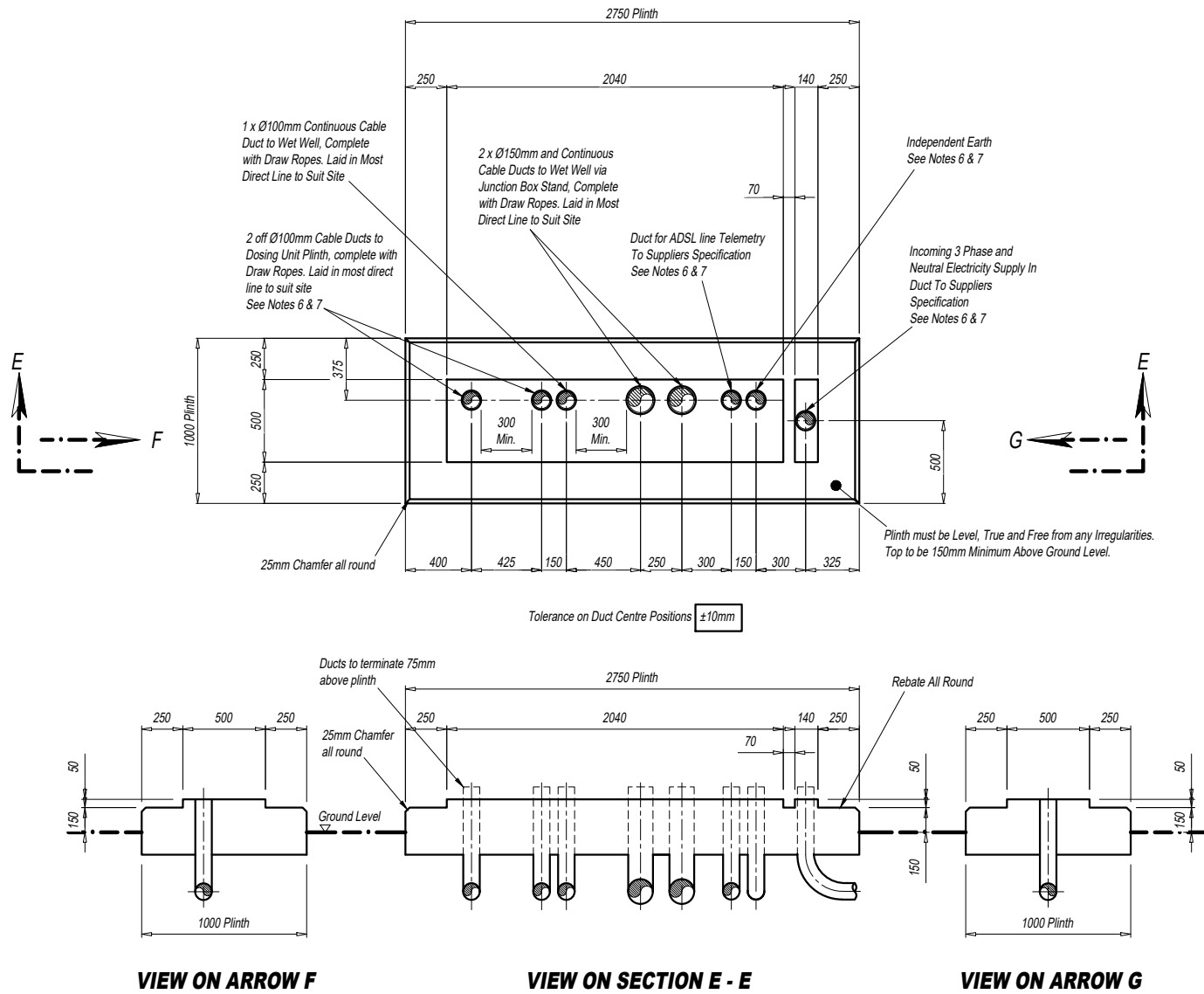


- NOTES**
- DO NOT SCALE.
 - UNLESS OTHERWISE STATED ALL DIMENSIONS ARE IN MILLIMETRES AND ALL INVERTS IN METRES AOD.
 - ALL CIVIL WORKS IS THE RESPONSIBILITY OF THE DEVELOPER OR CONTRACTOR INCLUDING FIXING OF STEELWORK SUCH AS ACCESS COVERS AND PENSTOCKS ETC. INSTALLATION OF CABLE DUCTS, BENCHING AND MAKING GOOD AROUND PIPES AFTER INSTALLATION.
 - REINFORCING BARS ARE TO BE A MINIMUM OF 75MM BELOW THE SURFACE. ANY STRUCTURAL DETAILING / CIVIL WORKS SHOWN SHOWN ON THIS DRAWING ARE ILLUSTRATIVE ONLY UNLESS OTHERWISE STATED AND SHOULD NOT BE USED FOR CONSTRUCTION.
 - BENCHING IS TO BE FORMED AFTER PUMP INSTALLATION AND TO BE IN ACCORDANCE WITH THE APPLICABLE CONSTRUCTION DESIGN GUIDE AND ADOPTING AUTHORITY SPECIFICATION.
 - UNLESS OTHERWISE STATED, ALL DUCTS ARE TO BE Ø100MM AND BE COMPLETE WITH DRAW ROPES. SERVICE DUCTS TO BE TO THE UTILITY SUPPLIERS SPECIFICATION.
 - DUCT ROUTES ARE SHOWN DIAGRAMMATICALLY ONLY. ALL DUCTS LAID IN THE MOST DIRECT ROUTE TO SUIT THE SERVICE BEING CARRIED AVOIDING ANY ACUTE CHANGES OF DIRECTION.
 - LEVEL CONTROL POSITIONS ARE SHOWN DIAGRAMMATICALLY ONLY. THEY WILL BE POSITIONED AWAY FROM OBSTRUCTIONS AND BE READILY ADJUSTABLE AFTER INSTALLATION.

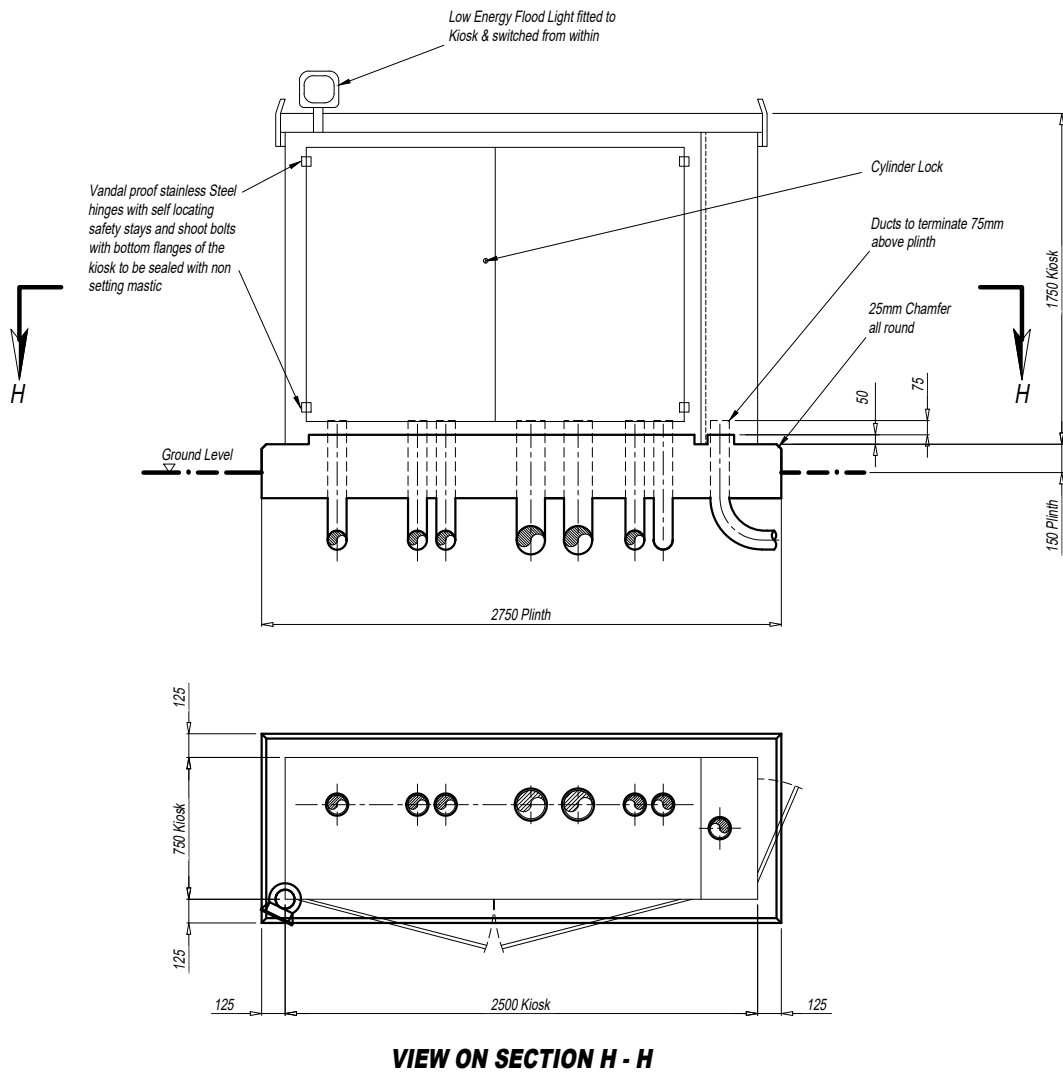
VIEW ON SECTION B - B

REV	DATE	DESCRIPTION	DR'n	CHK'd	APR'l
FOR APPROVAL					
 DESIGN INSTALL PROACTIVE TOTAL WATER EXPERTISE					
BUILDING 4 & 5, HITECH, FRIMLEY 4 BUSINESS PARK, FRIMLEY, CAMBERLEY, SURREY, GU16 7SG OFFICE TEL No. (01483) 930520 WEBSITE WWW.PDASLTD.CO.UK					
PROJECT ONE HORTON HEATH SOUTHERN PUMP STATION					
TITLE FOUL WATER PUMP STATION PLAN VIEW					
CLIENT PFA CONSULTING LIMITED					
SCALE AT A1 1:25		SCALE AT A3 1:50			
QUOTE NUMBER 1641		APR'l P.W.	DATE 27-05-2022		
JOB NO. 16103		CHK'd P.W.	DATE 27-05-2022		
DRAWING NUMBER 1641-16103-002		DR'n N.K.	DATE 27-05-2022		

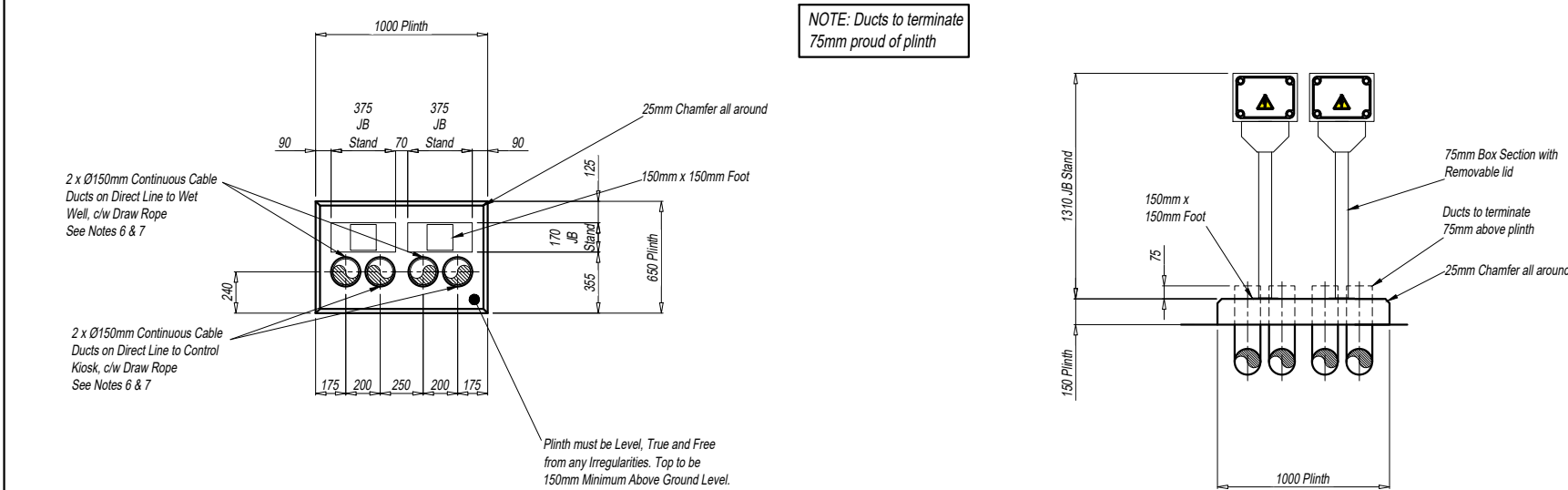
KIOSK PLINTH DETAIL



CONTROL KIOSK PLAN & ELEVATION VIEW



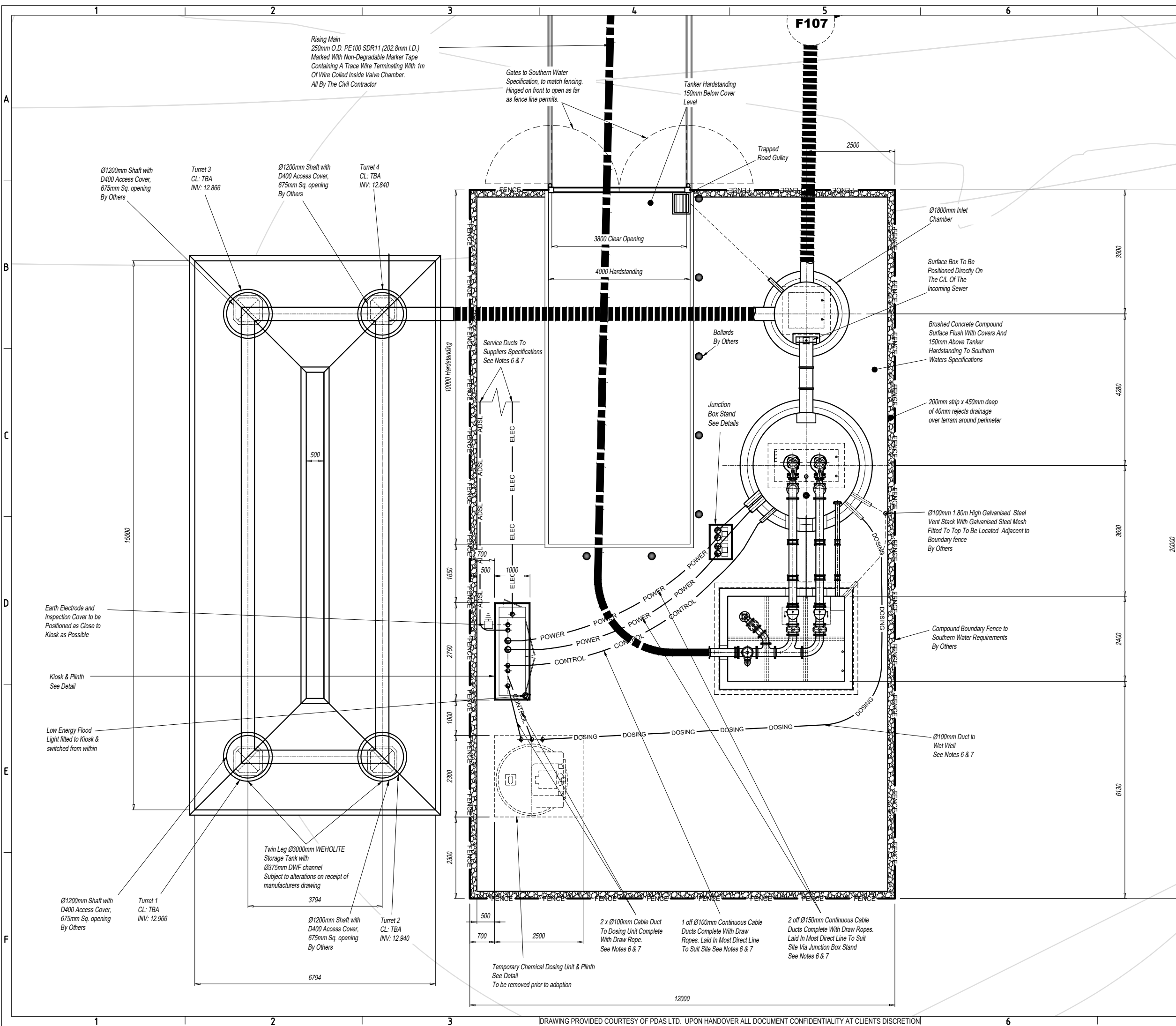
JUNCTION BOX STAND PLINTH DETAIL



NOTES

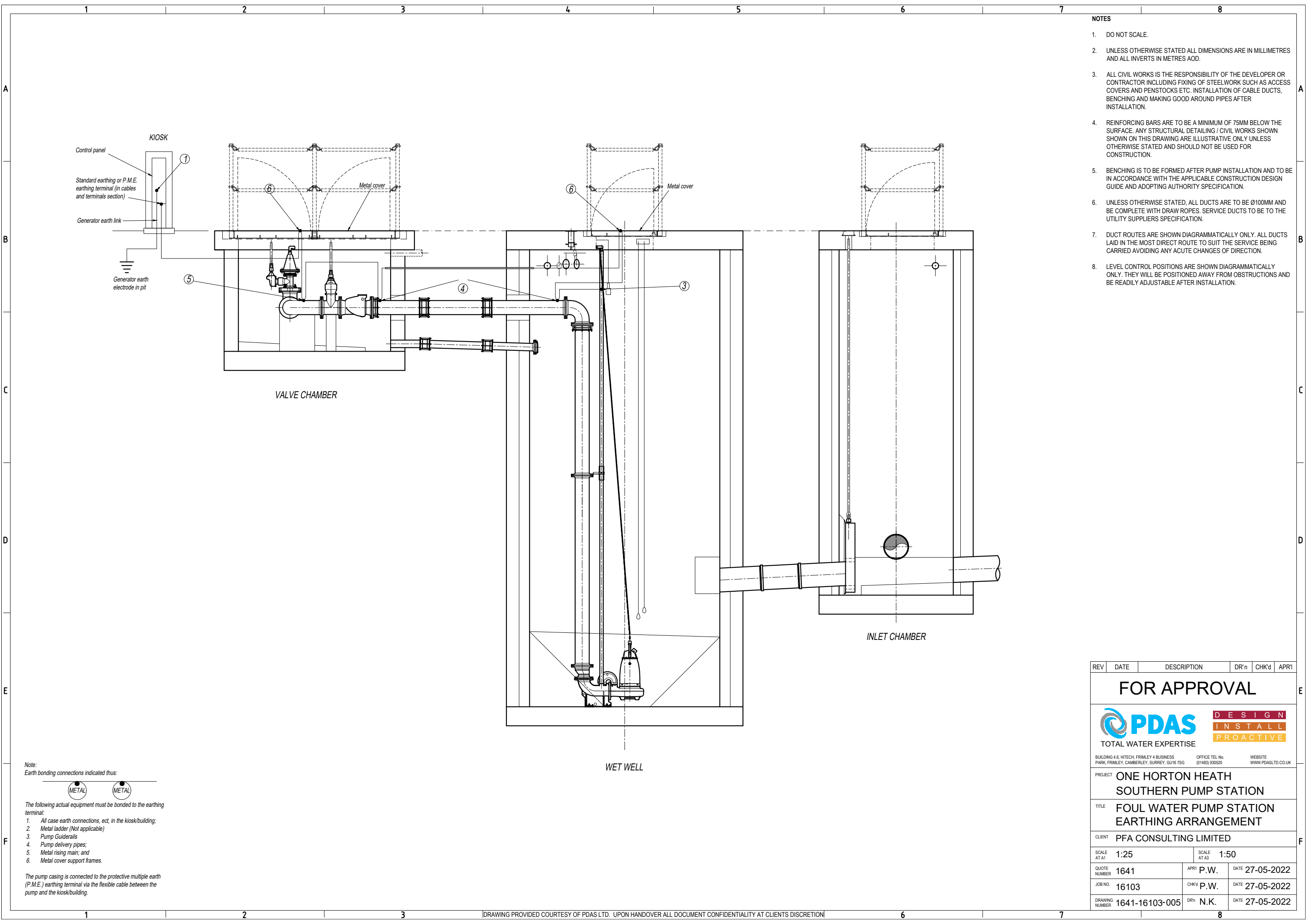
- DO NOT SCALE.
- UNLESS OTHERWISE STATED ALL DIMENSIONS ARE IN MILLIMETRES AND ALL INVERTS IN METRES AOD.
- ALL CIVIL WORKS IS THE RESPONSIBILITY OF THE DEVELOPER OR CONTRACTOR INCLUDING FIXING OF STEELWORK SUCH AS ACCESS COVERS AND PENSTOCKS ETC. INSTALLATION OF CABLE DUCTS, BENCHING AND MAKING GOOD AROUND PIPES AFTER INSTALLATION.
- REINFORCING BARS ARE TO BE A MINIMUM OF 75MM BELOW THE SURFACE. ANY STRUCTURAL DETAILING / CIVIL WORKS SHOWN SHOWN ON THIS DRAWING ARE ILLUSTRATIVE ONLY UNLESS OTHERWISE STATED AND SHOULD NOT BE USED FOR CONSTRUCTION.
- BENCHING IS TO BE FORMED AFTER PUMP INSTALLATION AND TO BE IN ACCORDANCE WITH THE APPLICABLE CONSTRUCTION DESIGN GUIDE AND ADOPTING AUTHORITY SPECIFICATION.
- UNLESS OTHERWISE STATED, ALL DUCTS ARE TO BE Ø100MM AND BE COMPLETE WITH DRAW ROPES. SERVICE DUCTS TO BE TO THE UTILITY SUPPLIERS SPECIFICATION.
- DUCT ROUTES ARE SHOWN DIAGRAMMATICALLY ONLY. ALL DUCTS LAID IN THE MOST DIRECT ROUTE TO SUIT THE SERVICE BEING CARRIED AVOIDING ANY ACUTE CHANGES OF DIRECTION.
- LEVEL CONTROL POSITIONS ARE SHOWN DIAGRAMMATICALLY ONLY. THEY WILL BE POSITIONED AWAY FROM OBSTRUCTIONS AND BE READILY ADJUSTABLE AFTER INSTALLATION.

REV	DATE	DESCRIPTION	DR'n	CHK'd	APR'l
FOR APPROVAL					
 TOTAL WATER EXPERTISE DESIGN INSTALL PROACTIVE					
BUILDING 4.6, HITECH, FRIMLEY 4 BUSINESS PARK, FRIMLEY, CAMBERLEY, SURREY, GU16 7SG OFFICE TEL No. (01483) 930520 WEBSITE WWW.PDASLTD.CO.UK					
PROJECT ONE HORTON HEATH SOUTHERN PUMP STATION					
TITLE FOUL WATER PUMP STATION KIOSK AND PLINTH DETAIL					
CLIENT PFA CONSULTING LIMITED					
SCALE AT A1 1:20		SCALE AT A3 1:40			
QUOTE NUMBER	1641	APR'l	P.W.	DATE	27-05-2022
JOB NO.	16103	CHK'd	P.W.	DATE	27-05-2022
DRAWING NUMBER	1641-16103-003	DR'n	N.K.	DATE	27-05-2022



- NOTES
- DO NOT SCALE.
 - UNLESS OTHERWISE STATED ALL DIMENSIONS ARE IN MILLIMETRES AND ALL INVERTS IN METRES AOD.
 - ALL CIVIL WORKS IS THE RESPONSIBILITY OF THE DEVELOPER OR CONTRACTOR INCLUDING FIXING OF STEELWORK SUCH AS ACCESS COVERS AND PENSTOCKS ETC. INSTALLATION OF CABLE DUCTS, BENCHING AND MAKING GOOD AROUND PIPES AFTER INSTALLATION.
 - REINFORCING BARS ARE TO BE A MINIMUM OF 75MM BELOW THE SURFACE. ANY STRUCTURAL DETAILING / CIVIL WORKS SHOWN SHOWN ON THIS DRAWING ARE ILLUSTRATIVE ONLY UNLESS OTHERWISE STATED AND SHOULD NOT BE USED FOR CONSTRUCTION.
 - BENCHING IS TO BE FORMED AFTER PUMP INSTALLATION AND TO BE IN ACCORDANCE WITH THE APPLICABLE CONSTRUCTION DESIGN GUIDE AND ADOPTING AUTHORITY SPECIFICATION.
 - UNLESS OTHERWISE STATED, ALL DUCTS ARE TO BE Ø100MM AND BE COMPLETE WITH DRAW ROPES. SERVICE DUCTS TO BE TO THE UTILITY SUPPLIERS SPECIFICATION.
 - DUCT ROUTES ARE SHOWN DIAGRAMMATICALLY ONLY. ALL DUCTS LAID IN THE MOST DIRECT ROUTE TO SUIT THE SERVICE BEING CARRIED AVOIDING ANY ACUTE CHANGES OF DIRECTION.
 - LEVEL CONTROL POSITIONS ARE SHOWN DIAGRAMMATICALLY ONLY. THEY WILL BE POSITIONED AWAY FROM OBSTRUCTIONS AND BE READILY ADJUSTABLE AFTER INSTALLATION.

REV	DATE	DESCRIPTION	DR'n	CHK'd	APR'l
FOR APPROVAL					
 TOTAL WATER EXPERTISE DESIGN INSTALL PROACTIVE					
BUILDING 4.6, HITECH, FRIMLEY 4 BUSINESS PARK, FRIMLEY, CAMBERLEY, SURREY, GU16 7SG OFFICE TEL No. (01483) 930520 WEBSITE WWW.PDASLTD.CO.UK					
PROJECT ONE HORTON HEATH SOUTHERN PUMP STATION					
TITLE FOUL WATER PUMP STATION SITE PLAN					
CLIENT PFA CONSULTING LIMITED					
SCALE AT A1 1:50		SCALE AT A3 1:100			
QUOTE NUMBER	1641	APR'l	P.W.	DATE	27-05-2022
JOB NO.	16103	CHK'd	P.W.	DATE	27-05-2022
DRAWING NUMBER	1641-16103-004	DR'n	N.K.	DATE	27-05-2022



- NOTES
- DO NOT SCALE.
 - UNLESS OTHERWISE STATED ALL DIMENSIONS ARE IN MILLIMETRES AND ALL INVERTS IN METRES AOD.
 - ALL CIVIL WORKS IS THE RESPONSIBILITY OF THE DEVELOPER OR CONTRACTOR INCLUDING FIXING OF STEELWORK SUCH AS ACCESS COVERS AND PENSTOCKS ETC. INSTALLATION OF CABLE DUCTS, BENCHING AND MAKING GOOD AROUND PIPES AFTER INSTALLATION.
 - REINFORCING BARS ARE TO BE A MINIMUM OF 75MM BELOW THE SURFACE. ANY STRUCTURAL DETAILING / CIVIL WORKS SHOWN SHOWN ON THIS DRAWING ARE ILLUSTRATIVE ONLY UNLESS OTHERWISE STATED AND SHOULD NOT BE USED FOR CONSTRUCTION.
 - BENCHING IS TO BE FORMED AFTER PUMP INSTALLATION AND TO BE IN ACCORDANCE WITH THE APPLICABLE CONSTRUCTION DESIGN GUIDE AND ADOPTING AUTHORITY SPECIFICATION.
 - UNLESS OTHERWISE STATED, ALL DUCTS ARE TO BE Ø100MM AND BE COMPLETE WITH DRAW ROPES. SERVICE DUCTS TO BE TO THE UTILITY SUPPLIERS SPECIFICATION.
 - DUCT ROUTES ARE SHOWN DIAGRAMMATICALLY ONLY. ALL DUCTS LAID IN THE MOST DIRECT ROUTE TO SUIT THE SERVICE BEING CARRIED AVOIDING ANY ACUTE CHANGES OF DIRECTION.
 - LEVEL CONTROL POSITIONS ARE SHOWN DIAGRAMMATICALLY ONLY. THEY WILL BE POSITIONED AWAY FROM OBSTRUCTIONS AND BE READILY ADJUSTABLE AFTER INSTALLATION.

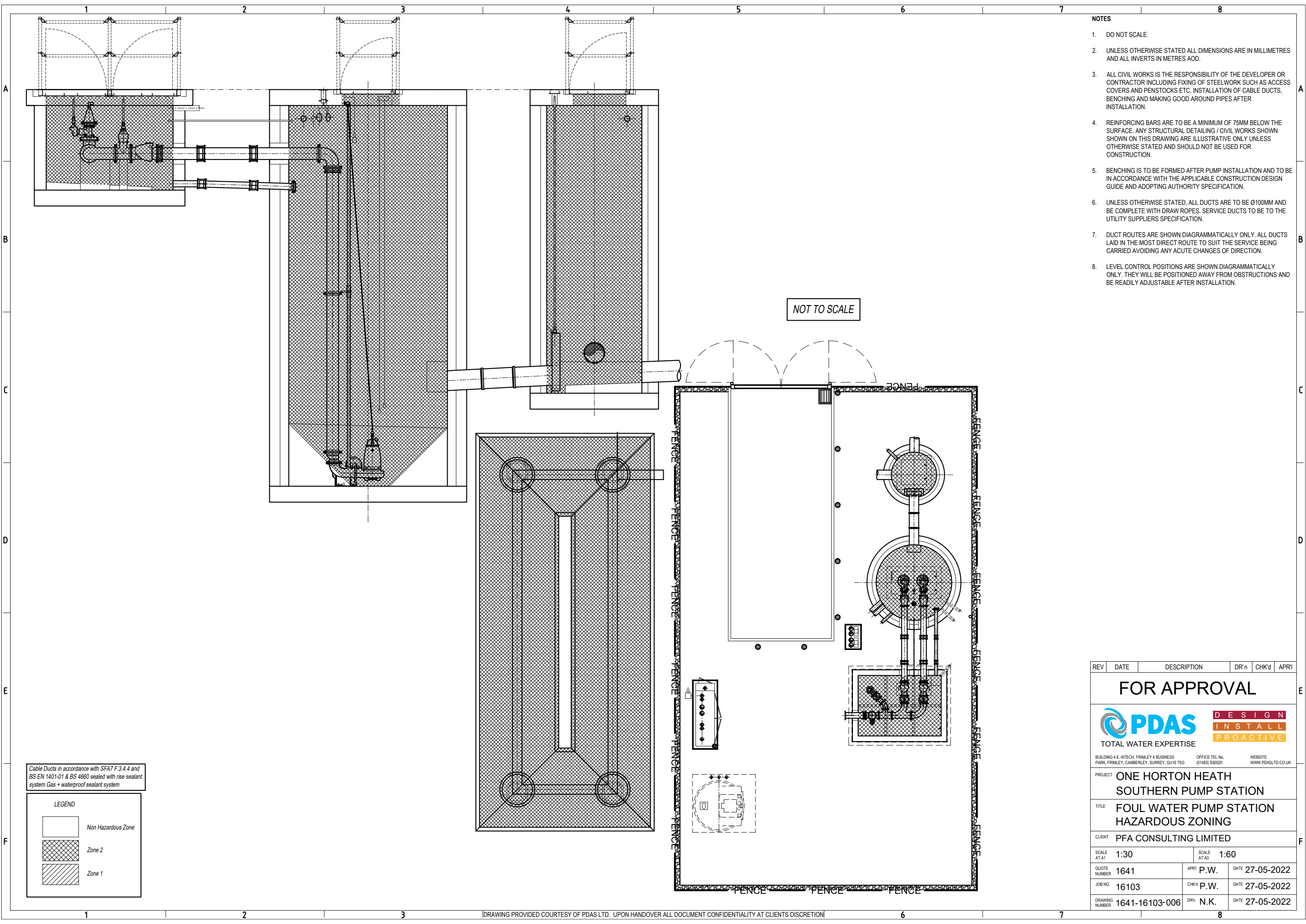
Note:
Earth bonding connections indicated thus:

The following actual equipment must be bonded to the earthing terminal:

- All case earth connections, ect, in the kiosk/building;
- Metal ladder (Not applicable)
- Pump Guiderails
- Pump delivery pipes;
- Metal rising main; and
- Metal cover support frames.

The pump casing is connected to the protective multiple earth (P.M.E.) earthing terminal via the flexible cable between the pump and the kiosk/building.

REV	DATE	DESCRIPTION	DR'n	CHK'd	APR'l
FOR APPROVAL					
 DESIGN INSTALL PROACTIVE TOTAL WATER EXPERTISE					
BUILDING 4 & 6, HITECH, FRIMLEY 4 BUSINESS PARK, FRIMLEY, CAMBERLEY, SURREY, GU16 7SG OFFICE TEL No. (01483) 930520 WEBSITE WWW.PDASLTD.CO.UK					
PROJECT ONE HORTON HEATH SOUTHERN PUMP STATION					
TITLE FOUL WATER PUMP STATION EARTHING ARRANGEMENT					
CLIENT PFA CONSULTING LIMITED					
SCALE AT A1 1:25		SCALE AT A3 1:50			
QUOTE NUMBER	1641	APR'l	P.W.	DATE	27-05-2022
JOB NO.	16103	CHK'd	P.W.	DATE	27-05-2022
DRAWING NUMBER	1641-16103-005	DR'n	N.K.	DATE	27-05-2022



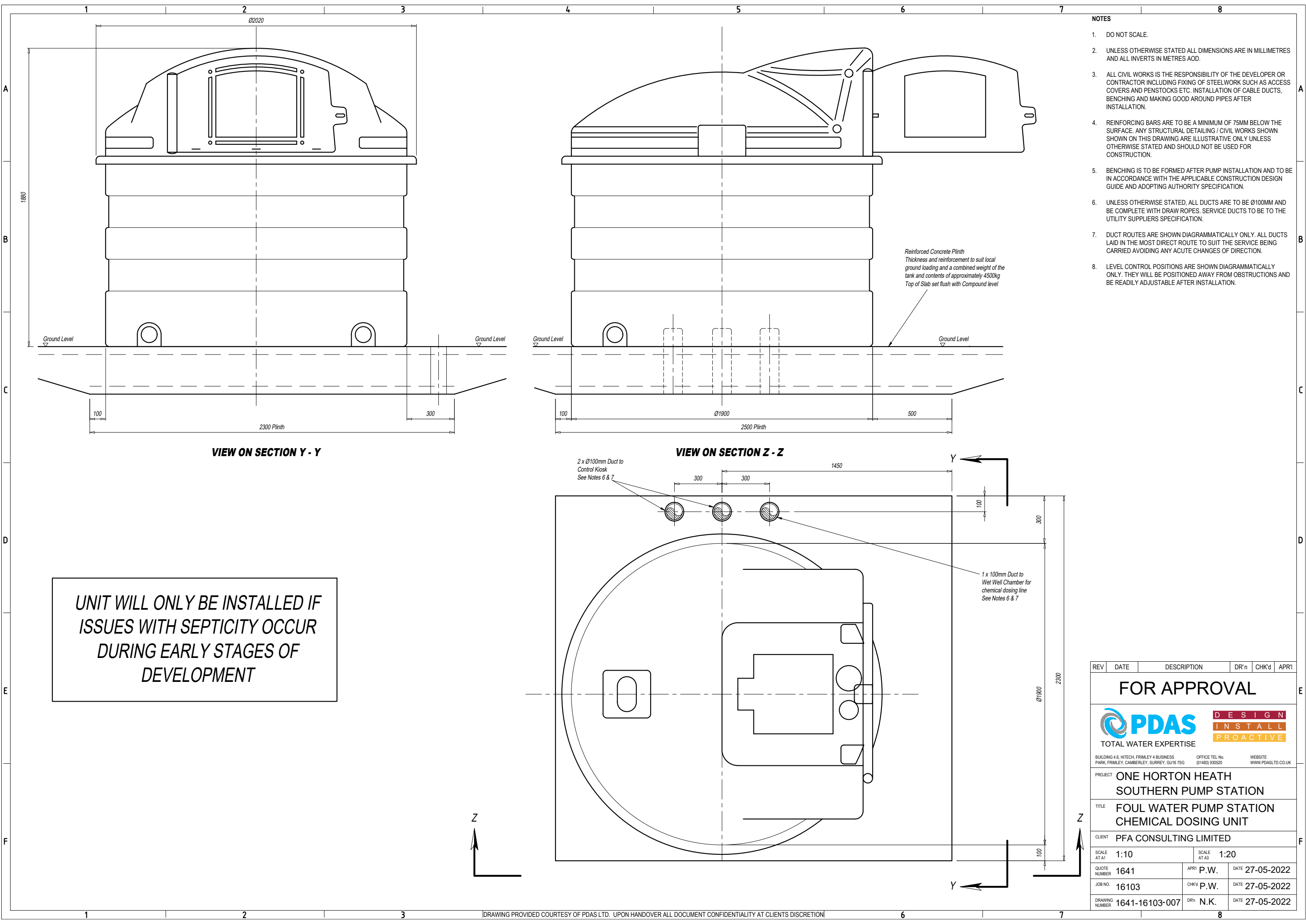
- NOTES
- DO NOT SCALE.
 - UNLESS OTHERWISE STATED ALL DIMENSIONS ARE IN MILLIMETRES AND ALL INVERTS IN METRES AOD.
 - ALL CIVIL WORKS IS THE RESPONSIBILITY OF THE DEVELOPER OR CONTRACTOR INCLUDING FIXING OF STEELWORK SUCH AS ACCESS COVERS AND PENSTOCKS ETC. INSTALLATION OF CABLE DUCTS, BENCHING AND MAKING GOOD AROUND PIPES AFTER INSTALLATION.
 - REINFORCING BARS ARE TO BE A MINIMUM OF 75MM BELOW THE SURFACE. ANY STRUCTURAL DETAILING / CIVIL WORKS SHOWN ON THIS DRAWING ARE ILLUSTRATIVE ONLY UNLESS OTHERWISE STATED AND SHOULD NOT BE USED FOR CONSTRUCTION.
 - BENCHING IS TO BE FORMED AFTER PUMP INSTALLATION AND TO BE IN ACCORDANCE WITH THE APPLICABLE CONSTRUCTION DESIGN GUIDE AND ADOPTING AUTHORITY SPECIFICATION.
 - UNLESS OTHERWISE STATED, ALL DUCTS ARE TO BE Ø100MM AND BE COMPLETE WITH DRAW ROPES. SERVICE DUCTS TO BE TO THE UTILITY SUPPLIERS SPECIFICATION.
 - DUCT ROUTES ARE SHOWN DIAGRAMMATICALLY ONLY. ALL DUCTS LAID IN THE MOST DIRECT ROUTE TO SUIT THE SERVICE BEING CARRIED AVOIDING ANY ACUTE CHANGES OF DIRECTION.
 - LEVEL CONTROL POSITIONS ARE SHOWN DIAGRAMMATICALLY ONLY. THEY WILL BE POSITIONED AWAY FROM OBSTRUCTIONS AND BE READILY ADJUSTABLE AFTER INSTALLATION.

Cable Ducts in accordance with SFA7 F.3.4.4 and BS EN 1401-01 & BS 4660 sealed with rise sealant system Gas + waterproof sealant system

LEGEND

Non Hazardous Zone
Zone 2
Zone 1

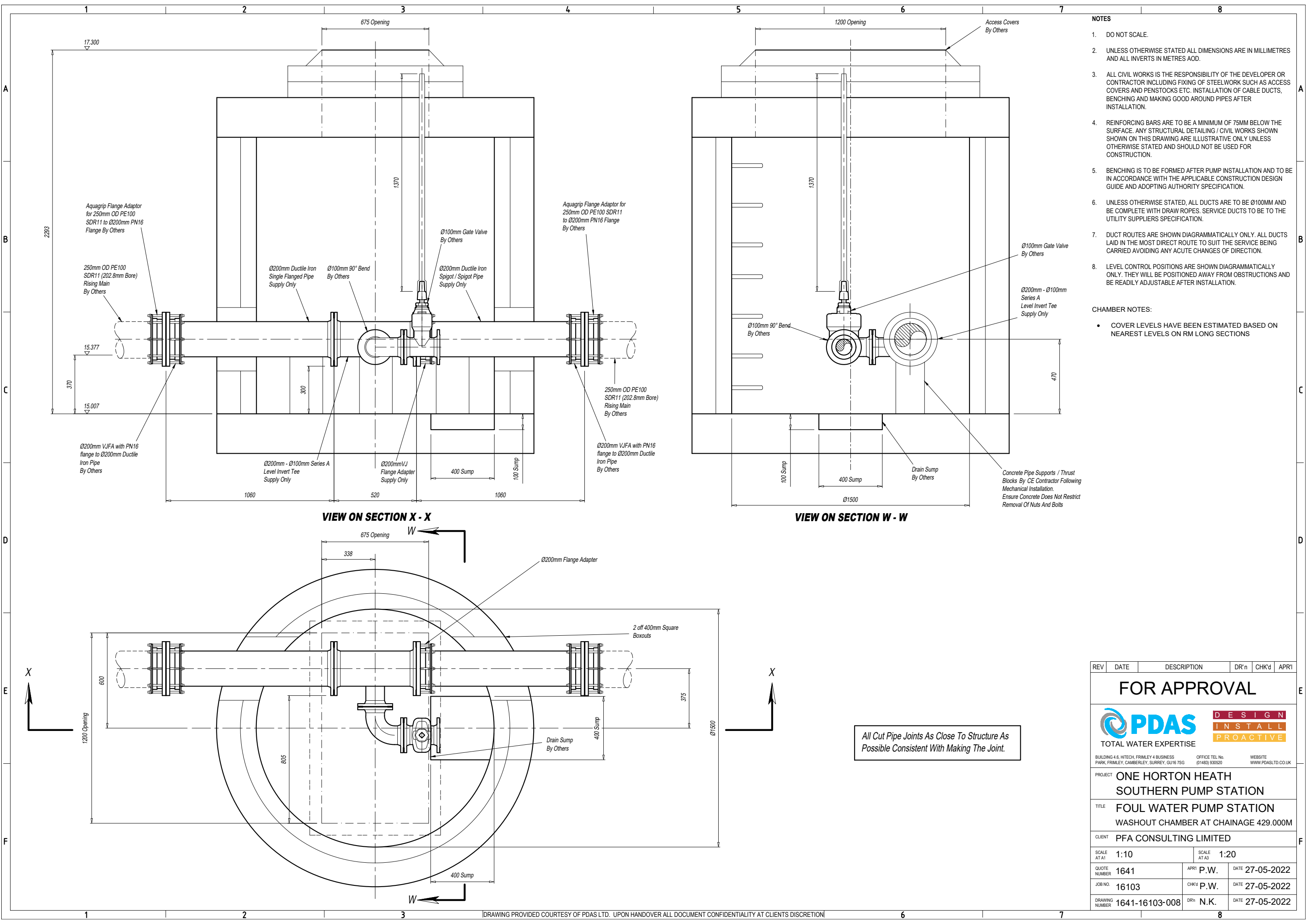
REV	DATE	DESCRIPTION	DR'n	CHK'd	APR'l
FOR APPROVAL					
 TOTAL WATER EXPERTISE DESIGN INSTALL PROACTIVE					
BUILDING 4 & 6, HITECH, FRIMLEY 4 BUSINESS PARK, FRIMLEY, CAMBERLEY, SURREY, GU16 7SG OFFICE TEL No. (01483) 930520 WEBSITE WWW.PDASLTD.CO.UK					
PROJECT ONE HORTON HEATH SOUTHERN PUMP STATION					
TITLE FOUL WATER PUMP STATION HAZARDOUS ZONING					
CLIENT PFA CONSULTING LIMITED					
SCALE AT A1 1:30		SCALE AT A3 1:60			
QUOTE NUMBER	1641	APR'l	P.W.	DATE	27-05-2022
JOB NO.	16103	CHK'd	P.W.	DATE	27-05-2022
DRAWING NUMBER	1641-16103-006	DR'n	N.K.	DATE	27-05-2022



- NOTES**
- DO NOT SCALE.
 - UNLESS OTHERWISE STATED ALL DIMENSIONS ARE IN MILLIMETRES AND ALL INVERTS IN METRES AOD.
 - ALL CIVIL WORKS IS THE RESPONSIBILITY OF THE DEVELOPER OR CONTRACTOR INCLUDING FIXING OF STEELWORK SUCH AS ACCESS COVERS AND PENSTOCKS ETC. INSTALLATION OF CABLE DUCTS, BENCHING AND MAKING GOOD AROUND PIPES AFTER INSTALLATION.
 - REINFORCING BARS ARE TO BE A MINIMUM OF 75MM BELOW THE SURFACE. ANY STRUCTURAL DETAILING / CIVIL WORKS SHOWN SHOWN ON THIS DRAWING ARE ILLUSTRATIVE ONLY UNLESS OTHERWISE STATED AND SHOULD NOT BE USED FOR CONSTRUCTION.
 - BENCHING IS TO BE FORMED AFTER PUMP INSTALLATION AND TO BE IN ACCORDANCE WITH THE APPLICABLE CONSTRUCTION DESIGN GUIDE AND ADOPTING AUTHORITY SPECIFICATION.
 - UNLESS OTHERWISE STATED, ALL DUCTS ARE TO BE Ø100MM AND BE COMPLETE WITH DRAW ROPES. SERVICE DUCTS TO BE TO THE UTILITY SUPPLIERS SPECIFICATION.
 - DUCT ROUTES ARE SHOWN DIAGRAMMATICALLY ONLY. ALL DUCTS LAID IN THE MOST DIRECT ROUTE TO SUIT THE SERVICE BEING CARRIED AVOIDING ANY ACUTE CHANGES OF DIRECTION.
 - LEVEL CONTROL POSITIONS ARE SHOWN DIAGRAMMATICALLY ONLY. THEY WILL BE POSITIONED AWAY FROM OBSTRUCTIONS AND BE READILY ADJUSTABLE AFTER INSTALLATION.

UNIT WILL ONLY BE INSTALLED IF
ISSUES WITH SEPTICITY OCCUR
DURING EARLY STAGES OF
DEVELOPMENT

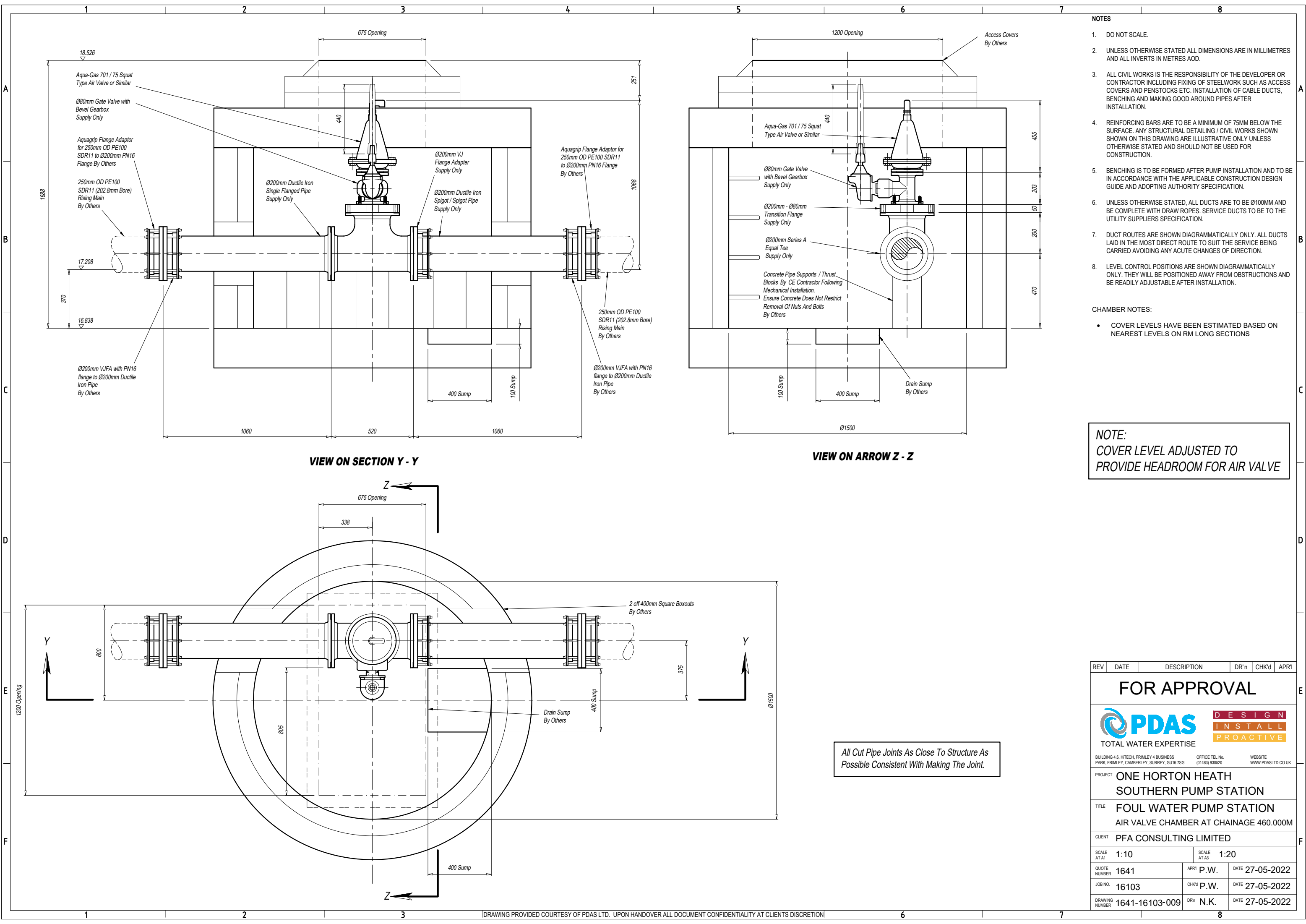
REV	DATE	DESCRIPTION	DR'n	CHK'd	APR'l
FOR APPROVAL					
 TOTAL WATER EXPERTISE			DESIGN INSTALL PROACTIVE		
BUILDING 4 & 5, HITECH, FRIMLEY 4 BUSINESS PARK, FRIMLEY, CAMBERLEY, SURREY, GU16 7SG			OFFICE TEL No. (01483) 930520		WEBSITE WWW.PDASLTD.CO.UK
PROJECT	ONE HORTON HEATH SOUTHERN PUMP STATION				
TITLE	FOUL WATER PUMP STATION CHEMICAL DOSING UNIT				
CLIENT	PFA CONSULTING LIMITED				
SCALE AT A1	1:10		SCALE AT A3	1:20	
QUOTE NUMBER	1641		APR'l	P.W.	DATE 27-05-2022
JOB NO.	16103		CHK'd	P.W.	DATE 27-05-2022
DRAWING NUMBER	1641-16103-007		DR'n	N.K.	DATE 27-05-2022



- NOTES**
- DO NOT SCALE.
 - UNLESS OTHERWISE STATED ALL DIMENSIONS ARE IN MILLIMETRES AND ALL INVERTS IN METRES AOD.
 - ALL CIVIL WORKS IS THE RESPONSIBILITY OF THE DEVELOPER OR CONTRACTOR INCLUDING FIXING OF STEELWORK SUCH AS ACCESS COVERS AND PENSTOCKS ETC. INSTALLATION OF CABLE DUCTS, BENCHING AND MAKING GOOD AROUND PIPES AFTER INSTALLATION.
 - REINFORCING BARS ARE TO BE A MINIMUM OF 75MM BELOW THE SURFACE. ANY STRUCTURAL DETAILING / CIVIL WORKS SHOWN SHOWN ON THIS DRAWING ARE ILLUSTRATIVE ONLY UNLESS OTHERWISE STATED AND SHOULD NOT BE USED FOR CONSTRUCTION.
 - BENCHING IS TO BE FORMED AFTER PUMP INSTALLATION AND TO BE IN ACCORDANCE WITH THE APPLICABLE CONSTRUCTION DESIGN GUIDE AND ADOPTING AUTHORITY SPECIFICATION.
 - UNLESS OTHERWISE STATED, ALL DUCTS ARE TO BE Ø100MM AND BE COMPLETE WITH DRAW ROPES. SERVICE DUCTS TO BE TO THE UTILITY SUPPLIERS SPECIFICATION.
 - DUCT ROUTES ARE SHOWN DIAGRAMMATICALLY ONLY. ALL DUCTS LAID IN THE MOST DIRECT ROUTE TO SUIT THE SERVICE BEING CARRIED AVOIDING ANY ACUTE CHANGES OF DIRECTION.
 - LEVEL CONTROL POSITIONS ARE SHOWN DIAGRAMMATICALLY ONLY. THEY WILL BE POSITIONED AWAY FROM OBSTRUCTIONS AND BE READILY ADJUSTABLE AFTER INSTALLATION.

- CHAMBER NOTES:**
- COVER LEVELS HAVE BEEN ESTIMATED BASED ON NEAREST LEVELS ON RM LONG SECTIONS

REV	DATE	DESCRIPTION	DR'n	CHK'd	APR'l
FOR APPROVAL					
 DESIGN INSTALL PROACTIVE					
TOTAL WATER EXPERTISE					
BUILDING 4 & 6, HITECH, FRIMLEY 4 BUSINESS PARK, FRIMLEY, CAMBERLEY, SURREY, GU16 7SG OFFICE TEL No. (01483) 930520 WEBSITE WWW.PDASLTD.CO.UK					
PROJECT ONE HORTON HEATH SOUTHERN PUMP STATION					
TITLE FOUL WATER PUMP STATION WASHOUT CHAMBER AT CHAINAGE 429.000M					
CLIENT PFA CONSULTING LIMITED					
SCALE AT A1 1:10		SCALE AT A3 1:20			
QUOTE NUMBER	1641	APR'l	P.W.	DATE	27-05-2022
JOB NO.	16103	CHK'd	P.W.	DATE	27-05-2022
DRAWING NUMBER	1641-16103-008	DR'n	N.K.	DATE	27-05-2022

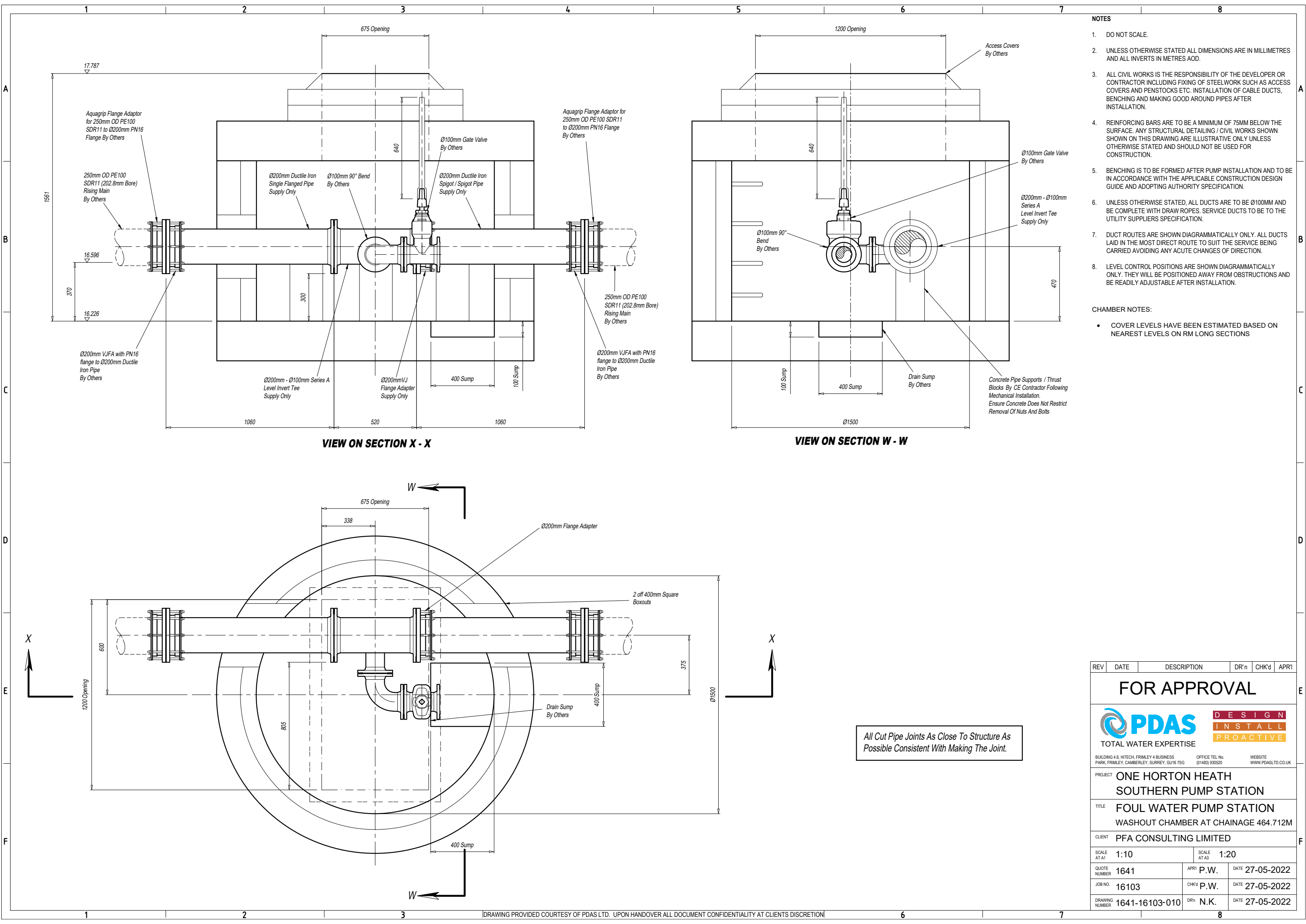


- NOTES**
- DO NOT SCALE.
 - UNLESS OTHERWISE STATED ALL DIMENSIONS ARE IN MILLIMETRES AND ALL INVERTS IN METRES AOD.
 - ALL CIVIL WORKS IS THE RESPONSIBILITY OF THE DEVELOPER OR CONTRACTOR INCLUDING FIXING OF STEELWORK SUCH AS ACCESS COVERS AND PENSTOCKS ETC. INSTALLATION OF CABLE DUCTS, BENCHING AND MAKING GOOD AROUND PIPES AFTER INSTALLATION.
 - REINFORCING BARS ARE TO BE A MINIMUM OF 75MM BELOW THE SURFACE. ANY STRUCTURAL DETAILING / CIVIL WORKS SHOWN SHOWN ON THIS DRAWING ARE ILLUSTRATIVE ONLY UNLESS OTHERWISE STATED AND SHOULD NOT BE USED FOR CONSTRUCTION.
 - BENCHING IS TO BE FORMED AFTER PUMP INSTALLATION AND TO BE IN ACCORDANCE WITH THE APPLICABLE CONSTRUCTION DESIGN GUIDE AND ADOPTING AUTHORITY SPECIFICATION.
 - UNLESS OTHERWISE STATED, ALL DUCTS ARE TO BE Ø100MM AND BE COMPLETE WITH DRAW ROPES. SERVICE DUCTS TO BE TO THE UTILITY SUPPLIERS SPECIFICATION.
 - DUCT ROUTES ARE SHOWN DIAGRAMMATICALLY ONLY. ALL DUCTS LAID IN THE MOST DIRECT ROUTE TO SUIT THE SERVICE BEING CARRIED AVOIDING ANY ACUTE CHANGES OF DIRECTION.
 - LEVEL CONTROL POSITIONS ARE SHOWN DIAGRAMMATICALLY ONLY. THEY WILL BE POSITIONED AWAY FROM OBSTRUCTIONS AND BE READILY ADJUSTABLE AFTER INSTALLATION.

- CHAMBER NOTES:**
- COVER LEVELS HAVE BEEN ESTIMATED BASED ON NEAREST LEVELS ON RM LONG SECTIONS

NOTE:
COVER LEVEL ADJUSTED TO
PROVIDE HEADROOM FOR AIR VALVE

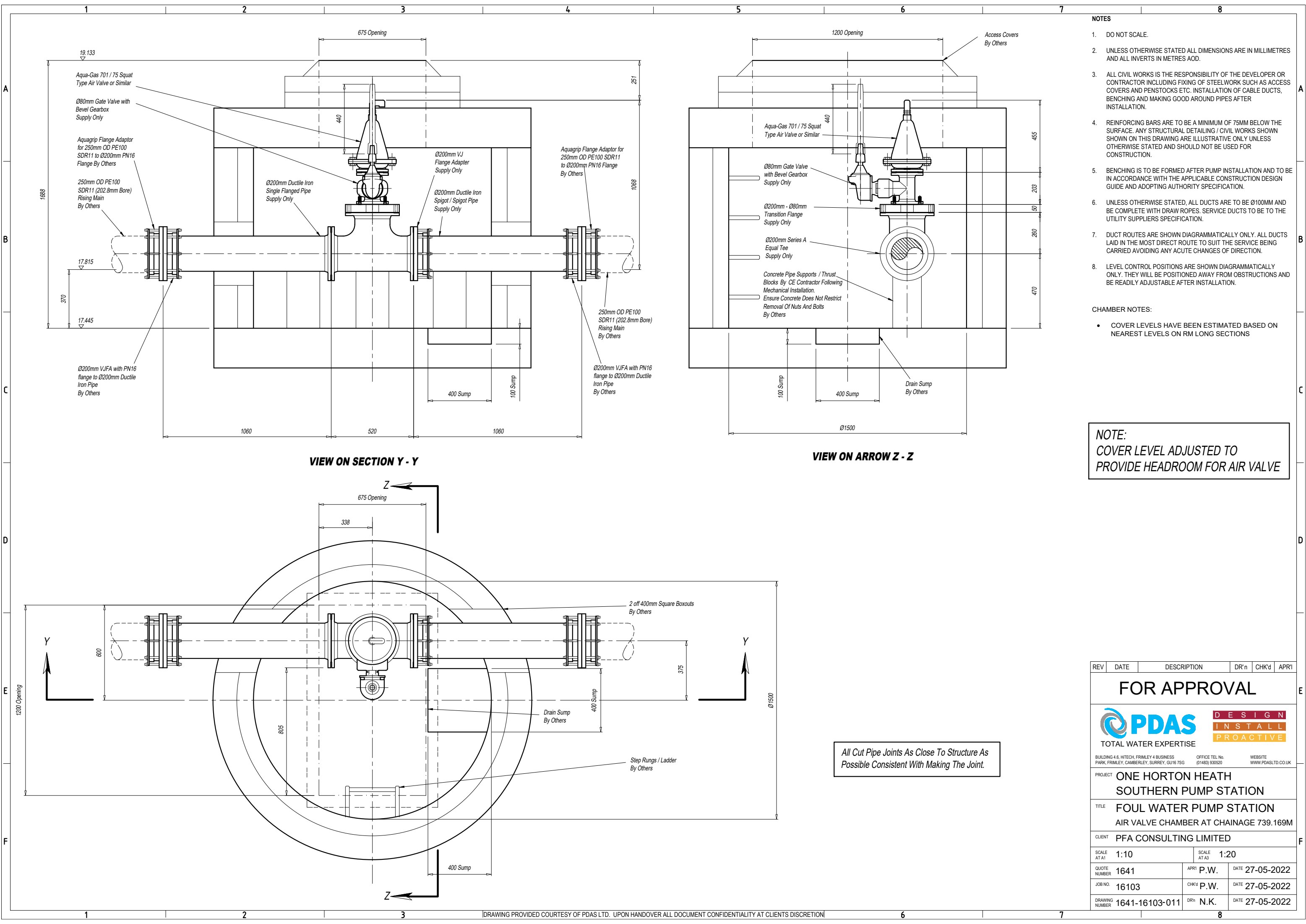
REV	DATE	DESCRIPTION	DR'n	CHK'd	APR
FOR APPROVAL					
			DESIGN INSTALL PROACTIVE		
TOTAL WATER EXPERTISE					
BUILDING 4 & 6, HITECH, FRIMLEY 4 BUSINESS PARK, FRIMLEY, CAMBERLEY, SURREY, GU16 7SG			OFFICE TEL No. (01483) 930520		WEBSITE WWW.PDASLTD.CO.UK
PROJECT	ONE HORTON HEATH SOUTHERN PUMP STATION				
TITLE	FOUL WATER PUMP STATION AIR VALVE CHAMBER AT CHAINAGE 460.000M				
CLIENT	PFA CONSULTING LIMITED				
SCALE AT A1	1:10		SCALE AT A3	1:20	
QUOTE NUMBER	1641		APR1	P.W.	DATE 27-05-2022
JOB NO.	16103		CHK'd	P.W.	DATE 27-05-2022
DRAWING NUMBER	1641-16103-009		DR'n	N.K.	DATE 27-05-2022



- NOTES**
- DO NOT SCALE.
 - UNLESS OTHERWISE STATED ALL DIMENSIONS ARE IN MILLIMETRES AND ALL INVERTS IN METRES AOD.
 - ALL CIVIL WORKS IS THE RESPONSIBILITY OF THE DEVELOPER OR CONTRACTOR INCLUDING FIXING OF STEELWORK SUCH AS ACCESS COVERS AND PENSTOCKS ETC. INSTALLATION OF CABLE DUCTS, BENCHING AND MAKING GOOD AROUND PIPES AFTER INSTALLATION.
 - REINFORCING BARS ARE TO BE A MINIMUM OF 75MM BELOW THE SURFACE. ANY STRUCTURAL DETAILING / CIVIL WORKS SHOWN SHOWN ON THIS DRAWING ARE ILLUSTRATIVE ONLY UNLESS OTHERWISE STATED AND SHOULD NOT BE USED FOR CONSTRUCTION.
 - BENCHING IS TO BE FORMED AFTER PUMP INSTALLATION AND TO BE IN ACCORDANCE WITH THE APPLICABLE CONSTRUCTION DESIGN GUIDE AND ADOPTING AUTHORITY SPECIFICATION.
 - UNLESS OTHERWISE STATED, ALL DUCTS ARE TO BE Ø100MM AND BE COMPLETE WITH DRAW ROPES. SERVICE DUCTS TO BE TO THE UTILITY SUPPLIERS SPECIFICATION.
 - DUCT ROUTES ARE SHOWN DIAGRAMMATICALLY ONLY. ALL DUCTS LAID IN THE MOST DIRECT ROUTE TO SUIT THE SERVICE BEING CARRIED AVOIDING ANY ACUTE CHANGES OF DIRECTION.
 - LEVEL CONTROL POSITIONS ARE SHOWN DIAGRAMMATICALLY ONLY. THEY WILL BE POSITIONED AWAY FROM OBSTRUCTIONS AND BE READILY ADJUSTABLE AFTER INSTALLATION.

- CHAMBER NOTES:**
- COVER LEVELS HAVE BEEN ESTIMATED BASED ON NEAREST LEVELS ON RM LONG SECTIONS

REV	DATE	DESCRIPTION	DR'n	CHK'd	APR'l
FOR APPROVAL					
 DESIGN INSTALL PROACTIVE					
TOTAL WATER EXPERTISE					
BUILDING 4 & 6, HITECH, FRIMLEY 4 BUSINESS PARK, FRIMLEY, CAMBERLEY, SURREY, GU16 7SG OFFICE TEL No. (01483) 930520 WEBSITE WWW.PDASLTD.CO.UK					
PROJECT ONE HORTON HEATH SOUTHERN PUMP STATION					
TITLE FOUL WATER PUMP STATION WASHOUT CHAMBER AT CHAINAGE 464.712M					
CLIENT PFA CONSULTING LIMITED					
SCALE AT A1	1:10		SCALE AT A3	1:20	
QUOTE NUMBER	1641	APR'l	P.W.	DATE	27-05-2022
JOB NO.	16103	CHK'd	P.W.	DATE	27-05-2022
DRAWING NUMBER	1641-16103-010	DR'n	N.K.	DATE	27-05-2022



- NOTES**
- DO NOT SCALE.
 - UNLESS OTHERWISE STATED ALL DIMENSIONS ARE IN MILLIMETRES AND ALL INVERTS IN METRES AOD.
 - ALL CIVIL WORKS IS THE RESPONSIBILITY OF THE DEVELOPER OR CONTRACTOR INCLUDING FIXING OF STEELWORK SUCH AS ACCESS COVERS AND PENSTOCKS ETC. INSTALLATION OF CABLE DUCTS, BENCHING AND MAKING GOOD AROUND PIPES AFTER INSTALLATION.
 - REINFORCING BARS ARE TO BE A MINIMUM OF 75MM BELOW THE SURFACE. ANY STRUCTURAL DETAILING / CIVIL WORKS SHOWN SHOWN ON THIS DRAWING ARE ILLUSTRATIVE ONLY UNLESS OTHERWISE STATED AND SHOULD NOT BE USED FOR CONSTRUCTION.
 - BENCHING IS TO BE FORMED AFTER PUMP INSTALLATION AND TO BE IN ACCORDANCE WITH THE APPLICABLE CONSTRUCTION DESIGN GUIDE AND ADOPTING AUTHORITY SPECIFICATION.
 - UNLESS OTHERWISE STATED, ALL DUCTS ARE TO BE Ø100MM AND BE COMPLETE WITH DRAW ROPES. SERVICE DUCTS TO BE TO THE UTILITY SUPPLIERS SPECIFICATION.
 - DUCT ROUTES ARE SHOWN DIAGRAMMATICALLY ONLY. ALL DUCTS LAID IN THE MOST DIRECT ROUTE TO SUIT THE SERVICE BEING CARRIED AVOIDING ANY ACUTE CHANGES OF DIRECTION.
 - LEVEL CONTROL POSITIONS ARE SHOWN DIAGRAMMATICALLY ONLY. THEY WILL BE POSITIONED AWAY FROM OBSTRUCTIONS AND BE READILY ADJUSTABLE AFTER INSTALLATION.

- CHAMBER NOTES:**
- COVER LEVELS HAVE BEEN ESTIMATED BASED ON NEAREST LEVELS ON RM LONG SECTIONS

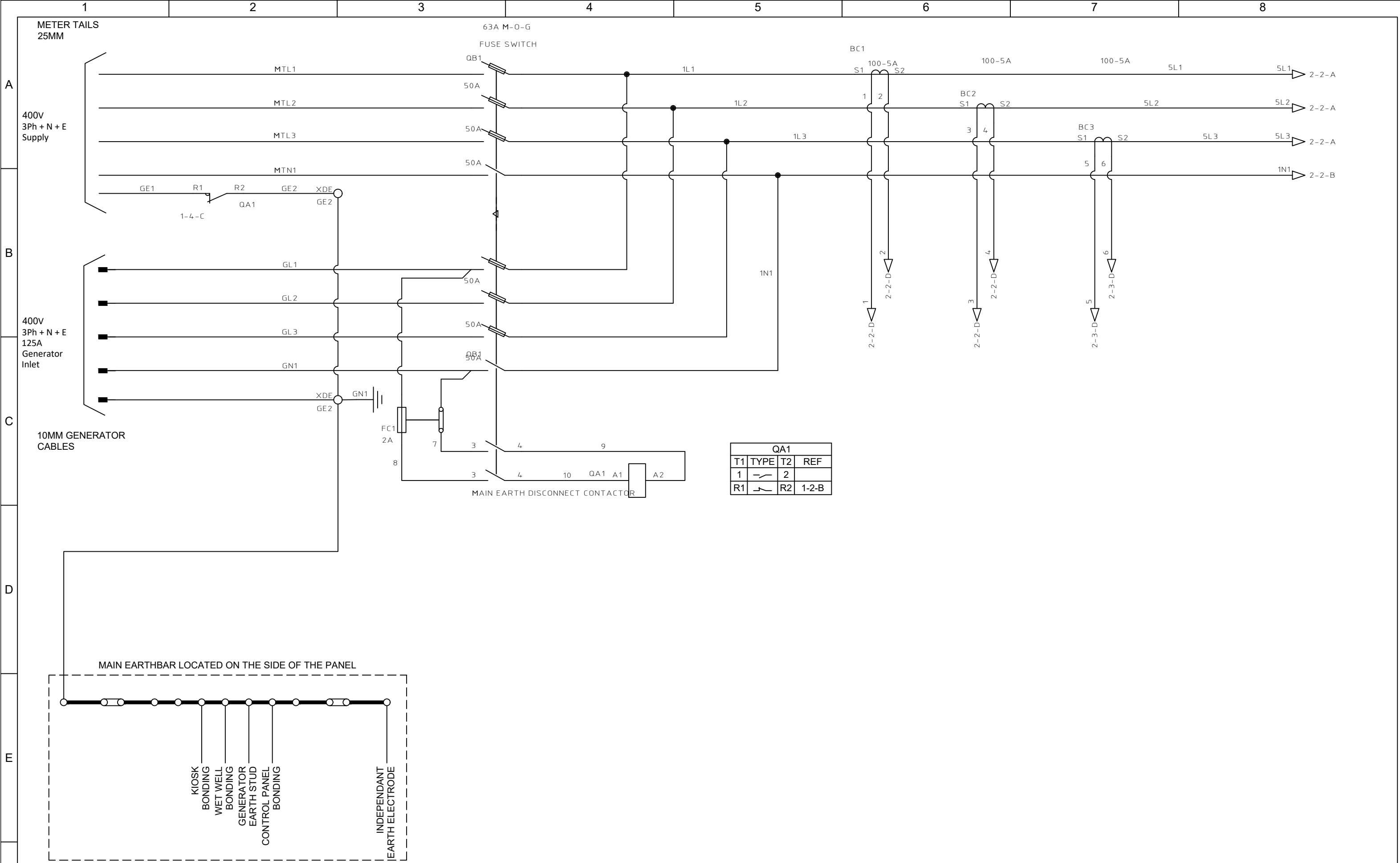
NOTE:
COVER LEVEL ADJUSTED TO
PROVIDE HEADROOM FOR AIR VALVE

REV	DATE	DESCRIPTION	DR'n	CHK'd	APR'l
FOR APPROVAL					
			DESIGN INSTALL PROACTIVE		
TOTAL WATER EXPERTISE					
BUILDING 4 & 6, HITECH, FRIMLEY 4 BUSINESS PARK, FRIMLEY, CAMBERLEY, SURREY, GU16 7SG			OFFICE TEL No. (01483) 930520		WEBSITE WWW.PDASLTD.CO.UK
PROJECT	ONE HORTON HEATH SOUTHERN PUMP STATION				
TITLE	FOUL WATER PUMP STATION AIR VALVE CHAMBER AT CHAINAGE 739.169M				
CLIENT	PFA CONSULTING LIMITED				
SCALE AT A1	1:10		SCALE AT A3	1:20	
QUOTE NUMBER	1641	APR'l	P.W.	DATE	27-05-2022
JOB NO.	16103	CHK'd	P.W.	DATE	27-05-2022
DRAWING NUMBER	1641-16103-011	DR'n	N.K.	DATE	27-05-2022

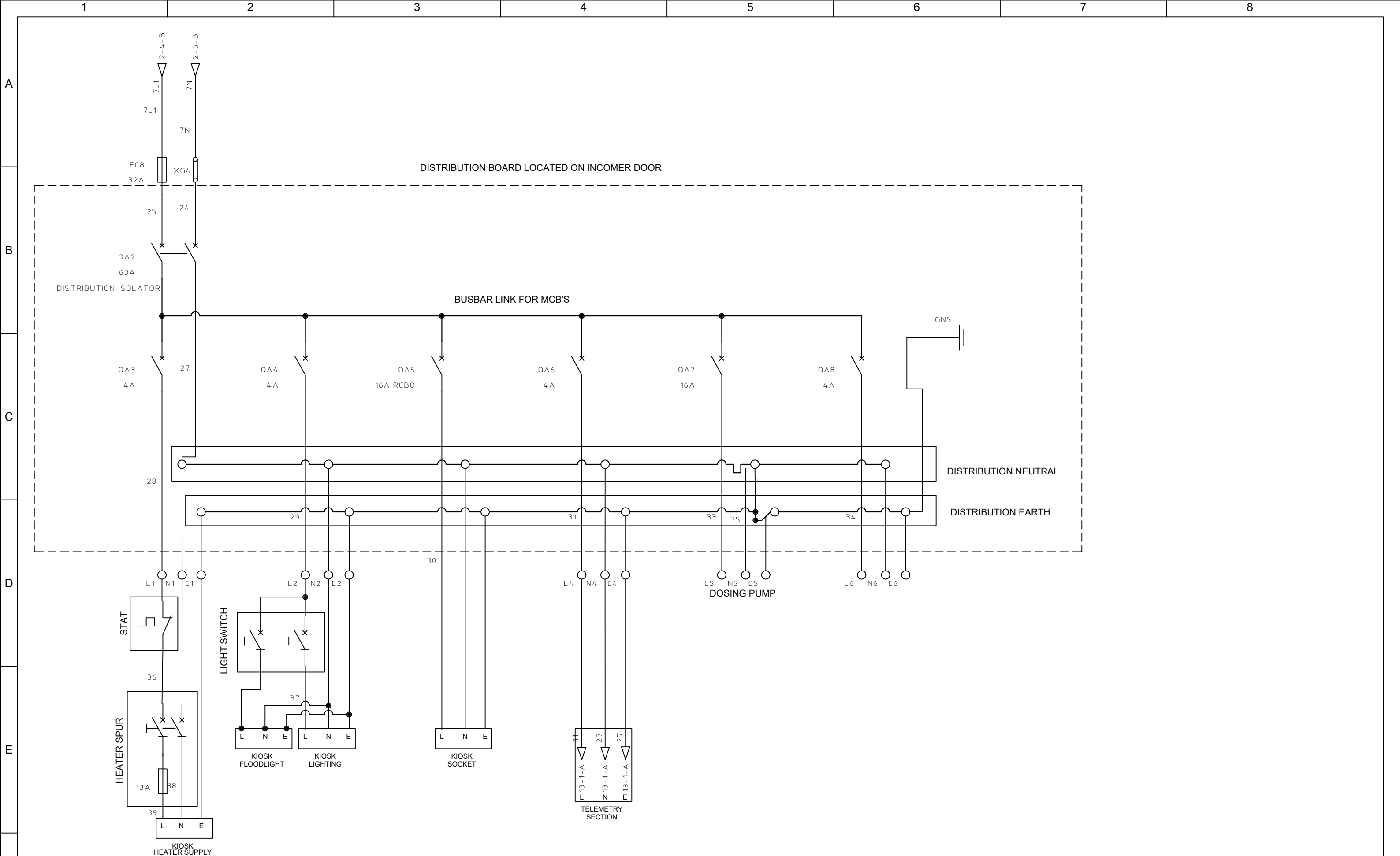
Appendix H
Structural Design
(To Follow)

Appendix I

Wiring Diagrams

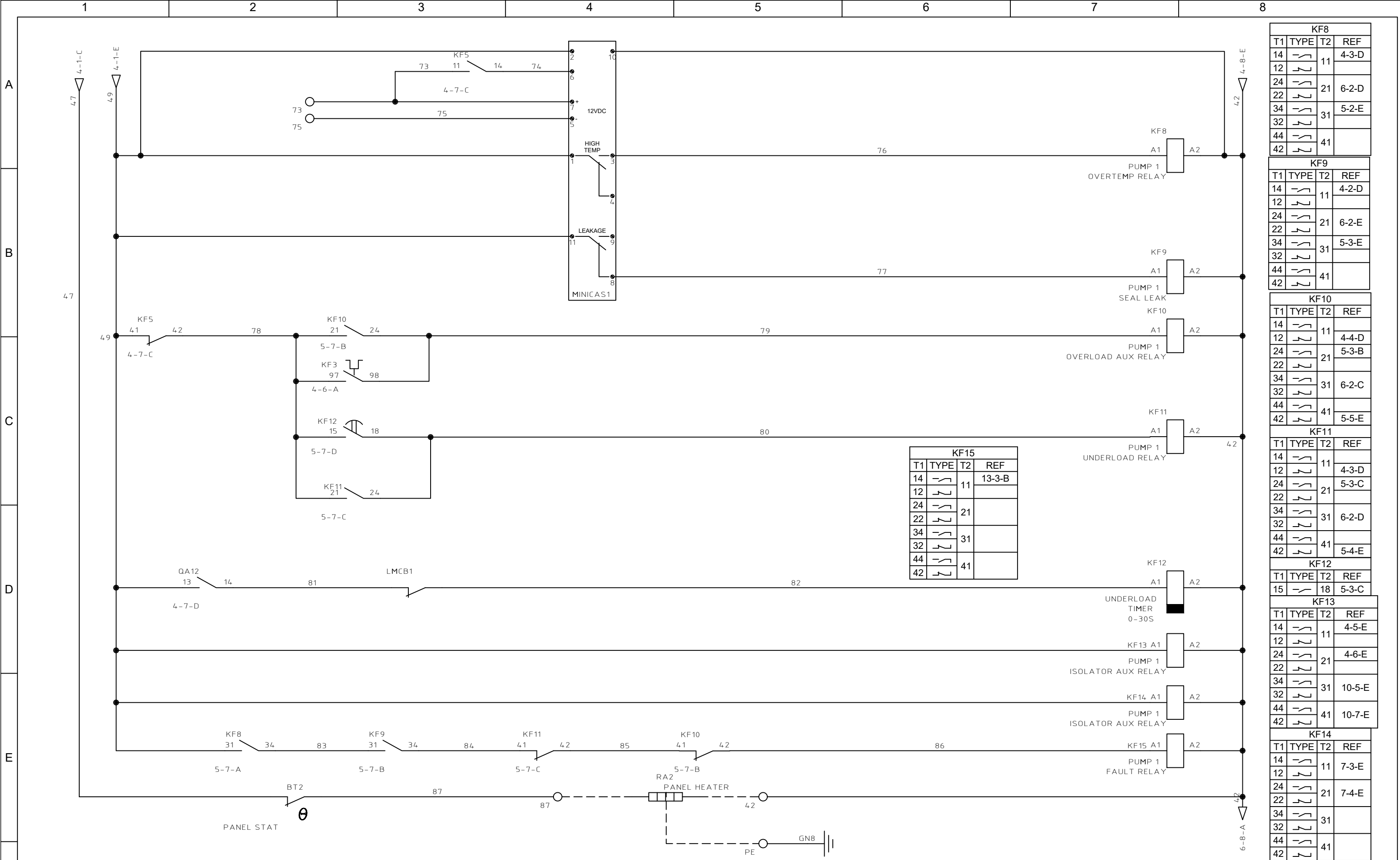


F					Client Name PFA CONSULTING LIMITED		 total control panel solutions gemini control systems ltd designers and manufacturers	 APPROVED CONTRACTOR GEMINI CONTROL SYSTEMS LTD TEL: 0808 196 8770 FAX: 01782 659 465 WWW.GEMINI-CONTROLS.COM	 interface ISO 9001 CERTIFICATION	 UKAS	 PDAS TOTAL WATER EXPERTISE		
					Title DCG V2 + SW LOCAL PRACTICES DUAL ASD CONTROL PANEL INCOMER SECTION								
	B	Kiosk Changed to 2500mm	30/05/22	JS	JS	Drawn By JS							Project Code PR16103
	A	First Issue	24/05/22	JS	JS								
	Rev	Description	Date	Drn	Apprv	Drawing No PR16103							
								Site ONE HORTON HEATH, SOUTHERN PUMPING STATION	This document may not, without our permission, be copied, shown or handed out to competitors or any other unauthorised persons Copyright Protected			1 of 20	

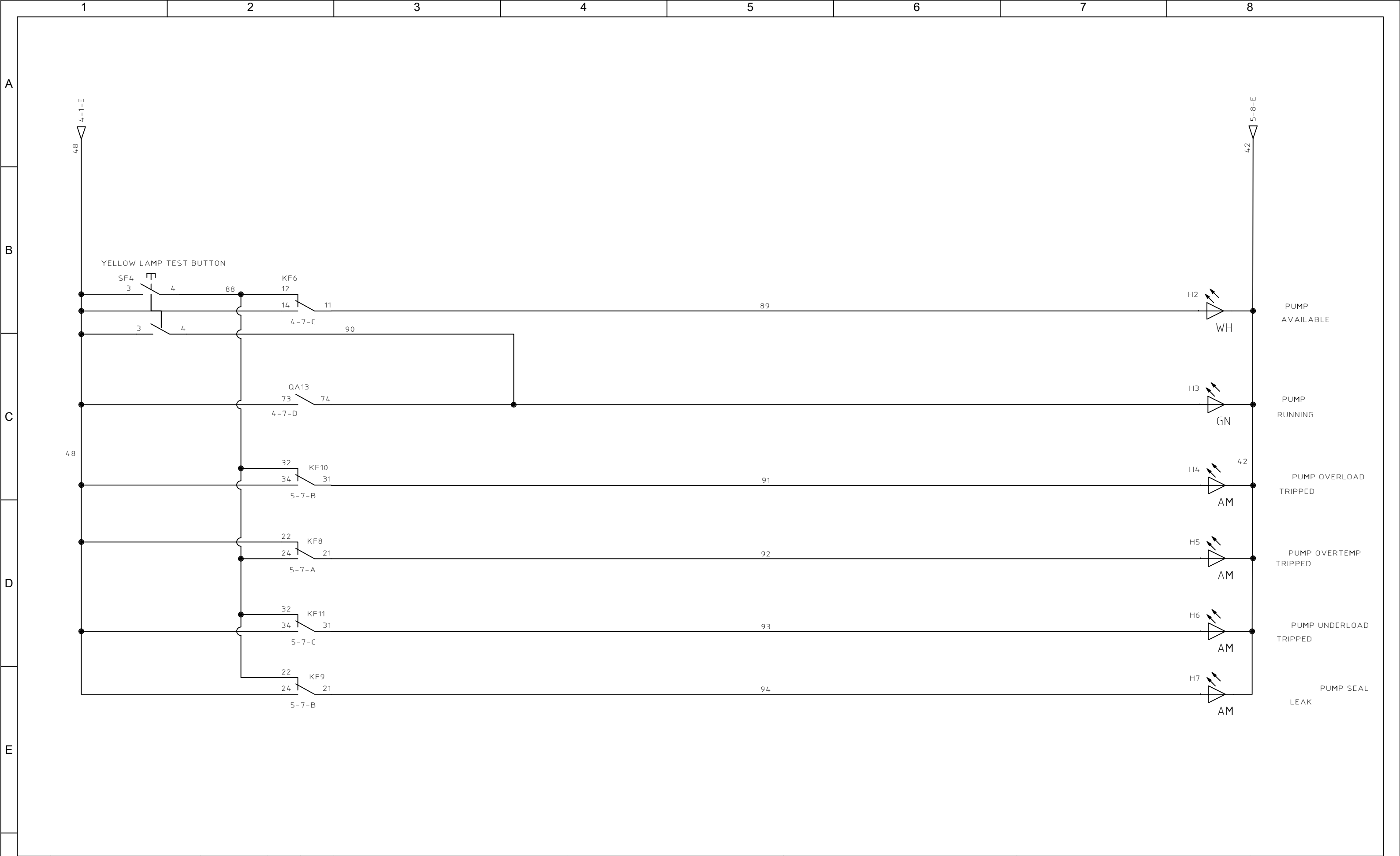


F					Client Name PFA CONSULTING LIMITED					
					Title DCG V2 + SW LOCAL PRACTICES DUAL ASD CONTROL PANEL DISTRIBUTION SECTION					
	B	Kiosk Changed to 2500mm	30/05/22	JS	JS	Drawn By JS			Project Code PR16103	
	A	First Issue	24/05/22	JS	JS					
	Rev	Description	Date	Drn	Apprv	Drawing No PR16103				
									Site ONE HORTON HEATH, SOUTHERN PUMPING STATION	
									This document may not, without our permission, be copied, shown or handed out to competitors or any other unauthorised persons Copyright Protected	
							3 of 20			

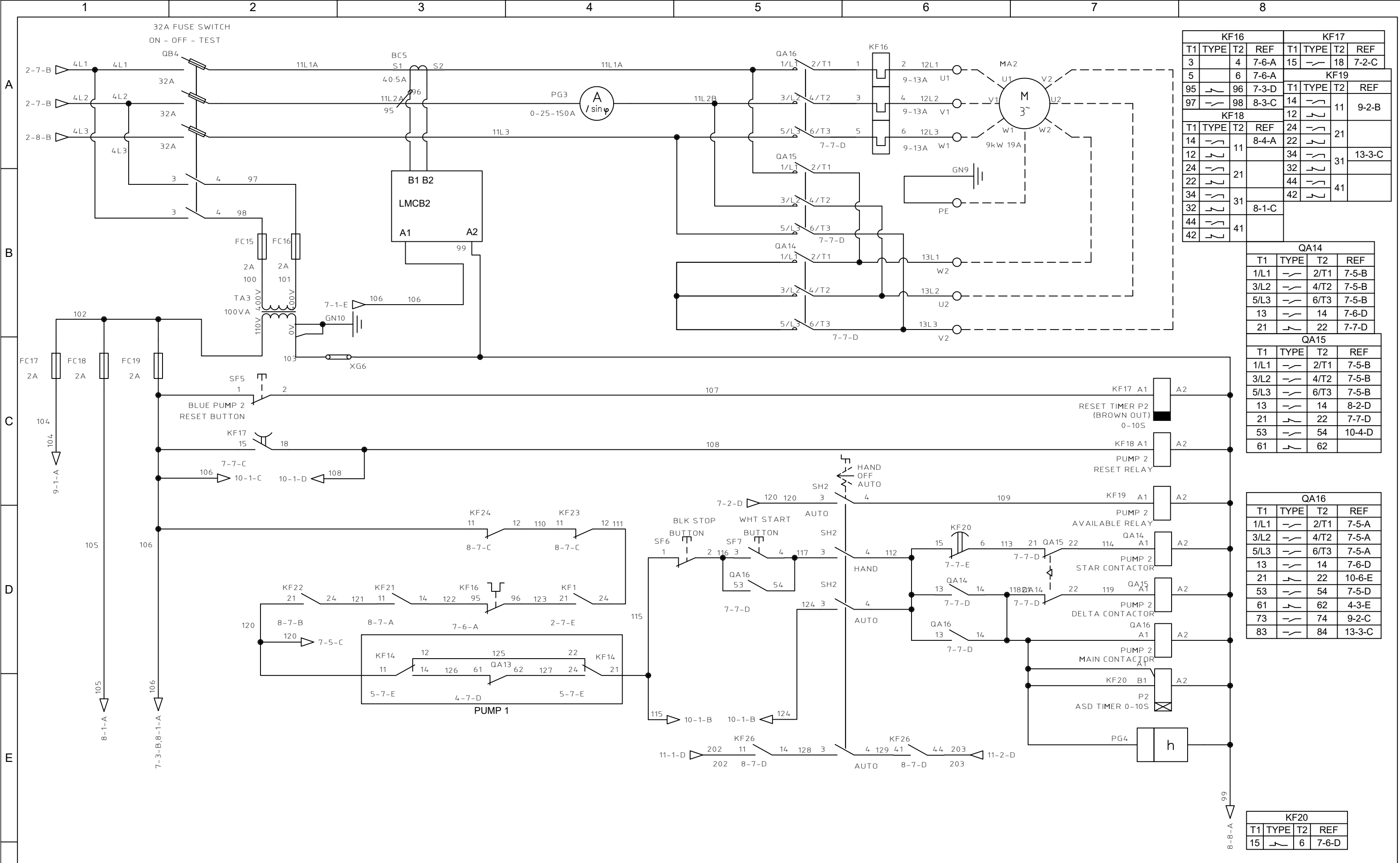


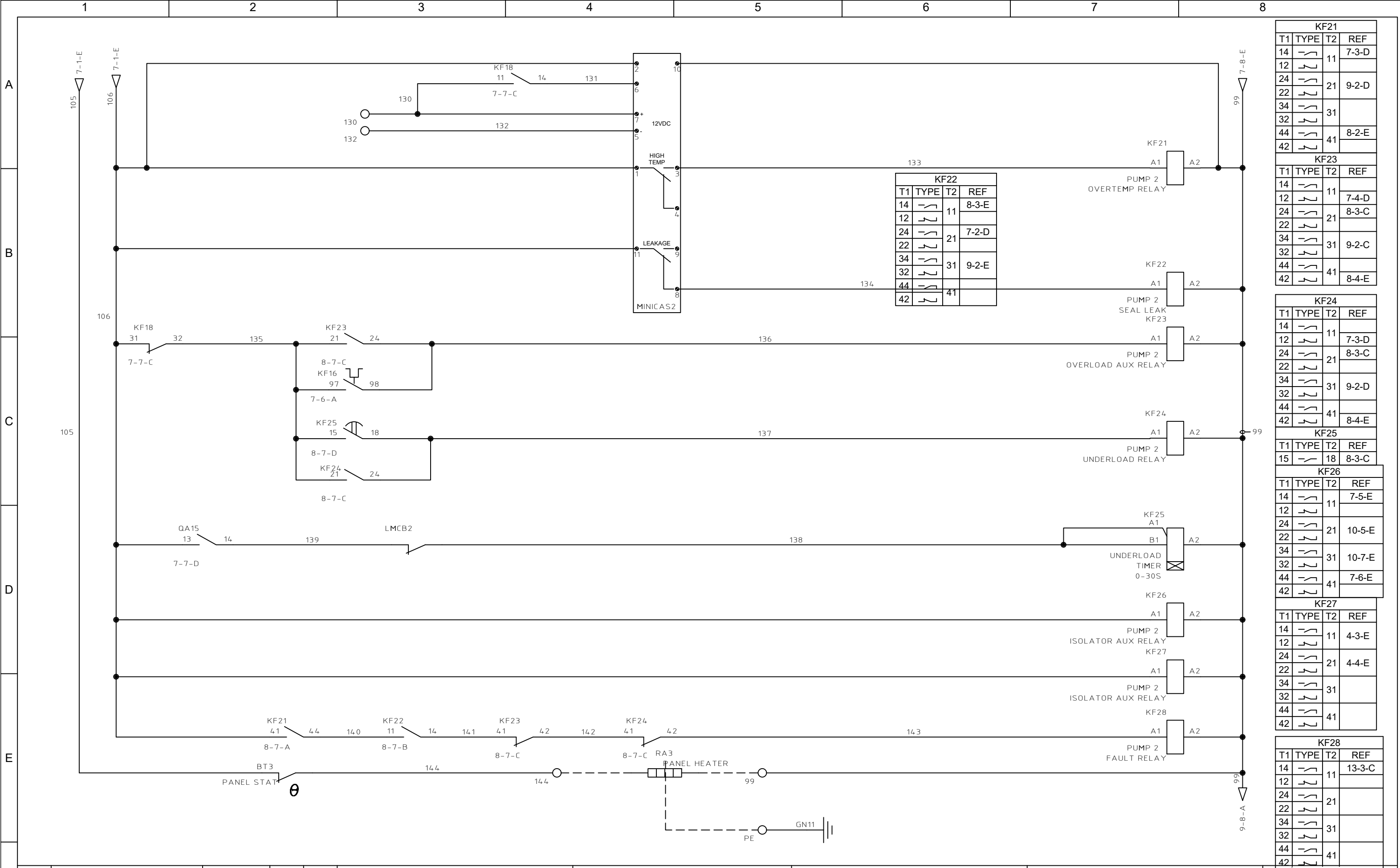


F						Client Name PFA CONSULTING LIMITED		 gemini control systems ltd designers and manufacturers	 GEMINI CONTROL SYSTEMS LTD TEL: 0808 196 8770 FAX: 01782 659 465 WWW.GEMINI-CONTROLS.COM	 GEMINI CONTROL SYSTEMS LTD TEL: 0808 196 8770 FAX: 01782 659 465 WWW.GEMINI-CONTROLS.COM			
						Title DCG V2 + SW LOCAL PRACTICES DUAL ASD CONTROL PANEL PUMP 1 STARTER							
	B	Kiosk Changed to 2500mm	30/05/22	JS	JS	Drawn By JS	Project Code PR16103	Site ONE HORTON HEATH, SOUTHERN PUMPING STATION	This document may not, without our permission, be copied, shown or handed out to competitors or any other unauthorised persons Copyright Protected	Sheet No 5 of 20			
	A	First Issue	24/05/22	JS	JS								
Rev	Description	Date	Drn	Apprv	Drawing No PR16103								

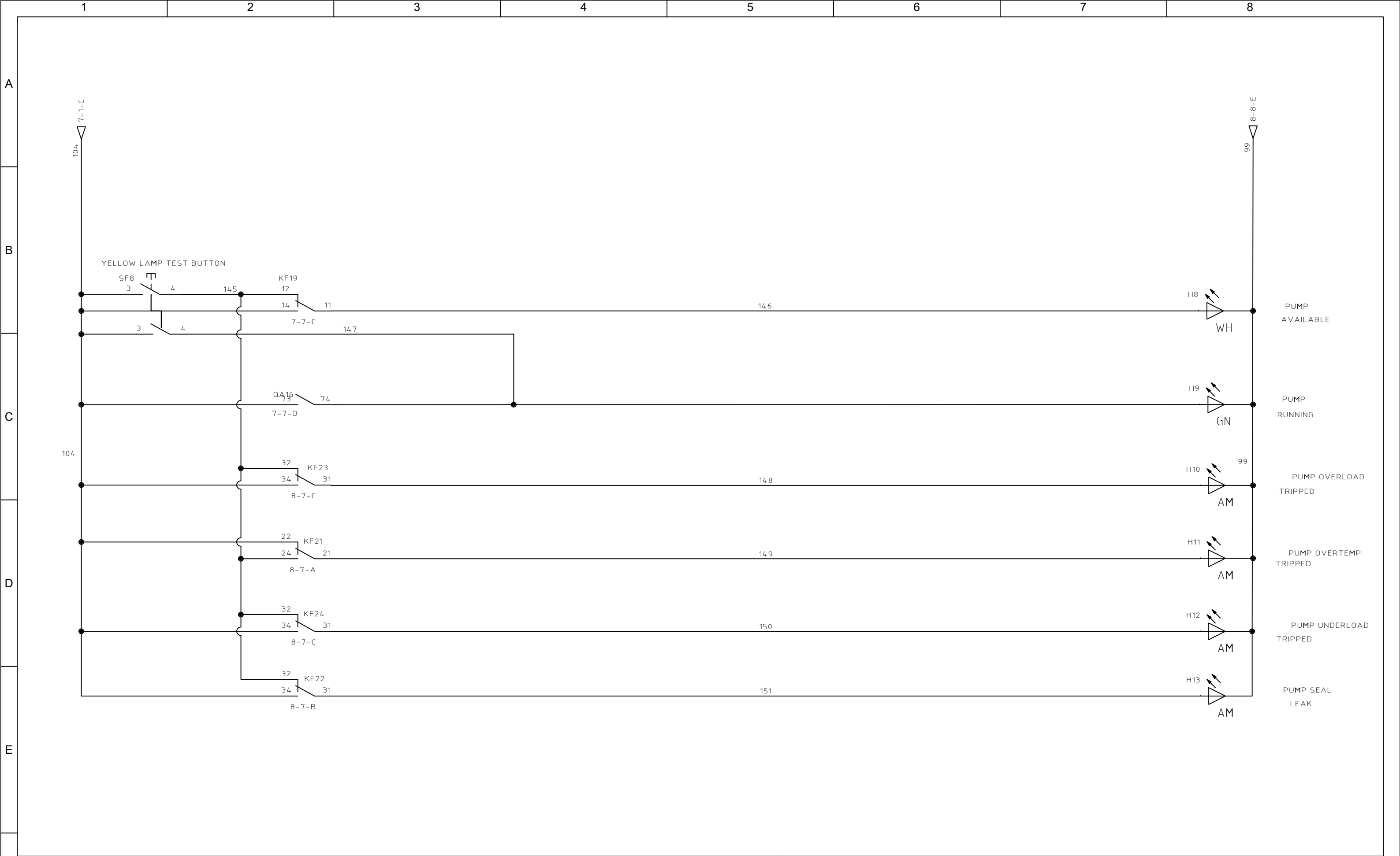


F						Client Name PFA CONSULTING LIMITED			   GEMINI CONTROL SYSTEMS LTD TEL: 0808 196 8770 FAX: 01782 659 465 WWW.GEMINI-CONTROLS.COM			
						Title DCG V2 + SW LOCAL PRACTICES DUAL ASD CONTROL PANEL PUMP 1 STARTER						
	B	Kiosk Changed to 2500mm	30/05/22	JS	JS	Drawn By JS	Project Code PR16103					
	A	First Issue	24/05/22	JS	JS							
	Rev	Description	Date	Drn	Apprv	Drawing No PR16103		Site ONE HORTON HEATH, SOUTHERN PUMPING STATION	This document may not, without our permission, be copied, shown or handed out to competitors or any other unauthorised persons Copyright Protected	6	of	20

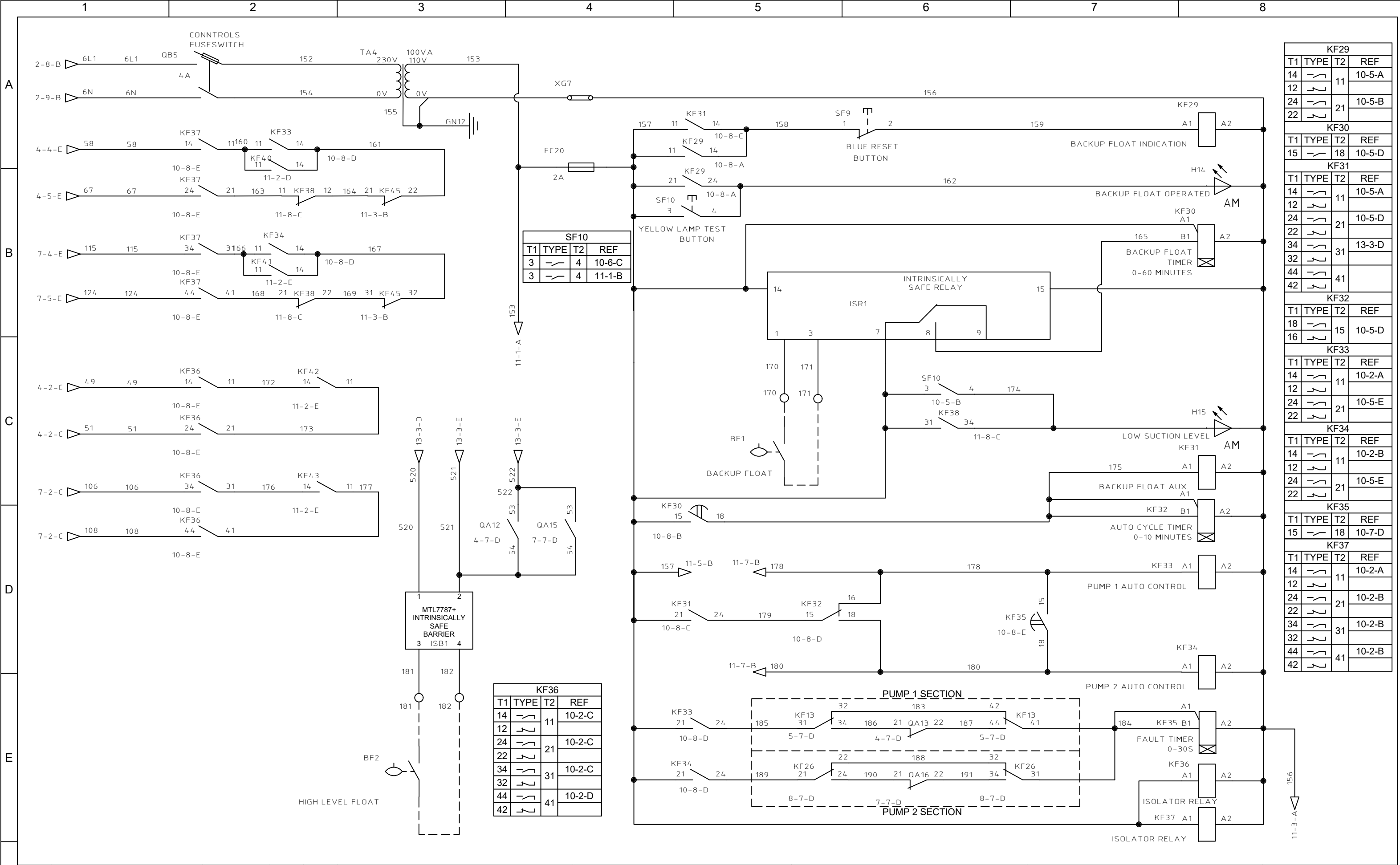


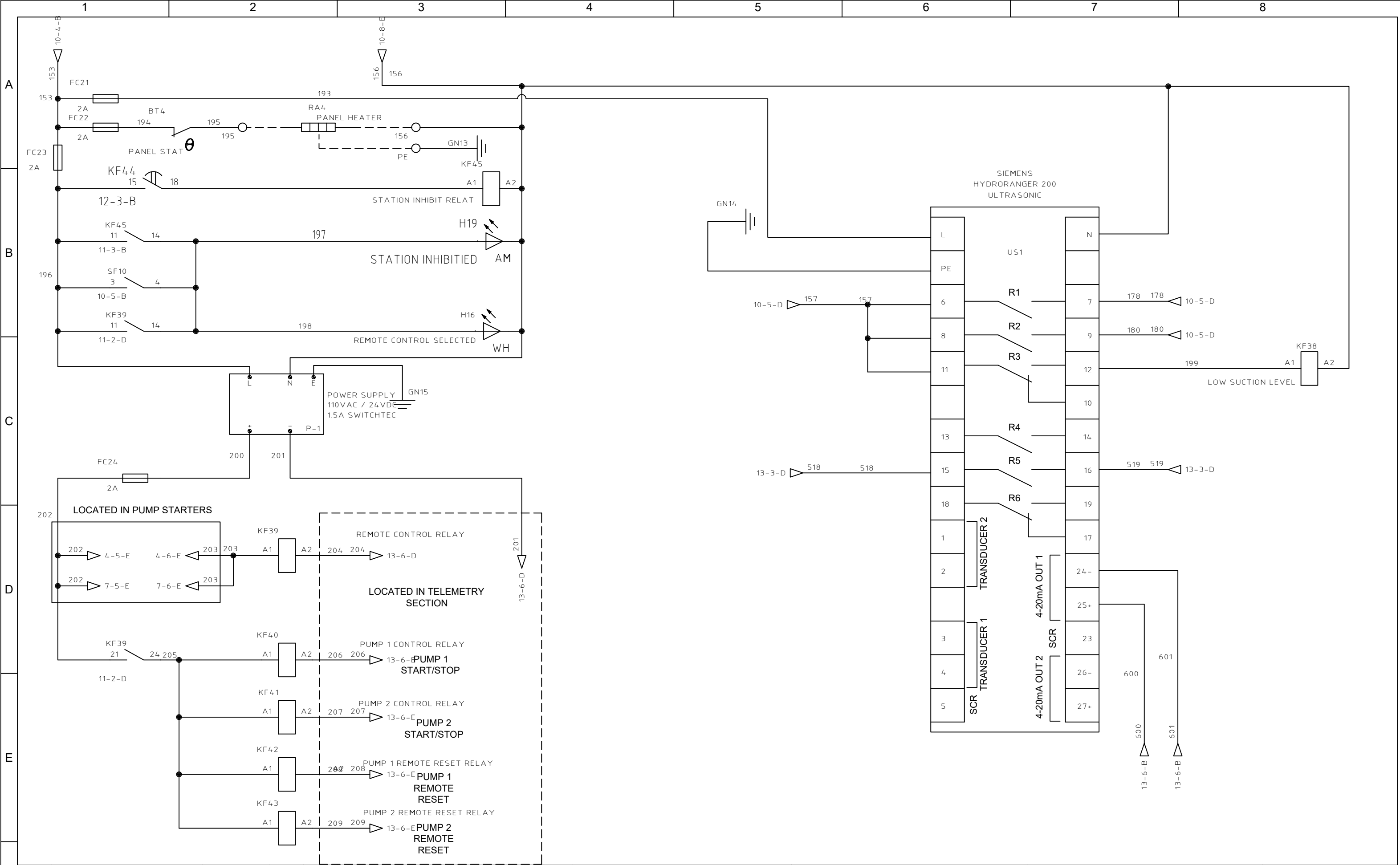


F						Client Name PFA CONSULTING LIMITED		 gemini control systems ltd designers and manufacturers	 APPROVED CONTRACTOR GEMINI CONTROL SYSTEMS LTD TEL: 0808 196 8770 FAX: 01782 659 465 WWW.GEMINI-CONTROLS.COM	 interface ISO 9001 CERTIFICATION	 UKAS	 TOTAL WATER EXPERTISE This document may not, without our permission, be copied, shown or handed out to competitors or any other unauthorised persons Copyright Protected	
						Title DCG V2 + SW LOCAL PRACTICES DUAL ASD CONTROL PANEL PUMP 2 STARTER							
	B	Kiosk Changed to 2500mm	30/05/22	JS	JS	Drawn By JS	Project Code PR16103						
	A	First Issue	24/05/22	JS	JS								
	Rev	Description	Date	Drn	Apprv	Drawing No PR16103							
								Site ONE HORTON HEATH, SOUTHERN PUMPING STATION	8 of 20				

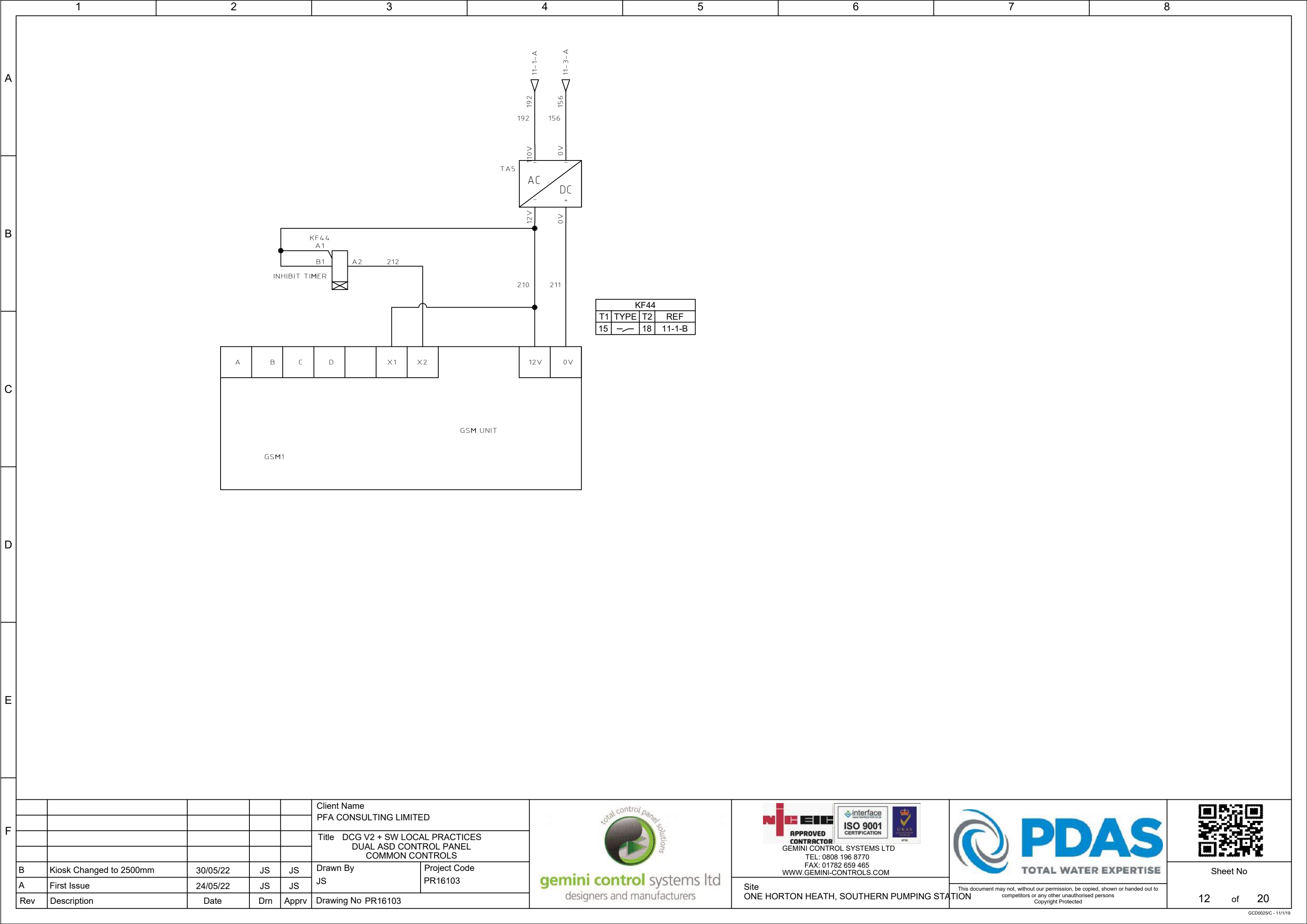


F						Client Name PFA CONSULTING LIMITED			   GEMINI CONTROL SYSTEMS LTD TEL: 0808 196 8770 FAX: 01782 659 465 WWW.GEMINI-CONTROLS.COM		
						Title DCG V2 + SW LOCAL PRACTICES DUAL ASD CONTROL PANEL PUMP 2 STARTER					
	B	Kiosk Changed to 2500mm	30/05/22	JS	JS	Drawn By JS	Project Code PR16103				
	A	First Issue	24/05/22	JS	JS						
	Rev	Description	Date	Drn	Apprv	Drawing No PR16103		Site ONE HORTON HEATH, SOUTHERN PUMPING STATION	This document may not, without our permission, be copied, shown or handed out to competitors or any other unauthorised persons Copyright Protected	9 of 20	





F						Client Name PFA CONSULTING LIMITED			 APPROVED CONTRACTOR GEMINI CONTROL SYSTEMS LTD TEL: 0808 196 8770 FAX: 01782 659 465 WWW.GEMINI-CONTROLS.COM	 interface ISO 9001 CERTIFICATION	 UKAS	 PDAS TOTAL WATER EXPERTISE		
						Title DCG V2 + SW LOCAL PRACTICES DUAL ASD CONTROL PANEL COMMON CONTROLS								
	B	Kiosk Changed to 2500mm	30/05/22	JS	JS	Drawn By JS	Project Code PR16103							
	A	First Issue	24/05/22	JS	JS									
	Rev	Description	Date	Drn	Apprv	Drawing No PR16103								
									Site ONE HORTON HEATH, SOUTHERN PUMPING STATION	This document may not, without our permission, be copied, shown or handed out to competitors or any other unauthorised persons Copyright Protected				Sheet No 11 of 20



					Client Name PFA CONSULTING LIMITED	
					Title DCG V2 + SW LOCAL PRACTICES DUAL ASD CONTROL PANEL COMMON CONTROLS	
B	Kiosk Changed to 2500mm	30/05/22	JS	JS	Drawn By JS	Project Code PR16103
A	First Issue	24/05/22	JS	JS		
Rev	Description	Date	Drn	Apprv	Drawing No PR16103	



gemini control systems ltd
designers and manufacturers



GEMINI CONTROL SYSTEMS LTD
TEL: 0808 196 8770
FAX: 01782 659 465
WWW.GEMINI-CONTROLS.COM

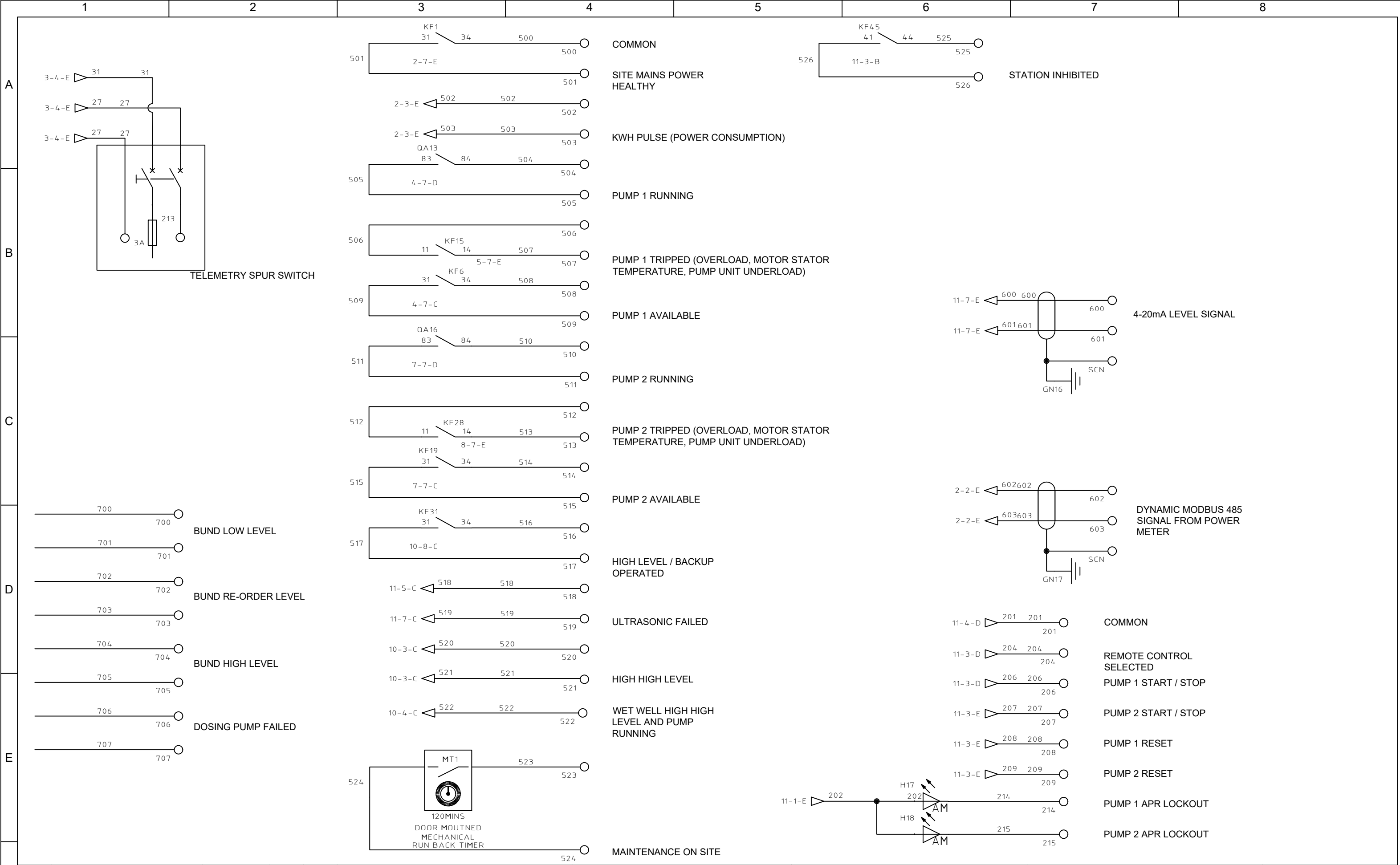
Site
ONE HORTON HEATH, SOUTHERN PUMPING STATION



This document may not, without our permission, be copied, shown or handed out to competitors or any other unauthorised persons
Copyright Protected



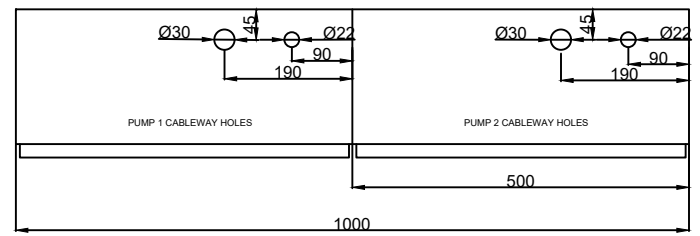
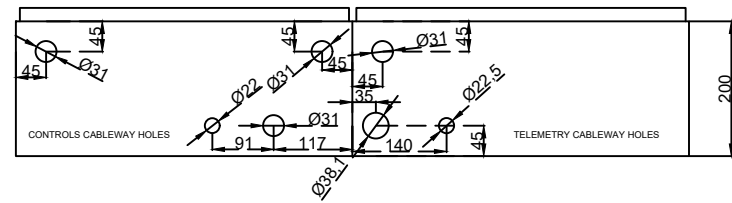
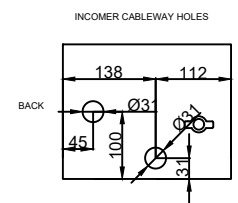
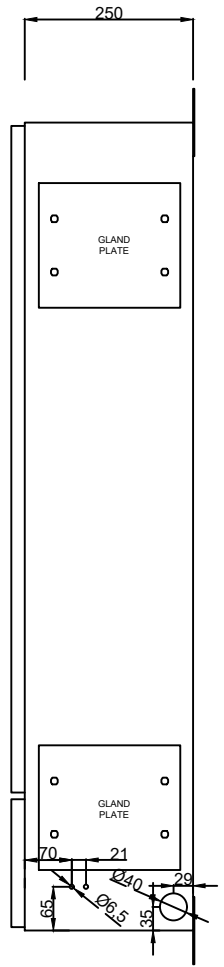
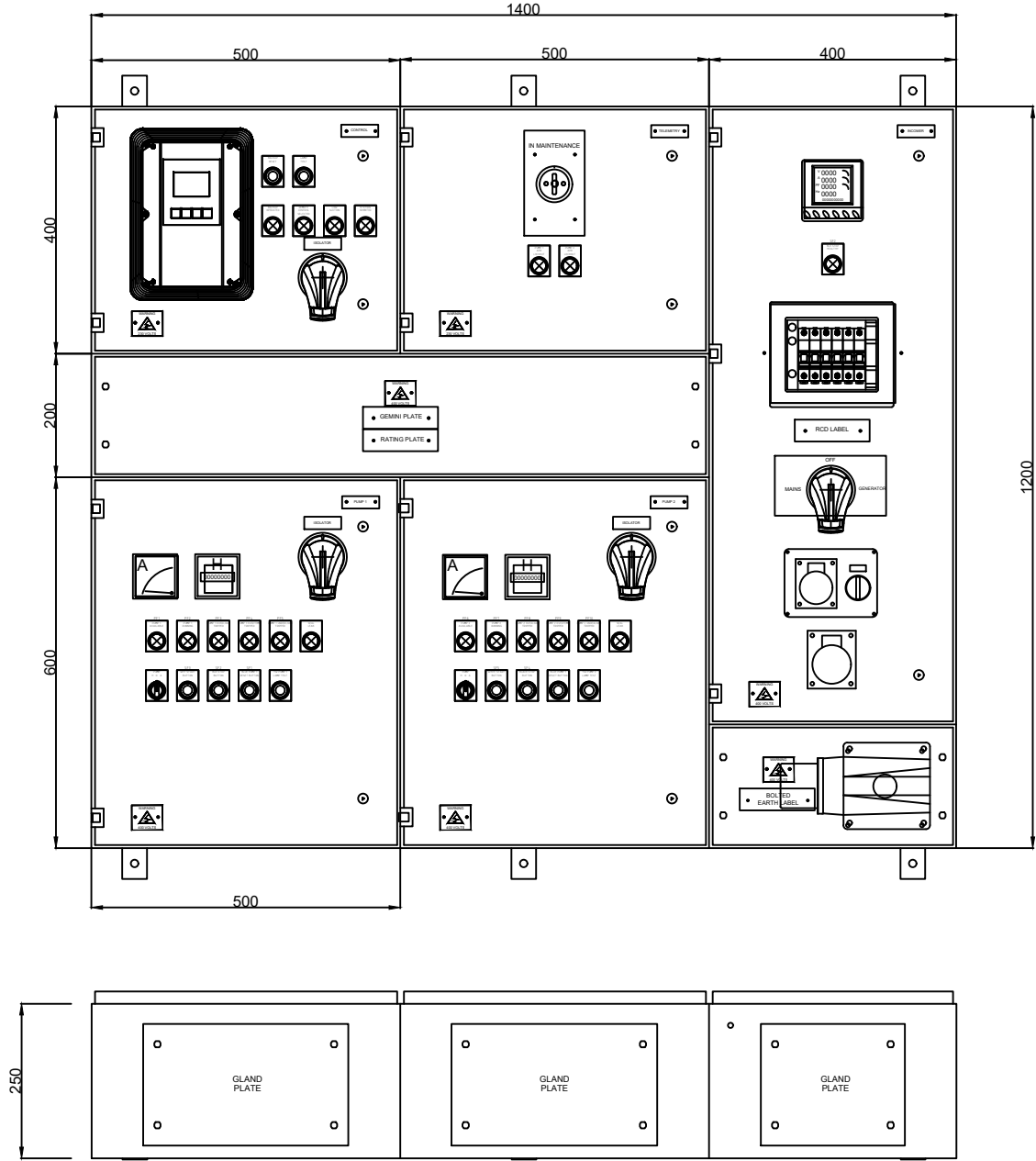
Sheet No
12 of 20



F

					Client Name PFA CONSULTING LIMITED			  		
					Title DCG V2 + SW LOCAL PRACTICES DUAL ASD CONTROL PANEL TELEMETRY MARSHALLING					
B	Kiosk Changed to 2500mm	30/05/22	JS	JS	Drawn By JS	Project Code PR16103				
A	First Issue	24/05/22	JS	JS						
Rev	Description	Date	Drn	Apprv	Drawing No PR16103		Site ONE HORTON HEATH, SOUTHERN PUMPING STATION		This document may not, without our permission, be copied, shown or handed out to competitors or any other unauthorised persons Copyright Protected	13 of 20

NOTE CONTROLS DOOR TO
BE ORDERED BLANK FOR
ADDITIONAL LAMP



Steelwork
Fully Welded Form 4 Construction
Mild Steel, 2mm thick
IP54 - Colour BS 18-E-51
Semi Gloss Finish
Black hinges and tri locks
Earth studs to be fitted to all doors,
gear plates and gland plates
Gland plates to be galvanised

					Client Name PFA CONSULTING LIMITED	
					Title DCG V2 + SW LOCAL PRACTICES DUAL ASD CONTROL PANEL PANEL GA	
B	Kiosk Changed to 2500mm	30/05/22	JS	JS	Drawn By JS	Project Code PR16103
A	First Issue	24/05/22	JS	JS		
Rev	Description	Date	Drn	Apprv	Drawing No PR16103	


gemini control systems ltd
designers and manufacturers


APPROVED CONTRACTOR
GEMINI CONTROL SYSTEMS LTD
TEL: 0808 196 8770
FAX: 01782 659 465
WWW.GEMINI-CONTROLS.COM

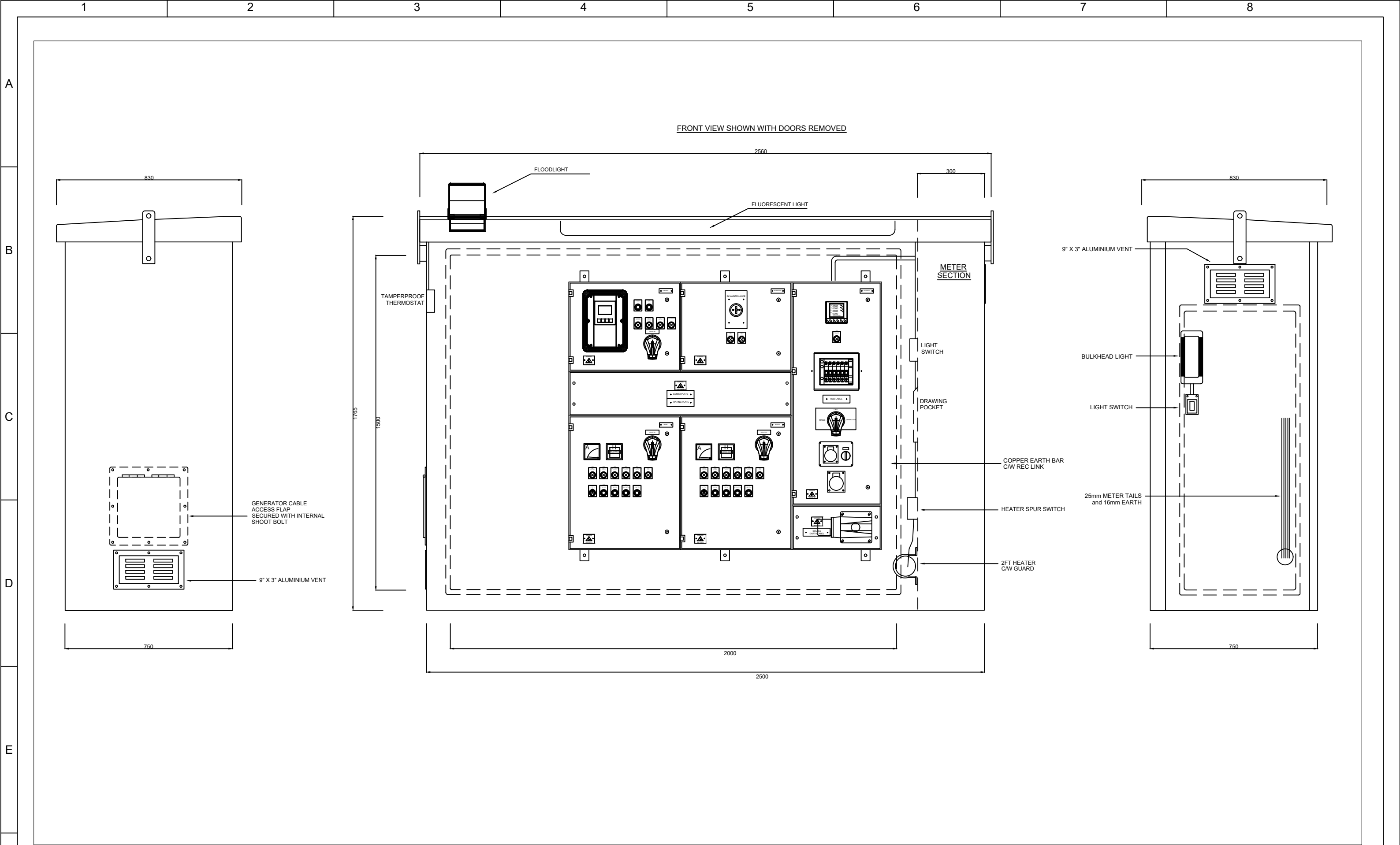
Site
ONE HORTON HEATH, SOUTHERN PUMPING STATION


PDAS
TOTAL WATER EXPERTISE

This document may not, without our permission, be copied, shown or handed out to competitors or any other unauthorised persons
Copyright Protected



Sheet No
15 of 20



F					Client Name PFA CONSULTING LIMITED	
					Title DCG V2 + SW LOCAL PRACTICES DUAL ASD CONTROL PANEL KIOSK GA	
	B	Kiosk Changed to 2500mm	30/05/22	JS	JS	Drawn By JS
	A	First Issue	24/05/22	JS	JS	Project Code PR16103
	Rev	Description	Date	Drn	Apprv	Drawing No PR16103



gemini control systems ltd
designers and manufacturers



APPROVED CONTRACTOR



interface
ISO 9001
CERTIFICATION



UKAS

GEMINI CONTROL SYSTEMS LTD
TEL: 0808 196 8770
FAX: 01782 659 465
WWW.GEMINI-CONTROLS.COM



PDAS
TOTAL WATER EXPERTISE

This document may not, without our permission, be copied, shown or handed out to competitors or any other unauthorised persons
Copyright Protected



Sheet No

16 of 20

A

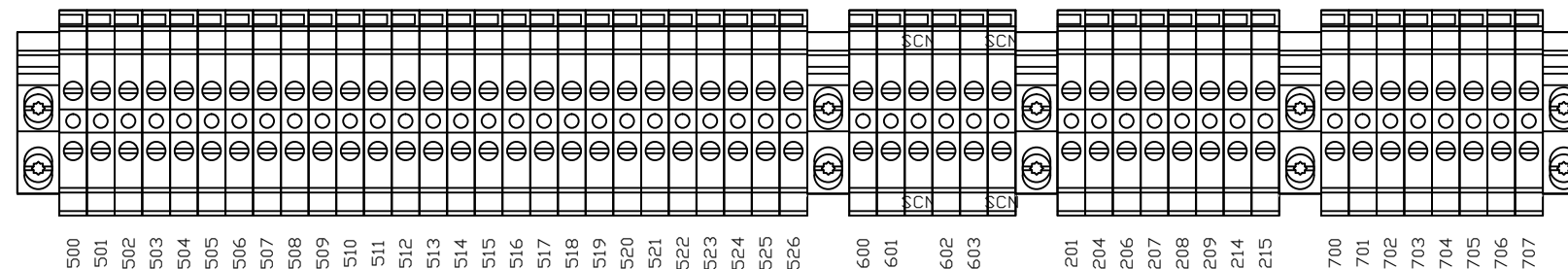
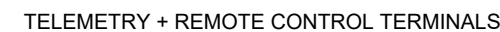
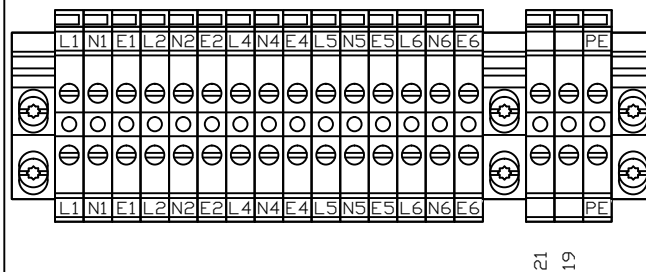
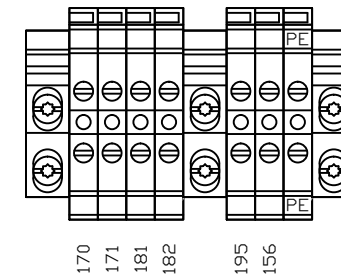
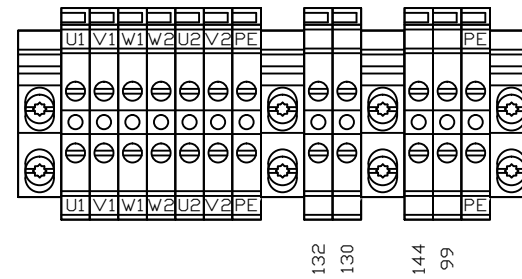
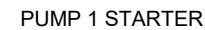
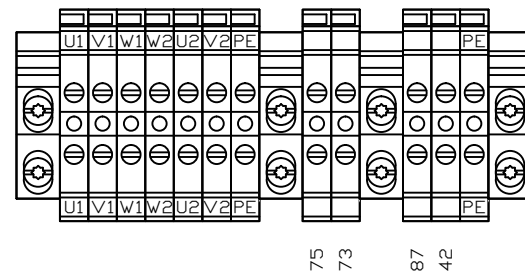
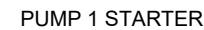
B

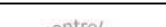
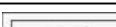
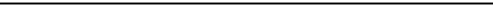
C

D

E

F



					Client Name PFA CONSULTING LIMITED		 gemini control systems ltd designers and manufacturers	 GEMINI CONTROL SYSTEMS LTD TEL: 0808 196 8770 FAX: 01782 659 465 WWW.GEMINI-CONTROLS.COM	 UKAS 4758		
					Title DCG V2 + SW LOCAL PRACTICES DUAL ASD CONTROL PANEL TERMINAL FOOTPRINTS						
B	Kiosk Changed to 2500mm	30/05/22	JS	JS	Drawn By	Project Code					
A	First Issue	24/05/22	JS	JS	JS	PR16103					Sheet No
Rev	Description	Date	Drn	Apprv	Drawing No PR16103			Site ONE HORTON HEATH, SOUTHERN PUMPING STATION	This document may not, without our permission, be copied, shown or handed out to competitors or any other unauthorised persons Copyright Protected		17 of 20

A

B

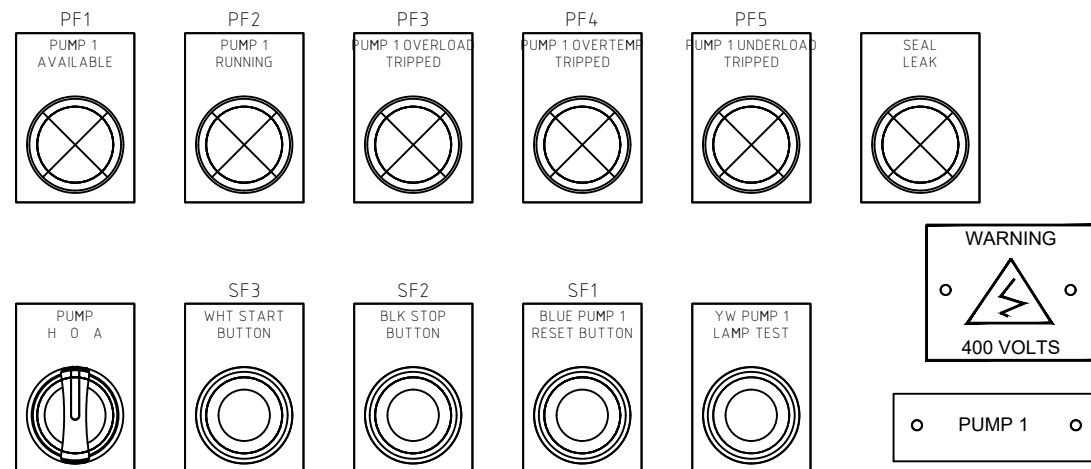
C

D

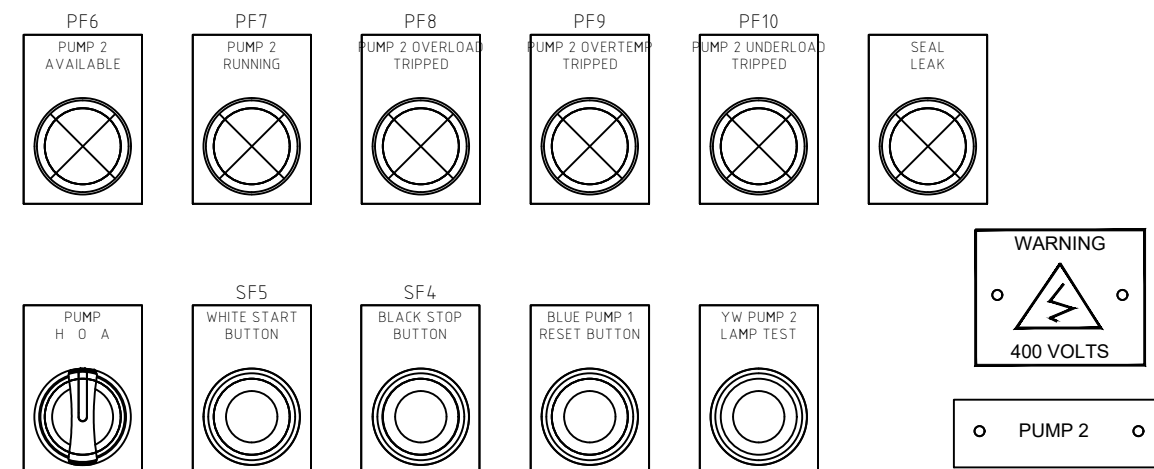
E

F

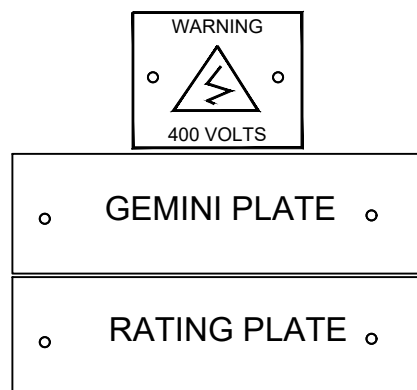
PUMP 1



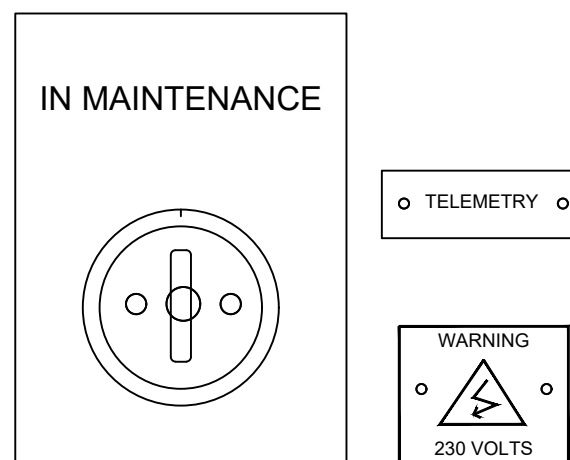
PUMP 2



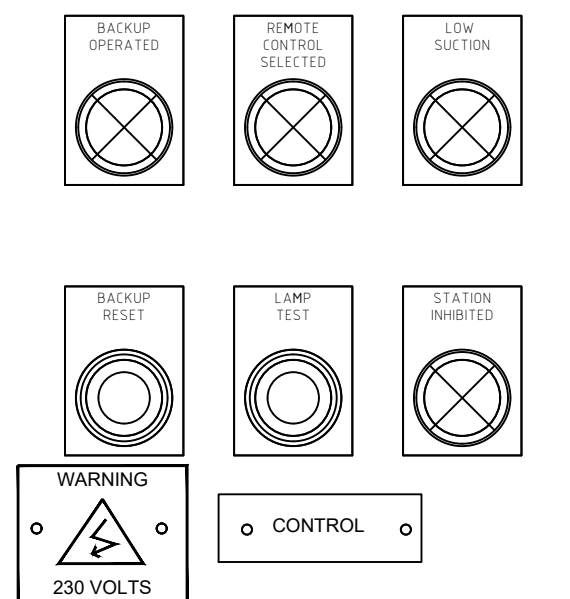
CABLEWAY



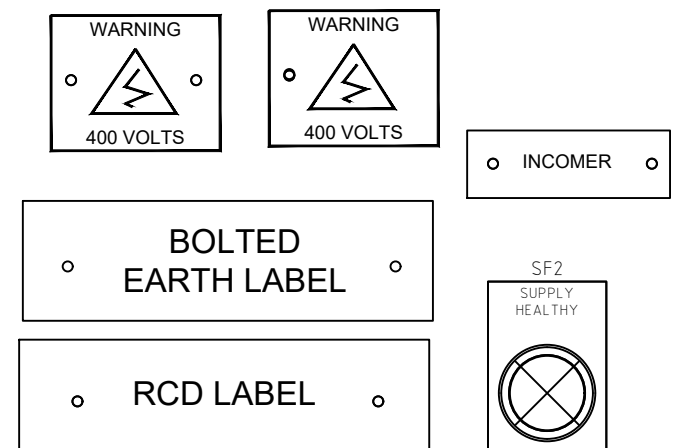
TELEMETRY



CONTROLS



INCOMER



					Client Name PFA CONSULTING LIMITED	
					Title DCG V2 + SW LOCAL PRACTICES DUAL ASD CONTROL PANEL LABEL GA	
B	Kiosk Changed to 2500mm	30/05/22	JS	JS	Drawn By JS	Project Code PR16103
A	First Issue	24/05/22	JS	JS		
Rev	Description	Date	Drn	Apprv	Drawing No PR16103	



Site	This c
ONE HORTON HEATH, SOUTHERN PUMPING STATION	

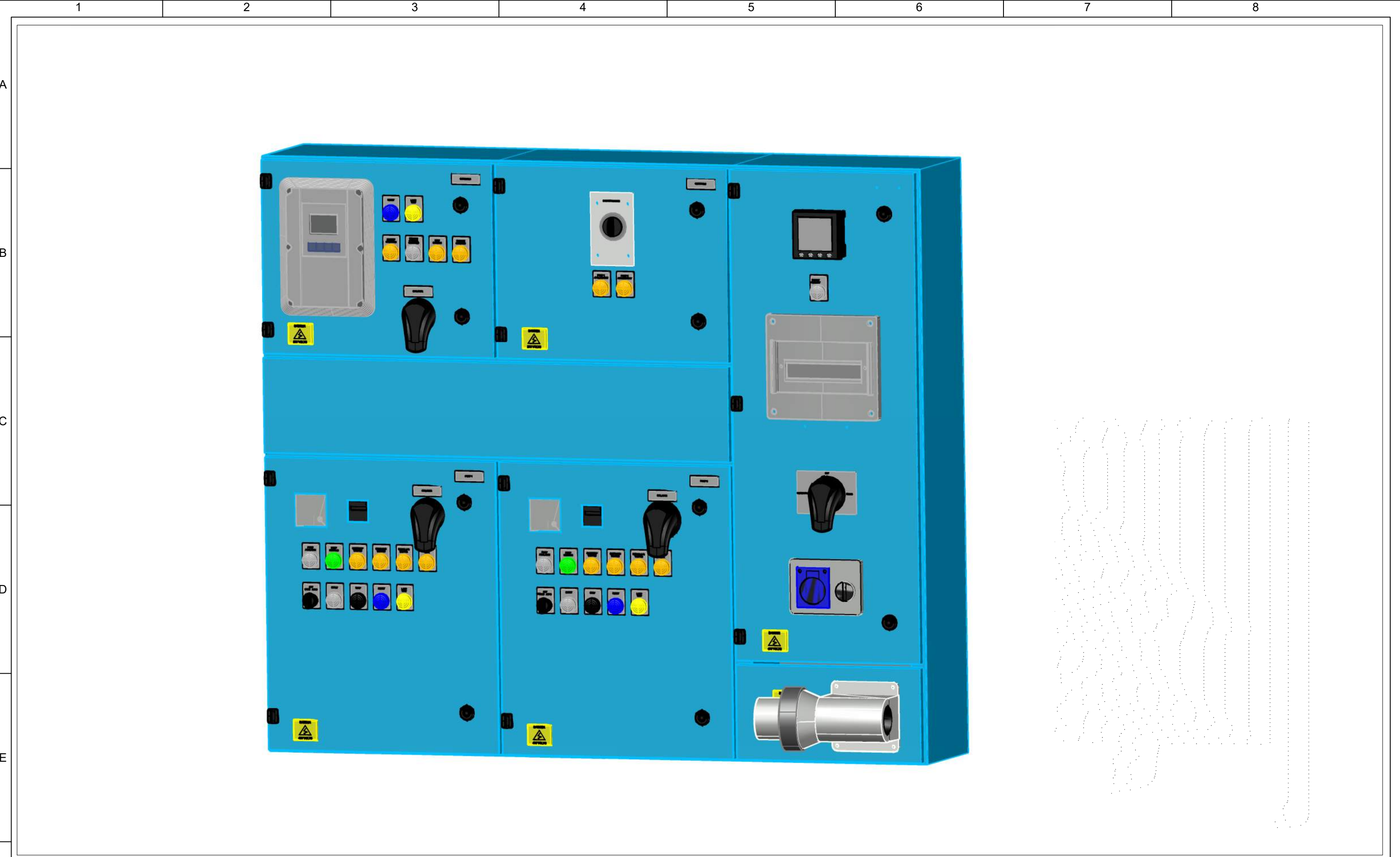


This document may not, without our permission, be copied, shown or handed out to competitors or any other unauthorised persons
 Copyright Protected

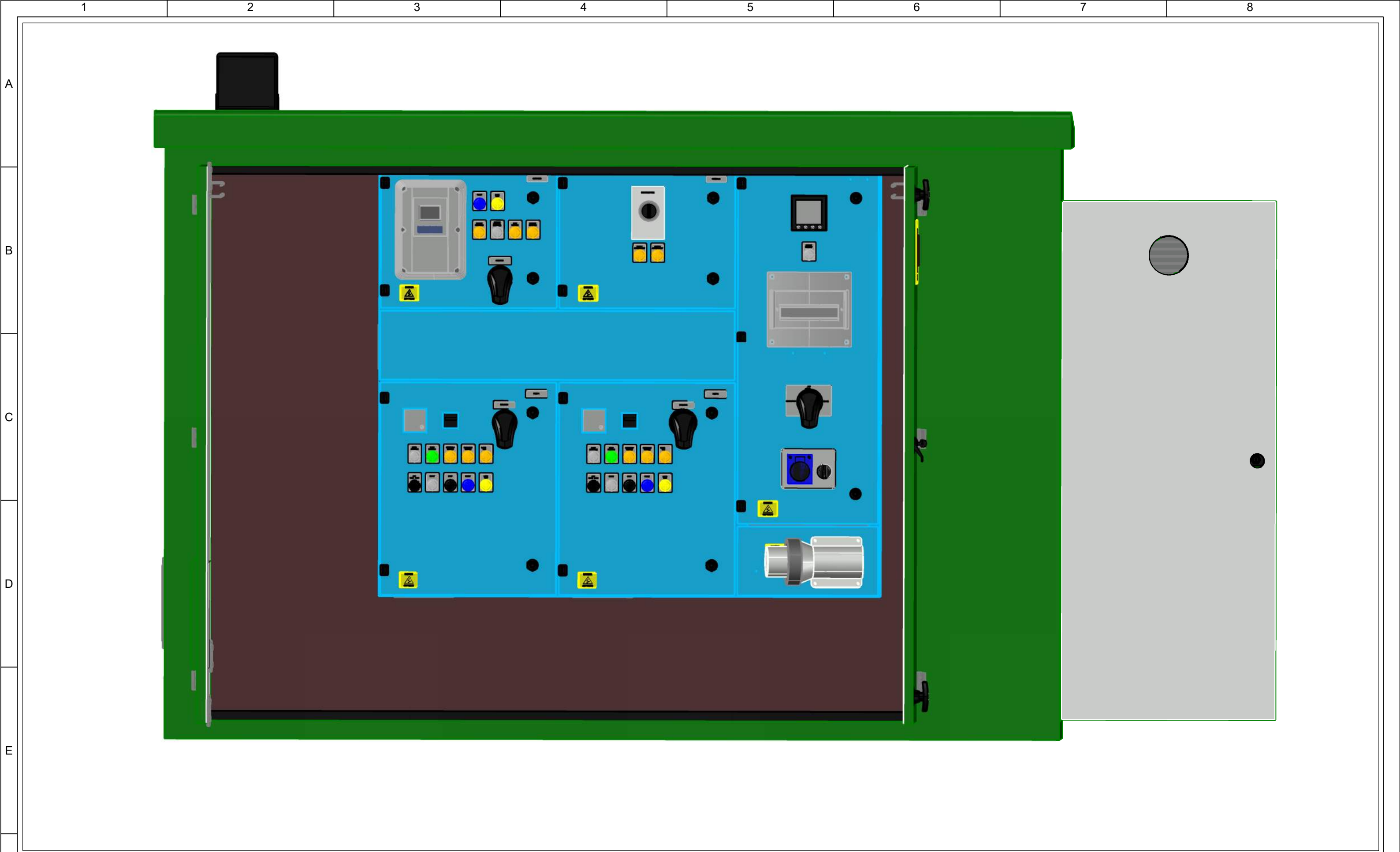


Sheet No

18 of 20



					Client Name PFA CONSULTING LIMITED			 APPROVED CONTRACTOR  GEMINI CONTROL SYSTEMS LTD TEL: 0808 196 8770 FAX: 01782 659 465 WWW.GEMINI-CONTROLS.COM 	 TOTAL WATER EXPERTISE	 Sheet No
					Title DCG V2 + SW LOCAL PRACTICES DUAL ASD CONTROL PANEL PANEL GA 3D					
B	Kiosk Changed to 2500mm	30/05/22	JS	JS	Drawn By JS	Project Code PR16103				
A	First Issue	24/05/22	JS	JS						
Rev	Description	Date	Drn	Apprv	Drawing No PR16103		Site ONE HORTON HEATH, SOUTHERN PUMPING STATION		This document may not, without our permission, be copied, shown or handed out to competitors or any other unauthorised persons Copyright Protected	



					Client Name	PFA CONSULTING LIMITED
					Title	DCG V2 + SW LOCAL PRACTICES DUAL ASD CONTROL PANEL KIPSK GA 3D
B	Kiosk Changed to 2500mm	30/05/22	JS	JS	Drawn By	Project Code
A	First Issue	24/05/22	JS	JS	JS	PR16103
Rev	Description	Date	Drn	Apprv	Drawing No PR16103	

total control panel solutions

gemini control systems ltd
designers and manufacturers

NICEIC
APPROVED
CONTRACTOR

interface
ISO 9001
CERTIFICATION

UKAS

GEMINI CONTROL SYSTEMS LTD
TEL: 0808 196 8770
FAX: 01782 659 465
WWW.GEMINI-CONTROLS.COM

Site
ONE HORTON HEATH, SOUTHERN PUMPING STATION

PDAS
TOTAL WATER EXPERTISE

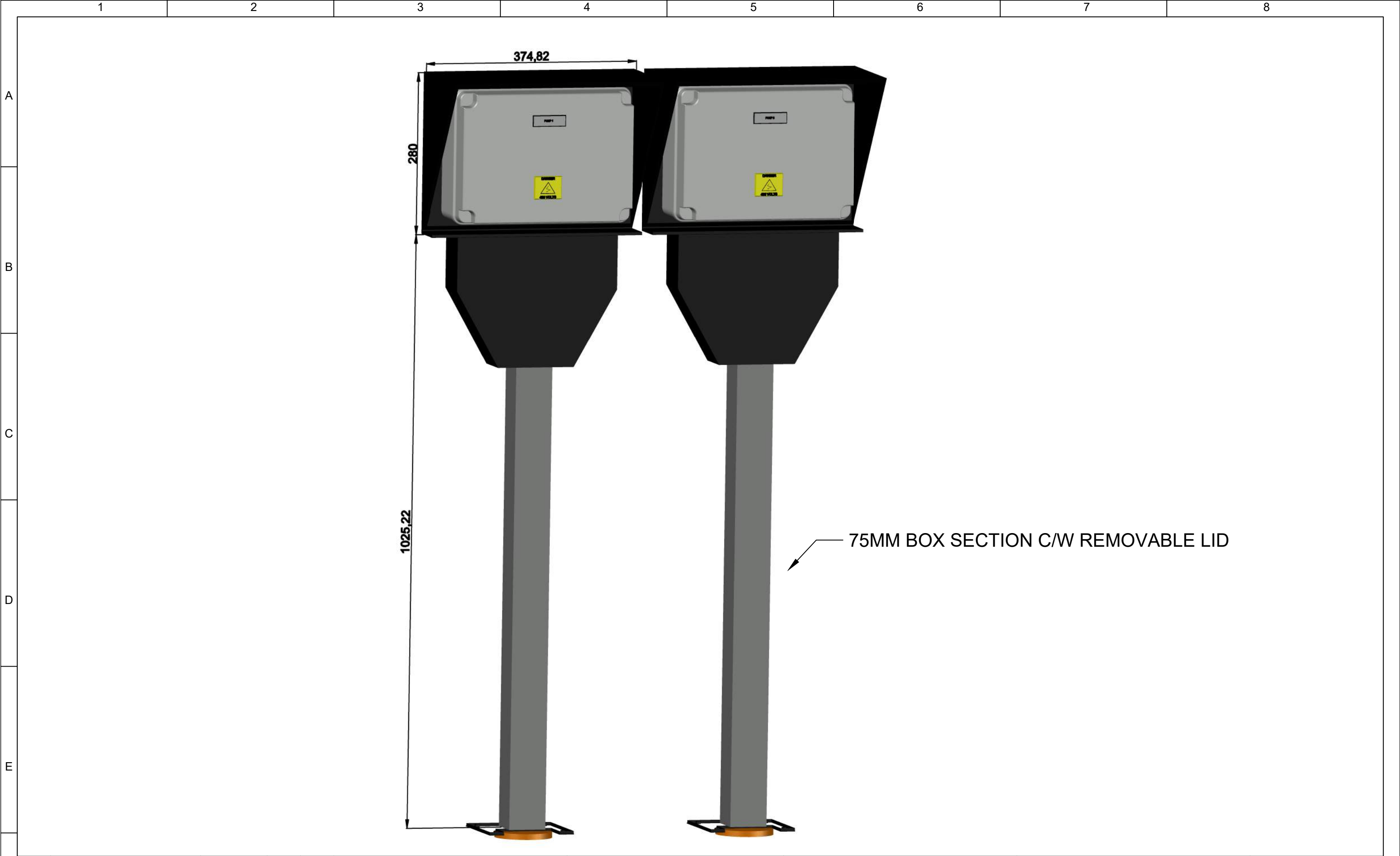
This document may not, without our permission, be copied, shown or handed out to competitors or any other unauthorised persons
Copyright Protected

Sheet No

20 of 20

GCD0025/C - 11/1/19

Appendix J
Junction Box Stand Details



F					Client Name			  	
					Title PUMP JB Stand				
					Drawn By JH	Project Code GCS0340			
	A	FIRST ISSUE							
	Rev	Description	Date	Drn	Apprv	Drawing No			Site

Appendix K
Southern Water Telemetry Schedule

RTU Name:					RTU Address:			
RTU Type: S2000					Serial No.			
GSM Phone Number:					Cat No.		Server.	
Chassis No	RTU I/O Slot	Terminals	Description	Text Units (On/Off)	I/O Type & No.	RTU DNP Ref	Dbase Point	Date
1	0	0V/0	Maintenance Mode	Maint/Normal	DI 0	DI0	B	
1	0	0V/1	Site Mains Status	Normal/Failed	DI 1	DI1	B	
1	0	0V/2			DI 2		B	
1	0	0V/3	Sump Level High Alarm	Normal/High	DI 3	DI3	B	
1	0	0V/4	Backup Activated	Normal/Activated	DI 4	DI4	B	
1	0	0V/5	Ultrasonic Failed	Normal/ failed	DI 5	DI5	B	
1	0	0V/6			DI 6		B	
1	0	0V/7			DI 7		B	
1	0	0V/8			DI 8		B	
1	0	0V/9			DI 9		B	
1	0	0V/10			DI 10		B	
1	0	0V/11			DI 11		B	
1	0	0V/12			DI 12		B	
1	0	0V/13			DI 13		B	
1	0	0V/14			DI 14		B	
1	0	0V/15			DI 15		B	
1	0	1V/0	Pump 1 Running Status	Running/Stopped	DI 0	DI16	B	
1	0	1V/1	Pump 1 Tripped Status	Normal/ Tripped	DI 1	DI17	B	
1	0	1V/2	Pump 1 Available Status	Available/Normal	DI 2	DI18	B	
1	0	1V/3			DI 3	DI19	B	
1	0	1V/4	Pump 2 Running Status	Running/Stopped	DI 4	DI20	B	
1	0	V/5	Pump 2 Tripped Status	Normal/Tripped	DI 5	DI21	B	
1	0	V/6	Pump 2 Available Status	Available/Normal	DI 6	DI22	B	
1	0	1V/7			DI 7		B	
1	0	1V/8			DI 8		B	
1	0	1V/9			DI 9		B	
1	0	1V/10			DI 10		B	
1	0	1V/11			DI 11		B	
1	0	1V/12			DI 12		B	
1	0	1V/13			DI 13		B	
1	0	1V/14			DI 14		B	
1	0	1V/15			DI 15		B	
1	1	0+/0-	Sump Level	M 0-100%	AI 0	AI0	E	
1	1	1+/1-	Spare AI 1		AI 1	AI1	E	
1	1	2+/2-	Spare AI 2		AI 2	AI2	E	
1	1	3+/3-	Spare AI 3		AI 3	AI3	E	
1	2	CM/0	Pump 1 Control	Start/Stop	DO 0	N/A	N/A	
1	2	CM/1	Pump 1 Reset	Reset/Normal	DO 1	N/A	N/A	
1	2	CM/2	Pump 2 Control	Start/Stop	DO 2	N/A	N/A	
1	2	CM/3	Pump 2 Reset	Reset/Normal	DO 3	N/A	N/A	
1	N/A	N/A	RTU Mains Status	Fault/Normal	DER DI	HCW00	M	
1	N/A	N/A	RTU Battery Status	Low/Normal	DER DI	HCW01	M	
1	N/A	N/A	Configuration Status	Changed/Normal	DER DI	HCW08	M	
N/A	N/A	N/A	RTU Communications Status (SCOPE-X)	Failed/Normal	N/A	N/A	B	
1	N/A	N/A	Remote/Local Selector	Local/Remote	DER DO	DO0	B	
1	N/A	N/A	Auto/Manual Selector	Manual/Auto	DER DO	DO1	B	
1	N/A	N/A	Pump 1 Reset	Reset/Normal	DER DO	DO2	B	
1	N/A	N/A	Pump 2 Reset	Reset/Normal	DER DO	DO3	B	
1	N/A	N/A			DER AI	AI16	E	
1	N/A	N/A			DER AI	AI17	E	
1	N/A	N/A			DER AI	AI19	E	
1	N/A	N/A			DER AI	AI21	E	
1	N/A	N/A			DER AI	AI22	E	
1	N/A	N/A			DER AI	AI32	E	
1	N/A	N/A			DER AI	AI33	E	
1	N/A	N/A			DER AI	AI35	E	
1	N/A	N/A			DER AI	AI36	E	
1	N/A	N/A			DER AI	AI37	E	
1	N/A	N/A			DER AI	AI38	E	
1	N/A	N/A			DER AI	AI39	E	
1	N/A	N/A			DER AI	AI40	E	
1	N/A	N/A			DER AI	AI41	E	
1	N/A	N/A			DER AI	AI42	E	
1	N/A	N/A			DER AI	AI77	E	
1	N/A	N/A			DER AI	AI78	E	
1	N/A	N/A			DER AI	AI84	E	

Appendix L
Design Flow Criteria Extracts

B1 SCOPE

1. This Part gives guidance on the design and construction of gravity, foul and lateral drains, and sewers. For guidance on surface water sewer systems see Part C, and for guidance on sewage pumping stations see Part D.

B2 SEPARATE SYSTEMS

1. Separate foul and surface water systems should be provided.
2. If sewers are to discharge into an existing combined (single pipe) sewer system, the separate foul and surface water sewers should be combined at locations immediately upstream of the point where they discharge into the existing combined sewer system. The levels should be arranged to minimise the risk of foul sewage entering into the surface water system.
3. Natural watercourses, land drainage and groundwater are not permitted to be directly or indirectly connected to the public foul sewer system (see A9).

B3 HYDRAULIC DESIGN

B3.1 Foul Sewers and Lateral Drains

1. The peak design flow rates for dwellings should, at the discretion of the designer, be either:
 - a) calculated in accordance with BS EN 12056-2 System II (this method is recommended for this application in BS EN 16933-2); or
 - b) 4000 litres per dwelling per day (0.05 litres per second per dwelling). Note: This is a design peak flow rate not a daily average water usage, and represents the peak flow rate from a number of appliances. Reducing daily water usage does not necessarily reduce the peak flow rate.
2. Design flows for industrial and commercial developments can contain two elements: domestic flows (flows from toilets and kitchens, etc.) and trade effluent flow (wastewater from industrial processes¹). The total peak design flow is the sum of the domestic design flow and the trade effluent design flow.
 - a) The domestic design flow should be calculated in accordance with BS EN 12056-2 System II (see also BS EN 16933-2) or, in the absence of appropriate information, 0.6 litres per second per hectare of developable land;
 - b) The trade effluent design flow should be based on a metered discharge from premises similar to that proposed, or assumed as 0.5 litres per second per hectare for normal industry and 1 litre per second per hectare for wet industry. Where the proportion of wet industry is unknown, an average flow of 0.7 litres per second per hectare should be used.

¹ Developers are reminded that the occupier of the building will be required to make a separate application to discharge any trade effluent flows.



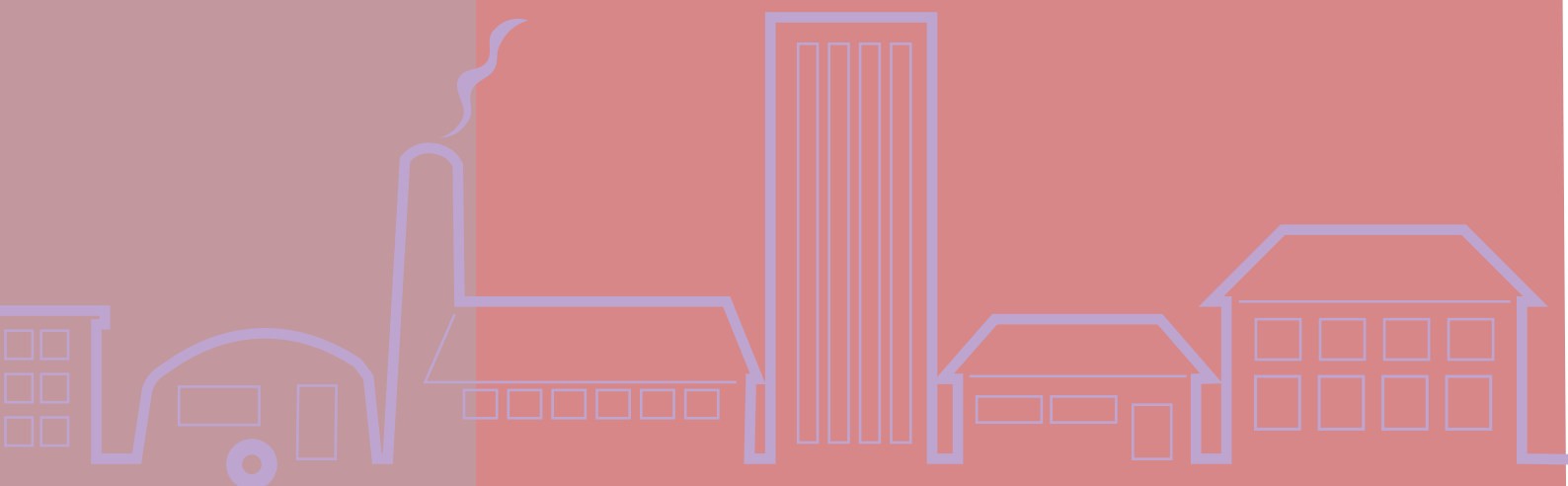
BRITISH WATER
expertise worldwide



Code of Practice

Flows and Loads – 4

Sizing Criteria, Treatment Capacity for Sewage Treatment Systems



Southbank House
Black Prince Road
London SE1 7SJ
www.britishwater.co.uk

BW COP: 18.11/13

ISBN 978-1-903481-10-3



Code of Practice

Flows and Loads – Sizing Criteria, Treatment Capacity for Sewage Treatment Systems

This code of practice was prepared by the British Water Package Sewage Treatment Plant Focus Group comprising manufacturers, suppliers and service companies of all types of small wastewater treatment systems.

The Environment Agency, the Northern Ireland Environment Agency and the Scottish Environment Protection Agency support the use of this code of practice, but the Agencies do not specifically endorse any particular manufacturer's product.

This code of practice provides a table of loadings which allows the total daily sewage load from properties to be calculated and it is recommended that all designers should use this table when sizing and designing non-mains sewage treatment systems. The flows and loads values given represent current best knowledge within the UK but may change with time in line with per capita water use.

Where proposed alternative usage rates or methods of sizing might be more appropriate for a particular application this should be supported by the collection of data or additional site specific evidence to validate the proposal. Professional judgment is required and may be used to compare alternatives especially when assessing sewage strengths and treatability.

Guidance is provided to assist the user to identify the various sources of sewage, to consider the nature of the sewage to be treated and to make users aware of issues which may affect treatability and system performance. Each manufacturer is aware of the capabilities of their own systems with respect to different situations.

The table of loadings may be used to design all sizes of sewage treatment systems serving up to 1000 population.

Use of this code of practice by all UK manufacturers and system designers will:

- help to clearly define site activity and sewage sources
- promote a consistent approach to collecting accurate and complete loading information
- provide consistent information about problem effluents and treatability, and
- promote the design and installation of appropriate treatment systems and so reduce the problem of undersized systems causing environmental contamination.

The loadings in this code of practice are more comprehensive than in previously published guidance, they are generally higher and include values for ammonia.

1 Scope

The purpose of this code of practice is to provide an appropriate table of loadings (volumes and loads) to allow the total daily load entering a treatment system to be calculated.

2 Regulations

Early contact with the Regulator to discuss the proposed discharge of sewage effluent is advisable.

- Planning requirements, eg *DETR Circular 3/99, site survey, etc.*
- Building regulations, eg part H *DTLR England & Wales, part M Scotland, Water (Northern Ireland) Order 1999 and Northern Ireland building regulations.*
- A Permit, Authorisation or Consent to discharge will be required from the environmental regulators (the Agencies).
- Planning permission (Local Authority Planning Guidance).

3 Definitions of terms

- **Population (P)** – number of people the system will serve.
- **Biochemical oxygen demand (BOD₅)** – Mass concentration of dissolved oxygen consumed under specified conditions (5 days at 20° C with nitrification inhibition) by the biological oxidation of organic and/or inorganic matter in water.
- **Ammonia expressed as mg/l N** – Ammonia is NH₃, Ammonium is NH₄OH. In wastewater we frequently refer to and use the word/symbol, ammonia/NH₃. The term ammonia usually includes ammonium as well.

4 Selection considerations – all applications

- Values and conditions required by any regulatory permit or consent.
- Loading figures for each specified load are given for Flow, BOD and NH₃.
- The user/purchaser of the system must declare **ALL ACTIVITIES** to enable all loads entering the treatment system to be identified and evaluated. The user/purchaser should be made aware that there is a risk of poor performance from the equipment if loads are understated. The accuracy of the declared loads is of paramount importance.
- Guidance points given under each category suggest questions to enable the specifier to recognise variable or unusual loads,

particular to that site, to improve correct system selection and design.

- Total daily loadings are calculated based on the anticipated final maximum capacity of the site. New sites initially may have a reduced business level but the system suggested should reflect the full business potential, e.g. a system suggested for a hotel or caravan site or any other application, with an average 80% occupancy rate should be designed to handle 100% occupancy. The equipment selected by the specifier should reflect the maximum potential of the site. Where a specifier is instructed to use lower occupancy rates, this should be recorded. Flow balancing should be considered where appropriate
- Excess disinfectants, chemicals, etc can affect the biological processes as can specific toxic substances from site activities e.g. photographic chemicals, weed killers, motor oils. It is assumed that these substances are excluded from the wastes to be treated.
- Some water treatment equipment effluents eg softeners, chlorinated backwashes may not be acceptable; system designers should specifically accept or exclude their use. Many treatment system designs will accept regenerants into their units, however this must be checked and agreed.
- Water saving devices affect sewage strength, the impact of their installation should be identified.
- Laundries affect sewage strength and treatability; their proportion should be identified.
- Surface/storm water is not permitted as part of the wastewater stream and must be excluded.
- It is assumed, unless stated, that waste disposal units (WDU) are not in use.
- Undersizing of equipment is to be avoided as it is always better to have a plant slightly oversized, rather than on the limit or undersized.

■ **The owner of the treatment system holds the permit, consent or authorisation to discharge and should be aware that he is responsible for the effluent quality discharged. Thus all sources of discharge into the system must be declared. It is an offence if the effluent fails to comply with the regulators requirements.**

(continued on page 4)



Table of Loadings for Sewage Treatment Systems

Per person / activity / day (unless otherwise specified)	FLOW (Litres)	BOD (Grams)	Ammonia as N
DOMESTIC DWELLINGS (Grams)			
Standard residential	150	60	8
Mobile home type caravans with full services	150	60	8
INDUSTRIAL			
Office / Factory without canteen	50	25	5
Office / Factory with canteen	100	38	5
Open industrial site, e.g. construction, quarry, without canteen	60	25	5
*Full-time Day Staff	90	38	5
*Part-time Staff (4 hr shift)	45	25	3
SCHOOLS			
Non-residential with canteen cooking on site	90	38	5
Non-residential without a canteen	50	25	5
Boarding school (i) residents	175	60	8
(ii) day staff (inc. mid-day meal)	90	38	5
HOTELS, PUBS & CLUBS			
Hotel Guests (Prestige hotels)	300	105	12
Hotel Guests (3 rd & 4 th hotels)	250	94	10
Guests (Bedroom only – no meals)	80	50	6
Residential Training/Conference Guest (inclusive all meals)	350	150	15
Non residential Conference Guest	60	25	2.5
Drinkers	12	15	5
Holiday camp chalet resident	227	94	10
Resident Staff	180	75	10
Restaurants - Full Meals - luxury catering	30	38	4
- pre-prepared catering	25	30	2.5
- Snack Bars & bar meals	15	19	2.5
- Function Rooms including buffets	15	19	2.5
- Fast Food i.e. (roadside restaurants)	12	12	2.5
- Fast Food Meal (burger chain and similar)	12	15	4
Students (Accommodation only)	100	60	8
AMENITY SITES			
Toilet Blocks (per use)	10	12	2.5
Toilet (WC) (per use)	10	12	2.5
Toilet (Urinal) (per use)	5	12	2.5
Toilet Blocks in long stay car parks/lorry parks (per use)	10	19	4
Shower (per use)	40	19	2
Golf Club	20	19	5
Local community sports club, e.g. squash, rugby & football	40	25	6
Swimming (where a separate pool exists without an associated sports centre)	10	12	2.5
Health Club/Sports Centre	50	19	4
Tent sites	75	44	8
Caravan Sites - (i) Touring not serviced	100	44	8
(ii) Static not serviced	100	44	8
(iii) Static fully serviced	150	60	8
HOSPITALS & RESIDENTIAL CARE HOMES			
Residential old people / nursing	350	110	13
Small hospitals	450	140	Assess
Large hospitals	Assess individually		

*Staff figures also apply to other applications



- After installation, if the system is overloaded, due to activities that were not previously identified by the owner/ purchaser of the system, then the manufacturer may not be able to assist with meeting the legal obligations of the permit provided by the regulator. The regulator has the right to review permits and change them if necessary.
- All sewage treatment system should be maintained according to the manufacturer's instructions by a certified engineer trained in accordance with the British Water Maintenance and Service Code of Practice.

5 Domestic housing

- A treatment system for a single house with **up to and including 3 bedrooms** shall be designed for a minimum population (P) of 5 people.
- The size of a treatment system for a single house with more than 3 bedrooms shall be designed by **adding 1 P for each additional bedroom** to the **minimum single house value of 5 P**, eg:
 - house with 3 bedrooms = **minimum 5 P system**
 - house with 4 bedrooms = **minimum 6 P system (5+1)**
 - house with 6 bedrooms = **minimum 8 P system (5+3).**
- For groups of small 1 and 2 bedroom houses or flats
 - flat with 1 bedroom = **allow 3 P**
 - flat with 2 bedrooms = **allow 4 P**
- A treatment system serving a group of houses shall be designed by adding together the P values for each house calculated independently, eg:
 - for a group of two houses (3 and 4 bedrooms, respectively) the system shall be for a minimum of 11 P (5+6)
- **If the calculated total P for a group of houses exceeds 12 P then some reduction may be made** to allow for the balancing effects on daily flow of a group of houses (round UP not down)
 - **Where the total is 13-25 P** multiply the total by 0.9 to give an adjusted P value, e.g. if there are four four-bedroom houses the total P will be 24 P (4 x 6) and the adjusted P will be 22 P (24 x 0.9 = 21.6)
 - **Where the total is 26-50 P** multiply the total by 0.8 to give an adjusted P value, e.g. if there are four three-bedroom houses and three four-bedroom houses the total P will be 38 P (4 x 5 and 3 x 6) and the adjusted P will be 31 P (38 x 0.8 = 30.4)
- Where there are larger groups of houses, the P should be estimated using both the expected total load and the flow, considering both peak and total flow
- These are minimum recommended population (P) loads, they should not be modified downwards, upward modification may be necessary because of particular characteristics of each property or groups of properties.
- The above assessments of population (P) should be used for both existing and new properties

- Larger luxurious houses tend to have greater loads and increased water consumption with variability.
- Holiday homes tend to have higher occupancies, with perhaps, lounges also acting as bedrooms. Holiday lets and second homes may be used intermittently
- Check for unusual water uses such as spa baths, home brewing or home photo processing.
- Waste disposal units increase biological load.
- Laundry chemicals and toxic substances will affect the performance. (See below) It is assumed that laundry is not brought in, i.e. Team strips.

6 Commercial Premises

- Identify **ALL** the sources of waste.
- Identify final maximum site usage/business expectations.
- The individual values provided for each function within the table assume that 100% of every application and load is quantified. **DO NOT** reduce values based on reduced expectations.
- All catering applications require the installation of adequately sized grease separators, removal or retention systems up-stream of the biological treatment equipment.

7 Catering premises

- Establish maximum (and minimum) daily load based on a 24 hour cycle.
- Check period of operation.
- Identify dates of maximum loads, e.g. Mothering Sunday, Easter, Bank holidays, Fridays etc.
- Identify load peaks, usually at lunch or evening.

- Flow balancing may provide an appropriate solution.
- Where WDU and potato peelers are to be used calculate/document the load.
- Identify the nature(s) of the catering in order to select the correct loading, eg

■ Bar snacks	- ploughmans, sandwiches, basket meals, etc.
■ Pre-prepared catering	- frozen and chilled meals (not prepared on site).
■ Home cooked meals	- fresh soups, fresh vegetables, casseroles, etc.
■ Luxury catering	- fully prepared on site with cream sauces, home made desserts.
■ Takeaways	- Indian, Chinese, fish and chips, etc.
■ Fast food	- roadside restaurants, burger chains, etc.
■ Function room catering	- Establish "normal" style, may be sandwiches, or full buffet, home cooked meals, conference, wedding banquets, etc.
- The biological unit must be protected from grease and fats. Modern cooking uses light oils, which may not separate. The collection and containment of all forms of grease prior to the biological equipment is vital. Operate any grease system in full accordance with the manufacturer's instructions.
- Individual kitchen practices affect loads, i.e. leftovers on plates may be scraped into bins, or wet rinsed into system, the former to be encouraged, the latter should be discouraged or factored into the treatment plant design.
- Premises serving beers may produce toxic caustic effluents due to the hygiene and cleaning regimes.
- The proportion of wastes from some sources can produce an effluent, which is difficult to treat, e.g. some Drive Through Fast Food establishments can have an effluent with a low organic content.

8 Hotels & Residential Centres

- Establish "style and type" of hotel e.g. Prestige (5^M), Bedroom only accommodation, Conference Centres, Resort Hotels with Sports and Spas, Treatment Centres, etc.
- Calculate total loading based on occupancy of at least 2 people per room.
- Some hotels regularly have 4 occupants per room.



- Consider and add other hotel activities and waste functions.

■ *The volume/BOD figures are based on an expectation that guests have an evening meal, drink and breakfast and that good kitchen practices are in place.*

- Add all other loads, considering non-resident uses, ie Lunches, Functions, Visiting Drinkers, Diners, etc.
- Consider periodicity of loads.
- Ensure residential and training centre loadings reflect the complete meal plan, i.e. allow for lunch and afternoon tea, sports, etc.
- Special Events. Check provision of temporary facilities, e.g. summer marquees and allow for appropriate loading.
- Consider any loads from outside catering.

9 Laundries

- Excepting domestic premises, it is assumed that all laundry functions are additional.
- For each premises, identify which laundry items are done in house or sent off site.
- Calculate the laundry load on the basis of the number of machines and the period of use.
- Sites with laundries must fit and maintain lint filters.

■ *The chemical load (detergents) inhibits biological treatment, the laundry waste percentage of the normal maximum Flow usually needs to be less than 30% of the total load.*

■ *Where the laundry percentage >30%, manufacturers select equipment on a different basis.*

■ *As a guide, where the hydraulic load from laundries is between 1-10%, system size increases by 10%, 11-20% increases by 20%, 21-30% increases by 30%.*

■ *Excess/surplus detergents (above the recommended quantities) can affect the biological process.*

■ *Discharge quality may be improved if operators use low/zero phosphate detergents.*

10 Toilet Blocks

- Figures can also be assessed according to the sanitary equipment and control system installed.

■ *Automatically flushed urinals use 10 litres per hour; a single flush should not use more than 1.5 litres.*

■ *Consider ladies and gents toilet facilities separately.*

11 Sports Clubs

- Calculate loadings on 100% usage for the sporting facility. The figure provided includes showering and toilet use by the sports person.
- Consider also the non-sporting uses, i.e. spectators' toilet use.
- Add drinkers, social members and staff.
- Add values for catering facilities.
- Check normal and exceptional catering provisions.

- A swimming pool with no associated sports centre may be calculated using the number of swimmers, assume a toilet use per person, and by adding values for showers and spectators. Check duration of visits and modify for extended use.

■ *Consider separate treatment or disposal of backwash waters from ancillary equipment, such as types of filtration and disinfectant removal in swimming pools.*

12 Golf Clubs

- The values within the data table allow for light snacks and toilet use.
- Calculate additional allowances for showers.
- Add values for other catering facilities (if other than light snacks).

13 Hospitals

- The nature of the facility affects the design values. Some nursing homes have very high hydraulic loads as a result of the use of bedpans and their sanitation. Consider any disinfection equipment installed.
- With drugs and hygiene requirements of hospitals adjust the equipment size to compensate for treatability factors.

■ *Disposal of unused/waste medicines is not permitted via the treatment facility.*

14 Caravan Sites

- Establish nature of communal blocks, i.e. toilet, shower usage, laundry, etc.
- Where laundry equipment is installed, count the number of machines on site and period of use. Where possible, identify specific commercial machine details for volume and wash cycle duration.

■ *Hydraulic loads of 100 litres per hour for 12 hours are not unusual.*

- Loading figures quoted assume that wastes from chemical toilets do not enter the system as they must not be allowed to enter into the treatment plant.

■ *A cesspool may be installed to receive chemical toilet waste for separate disposal.*

15 Installation

The following may affect which equipment is offered.

- The site.
- Location of treatment plant within the site.
- Invert depth of installation (where possible, locate to permit gravity flow into and out of the system).
- Pumping equipment.
- Installation requirements.

■ *Refer to manufacturer's specifications and installation manual.*

- Access for maintenance and servicing.

■ *Refer to manufacturer's specifications and maintenance instructions.*

- The need for a sample chamber.
- Discharge point.
- Soil percolation area or other tertiary treatment.



16 Documentation

Records of the loads used to select and recommend the type and size of treatment systems should be maintained by the specifier and the customer. A typical example follows.

Treatment system enquiry sizing sheet

Our Ref. 123456 **Date** 10th August 2003 **Site** ABC Hotel 3* Hotel **Client** New Architects & Consultants

SOURCE OF WASTE				FLOW LITRE / DAY		BOD GRAMS / DAY		NH ₃	
Description	No of rooms	Occupancy	No	Per Head	TOTAL	Per Head	TOTAL	Per Head	TOTAL
Rooms	80	2	160	250	40000	94	15040	10	1600
Bar drinkers			120	12	1440	15	1800	5	600
Non resident luxury meals			150	30	4500	38	5700	4	600
Staff, full-time day staff			30	90	2700	38	1140	5	150
Staff, part-time			20	45	900	25	500	3	60
Laundry – all sent off site									
Domestic washing machine for tea towels only				800					
Total load(s)					50340		24180		3010
Effluent quality requested					20 mg/l BOD		30 mg/l SS		20 mg/l NH₃ N

Suggested type of plant: XYZ. **Invert:** 1.0m. **Power:** 3-phase. **Surface water:** all to be excluded from foul sewer. **Consent to discharge:** to be obtained from the Regulator. **Waste Disposal Units:** assumed that none are fitted.

Grease trap: required size "125".

Notes

Swimming pool – present, used for guests only, all backwash wastes to be excluded. No function rooms or catering

Further information and guidance can be obtained from the British Water website – www.britishwater.co.uk

Please note the following statement by British Water

Subject as stated below, no responsibility, duty of care or liability whatsoever (whether in contract or tort or otherwise including, but not limited to, negligence) is or will be accepted by British Water, its officers, employees, agents or members to any user of this guidance or any other person in connection with or in relation to this guidance.

Subject as stated below, British Water, its officers, employees, agents and members do not accept any responsibility or liability for any loss or damage caused to any person who acts or refrains from acting as a result of anything contained in or omitted from this guidance or in reliance on the provisions of or material in this guidance, whether such loss or damage is caused by negligence or otherwise.

Nothing in this disclaimer shall be construed as excluding or limiting the liability of British Water or any of its officers, employees, agents or members for death or personal injury resulting from the negligence of such persons or for fraud.

This guidance does not constitute legal, technical or other advice and it should not be regarded as such. Anyone requiring advice on any of the matters referred to in this guidance, including on how to ensure compliance with any relevant legal or regulatory requirements, should consult their legal or other appropriate professional advisers.

Nothing in this guidance is intended to be or should be construed as advice on the merits of, or a recommendation in relation to, any particular product or product provider and no representation is made that any member of British Water operates or will operate in accordance with this guidance.

Each part of this disclaimer shall be construed as a separate and severable part, and if one or more parts is held to be invalid, unlawful or otherwise unenforceable, the remaining parts shall remain in full force and effect.

Company contact details are in the member list on the British Water website www.britishwater.co.uk



Appendix M
Southern Water Addendum to DCG Issue 4, Dated May 2021

**SOUTHERN WATER
TECHNICAL SPECIFICATIONS MANUAL
MECHANICAL AND ELECTRICAL SPECIFICATIONS**

**SOUTHERN WATER SUPPLEMENTARY ADDENDUM
TO CODE FOR ADOPTION, SEWERAGE SECTOR GUIDANCE,
APPENDIX C – DESIGN AND CONSTRUCTION GUIDANCE
(DCG) VERSION 2.1**

1. OBJECTIVE	4
2. GENERAL	4
3. PART D – PUMPING STATIONS	4
D5 PROVISION OF PUMPING STATIONS	4
D5.2 SITE ACCESS	4
D5.3 SITE LAYOUT	4
D5.5 STORAGE	4
D5.7 PUMPING STATION DESIGN	5
D6 RISING MAINS	5
D6.3 HYDRAULIC DESIGN	5
D6.5 MATERIALS FOR RISING MAIN	5
D7 DESIGN OF PUMPING STATIONS	5
D7.2 HAZARDOUS AREAS	5
D7.3 WET WELL GENERAL	6
D7.4 WET WELL STRUCTURAL DESIGN	6
D7.5 VALVE CHAMBER	7
D7.6 FLOW METERING	7
D7.7 ACCESS INTO WET WELL, VALVE CHAMBER, CARBON FILTER AND FLOWMETER CHAMBERS	7
D7.9 DAVIT SOCKETS	8
D7.10 KIOSK	8
D7.11 KIOSK CONSTRUCTION	8
4. PART E	8
INTRODUCTION	8
5. PART F	9
F1.2 OPERATION AND MAINTENANCE DOCUMENTATION	9

F2.2 PERFORMANCE REQUIREMENTS AND INFORMATION	9
F2.3.2 EXTERNAL CORROSION PROTECTION	10
F2.3.4.2 AUTO-COUPLING SYSTEM (ACS)	10
F2.3.10 MOTORS	10
F2.3.11 INFORMATION PLATE	10
F2.3.14.3 LIFTING CHAINS	10
F2.3.15 CABLE SUPPORT SYSTEM	10
F3 ELECTRICAL SPECIFICATION SCOPE	10
F3.2.1 GENERAL	10
F3.2.2 LABELS AND SAFETY SIGNS	11
F3.3 ELECTRICAL ASSEMBLY	12
F3.3.1 GENERAL	12
F3.3.3 ASSEMBLY CONSTRUCTION	12
F3.3.6 INDICATOR LAMPS, PUSH-BUTTONS AND SELECTOR SWITCHES	12
F3.3.6.2	12
F3.3.6.3	13
F3.3.7 CONNECTION OF A MOBILE GENERATOR	13
F3.3.8 ABNORMAL OPERATION	13
F3.3.9 TELEMETRY SIGNALS	13
F3.3.10 ULTRASONIC LEVEL CONTROLLER SPECIFICATION	14
F3.3.11 FUNCTIONAL UNITS – FORM 4 ASSEMBLIES	15
F3.3.12 FUNCTIONAL UNITS – FORM 2 ASSEMBLIES	15
F3.3.12.3 INCOMER	15
F3.3.12.4 CONTROL CIRCUIT SUPPLIES	15
F3.3.12.5 MOTOR STARTERS	15
F3.3.12.6 COMMON CONTROL SECTION	16
F3.4 PUMPING STATION ELECTRICAL INSTALLATION	17
F3.4.1 ELECTRICAL COMPONENTS AND EQUIPMENT (EXCLUDING THE ELECTRICAL ASSEMBLY AND CABLES)	17
F3.4.1.2 SOCKET OUTLET	17
F3.4.1.3 LUMINARIES	17
F3.4.1.4 ANTI-CONDENSATION HEATERS	17
F3.4.1.5 JUNCTION BOXES	17
F3.4.4 INSTALLATION OF CABLES	18
F3.6 TELEMETRY OUTSTATION	18

F4.1 GATE (SLUICE) VALVES _____	18
F4.2 CHECK (REFLUX) VALVES _____	19
F4.2.4 ADD SENTENCE: 'THE HALF-INCH BSP PLUGGED TAPPINGS SHALL BE FITTED WITH STAINLESS STEEL QUARTER-TURN BALL VALVES.' _____	19
F4.4 MISCELLANEOUS _____	19
F4.5 ISOLATION _____	19
APPENDIX VII ASSOCIATED SOUTHERN WATER STANDARDS _____	20
6. DETAILS OF CHANGE HISTORY _____	21
ISSUE 3 _____	21

1. OBJECTIVE

This document is Southern Water's addendum to Parts D, E & F of Water UK's Code for Adoption, Sewerage Sector Guidance, Appendix C – Design and Construction Guidance (DCG) Version 2.1 DCG, and shall be read in conjunction with that publication.

2. GENERAL

Where conflict exists between DCG and this addendum, this document shall take precedence. Section/clause numbers used in this specification are those from DCG, except where further clauses are added and these use similar numbers added at the end of each DCG clause series.

Refer to the Purchaser's standard layout drawings.

The Developer shall ensure compliance with the latest versions of all appropriate legislation (including Construction, Design & Management Regulations), Codes of Practice etc., and ensure the installation is safe, serviceable and fit for purpose.

3. PART D – PUMPING STATIONS

D5 PROVISION OF PUMPING STATIONS

D5.2 Site Access

D5.2.4 Access shall allow for a minimum tanker size of 9000 litres (2000 gallons).

D5.3 Site Layout

D5.3.4 The need for a fenced compound, and its type shall be agreed with the Undertaker and local planning authority. Generally a fenced compound shall be provided for Type 2 & 3 pumping stations.

D5.3.5 Where security fencing is deemed necessary, the type of fencing shall be one of the following:

- 1.8m high galvanised chain link, topped with 3 strands of barbed wire, set on concrete posts in accordance with BS1722: Part 1, GLC 108c
- 1.8m high close boarded morticed fencing, set in concrete posts, with concrete gravel boards, in accordance with BS1722: Part 5, PCR 180B
- 1.8m high brick wall to match surroundings
- 2.4m high palisade fencing, in accordance with BS 1722-12
- Gate posts shall be steel

D5.3.9 Where permeable hardstanding is shingle, it shall consist of 100mm depth of 20 mm clean shingle laid on geotextile membrane.

D5.3.11 Impermeable hardstandings should be laid to falls such that surface water cannot pond.

D5.5 Storage

D5.5.5 [N] An emergency overflow shall only be provided where agreed by the Undertaker and the Environment Agency. Any overflow shall not operate until all of the storage volume specified has been fully utilised.

D5.7 Pumping Station Design

D5.7.1 Pumping station design shall be as follows:

Design	Type 1	Type 2	Type 3	Type 4
Package pumping station in dry chamber	√			
Package pumping station with wet well	√	√	√	
Bespoke pumping station	√	√	√	
Undertaker's specification pumping station				√

- Package pumping stations in dry chambers, shall comply with the Undertaker's specification MED 4142, available from the Undertaker's Policies & Standards Team
- Package pumping stations with wet wells, shall comply with this specification and not WIS 4-04-2
- Bespoke pumping stations, shall comply with Section D7 and Part F of DCG with the relevant Undertaker's addendum as per this specification
- Undertaker's specification pumping stations, shall comply with the Undertaker's Technical Specifications Manual, Commissioning Manual and Works Operating & Maintenance Manual. These manuals are available from the Undertaker's Policies & Standards Team

D6 RISING MAINS**D6.3 Hydraulic Design**

D6.3.3.c Air valves shall comply with the Undertaker's air valve specification contained within standard MED 4100, and shall be installed in accordance with CED 4010, both available from the Undertaker's Policies & Standards Team. Generally they shall be of the double orifice type, fitted with an auxiliary float chamber.

D6.5 Materials for Rising Main

D6.5.2 [N] Rising Mains shall be constructed from Polyethylene to Clause E 2.23 with jointing to Clause E5.5; other materials are not permitted. Rising Mains shall be connected as close as physically possible to pumping station structures and other ancillaries.

D7 DESIGN OF PUMPING STATIONS**D7.2 Hazardous Areas**

D7.2.1 For the Undertaker's hazardous zone classification requirements refer to the Undertaker's specification MED 4004 and the following clauses:

Equipment used in classified areas under DSEAR shall be selected in accordance with Equipment and Protective Systems Intended for Use in Potentially Explosive Atmospheres Regulations 1996 (or later as amended).

Electrical equipment and systems shall comply with all relevant parts of BS EN 60079 & BS EN 61241 and shall be certified for use in the appropriate zone and for the intended application.

Non-electrical equipment and systems shall comply with all relevant parts of BS EN 13463 and shall be certified for use in the appropriate zone and for the intended application.

If a motor certified for use in a classified area is to be supplied for use with variable speed or other electronic equipment, then it shall be confirmed that the motor certification remains suitable for the application.

Certification information for Hazardous Area equipment shall be clearly presented on a manufacturer's nameplate on the equipment. Where certified equipment as part of a system is not individually identifiable by an existing label (e.g. submersible pumps) an additional label shall be provided to enable identification and tracking for maintenance purposes.

D7.3 Wet Well General

D7.3.10 [N] Velocities within the wet well and valve chamber pipework, shall be as follows:

DN	V _{min}	Suction		Discharge	
		V _{design}	V _{max}	V _{design}	V _{max} *
50	0.30	0.40	1.20	0.50	2.00
75	0.40	0.50	1.20	0.60	2.25
100	0.50	0.60	1.30	0.70	2.50
150	0.60	0.80	1.40	0.90	2.50
200	0.70	0.90	1.50	1.10	2.50
250	0.80	1.10	1.60	1.20	2.50

D7.4 Wet Well Structural Design

D7.4.7 [N] All chambers shall withstand all necessary loads in accordance with BS EN 1990, including the following loads:

- Internal hydrostatic pressure
- External hydrostatic pressure from groundwater up to the finished ground level
- External ground pressure
- External imposed loads

D7.4.8 [N] Where a wet well comprises a prefabricated impermeable liner with in-situ mass/reinforced concrete, it shall be capable of withstanding hydrostatic pressure equal to depth, regardless of any provision of concrete surround.

D7.4.9 [N] Pumping stations shall incorporate fixing devices to prevent rotation or flotation of the empty structures when subject to groundwater pressure up to the finished ground level.

D7.4.10 [N] Type testing of prefabricated impermeable liner wells shall involve the following:

- An internal water pressure test shall be carried out in accordance with BS EN 12050 Part 1 Clause 5.2.1. If there is no visible leakage from the pumping station during the test, it shall be considered to have passed the test
- The pumping station shall be able to withstand up to 4 m of groundwater pressure, or the equivalent mechanical load, without distortion and without the provision of a concrete surround. If there is no visible leakage, or damage sufficient to cause leakage, in the pumping station during the test, it shall be considered to have passed the test
- A discharge pipe connection test shall be carried out in accordance with BS EN 12050 Part 1 Clause 5.2.3. If there is no visible leakage of water from the discharge pipe during the test, it shall be considered to have passed the test
- A structural behaviour test shall be carried out in accordance with BS EN 12566 Part 1 Annex D Clause D.6. For a pumping station made of concrete or GRP, if there is no structural failure during the test and no lack of watertightness is recorded, it shall be considered to have passed the test
- Self cleaning test in accordance with WIS 4-04-02 clause 12.1.9

D7.5 Valve Chamber

- D7.5.2 For Type 1, 2 & 3 pumping stations, where the rising main is horizontally less than or equal to 20 metres in length and has a permanent free discharge (with no risk of surcharge), then the isolation valves, non-return valves and Bauer coupling can be omitted and dual rising mains installed.
- D7.5.3.c The Bauer coupling shall be installed such that the connection of a flexible hose can be made without entry to the valve chamber.
- D7.5.4 The discharge point of the gravity drain shall be fitted with a plastic flap valve having a stainless steel pin. A hand-operated valve within the gravity drain is not required.

D7.6 Flow Metering

- D7.6.1 The Undertaker's clarification of this requirement is: where the individual pump rating is equal-to or above 22kW, a suitable electromagnetic flowmeter shall be installed downstream of the valves in a chamber.

D7.7 Access into Wet Well, Valve Chamber, Carbon Filter and Flowmeter Chambers

- D7.7.2.a Where the pumping station is located within 500 metres of a coastline or estuary, covers shall be fabricated from mild steel galvanised to BS EN 1461, with a minimum galvanise thickness dependent on Corrosivity Category (refer to WIMES 8.03). Non slip surface shall be achieved via a surface coating.
- D7.7.2.b Facilities for opening the covers shall be provided, such as eyeholes for standard lifting keys or flush mounted integral handles.
- D7.7.2.c Assistance to ensure a lifting effort not exceeding 25 kgF shall be via spring and not gas struts.
- D7.7.3.b Holes/slots drilled in the chequer plate or open mesh flooring are not permitted as a ventilation option.

- D7.7.4 Where the pumping station and vent stack may cause an odour nuisance in a public area or private residential area, a passive activated carbon filter shall be installed between the vent pipe and the vent stack. The activated carbon filter shall be contained in an underground chamber fitted with a drain and manhole cover for access.

D7.9 Davit Sockets

- D7.9.2 The davit socket shall comply with the following additional clauses:

- Lifting test certificate/report shall be submitted in compliance with the Undertaker's M&E 3015 document, available from the Undertaker's Policies & Standards Team. Where the certificate/report has less than 6 month until its next inspection at the time of Adoption, then a further examination shall be undertaken.
- The socket shall be stamped with the following:
 - CE Marking
 - Safe Working Load
 - Serial Number
 - Undertaker's Asset Number, available from the Undertaker's Asset Information Team

D7.10 Kiosk

- D7.10.1e For socket details refer to clause F3.4.1.2.

D7.11 Kiosk Construction

- D7.11.14 Where double hinged doors are utilised, these shall include shoot bolts fitted to the top and bottom of the left-hand door (when facing the doors from the outside). The right-hand door shall incorporate top and bottom T type handles complete with clamp latches compressing the seal and a cylinder type night latch lock. The lock barrel shall be compatible with the Undertaker's standard access keys for operational sites in that area. Where a single door is utilised then the door shall comply with the right-hand door as above.

- D7.11.15 The kiosk security requirement is normally Class C (SR2) when sited within a fenced compound; however this shall be increased to Class B (SR3) if there are any particular security issues (e.g. no fenced compound).

- D7.11.16f The site information plate shall include the Undertaker's site reference 'Catalogue' number, available from the Undertaker's Asset Information Team.

4. PART E

Introduction

E Intro Where additional CESWI Clauses are utilised, these shall be read in conjunction with Southern Water Supplementary Clauses, available from the Undertaker's Policies and Standards Team.

E1.3.3 [N] All gravity pipework up to and including 300mm shall be certified by a recognised third party test body as proven to withstand a jetting pressure of 2600 psi (180bar). All ancillary equipment made of plastic materials and elements in association

with such pipework must be similarly proven to withstand jetting pressure of 2600 psi (180bar).

5. PART F

F1.2 Operation and Maintenance Documentation

F1.2.1 The primary purpose of Operation and Maintenance documentation (O&M) is | to convey information on safe operation of the site, its equipment and systems. The O&M shall comply with the following:

- Shall be designed to provide details of all installed equipment, describe how the pumping station will operate and how it is to be maintained
- Where the site has an overflow, emergency storage capacity or any other unusual system this shall be included in the manual with an explanation of how the system is integrated with the pumping station
- One paper copy of the O & M must be submitted to the Undertaker on issue of the provisional certificate for approval
- Once approved a further two copies of the O&M including all in-date certificates, and one CD copy, must be submitted to the Undertaker one month prior to the pumping station being handed over
- Paper copies should be in an A4 folder or similar. The CD shall contain fully editable files in standard software, e.g. Word, Excel, Autocad
- Manuals shall be produced in accordance with the Undertaker's Works Operation and Maintenance manual (WOM), which is available from the Undertaker's Policies & Standards Team
- The manual shall contain the following sections:
 - Site Health and Safety
 - Overview of pumping station design and site operation
 - Site generator or mobile unit and changeover procedures
 - Maintenance procedures and manufacturers' documentation
 - Ultrasonic level controller configuration (setup) list
 - Flowmeter configuration (where fitted)
 - Telemetry configuration list
 - Pump unit label data and pump system curve
 - Utility account numbers, utility supplier and site telephone number
 - Hazardous Area classification assessment
 - Certificates
 - Drawings and schematic diagrams
 - Asbestos free certificate
 - Phase 1 contaminated land report

F2.2 Performance Requirements and Information

F2.2.1 Pump units shall be capable of being reversed up to 100% of the normal forward running speed.

F2.2.2 Each pump unit shall be capable of pumping the design flow rate when the sewage level is at the mid-point of the start and stop levels in the wet well, plus an additional 5% flow to take account of fall-off in performance due to wear.

F2.3.2 External Corrosion Protection

F2.3.2.1 Where applicable, all corrosion protection shall be in accordance with WIMES 4.01.

F2.3.4.2 Auto-coupling System (ACS)

F2.3.4.2.1 The ACS shall be manufactured from cast iron and coated in accordance with WIMES 4.01. The effective sealing between pump and ACS shall not rely on rubber seals, o-rings, etc.

F2.3.10 Motors

F2.3.10.6 The minimum insulation class shall be Class H with a Class B temperature rise.

F2.3.11 Information Plate

F2.3.11.1 The pump unit information plate shall additionally have a 'CE' mark.

F2.3.14.3 Lifting Chains

F2.3.14.3 Pump unit lifting chains are not permitted; a lifting location system as described in the DCG shall be safely utilised.

F2.3.15 Cable Support System

F2.3.15 Pump flexible cables shall be supported in the wet well by cable socks.

F3 Electrical Specification Scope

F3.1e For the Undertaker's telemetry outstation requirements refer to clause F3.3.9.1.

F3.2.1 General

F3.2.1.1 Where downstream requirements suggest variable speed drives may be required, the design shall be submitted to the Undertaker for approval before construction.

Where electronic starters (variable speed, soft start) are employed, the installation shall comply with the planning levels of Energy Networks Association (ENA) Recommendation G.5/4 (or later as amended) and evidence in the form of detailed calculations and/or test certificate from a certified instrument shall be provided to the Undertaker.

F3.2.1.5 The electrical installation contractor shall be currently enrolled in an approved scheme for electrical installations in hazardous areas, e.g. NICEIC Hazardous Area scheme.

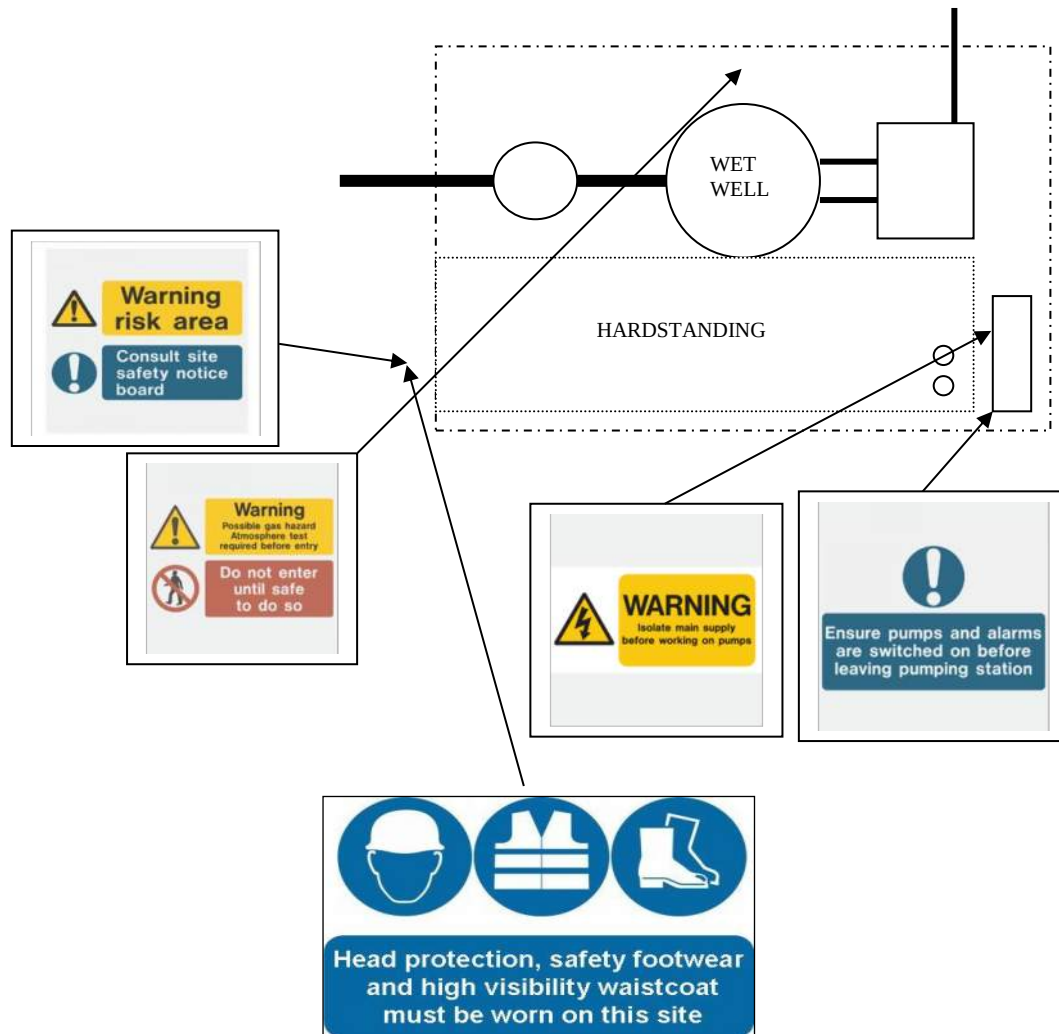
F3.2.1.9 Evidence shall be supplied to the Undertaker that the installation complies with The Electricity Safety, Quality and Continuity Regulations 2002 (or later as amended) and BS EN 50160 regarding supply flicker, i.e. proof of compliance in the form of a test certificate from a certified instrument.

F3.2.1.10 The Developer shall be liable for all remedial works where non-compliance with The Electricity Safety, Quality and Continuity Regulations, BS EN 50160 and/or ENA Recommendation G.5/4 (or later as amended) is proven by the Distribution Network Operator, for a period of 2 years from the date of handover to the Undertaker, provided no material changes have been made to

the installation by the Undertaker during that period that may affect this compliance.

F3.2.2 Labels and Safety Signs

The Undertaker requires additional safety signs as shown below.



Signs shall be manufactured from UV stable semi-rigid plastic. The lettering shall be of a size suitable for the application, but not be less than 6mm high.

Warning Risk Area (150mm x 100mm Landscape) and **Head Protection** (400mm x 300mm Landscape) signs shall be positioned externally on the gates.

Warning Possible Gas Hazard (400mm x 270mm Landscape) shall be positioned internally adjacent to the wet well valve chamber.

Warning Isolate Main Supply (150mm x 75mm) shall be positioned on the control panel inside kiosk.

Ensure Pumps (300mm x 200mm) shall be positioned externally on the kiosk doors.

In addition to the above signs a document pouch shall be fixed inside the kiosk for safety information.

F3.3 Electrical Assembly

F3.3.1 General

F3.3.1.2 For sites that come under the scope of MED 4006, the Undertaker has 2 No. Form 2 two pump control panel designs and 1 No. Form 4 two pump control panel design. The Form 2 control panel designs are detailed in the Wastewater Pumping Station (WPS) Standard Panel Drawings (SPD) Design B 2 Pump Control Panel – up to 15kW and Design C 2 Pump VSD Control Panel – up to 7.5kW. The Form 4 control panel is detailed in the Wastewater Pumping Station (WPS) Standard Panel Drawings (SPD) Standard 2 Pump Panel. All control panel drawings are located in the Design Drawing Manual (DDM). Table 2 – Typical Configuration Of Wastewater Pumping Station (WPS) in MED 4001_B details the form of separation which can be employed at the different pumping station types (DCG, Type 1, 2, 3 or 4)

The Undertaker's preference is for the Developer to utilise the Design C 2 Pump VSD Control Panel (up to 7.5kW). This provides a cost effective solution that has the benefit of providing energy savings, pump blockage protection, pipe flushing, wet well cleaning within a small footprint. The Developer shall seek approval from the Undertaker for the proposed design of the control panel if different from the standard designs outlined above.

F3.3.3 Assembly Construction

F3.3.3.4.3 A triangular key type lock is required on the electrical assembly doors.

F3.3.6 Indicator Lamps, Push-Buttons and Selector Switches

Indicator lamps shall not form part of a push button or switch. A lamp test facility shall be provided.

The Undertaker's lamp/button standard colours differ from DCG document, hence for safety reasons the Developer shall conform to the following:

F3.3.6.2

Indicator Lamp Colour	Application
Red	Hazardous or dangerous condition, zoned area ventilation failure, gas detected, over pressure, or emergency stop operated
Green	Normal condition, motor running, valve operating, or on
Yellow/Amber	Machine tripped or overloaded, slow rotation, seal leakage, low flow, or level alarm
White	Available, off, heater on, stopped, or valve fully open/closed or duty or standby level reached. Supply On (where fitted)

F3.3.6.3

Push Button Colour	Application
Red	Emergency stop
White	Start/on/inch
White	Valve open/close
Black	Stop/off
Yellow	Lamp test
Blue	Reset

F3.3.7 Connection of a Mobile Generator

3. Where site-specific requirements indicate a fixed standby generator, contact the Undertaker's Telemetry Team for additional telemetry requirements.

4. Where a mobile generator connection point is provided, an earth electrode system for the mobile generator shall be provided and connected to the main earth bar of the assembly. This means there is a permanent earth system in place for the generator and appropriate signage shall be provided.

F3.3.8 Abnormal Operation

F3.3.8.2.1 All Pump Protection shall operate in AUTOMATIC, HAND, and BACKUP modes.

F3.3.8.2.1d The hardwired suction protection device used in the Wastewater Pumping Station (WPS) Design B 2 Pump Control Panel (Form 2), Design C 2 Pump VSD Control Panel (Form 2) and the Standard 2 Pump Panel (Form 4), to prevent 'snoring', shall utilise a load/power monitoring device (in motor starter, appropriate to motor rating, capable of reliably detecting transient conditions when pump begins to draw air). Where the pump is installed in a Zoned area then the monitoring device shall trip the pump within 3 seconds, or faster if required by the pump manufacturer's Potentially Explosive Atmospheres approval.

F3.3.8.2.1e Low flow protection signal shall be derived from the pump low flow cut-off signal.

F3.3.8.2.1f Pump unit bearing vibration and temperature protection shall be used only with pumps rated at 55kW or above. Pumps of this rating would only be used in DCG Type 4 pumping stations (where the pump units exceed 30kW).

F3.3.9 Telemetry Signals

F3.3.9.1 The Undertaker's communication standard for telemetry is ADSL lines. Alternatives to ADSL shall be used only where specifically agreed with the Undertaker on a site-by-site basis.

PSTN lines will be withdrawn from service in December 2025 and thus No new PSTN lines shall be installed.

Where no existing communication line is available the Developer shall liaise with the Undertaker's IT Department for installation of the new line.

On sites where an existing PSTN line exists and is being considered for use for telemetry then it shall be upgraded to an ADSL line as part of the works. The Developer shall liaise with the Undertakers I.T. Department for this upgrade.

The incoming ADSL line shall be provided with a lightning protection unit (LPU). The LPU shall be installed next to the telemetry outstation and connected to earth in accordance with the LPU manufacturer's recommendations.

The Developer shall provide and install a telemetry outstation with type determined by the Undertaker's OT and Telemetry Team. The telemetry system shall be configured at the Developer's expense and commissioned with the assistance of the Undertaker. This will include Developer participation in point-to-point Input/Output testing to demonstrate the satisfactory operation of the integrated system.

The Developer can obtain further information and a quotation for this work by contacting the Undertaker's OT and Telemetry Team, e-mail address: MailBxTELENQ@southernwater.co.uk

TableF.3 For provision of the 'Maintenance in Progress' signal, an 'Engineer-on-Site' switch shall be provided by the Developer. This switch shall be independent of an external power source, using a mechanical run-down timer allowing the engineer to select any 'ON' period of up to 120 minutes. When in use the switch provides a status signal to the outstation which will report and inhibit alarms for the selected period of time.

TableF.3 A 'Rising Main Delivery flow' telemetry signal shall also be provided for Type 2, as **derived**-flow pulsed inputs from the level controller.

TableF.3 The Undertaker does not require a 'Rising Main Delivery Pressure' signal.

TableF.4 Remote control select signal shall be set to OFF, except where agreed & enabled by the Undertaker's OT and Telemetry Team.

TableF.5 Pump unit underload signal shall be from suction protection, see F3.3.8.2.1d.

Table F.5 Note 2 shall be 'Only required if each pump unit is rated at or above 55kW'.

The pumping Station shall have the facility to automatically reset the pumps via the Telemetry Outstation. The Automatic Pump Reset (APR) function is detailed in clause 7.2 of MED 4408.

F3.3.9.6 Pulsed inputs for high-frequency operation (e.g. derived-flow) shall be solid-state electronic type.

F3.3.10 Ultrasonic Level Controller Specification

F3.3.10.1 The Undertaker envisages that the technical standard adopted by the Developer for ultrasonic level controllers will be compatible with that used

by the Undertaker (so as to secure compatibility, and to avoid other substantive functionality issues). At the date of this publication this standard is Siemens Process Instruments' HydroRanger 200 Therefore any proposal for use of alternatives shall be submitted to the Undertaker for prior acceptance.

F3.3.11 Functional Units – Form 4 Assemblies

- F3.3.11.4.9 Where a fixed speed pump is assessed as likely to block, a system to monitor the pump motor load/torque and reverse the pump as appropriate shall be installed. In defining the specification for the detection of blockage and unblocking cycle the pump manufacturer shall be consulted, as not all pumps are suitable for reversing.

F3.3.12 Functional Units – Form 2 Assemblies

F3.3.12.3 Incomer

- F3.3.12.3.2a The Wastewater Pumping Station (WPS) Design B 2 Pump Control Panel and Design C 2 Pump VSD Control Panel shall incorporate a 125A 4 pole fuse switch, with 'Mains – Off – Generator' positions, with suitably rated fuses. The Design B 2 Pump Control Panel and Design C 2 Pump VSD Control Panel shall incorporate a control circuit test facility as detailed in the Wastewater Pumping Station (WPS) Standard Panel Drawings (SPD) Design B 2 Pump Control Panel.
- F3.3.12.3.2c The phase failure relay shall be fed via an MCB. The Wastewater Pumping Station (WPS) Design B 2 Pump Control Panel and Design C 2 Pump VSD Control Panel shall incorporate a mains supply monitor.
- F3.3.12.3.3a The operating handle for the control panel fuse switch shall be padlockable in the 'OFF' position.
- F3.3.12.3.3b &
F3.3.12.3.3d &
F3.3.12.3.4 The Wastewater Pumping Station (WPS) Design B 2 Pump Control Panel and Design C 2 Pump VSD Control Panel shall incorporate MCB fed circuits as per the Wastewater Pumping Station (WPS) Standard Panel Drawings (SPD) Design B 2 Pump Control Panel and Design C 2 Pump VSD Control Panel, in the DDM.

F3.3.12.4 Control Circuit Supplies

- F3.3.12.4.6 The control circuit transformer (CCT) for The Wastewater Pumping Station (WPS) Design B 2 Pump Control Panel and Design C 2 Pump VSD Control Panel shall have a 230V primary winding and a 110V or 24V secondary winding with one side earthed.

F3.3.12.5 Motor Starters

The Developer, in accordance with BS EN ISO 12100 shall assess the requirement for emergency stop equipment. Measures taken shall be justified by risk assessment of the hazards involved and recorded.

Typical Installation – the following guidelines for submersible pumps lay down the minimum standards to which the Developer shall work when

considering the use of emergency stop devices. They form the basis of the risk assessment which is the responsibility of the designer:-

- a. Under normal circumstances there should be no requirement for an emergency stop
- b. Electrical supply must be isolated and locked off at the isolator before the pump is lifted
- c. Pump rotational checks shall normally be carried out from the pump starter control panel: where this is not practicable consideration shall be given to a local 'hold-to-run' push button which shall be justified by a Risk Assessment submitted to and agreed with the Project Manager

Where fitted, emergency stop devices if required shall override all controls whatever their function and cut off the power supply to the drive. The device shall comply with BS EN 418 and shall be of the mushroom headed stay put type with break before latch mechanism, and twist or pull to release. Release of the mechanical latch shall not permit the plant to restart without appropriate resetting at the controlling Assembly.

F3.3.12.5.2 The Wastewater Pumping Station (WPS) Design B 2 Pump Control Panel and Design C 2 Pump VSD Control Panel shall incorporate the following additional motor protection:

- Motor over-temperature protection
- Seal leakage protection
- Dry run protection

F3.3.12.5.4 The equipment mounted on the door of the Wastewater Pumping Station (WPS) Design B 2 Pump Control Panel and Design C 2 Pump VSD Control Panel, shall be as per Wastewater

Pumping Station (WPS) Standard Panel Drawings (SPD) Design B 2 Pump Control Panel and Design C 2 Pump VSD Control Panel– Portrait (Hinged LHS) General Arrangement – SW Drawing No. JN.900002.0E3231 & Portrait (Hinged RHS) General Arrangement – SW Drawing No. JN.900002.0E3251. Both drawings are available in the DDM.

F3.3.12.6 Common Control Section

F3.3.12.6.1d The Wastewater Pumping Station (WPS) Design B 2 Pump Control Panel and Design C 2 Pump VSD Control Panel shall utilise a back-up float switch system.

F3.3.12.6.3 The Wastewater Pumping Station (WPS) Design B 2 Pump Control Panel and Design C 2 Pump VSD Control Panel shall utilise an ultrasonic level controller and a back-up float switch system.

F3.4 Pumping Station Electrical Installation**F3.4.1 Electrical Components and Equipment (excluding the electrical assembly and cables)****F3.4.1.2 Socket Outlet**

F3.4.1.2.1 A 13A, 230V, RCD protected socket outlet shall be mounted on the control panel, as per Wastewater Pumping Station (WPS) Standard Panel Drawings (SPD) Design B 2 Pump Control Panel and Design C 2 Pump VSD Control Panel– Portrait (Hinged LHS) General Arrangement – SW Drawing No. JN.900002.0E3231 & Portrait (Hinged RHS) General Arrangement – SW Drawing No. JN.900002.0E3251. All drawings are available in the DDM.

F3.4.1.3 Luminaries

F3.4.1.3.1 All kiosks shall be provided with internal lighting. This lighting shall be provided in accordance with the Form 2 Wastewater Pumping Station (WPS) Design B 2 Pump Control Panel, the Design C 2 Pump VSD Control Panel and the Form 4 Wastewater Pumping Station (WPS) Standard 2 Pump Panel. External working areas with pumps and motor drives (including wet wells), in automatic control shall have an Illumination Level of 100 LUX and a CIE Colour Rendering Index of 2. Special care shall be taken to prevent stroboscopic effects. The internal and external lighting shall be controlled from a single switch located within the Kiosk. This is to ensure that it is obvious that the lighting is on and needs to be switched off before personnel leave the site. All lighting and luminaries shall be provided in accordance with MED 4318 and WIMES 3.02.

F3.4.1.4 Anti-Condensation Heaters

F3.4.1.4.1 Kiosk heating shall be provided for kiosks containing the Form 2 Wastewater Pumping Station (WPS) Design B 2 Pump Control Panel, the Design C 2 Pump VSD Control Panel and the Form 4 Wastewater Pumping Station (WPS) Standard 2 Pump Panel. The heaters shall be suitably rated, tubular, anti-condensation heaters, controlled tamperproof thermostats.

F3.4.1.5 Junction Boxes

F3.4.1.5.7 The normal connection arrangement for pump flexible cables (power & protection, not instrumentation) shall be a separate weatherproof junction box (IP 65 minimum) per pump unit, outside the well, suitable for the hazardous area classification of the area. Cables shall be suitably glanded at the junction box. Disconnection of cables from the junction box shall be possible without entry into the wet well or valve chamber. The junction box shall be at waist height and associated supports shall not obstruct removal of the pump or cause a trip hazard. Junction boxes with doors shall be triangular key lockable, and all junction boxes shall have a label permanently fixed stating:

DANGER – LIVE TERMINALS

Do not test from this point

Voltage bands shall be segregated. Ultrasonic level sensor and float switch cables shall be cabled directly to the electrical assembly. Marshalling of cable terminations shall be logical from each duct.

F3.4.4 Installation of Cables

F3.4.4.13 Cable ducts from the junction box to the control panel shall be sealed at both ends against moisture and explosive/corrosive gas. The type of sealing system used shall be suitable for the assessed risk, prevent the migration of gases and be compliant with WIMES 3.02. Expanding foam shall not be used.

F3.4.4.16 If the installation is a pumping station not located in a secure compound, to mitigate risk of damage/vandalism each pump unit cable shall be directly cabled to the control panel kiosk via the duct provided. Ducts direct from the wet well shall be sealed against moisture and explosive/corrosive gas at the control panel end. If the wet well is designated as a hazardous area, a label shall be fixed adjacent to the duct(s) at the control panel end as follows:

HAZARDOUS AREA DUCT

Duct Sealing System to be retained at all times

A means of retaining the seal shall be provided for when cables are removed.

F3.6 Telemetry Outstation

F3.6.1b The following telemetry outstations shall be provided:

- Wastewater Pumping Station (WPS) Design B 2 Pump Control Panel – Servelec Systems S2000 micro or S2000. The telemetry outstation shall be mounted on the control panel as per the Wastewater Pumping Station (WPS) Standard Panel Drawings (SPD) Design B 2 Pump Control Panel – Portrait (Hinged LHS) General Arrangement – SW Drawing No. JN.900002.0E3231 & Portrait (Hinged RHS) General Arrangement – SW Drawing No. JN.900002.0E3251
- Wastewater Pumping Station (WPS) Design C 2 Pump VSD Control Panel - Servelec Systems S2000 micro or S2000. The telemetry outstation shall be wall mounted within as per the Wastewater Pumping Station (WPS) Standard Panel Drawings (SPD) Design C 2 Pump VSD Control Panel – Portrait (Hinged LHS) General Arrangement – SW Drawing No. JN.900002.0E3231 & Portrait (Hinged RHS) General Arrangement – SW Drawing No. JN.900002.0E3251
- Wastewater Pumping Station (WPS) Standard 2 Pump Panel (Form 4) – Servelec Systems S2000 micro or S2000.

F4.1 Gate (Sluice) Valves

F4.1.3 Valves shall additionally comply with the following:

- O-ring sealed
- Resilient seated
- Stainless steel shafts and fasteners

- Paint spec to WIMES 4.01
- Suitable for long periods (> 12 months) of idleness without seizing
- Marked with direction of closure
- Individually tightness tested in accordance with BS EN 12266-1

F4.2 Check (Reflux) Valves

F4.2.4 Add sentence: 'The half-inch BSP plugged tappings shall be fitted with stainless steel quarter-turn ball valves.'

F4.4 Miscellaneous

F4.4.1 Add sentence: 'The half-inch BSP plugged tappings shall be installed on the horizontal centreline and fitted with stainless steel quarter-turn ball valves.'

F4.5 Isolation

For the purposes of Baseline Mechanical Isolation (in accordance with HSG 253 Safe Isolation of Plant and Equipment), the following shall be applied to achieve Proved Isolation of the Single Block and Bleed:

- NRV: Downstream isolation valve fitted and Bleed (test point) fitted to downstream part of NRV.
- Pumps: Downstream isolation valve fitted and Bleed (test point) fitted to downstream part of NRV. Note pumps and associated pipework are self-draining.
- Rising main, common manifold and flowmeter (where fitted): Drained through Bauer connection and Bleed (test point) fitted to common manifold.
- Wet well: Upstream isolation valve with Bleed via visual leakage into wet well. Final Isolation by temporary means as per task specific risk assessment.

APPENDIX VII ASSOCIATED SOUTHERN WATER STANDARDS

<u>TSM</u>	Technical Specifications Manual, including:-
<u>MED 4001</u>	Mechanical and Electrical General Specification
<u>MED 4003</u>	Condition Monitoring
<u>MED 4004</u>	Hazardous Area Classification
<u>MED 4100</u>	Valves
<u>MED 4131</u>	Ventilation Systems
<u>MED 4138</u>	Lifting Equipment
<u>MED 4140</u>	Mixed Flow Volute Submersible Sewage and Sludge Pumpsets
<u>MED 4142</u>	Micro Pumping Stations
<u>MED 4301</u>	Package Plant and Control Panels rated up to 100 Amps
<u>MED 4408</u>	Telemetry
<u>MED 4415</u>	Liquid Flow Metering
<u>MED 4417</u>	Control of Pumps
<u>MED 4433</u>	Liquid Level Measurement
<u>CED 4001</u>	Hydraulic Design Requirements
<u>CED 4010</u>	Pressure Pipelines and Rising Mains
<u>CED 4019</u>	Fibre Reinforced Plastic Kiosks
<u>CED 4023</u>	CESWI Amended and Supplementary Clauses
<u>PSWWT 4022</u>	Odour Control – Load Assessment and Dispersion Modelling
<u>COM</u>	Commissioning Manual
<u>WOM</u>	Works Operation & Maintenance Manual
<u>M&E 3015</u>	Procedure for Inspection of Lifting Equipment
RD.000000.0Z3901	2 Submersible Pump - Network with valve chamber
RD.000000.0Z3926	2 Submersible Package Pumping Station - (Network & Site)
RD.000000.0Z3931	Micro Pumping Station

6. DETAILS OF CHANGE HISTORY**Issue 4**

Section No.	Paragraph No.	Change	Rational for Change
1.0	All	Design and Construction Guidance (DCG) changed from Version 1.0 to 2.1	Change of DCG from V1.0 to 2.1 – though amendment in V2.1 has no impact in current MED.
Misc	Misc	Change reference from SFA to DCG	SFA now called DCG
Misc	Misc	Change from ATEX to Potentially Explosive Atmospheres Regulations 1996	BREXIT
D7.7.	2a	Requirement for Manhole covers near coastal regions changed from stainless steel to galv	To align with WIMES 8.03

Authorised by



Signature

.....Mike Kay

This page is intentionally left blank