

TECHNICAL SUBMISSION

PROJECT

One Horton Heath – Northern Pump Station

CLIENT

PFA Consulting

PROJECT REFERENCE

PR16417

ISSUE

A

Change History

Issue	Revision Description	Date	Engineer	Approved
A	Initial submission for submission to Southern Water for approval	11.06.2022	P. Warner	P. Warner

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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 (30000 ft²) 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 Northern Pump Station. A separate submission has been prepared for the Southern Pump Station.

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

- 1175 Residential dwellings.
- 5500m² of Employment area
- 2787m² (30000 ft²) Mixed use area
- Pump flows entering the gravity system from the Southern Pump Station

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 public sewer network.

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 wet well.

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 E

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 areas also as Zone 1 environments although there is no electrical equipment installed in these areas.

A Zoning Plan is shown on drawing 1641-16417-006

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 E 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.

- 1175 Residential dwellings.
- 5500m² of Employment area
- 2787m² (30000 ft²) Mixed use area
- Pump flows entering the gravity system from the Southern Pump Station

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.

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

Residential Dwellings

4000 litres per dwelling per day design flow

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 1175 dwellings at 4000 litres per day per dwelling we calculate the design flow to be 54.398l/s.

Employment Area

This element has an area of 5500m²

Using the 1.3l/s/ha criteria and applying this to the area of 5500m² we get a calculated peak flow according to DCG criteria of 0.715l/s.

Mixed Use Area

This element has an area of 30000ft² which equates to 2788m²

Using the 1.3l/s/ha criteria and applying this to the area of 2788m² we get a calculated peak flow according to DCG criteria of 0.362l/s.

In summary this gives total design flows that derive from gravity excluding pumped flows from the Southern Pump Station as follows

Element	Design Flows (l/s)
Dwellings	54.398
Employment Area	0.715
Mixed Use Area	0.362
Total	55.476

Pumped Flows from Southern Pump Station

Referring to the submission for this pump station the calculated pump rate is 36.50l/s

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 or that to provide a self-cleansing velocity in the rising main.

For the flows that emanate from gravity this equates to 27.74l/s

The pumped flows from the Southern Pump Station have already been halved and are not to be halved again. To the above rate we therefore need to add 36.50l/s

This equates to a total calculated pump rate of 64.24l/s.

We are proposing the rising main is a 315mm OD PE100 SDR11 pressure pipe with a 255.6mm bore through which a minimum 38.48l/s would be required for self-cleansing. The highest of the requirements is the calculated rate and it is on a rounded 64.25l/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 315mm OD PE100 SDR11 pressure pipe with a 255.6mm bore is proposed.

The rising main is 428.064m long and has an undulating profile. As the rising main is less than 500m long then it is not proposed to prepare a surge report in this instance.

The rising main has a high point at chainages of 183.789m and 355.582m where air valve assemblies would be installed and a low point at a chainage of 211.405m where a washout assembly would be installed. Please refer to the drawings in Appendix F for details of these.

6: Emergency Storage

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.

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 1175 dwellings.

Based on the 160 litres per day criteria detailed above this equates to a requirement of 188.000m³

Employment Area

The design flow for this element is 0.715/s. One hour at design flow equates to 2.574m³.

Mixed Use Area

The design flow for this element is 0.362l/s. One hour at design flow equates to 1.305m³.

In summary this gives total emergency storage as follows

Element	Storage (m ³)
Dwellings	188.000
Employment Area	2.574
Mixed Use Area	1.305
Total	191.879

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 16.200m. The valve chamber base in this instance has a level of 14.904m 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 C there is 17.776m³ of storage in the main manholes, 18.152m³ in the pipe runs, 174.617m³ in the Weholite chamber and 26.882m³ in the wet well. This totals 237.428m³ which is 23% more than required.

Manufacturers drawings for the storage chamber will be contained in Appendix D 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 2.04 hours and when fully completed 1.02 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 F 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 64.25l/s against a total head of 17.79m for which we have selected submersible sewage pumps from the Xylem NP3171MT range fitted with 432 impellers and 18.5kw 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	64.20	1.31	1.25
Mid Water Level	67.54	1.38	1.32
Duty Pump Start	70.60	1.44	1.38
Standby Pump Start	71.20	1.45	1.39
High Level Alarm	71.60	1.46	1.40
Inlet	72.50	1.48	1.41
Maximum Storage Level (14.904m)	86.10	1.75	1.68

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 1641-16417-001 to 010 contained in Appendix F.

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 G 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 pump station pipework would terminate a short distance outside the valve chamber in a 250mm 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 I 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 the Southern 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 H 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 J.

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 1000mm (Twin Lid)	Prolift
Valve Chamber	3300 x 2400mm (Multi Lid)	Defender

14: Lifting Equipment

Pumps weigh 300kg

We propose that a REID Porta Quantum lifting davit be provided complete with a single cast in type davit socket all rated for 600kg SWL with the davit socket in the position as shown on the PDAS drawings.

Details of the Quantum lifting davit are contained in Appendix L

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)	64.25
Head Generated (m)	17.79
Pump Manufacturer	Xylem
Pump Type	NP3171MT
Impeller Type / Reference	N / 432
Solids Handling (mm)	N/A
Hazardous Area Rating of Pump	EXP
Motor Rating (kw)	18.5
Speed (rpm)	1460
Electric Supply	230/400V 50Hz, 3 Phase
Full Load Current (Amps)	36
Method of Starting	Star Delta
Length of Cables	30
Level Controls	Siemens Hydromanager 200 Plus Ultrasonic plus high level and back up float switches
Wet Well Diameter (mm)	3000
Wet Well Depth (m)	7.800
Station Pipes and Valves (mm)	250
Station Final Discharge Pipe (mm)	250 terminating in 250mm PN16 Flange
Pump Station Pipe Material	Ductile Iron
Rising Main(By Others)	315mm OD PE100 SDR11 (255.6mm Bore)
Access Covers (Supply Only)	Manufacturer: Steelway Rating: FACTA B Inlet Manhole 1000 x 1000mm (Prolift - Single Lid) Wet Well 1800 x 1000mm (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	1641-16417-001-010

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 Hydromat 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 Transmitter
- 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 1000mm 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 Quantum Davit 600kg 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. Extension spindles with brackets on all valve chamber isolating valves
4. Pressure tappings on valve chamber pipe work
5. 150mm Bauer coupling on over pumping tee
6. Rubber matting in control panel kiosk
7. 100mm valve chamber drain with gate valve located over it in valve chamber and flap valve in wet well
8. Air valve assembly at chainage 183.789m as shown on drawing 1641-16417-008
9. Washout assembly at chainage 211.405m as shown on drawing 1641-16417-009
10. Air valve assembly at chainage 355.582m as shown on drawing 1641-16417-010
11. 2500 Litre temporary dosing unit as required. Removed prior to adoption
12. 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



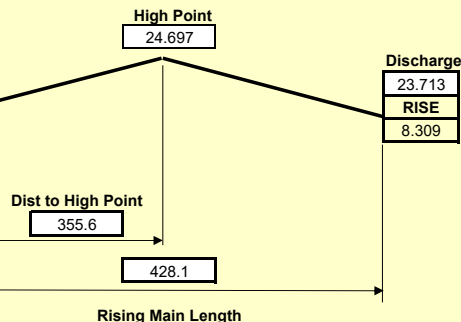
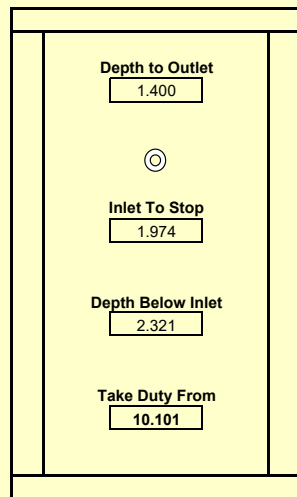
Site Reference	1641
Date	11.06.2022
Project Reference	PR16417
Date	11.06.2022

Clients Name	PFA Consulting
Site Address	One Horton Heath - Northern Pump Station

Adopting Authority	Southern Water
Pump Station Type	Foul
Number of Dwellings	1175
Employment Area (M2)	5500
Mixed Use Area (M2)	2788
Non Domestic Rate (l/s Hectare)	1.3
Inflow From Southern PS	36.5
Number of Pumps	2
Number of Duty Pumps	1

Design Flow / Rising Main		
Design Flow Dwellings	54.398	l/s
Design Flow Employment	0.715	l/s
Design Flow Mixed Use	0.362	l/s
Total Design Flow	55.476	l/s
Pump Discharge Rate DCG	27.74	l/s
Inflow From Southern PS	36.50	l/s
Calculated Pump Rate	64.24	l/s
Pump Discharge Rate	64.25	l/s
Rising Main I.D	255.6	mm
Velocity in Main	1.25	m/sec
Surge Analysis	NOT REQUIRED	

Cover Level	16.804
VC Outlet	15.404
Max Storage	14.904
Inlet	11.325
HLA	11.101
P2 Start	11.001
P1 Start	10.851
Mid Water	10.101
Stop Level	9.351
Dead Area	347
Base Level	9.004



Notes:

Wet Well	
Wet Well Diameter	3000 mm
Calc Chamber Depth	7.170 m
Volume Per M	7,068.58 litres
Depth Between Starts	100 mm
Actual Chamber Depth	7.800 m
Theoretical Op Volume	7,710.00 litres
Actual Op Volume	8,365.34 litres
Max Theoretical Starts	7.50
Actual Starts	7.27

Retention Calculations		
Dwf Inflow Per Day	712,121.21	litres
Rising Main Volume	21,964.45	litres
Combined Main and Op Vol	30,329.79	litres
No. of Main Clears per Day	23.48	
Retention Full Usage	1.02	Hours
Retention Half Usage	2.04	Hours

Retention calcs assume ascending rising main

Storage	
Domestic @ 160L / Dwelling	188.000 m3
Employment 1 Hr @ Design Flow	2.574 m3
Mixed Use 1 Hr @ Design Flow	1.305 m3
Total Required Storage	191.879 m3
Capacity in Gravity System	191.879 m3
Capacity between HLA & inlet	1,583.36 litres

	Rising Main	Common 3	Common 2	Common 1	Individual 3	Individual 2	Individual 1
Flow Rate (l/sec)	64.25	64.25	64.25	64.25	64.25	64.25	64.25
Static Head (M)	14.60						
Pipe Diameter (mm)	255.60	250	250	250	250	250	150
Velocity (M/sec)	1.25	1.31	1.31	1.31	1.31	1.31	3.64
Roughness Factor	0.15	0.15	0.15	0.15	0.15	0.15	0.06
Pipe length (M)	355.582					11	
Duckfoot Bend							1
Short Radius Bends						1	
Long Radius Bends	2					1	
Tee Straight through		3				2	
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)	364.7836	8.25	0	0	0	42.5	8.4
Reynolds Number	2.8E+05	2.9E+05	2.9E+05	2.9E+05	2.9E+05	2.9E+05	4.8E+05
Darcy-Weisbach Friction Factor	0.0188	0.0188	0.0188	0.0188	0.0188	0.0188	0.0171
Velocity Head	0.080	0.087	0.087	0.087	0.087	0.087	0.673
Hydraulic (Piezometric) gradient	0.0059	0.0066	0.0066	0.0066	0.0066	0.0066	0.0766
Friction Head Loss	2.139	0.054	0.000	0.000	0.000	0.279	0.643

Calc Duty Point	
Flow	64.25 l/s
Static Head	14.60 m
Total Head	17.79 m

Pump Selection	
Pump Type	NP3171MT
Impeller	432
Kw Rating	18.5

Actual Duty	
Flow	67.54 l/s
Head	18.10 m

NP 3171 MT 3~ 432

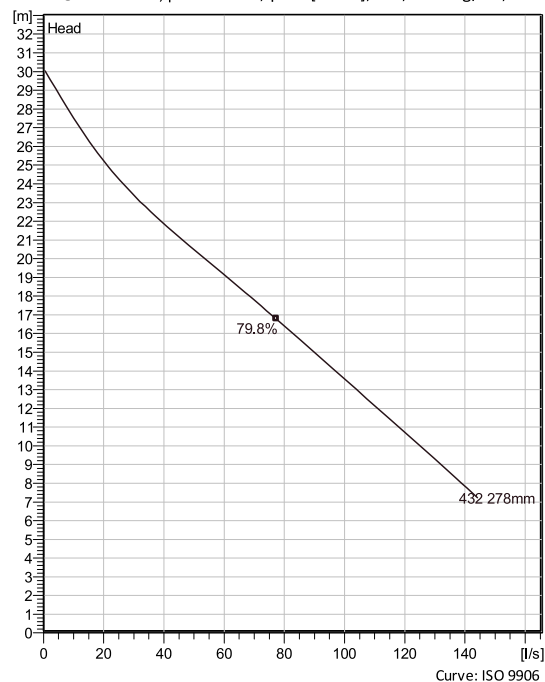
Patented self cleaning semi-open channel impeller, ideal for pumping in most waste water applications. Modular based design with high adaptation grade.



Technical specification



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



Configuration

Motor number N3171.091 25-17-4AA-W 18.5KW	Installation type P - Semi permanent, Wet
Impeller diameter 278 mm	Discharge diameter 150 mm

Pump information

Impeller diameter 278 mm
Discharge diameter 150 mm
Inlet diameter 200 mm
Maximum operating speed 1460 rpm
Number of blades 2
Max. fluid temperature 40 °C

Materials

Impeller Grey cast iron

Project

Block 0

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Created on 6/10/2022 Last update 6/10/2022

NP 3171 MT 3~ 432

Technical specification



Motor - General

Motor number N3171.091 25-17-4AA-W 18.5KW	Phases 3~	Rated speed 1460 rpm	Rated power 18.5 kW
Approval EN	Number of poles 4	Rated current 36 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 0.84	Motor efficiency - 1/1 Load 88.0 %	Total moment of inertia 0.182 kg m ²	Starts per hour max. 30
Power factor - 3/4 Load 0.79	Motor efficiency - 3/4 Load 89.5 %	Starting current, direct starting 223 A	
Power factor - 1/2 Load 0.67	Motor efficiency - 1/2 Load 89.5 %	Starting current, star-delta 74.3 A	

Project

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NP 3171 MT 3~ 432

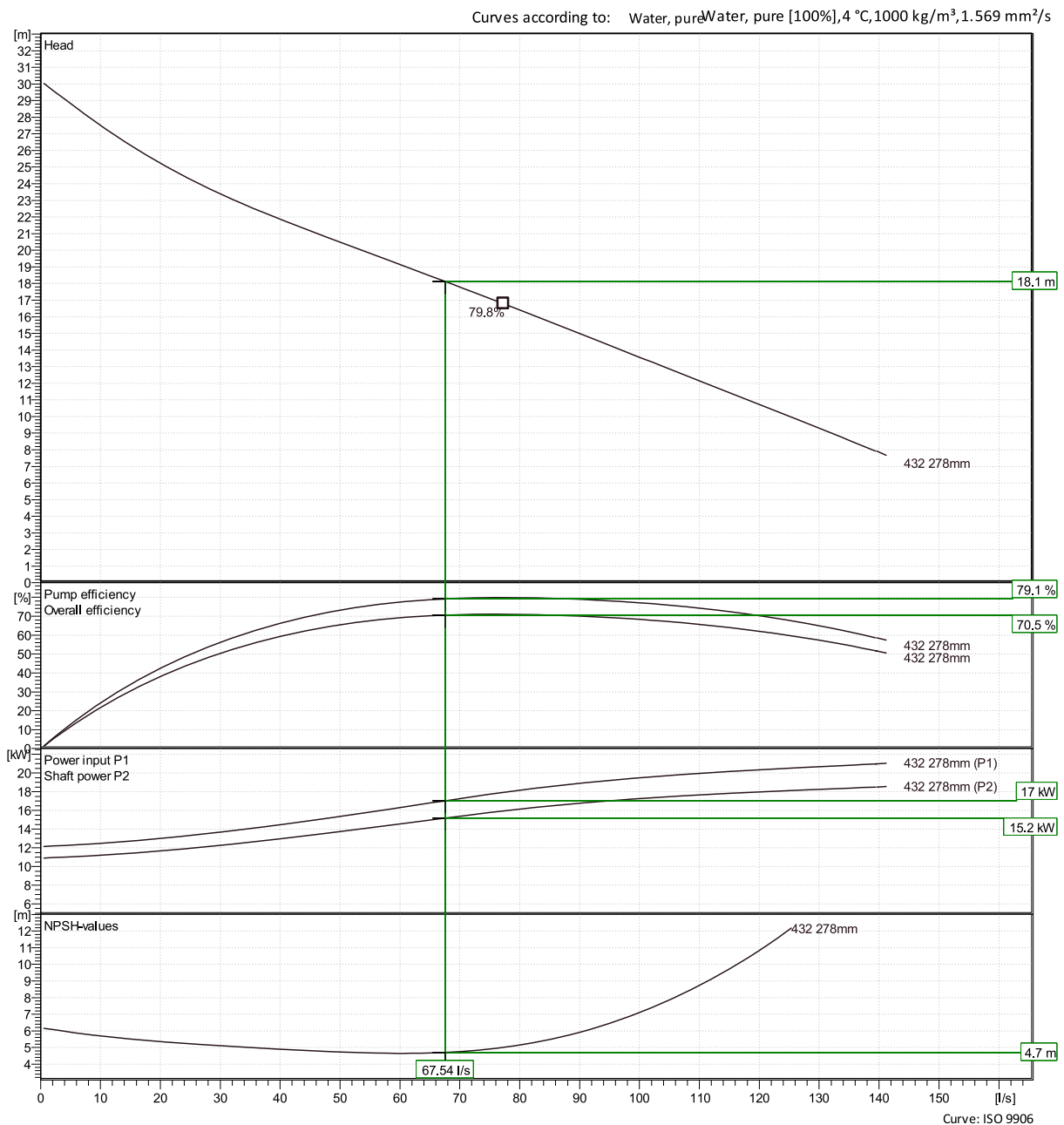
Performance curve



Duty point

Flow
67.5 l/s

Head
18.1 m



0

Created on

6/10/2022

Last update

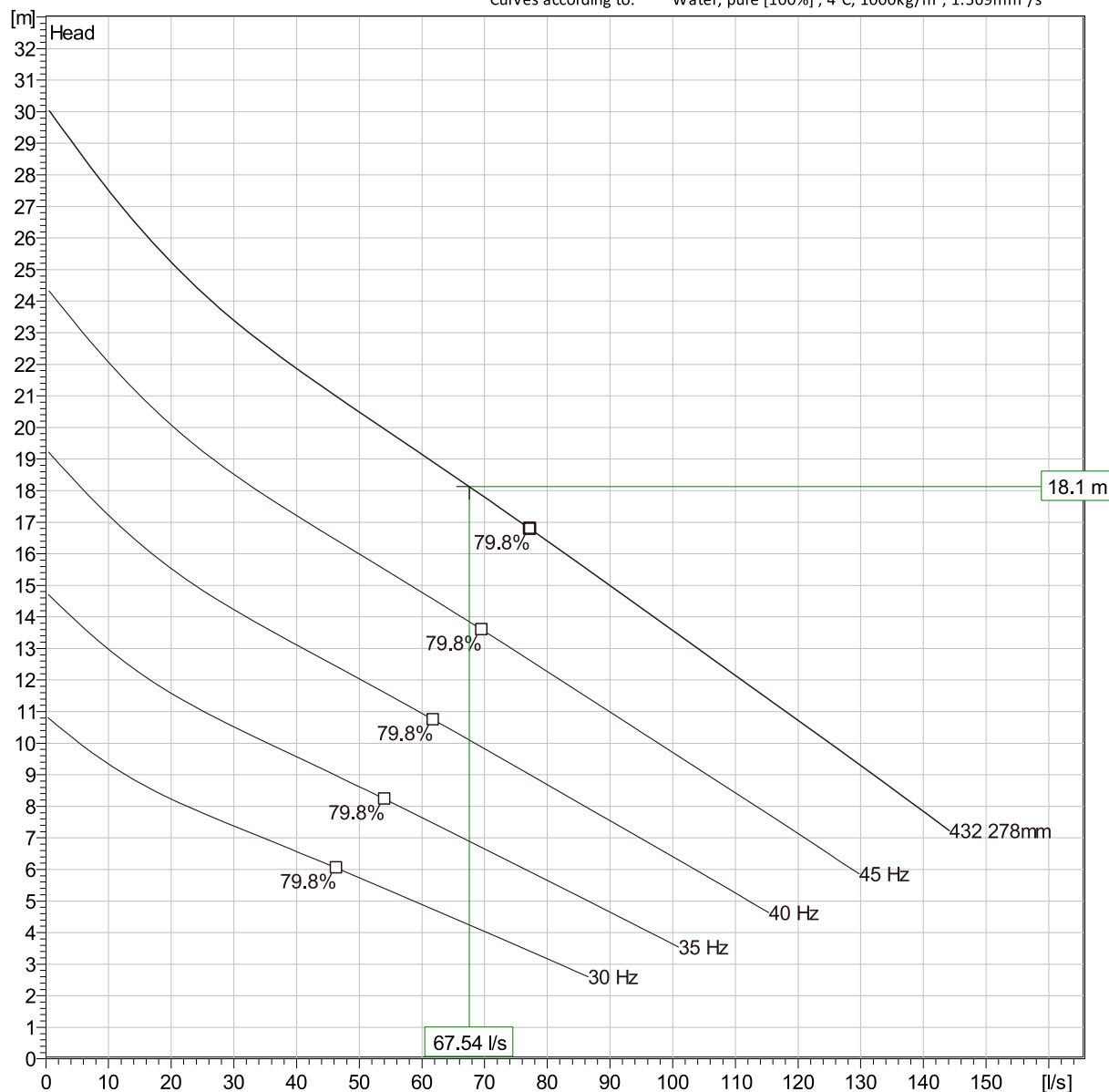
6/10/2022

NP 3171 MT 3~432

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	86.1	15.5	16.5	86.1	15.5	16.5	79.4 %	0.0601	5.57
Inlet	72.5	17.4	15.6	72.5	17.4	15.6	79.7 %	0.067	4.82
High Level Alarm	71.6	17.6	15.5	71.6	17.6	15.5	79.6 %	0.0675	4.79
Standby Pump Sta	71.2	17.6	15.5	71.2	17.6	15.5	79.6 %	0.0678	4.78
Duty Pump Start	70.6	17.7	15.4	70.6	17.7	15.4	79.5 %	0.0681	4.77
Mid Water Level	67.5	18.1	15.2	67.5	18.1	15.2	79.1 %	0.07	4.7

Project

Block

Created by

Created on

6/10/2022

Last update

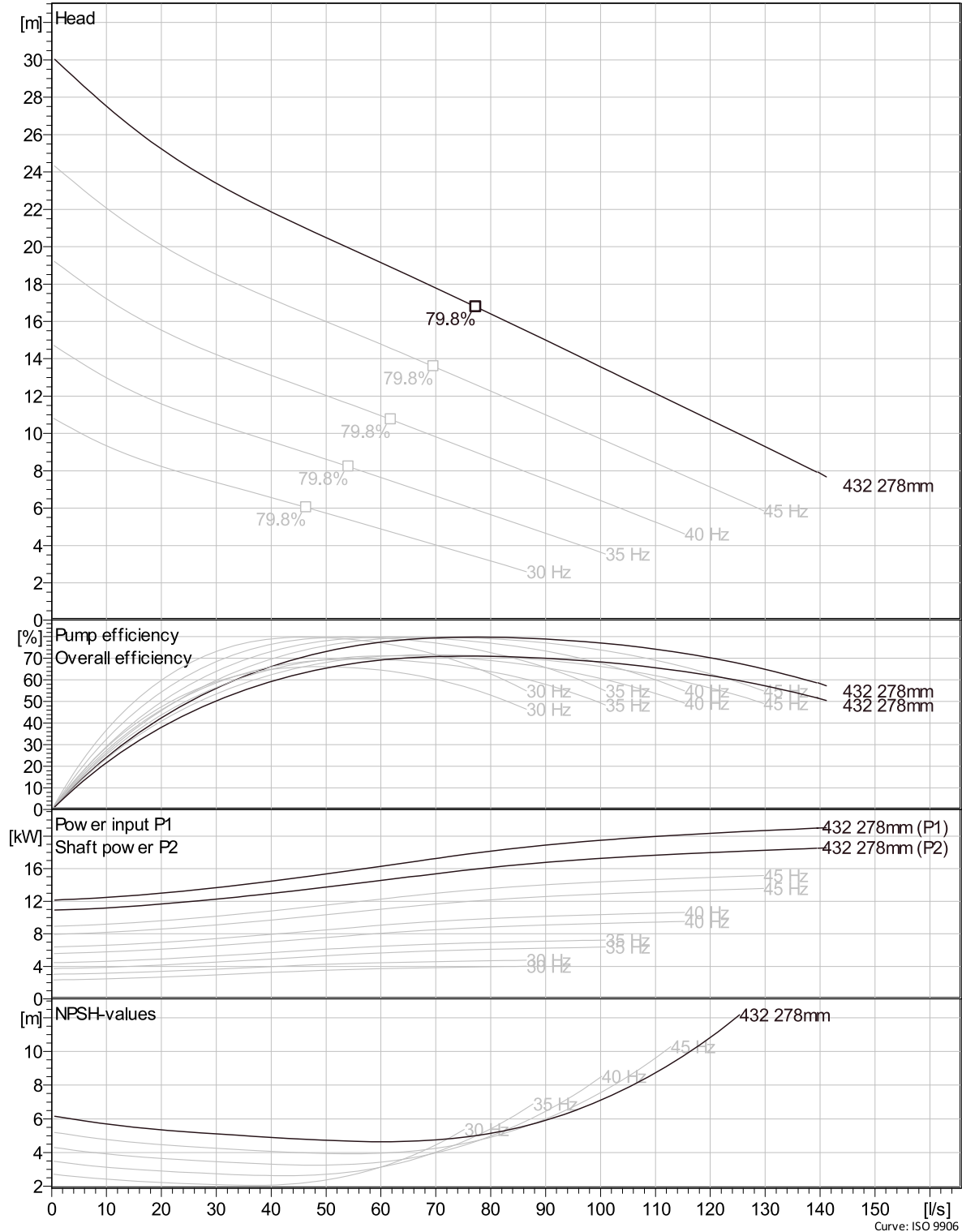
6/10/2022

NP 3171 MT 3~ 432

VFD Curve



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



Project

Block 0

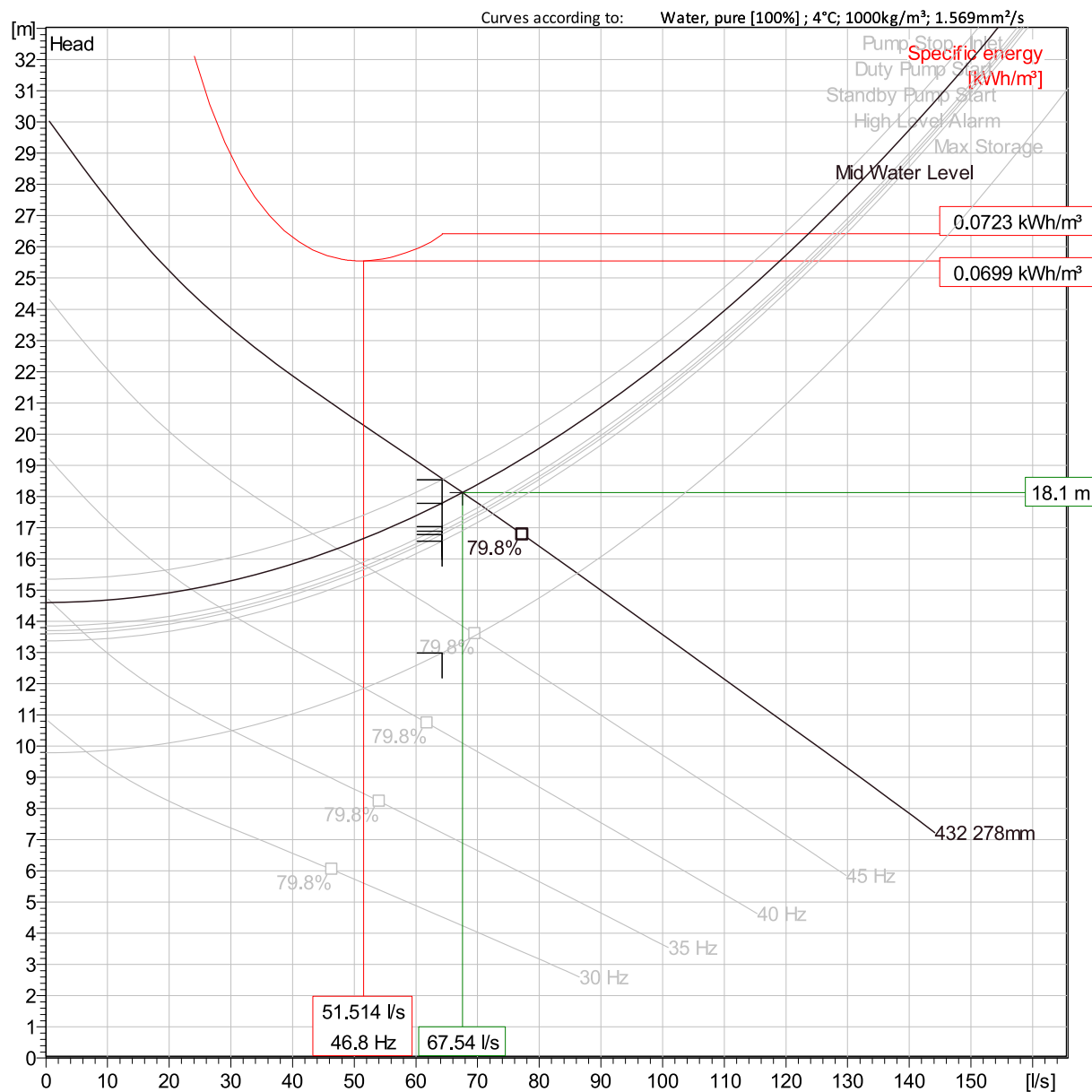
Created by

Created on 6/10/2022 Last update 6/10/2022

Curve: ISO 9906

NP 3171 MT 3~432

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	86.1	15.5	16.5	86.1	15.5	16.5	79.4 %	0.0601	5.57
Max Storage	45 Hz	69.8	13.6	11.6	69.8	13.6	11.6	79.8 %	0.0686	4.24
Max Storage	40 Hz	51.7	11.9	7.65	51.7	11.9	7.65	78.6 %	0.0834	3.26
Max Storage	35 Hz	30.2	10.5	4.53	30.2	10.5	4.53	68.7 %	0.126	2.73

Project

Block 0

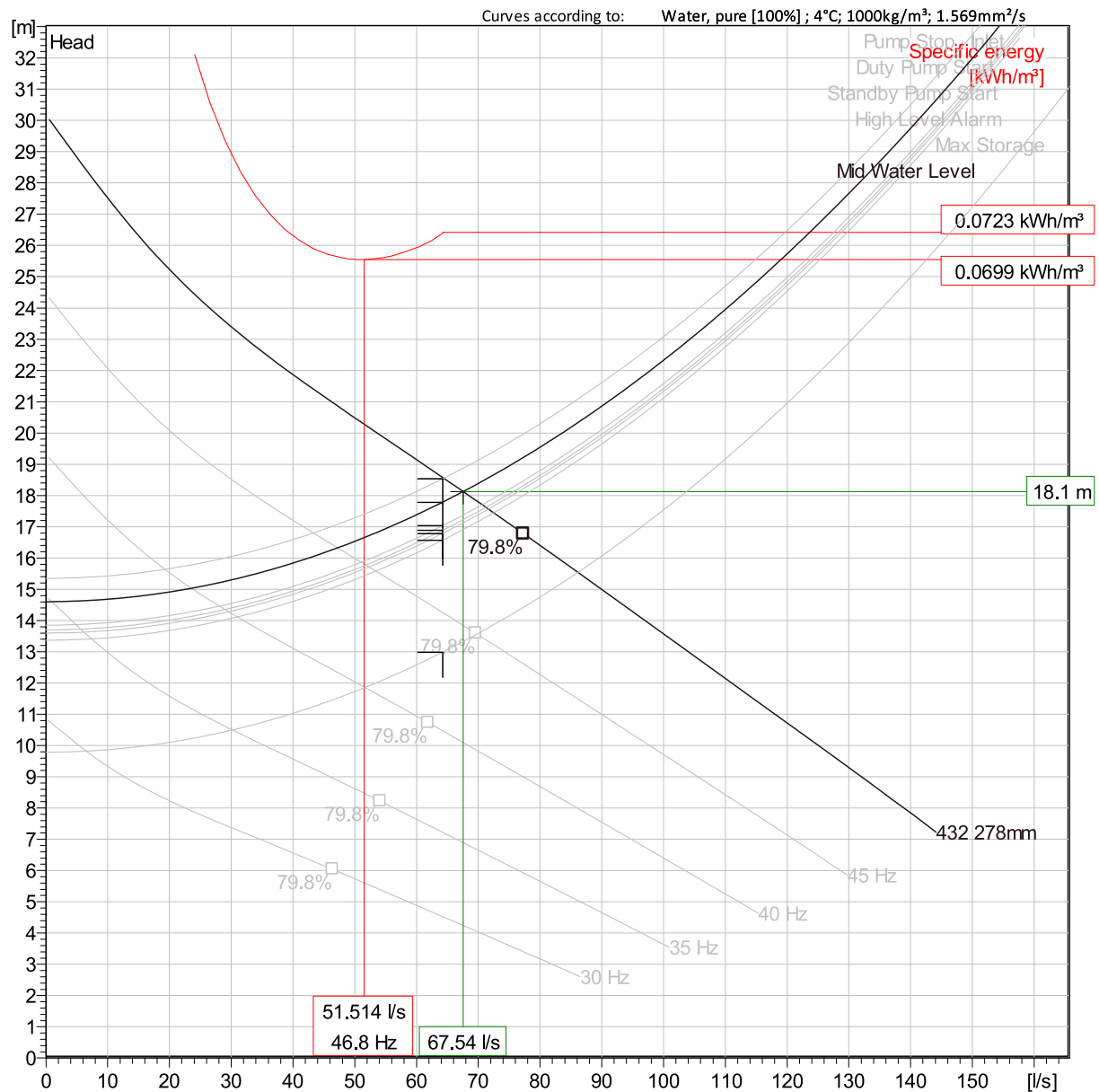
Created by

Created on 6/10/2022

Last update

6/10/2022

VFD Analysis



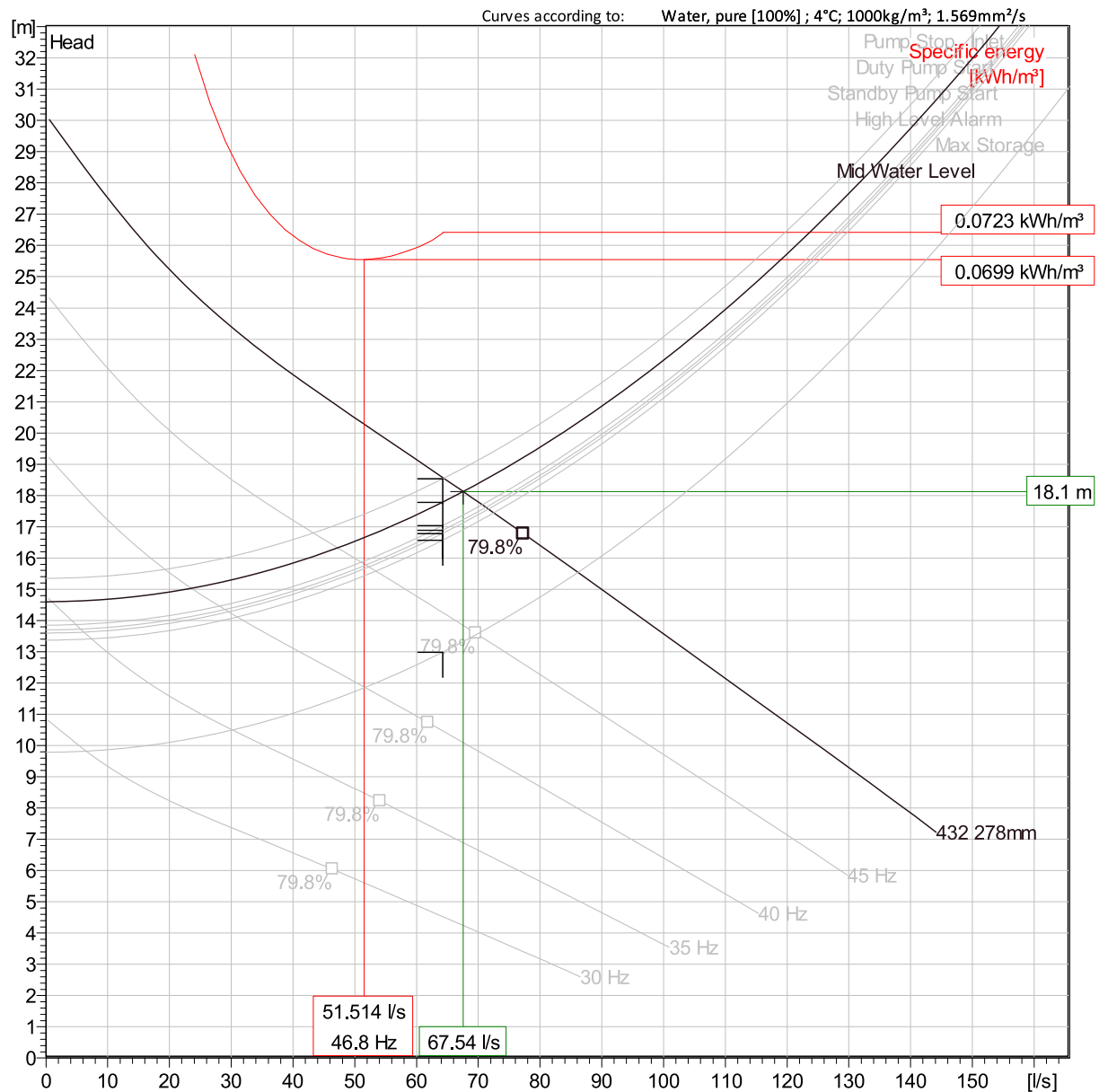
Operating Characteristics

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 Hz	6.55	9.82 m	2.42	6.55	9.82	2.42	26 %	0.523	2.5
Inlet	50 Hz	72.5	17.4	15.6	72.5	17.4	15.6	79.7 %	0.067	4.82
Inlet	45 Hz	53.4	15.6	10.6	53.4	15.6	10.6	77.2 %	0.0815	3.92
Inlet	40 Hz	31	14.1	6.59	31	14.1	6.59	65.1 %	0.123	3.44

Project		Created by			
Block	0	Created on	6/10/2022	Last update	6/10/2022

NP 3171 MT 3~ 432

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 Hz	7.41	13.4	3.85	7.41	13.4	3.85	25.3 %	0.464	3.21
Inlet	30 Hz									
High Level Ala	50 Hz	71.6	17.6	15.5	71.6	17.6	15.5	79.6 %	0.0675	4.79
High Level Ala	45 Hz	52.3	15.7	10.5	52.3	15.7	10.5	76.8 %	0.0827	3.93

Project

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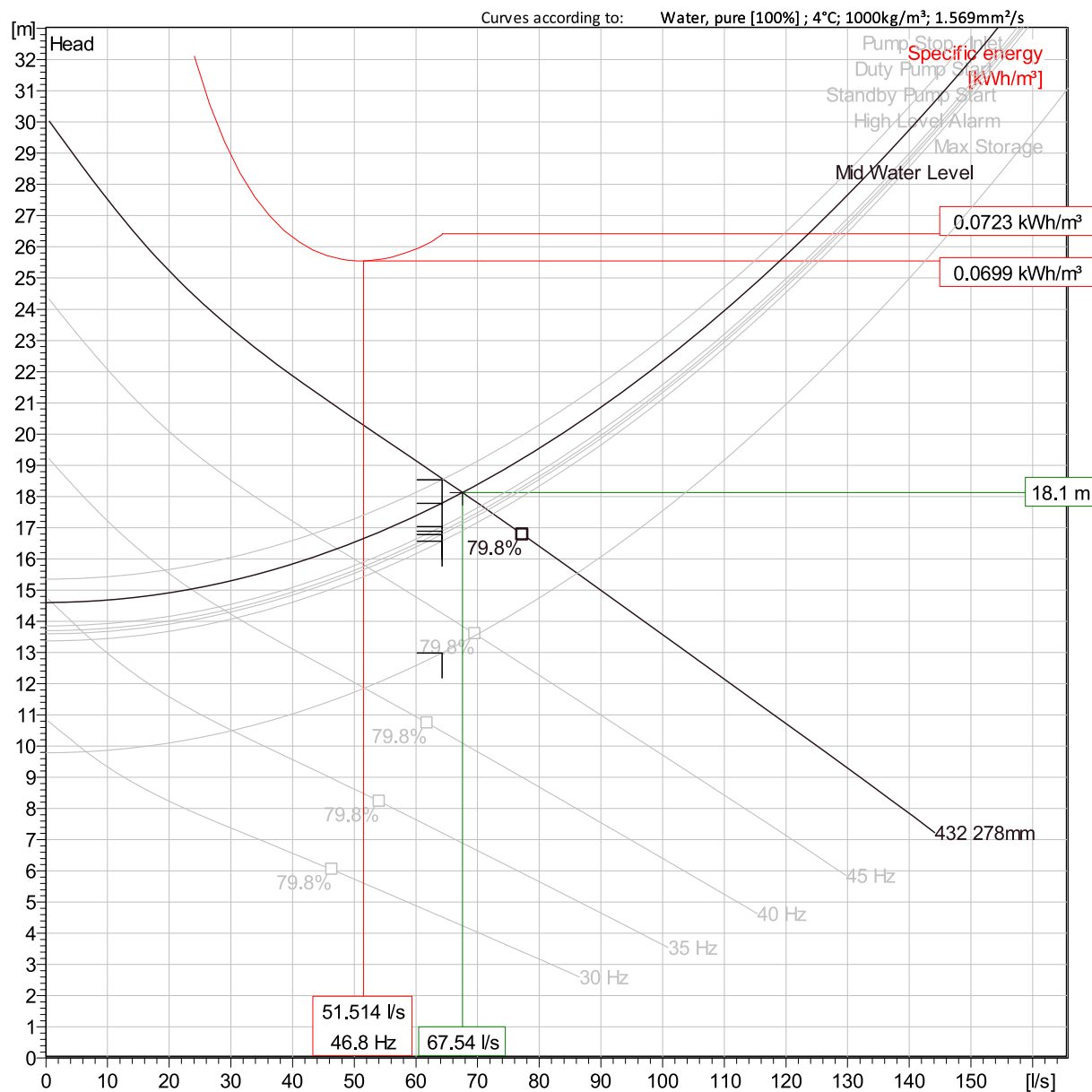
Created on 6/10/2022

Last update

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NP 3171 MT 3~432

VFD Analysis



Operating Characteristics

Pumps / Systems	Frequency	Flow l/s	Head m	Shaft power kW	Flow l/s	Head m	Shaft power kW	Hydr. eff.	Specific energy kWh/m³	NPSHre m
High Level Ala	40 Hz	29.6	14.3	6.52	29.6	14.3	6.52	63.5 %	0.128	3.47
High Level Ala	35 Hz	6.18	13.6	3.82	6.18	13.6	3.82	21.6 %	0.554	3.25
High Level Ala	30 Hz									
Standby Pump	50 Hz	71.2	17.6	15.5	71.2	17.6	15.5	79.6 %	0.0678	4.78

Project

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Created by

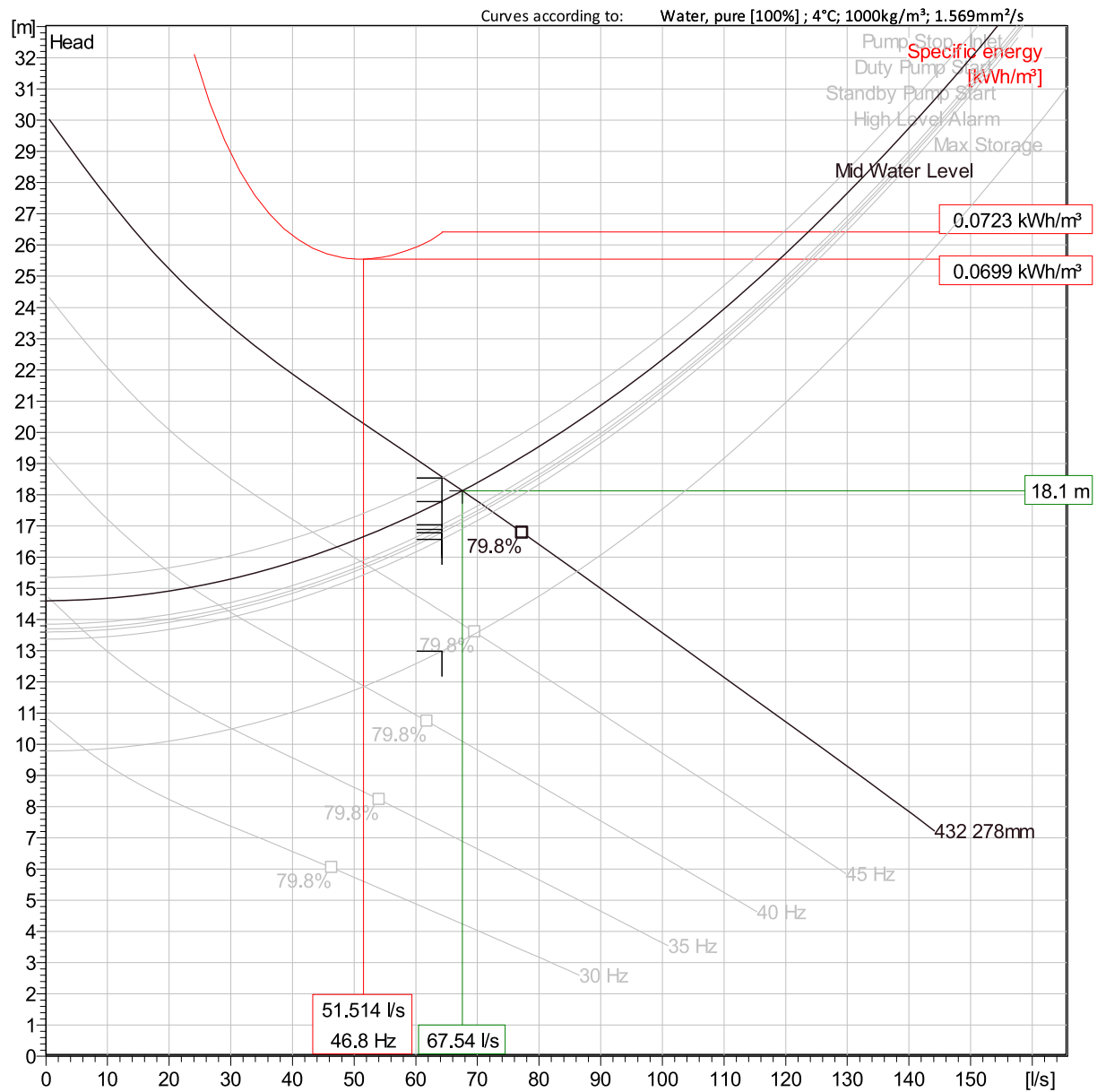
Created on 6/10/2022

Last update

6/10/2022

NP 3171 MT 3~432

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 Hz	51.8	15.8	10.5	51.8	15.8	10.5	76.6 %	0.0832	3.93
Standby Pump:	40 Hz	29	14.3	6.5	29	14.3	6.5	62.8 %	0.13	3.48
Standby Pump:	35 Hz	5.66	13.7	3.81	5.66	13.7	3.81	20 %	0.604	3.27
Standby Pump:	30 Hz									

Project

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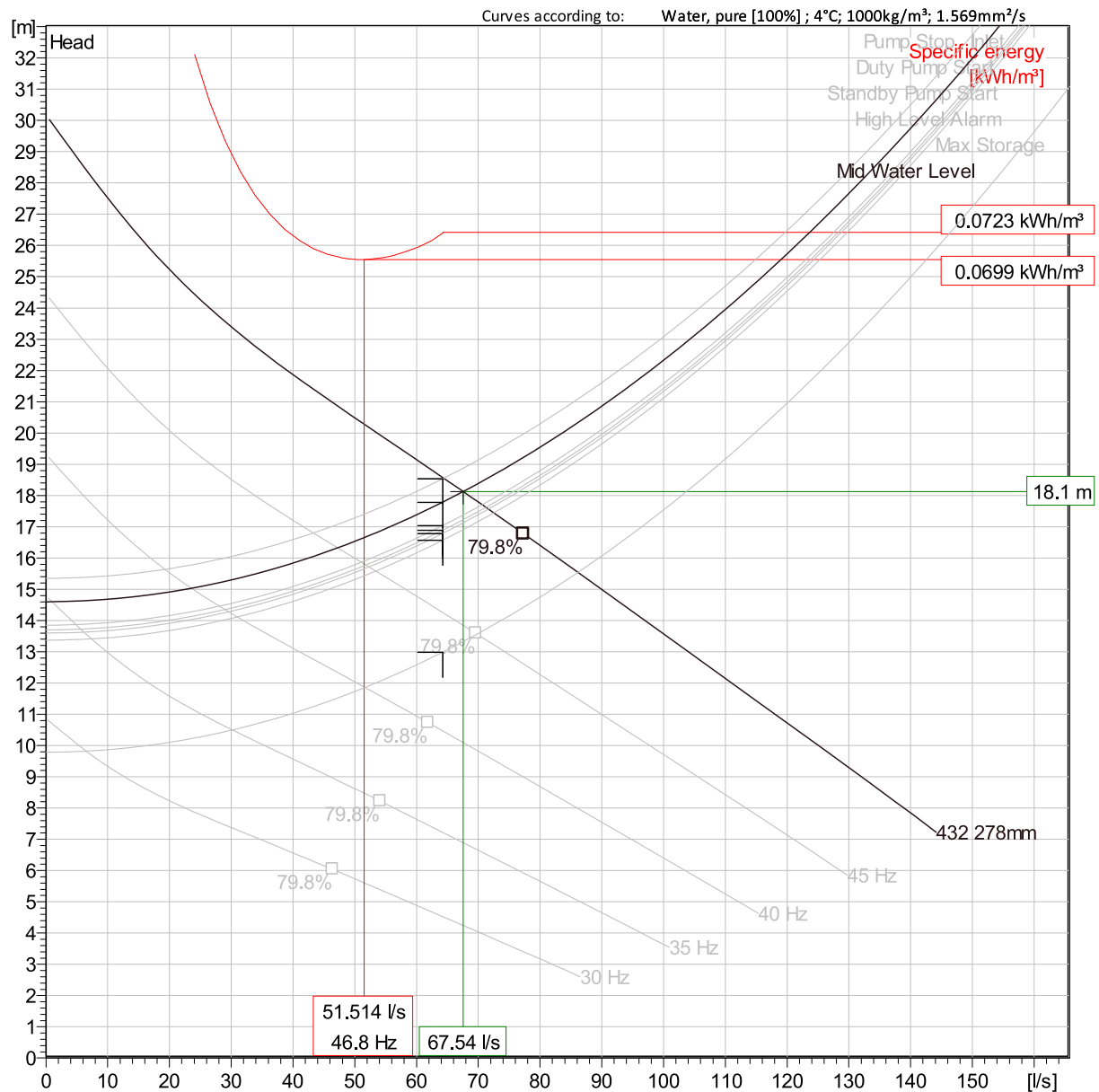
Created on 6/10/2022

Last update

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NP 3171 MT 3~432

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	70.6	17.7	15.4	70.6	17.7	15.4	79.5 %	0.0681	4.77
Duty Pump St	45 Hz	51.1	15.9	10.4	51.1	15.9	10.4	76.3 %	0.0841	3.93
Duty Pump St	40 Hz	28.1	14.5	6.46	28.1	14.5	6.46	61.7 %	0.134	3.5
Duty Pump St	35 Hz	4.87	13.9	3.8	4.87	13.9	3.8	17.5 %	0.7	3.3

Project

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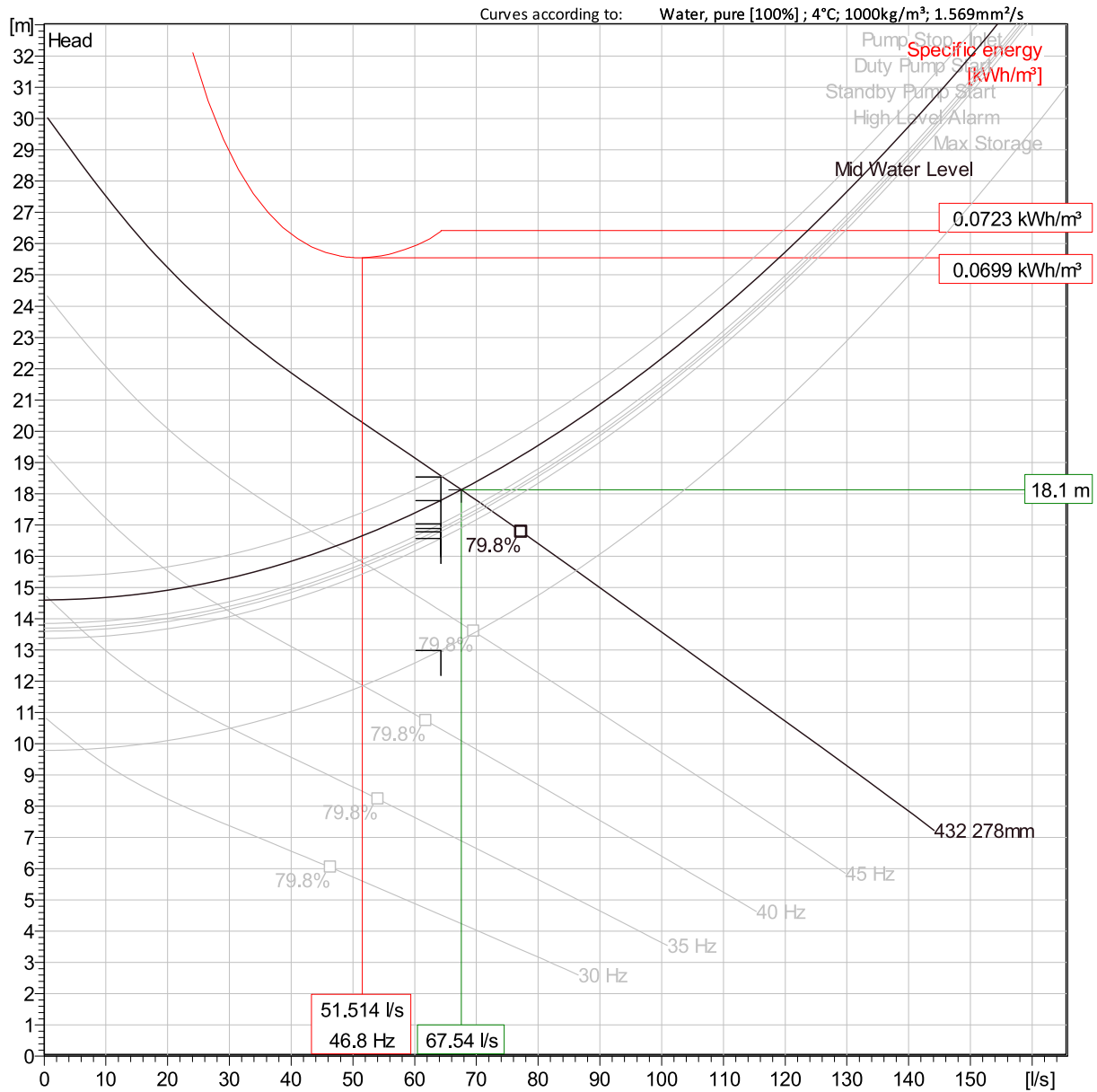
Created on 6/10/2022

Last update

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NP 3171 MT 3~ 432

VFD Analysis



Operating Characteristics

Pumps / Systems	Frequency	Flow l/s	Head m	Shaft power kW	Flow l/s	Head m	Shaft power kW	Hydr. eff.	Specific energy kWh/m³	NPSHre m
Duty Pump St	30 Hz									
Mid Water Le	50 Hz	67.5	18.1	15.2	67.5	18.1	15.2	79.1 %	0.07	4.7
Mid Water Le	45 Hz	47.2	16.3	10.2	47.2	16.3	10.2	74.4 %	0.0888	3.96
Mid Water Le	40 Hz	23.6	15	6.26	23.6	15	6.26	55.5 %	0.156	3.58

Project

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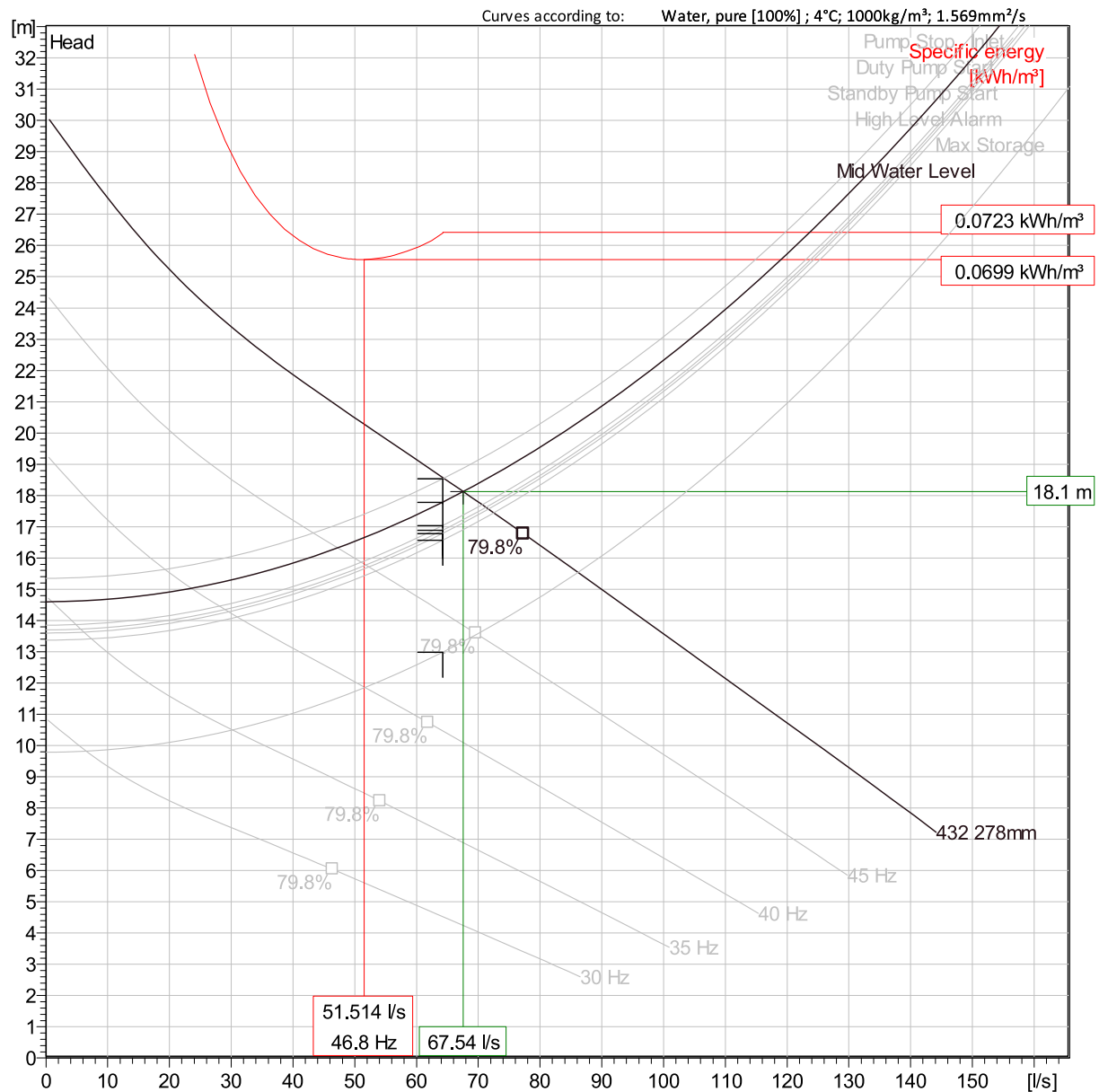
Created on 6/10/2022

Last update

6/10/2022

NP 3171 MT 3~432

VFD Analysis



Operating Characteristics

Pumps / Systems	Frequency	Flow l/s	Head m	Shaft power kW	Flow l/s	Head m	Shaft power kW	Hydr. eff.	Specific energy kWh/m³	NPSHre m
Mid Water Le	35 Hz	0.982	14.6	3.75	0.982	14.6	3.75	3.76 %	3.44	3.45
Mid Water Le	30 Hz									
Pump Stop	50 Hz	64.2	18.5	14.9	64.2	18.5	14.9	78.5 %	0.0723	4.66
Pump Stop	45 Hz	43.3	16.8	9.9	43.3	16.8	9.9	72.1 %	0.0946	4.01

Project

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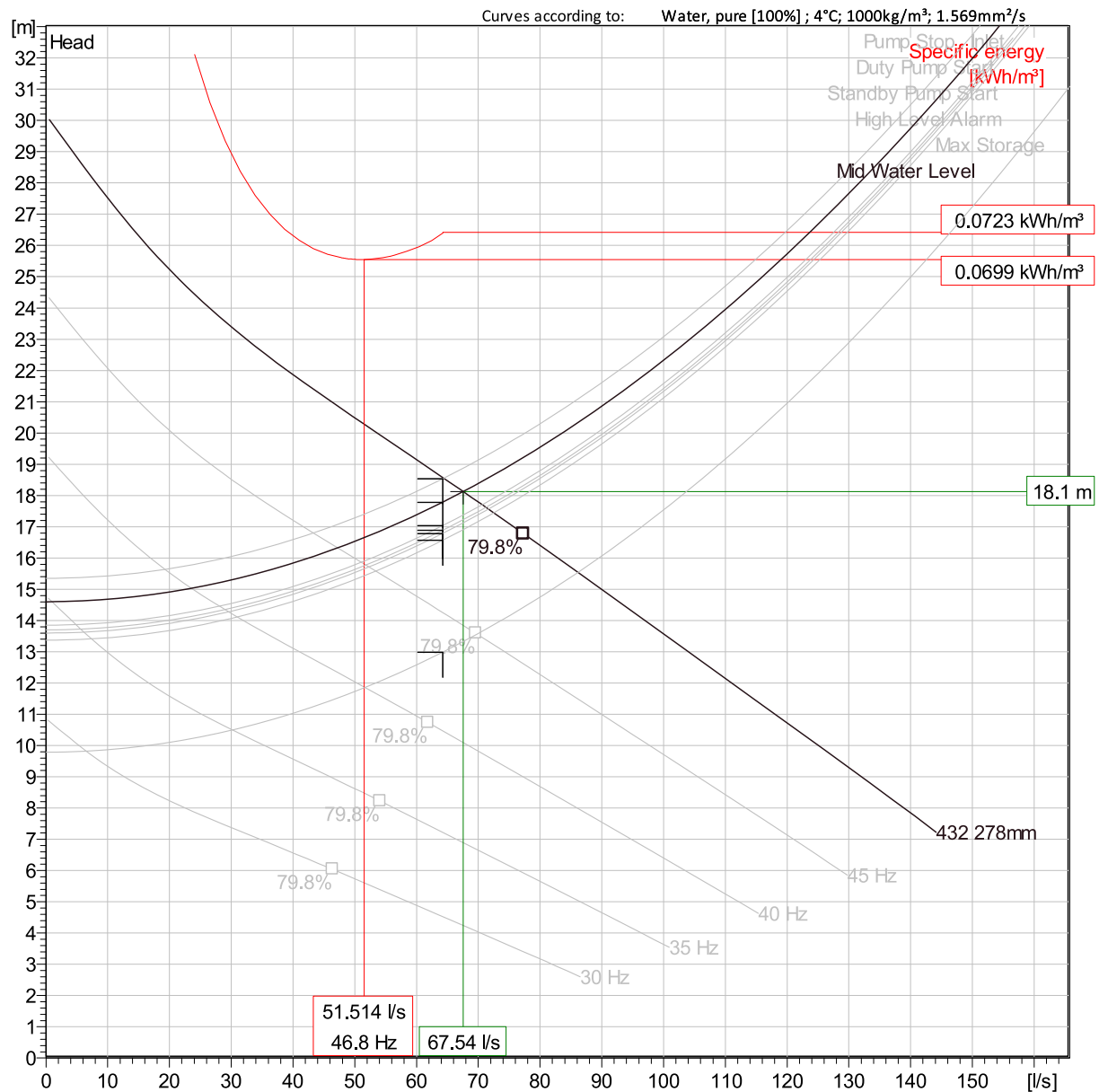
Created on 6/10/2022

Last update

6/10/2022

NP 3171 MT 3~ 432

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 Hz	19.3	15.6	6.09	19.3	15.6	6.09	48.5 %	0.187	3.67
Pump Stop	35 Hz									
Pump Stop	30 Hz									

Project

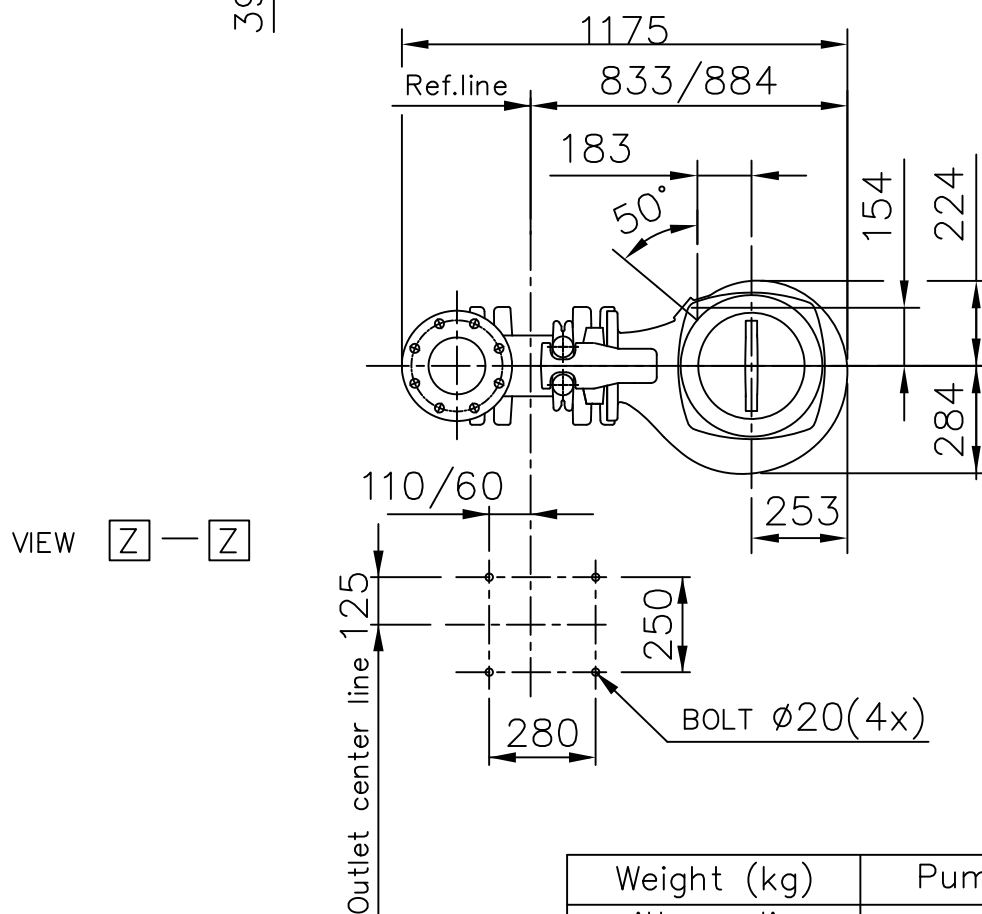
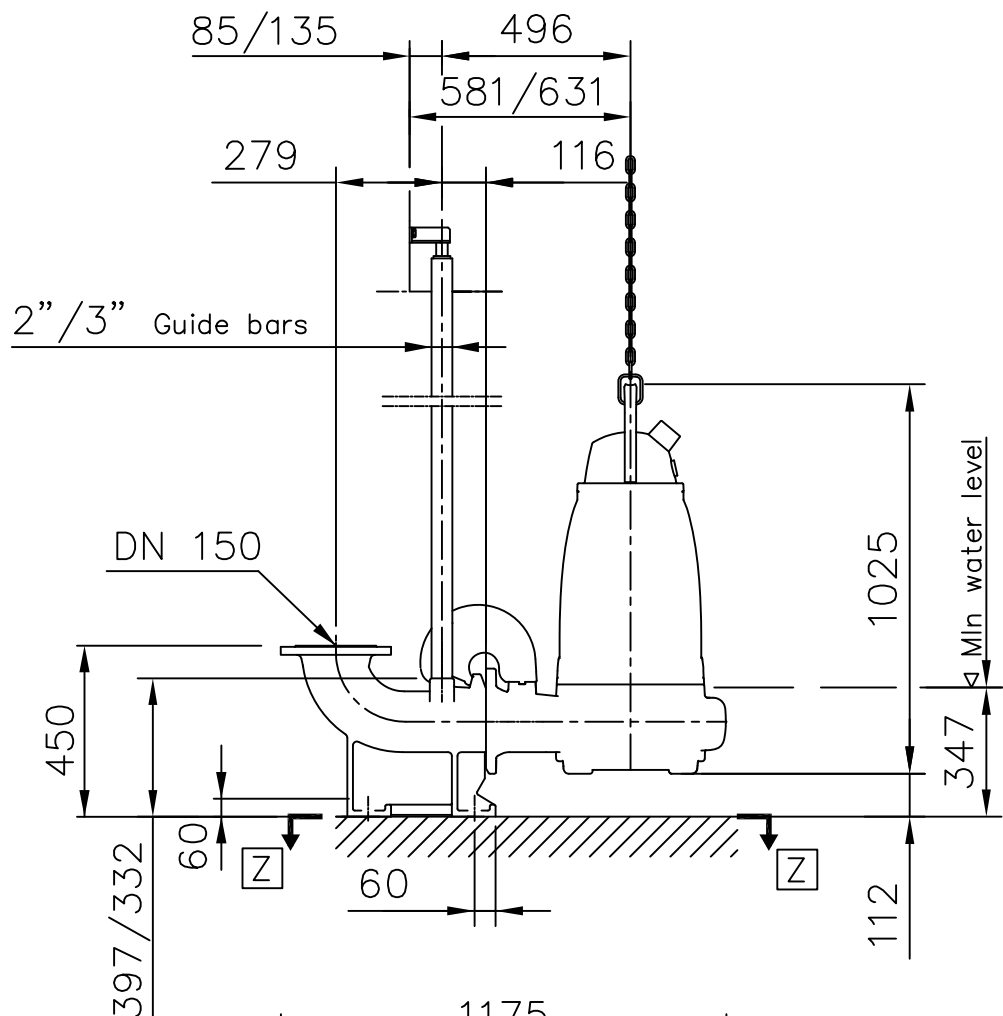
Block 0

Created by

Created on 6/10/2022

Last update

6/10/2022



2" GUIDE BARS FOR NEW INSTALLATION
3" GUIDE BARS FOR RETROFIT

Weight (kg)	Pump	Discharge
with cooling jacket	329	78
without cooling jacket	300	78

	NP,FP	3171	MT		Discharge outlet DN 150	Scale	Date
	091,095,181,185,350,390,660,670				Pump outlet DN 150	1: 20	191212
					Pump inlet Suction inlet	Drawing number	Revision
						6599500	18

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

Emergency Storage Calculations

PDAS Ltd Building 4.6 HiTech Frimley 4 Business Park Frimley, Camberley Surrey GU16 7SG	 Pump Design and Services Ltd Tel 01483 930520	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 60%;">Quote Reference</td> <td>1641</td> </tr> <tr> <td>Date</td> <td>11.06.2022</td> </tr> <tr> <td>Project Reference</td> <td>PR16417</td> </tr> <tr> <td>Date</td> <td>11.06.2022</td> </tr> </table>	Quote Reference	1641	Date	11.06.2022	Project Reference	PR16417	Date	11.06.2022																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
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<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th colspan="6" style="text-align: center;">Storage in Gravity Manholes</th> <th></th> </tr> <tr> <th>Manhole Reference</th> <th>Manhole Diameter (mm)</th> <th>Max Storage Level (m)</th> <th>Cover Level (m)</th> <th>Invert Level (m)</th> <th>Storage Volume (m3)</th> <th>Private Manhole Invert (m)</th> </tr> <tr><td>Inlet</td><td>1800</td><td>14.904</td><td>16.804</td><td>11.375</td><td>8.980</td><td></td></tr> <tr><td>F116</td><td>1350</td><td>14.904</td><td>17.810</td><td>13.630</td><td>1.824</td><td></td></tr> <tr><td>F115</td><td>1350</td><td>14.904</td><td>17.720</td><td>13.657</td><td>1.785</td><td></td></tr> <tr><td>F114</td><td>1200</td><td>14.904</td><td>18.022</td><td>14.425</td><td>0.542</td><td></td></tr> <tr><td>F113</td><td>1200</td><td>14.904</td><td>17.958</td><td>15.477</td><td>0.000</td><td></td></tr> <tr><td>F112</td><td>1200</td><td>14.904</td><td>18.556</td><td>15.580</td><td>0.000</td><td></td></tr> <tr><td>F111</td><td>1200</td><td>14.904</td><td>17.174</td><td>15.885</td><td>0.000</td><td></td></tr> <tr><td>F110</td><td>1200</td><td>14.904</td><td>18.038</td><td>16.683</td><td>0.000</td><td></td></tr> <tr><td>F109</td><td>1200</td><td>14.904</td><td>18.513</td><td>16.000</td><td>0.000</td><td></td></tr> <tr><td>F108</td><td>1200</td><td>14.904</td><td>18.860</td><td>16.315</td><td>0.000</td><td></td></tr> <tr><td>F107</td><td>1200</td><td>14.904</td><td>19.006</td><td>16.630</td><td>0.000</td><td></td></tr> <tr><td>F106</td><td>1200</td><td>14.904</td><td>19.886</td><td>18.148</td><td>0.000</td><td></td></tr> <tr><td>F105</td><td>1200</td><td>14.904</td><td>20.177</td><td>18.332</td><td>0.000</td><td></td></tr> <tr><td>F104</td><td>1200</td><td>14.904</td><td>20.550</td><td>18.644</td><td>0.000</td><td></td></tr> <tr><td>F103</td><td>1200</td><td>14.904</td><td>20.741</td><td>18.755</td><td>0.000</td><td></td></tr> <tr><td>F102</td><td>1200</td><td>14.904</td><td>21.729</td><td>19.021</td><td>0.000</td><td></td></tr> <tr><td>F101</td><td>1200</td><td>14.904</td><td>21.676</td><td>20.326</td><td>0.000</td><td></td></tr> <tr><td>F100</td><td>1200</td><td>14.904</td><td>22.218</td><td>20.759</td><td>0.000</td><td></td></tr> <tr><td>F99</td><td>1200</td><td>14.904</td><td>23.061</td><td>21.711</td><td>0.000</td><td></td></tr> <tr><td>F98</td><td>1200</td><td>14.904</td><td>24.510</td><td>23.160</td><td>0.000</td><td></td></tr> <tr><td>F97</td><td>1200</td><td>14.904</td><td>22.902</td><td>21.552</td><td>0.000</td><td></td></tr> <tr><td>F96</td><td>1200</td><td>14.904</td><td>23.859</td><td>22.509</td><td>0.000</td><td></td></tr> <tr><td>F95</td><td>1200</td><td>14.904</td><td>25.096</td><td>23.746</td><td>0.000</td><td></td></tr> <tr><td>F94</td><td>1200</td><td>14.904</td><td>23.048</td><td>19.453</td><td>0.000</td><td></td></tr> <tr><td>F93</td><td>1200</td><td>14.904</td><td>23.327</td><td>19.673</td><td>0.000</td><td></td></tr> <tr><td>F92</td><td>1200</td><td>14.904</td><td>23.965</td><td>22.615</td><td>0.000</td><td></td></tr> <tr><td>F91</td><td>1200</td><td>14.904</td><td>25.476</td><td>23.230</td><td>0.000</td><td></td></tr> <tr><td>F90</td><td>1200</td><td>14.904</td><td>25.130</td><td>23.384</td><td>0.000</td><td></td></tr> <tr><td>F89</td><td>1200</td><td>14.904</td><td>24.922</td><td>23.572</td><td>0.000</td><td></td></tr> <tr><td>F88</td><td>1200</td><td>14.904</td><td>25.342</td><td>23.992</td><td>0.000</td><td></td></tr> <tr><td>F87</td><td>1200</td><td>14.904</td><td>26.589</td><td>24.651</td><td>0.000</td><td></td></tr> <tr><td>F86</td><td>1200</td><td>14.904</td><td>26.078</td><td>24.728</td><td>0.000</td><td></td></tr> <tr><td>F85</td><td>1200</td><td>14.904</td><td>26.828</td><td>25.478</td><td>0.000</td><td></td></tr> <tr><td>F84</td><td>1200</td><td>14.904</td><td>27.634</td><td>26.284</td><td>0.000</td><td></td></tr> <tr><td>F83</td><td>1200</td><td>14.904</td><td>28.291</td><td>26.941</td><td>0.000</td><td></td></tr> <tr><td>F82</td><td>1200</td><td>14.904</td><td>23.385</td><td>19.836</td><td>0.000</td><td></td></tr> <tr><td>F81</td><td>1200</td><td>14.904</td><td>22.520</td><td>20.478</td><td>0.000</td><td></td></tr> <tr><td>F80</td><td>1200</td><td>14.904</td><td>22.977</td><td>20.594</td><td>0.000</td><td></td></tr> <tr><td>F79</td><td>1200</td><td>14.904</td><td>23.350</td><td>20.789</td><td>0.000</td><td></td></tr> <tr><td>F78</td><td>1200</td><td>14.904</td><td>22.411</td><td>20.986</td><td>0.000</td><td></td></tr> <tr><td>F77</td><td>1200</td><td>14.904</td><td>22.651</td><td>21.301</td><td>0.000</td><td></td></tr> <tr><td>F76</td><td>1200</td><td>14.904</td><td>25.397</td><td>24.047</td><td>0.000</td><td></td></tr> <tr><td>F75</td><td>1200</td><td>14.904</td><td>26.468</td><td>24.792</td><td>0.000</td><td></td></tr> <tr><td>F74</td><td>1200</td><td>14.904</td><td>26.597</td><td>24.925</td><td>0.000</td><td></td></tr> <tr><td>F73</td><td>1200</td><td>14.904</td><td>26.569</td><td>25.219</td><td>0.000</td><td></td></tr> <tr><td>F72</td><td>1200</td><td>14.904</td><td>28.808</td><td>27.172</td><td>0.000</td><td></td></tr> <tr><td>F71</td><td>1200</td><td>14.904</td><td>29.248</td><td>27.898</td><td>0.000</td><td></td></tr> <tr><td>F70</td><td>1200</td><td>14.904</td><td>29.638</td><td>28.288</td><td>0.000</td><td></td></tr> <tr><td>F69</td><td>1200</td><td>14.904</td><td>29.911</td><td>28.210</td><td>0.000</td><td></td></tr> <tr><td>F68</td><td>1200</td><td>14.904</td><td>29.788</td><td>28.438</td><td>0.000</td><td></td></tr> <tr><td>F67</td><td>1200</td><td>14.904</td><td>29.018</td><td>27.250</td><td>0.000</td><td></td></tr> <tr><td>F66</td><td>1200</td><td>14.904</td><td>29.567</td><td>27.378</td><td>0.000</td><td></td></tr> <tr><td>F65</td><td>1200</td><td>14.904</td><td>29.191</td><td>27.841</td><td>0.000</td><td></td></tr> <tr><td>F64</td><td>1200</td><td>14.904</td><td>29.703</td><td>28.353</td><td>0.000</td><td></td></tr> <tr><td>F63</td><td>1200</td><td>14.904</td><td>23.401</td><td>21.771</td><td>0.000</td><td></td></tr> <tr><td>F62</td><td>1200</td><td>14.904</td><td>23.897</td><td>22.000</td><td>0.000</td><td></td></tr> <tr><td>F61</td><td>1200</td><td>14.904</td><td>24.014</td><td>22.390</td><td>0.000</td><td></td></tr> <tr><td>F60</td><td>1200</td><td>14.904</td><td>24.537</td><td>22.780</td><td>0.000</td><td></td></tr> <tr><td>F59</td><td>1200</td><td>14.904</td><td>26.202</td><td>24.404</td><td>0.000</td><td></td></tr> <tr><td>F58</td><td>1200</td><td>14.904</td><td>27.378</td><td>26.028</td><td>0.000</td><td></td></tr> <tr><td>F57</td><td>1350</td><td>14.904</td><td>17.780</td><td>13.802</td><td>1.577</td><td></td></tr> <tr><td>F56</td><td>1350</td><td>14.904</td><td>18.100</td><td>13.916</td><td>1.414</td><td></td></tr> <tr><td>F55</td><td>1350</td><td>14.904</td><td>18.650</td><td>14.073</td><td>1.189</td><td></td></tr> <tr><td>F54</td><td>1200</td><td>14.904</td><td>17.137</td><td>14.717</td><td>0.211</td><td></td></tr> <tr><td>F53</td><td>1200</td><td>14.904</td><td>17.082</td><td>14.748</td><td>0.176</td><td></td></tr> <tr><td>F52</td><td>1200</td><td>14.904</td><td>16.640</td><td>15.290</td><td>0.000</td><td></td></tr> <tr><td>F51</td><td>1200</td><td>14.904</td><td>17.031</td><td>14.836</td><td>0.077</td><td></td></tr> <tr><td>F50</td><td>1200</td><td>14.904</td><td>16.746</td><td>15.396</td><td>0.000</td><td></td></tr> </table>			Storage in Gravity Manholes							Manhole Reference	Manhole Diameter (mm)	Max Storage Level (m)	Cover Level (m)	Invert Level (m)	Storage Volume (m3)	Private Manhole Invert (m)	Inlet	1800	14.904	16.804	11.375	8.980		F116	1350	14.904	17.810	13.630	1.824		F115	1350	14.904	17.720	13.657	1.785		F114	1200	14.904	18.022	14.425	0.542		F113	1200	14.904	17.958	15.477	0.000		F112	1200	14.904	18.556	15.580	0.000		F111	1200	14.904	17.174	15.885	0.000		F110	1200	14.904	18.038	16.683	0.000		F109	1200	14.904	18.513	16.000	0.000		F108	1200	14.904	18.860	16.315	0.000		F107	1200	14.904	19.006	16.630	0.000		F106	1200	14.904	19.886	18.148	0.000		F105	1200	14.904	20.177	18.332	0.000		F104	1200	14.904	20.550	18.644	0.000		F103	1200	14.904	20.741	18.755	0.000		F102	1200	14.904	21.729	19.021	0.000		F101	1200	14.904	21.676	20.326	0.000		F100	1200	14.904	22.218	20.759	0.000		F99	1200	14.904	23.061	21.711	0.000		F98	1200	14.904	24.510	23.160	0.000		F97	1200	14.904	22.902	21.552	0.000		F96	1200	14.904	23.859	22.509	0.000		F95	1200	14.904	25.096	23.746	0.000		F94	1200	14.904	23.048	19.453	0.000		F93	1200	14.904	23.327	19.673	0.000		F92	1200	14.904	23.965	22.615	0.000		F91	1200	14.904	25.476	23.230	0.000		F90	1200	14.904	25.130	23.384	0.000		F89	1200	14.904	24.922	23.572	0.000		F88	1200	14.904	25.342	23.992	0.000		F87	1200	14.904	26.589	24.651	0.000		F86	1200	14.904	26.078	24.728	0.000		F85	1200	14.904	26.828	25.478	0.000		F84	1200	14.904	27.634	26.284	0.000		F83	1200	14.904	28.291	26.941	0.000		F82	1200	14.904	23.385	19.836	0.000		F81	1200	14.904	22.520	20.478	0.000		F80	1200	14.904	22.977	20.594	0.000		F79	1200	14.904	23.350	20.789	0.000		F78	1200	14.904	22.411	20.986	0.000		F77	1200	14.904	22.651	21.301	0.000		F76	1200	14.904	25.397	24.047	0.000		F75	1200	14.904	26.468	24.792	0.000		F74	1200	14.904	26.597	24.925	0.000		F73	1200	14.904	26.569	25.219	0.000		F72	1200	14.904	28.808	27.172	0.000		F71	1200	14.904	29.248	27.898	0.000		F70	1200	14.904	29.638	28.288	0.000		F69	1200	14.904	29.911	28.210	0.000		F68	1200	14.904	29.788	28.438	0.000		F67	1200	14.904	29.018	27.250	0.000		F66	1200	14.904	29.567	27.378	0.000		F65	1200	14.904	29.191	27.841	0.000		F64	1200	14.904	29.703	28.353	0.000		F63	1200	14.904	23.401	21.771	0.000		F62	1200	14.904	23.897	22.000	0.000		F61	1200	14.904	24.014	22.390	0.000		F60	1200	14.904	24.537	22.780	0.000		F59	1200	14.904	26.202	24.404	0.000		F58	1200	14.904	27.378	26.028	0.000		F57	1350	14.904	17.780	13.802	1.577		F56	1350	14.904	18.100	13.916	1.414		F55	1350	14.904	18.650	14.073	1.189		F54	1200	14.904	17.137	14.717	0.211		F53	1200	14.904	17.082	14.748	0.176		F52	1200	14.904	16.640	15.290	0.000		F51	1200	14.904	17.031	14.836	0.077		F50	1200	14.904	16.746	15.396	0.000	
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F91	1200	14.904	25.476	23.230	0.000																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
F90	1200	14.904	25.130	23.384	0.000																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
F89	1200	14.904	24.922	23.572	0.000																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
F88	1200	14.904	25.342	23.992	0.000																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
F87	1200	14.904	26.589	24.651	0.000																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
F86	1200	14.904	26.078	24.728	0.000																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
F85	1200	14.904	26.828	25.478	0.000																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
F84	1200	14.904	27.634	26.284	0.000																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
F83	1200	14.904	28.291	26.941	0.000																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
F82	1200	14.904	23.385	19.836	0.000																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
F81	1200	14.904	22.520	20.478	0.000																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
F80	1200	14.904	22.977	20.594	0.000																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
F79	1200	14.904	23.350	20.789	0.000																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
F78	1200	14.904	22.411	20.986	0.000																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
F77	1200	14.904	22.651	21.301	0.000																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
F76	1200	14.904	25.397	24.047	0.000																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
F75	1200	14.904	26.468	24.792	0.000																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
F74	1200	14.904	26.597	24.925	0.000																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
F73	1200	14.904	26.569	25.219	0.000																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
F72	1200	14.904	28.808	27.172	0.000																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
F71	1200	14.904	29.248	27.898	0.000																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
F70	1200	14.904	29.638	28.288	0.000																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
F69	1200	14.904	29.911	28.210	0.000																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
F68	1200	14.904	29.788	28.438	0.000																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
F67	1200	14.904	29.018	27.250	0.000																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
F66	1200	14.904	29.567	27.378	0.000																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
F65	1200	14.904	29.191	27.841	0.000																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
F64	1200	14.904	29.703	28.353	0.000																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
F63	1200	14.904	23.401	21.771	0.000																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
F62	1200	14.904	23.897	22.000	0.000																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
F61	1200	14.904	24.014	22.390	0.000																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
F60	1200	14.904	24.537	22.780	0.000																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
F59	1200	14.904	26.202	24.404	0.000																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
F58	1200	14.904	27.378	26.028	0.000																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
F57	1350	14.904	17.780	13.802	1.577																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
F56	1350	14.904	18.100	13.916	1.414																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
F55	1350	14.904	18.650	14.073	1.189																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
F54	1200	14.904	17.137	14.717	0.211																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
F53	1200	14.904	17.082	14.748	0.176																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
F52	1200	14.904	16.640	15.290	0.000																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
F51	1200	14.904	17.031	14.836	0.077																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
F50	1200	14.904	16.746	15.396	0.000																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							

F49	1200	14.904	19.000	15.089	0.000
F48	1200	14.904	19.200	15.193	0.000
F47	1200	14.904	18.900	15.518	0.000
F46	1200	14.904	18.643	15.671	0.000
F45	1200	14.904	18.350	15.834	0.000
F44	1200	14.904	18.100	15.989	0.000
F43	1200	14.904	17.869	16.169	0.000
F42	1200	14.904	17.906	16.306	0.000
F41	1200	14.904	20.578	17.527	0.000
F40	1200	14.904	21.618	18.040	0.000
F39	1200	14.904	21.449	18.200	0.000
F38	1200	14.904	21.579	18.556	0.000
F37	1200	14.904	22.053	19.484	0.000
F36	1200	14.904	21.843	19.624	0.000
F35	1200	14.904	22.319	20.185	0.000
F34	1200	14.904	22.843	20.292	0.000
F33	1200	14.904	24.757	23.148	0.000
F32	1200	14.904	26.615	23.550	0.000
F31	1200	14.904	27.193	23.720	0.000
F30	1200	14.904	29.639	27.876	0.000
F29	1200	14.904	30.037	28.031	0.000
F28	1200	14.904	29.956	28.606	0.000
F27	1200	14.904	30.521	28.955	0.000
F26	1200	14.904	30.728	29.378	0.000
F25	1200	14.904	27.287	23.990	0.000
F24	1200	14.904	26.920	24.304	0.000
F23	1200	14.904	25.934	24.584	0.000
F22	1200	14.904	27.094	25.744	0.000
F21	1200	14.904	27.347	25.997	0.000
F20	1200	14.904	29.023	27.673	0.000
F19	1200	14.904	29.998	28.648	0.000
F18	1200	14.904	22.000	20.567	0.000
F17	1200	14.904	22.400	20.791	0.000
F16	1200	14.904	22.800	20.955	0.000
F15	1200	14.904	23.575	21.357	0.000
F14	1200	14.904	24.010	21.772	0.000
F13	1200	14.904	23.960	22.042	0.000
F12	1200	14.904	26.350	24.555	0.000
F11	1200	14.904	26.309	24.959	0.000
F10	1200	14.904	26.549	25.199	0.000
F9	1200	14.904	26.973	25.623	0.000
F8	1200	14.904	26.324	24.744	0.000
F7	1200	14.904	26.398	24.850	0.000
F6	1200	14.904	27.221	25.260	0.000
F5	1200	14.904	27.057	25.449	0.000
F4	1200	14.904	26.941	25.591	0.000
F3	1200	14.904	23.677	22.327	0.000
F2	1200	14.904	23.887	22.537	0.000
F1	1200	14.904	25.346	23.996	0.000
		14.904			0.000
Total storage in manholes below detailed maximum storage level					17.776

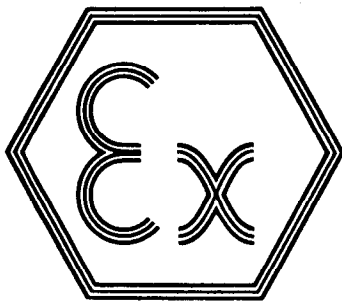
Storage in Gravity Sewer Pipes					
Sewer Pipe Run	Sewer Diameter (mm)	Max Storage Level (m)	Length (m)	Upper Invert (m)	Storage Volume (m3)
F48-F49	300	14.904	25.556	15.193	0.000
F49-F55	300	14.904	24.441	15.089	0.000
F50-F51	150	14.904	84.086	15.396	0.000
F51-F54	150	14.904	3.985	14.836	0.000
F52-F53	150	14.904	81.295	15.290	0.000
F53-F54	150	14.904	4.766	14.748	0.084
F54-F55	150	14.904	62.900	14.717	1.112
F55-F56	375	14.904	38.314	14.073	4.232
F56-F57	375	14.904	26.602	13.916	2.938
F57-F115	375	14.904	34.724	13.802	3.835
F109-F114	225	14.904	37.479	16.000	0.000
F114-F115	225	14.904	11.065	14.425	0.440
F115-F116	375	14.904	7.960	13.657	0.879
F116-INLET	375	14.904	23.861	13.630	2.635
INLET -WW	375	14.904	8.360	11.375	0.923
		14.904			0.000
STORAGE TANK	2947.681712	14.904	25.588	11.904	174.617
STORAGE - INLET	375	14.904	9.722	11.814	1.074
		14.904			0.000
Total storage in sewers below detailed maximum storage level					192.770

Storage in Wet Well					
	Wet Well Diameter (mm)	Max Storage Level (m)		High Level Alarm (m)	Storage Volume (m3)
Pump Station	3000	14.904		11.101	26.882
Total storage in wet well below detailed maximum storage level					26.882

Summary	
Manholes	17.776 m3
Sewers	192.770 m3
Pump Station	26.882 m3
Total Provided	237.428 m3
Total Required	191.879 m3

Appendix D
Storage Chamber – Manufacturers Drawings
(To Follow)

Appendix E
Hazardous Area Certification



(2) **Equipment 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 00ATEX0029 X**

(4) Protection apparatus or system:

PUMP TYPE 3171

(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 fulfils 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°15767/00.

(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.

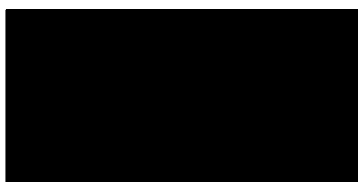
(10) Sign X, when it is placed following the Number of the EC type examination certificate, indicates that this equipment and protection system is subjected to the special conditions for safe use, mentioned in the annex of this certificate.

- (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

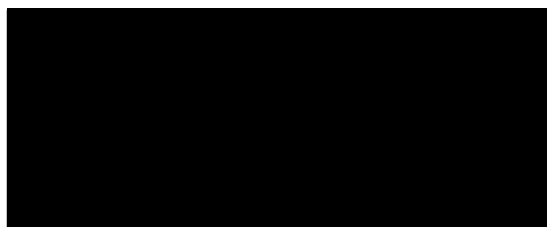
EEx d IIB T4 (Tamb = 25°C) or EEx d IIB T3

Verneuil-en-Halatte, 2000 11 29

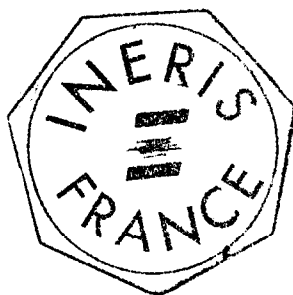


X. LEFEBVRE

Project Manager
Laboratory for Certification of ATEX equipment



The Director of the Organisation Certified,
By delegation
B. PIQUETTE
Deputy manager of Certification



(13)

ANNEX

(14)

EC TYPE EXAMINATION CERTIFICATE N INERIS 00ATEX0029 X

(15) DESCRIPTION OF THE EQUIPMENT OR THE PROTECTION SYSTEM

Electric pump motor type 3171 intended to equip an immersed mixer or pump. 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 and/or a certificate of component Ex.

Parameters relating to the safety

- . Supply voltage : up to 1000 Volts.
- . Frequency : until 60 Hz.
- . Power according to version : from 14.8 kW to 26.4 kW

Characteristics of protections :

- Limit of release of the probe : 140°C $\pm$ 6% for a Temperature class T3.
- Limit of release of the probe : 125°C $\pm$ 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
- 3171
- INERIS 00ATEX0029 X
- (serial number, if any)
- (year of construction)
-  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 EN 50 018. The prototype having successfully undergone a static overpressure test of 42 bar, corresponding a value superior to 4 times the reference pressure measured at 6.4 bar.

(16) DESCRIPTIVE DOCUMENTS

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

- Descriptive notice (2 pages) edition 2 signed on 2000.10.31
- Instructions contents signed on 2000.11.28
- Drawing N° 651 21 00 of the 2000.02.22 Rev.0 signed on 2000.10.02

(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).

(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 00ATEX0029 X/01

PUMP TYPE 3171

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

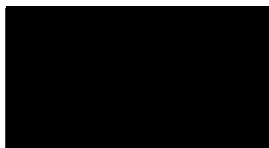
The document referred to below, constitutes the file describing the modifications of the apparatus and forming the subject of the present addition.

- Drawing No 651 21 00 rev 01. of 2001.09.20 signed on 2001.09.20

(17) - SPECIAL CONDITIONS FOR SAFE USE

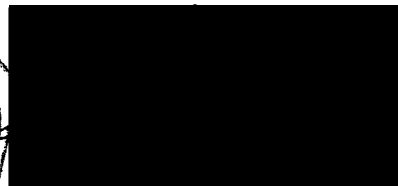
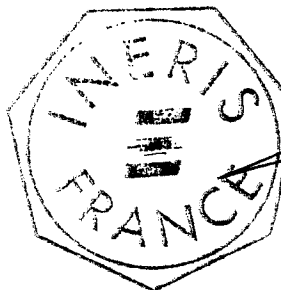
The special conditions for safe use defined in the basic certificate are unchanged.

Verneuil-en-Halatte, 2001 10 25



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 00ATEX0029 X/02

PUMP TYPE 3171

Made by ITT FLYGT AB

(15) - PURPOSE OF THE ADDITION

Update of descriptive documents in view to introduce an eventual mechanical modification.

As a variation, the equipment shall be fitted with the following certified component: cable entry type 597 63 00 X , INERIS 02ATEX9008 U.

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.

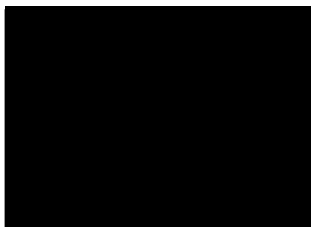
(16) - DESCRIPTIVE DOCUMENTS

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

- Drawing N° 597 63 00 X rev 07. of 2002.05.07 signed on 2002.05.07.

(17) - SPECIAL CONDITIONS FOR SAFE USE

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

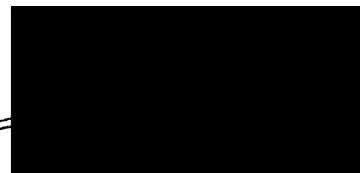


X. LEFEBVRE

Engineer at the Laboratory of Certification
of Materials ATEX



Verneuil-en-Halatte, 2002 10 15



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

ADDITION

INERIS 00ATEX0029 X/03

PUMP TYPE 3171

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

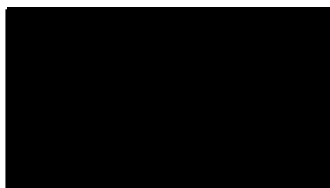
The document referred to below, constitutes the file describing the modifications of the apparatus and forming the subject of the present addition.

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

(17) - SPECIAL CONDITIONS FOR SAFE USE

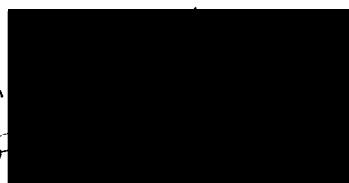
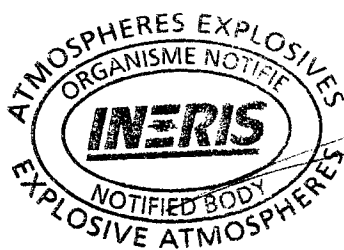
The special conditions for safe use defined in the basic certificate are unchanged.

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 00ATEX0029 X/04

PUMP TYPE 3171

Made by ITT FLYGT AB

(15) - PURPOSE OF THE ADDITION

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

Parameters relating to the safety

- . Supply voltage : up to 690 Volts.
- . Frequency : until 60 Hz.
- . Power according to version : from 14.8 kW to 27.8 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

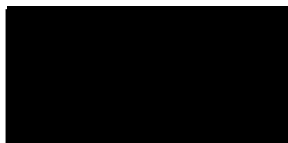
The document referred to below, constitutes the file describing the modifications of the apparatus and forming the subject of the present addition.

- Drawing No 651 21 00 rev 02. of 2003.03.14 signed on 2003.03.14

(17) - SPECIAL CONDITIONS FOR SAFE USE

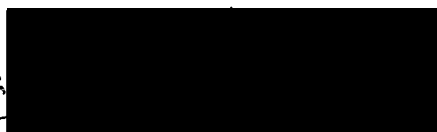
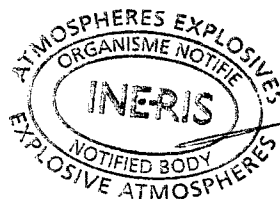
The special conditions for safe use defined in the basic certificate are unchanged.

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 00ATEX0029 X/05

PUMP TYPE 3171

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 27.8 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

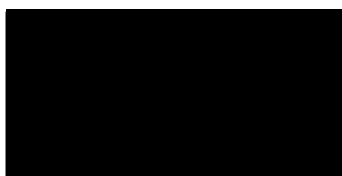
The special conditions for safe use defined in the basic certificate and its additions are unchanged.

(18) - ESSENTIAL REQUIREMENTS OF SAFETY AND HEALTH

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

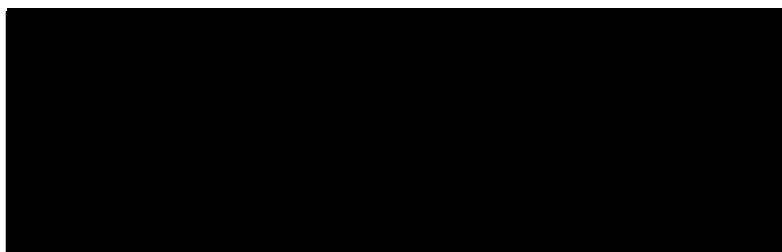
- Conformity to the European standards EN 50 014, EN 50 018, EN 1127-1 and EN 13463-1.
- The whole of the provisions adopted by the manufacturer and described in the descriptive documents.

Verneuil-en-Halatte, 2003 11 07

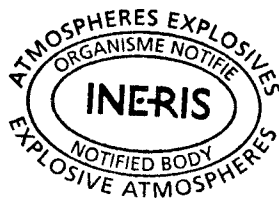


X. LEFEBVRE

Engineer at the Laboratory of Certification
of Materials ATEX



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



ADDITION

INERIS 00ATEX0029 X/06

PUMP TYPE 3171

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 21-18-2 has been changed to 25.2 kW (50 Hz) and to 30.5 kW (60 Hz).

PARAMETERS RELATING TO THE SAFETY

The parameters relating to the safety are modified as follow :

- . Supply voltage : until 1000 Volt,
- . Frequency : until 60 Hz,
- . Power according to version : until 30.5 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° 651 21 00 rev. 3 of 01.22.2004 signed on 01.22.2004

(17) - SPECIAL CONDITIONS FOR SAFE USE

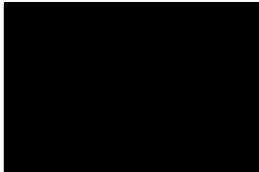
The special conditions for safe use defined in the basic certificate and its additions are unchanged.

(18) - ESSENTIAL REQUIREMENTS OF SAFETY AND HEALTH

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

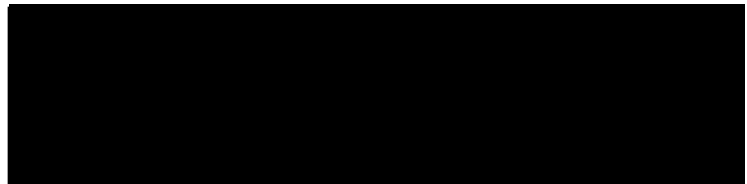
- Conformity to the European standards EN 50 014, EN 50 018, EN 1127-1 and EN 13463-1.
- The whole of the provisions adopted by the manufacturer and described in the descriptive documents.

Verneuil-en-Halatte, 2004 03 03

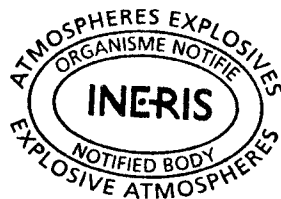


X. LEFEBVRE

Engineer at the Laboratory of Certification of ATEX
Equipment



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



ADDITION

INERIS 00ATEX0029 X/07

PUMP TYPE 3171

Made by ITT FLYGT AB

(15) - PURPOSE OF THE ADDITION

Use 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 :

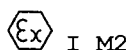
- . Supply voltage : until 1000 Volts,
- . Frequency : until 60 Hz,
- . Power according to version : until 27.8 kW.

Characteristics of protections :

- Limit of release of the probe : 140°C $\pm$ 6% for a Temperature class T3 and/or group I.
- Limit of release of the probe : 125°C $\pm$ 6% for a Temperature class T4 with Tamb = 25°C.

MARKING

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



- 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

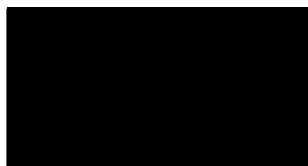
The special conditions for safe use defined in the basic certificate and its additions are unchanged.

(18) - ESSENTIAL REQUIREMENTS OF SAFETY AND HEALTH

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

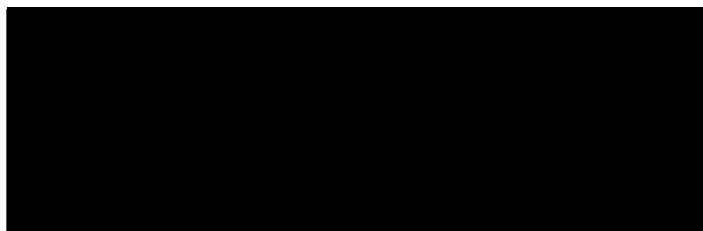
- Conformity to the European standards EN 50 014, EN 50 018, EN 1127-1, EN 1127-2 and EN 13463-1.
- The whole of the provisions adopted by the manufacturer and described in the descriptive documents.

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 00ATEX0029 X/08

PUMP TYPE 3171

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 25-19-4 has been changed to 25 kW (50 Hz) and to 28.6 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 651 21 00 rev. 4 of 2004.09.03 signed on 2004.09.03

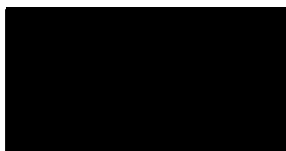
(17) - SPECIAL CONDITIONS FOR SAFE USE

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

(18) - ESSENTIAL REQUIREMENTS OF SAFETY AND HEALTH

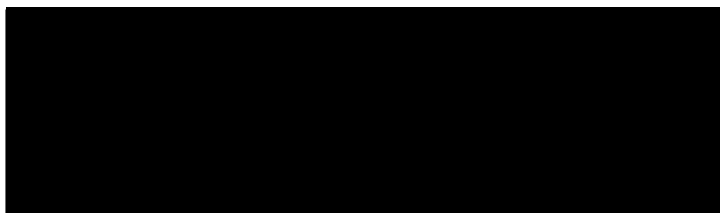
The respect of the Essential Health and Safety Requirements defined in the basic certificate and its additions is unchanged.

Verneuil-en-Halatte, 2004 11 19

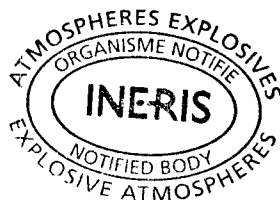


X. LEFEBVRE

Engineer at the Laboratory of Certification of ATEX
Equipment



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



ADDITION

INERIS 00ATEX0029 X/09

PUMP TYPE 3171

Made by ITT FLYGT AB

(15) - PURPOSE OF THE ADDITION

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

Introduction of 2 new versions : 3171-091 and 5100-261

For those new versions, the maximum input power of the motor type 25-19-4 has been changed to 26 kW (50 Hz) and to 31 kW (60 Hz).

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 N° 650 90 01 X rev. 3 of 2005.01.12 signed on 2005.01.12
- Drawing N° 651 21 00 rev. 5 of 2004.12.20 signed on 2004.12.20

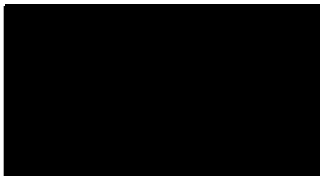
(17) - **SPECIAL CONDITIONS FOR SAFE USE**

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

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

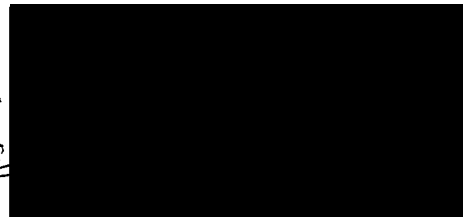
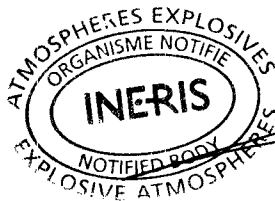
The respect of the Essential Health and Safety Requirements defined in the basic certificate and its additions is unchanged.

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 00ATEX0029 X/10**

(4) **PUMP TYPE 3171**

(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

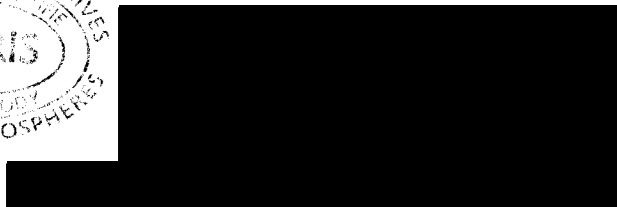
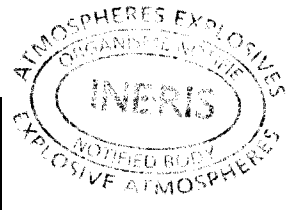
The respect of the Essential Health and Safety Requirements defined in the basic certificate and its additions is unchanged.

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 00ATEX0029X/11**

(4) **Pump TYPE 3171**

(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° 651 21 00 rev.6

dated and signed on 2006.06.16

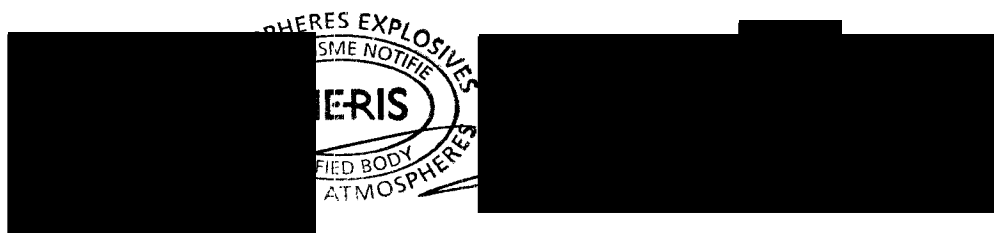
(17) **SPECIAL CONDITIONS FOR SAFE USE**

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. LEFEBVRE

Project Manager at the ATEX
Equipment Certification Laboratory

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

ADDITION

(3) **INERIS 00ATEX0029X/12**

(4) **PUMP TYPE 3171**

(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°651 21 00 rev.7

dated and signed on 2007.06.14

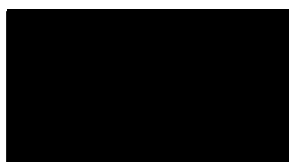
(17) **SPECIAL CONDITIONS FOR SAFE USE**

The special conditions are unchanged.

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

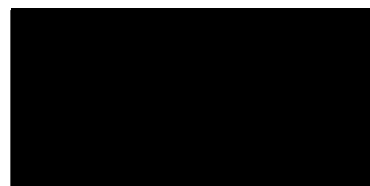
The respect of the Essential Health and Safety Requirements is unchanged.

Verneuil-en-Halatte, 2007 10 24



X. LEFEBVRE

Project Manager at the ATEX
Equipment Evaluation Laboratory



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

ADDITION

(3) INERIS 00ATEX0029X/13

(4) PUMP TYPE 3171

(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

3171

INERIS 00ATEX0029 X

(Serial number)

(Year of construction)

 II 2 G Ex d IIB T4 (Tamb=25°C) or T3

 I M2 Ex d I

WARNING:

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 651 21 00 rev.7 dated and signed on 2007.06.14

(17) SPECIAL CONDITIONS FOR SAFE USE

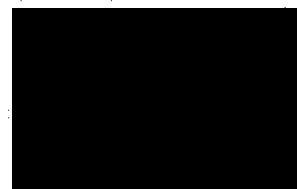
The special conditions for safe use are unchanged.

(18) ESSENTIAL SAFETY AND HEALTH REQUIREMENTS

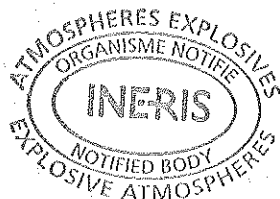
The respect of the Essential Health and Safety Requirements is assured by :

- 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 00ATEX0029X/14

(4) PUMP TYPE 3171

(5) Made by ITT WATER & WASTEWATER AB

(15) PURPOSE OF THE ADDITION

- Updating of manufacturer documents.
- Introduction of new products 8149.190 and 8150.190.

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

- | | |
|---|--------------------------------|
| - Change description for EN-approved products | dated on 2010.10.15 |
| - CRITICAL PARTS | dated on 2010.10.15 |
| - REVISION REPORT | dated on 2010.10.15 |
| - Drawing n° 651 21 00 rev 8 | dated and signed on 2010.07.26 |

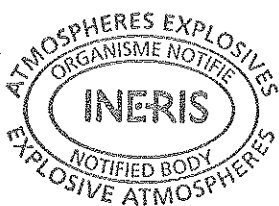
(17) SPECIAL CONDITIONS FOR SAFE USE

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, 2011.01.20



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

ADDITION

(3) INERIS 00ATEX0029X/15

(4) PUMP TYPE 3171

(5) Made by Xylem Water Solutions AB

(15) **PURPOSE OF THE ADDITION**

- Updating of the manufacturer's documents.
- Mechanical modifications.
- New stators housing 650 90 01 and 650 90 05 added.
- New pumps 3171.810, 3171.830 and 3171.850 added.
- New motor, 2 poles 25-31-2; 4 poles 25-27-4, 25-32-4; and 6 poles 25-32-6 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

3171

INERIS 00ATEX0029X

(Serial number)

(Year of construction)

 II 2 G c Ex d IIB T4 (Tamb=25°C) or 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 |
| - RSA11070EDH | dated on 2012.01.03 |
| - Drawing n°651 21 00 / 9 | 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.

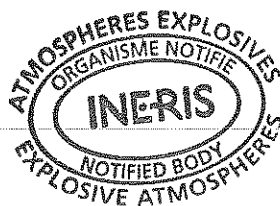
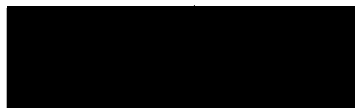
(18) ESSENTIAL SAFETY AND HEALTH REQUIREMENTS

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

ADDITION

- (3) **INERIS 00ATEX0029X/16**
- (4) **PUMP TYPE 3171.090, 3171.091, 3171.095, 3171.390, 3171.810, 3171.830, 3171.850, 3171.670, 3171.870, 5100.260, 5100.261, 8149.190 and 8150.190**
- (5) **Made by Xylem Water Solutions Manufacturing AB**
- (15) **PURPOSE OF THE ADDITION**
- Updating of the manufacturer's documents and minor mechanical modifications.
 - Addition of the new types of pumps 3171.670 and 3171.870.
 - Modification of the class of temperature.

PARAMETERS RELATING TO THE SAFETY

The parameters relating to the safety are modified as follows:

Limit of release of the thermal contacts :

- 125°C ±6°C for a class T4.
- 140°C ±6°C for a class T3.
- 125°C ±6°C for 150°C (group I).

MARKING

The marking is modified as follows:

Xylem Water Solutions Manufacturing AB

S-17487 Sundbyberg

(**)

INERIS 00ATEX0029X

(Serial number)

(Year of construction)

 II 2 G c Ex d IIB T(*) Gb

 I M 2 c Ex d I Mb

Tamb. : -20°C to +60°C or -20°C to +25°C

WARNINGS:

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

DO NOT OPEN WHEN ENERGIZED.

CONNECT THERMAL CONTACTS.

(**) : One of these types : 3171.090, 3171.091, 3171.095, 3171.390, 3171.810, 3171.830, 3171.850, 3171.670, 3171.870, 5100.260, 5100.261, 8149.190 or 8150.190

T(*) : T4 for Tamb = -20°C to +25°C with the limit of release of the thermal contacts at 125°C ±6°C.

T3 for Tamb = -20°C to +60°C with the limit of release of the thermal contacts at 140°C ±6°C

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

None.

(16) DESCRIPTIVE DOCUMENTS

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

- | | |
|---|---------------------|
| - Change description for EN-approved products | dated on 2013.07.08 |
| - CRITICAL PARTS | dated on 2013.07.08 |
| - REVISION REPORT | dated on 2013.07.08 |
| - Drawing no. 651 21 00 / 10 | dated on 2013.06.14 |

(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 unchanged.

Verneuil-en-Halatte, 2013.11.22



[Redacted Signature]
The Chief Executive Officer of INERIS
By delegation
T. HOUËIX
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

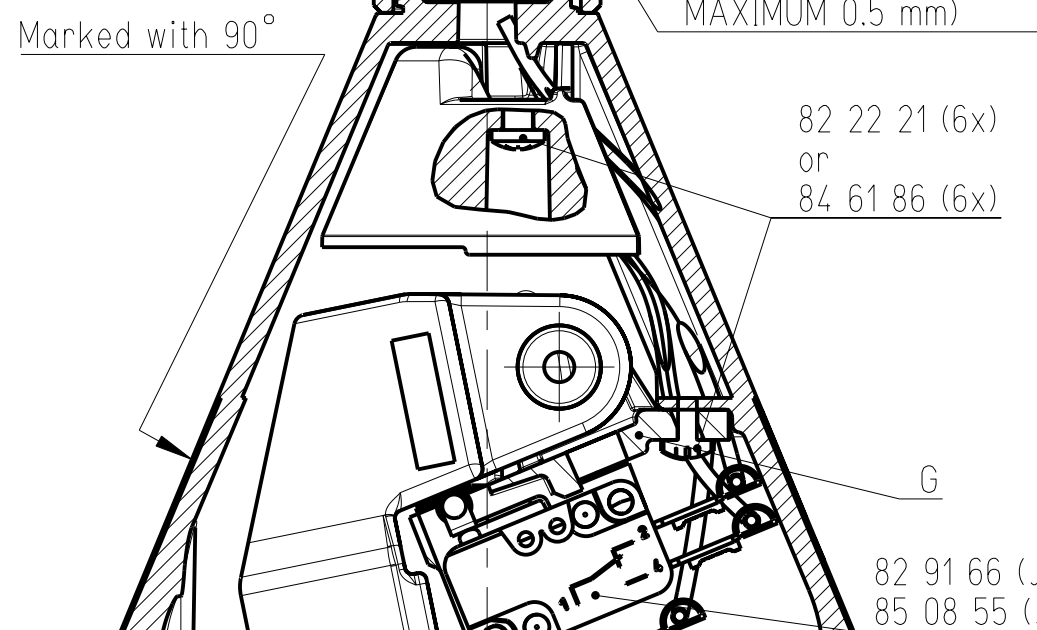
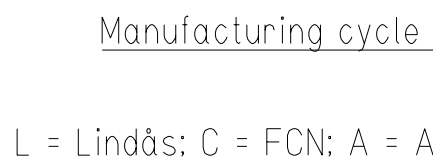
[17] **Specific Conditions of Use**

None

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

See item 9

11	-Changed notation for connection instructions. -Added new screw 84 61 86 as option to construction -Added missing colour information -Text clarification with regards to nut to allow small gap. -A = AMB marking option added	table: M5: table: M4: C5:
Rev. No:	Revision	Pos



Var: 594 79 19
594 79 20
594 79 21
594 79 40
594 79 41
594 79 42
594 79 49
594 79 50

MATERIAL:PLASTIC, SEE:FLYGT STD:A4090.01
*) SURFACES: 0.8/

This drawing may not be altered without permission of authorities listed below.

EN

Applicable to Approved Products

ENM 10

xylem

Denomination	Level switch unit ENM-10
--------------	--------------------------

Sheet 1 of 1

Drawing No. _____

Rev	
-----	--

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.

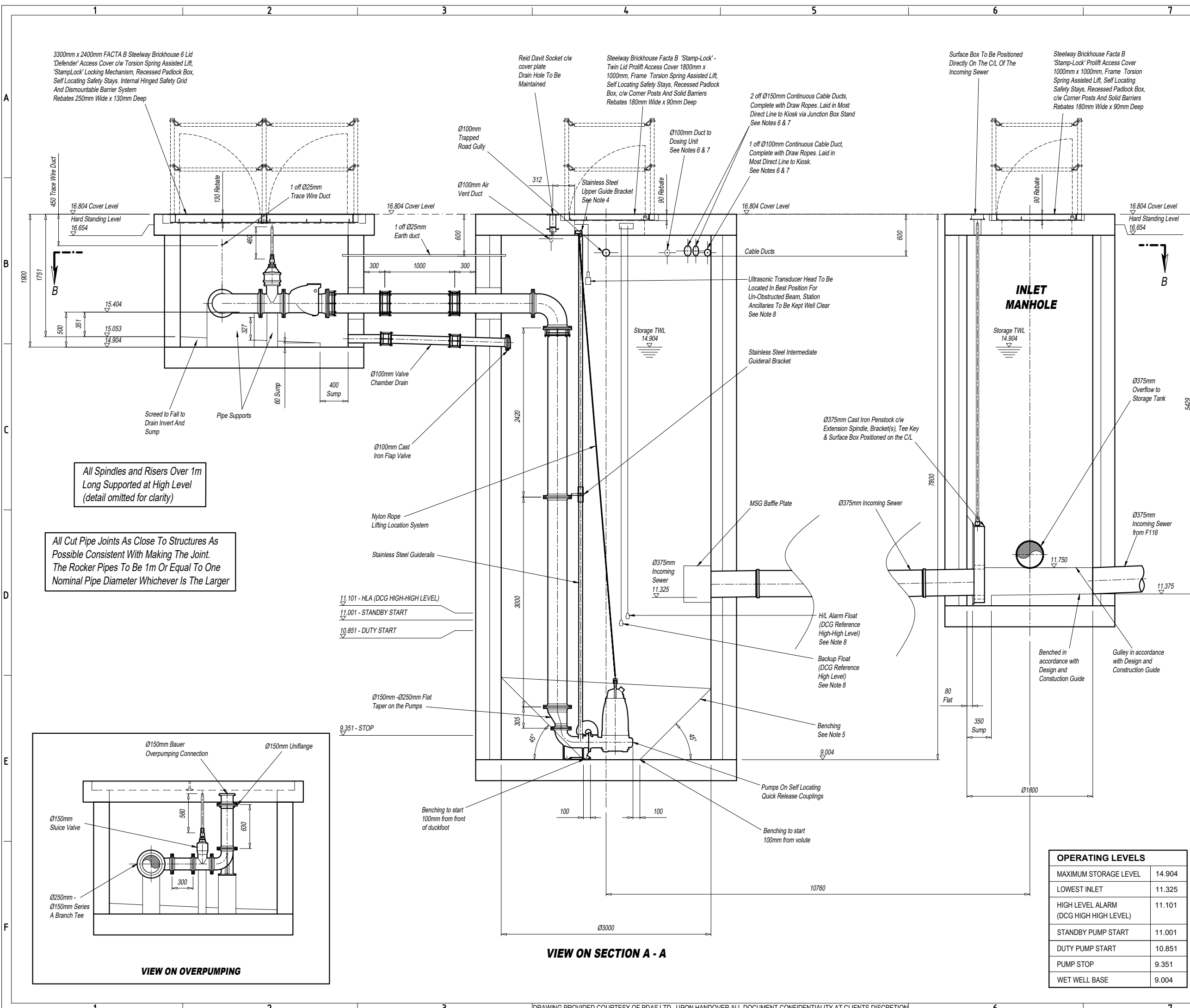
- Key Applications: wet wells, flumes, weirs, filter beds

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 F

Pump Station Drawings



NOTES

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

STATION INFORMATION					
PUMP TYPE	XYLEM	NP 3171 MT			
IMPELLER		432			
MOTOR RATING		18.5 k.W.			
FULL LOAD CURRENT		36 A FLC			
ZONE RATING		EXP			
DUTY FLOW		64.25 L/Sec			
HEAD GENERATED		17.79m			
LEVEL CONTROLS		SIEMENS HYDRORANGER 200 PLUS HIGH LEVEL AND BACK UP FLOAT SWITCHES			
PIPE / VALVE SIZE		Ø250mm			
FINAL DISCHARGE					
INTERNAL DIAMETER		Ø250mm			
MATERIAL		DUCTILE IRON			
TERMINATION		FLANGE			
PIPE OD		N/A			
FLANGE DATA		250mm PN16			
RISING MAIN		315mm OD PE100 SDR11 (255.6mm Bore)			
RISING MAIN COUPLER		BY DEVELOPER / CONTRACTOR			
REV	DATE	DESCRIPTION	DR'n	CHK'd	APR'l

FOR APPROVAL

PDAS 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 NORTHERN PUMP STATION**

TITLE **FOUL WATER PUMP STATION ELEVATION VIEW**

CLIENT **PFA CONSULTING LIMITED**

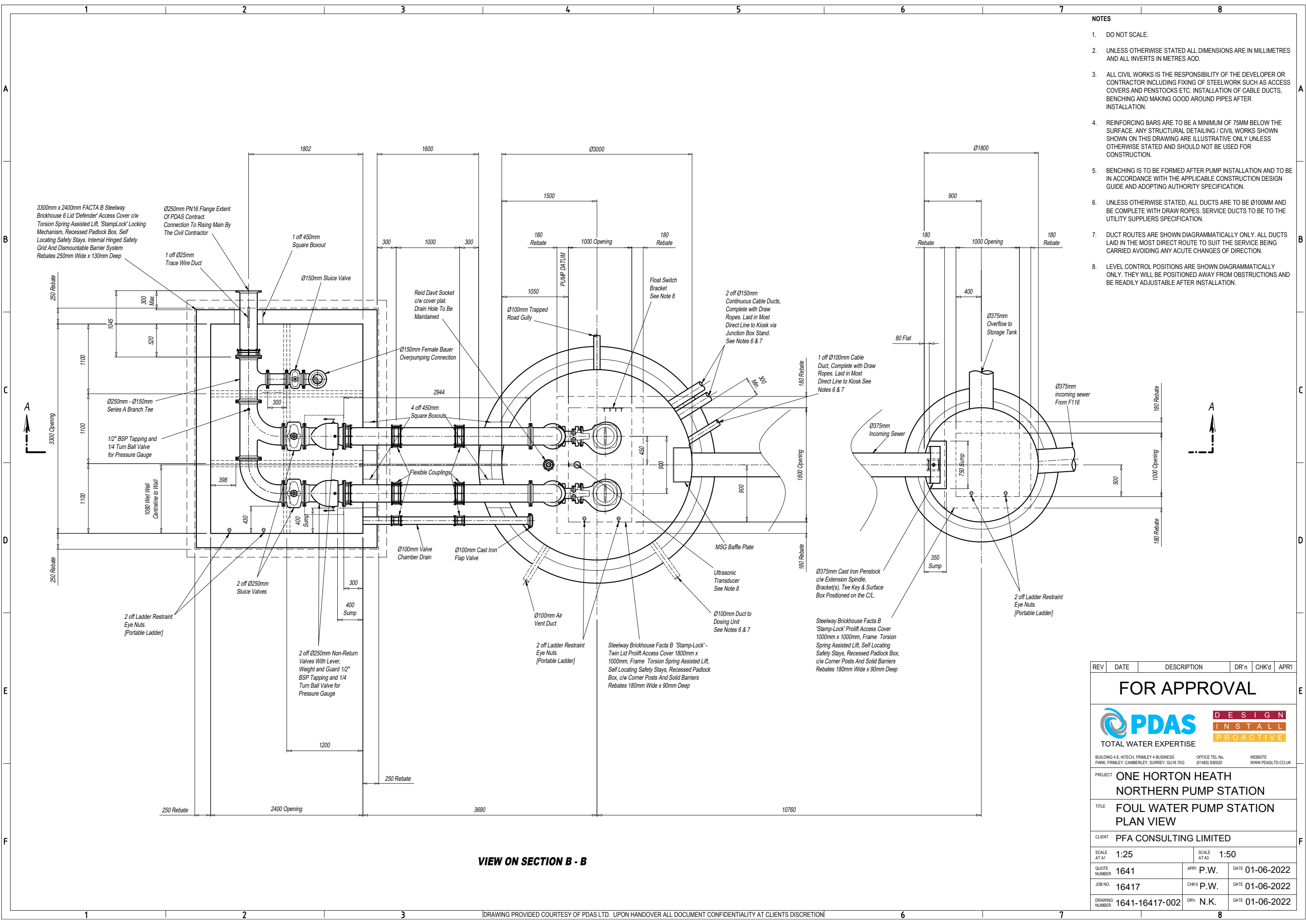
SCALE AT A1 **1:25** SCALE AT A3 **1:50**

QUOTE NUMBER	1641	APR'l	P.W.	DATE	01-06-2022
JOB NO.	16417	CHK'd	P.W.	DATE	01-06-2022
DRAWING NUMBER	1641-16417-001	DR'n	N.K.	DATE	01-06-2022

OPERATING LEVELS

MAXIMUM STORAGE LEVEL	14.904
LOWEST INLET	11.325
HIGH LEVEL ALARM (DCG HIGH HIGH LEVEL)	11.101
STANDBY PUMP START	11.001
DUTY PUMP START	10.851
PUMP STOP	9.351
WET WELL BASE	9.004

DRAWING PROVIDED COURTESY OF PDAS LTD. UPON HANDOVER ALL DOCUMENT CONFIDENTIALITY AT CLIENTS DISCRETION

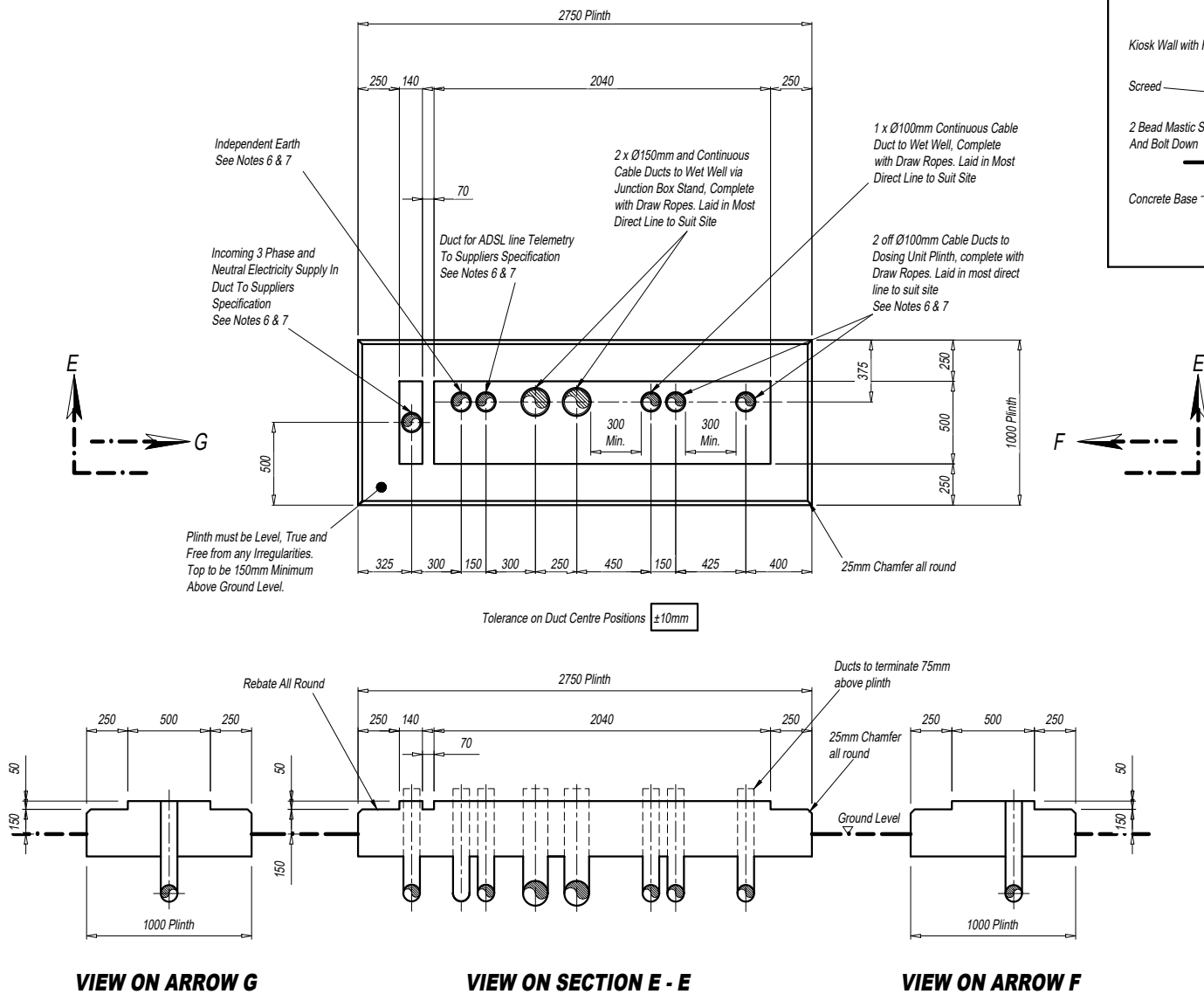


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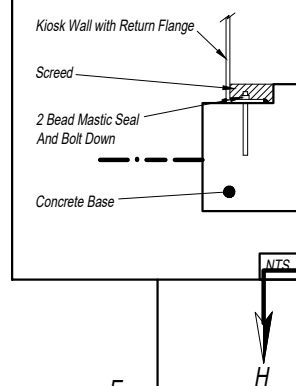
VIEW ON SECTION B - B

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 NORTHERN 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 01-06-2022
JOB NO.	16417		CHK'd	P.W.	DATE 01-06-2022
DRAWING NUMBER	1641-16417-002		DR'n	N.K.	DATE 01-06-2022

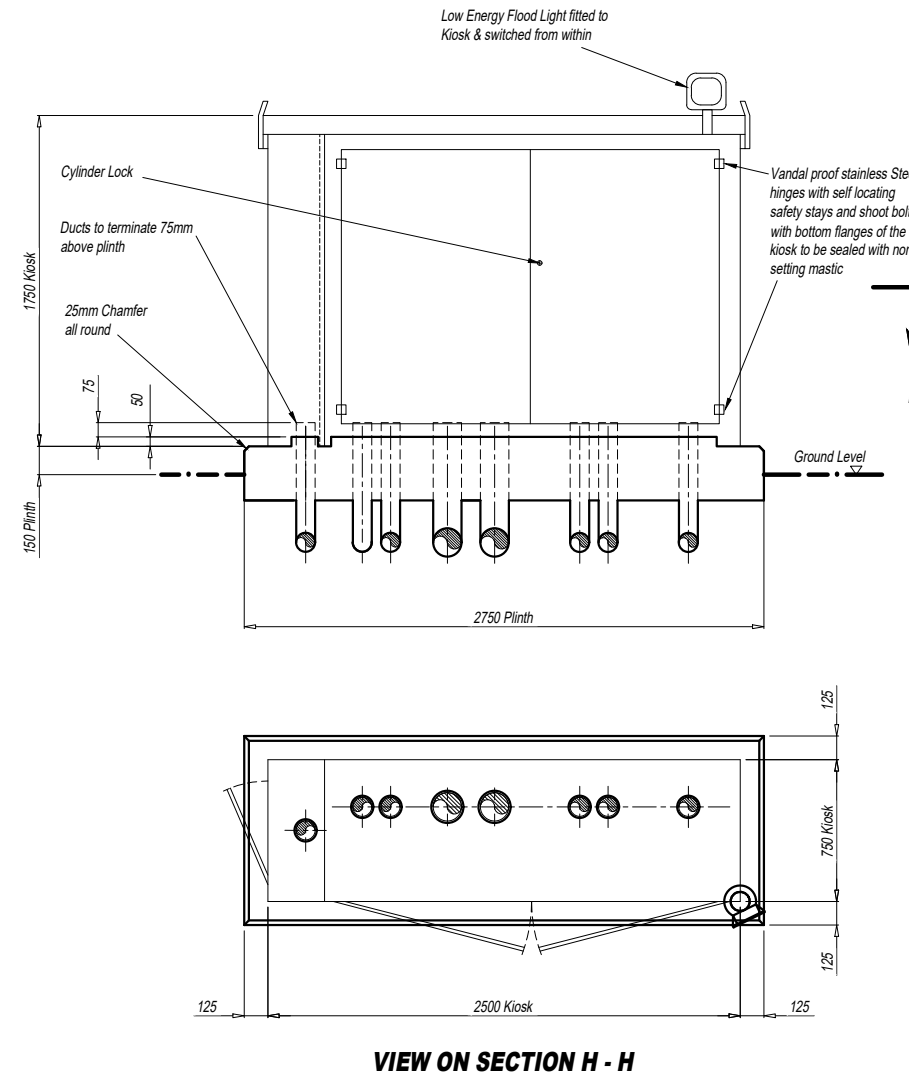
KIOSK PLINTH DETAIL



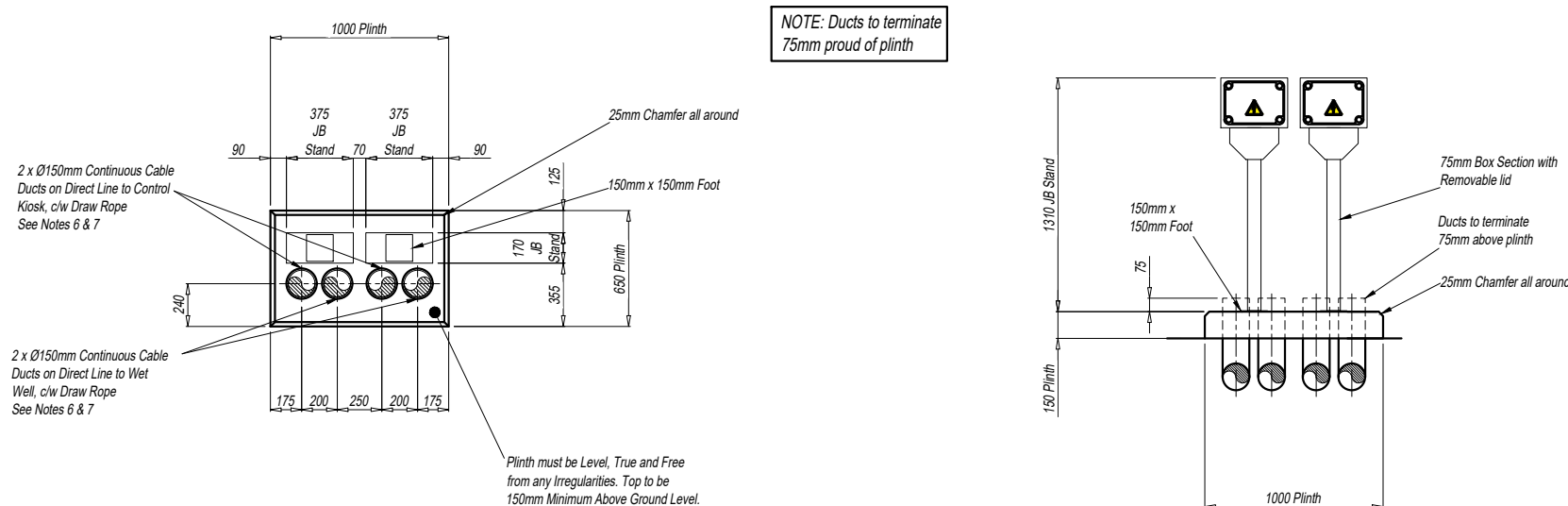
MCC KIOSK REBATE DETAIL



CONTROL KIOSK PLAN & ELEVATION VIEW



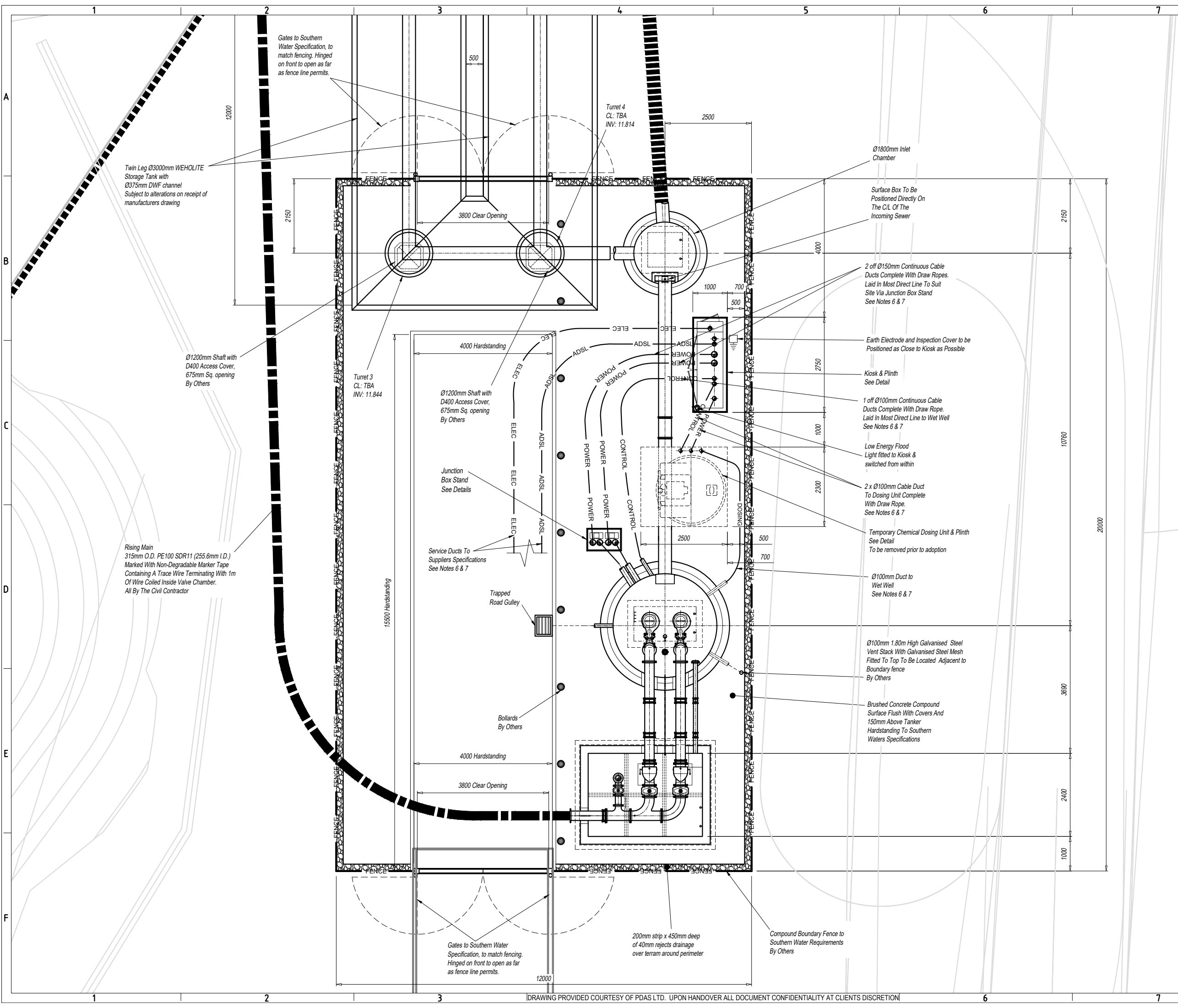
JUNCTION BOX STAND PLINTH DETAIL



NOTES

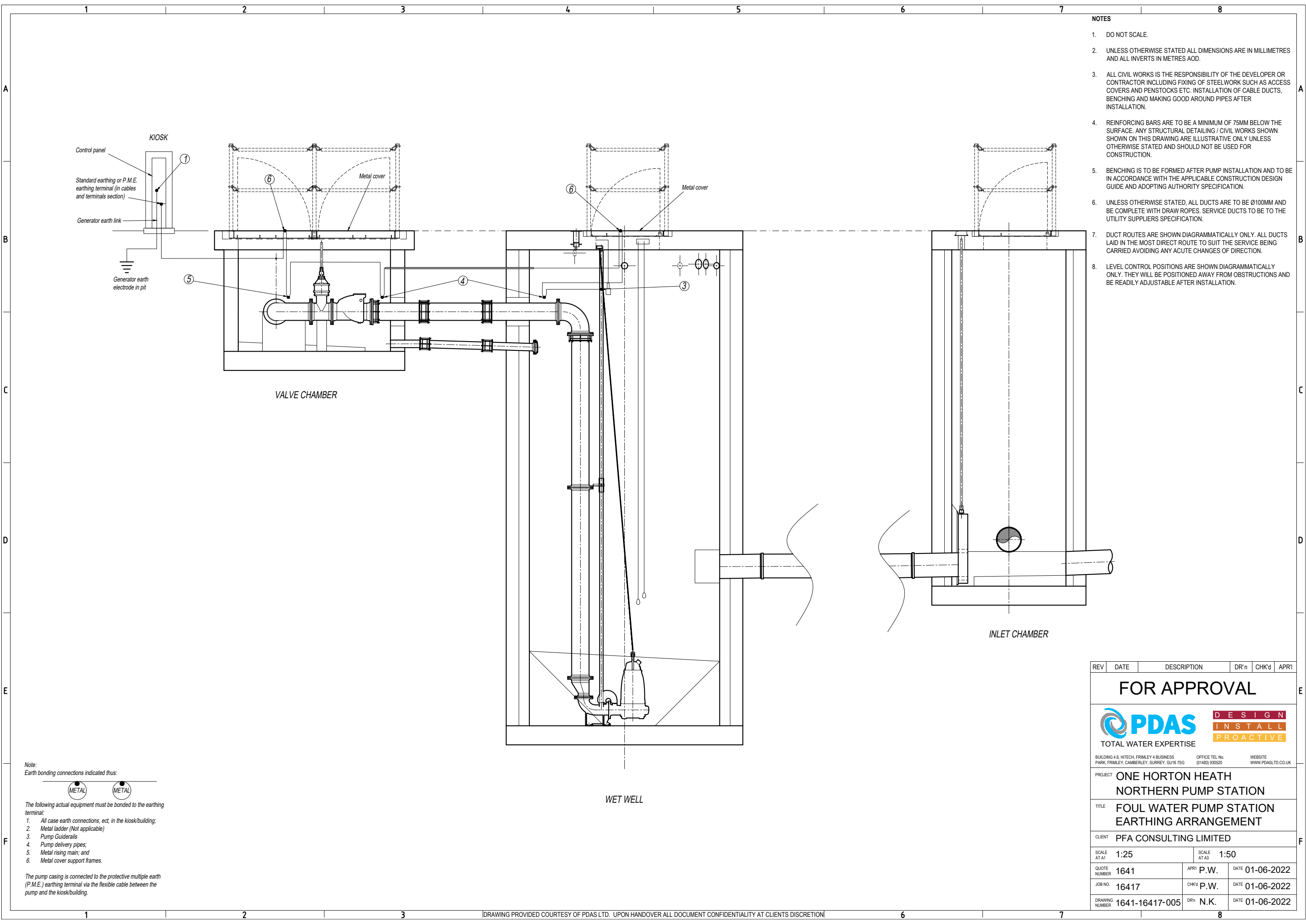
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REV	DATE	DESCRIPTION	DR'n	CHK'd	APR'l
FOR APPROVAL					
 DESIGN INSTALL PROACTIVE					
BUILDING 4 & 5, HITECH, FRIMLEY 4 BUSINESS PARK, FRIMLEY, CAMBERLEY, SURREY, GU16 7SG OFFICE TEL No. (01483) 930520 WEBSITE WWW.PDASLTD.CO.UK					
PROJECT ONE HORTON HEATH NORTHERN 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	01-06-2022
JOB NO.	16417	CHK'd	P.W.	DATE	01-06-2022
DRAWING NUMBER	1641-16417-003	DR'n	N.K.	DATE	01-06-2022



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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 NORTHERN 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	APR1	P.W.	DATE	01-06-2022
JOB NO.	16417	CHK'd	P.W.	DATE	01-06-2022
DRAWING NUMBER	1641-16417-004	DR'n	N.K.	DATE	01-06-2022



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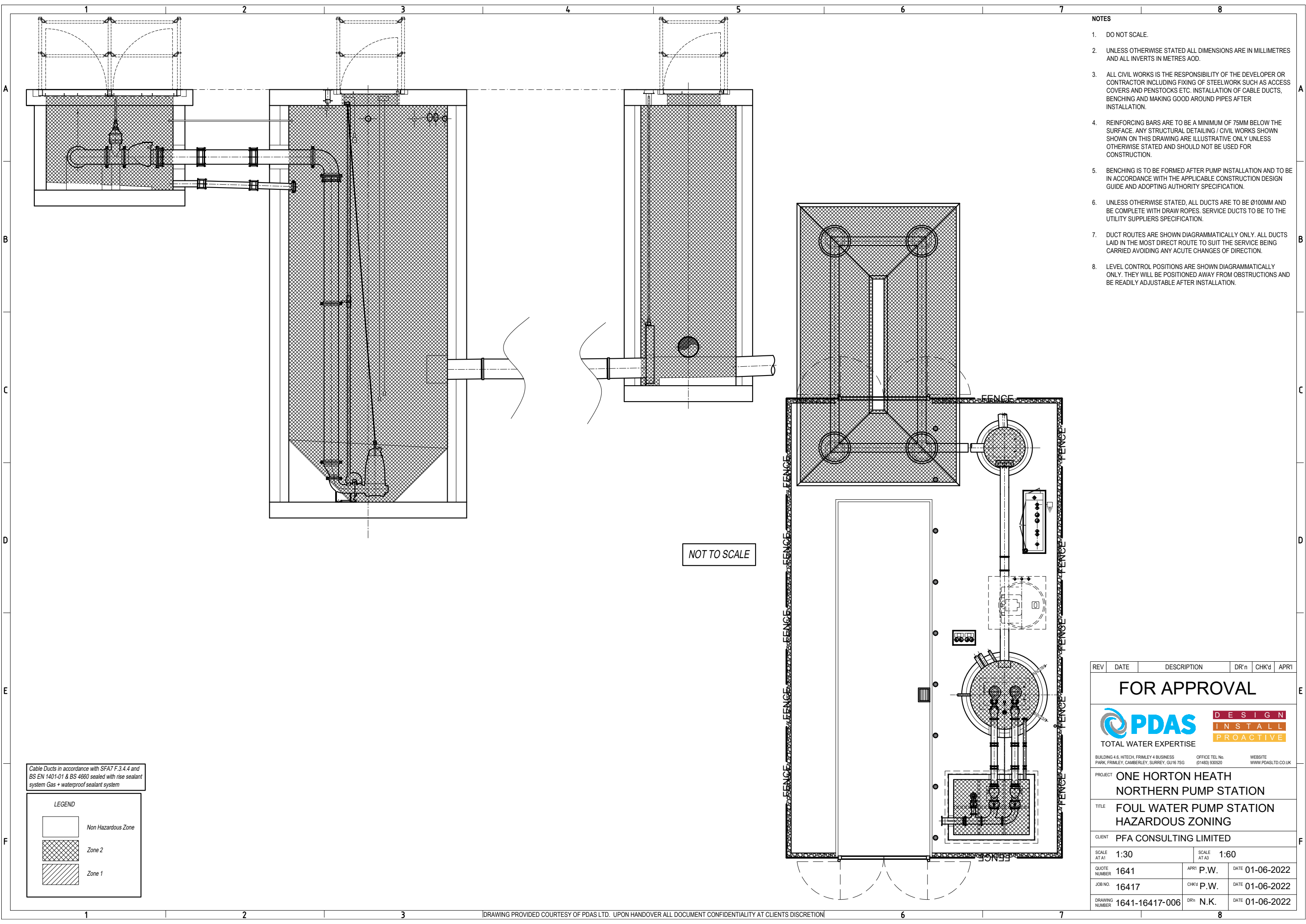
Note:
Earth bonding connections indicated thus:

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					
 TOTAL WATER EXPERTISE DESIGN INSTALL PROACTIVE					
BUILDING 4 & 5, HTECH, FRIMLEY 4 BUSINESS PARK, FRIMLEY, CAMBERLEY, SURREY, GU16 7SG OFFICE TEL No. (01483) 930520 WEBSITE WWW.PDASLTD.CO.UK					
PROJECT ONE HORTON HEATH NORTHERN 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	01-06-2022
JOB NO.	16417	CHK'd	P.W.	DATE	01-06-2022
DRAWING NUMBER	1641-16417-005	DR'n	N.K.	DATE	01-06-2022



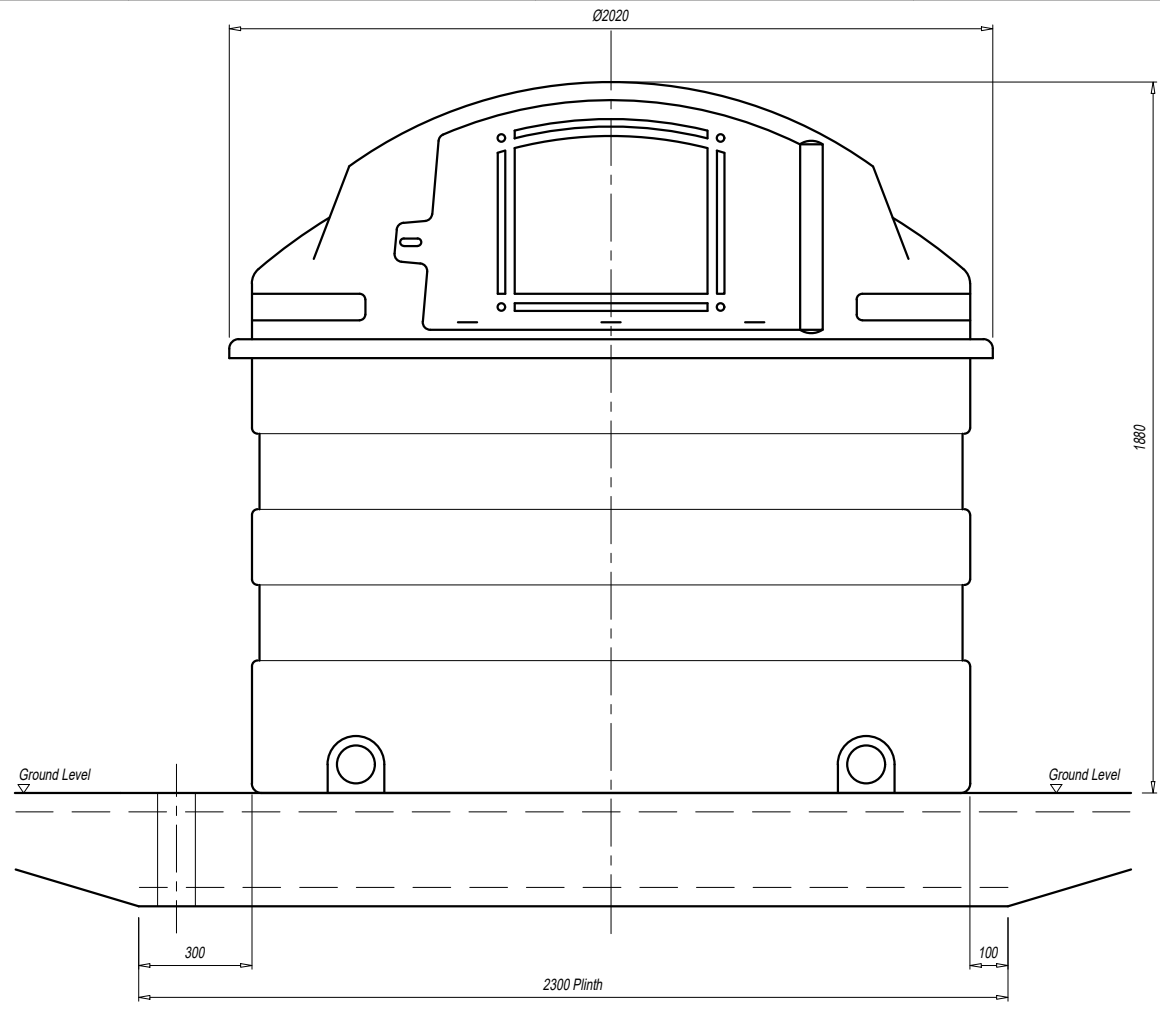
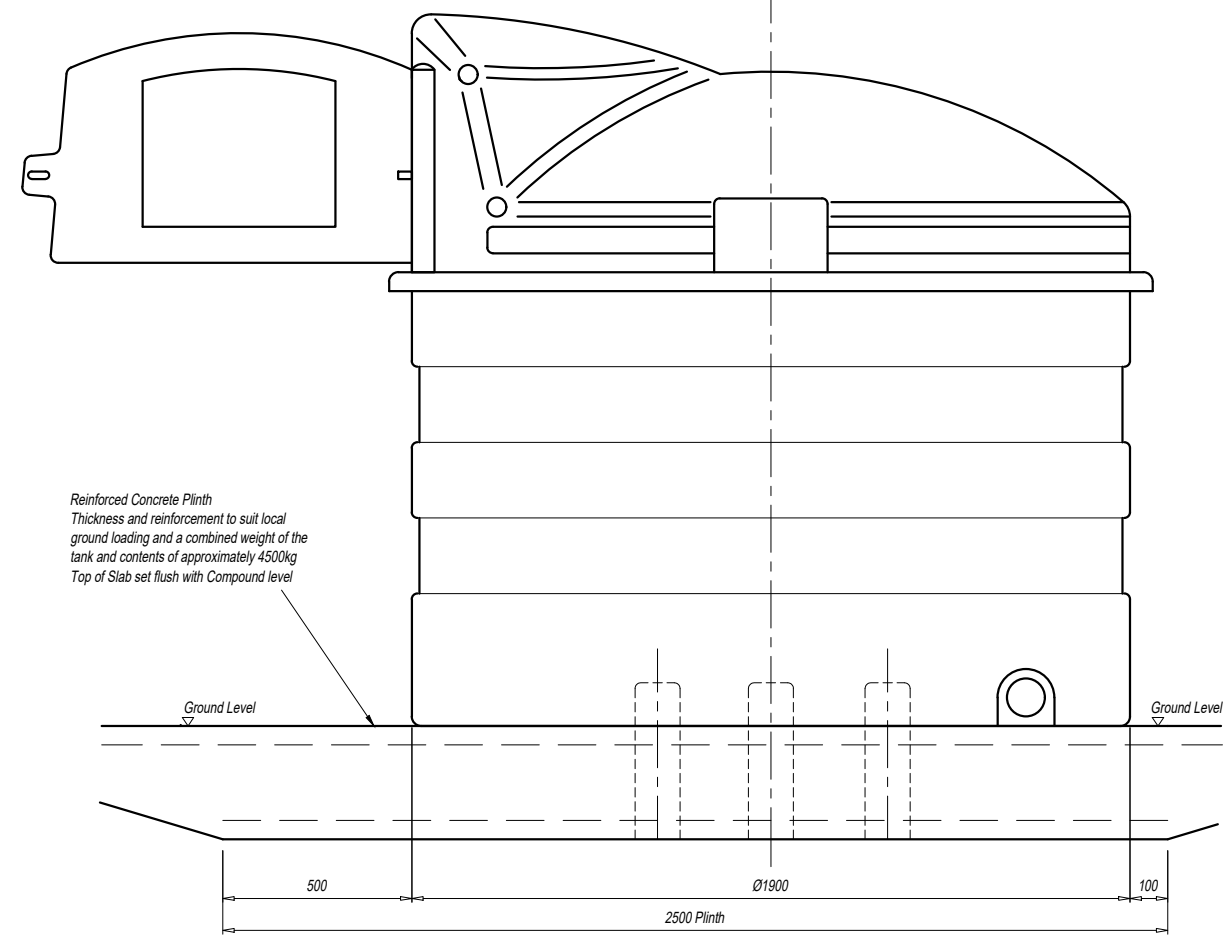
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 - DUCT ROUTES ARE SHOWN DIAGRAMMATICALLY ONLY. ALL DUCTS LAID IN THE MOST DIRECT ROUTE TO SUIT THE SERVICE BEING CARRIED AVOIDING ANY ACUTE CHANGES OF DIRECTION.
 - LEVEL CONTROL POSITIONS ARE SHOWN DIAGRAMMATICALLY ONLY. THEY WILL BE POSITIONED AWAY 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

[White Box]	Non Hazardous Zone
[Cross-hatch Box]	Zone 2
[Diagonal-hatch Box]	Zone 1

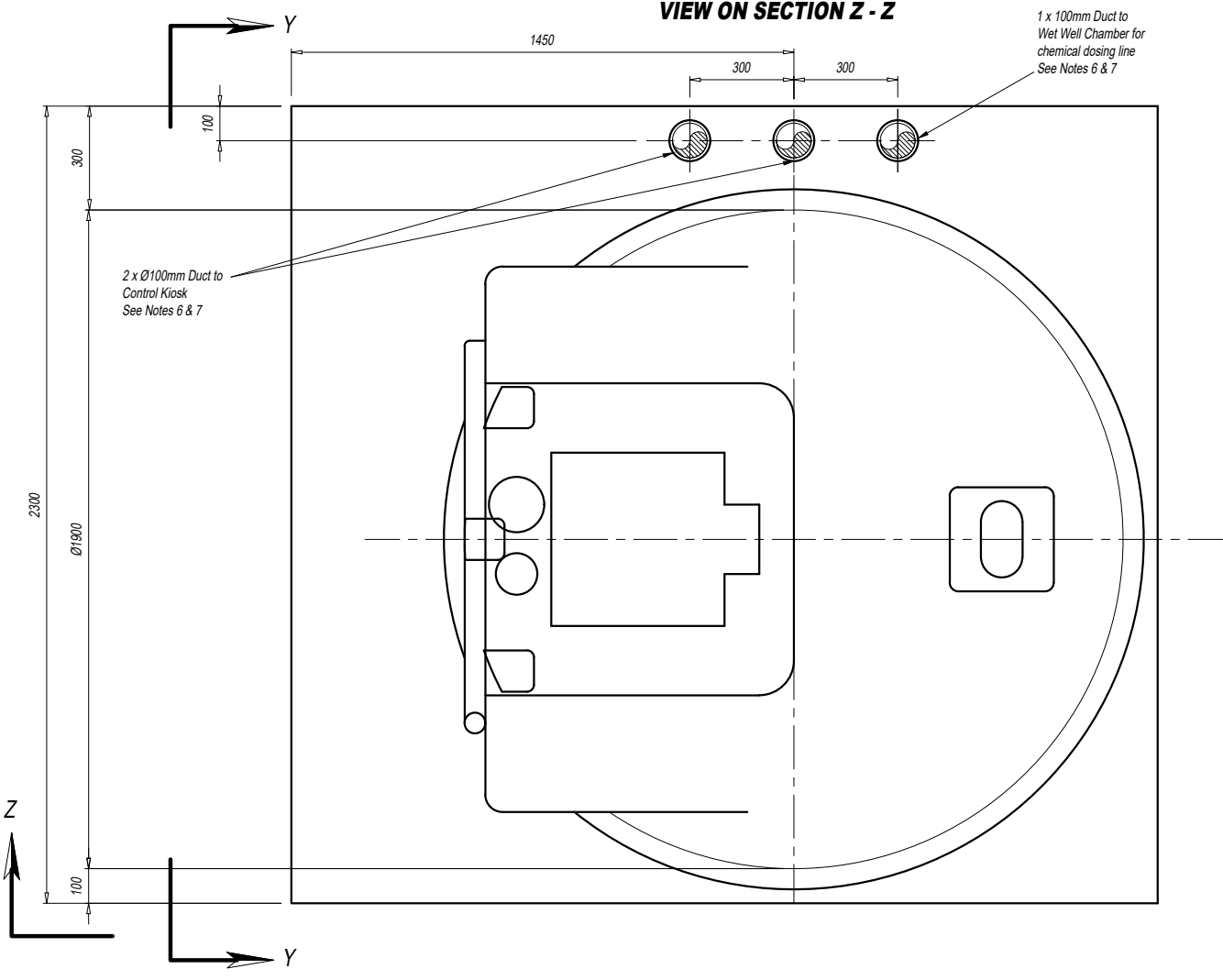
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FOR APPROVAL					
 TOTAL WATER EXPERTISE DESIGN INSTALL PROACTIVE					
BUILDING 4 & 6, HITECH, FRIMLEY 4 BUSINESS PARK, FRIMLEY, CAMBERLEY, SURREY, GU16 7SG OFFICE TEL No. (01483) 930520 WEBSITE WWW.PDASLTD.CO.UK					
PROJECT ONE HORTON HEATH NORTHERN 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	01-06-2022
JOB NO.	16417	CHK'd	P.W.	DATE	01-06-2022
DRAWING NUMBER	1641-16417-006	DR'n	N.K.	DATE	01-06-2022



- 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.
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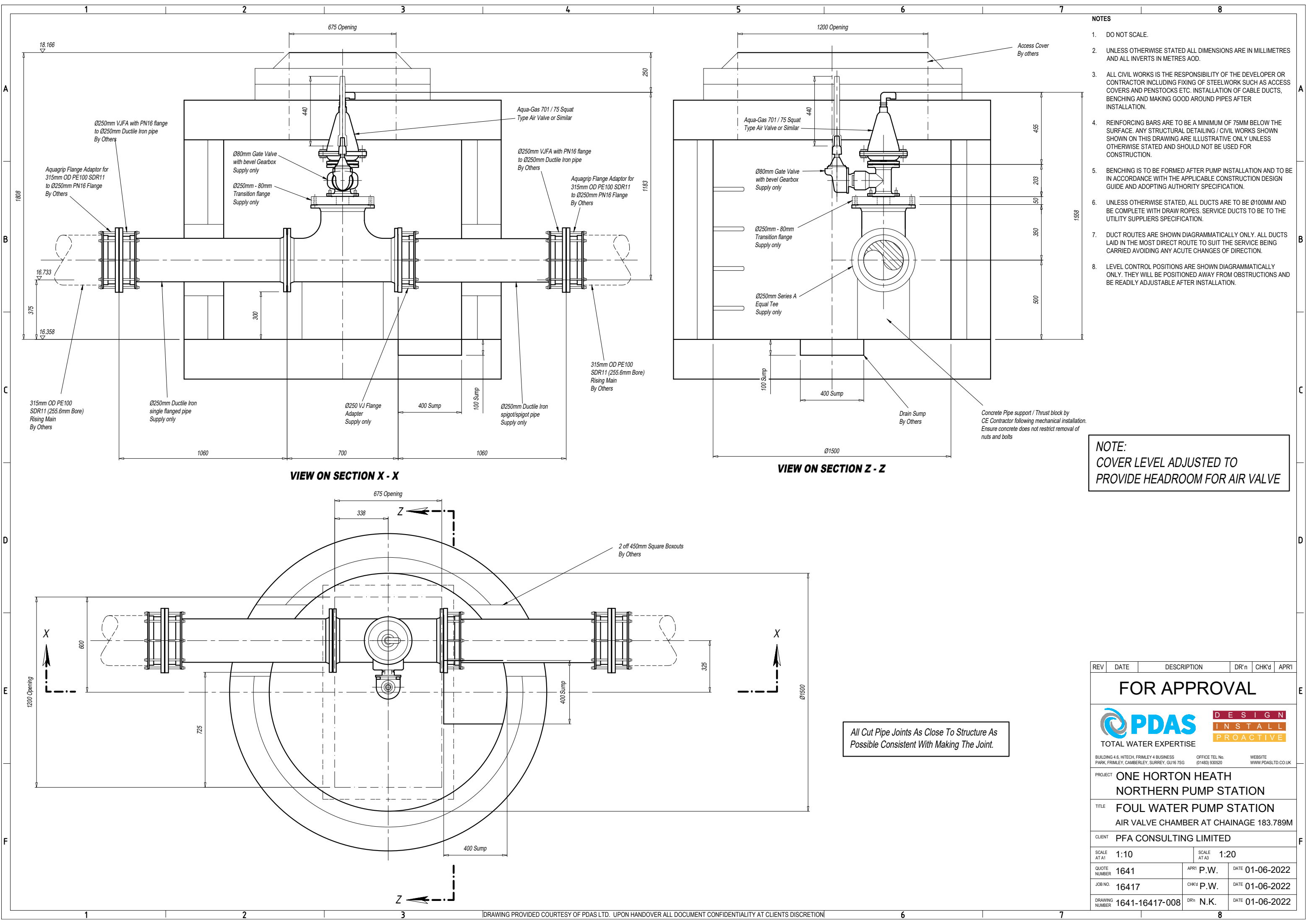
VIEW ON SECTION Z - Z

VIEW ON SECTION Y - Y



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

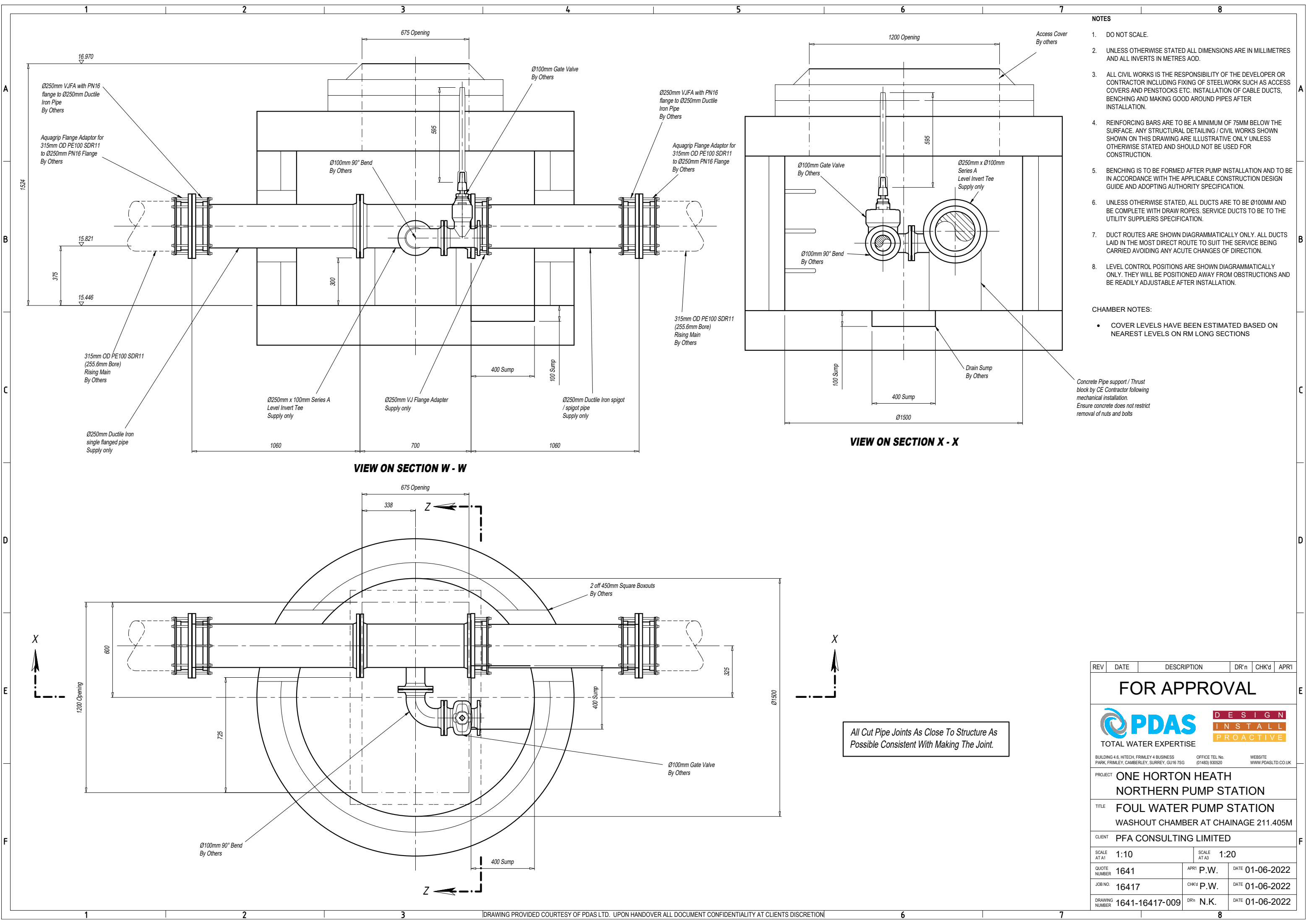
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FOR APPROVAL					
 TOTAL WATER EXPERTISE			DESIGN INSTALL PROACTIVE		
BUILDING 4 & 5, HITECH, FRIMLEY 4 BUSINESS PARK, FRIMLEY, CAMBERLEY, SURREY, GU16 7SG			OFFICE TEL No. (01483) 930520		WEBSITE WWW.PDASLTD.CO.UK
PROJECT ONE HORTON HEATH NORTHERN 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 01-06-2022		
JOB NO. 16417		CHK'd P.W.	DATE 01-06-2022		
DRAWING NUMBER 1641-16417-007		DR'n N.K.	DATE 01-06-2022		



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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 NORTHERN PUMP STATION				
TITLE	FOUL WATER PUMP STATION AIR VALVE CHAMBER AT CHAINAGE 183.789M				
CLIENT	PFA CONSULTING LIMITED				
SCALE AT A1	1:10		SCALE AT A3	1:20	
QUOTE NUMBER	1641		APR'l	P.W.	DATE 01-06-2022
JOB NO.	16417		CHK'd	P.W.	DATE 01-06-2022
DRAWING NUMBER	1641-16417-008		DR'n	N.K.	DATE 01-06-2022



NOTES

- DO NOT SCALE.
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- 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.
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CHAMBER NOTES:

- COVER LEVELS HAVE BEEN ESTIMATED BASED ON NEAREST LEVELS ON RM LONG SECTIONS

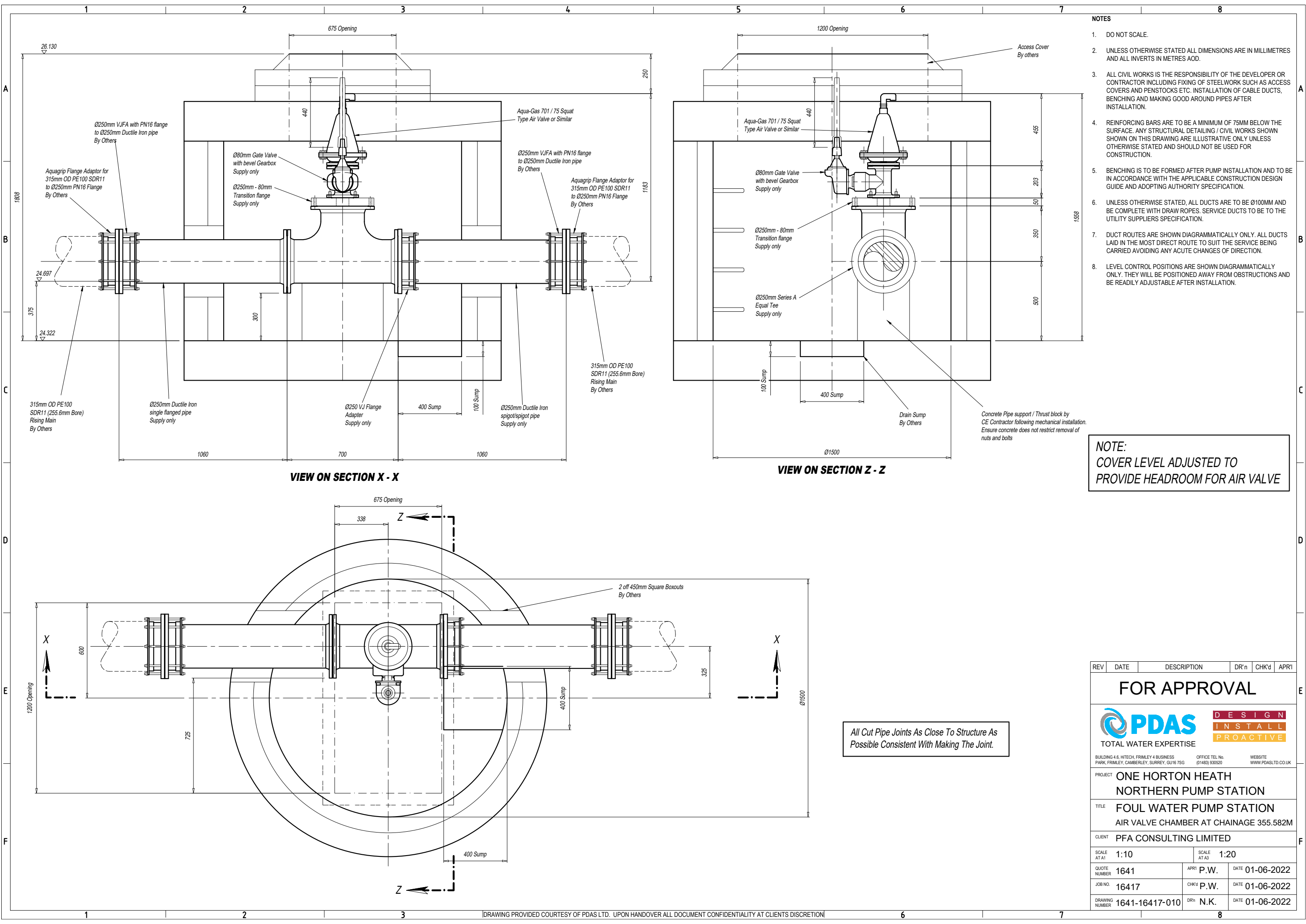
Concrete Pipe support / Thrust block by CE Contractor following mechanical installation. Ensure concrete does not restrict removal of nuts and bolts

VIEW ON SECTION X - X

VIEW ON SECTION W - W

All Cut Pipe Joints As Close To Structure As Possible Consistent With Making The Joint.

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 NORTHERN PUMP STATION					
TITLE FOUL WATER PUMP STATION WASHOUT CHAMBER AT CHAINAGE 211.405M					
CLIENT PFA CONSULTING LIMITED					
SCALE AT A1 1:10		SCALE AT A3 1:20			
QUOTE NUMBER 1641		APR'l P.W.	DATE 01-06-2022		
JOB NO. 16417		CHK'd P.W.	DATE 01-06-2022		
DRAWING NUMBER 1641-16417-009		DR'n N.K.	DATE 01-06-2022		

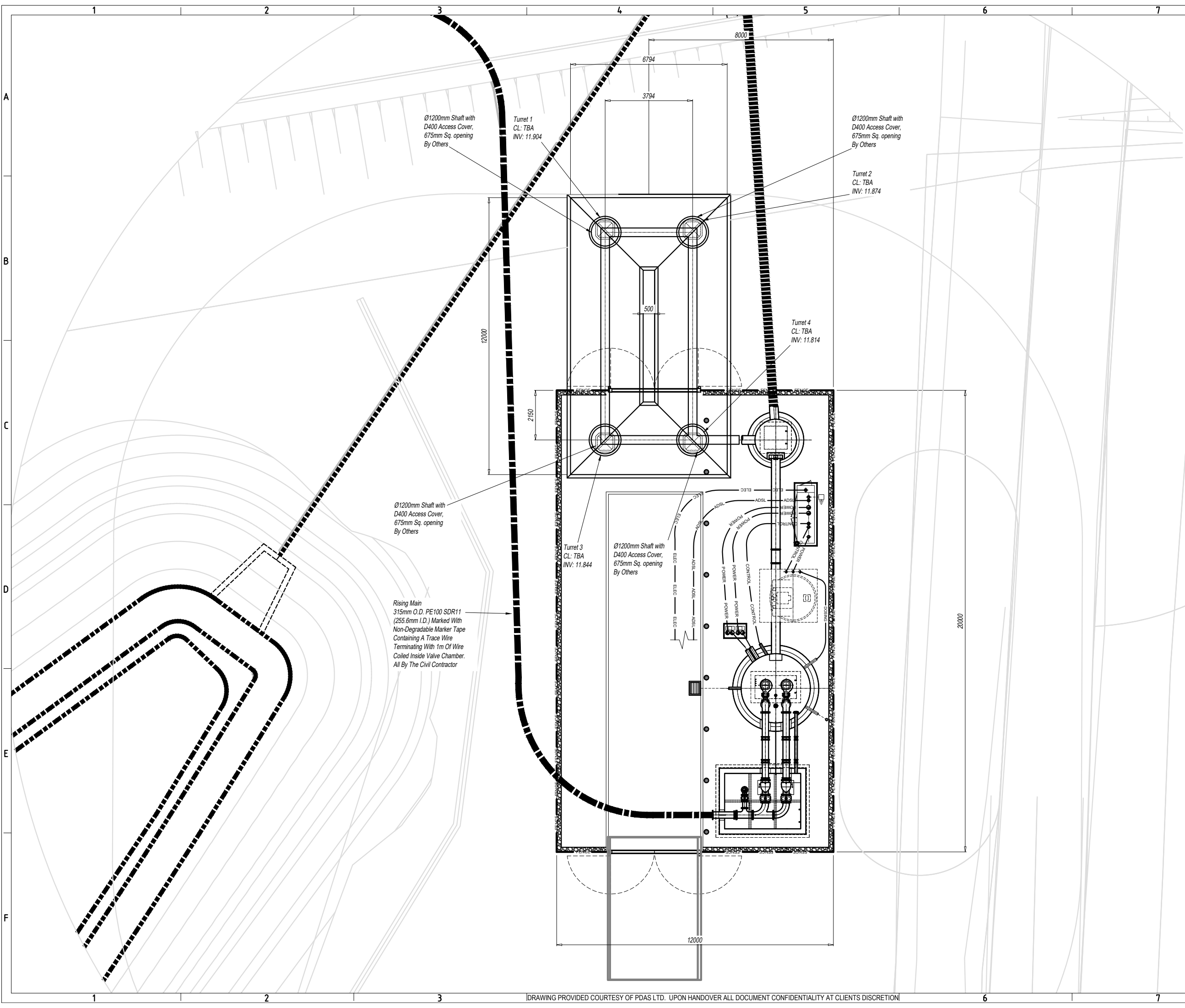


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NOTE:
COVER LEVEL ADJUSTED TO
PROVIDE HEADROOM FOR AIR VALVE

All Cut Pipe Joints As Close To Structure As Possible Consistent With Making The Joint.

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 NORTHERN PUMP STATION					
TITLE FOUL WATER PUMP STATION AIR VALVE CHAMBER AT CHAINAGE 355.582M					
CLIENT PFA CONSULTING LIMITED					
SCALE AT A1 1:10		SCALE AT A3 1:20			
QUOTE NUMBER	1641	APR'l	P.W.	DATE	01-06-2022
JOB NO.	16417	CHK'd	P.W.	DATE	01-06-2022
DRAWING NUMBER	1641-16417-010	DR'n	N.K.	DATE	01-06-2022



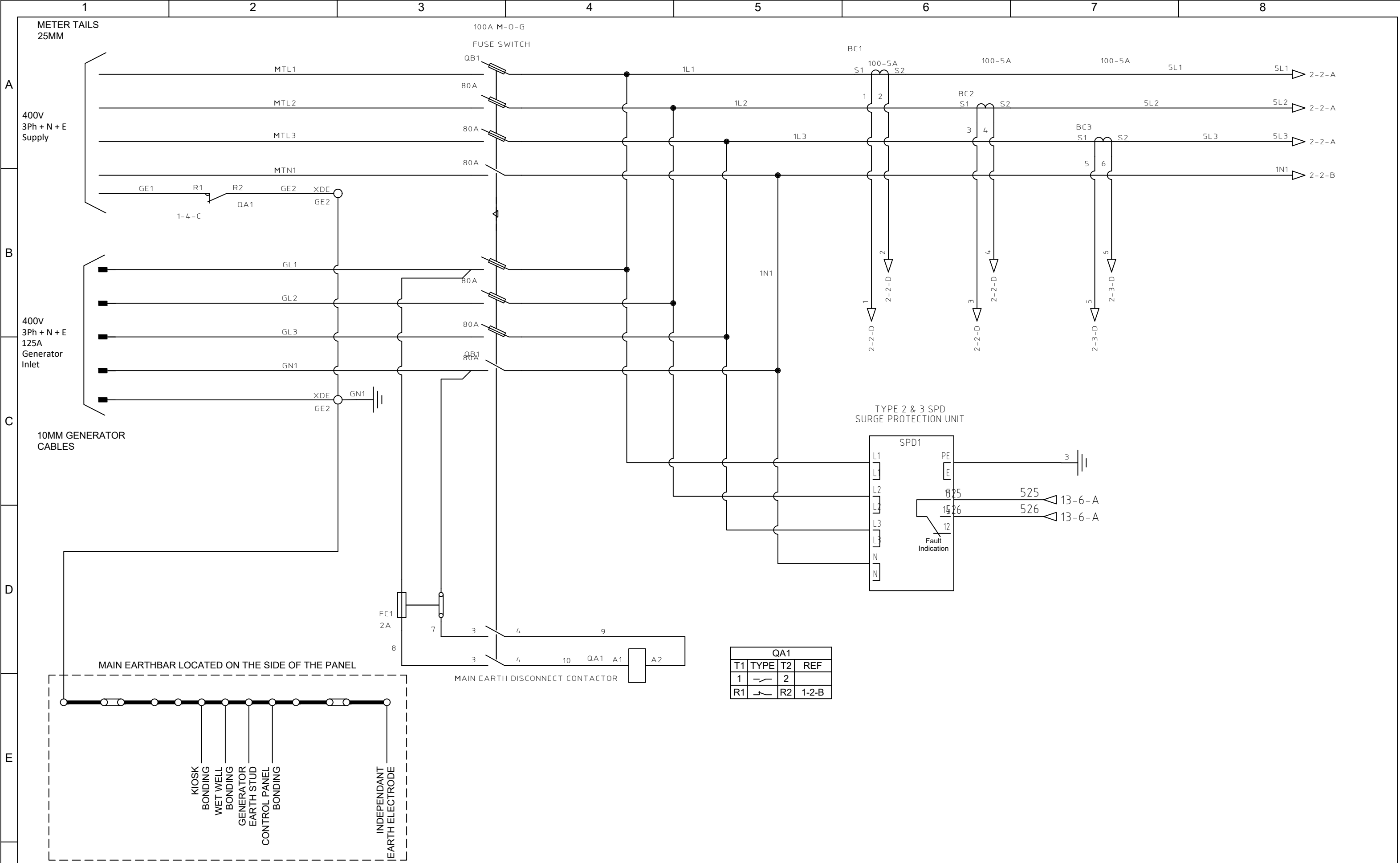
- NOTES
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REV	DATE	DESCRIPTION	DR'n	CHK'd	APR'l
FOR APPROVAL					
 DESIGN INSTALL PROACTIVE TOTAL WATER EXPERTISE					
BUILDING 4.6, HITECH, FRIMLEY 4 BUSINESS PARK, FRIMLEY, CAMBERLEY, SURREY, GU16 7SG OFFICE TEL No. (01483) 930520 WEBSITE WWW.PDASLTD.CO.UK					
PROJECT ONE HORTON HEATH NORTHERN PUMP STATION					
TITLE FOUL WATER PUMP STATION STORAGE TANK					
CLIENT PFA CONSULTING LIMITED					
SCALE AT A1 1:75		SCALE AT A3 1:150			
QUOTE NUMBER	1641	APR'l	P.W.	DATE	01-06-2022
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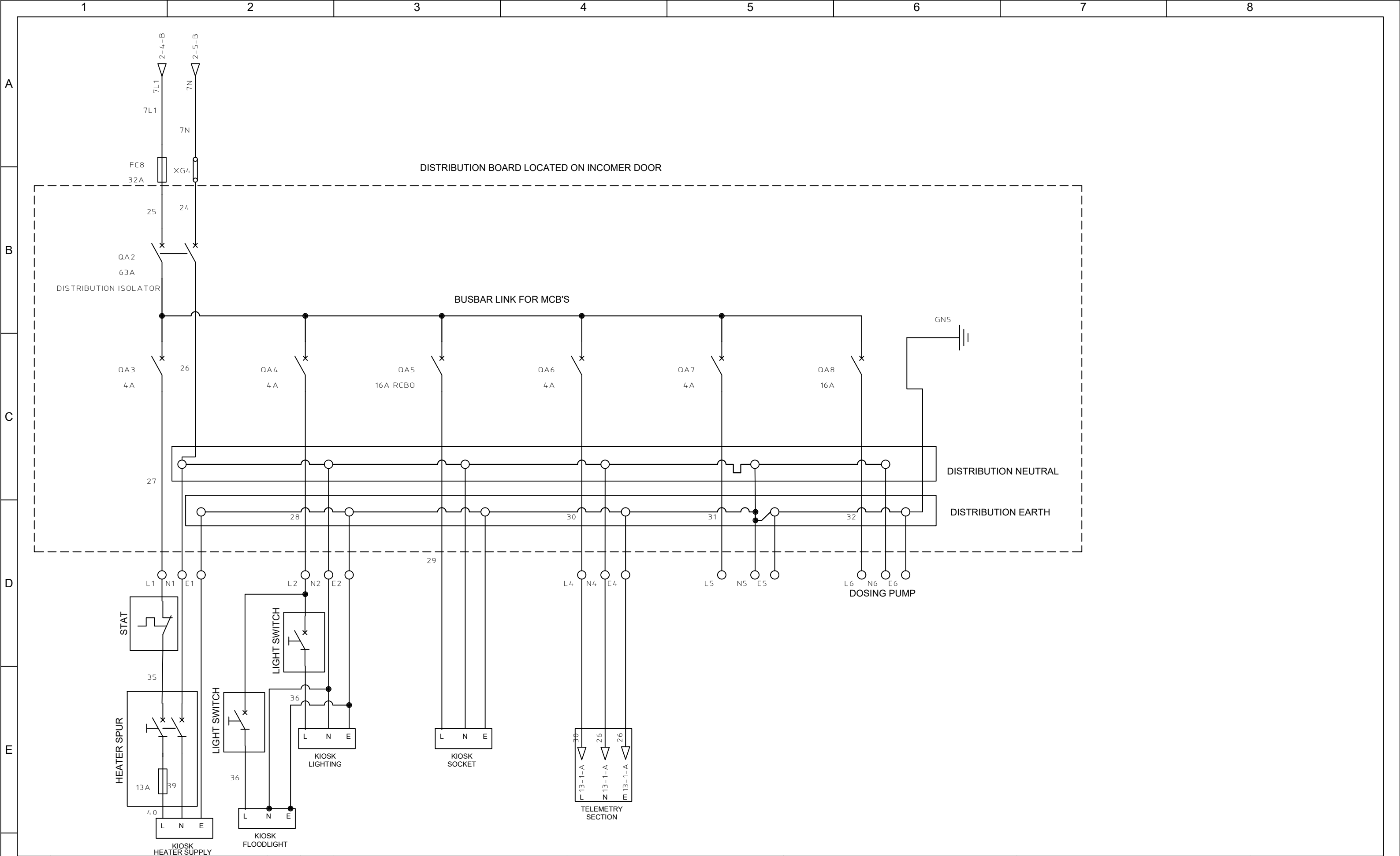
Appendix G
Structural Design
(To Follow)

Appendix H

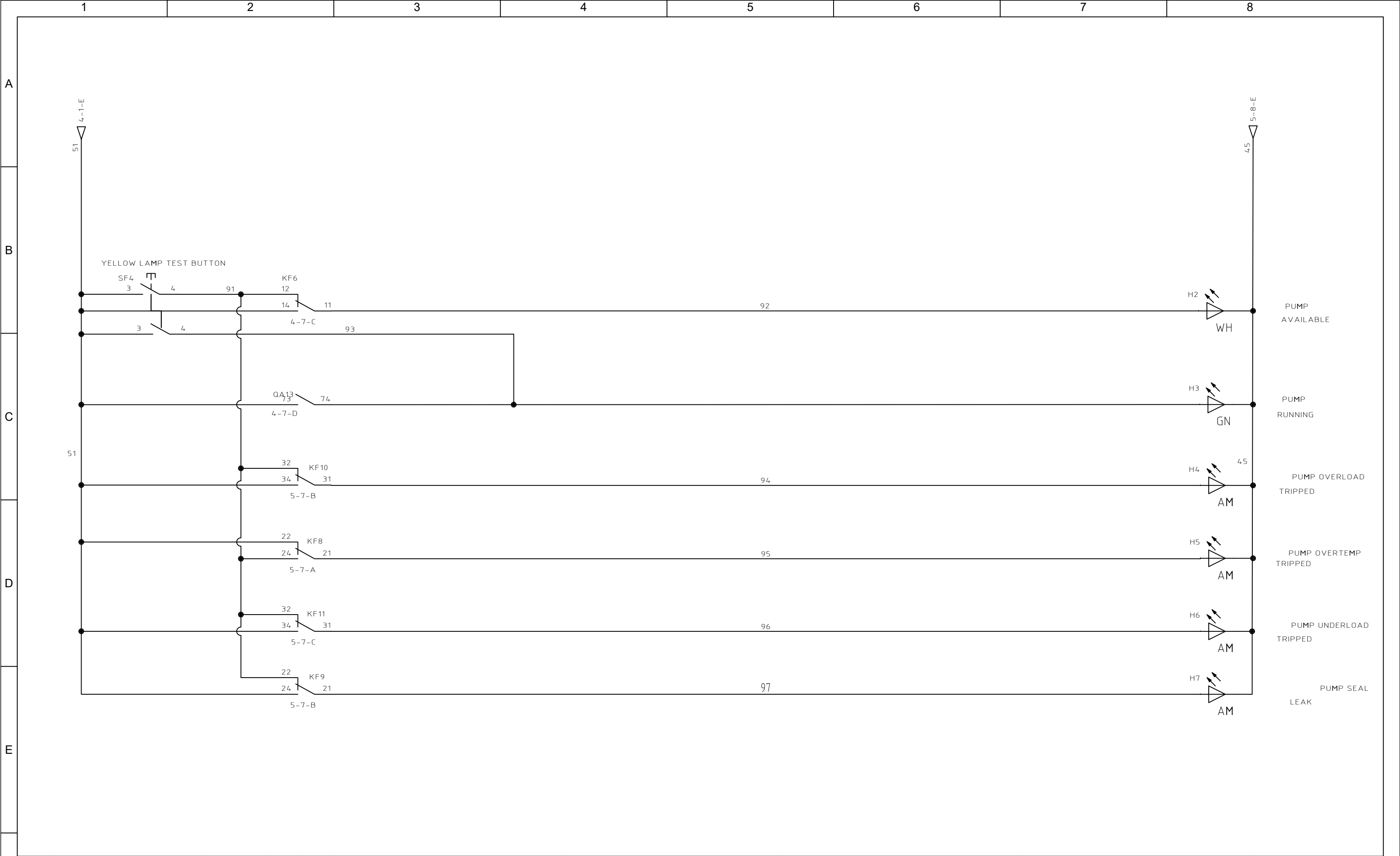
Wiring Diagrams



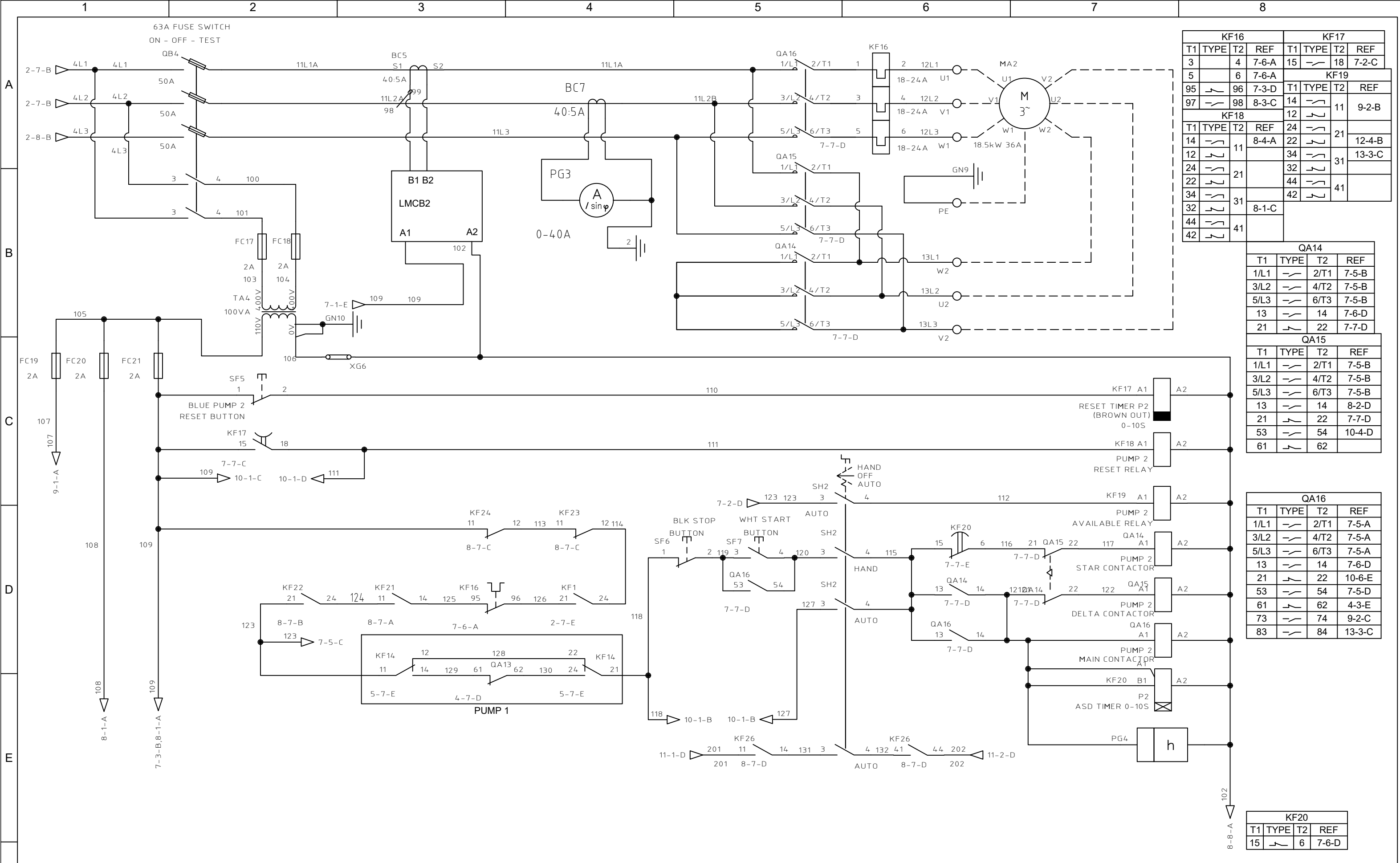
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	A	First Issue	01/06/22	JH	JH						
	Rev	Description	Date	Drn	Apprv	Drawing No PR16417-NPS					
					Site One Horton Heath Northern Pump Station			This document may not, without our permission, be copied, shown or handed out to competitors or any other unauthorised persons Copyright Protected	1 of 20		

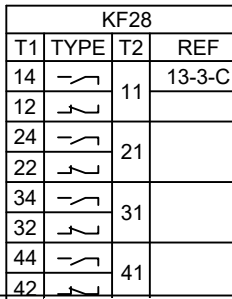


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	Rev	Description	Date	Drn	Apprv	Drawing No PR16417-NPS							



					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	 4752	 This document may not, without our permission, be copied, shown or handed out to competitors or any other unauthorised persons Copyright Protected					
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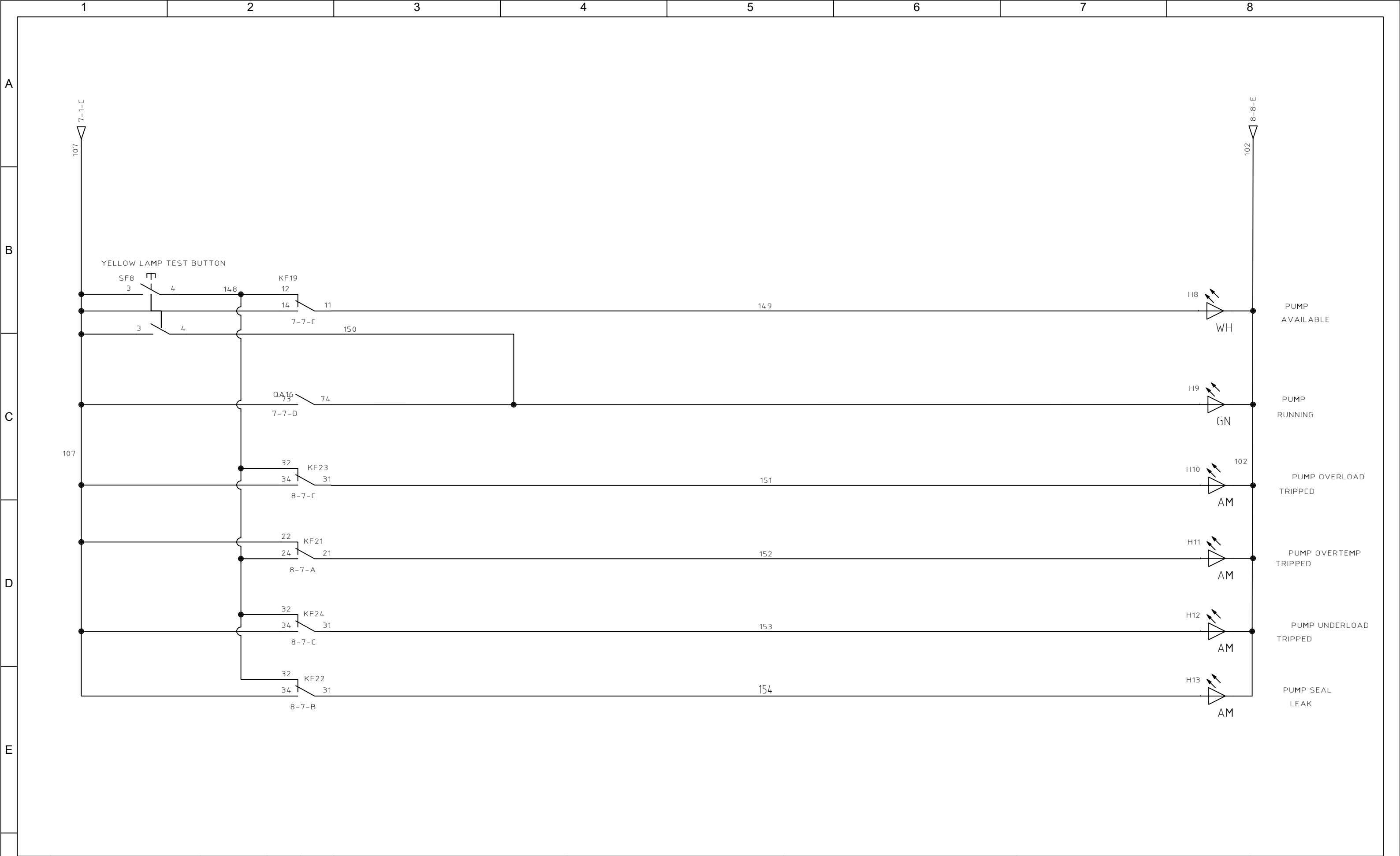




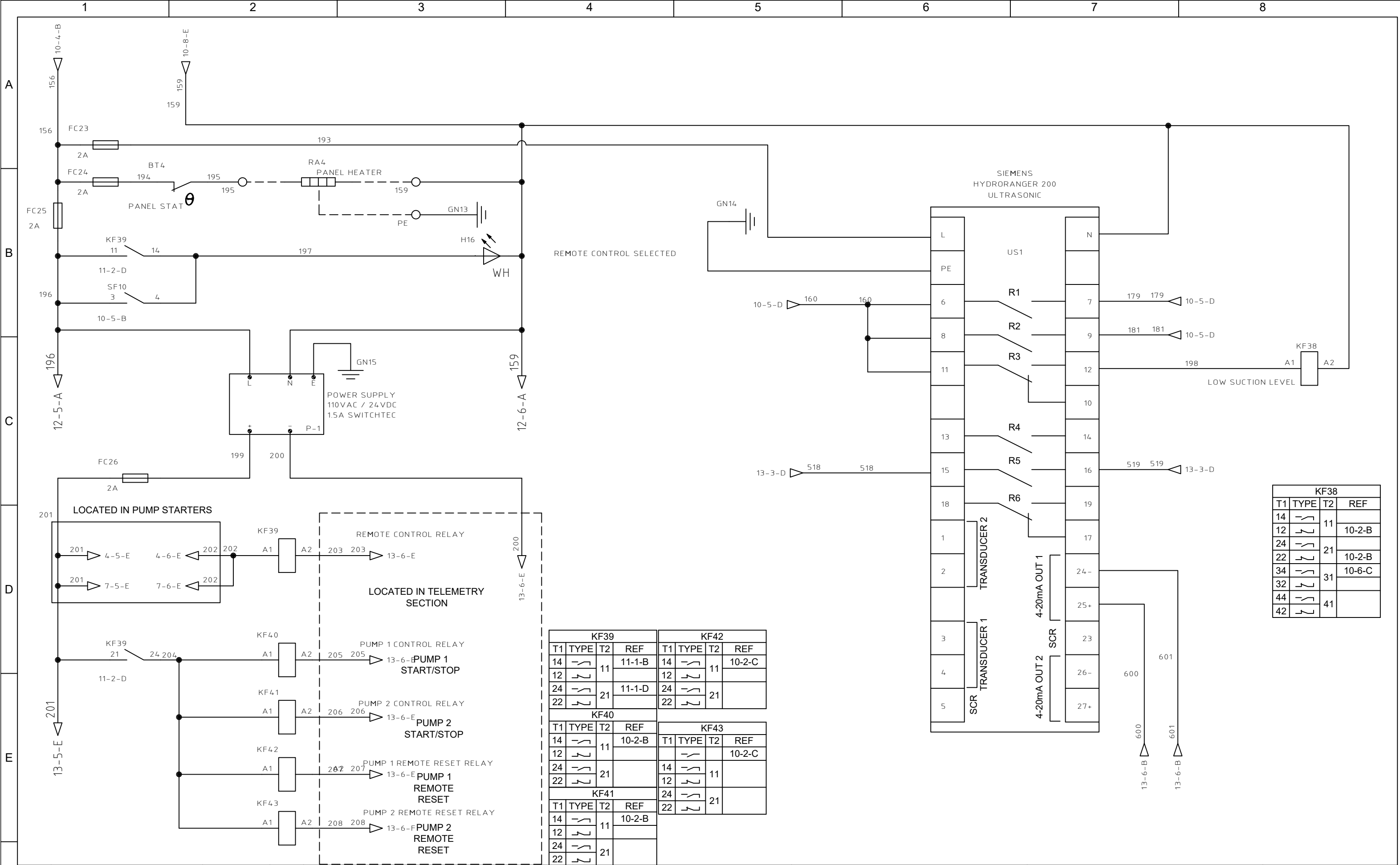


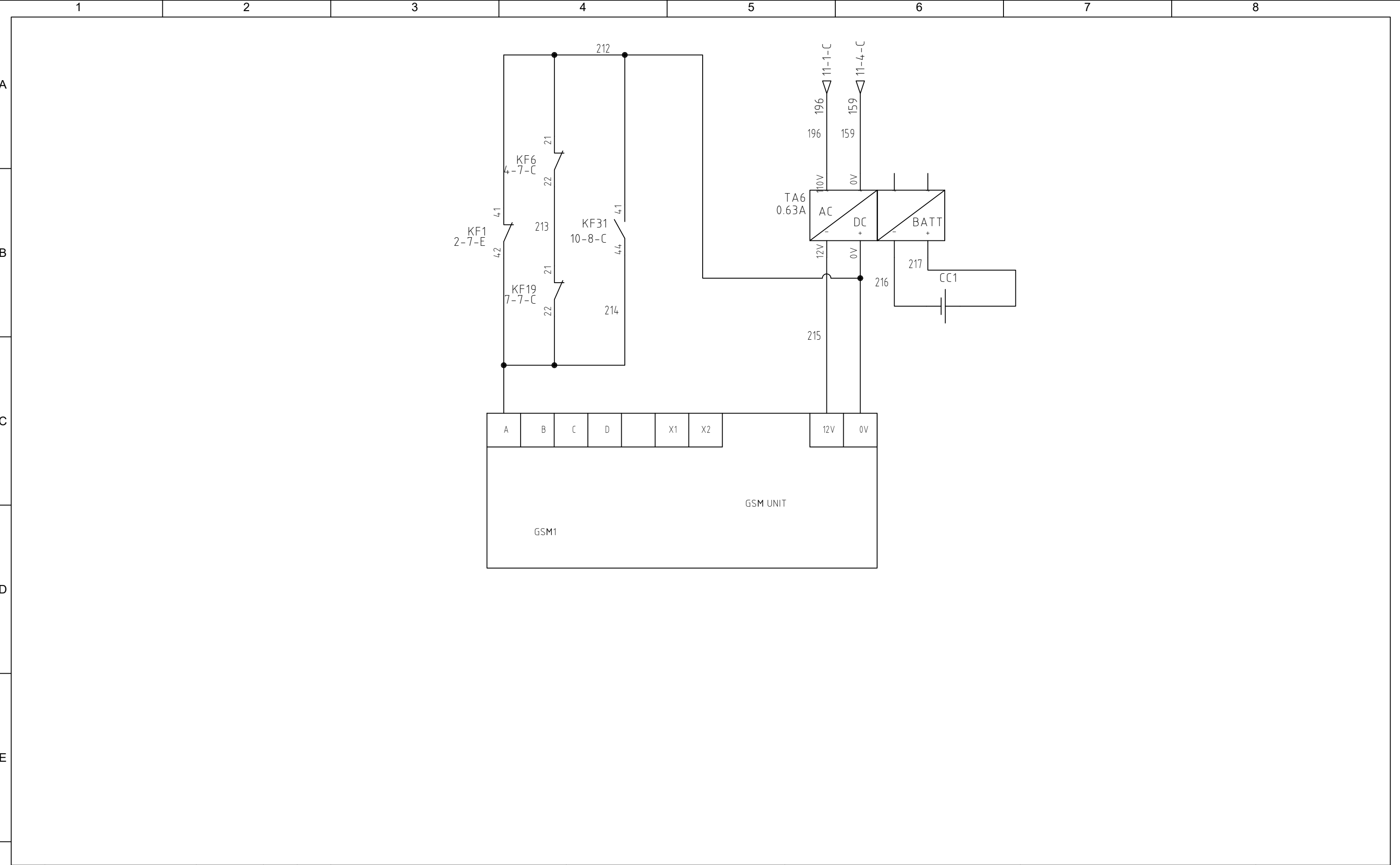
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A	First Issue	01/06/22	JH	JH						
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F					Client Name PFA Consulting Limited		 gemini control systems ltd designers and manufacturers	 GEMINI CONTROL SYSTEMS LTD TEL: 0808 196 8770 FAX: 01782 659 465 WWW.GEMINI-CONTROLS.COM	 		 Sheet No 12 of 20
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Rev	Description	Date	Drn	Apprv			Site One Horton Heath Northern Pump Station		This document may not, without our permission, be copied, shown or handed out to competitors or any other unauthorised persons Copyright Protected		



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D								
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F								

					Client Name PFA Consulting Limited			 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		 TOTAL WATER EXPERTISE	 Sheet No 14 of 20
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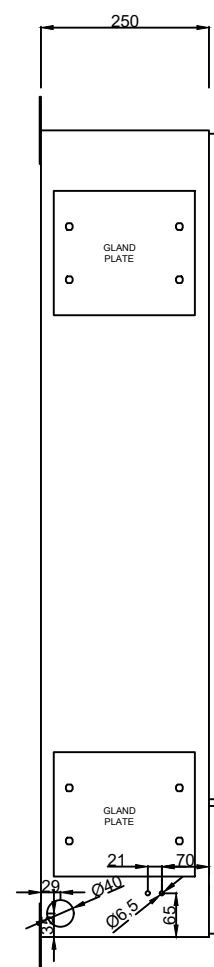
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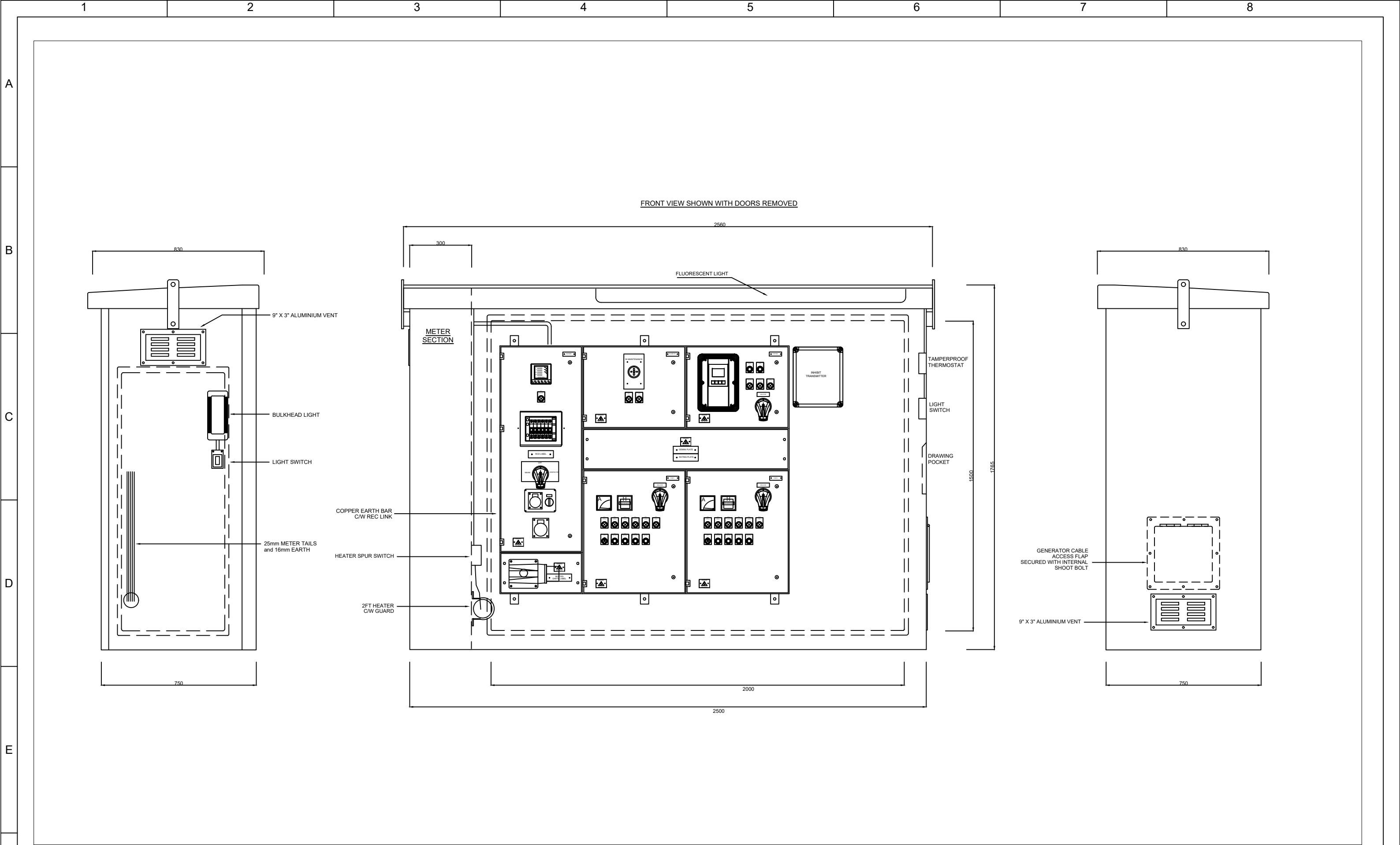


gemini control systems ltd
designers and manufacturers



Site
One Horton Heath Northern Pump Station





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 4751	 PDAS TOTAL WATER EXPERTISE	
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	Rev	Description	Date	Drn	Apprv	Drawing No PR16417-NPS						
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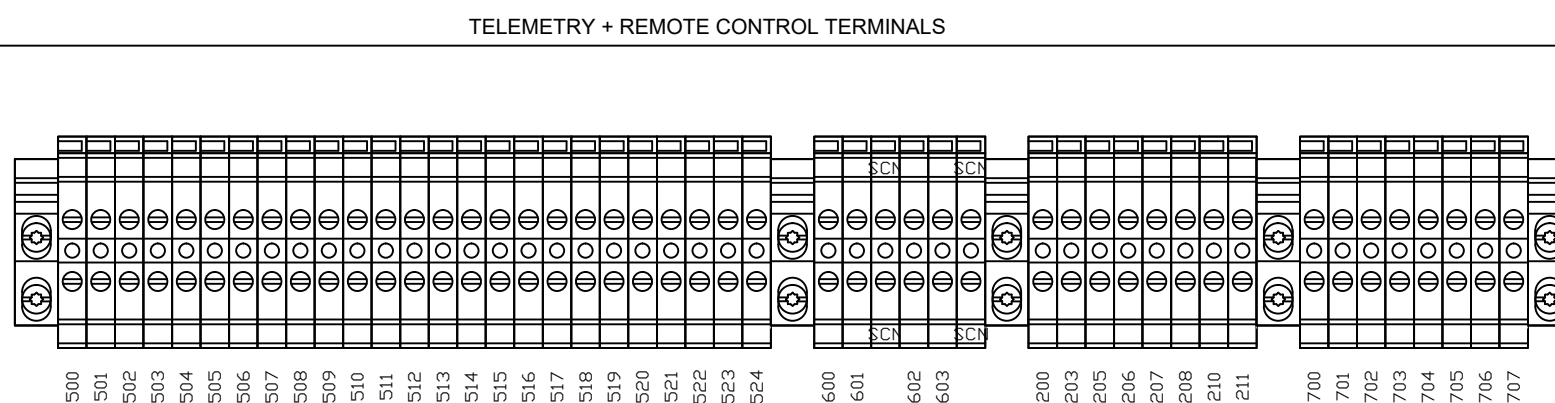
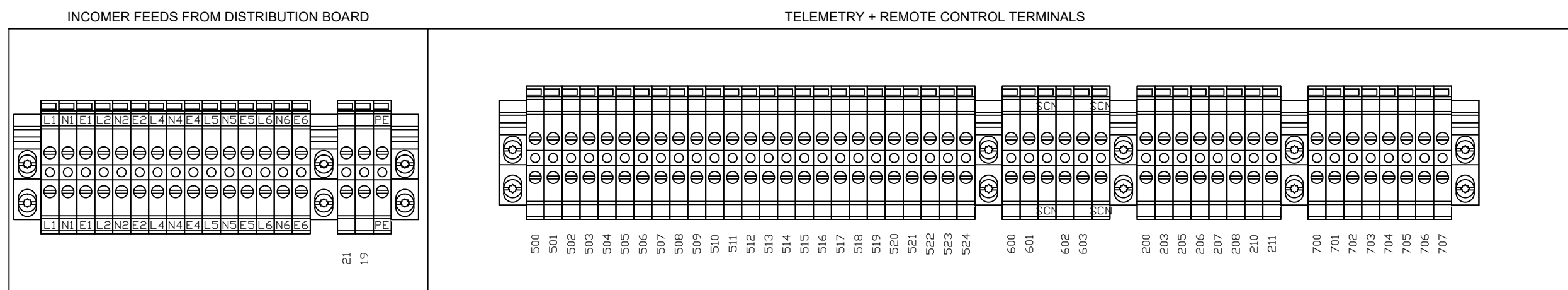
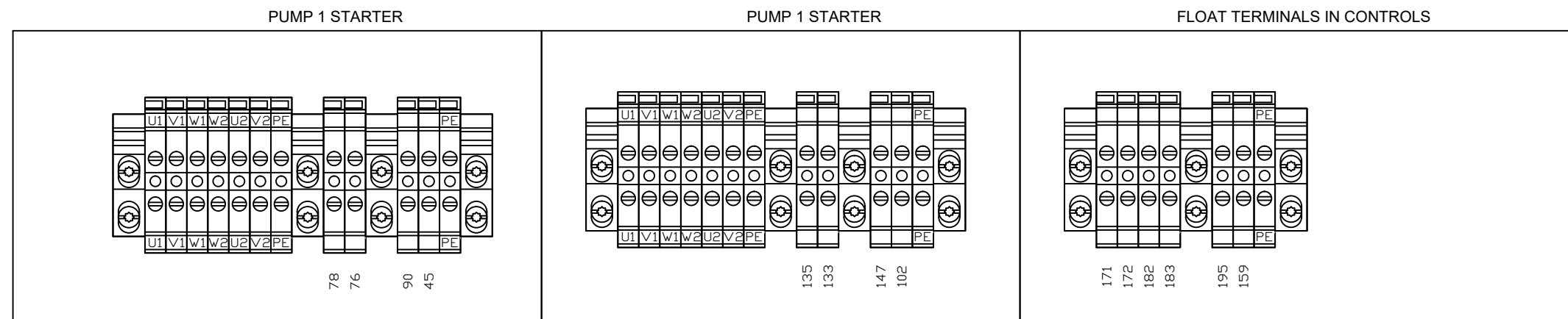
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A	First Issue	01/06/22	JH	JH	
Rev	Description	Date	Drn	Apprv	Drawing No PR16417-NPS

Title	DCG V2 + SW LOCAL PRACTICES DUAL ASD CONTROL PANEL TERMINAL FOOTPRINTS
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Drawn By JH	Project Code PR16417-NPS
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Project Code
PR16417-NPS

Drawing No PR16417-NPS

Site
One Horton Heath Northern Pump Station



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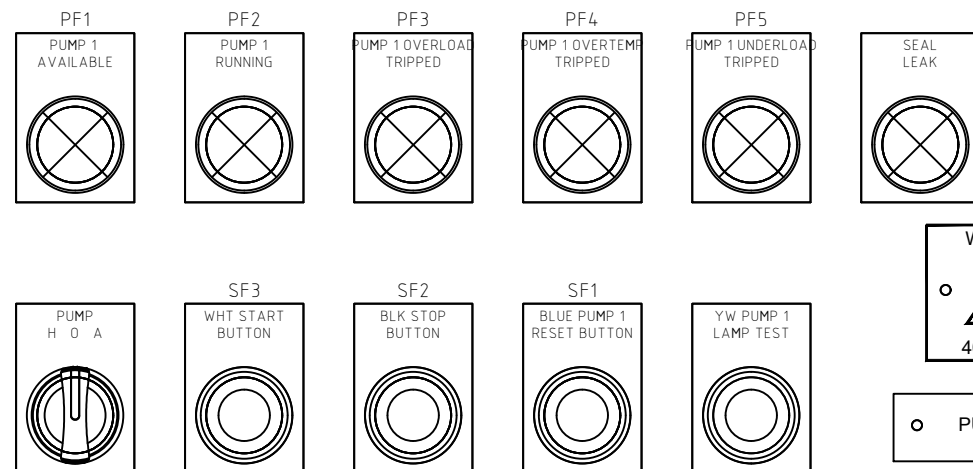


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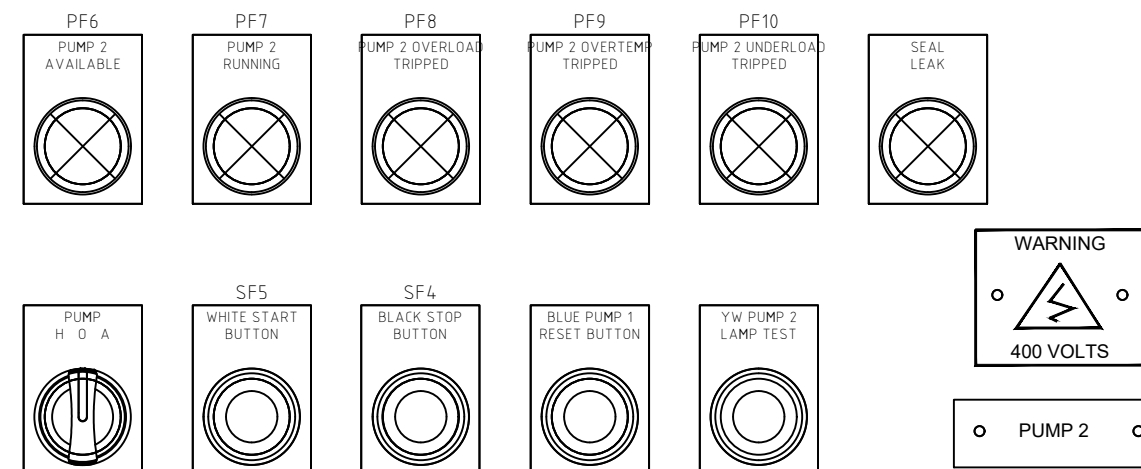
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PUMP 1



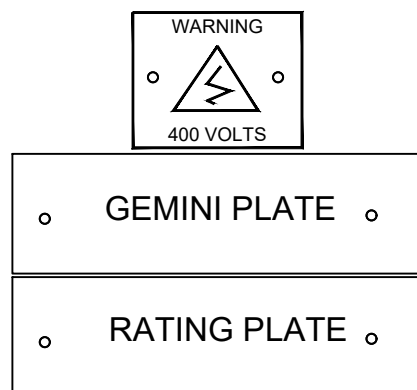
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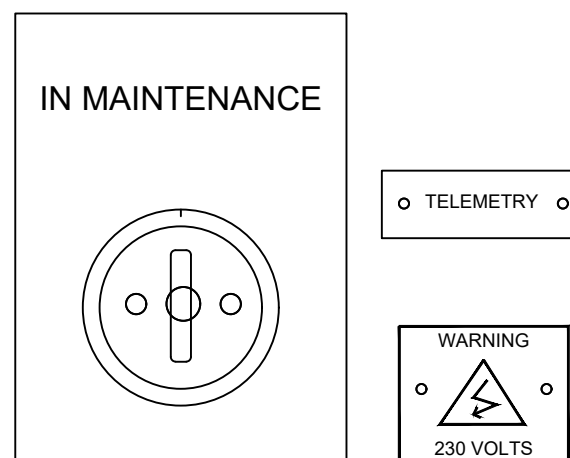
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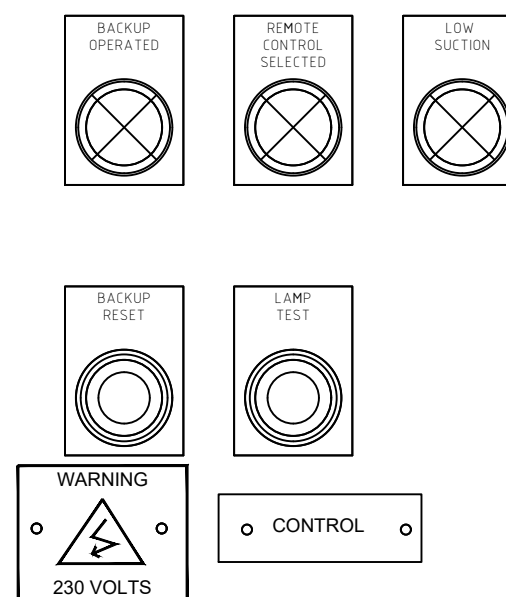
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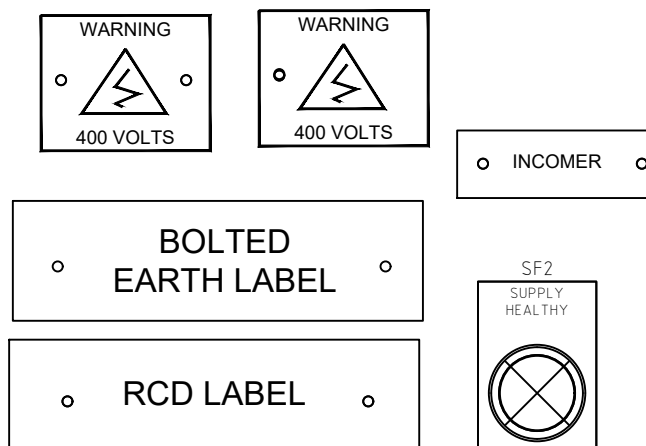
TELEMETRY



CONTROLS



INCOMER

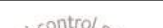


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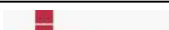
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					Title DCG V2 + SW LOCAL PRACTICES DUAL ASD CONTROL PANEL LABEL GA	
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A	First Issue	01/06/22	JH	JH	JH	PR16417-NPS
Rev	Description	Date	Drn	Apprv	Drawing No PR16417-NPS	



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CONTRACTOR



ISO 9001
CERTIFICATION



UKAS
4718



PDAS
TOTAL WATER EXPERTISE

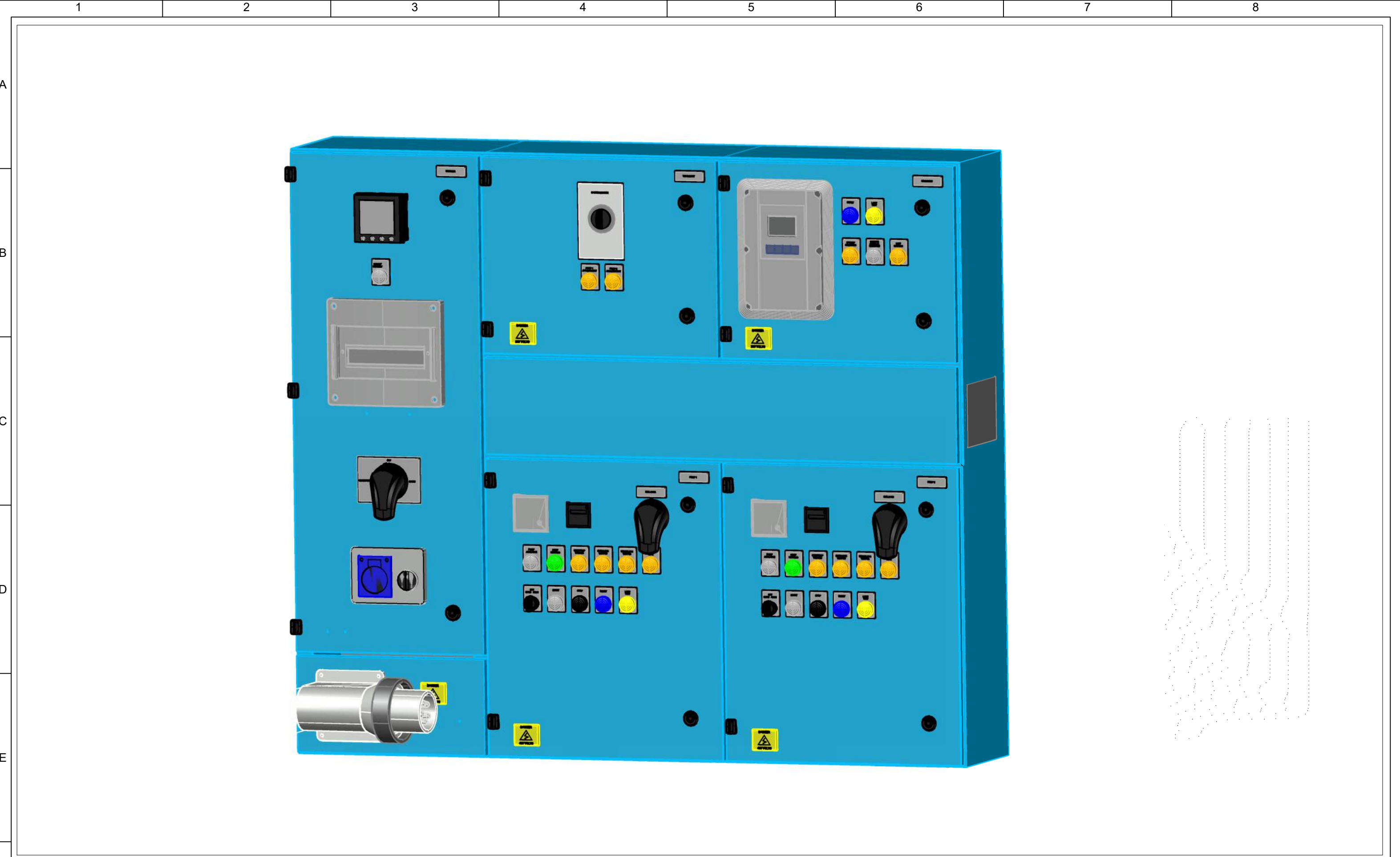


Site
One Horton Heath Northern Pump Station

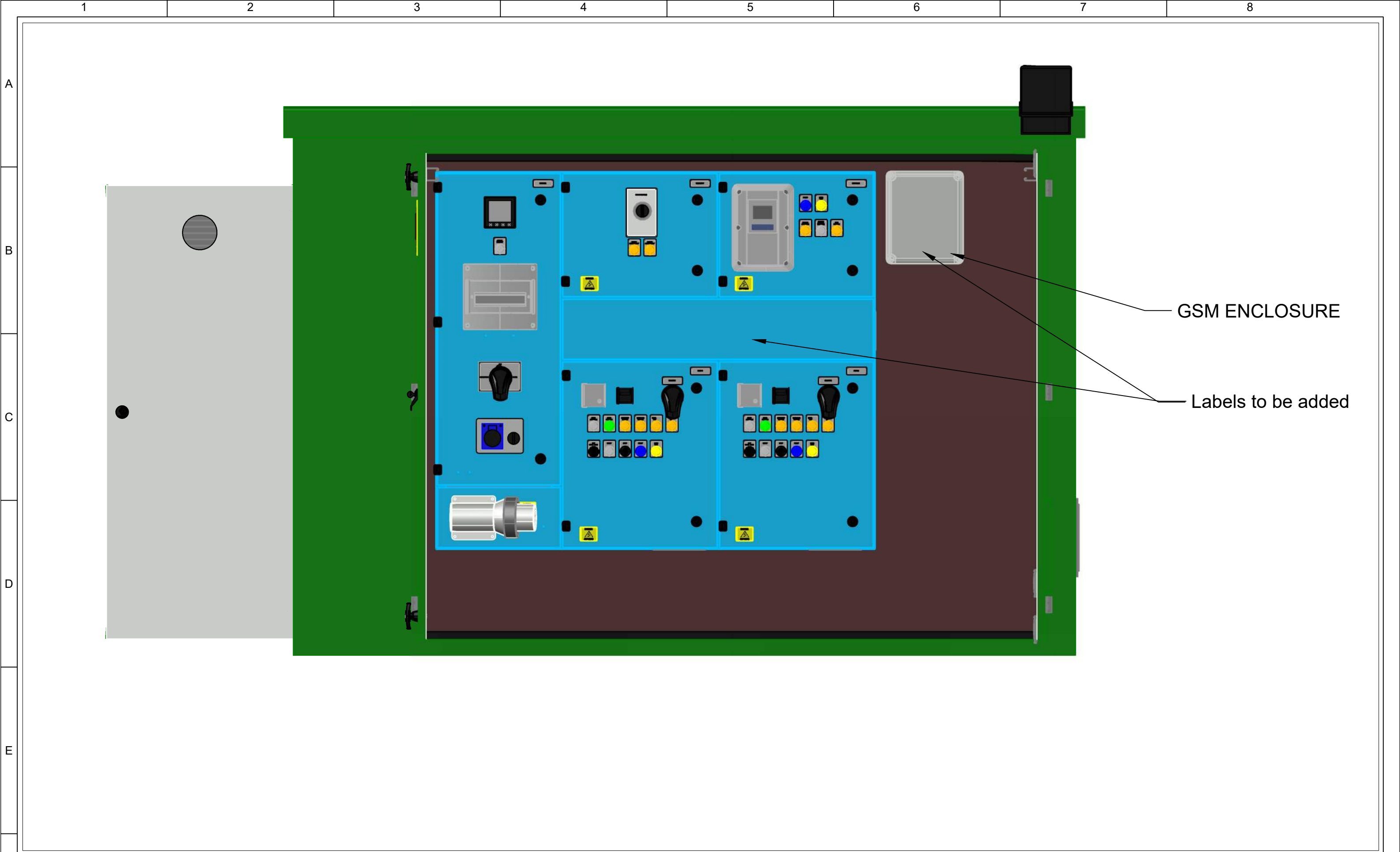
Sheet No

18 of 20

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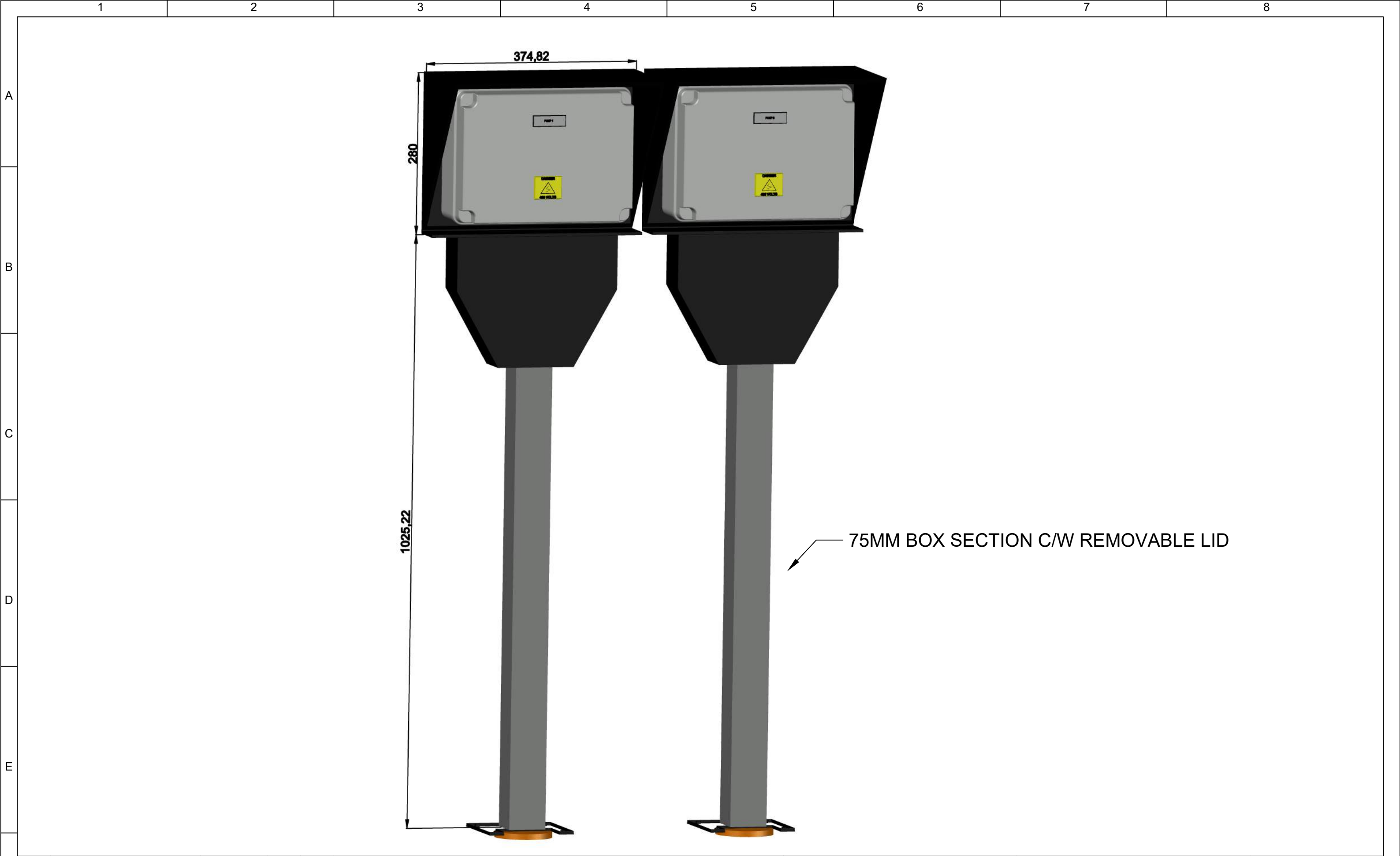


					Client Name PFA Consulting Limited			   GEMINI CONTROL SYSTEMS LTD TEL: 0808 196 8770 FAX: 01782 659 465 WWW.GEMINI-CONTROLS.COM		 Sheet No
					Title DCG V2 + SW LOCAL PRACTICES DUAL ASD CONTROL PANEL PANEL GA 3D					
B	Changed to LHS	10/06/22	JS	JS	Drawn By JH	Project Code PR16417-NPS				
A	First Issue	01/06/22	JH	JH			Site One Horton Heath Northern Pump Station		This document may not, without our permission, be copied, shown or handed out to competitors or any other unauthorised persons Copyright Protected	19 of 20
Rev	Description	Date	Drn	Apprv	Drawing No PR16417-NPS					



F					Client Name PFA Consulting Limited			  		 Sheet No	
					Title DCG V2 + SW LOCAL PRACTICES DUAL ASD CONTROL PANEL KIPSK GA 3D						
	B	Changed to LHS	10/06/22	JS	JS	Drawn By JH					Project Code PR16417-NPS
	A	First Issue	01/06/22	JH	JH						
	Rev	Description	Date	Drn	Apprv	Drawing No PR16417-NPS					
							 gemini control systems ltd designers and manufacturers	Site One Horton Heath Northern Pump Station		This document may not, without our permission, be copied, shown or handed out to competitors or any other unauthorised persons Copyright Protected	20 of 20

Appendix I
Junction Box Stand Details



F

					Client Name			   GEMINI CONTROL SYSTEMS LTD TEL: 0808 196 8770 FAX: 01782 659 465 WWW.GEMINI-CONTROLS.COM	
					Title PUMP JB Stand				
					Drawn By JH	Project Code GCS0340			
A	FIRST ISSUE								
Rev	Description	Date	Drn	Apprv	Drawing No		Site	This document may not, without our permission, be copied, shown or handed out to competitors or any other unauthorised persons Copyright Protected	Sheet No
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Appendix J
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	
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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 K

Lifting Equipment



PORTA-DAVIT[®] QUANTUM



ASSEMBLY VIDEO

Assembly & Operation

www.reidlifting.com

REID
LIFTING
LIGHTWEIGHT | PORTABLE | SAFE

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CONTENTS

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CORRECT OPERATION

- Intended use
- Inspection prior to initial operation
- Inspection before starting work
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- Attaching the load
- Temperature range
- Regulations
- Inspection/Maintenance
- Sockets
- Marking
- ATEX
- Language

ASSEMBLY INSTRUCTIONS

- *PORTA-DAVIT QUANTUM* - Type S (Shackle only)
- *PORTA-DAVIT QUANTUM* - Type W (Winched)

DETAILED DIMENSIONS

QUALITY & SAFETY

- Accreditations

INSPECTION RECORD

INTRODUCTION

All users must read these operating instructions carefully prior to the initial operation. These instructions are intended to acquaint the user with the *PORTA-DAVIT QUANTUM* and enable him/her to use it to the full extent of its intended capabilities.

The operating instructions contain important information on how to handle the davit in a safe, correct and economic manner. Acting in accordance with these instructions helps to avoid dangers, reduce repair costs and down time and to increase reliability and lifetime of the davit.

Anyone involved in doing any of the following work with the *PORTA-DAVIT QUANTUM* must read the operation instructions and act accordingly:

- operation, including preparation, trouble shooting during operation and cleaning
- maintenance, inspection, repair
- transport

Apart from the operating guide, health & safety and accident prevention act valid for the respective country and area where the equipment is used, the commonly accepted regulations for safe and professional work must be adhered to.

It is incumbent on the user or instigator of work with the equipment that all users have suitable medical and physical capabilities. Likewise the competent person should ensure there is a rescue plan in place in the event of an emergency that could occur during the work.

N.B. This document should form an element of the overriding Risk Assessment and Method Statement required for each lift.

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CORRECT OPERATION

Intended use

The *PORTA-DAVIT QUANTUM* is intended to be used for the lifting of goods or the lifting of persons, or for providing a safety anchor for the prevention of falls.

N.B. We recommend that the device is dedicated to either goods or personnel use and where reasonably practicable to avoid using the structure for both.

Inspection prior to initial operation

Each davit must be inspected prior to initial operation by a competent person. The inspection is visual and functional and shall establish that the structure is safe and has not been damaged by incorrect assembly, transport or storage. The inspection should particularly concentrate on:

- Dents or indentations on the kingpin, jib, backstay (if present) and column surfaces.
- Straightness of jib and column sections.

N.B. If the telescopic jib section does not close the davit has been overloaded – contact your REID representative.

- Elongation of the jib holes, column holes or backstay connection holes.

N.B. If the inner telescopic jib does not line up with the outer when folding and inserting retaining pin the davit may have been overloaded (see Overload Indicator section) - contact your REID representative.

- Damage to the shackles, strop (signs of fraying – the strop is manufactured from polyester; if signs of damage, UV degradation or wear REID recommend it is replaced).

The above list is not exhaustive. Inspections are instigated by the user.

Inspection before starting work

The inspection procedure requires that a valid inspection/test certificate has been submitted to and

checked by the user. Before starting work, inspect the davit tubes and all load bearing components for visual defects. Furthermore, test the free rotation of the kingpin and ensure that it is fully engaged in the socket. To check whether the kingpin is fully engaged, ensure that the lower bearing at the bottom of the column is flush with the top of the socket. This inspection requirement covers only the davit.

Ensure that the overall working load limit (WLL) is adhered to – following the necessary Risk Assessment and Method Statement.

Maximum capacity

The *PORTA-DAVIT QUANTUM* is designed to lift and lower loads up to its related capacity. The capacity indicated on the davit is the working load limit (WLL) or safe working load (SWL), which must not be exceeded.

The table below gives the maximum WLL and radius

	Max. Goods WLL	Max. Personnel WLL	Max. Radius
PDQ 1 (PDQ600)	600kg	300kg	1200mm
PDQ 2 (PDQ500)	500kg	250kg	1500mm

for each of the standard models.

When being used as a personnel lifting anchor the user must use a body harness and retractable device or shock absorber that complies with EN355 that limits the maximum arrest force (M.A.F.) to 6kN. Personnel winches used with the *PORTA-DAVIT QUANTUM* should comply to EN1496:2006 or equivalent.

Only ONE person/load may be attached to the davit structure in accordance with the WLL.

If the davit is to be used for personnel winching the WLLs must be observed. It is possible for the davit to have a WLL higher than is allowable when used with a fall arrest device. This is for situations where the structure is to be used as an anchor for lifting persons that have no possibility of falling through a free distance or when drafting out a rescue plan and should only be carried out following a comprehensive risk assessment.

N.B. If winching, a secondary line/fall arrest unit may also be required.

While the *PORTA-DAVIT QUANTUM* will have the capabilities stated on the product it is only one part of a fall arrest system which is only as strong as the lowest rated component. Each lift must be properly planned and all weights clearly known along with the WLL and constraints of all fall arrest system devices.

In the event of simultaneous goods and personnel combined lifting or when being used as a fall arrest system in sub-zero AND wet conditions contact the supplier as capacities may be reduced.

Only a chain hoist up to a capacity of 1000kg may be used with the davit. The structure has been designed such that the weight of a chain block can be neglected, however if using a device with a significant weight it should be included into the WLL.

In the event of using a lifting device other than a manual chain hoist particular attention must be paid to the dynamic effects induced into the structure and it may be required to reduce the WLL of the structure. If in doubt contact your REID Lifting representative.

Notes for correct usage

- For winched variants, each of the *PORTA-DAVIT QUANTUM*'s three sheaves have been designed to work with different rope materials and diameters as detailed below:

Sheave Colour	Rope Diameter	Rope Material
Yellow	4mm - 5mm	Wire rope / Fibre rope
White/Natural	4mm - 7mm	Wire rope / Fibre rope
Grey	8mm - 12mm	Fibre rope only

- It is important that each sheave is used for its intended purpose i.e. Rope diameter must fall within the sheaves capabilities to prevent pinching or squashing of the rope.
- The restraint attachment point (shackle) positioned on the lower column is to be used as a restraint point **only**.

- We recommend the use of load-sensing or overload protection devices on all lifts.
- The WLL (or SWL) rating must **NOT** be exceeded – risk assessment & method statement must consider additional loading in 'wet lift' or 'break-out force' situations.
- Ensure suitable winches and winch connection plates are used for all applications.
- Due care and attention should be practiced when transporting and storing the product to avoid damage.
- Do not throw the product or its components down or stack items on top of it. Always place properly on the ground to avoid damaging the equipment.
- Assemble only as instructed (ensure all bolts are present and fitted correctly as per instructions).
- We recommend that gloves are worn when using this equipment.
- Do not assemble davit in non-approved sockets.
- Do not use the davit if the kingpin shaft is not seated correctly in the socket.
- Do not use the davit if it does not rotate freely in the bearing or the bottom flange is fouled in any way, preventing free rotation of the davit.
- Do not knot or shorten the tension strap to reduce operating radius.
- Attach hoist only to one of the two lifting points.
- Lift only when load chain/rope forms a vertical line between load and lifting shackle used.
- Set up the product in its mounting socket ensuring that it is a safe location and there is no risk of falling into the hazard and davit is set at the correct operating radius for the job.

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- Persons are forbidden to walk or stand in dangerous areas.
- Attach the load only to the lifting points on the head or the lifeline/winch-line.
- Do not allow the load to swing.
- When lifting keep the load as low to the ground as possible.
- If the davit is to be used in special atmospheres contact your supplier.
- When using the davit as a fall arrest anchor the required clearance of the fall arrest device should be considered - refer to the device's Operations and Maintenance manual.
- **NEVER** walk away from structure whilst connected to the equipment i.e. connected by a fall arrest block or winch.
- Before the davit is used, consideration must be given to the potential effects of the ropes running over sharp edges, chemical reagents, electrical conductivity, cutting, abrasion, climatic exposure and the effect of offset forces as a result of pendulum falls.

Warning

- The equipment shall not be used outside its limitations, or for any purpose other than that for which it is intended.
- Do not allow personnel to pass under a suspended load.
- NEVER leave a suspended load unattended.
- The *PORTA-DAVIT QUANTUM* can only be used for lifting or arresting the fall of **ONE** person.
- It is **NOT** recommended to mix the use of the davit with personnel and goods lifting concurrently.
- Be aware of hazards when setting up/setting down.
- It is essential for safety that the davit is withdrawn from use immediately should:
 1. any doubt arise about its condition for safe use, or;
 2. it has been used to arrest a fall,and not be used again until confirmed in writing by a competent person that it is acceptable to do so.

Disclaimer



All REID Lifting sockets & extensions have been designed, developed and tested for safe use with REID equipment and form a key part of the integrity of the total system.

- All sockets have a working load limit (WLL) based on the maximum radius setting of the davit, and the socket installation and verification tests performed.
- All sockets are supplied in galvanised mild steel or stainless steel (316L grade, passivated).
- Sockets can be powder coated upon request e.g. Yellow for trip hazard warning.

Should non-standard third party sockets be used, REID Lifting's Declaration of Conformity & Incorporation on the products is negated. i.e. The system becomes the responsibility of the client.

Attaching the load

The operator must ensure that the working load limit (WLL) maximum capacity hoist is attached in a manner that does not expose him or other personnel to danger by the hoist, chain(s) or the load.

Temperature range

The davit can be operated in ambient dry temperatures between -20°C and +50°C (-4°F to 122°F). Consult your supplier in case of extreme working conditions.

If used in sub-zero and wet conditions, the performance may be affected.

Regulations

The *PORTA-DAVIT QUANTUM* complies with the following regulations:

PPE Directive 89/686/EEC, Machinery Directive 2006/42/EC, ATEX Directive 94/9/EC, The Provision and Use of Work Equipment Regulations 1998 (S.I. 1998 No. 2306), EN795:2012, The Lifting Operations and Lifting Equipment Regulations 1998 (S.I. 1998 No. 2307). The safety regulations of the respective country for using manual lifting equipment must be strictly adhered to.

INSPECTION/MAINTENANCE

Regular inspections

To ensure that the structure remains in safe working order it must be subjected to thorough periodic inspections by a competent person. Inspections are to be 6 monthly if used for the lifting of persons or 12 monthly otherwise, unless adverse working conditions or profile of use dictate shorter periods. The components of the structure are to be inspected for damage, wear, corrosion or other irregularities. To check for worn parts it may be necessary to disassemble the structure. Particular attention should be paid to the areas of the structure described under **Inspection Prior to Initial Operation**.

Repairs should only be carried out by an approved specialist workshop that uses original spare parts. It is recommended that once inspected the device is marked with the date of next inspection.

Inspections are instigated by the user. If detailed information is required on inspection and test criteria, please refer to your supplier's technical department.

If using the davit in explosive atmospheres see additional section titled ATEX.

Maintenance/Repair

In order to ensure correct operation, not only the operating instructions, but also the conditions for inspection and maintenance must be complied with. If defects are found **stop** using the davit immediately.

No alterations or additions to the equipment should be made without the written consent of the manufacturer. Any repair shall only be carried out in accordance with the manufacturer's procedures.

It is recommended to maintain the equipment in a clean and dry manner. Cleaning is suggested using a sponge or cloth with warm, soapy water (using diluted domestic washing up liquid), rinsing and allowing to dry.

The majority of the structure is constructed from aluminium with steel fasteners; non-metallic parts are constructed from acetal co-polymers, polyethylene and polyester.

Overload indicator

The structure is fitted with a mechanism that will indicate if the structure has been overloaded.

The jib assembly, comprising 2 telescopic components is intended to deform differently under high loads. This results in 2 warnings:

1. Upon disassembly, when retracting the upper jib into its stowed position, with the davit orientated in a vertical position, if the pin to lock the two jib components together is difficult to or cannot be inserted completely, an overload may have occurred. If so quarantine the equipment and contact your REID representative.
2. Upon disassembly, when retracting the upper jib into its stowed position, if the jib cannot be inserted fully it has become deformed due to an overload. If this occurs, quarantine the equipment immediately and contact your REID Lifting representative.

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SOCKETS

The *PORTA-DAVIT QUANTUM* structure needs to be anchored to a surface/foundation capable of withstanding the applicable loading. The davit can be supplied with one of the mounts specified below (**only mounts supplied by REID Lifting are approved to be used with the *PORTA-DAVIT QUANTUM***):



Top
Mount



Side
Mount



Bridge
Mount



Cast & Resin
Bonded

- The **top mount** is for use on flat horizontal surfaces. It can be installed onto concrete using resin bonded anchors or into steel work using bolts.
- The **side mount** can be installed using resin bonded anchors or mechanical anchors.
- The **bridge mount** socket is for mounting into steel work and walkways.
- The **cast & resin bonded** sockets are for installation into concrete.

Socket installation

Depending upon the socket type there are multiple ways that installation can be achieved. When using bolts they are to be minimum grade 8.8 BZP or, if stainless, grade A4, or equivalent.

When installing the socket it is important to ensure that the top face is as level as possible, with installation being not more than 3 degrees misaligned from the horizontal.

Socket installation should only be carried out by a competent person. If specifying the anchors, resin, fasteners or any combination of the afore-mentioned, it is essential that the competent person is of ability to specify an installation that is safe for use. If in any doubt about the calculation of loads contact your REID Lifting representative.

Verifying the installation

REID Lifting strongly recommends testing the installation of the socket before initial use; especially when using resin bonded anchors.

When verifying the installation we recommend that it is tested to a maximum force of 6kN at the device's maximum radius, if used for the lifting of personnel. If used for the lifting of goods, we recommend testing to no greater than 125% of the goods WLL at its maximum radius. All tests should be carried out in all anticipated worst case loading directions, sustained for a duration of 3 minutes.

If unable to test the installation as a whole, then each anchor can be isolated and tested individually applying the applicable loading, i.e. tension and/or shear loads. For clarification on the loads contact your equipment supplier.

If an installation differs from the sockets referred to above, or to that specified by your supplier then the competent person must verify by calculation that the installation can withstand the following:

- for personnel, 12kN at the devices maximum radius in all anticipated worst case loading directions **but not test to more than 6kN at the devices maximum radius**;
- for lifting of goods, 150% of the goods WLL at the devices maximum radius in all anticipated worst case loading directions **but not test to more than 125% of the goods WLL at the devices maximum radius**.

If required a sacrificial anchor may need to be installed to verify the installation has the ultimate capacities required.

Following initial socket installation verification tests we do not recommend overload tests for the socket or davit and suggest thorough visual examination only. If the client feels that as a result of a visual examination that a load test is appropriate, we would recommend a 100% load test and certainly no greater than 125%.

MARKING

The serial labels indicate:

- The product description.
- The product identification number.
- The products unique serial number.
- The goods working load limit (WLL) of the device.
- The year of manufacture.
- The standards to which the device is approved (only applicable when rated for the lifting of persons).
- The ATEX rating of the product (if applicable) - see ATEX section.
- CE 0088: CE mark plus notified body number (currently LRQA) who are responsible for monitoring REID Lifting's quality control system in accordance with Article 11B of the PPE Directive (only applicable when rated for the lifting of persons otherwise CE just stated).



Read the Assembly & Operation instructions.



PORTA-DAVIT QUANTUM

Assembly & Operation instructions.

ATEX:



This product has been designed for use in explosive atmospheres. If the product is to be used in explosive atmospheres then the following section must be followed. Any different or exceeding use is considered incorrect and REID Lifting Ltd will not accept any responsibility for damages resulting from false application. The risk is solely with the user. If the product has been customised in any way then it may not comply with standards and not be suitable for use in explosive atmospheres. If this is the case then the product will not have any of the below marking. If in doubt contact your REID representative.

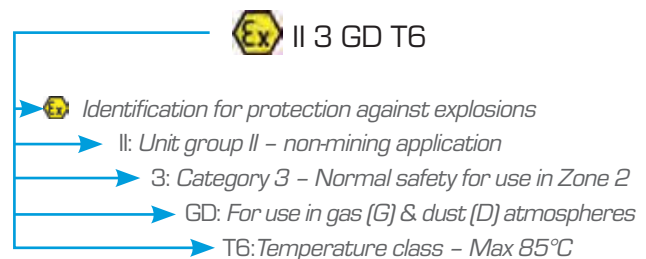
ATEX - Classification

If identified with the Marking below, the product meets the requirements of Category 3 equipment for use in Zone 2 explosive atmospheres, providing a normal level of protection where mixtures of air and gases, vapours or mists or by air/dust mixtures are unlikely to occur or, if they do occur, are likely to do so only infrequently and for a short period only.

ATEX - Identification

In addition to the previous Marking section, if suitable for use in explosive atmospheres, the product will have the following identification on the serial label:

As standard for Zone 2 atmospheres:



ATEX - Spark formation

Increased danger of ignition may emanate from clashing of special material pairings. These are non-corrosion resistant steel or cast iron against aluminium, magnesium or pertinent alloys. This applies especially in case of rust or surface rust.

When assembling the product and inserting fastening components; they must be clear of rust and debris of any kind. Care must be taken to ensure the product is handled in a suitable manner and is never thrown, and always placed, onto the ground.

ATEX - Static electricity

For Zone 2 applications, static electricity has been identified as potential for build-up, leading to an incendive spark. Although the risk of such ignition is unlikely, the structure must have a clear route to earth, which must be considered when installing the sockets for mounting the structure. These sockets should be in direct contact with the ground and there should be no membrane separating the socket from the ground.

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If an isolating membrane is to be used, an earthing path must be provided. If the structure is to be used in a larger socket with a nylon sleeve the davit will have to be earthed using a 4mm earthing cable attached to a convenient location on a metallic part of the structure.

ATEX - Inspection, maintenance & repair

If using the davit in explosive atmospheres, in addition to the regular inspection/maintenance information found on page 6, these additional instructions should be followed.

Inspections shall be instigated by the user and occur at least 6 monthly or sooner if adverse operating conditions or profile of use dictate shorter periods. Inspections and maintenance shall be carried out at a safe distance away from an explosive atmosphere.

Special attention should be given to dust deposits on the structure, especially in areas where the profiles come into contact, and should be wiped clean and care taken not to apply materials that could create electrostatic charging. Additionally the kingpin should be checked to ensure it rotates freely and the lower bearing must be ensured to be fixed to the structure with no possibility of a build-up of debris between the contact surfaces.

The structure is predominantly constructed from aluminium which will not rust. However there are steel components used throughout. These are the fasteners, shackles and sockets. Where there is sign of any rust deposits on the aluminium structure it should be wiped clean as above and where there is sign of rust on a steel component, then that component should be removed from use and the structure not used until a replacement is fitted.

LANGUAGE

It is essential for the safety of the user that if this product is re-sold outside the original country of destination the reseller shall provide instructions for use, maintenance, for periodic examination and for repair in the language of the country in which the product is to be used.

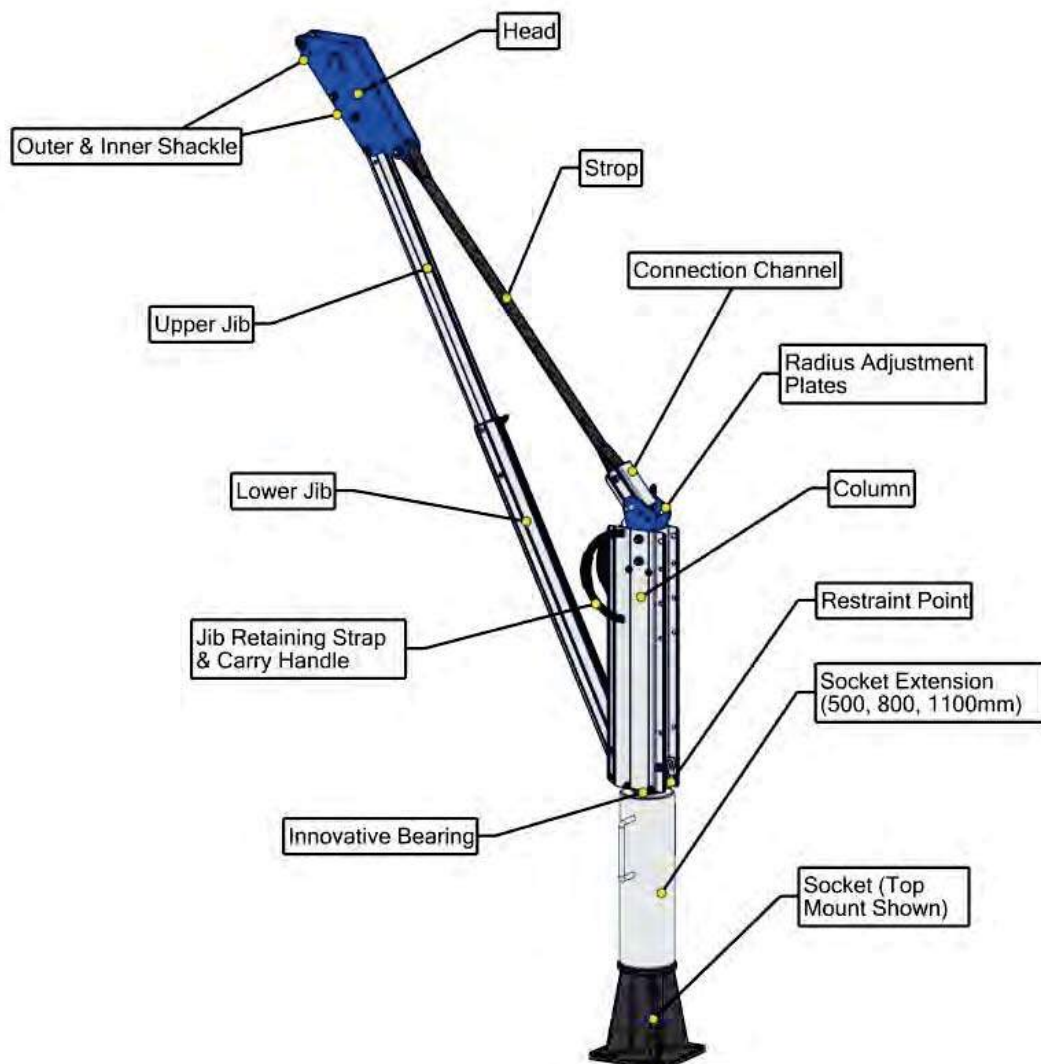
ASSEMBLY INSTRUCTIONS

PORTA-DAVIT QUANTUM - Type S (Shackle only)

NB: Appropriate PPE should be worn: Gloves, Protective footwear, Hard hat

The *PORTA-DAVIT QUANTUM* (Type S) and its constituent components are described in the image below. The use of a socket extension is optional and the mount type may vary between a top mount, side mount, bridge mount, cast in or resin bonded depending on application.

N.B. No tools are required for assembly.



No. 1 in lightweight, portable, safe lifting solutions

PORTA-DAVIT QUANTUM - Type S (Shackle only) Instructions



1. Insert the *PORTA-DAVIT QUANTUM* into the socket as shown.

N.B. Top mount socket shown.

N.B. If using a socket extension, install first. The use of a ladder may be required.



2. Remove the telescopic jib pin.



3. Extend the jib and re-insert the pin.

N.B. Holes on the lower and upper jib need to align.

Caution: Potential finger trap.



4. Release the jib retaining strap and rotate jib assembly outwards.

N.B. For disassembly, reverse steps 1-4.

Adjusting the radius



5. The operator can choose the most suitable radius for use.
The decal specifies the radius values with the upper value stating the outer shackle position and the lower value stating the inner shackle position.
The operating dimensions can be found on page 17.

N.B. Ensure pin fully engaged before use.

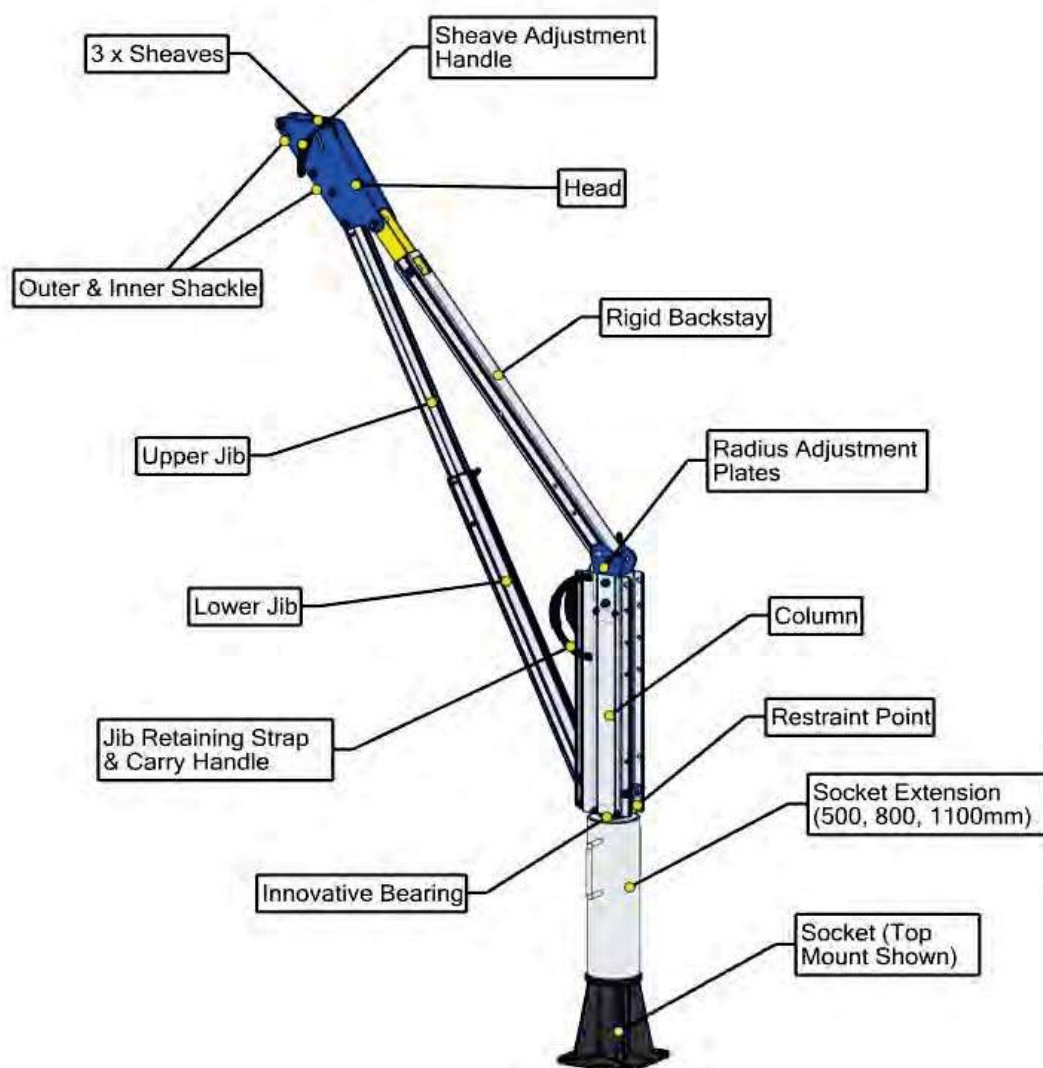
No. 1 in lightweight, portable, safe lifting solutions

PORTA-DAVIT QUANTUM - Type W (Winched)

NB: Appropriate PPE should be worn: Gloves, Protective footwear, Hard hat

The PORTA-DAVIT QUANTUM (Type W) and its constituent components are described in the image below. The use of a socket extension is optional and the mount type may vary between a top mount, side mount, bridge mount, cast in or resin bonded depending on application.

N.B. No tools are required for assembly.



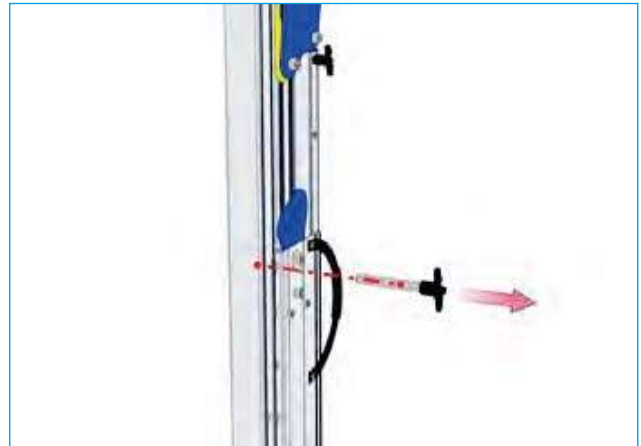
PORTA-DAVIT QUANTUM - Type W (Winched) Instructions



1. Insert the *PORTA-DAVIT QUANTUM* into the socket as shown.

N.B. Top mount socket shown.

N.B. If using a socket extension, install first. The use of a ladder may be required.

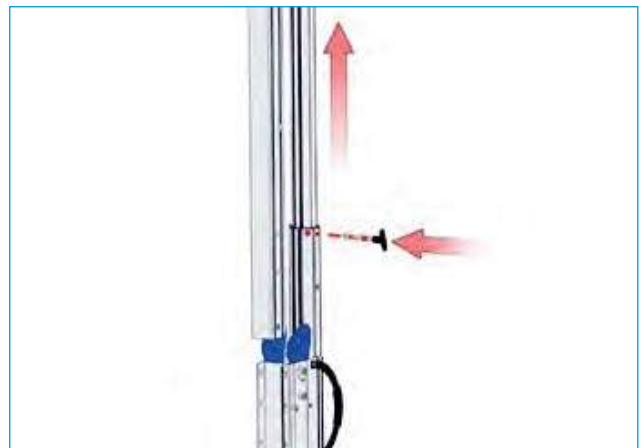


2. Remove column/ backstay pin and position the backstay towards the ground ensuring that the backstay remains inside the column fins.

Caution: Potential finger trap.



3. Remove telescopic jib pin.



4. Extend the jib and re-insert the pin.

N.B. Holes on the lower and upper jib need to align.

Caution: Potential finger trap.

No. 1 in lightweight, portable, safe lifting solutions



5. Line up the bottom hole on the backstay with the required operating radius hole and insert pin.

N.B. The backstay connection plates will need to rotate clockwise to allow for this to happen.



6. Release the jib retaining strap and rotate jib assembly outwards.

N.B. For disassembly, reverse steps 1-6.

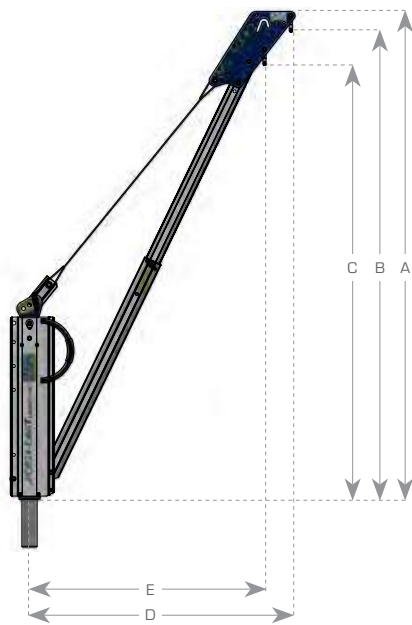
Adjusting the radius



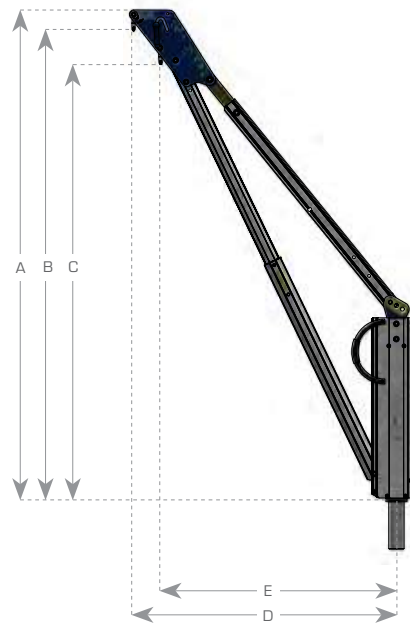
7. The operator can choose the most suitable radius for use.
The decal specifies the radius values with the upper value stating the outer shackle position and the lower value stating the inner shackle position.
The operating dimensions can be found on page 17.

N.B. Ensure pin fully engaged before use.

DETAILED DIMENSIONS



Type S (Shackle only)

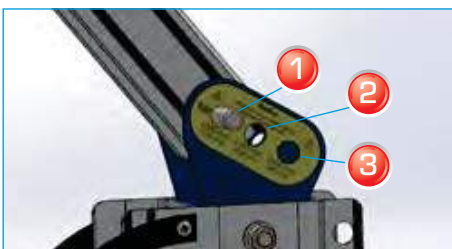


Type W (Winched)



Folded Dimensions

Radius Adjustment Points



	WLL	Radius Adjustment Points	Dimensions (mm)				
			A	B	C	D	E
PDQ 1 (PDQ 600)	600kg	1	2007	1935	1799	1200	1100
		2	2061	1989	1848	1100	1000
		3	2111	2039	1892	1000	900
PDQ 2 (PDQ 500)	500kg	1	1837	1766	1647	1500	1400
		2	1899	1827	1703	1400	1300
		3	1957	1885	1755	1300	1200

Dimensions are the same for Type S (Shackle only) and Type W (Winched).

QUALITY & SAFETY

ACCREDITATIONS

Quality and Safety are key themes throughout this document and the REID Lifting ethos. It is with this in mind that we have undertaken external accreditations to ensure we stay focused on what is important to our clients and users and ahead of market trends and developments in Safety and Quality systems.

REID Lifting has been successfully audited by Lloyds Register (LRQA) for approval of its Integrated Management System combining quality systems management, environmental issues and the Health and Safety practices within the company.

REID Lifting holds the following certifications:

- **ISO 9001** - Specifies requirements for a quality management system for any organisation that needs to demonstrate its ability to consistently provide product that meets customer and applicable regulatory requirements and aims to enhance customer satisfaction.
- **ISO 14001** - Specifies the requirements for implementing environmental management systems throughout all areas of the company.
- **OHSAS 18001** - Occupational Health and Safety Managements Systems.
- **LEEA Membership** - REID Lifting Ltd is a full member of the Lifting Equipment Engineers Association (membership 000897). REID Lifting conforms to the main aims of the association which is to achieve the highest standards of quality and integrity in the operations of members. Their entry qualifications are demanding and strictly enforced through technical audits based on the technical requirements for members.



Conformité Européenne (CE)

REID Lifting's products have been designed, tested and approved (as appropriate) by the Conformité Européenne. This certifies that REID Lifting's products meet the

demands of the European Directives regarding health and safety requirements.

EC Type examination in accordance with 89/686/EEC by notified body No. 0120: **SGS United Kingdom Limited**, Unit 202B Worle Parkway, Weston-super-Mare, BS22 6WA, United Kingdom.

The Queen's Award for Enterprise Innovation

REID Lifting has been awarded this prestigious award twice for innovative design and development of lightweight, portable and safe lifting solutions.

TESTING

Testing and Technical File review are integral parts of our design and manufacturing process – to externally verify the products, where appropriate, using government approved Notified Bodies.

Products are proof load tested either individually (or on a batch sampling basis). Full product design & development Technical Files are available for inspection.

Product IPR

Intellectual property rights apply to all REID Lifting Ltd products. There are patents in place, or pending, for:

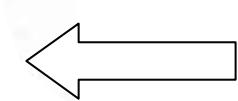
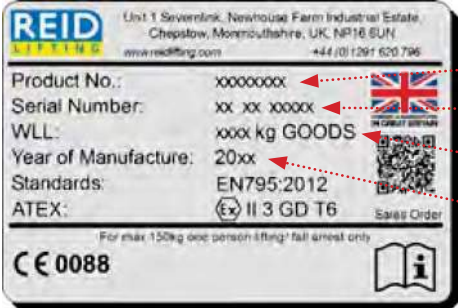
- *PORTA-GANTRY*
- *PORTA-GANTRY RAPIDE*
- *PORTA-DAVIT QUANTUM*
- *PORTA-DAVIT*
- *T-DAVIT*
- *SNAPPER*

All product names are Trade Marks of REID Lifting Ltd:

- *PORTA-GANTRY*
- *PORTA-GANTRY RAPIDE*
- *PORTA-DAVIT QUANTUM*
- *PORTA-DAVIT*
- *PORTA-BASE*
- *T-DAVIT*
- *PORTA-QUAD*
- *SNAPPER*
- *PORTA-LIFTER* Manhole Lifter

INSPECTION

INSPECTION RECORD



* Insert data from serial numbers found on product into table below.

Product number(s)* A			
Serial number(s)* B			
WLL* C			
Year of manufacture* D			
Name of user			
Date of purchase			
Date of first use			
Periodic Examination and Repair History			
Date	Inspected by	Pass/Fail	Comments



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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.

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**

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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.

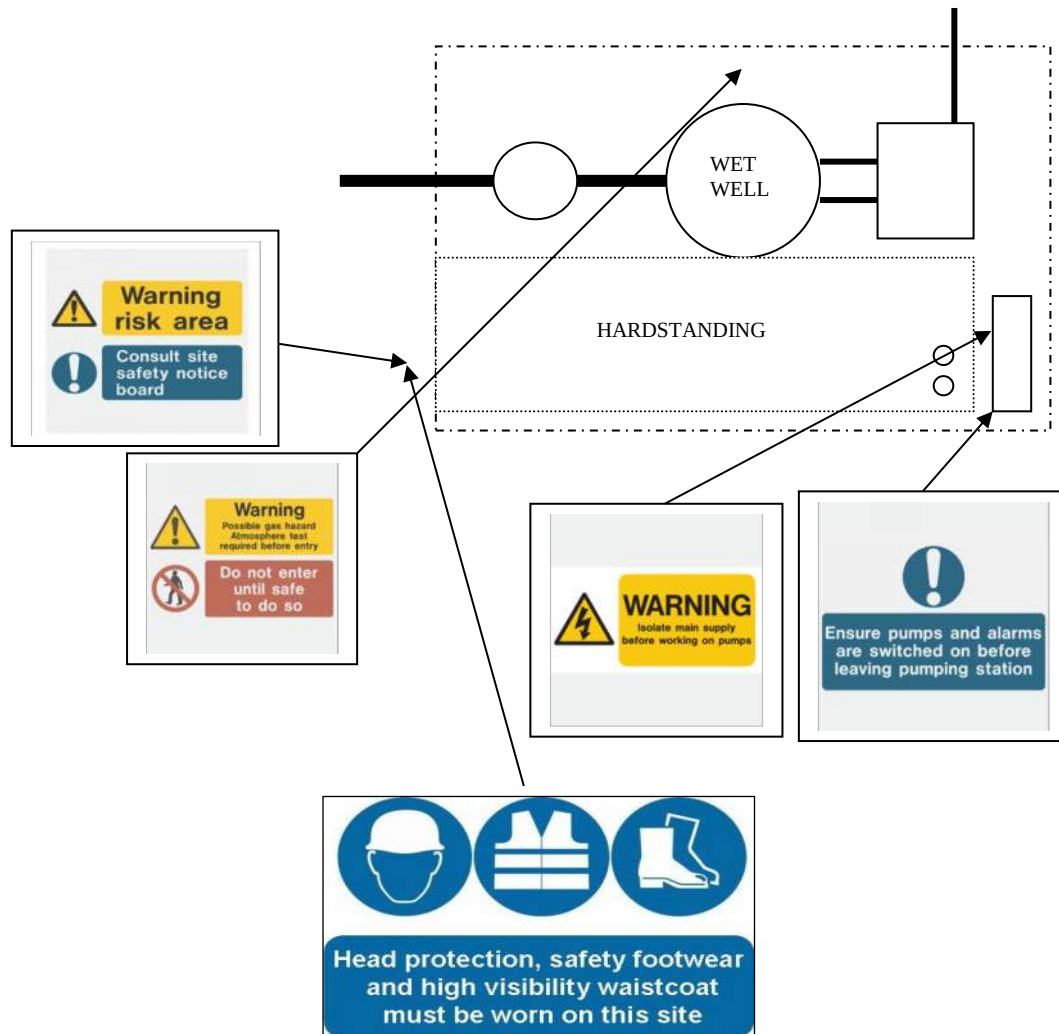
F3.2.1.9 Evidence shall be supplied to the Undertaker that the installation complies with The Electricity Safety, Quality and Continuity Regulations 2002 (or later as amended) and BS EN 50160 regarding supply flicker, i.e. proof of compliance in the form of a test certificate from a certified instrument.

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 byMike Kay
Signature

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