Design and Construction Guidance Addendum – Severn Trent

12th August 2024

Update Log:

Version Nr	Date	Comments (for minor versions only - *Latest updates shown in red text*
V3.2	12th Aug 2024	Updated document throughout to align with latest Severn Trent specification.
V3.1	24 Nov 2021	Updated document – clarification D5.5.3 added
v3.0	30 March 2020	Major version - Please note this change ONLY applies to ST not HD. (Supersedes v2.0 - sewers for adoption May 2018 addendum) Title changed from 'Sewers for Adoption 7th Edition Pumping Station Addendum – Severn Trent' to 'Design and Construction Guidance Addendum – Severn Trent'
v2.0	14/06/2018	Updated document to align with company rebrand to Severn Trent/ Hafren Dyfrdwy. Changed references from New Connections to Developer Services. DM0303-01A modified to DM0303-01A-STW and emailed for publishing on WRC website.
v1.6	17 Jun 2014	New document to align with new Sewers For adoption 7th Edition (updated on iDocs on 21/08/2015 and emailed for updating on http://sfa.wrcplc.co.uk/sfa7-supporting-documents.aspx website to denise.bennett@wrcplc.co.uk)
v1.5	05 Aug 2013	Part 3A – Sec 3.3.16.1 updated
v1.4	16 Dec 2011	Updated document - Dec2011 version (Version number - under 'Revision' column changed on 16/12/2011 - previously known as "Dec 2011 Version")
v1.3	12 Oct 2010	Updated document - Aug2010 version (Version number - under 'Revision' column changed on 11/11/2011 - previously known as "Aug 2010 Version")
v1.2	11 Dec 2009	Document moved from SC stds DB. Updated to Dec 08 version (Version number - under 'Revision' column changed on 11/11/2011 - previously known as "Dec 08 Version")
v1.1	27 Mar 2008	Updated document from WRc Website (Version number - under 'Revision' column changed on 11/11/2011 - previously known as "Jan 08 Version")
v1.0	15 May 2007	New document (Version number - under 'Revision' column changed on 11/11/2011 - previously known as "Oct 06 Version")

CONTENTS:

PURPOSE

This Addendum details where Severn Trent (ST) requirements for foul and storm pumping stations differ from those specified in The Design and Construction Guidance (DCG) for foul and surface water sewers offered for adoption under the Code for Adoption agreements for water and sewerage companies operating wholly or mainly in England (DCG). The Addendum should be used in conjunction with the DCG document and Severn Trent Mechanical and Electrical Standards (M&E) where the Developer wishes to design and construct a pumping station for inclusion within an Adoption Agreement.

Developers are encouraged to engage with ST at an early stage in a project to discuss site specific details.

ST standard pumping station template drawings are available on request.

Where there are inconsistencies/discrepancies in the DCG Parts D & F requirements/specification and ST standard documents referred to in this Addendum, specification/documents having the enhanced standard shall be utilised/applied.

PART A – GENERAL

No additional comments

PART B – DESIGN & CONSTRUCTION OF NEW FOUL SEWERS & LATERAL DRAINS

No additional comments

PART C – DESIGN & CONSTRUCTION OF NEW SURFACE WATER DRAINAGE SYSTEMS

No additional comments

PART D - PUMPING STATIONS

D1 Introduction

D1.3 ST standards or drawings referred to in the SPS Addendum are available from the Developer Services Team at sewer.adoptions@Severntrent.co.uk or 0800 707 6600.

D4 GENERAL

D4.1 ST require documented evidence of calculations and tentative longsections used to select a pumped solution in preference to a gravity system.

D4.2.a Land drainage must not directly or indirectly connect to the proposed adoptable surface water sewer network and be provided with sufficient flood protection to prevent it entering the sewer network in an extreme event.

D4.3 Special consideration should be given to the design of terminal pumping stations delivering directly to a treatment works or where the discharge point is close enough to the works for there to be no attenuation in the gravity sewer upstream of the works. Developers are advised to open discussions with the Undertaker as early as possible.

D5 PROVISION OF PUMPING STATIONS

D5.2 Site Access

D5.2.2a Access from public highway - To aid safe and reasonable vehicular access to pumping stations there are mandatory layouts with minimum dimensions for the following situations.

- Layout A - Pumping station off public highway with integral turning head in compound
- Layout B - Pumping station compound off public highway

Details are available from ST

D5.2.2b Access Roads - Where a new dedicated access road is being constructed then the preference is that the road is owned by ST. The access road shall conform to the necessary requirements of the Highway and Planning Authorities

D5.2.2c The minimum layout requirements for a site which will be served by large rigid and articulated vehicles are as follows:-
Road Width on straight single track roads is 4.0m and the internal radius of bends is 10.5 m, otherwise ST should be consulted

D5.2.2d Gradients and cross falls should be provided within the following ranges:-
Maximum road gradient is 1 in 15
Maximum cross fall is 1 in 30
Optimum cross fall is 1 in 40
Minimum cross fall is 1 in 50 (or 1 in 60 for concrete roads)
Maximum gradient within 15 m of highway is 1 in 30 (to be agreed with Highway Authority)

D5.2.2e Gates – should not open on to the highway. If the approach is straight then the gates should be 4.0 m wide minimum, having double gates.

D5.2.2f Concrete roads – In all cases Grade PAV2 air entrained concrete shall be used to provide adequate frost resistance. The concrete shall not contain PFA.

D5.2.2g ST requires a minimum road construction depth of 400mm for both a bituminous (tarmacadam) or Reinforced Concrete (R/C) road, having a minimum thickness of 150mm of tarmacadam or R/C.

Bituminous road –

- surface course minimum thickness of 30mm
- binder course minimum thickness of 50mm
- base minimum thickness of 70mm
- sub-base minimum thickness of 250mm of granular material Type 1 and capping layer depending on sub-grade CBR

(sub-base/capping:- CBR 5% to 4% 270mm thick Type 1, CBR 3% to 2.5% 350mm thick.Type 1, CBR 2.5% to 2% - 150mm thick Type 1 & 450mm thick capping and CBR < 2% -150mm thick Type 1 & 600mm thick capping)

Reinforcement preferably fabric C503, but if unavailable A393 – top surface cover 50mm.

For permitted materials (rigid & flexible), polythene underlays, geotextile membranes, concrete finishes and joint details, see ST standard drawings SD210 & SD212.dwg. See also ST Design Manual standard DM0104-01 for Access Roads

D5.3 Layout of Pumping Stations

D5.3.1g Pumping Station layout - To accommodate rigid body 4,000 gallon tankers the preferred minimum size of the compound needed is 14m depth x 11.35m width with 4m wide double gates. Where the compound has an integral turning head then size needed is 29.5m depth x 17.5 m width. The minimum compound size should be increased appropriately to accommodate any necessary 'Additional Storage' underground within the compound.

D5.3.1.h Fixed minimum 4m high collapsible, base or mid hinged, galvanised lighting column (or columns), with 100watt LED (8,300 to 9,500 lumens), depending on size of compound and lighting column positions, to illuminate main working area of pumping station compound.

D5.3.2 Fencing - Subject to local planning approval, ST standard requirement is for sites to be enclosed with 1.8 m high expanded metal panel fencing or alternatively an equivalent brick wall with gates secured by padlocked slide bolt or similar. Gates should provide the same degree of security as the fencing. Where the above requirement cannot be met either in order to satisfy specific local planning approval or other environmental and amenity

considerations selection of suitable perimeter fencing for the site will be based upon a risk assessment. Details are available from ST.

D5.3.6 Safe Parking shall be provided which must be agreed with ST

D5.3.8 Reinforcement in concrete shall be a minimum of A393 fabric in top and bottom faces with 40mm cover, complete with appropriate expansion/contraction joints.

D5.3.11 Pedestrian areas/hardstanding shall be Reinforced Concrete (R/C) 75 to 100mm thickness and lightly reinforced with a minimum of one central layer of D49 or D98 fabric, constructed in bays with appropriate expansion/contraction joints.

D5.3.14 The minimum size for the SPS Inlet Chamber (IC) before the Wet Well (WW) is 1500mm diameter, or larger if necessary, to suit the installed apparatus.

Penstocks in IC to have a circular aperture and be flush invert type.

D5.3.15 The ST standard lifting davit for a Safe Working Load (SWL) of 500KG is to have a 65mm pin dia of 225mm length, fitting in a 67mm dia davit socket of 280mm depth (10mm drain hole) including flush covers, with a davit height of 2m and reach of 760mm to 1200mm, positioned a minimum of 100mm from concrete edges and provided with a ST required aluminium label to enable the attachment of a ST inspection tag. See ST ME06 Lifting Equipment and D7.9 including F2.3.14.

D5.3.16 Any gullys for surface water drainage or washdown should be connected to the inlet chamber, not the wet well

Type 1 and 2 pumping stations having a layby access arrangement, as shown in the DCG Figure D 2, shall accommodate a small rigid body tanker and the manoeuvrability should be based on a tanker size of approximately 7.5m long with a 5.3m wheelbase.

The layby shall have a minimum of 6m radii for the entry and exit splays where they meet the estate/minor road and better radii (probably also 6m) for the two radii at the back of footway position.

The far kerb of the layby, next to the SPS, should be set approximately 5 to 6m back from the estate/minor road kerb line, to at least keep a working tanker away from pedestrians using the footway.

The tanker layby section (not splays) needs to be a minimum of 8m long (measured along the back of footway and not the SPS front boundary) and a minimum of 3.5m wide.

A vehicle tracking drawing should be furnished demonstrating that the lay-by can comfortably accommodate a smaller rigid body tanker entering and exiting without undue manoeuvring.

The width of the SPS compound area will depend on the largest chamber size, plus 0.75m each side of any chamber concrete surround, or outside face of any brickwork.

Pipework between chambers is to have a minimum of two flexible joints, to allow for differential settlement between chambers.

Proposed surfacing of the layby is preferably concrete, as even tarmacadam can be chewed up with slewing of tankers at low speed in warm weather. The use of brick paviours or soft landscape blockwork is to be avoided.

The Control Kiosk (CK) is required to be 2 to 3 paces away from the Valve Chamber (VC) opening.

'Additional Storage' is also required for Types 1 & 2 SPS's, but not in the WW and therefore it is suggested an oversized inlet manhole is utilised, or alternatively, if preferred, separate pipe storage can be provided within the SPS compound. The 'Additional Storage' volume required is 160 litres/dwelling.

The layout of the SPS can be subject to further discussion, subject to the minimum required access being provided, to enable a tanker to manoeuvre safely, which depends on the specific location of the SPS.

D5.4 Kiosk Positioning

D5.4.1.d There shall be 1m clear space between the fully open kiosk doors and the wet well to ensure a safe walkway. Full details for Kiosk specification can be found in ST ME31

D5.5 Storage

D5.5.1a A Storm Water Pumping Sation (SWPS) shall be capable of attenuating (not in the Wet Well) all storm events up to the 30 year storm return period and also the 100 year plus climate change storm event, where STW have agreed, either in the sewer network, tanks or an attenuation basin, including pumping at the limiting discharge rate approved by the Lead Local Flood Authority (LLFA) and the Local Planning Authority (LPA).

The controlled flow rate from attenuation should be approximately 15% less than the pump flow rate to provide pump rest periods. Half the storage should be pumped in 24 hours.

Attenuation in public and/or private storage should be sufficient to prevent flooding for all storm events up to the 100 year plus climate change, in the event of failure of the pumping station or rising main.

D5.5.1b The system must not flood in the 1:30 year event. In exceptional circumstances provision of storage for the 1:100 year + climate change event may be considered for adoption. ST shall be consulted in advance of proposing the 1:100 year + climate change event for adoption. The effectiveness of proposed flood routing must be demonstrated and approved by ST.

D5.5.1c Emergency overflows are not required on new foul water pumping stations.

D5.5.2b and for foul storage, shall be located within the SPS compound

D5.5.3 Typically for pumping stations serving more than 500 properties, storage of 12 or 13 m^3 per 100 properties above this would be considered acceptable. However further consultation is still recommended.

D5.5.5 GRP storage is not accepted

D5.6 Hydraulic Design of Pumping Stations

D5.6.1 For large pumping stations with high discharge rates it may be necessary to prove performance of their proposed design by undertaking scaled hydraulic modelling of the pumping station wet well and pump configuration by a specialist consultant in this work.

D5.7 Pumping Station Design

D5.7.1a ST will not adopt WIS 4-04-01 or WIS 4-04-02 designs. For Type 1 & Type 2 installations ST support the use of package pumping stations which satisfy the following criteria:

- MDPE wet well construction (GRP shall not be used)
- A separate valve chamber shall be provided – valves shall not be located in the wet well
- Pump stools (duckfoot) shall be fixed by captive studs which enable the stool to be removed/replaced from inside the well. These studs should be able to be replaced.

D5.7.1b A bespoke design in accoirdance with sections D6, D7 and Part F

D6 Rising Mains

D6.3 Hydraulic Design

D6.3.1 A Rising Main (RM) should be designed to give a velocity as close as feasible to 0.75 m/s to minimise friction heads and hence pumpset rating.

D6.3.3 The RM profile/vertical alignment should minimise the number of Air Valves (AV) and WashOut (WO) points where feasible, by increasing or decreasing depths in a sensible/practical/acceptable manner.

D6.1.10 For some medium (400 dwellings) and large (0ver 500/600 dwellings) developments, depending on construction programme, two RM's of different sizes may be required to ensure self-cleansing velocities are achieved in the early years of the development and also septicity in the RM is avoided. A three pumpset pumping station, having a duty assist arrangement, may also be appropriate, to cater for the majority of the off-peak periods and ST should be consulted at an early stage.

D7 DESIGN OF PUMPING STATIONS

D7.1 General

D7.1.1c Pumping stations must be fail-safe in operation in the event of pump or plant failure. A generator connection shall be provided.

D7.1.6 In some instances provision of adequate raked coarse screens and grit separators may be needed. See also D6.1.10 for number of RM's and pumpsets

D7.2 Hazardous Areas

D7.2.1 The hazardous (potentially explosive atmosphere) Zone classification of wet wells to pumping stations shall be determined by means of a non calculable approach used to better understand the likelihood of a Potentially Explosive Atmosphere (PEA) forming from the entry into sewers of flammable substances stored and used within the catchment. It is known as Catchment Area Analysis (CAA) assessment. Buildings and kiosks containing electrical equipment shall be isolated from chambers falling into any Zone classification. The equipment in them should be designed to comply with their Zone classification. The CAA assessment should be undertaken prior to the design stage to determine whether explosive proof equipment is required. The CAA is used to determine if a catchment is Normal or Higher Risk.

Where no existing flow is routed through the new development and there will be no significant volumes of flammable substances stored in that development then the presumption is that the CAA will give a Normal Risk classification. In this instance the "hazardous" zone is designated as ST-Zone BZ. This is the name used by ST to describe the minimum non statutory design standard applied to sewerage assets. The standard

determines a minimum standard for equipment installed into areas that are exposed to a sewage derived atmosphere that has a likelihood of forming a PEA which is less than the statutory Zone 2.

If the existing sewage flow is to be diverted through the new development site then the developer must consult with the Developer Services Team who will then arrange for the DSEAR Statutory Compliance Team to undertake the CAA assessment in order to determine whether the catchment risk is Higher or Normal and thus designate the hazardous zone classification.

Guidance on hazardous areas can be found in Dangerous Substances and Explosive Atmospheres Regulations 2002 (DSEAR) and STW Design Manual Standards ME37 entitled Potentially Explosive Atmospheres SPC0301-ME37 and all associated Appendices.

D7.3 Wet Well – General

D7.3.1 When designing the gravity foul sewer network the developer should note that the preferred maximum depth of the wet well, from ground cover level to the underside of the pumpset is 7 m. For depths exceeding this then an auxiliary suction pipe may be needed.

D7.3.2 A stainless steel baffle plate must be provided with a nylon rope, used to lift the baffle plate to clear any material trapped between the plate and inlet pipe, looped through the baffle plate and attached to a stainless steel parking bracket self anchored to the concrete edge of the clear opening, on the guide rail side.

D7.3.2 To facilitate having the access ladder along one of the short sides of the main opening in the roof slab the centreline of the pumpsets can be offset from the centreline of the chamber (say 100 to 300mm), in order to provide sufficient room between the ladder and the pumpset for reasonable access.

D7.3.4 Pump stools must be securely fixed to the SPS main reinforced concrete base slab.

D7.3.5 If a separate storage/inlet chamber is provided upstream of the wet well then it must be located in the compound and in an area where safe access for maintenance can be provided. The chamber shall be provided with a flush invert penstock or sluice valve, having circular openings and fixed tank emptying suction pipe of 100 mm diameter set 500 mm above the invert of the chamber and rising 900mm above ground level to the centre line of this suction pipe. It needs to terminate with a 90degree bend and a male Bauer coupling. The penstock or sluice valve must have an extension spindle capable of being operated at ground level and incorporated in the

benching flow channel to maintain smooth flows and be easily maintained or removed for replacement

D7.3.6 A vertical stainless steel ladder shall be provided for man entry into the wet well. It is to be located along the short side of the roof slab opening with the top of the ladder fixed to the concrete edge of the clear opening to the well. Retractable handposts are to be provided either side of the ladder, self anchor bolted to the concrete edge of the clear opening.

D7.4 Wet Well – Structural Design

D7.4.1 If a wet well constructed from MDPE is proposed, prior approval by Severn Trent is required. GRP wet wells shall not be used.

D7.4.2 Flotation – The minimum factor of safety against flotation for empty structures subject to groundwater pressure is 1.1 as outlined in BS8007:1987. This should only be used where the maximum groundwater level can be assessed accurately or a design groundwater level at finished ground level is being used.

D7.4.5 When using a MDPE wet well the foundation slab and backfill should be constructed in accordance with manufacturer's guidance. In locations with high water tables, all necessary measures should be taken to prevent flotation and to ensure the MDPE is of sufficient thickness to resist deformation.

D7.4.6 Pipe holes in precast concrete walls shall be circular, not square or rectangular

D7.5 Valve Chamber

D7.5.3c The male Bauer coupling over pumping pipe to terminate with a 90 degree horizontal bend, 900 mm above the valve chamber cover to centre line of the over pumping

D7.5.4 ST require that the discharge from the drain is by a penstock. A flap valve in the well is not acceptable.

D7.5.6 Chamber covers in secure compounds shall be open gridding over the whole chamber to FACTA (Fabrication Access Covers Trade Association) Class B loading in none-traffic areas and bolted down not clipped, with a minimum 600mm square operative access, hinged, stayed and lockable in a recess for a padlock, to provide a fully flush surface cover. Cover/cover frames should be recessed in chamber walls, or cover slab, including the support beams, to eliminate any support cleats. Brick walls to have a top concrete edging beam to accommodate covers and beams in recesses, unless the walls are a minimum 330mm thick. The lifting effort for each individual cover and support beams should be no greater than 25 kgF (where required, assistance mechanisms shall be provided)

D7.5.8 Pipe holes in brick walls to be either circular with brick arch or square with reinforced concrete lintel.

D7.6 Flow Metering

D7.6.1 ST require a flowmeter to be provided on all Type 3 & 4 pumping stations. The flowmeter shall:

- Monitor discharge performance
- Alarm, and change pump duty in the event of no flow conditions (e.g. partial blockage)

D7.6.2 ST require the chamber shall be a minimum of 1500 mm diameter and in secure compounds the cover shall be open gridding, all as described in Part D7.5.6 for the valve chamber.

D7.6.3 Further flowmeter specification can be found in ST ME3B – Electronic Sensors & Systems – Electromagnetic Flowmeters

D7.7 Access into Wet Well, Valve Chambers & Flow Meter Chambers

D7.7.1 ST require that open mesh gridding be utilised over the whole valve chamber and flow meter chamber. Maximum non-traffic loading to be 500kg/m^2. Mesh gridding to be provided with holes or slots to allow operation of valves from ground level. Mesh gridding should be compliant with ST ME0E – Permanent Access Fabrications

D7.7.2b Spring assisted hinged covers are required for the wet well covers and they should open away from the guide rails.

D7.7.2c Cover and frame to wet well, if subject to traffic loading from maintenance vehicles, to be FACTA Class C loading.

D7.7.2e The safety grid to be provided with a 225 mm dia slot to allow suction hose to pass through

D7.9 Davit Sockets

D7.9.4 Davit sockets, which shall be galvanized mild steel.

All sockets shall be installed level to a maximum tolerance of ± 0.3 degrees and positioned to enable the davit to be centred over the load whilst clearing any hand railing, guard railing or other obstruction.

Where sockets are fixed to concrete or cast into a concrete structure the installer shall ensure that the concrete and fixings used are able to withstand the oblique loads which will be applied during use.
All installations of lifting equipment that require fixings into concrete shall ensure:

- Any holes drilled into concrete are a minimum of 100mm from the centre of the hole to the nearest concrete edge.
- All fixings into concrete are stainless steel
- Contact between stainless steel fixings and galvanised steel is to be avoided. Where this cannot be achieved the use of an insulating material such as nylon washers is permissible.
- All fixings into concrete shall be of the chemical anchor type. Use of through-bolts or other expanding type fastener for affixing lifting equipment into concrete substrate is prohibited.

Sockets shall be designed as a minimum for the moment associated with a davit load of 500kg at a reach of 1200mm.

Sockets shall not be mounted to brick or block work structures under any circumstances.

When selecting a position for the fixings the installer shall also consider the effects of any deterioration of the concrete over the design life of the installation.

Where practicable davit sockets shall be installed to provide a flush finish. The top flange shall be installed flush with the finished surface to enable full load to be supported by the socket. The surrounding substrate shall not impede the safe operation of the davit when installed into the davit socker

Where it is not practical to provide davit sockets that have an installed flush finish, designs for surface or wall mounted sockets shall be submitted to Severn Trent for acceptance (e.g. retro fit).

- Surface mounted davit sockets shall be located to reduce the trip hazard.
- Surface mounted sockets shall be securely fixed using all fixing holes provided by the supplier
- Surface mounted davit sockets shall be marked with a robust, high visibility material

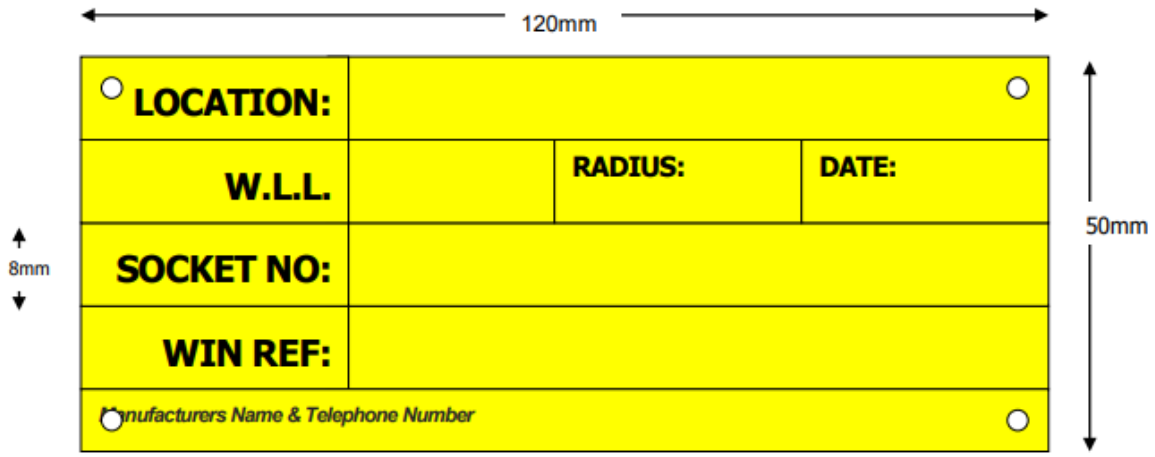
Flush finished sockets shall be provided with a drainage route from the davit socket where practical – e.g. wet well submersible pump davit socket

Flush finished davit sockets shall be fitted with a robust, corrosion resistant, removable cover attached by a retaining strap or chain. This

cover may shall be fixed in place by stainless steel screws where the installation is prone to vandalism. In both instances. The cover and socket flange plus retaining device or fixings should not exceed 10mm above the finished surface, so as not to constitute a trip hazard.

The socket shall be installed by the manufacturer or provided with clear installation instructions to enable the socket to be installed correctly to the manufacturer identified tolerances.

Davit sockets shall also have a visible mounted label as shown below with an integral stainless-steel loop to enable ST inspection date expiry tag to be attached. If practical, this label shall be duplicated in an adjacent building / kiosk to ensure that information is not lost in the event of the local label being damaged or removed.



Material: Aluminium – 20g (holes 3mm i.d.)

For best practice guidance on the verification of sockets and davits, refer to Lifting Equipment Engineers Association (LEEA) guidance document LEEA 061.

Further clarification can be found in Severn Trents ME06 – Lifting Equipment.

D7.11 Kiosk Construction

D7.11.1a The control panel should be no higher than 2000mm from the pumping station compound finished level, in order that manual controls are easily reached and not located at an excessive height. Instrument gauges and recorders should be set at a height that they can easily be seen/read by an operative of 1700mm height, taking into account the kiosk mounting height (plinth & bottom vents).

D7.11.1b ST require a separate ventilated integral compartment at the base of the complete kiosk, where sealed cable ducts in the kiosk plinth have the potential to allow noxious or possibly explosive vapours or gases to enter inappropriate locations, in order to permit the resultant vapours to be safely directed or bled-off to general atmosphere. As an alternative this facility may be included at the end of the kiosk, however this would lengthen the kiosk. The bottom ventilated compartment shall be sealed from the upper kiosk compartment to IP55 rating to prevent the entry of noxious or possibly explosive vapours or gases. The floor, or sections of the floor, of the upper kiosk compartment can be removable, as appropriate, to facilitate the entry of cables though appropriate cable glands, but removable floor panels must have appropriate sealing to IP55 rating to prevent the movement of noxious or possibly explosive vapours or gases.

A typical example of a kiosk is given in ST standard drawing STD1015 Rev 01

D7.11.7 The Developer should seek advice from ST on expected vandalism levels and Electro Magnetic Conductivity (emc) levels.

D7.11.9 The exterior finish shall be grey to BS 4800 shade 00-A-05 (preferred) or where grey is undesirable then holly to BS 4800 shade 14-C-39: Alternative colours shall be provided where required by the Planning Authority.

D7.11.12a A lockable storage kiosk for storing barriers, davit and winch equipment shall be provided. The door to the storage kiosk to have the same locking and hinge arrangements as the doors to the main panel kiosk. The davit must be stored securely and not be at risk of falling on opening the storage kiosk. A longer rather than taller kiosk may be preferable.

D7.11.13 The generator cat flap shall be installed on the side walls of the kiosk not in the doors.

D7.11.14 The kiosk doors shall be fitted with a cylinder type locks.

D7.12 Kiosk Mounting Arrangements

D7.12.1 The plinth should extend a minimum of 125mm beyond the kiosk walls and haver chamfered edges, with a 1 in 10 sloping top face to drain rainwater away from the kiosk.

PART E – CIVIL ENGINEERING SPECIFICATION

E1 GENERAL

No additional comments

PART F - M & E SPECIFICATION FOR PUMPING STATIONS

ST has a number of Framework Agreement purchasing arrangements for the supply of pump/motor sets and motor control panels.

Whilst there is no obligation upon Developers to use these Framework Suppliers, it may be advantageous to procure M&E equipment from these suppliers since the products are of an acceptable quality/specification for adoption.

The current list of relevant Framework Suppliers can be obtained from ST Developer Services Team.

F1 GENERAL

F1.1 Hazardous area appliances

F1.1.1 For sewage pumping stations designated as ST–Zone BZ only low risk equipment shall be used. Examples are float switches, submersible pumps, ultrasonic level detectors and proximity switches. The equipment shall be intrinsically safe.

Equipment requirements for ST-Zone BZ are based upon the concept of low risk equipment in that:-

1. For electrical equipment, this shall only include equipment, which under normal operating conditions, does not increase its surface temperature, does not have opening or closing contacts or does not have exposed conductors with minimal risk of “sparking” (intrinsically safe).
2. Motors are not normally exposed to air or to gas atmospheres above the liquid or where they are they do not include opening/closing contacts.
3. For mechanical equipment, this shall only include equipment which under normal operating conditions does not:

    - increase its surface temperature appreciably
    - have opening and closing contacts
    - have impacting items or devices

A non-electrical assessment based on EN 15198 and BS EN ISO 80079-36:2016 for ignition sources in normal operation should be undertaken where applicable/possible.

4. All equipment shall be earthed and Equipotentially bonded to BS EN 50310:2016+A1:2020.
5. All equipment shall have minimal capacity or capability for producing static.
6. Mechanical equipment such as bearings, seals and mechanical piece parts operating slowly and in a damp or wet environment is acceptable.

F1.1.3 The earthing, ducting and certification process for panels and electrical installations shall comply with ST standards ME37 and the various DSEAR associated electrical model approaches contained within the ST Design Manual.

DSEAR requirements – prior to commissioning and handover of the pumping station to ST the following DSEAR requirements must be complied with:-

Where hazardous zone is classified as ST-Zone BZ - a certificate of installation and the earth bonding certificate must be submitted to Developer Services. There is no standard 'Earth bond certificate' in BS7671 but proprietary sites offer certificate templates.

For the other statutory hazardous zones please contact ST Developer Services.

F1.2 Operation and maintenance documentation

F1.2.1 In addition to the specified information identified in the Design & Construction Guidance ST require one hard copy & one electronical of the pumping station maintenance manual. These shall contain record drawings, wiring diagrams and pump details, including all ancillary equipment.

F1.2.2 All lifting equipment shall be fitted with a robust label which is appropriately CE marked and includes the following information

- ST unique identification number, provided through the Clients trading agreement for the supply of lifting equipment.
- Manufacturers name and contact details
- Supplier reference/serial number
- WLL and limits of use (radius etc.)
- Date of manufacture

See ST standard ME06 – Lifting Equipment

F1.2.3 The developer shall supply a calibration certificate with the flowmeter that shall be issued by a National Measurement Accreditation Service (NAMAS) calibration laboratory. In addition, the Developer shall supply details of the methods to be used for carrying out in-situ validation checks. The flow sensor shall be clearly labelled with the following information:

a) Manufacturer's name.
b) Serial number.
c) Nominal internal diameter.
d) Nominal and maximum pressure.
e) Calibration factor.
f) Type of enclosure.
g) Flow direction

See ST Standard ME3B – Electronic Sensiors & Systems – Electromagnetic Flowmeters.

F2 PUMP UNIT SPECIFICATION

F2.1 Introduction

F2.1.1 The Pumping Station may have to be provided with a pump which can accommodate low flows from light rainfall as well as pumps needed to cope with flows from the critical storm event. The pumping station shall incorporate two identical submersible pump units arranged in a duty/standby configuration, unless a three pump pumping station is proposed, then the arrangement would be duty/assist/standby configuration. Two Rising Mains (RM) may also be required all as referred to earlier in D6.1.10

F2.1.2 The pump units shall be of the single stage, centrifugal, volute type, suitable for pumping untreated sewage containing fibrous and stringy material (rags, paper, etc.), solid faecal matter and grit, or for storm water pumping stations suitable for pumping rainwater runoff containing stones, grit, and suspended solids from landscape/soils runoff.

F2.2 Performance Requirements and Information

F2.2.2 Each pump unit shall be capable of pumping the design flow rate when the level is at the mid- point of the start and stop levels in the wet well.

F2.3.4.2 Auto Coupling System (ACS)

F2.3.4.2h The duck foot shall be able to be removed/replaced from within the wet well. Captive bolts/studs shall be able to be replaced.

F2.3.7 Shafts

F2.3.7.5c incorporate O-ring seals to prevent leakage of the pumped liquid/matter between shafts and sleeves.

F2.3.8 Seals

F2.3.8.4 Seal component materials shall be compatible with the pumped liquid/matter

F2.3.10 MOTORS

F.2.3.10.4 STARTING

F.2.3.10.4.1 To ensure air changes in the wet well and prevent retention under normal operating conditions there will be at least one pump start in a 24 hour period.

F2.3.10.5 ENCLOSURES & COOLING

F2.3.10.5.1 ST requirement is for no moisture to enter the motor housing during the life of the bearing

F.2.3.14 PUMP UNIT LIFTING ARRANGEMENTS

F.2.3.14.1 GENERAL

Lifting Operations (Davit Assembly) (also see note at D5.3.15 in addendum)

The following standard davit configuration shall be utilised wherever possible and practicable.

- Portable Davit (Individual components 25kg or less)
- SWL: 500kg
- Reach: 760-1200mm
- Height: 2M
- Socket Diameter: 67mm
- Pin Diameter: 65mm
- Socket Depth: 280mm
- Pin Length: 225mm
- Material: Galvanised mild steel or aluminium

The davit shall be provided with two separate load mounting points for supporting both the lifting tackle and slave chain.

For pumps up to 334kg gross weight a 500kg davit system must be supplied, this allows a safety factor of 50% to allow for lifting accessories / pump chains / breaking out forces / ragging, fat and grit deposition.
500kg davit installations must be able to support a standard 65mm pinned davit assembly and have the ability to incorporate a load cell as part of the lifting operation. All sockets shall be installed level and positioned to enable davit to be centred over the load whilst clearing any hand railing, guard railing or other obstruction. The davit and its component parts shall be designed to enable safe manual handling activities to be undertaken by a single person.

Note: - For pump installations above the 334 kg Gross weight limit lifting, Severn Trent shall be consulted on details of the most appropriate solution at the design stage to ensure this aligns with operational practices.

A lifting gantry shall be required for lifting pumps heavier than 334 kg.
Provision shall be made for sufficient clearance between the cover slab and the bottom of the pump incorporating load cell and chain block or electric winch within the load path.

F2.3.14.2 Lifting chain location system

F2.3.14.2.1 The Lifting Location System (LLS) is used widely within the water industry to remove permanently installed lifting accessories from a potentially aggressive environment. This in turn reduces the number of lifting activities associated with the statutory lifting accessory inspections. The system replaces the chain with a guide rope used to locate a proprietary hook when the submerged equipment requires lifting. The guide rope is secured to two eye bolts located at the top of the well.

Using the LLS requires the load to be raised in one continuous lift because the block and tackle/hoist is directly attached to the lifting point on the submerged equipment (there are no intermediate lifting rings as there are with a chain). Hence, the LLS has several key requirements:

- The load shall be ≤ 1000kg
- The well or tank shall be ≤ 7.5m in depth, and
- The total height of lift from block to equipment handle shall be ≤ 9m
- A block and tackle with a 10m chain shall be provided or shall be available
- The submerged equipment shall have a load attachment point of a size to enable the hook to fully engage. If required, this shall be retrofitted with prior agreement by the manufacturer and shall not affect the operation or warranty of the equipment.
- The well or tank is not prone to excessive ragging or fat build up

Where the LLS can be fitted, the following shall be installed for each item of equipment:

- A 3mm diameter stainless steel wire rope AIS1316 quality with a clear PVC coating to 5mm outside diameter, terminated at both ends with an 8mm x 80mm stainless steel carbine hook c/w eyelet & screw gate. The carbine hook shall be secured using a 3.5 DIN copper ferrule crimped onto the wire rope using a suitable crimping tool. Care shall be taken to ensure that any strands of wire protruding from the ferrule are trimmed or covered with a neoprene sleeve.
- For covered wet wells, two stainless steel M8 shield eye bolts fixed at the top of the well positioned to be easily reached and spaced apart so that the guide rope forms a V shape, (this shape helps to prevent ragging).
- For open wet wells where fixed handrail is fitted eye bolts shall be clamped (not drilled and bolted) to existing handrail

- Where the key requirements of the LLS system are not satisfied, a stainless-steel lifting chain and shackle shall be used which remain attached to the load during normal operation.

F2.3.14.3 Lifting chains

F2.23.14.3.1 Chains shall be short link welded and manufactured from Grade 50, AISI 316 Stainless Steel to BS EN 818 (DIN766). Two standard types shall be supplied

- Grade 8 (1.1t / 1.5t / 2.0t / 3.2t / 5.4t / 8.0t)
- Grade 10 (1.5t / 2.0t / 2.5t / 4.0t / 6.7t / 10.0t)

F2.3.14.3.2 Chains shall be provided with larger diameter oval master links positioned at each end and at 1000mm centres. This larger link should have a minimum internal diameter sufficient to accommodate two lifting hooks.

- The length of the lifting chain for submersible equipment applications shall be designed to an appropriate length. The chain shall not be left in tension and adequate slack shall be provided to prevent vibration from damaging the chain. Excessive slack shall be avoided to ensure that the chain cannot be drawn into the moving components of the pump or mixer.
- Designers shall consider where chain locating hooks shall be positioned for ease of access to operators in shafts and tanks. On enclosed tanks or wet wells, the hooks shall be positioned internally, just below the cover, for ease of access. Hooks shall be manufactured from stainless steel and shall be designed to support the suspended chain.
- Provision shall be given to the length of chain beyond the locating hook for the lifting operation to prevent the operator reaching through the handrail to make the connection to the lifting equipment.

Further information on the correct standard of chain and written scheme requirements, can be found in the LEEA Guidance

‘Written schemes of examination for stainless steel submersible pump lifting chain slings and accessories’

'Specification for stainless steel submersible pump lifting chain slings and accessories'

F2.3.14.3.7 Shackles shall be manufactured from AISI 316 Grade Stainless Steel. The lifting shackle attached to the pump must incorporate an extended pin and nylock nut to prevent loosening as a result of vibration.

Chains and shackles installed shall meet all the necessary requirements so as to produce a minimum two yearly Written Scheme of Examination. All chains and shackles should be individually tagged with a unique Severn Trent asset ID along with SWL and manufacturer batch ID.

Each chain and shackle shall be supplied with a report of thorough examination and CE marked for chain type.

Each shackle shall be supplied with a test certificate.

F3 ELECTRICAL SPECIFICATION

F3.1 Scope

F3.1.1d An electromagnetic flowmeter is required on all Type 3 and Type 4 pumping stations

F3.2 General

F3.2.1.5 ST will only accept registered contractors.

F3.2.1.9 A lockable TP&N isolator shall be installed between the DNO fuses and the control panel. This isolator enables the control panel to be electrically isolated without the supply fuses being withdrawn.

F.3.2.2.3 For ST Zone BZ installations, labels nominal size 50 mm x 100mm with the text "ST Zone BZ" (White, Black, White) shall be installed on :

The control panel door
The kiosk door

For labelling requirements for the other statutory zones please consult with Severn Trent

F3.3 Electrical Assembly

F3.3.1 General

F3.3.1.2 Where Form 2 construction is utilised lockable isolators for each individual pump shall be provided on the panel door.

F3.3.5.3 Identification of Wiring

F3.3.5.3.4 The colours of wiring insulation shall conform to the current ST Engineering Specification ME1A – Motor Control – Switch Geart and Control Gear Assemblies.

F3.3.8.2 Pump unit failure (initiated by hard wired pump unit protection systems)

F3.3.8.2.8 Auto reset shall only be applied when the pump is submerged and not exposed to a sewer derived atmosphere.

F3.3.8.4 Back-up control mode

F3.3.8.4.2c (The pump unit will, therefore, stop before the level reaches L2 if there are incoming flows)

F3.3.8.6 Low Flow Detection

F3.3.8.6 Low flow detection is to be provided using an electro magnetic flowmeter. Low flow circuit shall operate when the flow in the rising main is below the pre-set low flow cut off value. With the pump running and after an adjustable time delay if the flow in the rising main has not developed to a pre-set adjustable value (nominally set at 10% of design flow per pump) it shall generate a low flow trip which shall stop the pump and contribute to a pumped failed signal to telemetry. The second pump shall then be permitted to start under normal standby level control.

A low flow indicator light shall be provided on each starter door of the panel. The low flow signal shall be latched requiring attendance at site to reset via a common reset or automatically via the auto reset system.

F3.3.9 Telemetry Signals

ST operates a telemetry system to monitor and control remote sites, processes and equipment. The configuration, connection and commissioning of all signals used on this telemetry system shall conform to a standard arrangement to ensure consistency of application and response to issues.

A list of signals required by ST to effectively monitor a pumping station is detailed in Severn Trent ‘Telemetry Signal Provision Standard’. The signals are derived from Severn Trent Remote Asset Management Policies

(RAMPs) and use is **mandatory** for all sites, processes and equipment connected to the Severn Trent telemetry system.

The latest version of the Telemetry Signal Provision Standard' should be obtained from ST Developer Services Team.

F3.3.10 Ultrasonic Level Controller (ULC) Specification

F3.3.10.1 Normal Operation

F3.3.10.1.1 The level control unit shall provide signals or control at the following:

Level DPH	Start Duty Pump
Level DPL	Stop Duty Pump
Level APH	Start Assist/standby pump
Level APL	Stop Assist/standby pump

None of the levels DPH, DPL, APH and APL shall be coincident.

F3.3.10.1.2 ST Require the control of the scour cycle to allow for adjustment in frequency so that the scour frequency can be optimised.

F3.3.10.3 Functionality

F3.3.10.3.13 The ULC shall be capable of deriving a 'time to spill' signal

F3.3.10.3.14 The ULC shall be capable of initiating a remote reset

F3.3.11 Functional Units – Form 4 Assemblies

F3.3.11.5 Common control compartment

F3.3.11.5.1d an ultrasonic level controller (or equivalent) to enable start, stop, control and sequencing of the pump units to control the liquid/water level in the wet well;

F3.3.12 Functional Units – Form 2 Assemblies

F3.3.12.6 Common control section

F3.3.12.6.1c an ultrasonic level controller (or equivalent) to enable start, stop, control and sequencing of the pump units to control the liquid/water level in the wet well;

F3.4 Pumping Station Electrical Installation

F3.4.1 Electrical Components and Equipment (excluding the electrical assembly and cables)

F3.4.1.5.7 Junction Boxes

Junction boxes shall not be installed in wet wells irrespective of the DSEAR zone classification. If junction boxes are required they shall be mounted upon suitable up stands or in a below ground junction box chamber within a suitably IP rated enclosure.

F3.4.1.5.8 (This clause all in accordance with ST standards ME20A & ME20B & TD0300-03)

ST require Junction boxes to be provided where the distance from the Wet Well to the kiosk is more than 5 or 10 metres and the cable route is indirect, all as detailed below.

Where the distance between the panel and the wet well is:

a) Less than 5 metres:-	Junction boxes shall not be provided for wet well plant and equipment
b) between 5 metres and 10 metres:- Direct cable route:	Junction boxes shall not be provided for wet well plant and equipment
Indirect cable route:	Junction boxes for wet well plant and equipment shall be located within the valve chamber, except for enclosed/secure sites where they shall be fitted above ground on nominal 500 mm galvanised upstands.
c) greater than 10 metres:-	Junction boxes for wet well plant and equipment shall be located within the valve chamber, except for enclosed/secure sites where they shall be fitted above ground on nominal 500 mm galvanised upstands.

All boxes shall be GRP, provide protection to IP67 and be suitably installed to maintain the IP67 rating

A separate box shall be provided for each pump with segregation by internal barriers for differing voltages

The junction boxes shall be provided with weatherproof hoods to protect the internals during inclement weather.

A separate box shall be provided for level switches and ultrasonic level detectors with segregated terminal strips for each device.

All boxes shall be identified by labels which coincide with cabling diagrams.

All boxes shall have appropriate voltage warning labels.

Where possible Junction boxes for sites with no emergency overflow provision shall not be mounted in the valve chamber.

Resin type jointing techniques shall not be employed.

Cable ducts between junction box location and wet well to be sealed.

Cable duct between junction box location and kiosk housing the control panel to be sealed.

Junction boxes shall be located adjacent to the Wet Well, but at a safe distance from the Wet Well opening in order that maintenance work can be undertaken safely.

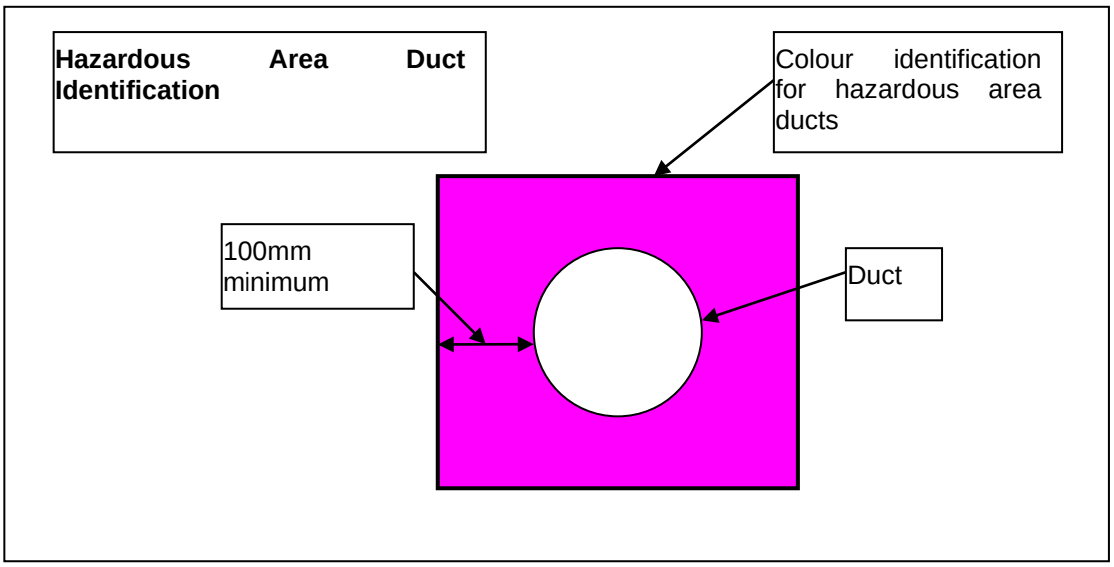
F3.4.4 Installation of Cables

F3.4.4.5c The pump set cables require two ducts to be provided, each 100 mm in diameter.

F3.4.4.5e The telemetry cable requires one duct to be provided, 100 mm in diameter

F3.4.4.6 All ducts to and from a hazardous area (including SEVERN TRENT -Zone BZ) are to be clearly identified by use of pink paint (BS4800 02 C 37) and labelling at the ends of ducts. Paint to be applied in a square around the end of each duct as detailed below,

Labelling is required to be installed adjacent to the ducts and shall state the following:



Hazardous Area Duct
Duct Sealing System to be retained at all times

F.3.4.5 Glanding, identification and termination of cables

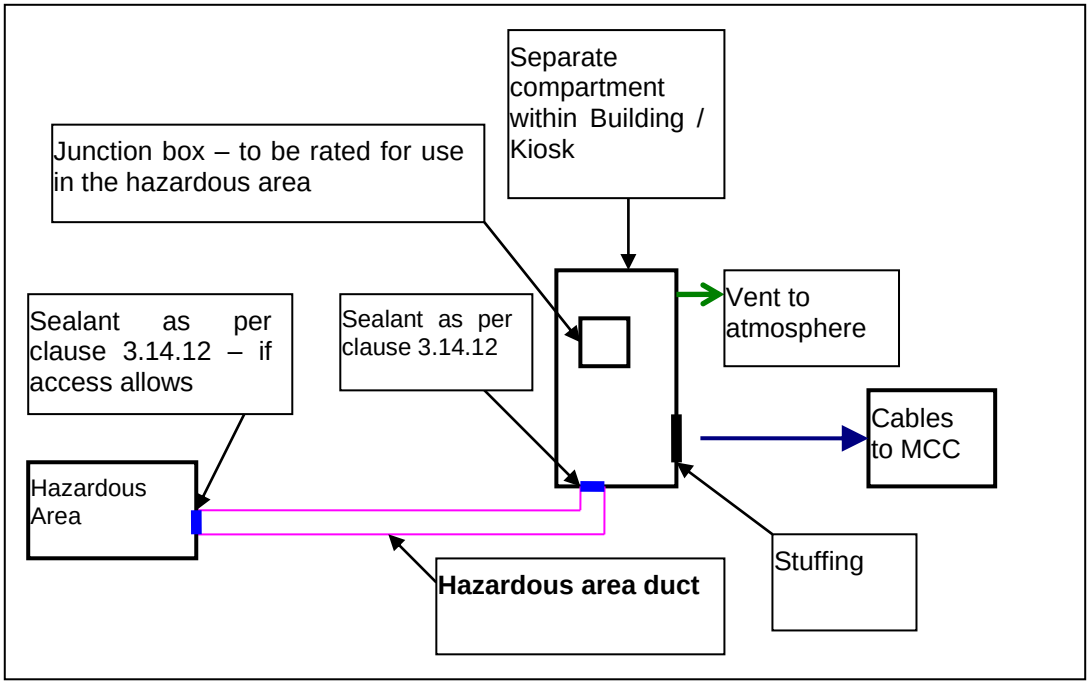
F.3.4.5.4 Connection of Pump unit Cables

F3.4.5.4.3 ST require Junction boxes to be provided, depending on whether a particular ventilated kiosk is proposed, as specified in Part D7.11.1b and also where the distance from the Wet Well to the kiosk is more than 5 or 10 metres and the cable route is indirect, as specified in Part F3.4.1.5.8.

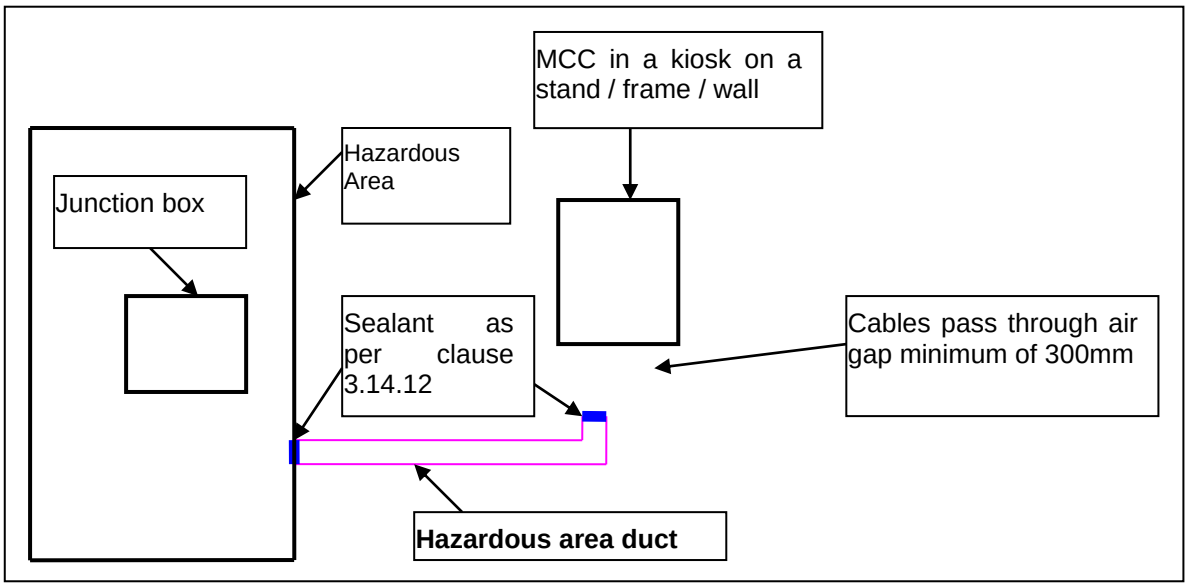
F3.4.5.4 For Junction boxes also refer to F3.4.1.5

F3.4.5.4.5 Sealing of ducts - Duct connections into hazardous areas shall be provided with a means to ensure vapours, products, gases etc do not migrate into areas inappropriately. Severn Trent uses a methodology based upon “block and bleed” where the duct is provided with a block or inhibit to the flow of the possibly hazardous substance and a means by which any hazardous substance which bypasses the “block” is allowed to dissipate safely. See sketch and sealant detail below.

Ducts leaving a hazardous area or a Severn Trent Zone BZ and entering directly into a kiosk shall do so in a separate compartment which shall be sealed from the rest of the kiosk to IP55 rating and ventilated to atmosphere. The ducts shall be sealed at the entrance into the compartment.

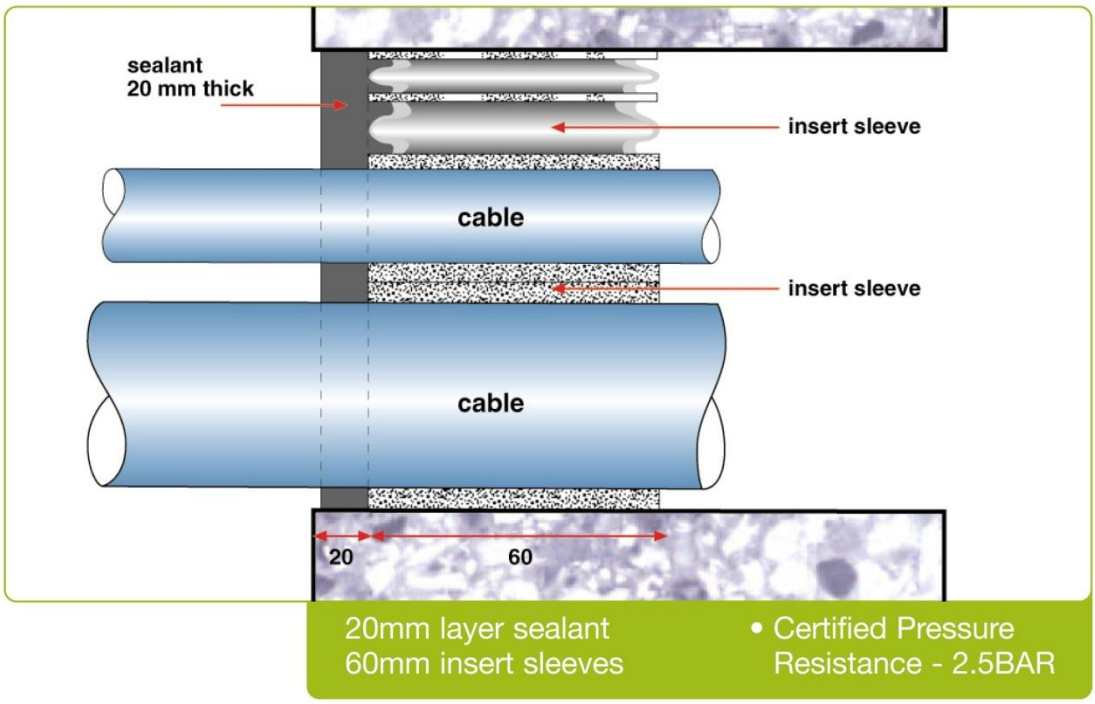


Ducts leaving a hazardous area or a Severn Trent Zone BZ and delivering cables to a junction box or a kiosk on a stand shall be sealed as they exit the ground; cables are required to pass through a minimum unobstructed air gap of 300 mm before entering the enclosure.



A proprietary duct or cable transit sealing system which ensures Lloyds certified minimum 1 bar gastight and 2.5 bar watertight seal and age tested for 50 years shall be used. This system shall consist of thermoplastic 60 mm long tubular water resistant split sleeves and a silicone based fire rated, water and gastight sealant as shown below. The insert sleeves shall be used to ensure cable separation and to pack any free space in the penetration allowing for easy addition/removal of future cables. Sealant shall be applied to the face of the penetration ensuring a pressure tight seal is maintained, sealant to be applied to a minimum depth of 20 mm.

The system shall be installed in accordance with the manufacturer's installation instructions.



F.3.4.6 Earthing and Bonding

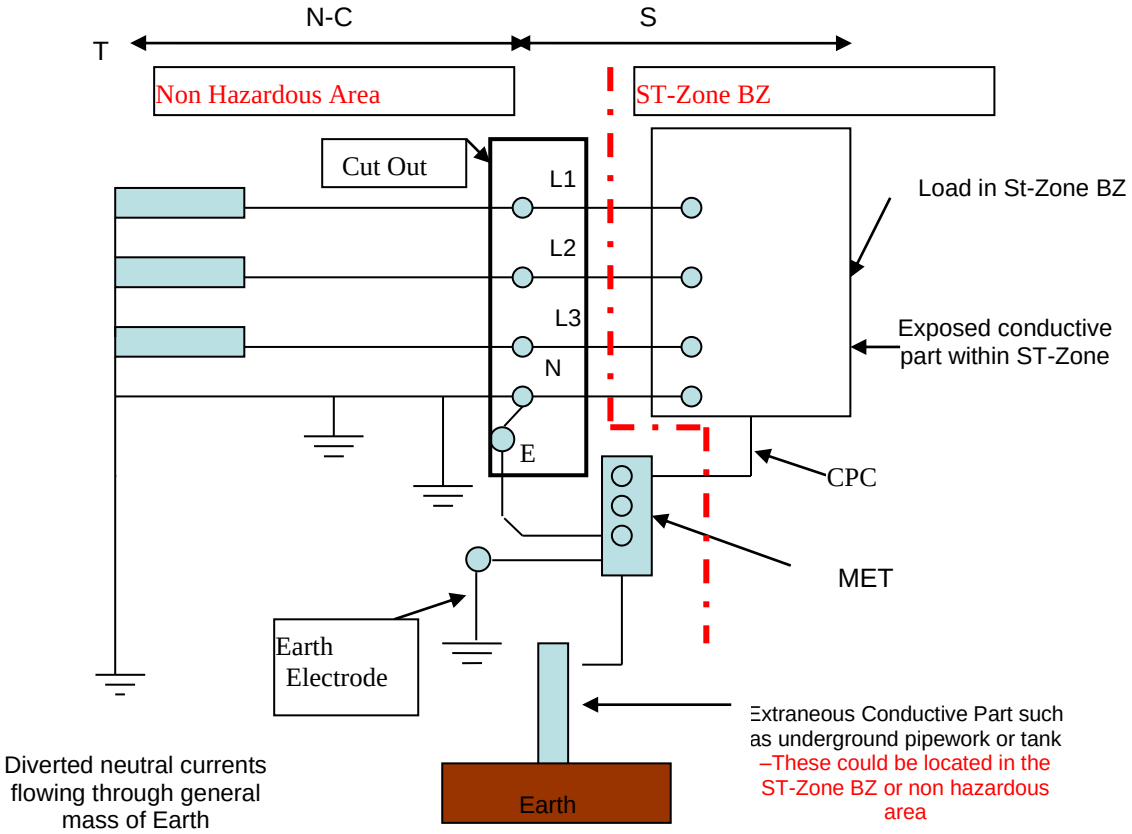
F.3.4.6.1 General

F.3.4.6.1.1d Testing - The earth leakage current for each completed installation shall be tested and recorded on the Earthing and Bonding Certificate. The current shall not be greater than 50mA. However as per 18th Edition, the accumulation of circuit protector currents/earth leakage currents that are present during normal operating conditions shall not be more than 30% of the rated residual operating current of the RCD.

The facility for non disconnection type testing shall be provided in the earth bonding installation to ensure that each equipotential bonding circuit can be tested. Each equipotential bond shall have a resistance of less than 1 Ohm.

F.3.4.6.1.2 TN-C-S in addition to the TN-C-S (PME) earthing system an isolating transformer shall be required. This installation shall include a local earth electrode.

This sketch provides an indication of intent from which the detail design may be developed.



F.3.4.6.2 Generator Connection facilities – an earth electrode system (which must be switchable) is required as part of the electrical installation. It shall be designed to be utilised for this purpose and for earthing of the hazardous area.

Earth Electrodes are to be selected and sized in accordance with BS7430 Table 4. Earth resistance should not exceed 20 Ohms. The earth resistance shall be measured and recorded on the Certificate of Earthing and Bonding.

F.3.4.6.3 Bonding

F.3.4.6.3.1 General

F.3.4.6.3.1.1 Installation Requirements – PVC coated copper tape or cable shall be used for all bonding applications and shall be unbroken at intermediate points (refer to IEE Earthing and Bonding Guidance Note 8 Section 5.2)

The size of earth conductors is required to be calculated in accordance with the requirements of BS 7671 and shall be the same size as the phase conductors as a minimum.

Each point of connection shall be protected using an anti corrosion and sealing product.

F3.4.6.3.2 Main equipotential bonding

F.3.4.6.3.2.1 Equipotential Bonding System – All exposed and extraneous-conductive parts of the installation within the hazardous area shall be connected to the equipotential bonding system on a separate earth bar as detailed in the sketch below.

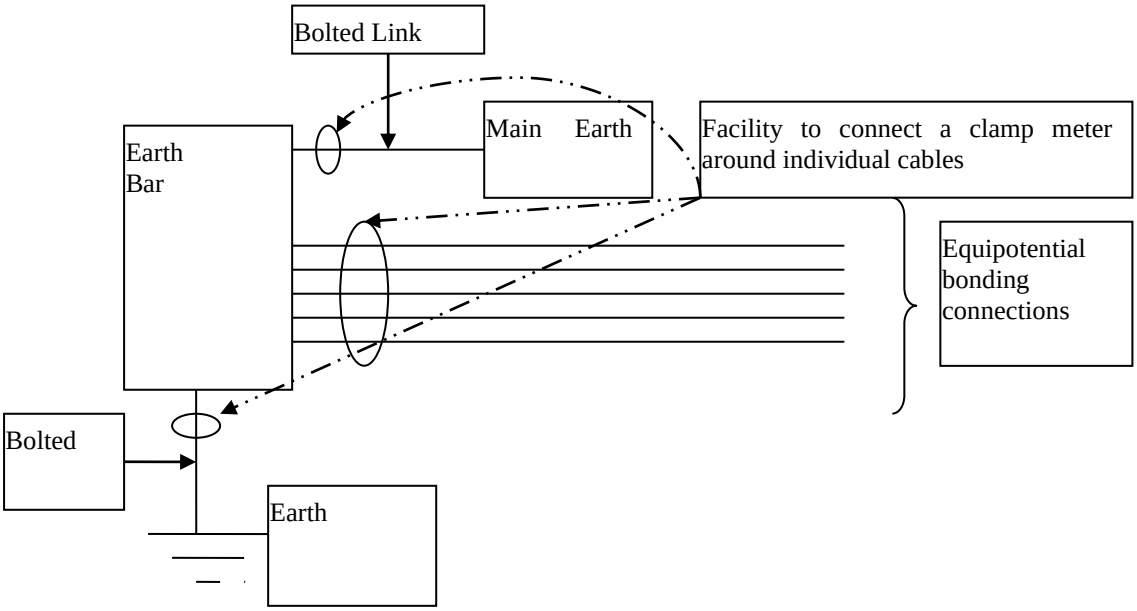
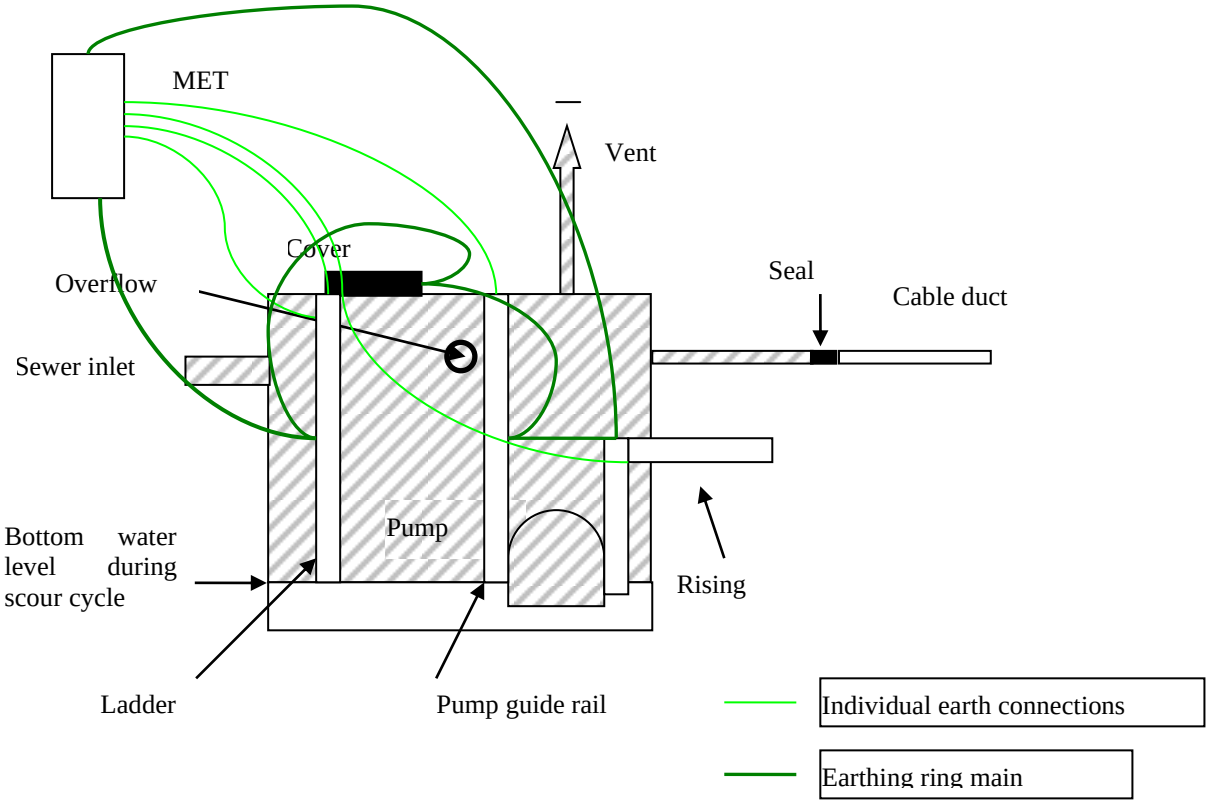


Figure 1. Earthing System

The earth bar shall be connected to the main earth terminal using a bolted link.

If the connection points are not readily accessible each item shall be connected separately to the earth bar twice, each connection point is required to be separate. Alternatively, one individual connection and an earthing ring main may be installed. If a ring main is utilised Continuity of the main equipotential bonding conductor shall be maintained (refer to IET Earthing and Bonding Guidance Note 8 Section 5.2)

This is required to ensure that a poor connection can be identified when tested. A typical example of this is shown in the sketch below.



F.3.4.6.3.3 Supplementary Equipotential Bonding

F.3.4.6.3.3.1 Supplementary Equipotential Bonding – This should be carried out as required to ensure compliance with BS 7671 and with reference to IET Earthing and Bonding Guidance Note 8.

F3.5 Instrumentation

F3.5.1 Flowmeter specification

F3.5.1.2 The flow transmitter connected to the flow sensor shall include the following features

a) Minimum 4 output relays
b) Programmed parameters stored in non volatile memory
c) Integral LCD display includes level, relay status and programming data with display being interactive in the programming mode
d) 110V ac input
e) 4-20 mA analogue signal output capability with a 750 ohms loading
f) Pulse output capability to give totalised flow output
g) Proven use within the waste water industry and suitable for outdoor installation rated at IP68

F3.5.1.3 Electromagnetic flowmeter shall be designed and installed in accordance with BS EN ISO 6817

F3.5.1.4 It shall be equipped with a flow sensor and a separate converter (transmitter) which shall be installed remotely from the flow sensor

F3.5.1.5 The flow sensor shall not incur a hydraulic head loss greater than 0.5 m when conveying maximum flow and shall not contain obstructions liable to restrict flow.

F3.5.1.6 Flow sensors shall be protected to BS EN 60529 – IP 68 (5 m depth of submergence). Signal convertors shall be protected to BS EN 60529 – IP 65

F3.5.1.7 All equipment shall be suitable for operation in ambient temperature -10C to +55C. In addition, signal convertors installed outdoors shall be protected from the effects of wind-chill and direct sunlight.

F3.5.1.8 The overall accuracy, as defined by WIS 7-03-01 shall be 1%. The flow sensor shall be suitably rated for the range of pressures within the installation. In addition, it shall be capable of withstanding a pressure equal to twice the normal operating pressure for a period of one minute without affecting the overall accuracy on return to normal rated pressure

F3.5.1.9 Flowmeter flanges shall be to BS EN 1092 part 2

F3.5.1.10 The input voltage to the flowmeter shall be 110V a.c. Local rate of flow indication shall be provided by a digital LCD indicator which, together with a totaliser, shall be mounted integral with, or adjacent to, the signal convertor. In addition, a pulsed output signal and an isolated analogue signal shall be provided. The 4-20 mA analogue signal shall be linearly proportional to the flow rate. The signal convertor shall be connected to the flow sensor by a suitably unjointed length of cable

F3.5.1.11 The flowmeter shall be installed in accordance with the manufacturer's recommendations and the certification requirements. The flow sensor shall be installed with all necessary earthing electrodes, gaskets and earthing straps and be bonded to earth. Upon completion of the installation of the flow sensor, any spare cabling shall be left neatly coiled and clipped.

F3.5.1.12 The developer shall supply a calibration certificate with the flowmeter that shall be issued by a NAMAS calibration laboratory. In addition, the Developer shall supply details of the methods to be used for carrying out in-situ validation checks. The flow sensor shall be clearly labelled with the following information:

a) Manufacturer's name.
b) Serial number.
c) Nominal internal diameter.

d) Nominal and maximum pressure.
e) Calibration factor.
f) Type of enclosure.
g) Flow direction

F3.5.2 Installation of instrumentation

F3.5.2.2 The ultrasonic level detector head shall not be positioned on the long side of the opening in the wet well roof slab where the cover is hinged, but preferably on the pump guide rail side or one of the short opening sides, avoiding interfering with the ladder access.

F3.6 Telemetry Outstation

F3.6.1 ST can offer to install and commission the telemetry system. There is a standard charge for this service. The Developer should contact Severn Trent Developer Services Team.