Local Practice for the Adoption of Small Submersible Foul and Surface Water Pumping Stations

April 2025

YorkshireWater

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For more information contact:

Sewer Adoption, Diversion and Requisition Team
Developer Services

0345 1 20 84 82

technical.sewerage@yorkshirewater.co.uk

Document control

Author	David Hanson
Created Date	November 2016
Last Updated	March 2025
Document Ref	Local Practice for the Adoption of Small Submersible Foul and Surface Water Pumping Stations
Version	Final
Reviewed By	Natalie Drake/Wendy Mullaney/ Nick Cooper
Date Reviewed	March 2025
Signature	N A Drake

Local Practice

The purpose of this Local Practice is to provide developers and designers with mandatory addenda and supplementary information to Part D – Pumping Stations of the Design and Construction Guidance (DCG), contained within the Code for Adoption, for the adoption of small submersible foul and surface water pumping stations.

This Local Practice must be applied to all pumping station designs to be constructed under Section 104 (Water Industry Act 1991) Agreements with Yorkshire Water.

Design specifications provided in this Local Practice shall take precedence over the relevant section in the DCG.

Framework Suppliers of Electrical and Mechanical Equipment

Yorkshire Water has negotiated with suppliers of electrical and mechanical equipment to ensure that the company obtains equipment of suitable quality and with a guaranteed supply of spare parts.

This framework provides Yorkshire Water and associated parties with submersible centrifugal pumps for all submersible applications and the provision of spares throughout its duration. It is preferable that the electrical and mechanical equipment should be procured from the Yorkshire Water Framework Suppliers where these exist. If the developer opts to use non-framework equipment, then that equipment must conform to Yorkshire Water's Engineering Specification. This can be discussed on a case by case basis with Yorkshire Water's Electrical and Mechanical Engineers.

Where a pumping station is proposed in Source Protection Zone 1 (SPZ1) or Source Protection Zone 2 (SPZ2), Developer Services should be consulted at an early stage before any design work is undertaken. Pumping stations in SPZ1 or SPZ2 will need to be approved by Yorkshire Water's Hydrogeologist.

D5: Provision of Pumping Stations

D5.2 Site Access

3.	For Type 1 and Type 2 pumping stations, provision should allow access by a 7.5 tonne maintenance/pump recovery vehicle fitted with a hiab to be able to park up and offload a mobile generator adjacent to the kiosk and also a mobile pump adjacent to the wet well. Tanker parking bay is not required.
4.	For Type 3 pumping stations, a 10.5 metre by 2.5 metre tanker should be able to park on the parking bay within the compound. The swept path of the tanker should be shown on a drawing and submitted for approval to demonstrate this.
5.	A vehicular turning area shall be provided where necessary. A turning area for tankers is required for Type 2 and 3 pumping stations. Vehicle tracking drawings shall be presented to Yorkshire Water to demonstrate compliance with this.

D5.3 Site Layout

The following guidance replaces Part D5.3 of the DCG.

1. Surfacing to Compound and Access Road

For all types of pumping station, any access road shall be constructed to highway specification and should be finished level with or be above the adjacent highway and not below. The compound surface should be concrete, and the perimeter edge should be delineated by pre-cast concrete kerb edging.

If the compound is not self-draining, the surface rainwater should be trapped by means of a gully and then directed to the foul wet well. For surface water pumping stations, the drain should be directed into the surface water wet well.

The compound construction should be similar to that of the adjacent highway with a concrete surfacing. The concrete compound construction shall be for trafficked areas (250 mm thick Gen 3 concrete with two layer of A393 mesh) and for non-trafficked areas (150 mm thick Gen 3 concrete with one layer of A393 mesh).

Concrete areas shall be formed with a concrete mix that is freeze/thaw resistant. Concrete hardstanding shall have a brushed finish with a trowelled margin. The brush finish direction shall be traverse across the width of the road.

The top of the wet well and valve chamber covers on all types of pumping station should be finished flush with the compound surfacing. Where the compound involves both foul and surface water pumping stations, the foul wet well and valve chamber covers should be 50 mm lower than the surface water wet well, and valve chamber covers. The area between the foul and surface water covers should be gently sloped and not stepped (trip hazards should be designed out).

2. Compound Boundary

A compound is required for all pumping stations. The compound should be a minimum of 14 metres long by 10 metres wide for a single pumping station and a minimum of 14 metres long and 14 metres wide for a foul and surface water pumping station within the same compound.

The compound boundary treatment shall be determined at the Pre Start Inspection meeting for the site once Conditional and/or Technical Acceptance has been issued.

The type of boundary treatment should be discussed between the Developer and the Yorkshire Water Engineers at the time of the Pre Start Inspection meeting prior to construction. The type and design of the boundary will be determined by the location and the surroundings of where the pumping station is to be constructed.

3. Last Access Point on Gravity Sewer System

The last access point on the gravity sewer system upstream of the wet well should be within the site compound adjacent to the wet well. This access chamber should also have provision for isolating the incoming flow to the pumping station by means of a hand operated valve or rising spindle penstock. If a T-key is required to operate the penstock then the T-key should be located inside the spare's cabinet/kiosk.

4. Pump Lifting Davits

Pump lifting davits shall be provided adjacent to the wet well for lifting operations and removal of the pump units. The location of the lifting davit socket should allow unhindered use of the davit. The davit shall be lightweight aluminium, be capable of lifting 500kg, and the reach shall not exceed 1200 mm. Davits supplied for loads over 500kg or with a reach exceeding 1200 mm shall be conventional galvanised steel design.

Both davits and sockets shall have safe working loads indelibly marked on them and test certificates shall be provided.

An additional kiosk is required for secure and safe storage at the pumping station site for the lifting davit.

Standard socket diameter shall be 65 mm.

D5.5 Storage

4. For surface water pumping stations, the surface water storage shall be in the upstream sewer system. Peak flows into the station shall be restricted to 0.5-1.0 l/sec less than the proposed pump discharge rate

D5.6 Hydraulic Design of Pumping Stations

3c. These levels should be selected to ensure that the number of starts per hour should be kept to a minimum and the maximum number of starts per hour shall not exceed

- For Framework Pumps
  – no more than 15 starts per hour if approved by Yorkshire Water Framework Suppliers
- For Non Framework Pumps
  – Up to 15kW – 8 starts per hour
  – 15kW and above – 6 starts per hour

3h. The standby pump unit start level is a minimum of 150 mm above the duty pump unit start level and the High Level Alarm level is a minimum 100 mm above the standby pump level.

D6: Rising Mains

D6.1 Layout and Marking

3.	Minimum depths of cover to the crown of the rising mains without protection should be as follows:
3a.	Grassed areas and pathways without the possibility of vehicular access shall be 0.9 metres
3b.	Driveways, parking areas and yards with height restrictions to prevent entry by vehicles with a gross vehicle weight in excess of 7.5 tonnes shall be 0.9 metres
7.	For rising mains, non-degradable marker tape should be laid 300 mm above the top of the pipe. For a non-metal main, the marker tape should incorporate a trace wire brought to the surface at a marker post every 1000 metres (approximately) and connected to terminals on the marker post. At the pumping station, the tape should enter through a sealed duct, 300 mm below the finished paved area, and should be terminated with one metre of wire coiled inside the valve chamber. At the discharge end of the rising main, the tape should be terminated inside the discharge manhole and coiled around a brass hook.

D6.2 Reliability

1.	The minimum size (internal diameter) for a rising main should be 78.5 mm nominal bore for Type 3 pumping stations.

D6.3 Hydraulic Design

4.	The rising main should connect at its high point to a discharge manhole before it connects via a minimum of five metres of gravity sewer to the public system. Detailed design of the entry arrangements should ensure that sewer maintenance operations can be undertaken at the manhole without difficulty and avoid turbulence which could cause gas formation, surcharge or flooding.
5.	Where the drainage from a single property is pumped, the rising main should discharge upstream of the demarcation chamber and the lateral drain should be a gravity pipeline.

D7: Design of Pumping Stations

D7.3 Wet Well - General

2. The inlet to the wet well shall be opposite the pump delivery pipework (where this is not achievable then the angle of the inlet pipe should not exceed 45 degrees from the centre of the pump station), and arranged to avoid turbulence in the well. The invert level of the incoming sewer shall be above the start level of the standby pump. Dependant on the benching arrangement, it may be necessary to backdrop the incoming pipework internally within the well.

Where excessive aeration, or interference with ultrasonic beams from transducers, an inlet baffle shall be installed to manage the flow into the wet well. This baffle shall have a return angle to the wall to further minimise flows dropping onto the pumps.

The angle and height of the inlet pipe shall not direct flows directly onto the pumps or pipework.

3. Benching should be provided to eliminate 'dead zones' in the wet well where siltation would otherwise occur. Benching should start no more than 100 mm from the pump unit volute and 50 mm from the duck foot bend. The benching shall be 60 degrees. The area under the pump should be as small as possible to ensure effective well cleansing. Flat floor areas should be kept to a minimum. The wet well diameter should be kept to a minimum to reduce the amount of benching required.

D7.5 Valve Chamber

1. The valve chamber should be separate from the wet well to accommodate differential settlement. Valves should not be installed in the wet well. Where a valve chamber is structurally attached to the wet well, settlement around the structure shall be taken into account.

3c. Depending on the pumping station type, the valve chamber should house the following:

- for Type 2 and Type 3 pumping stations, a gate valve and 100 mm diameter female Bauer coupling, mounted vertically in a tee piece in the rising main, downstream of the gate and check valves. This should be suitable for connecting to a flexible hose to allow a mobile pump to pump into the rising main during plant maintenance or failure. Where pump flow rates are above 20 l/s then a minimum of 125 mm female Bauer coupling shall be provided
- check valves, or non-return valves, shall be mounted horizontally, fitted with a removable top cover, and an external lever weighted arm. The lever weighted arm shall be guarded. One inch British Standard Pipe (BSP) tappings shall also be provided and fitted with one inch BSP stainless steel flanged plugs.

D7.5 Valve Chamber

4. Where the valve chamber is adjacent to a submersible pump wet well, a drain shall be installed within the valve chamber to drain water back into the wet well via 100 mm open ended pipe work. A trapped gully (P trap) should be installed below the finished floor level of the valve chamber; this provides a trapped arrangement to prevent gases entering the valve chamber. A suitable plug valve should be installed onto the opening of the gully to form a seal between the gully and the valve chamber and this valve shall be normally closed. An extended spindle arrangement must be installed to enable the valve to be operated safely at ground level to facilitate the draining of water back into the wet well.

5. Valves should comply with the specification given in F.4 in Design and Construction Guidance and be fitted with extension spindles up to the underside of the cover and a 'T' key provided for operation, without entering the valve chamber. The 'T' key shall be stored inside the storage kiosk.

Swept 'T' junctions and long radius bends should be used for pipework. Square 'T' junctions and close radius bends should be avoided to minimise friction headloss.

7. The chamber shall be provided as shallow as possible and should have a maximum depth of 1.5 metres from cover level to floor of the valve chamber. However, this shall not be detrimental to the profile of the rising main. The required depth of cover for the rising main must be achieved, (1.2 metres from soffit in trafficked areas, 0.9 metres in non-trafficked areas).

Support stools shall be fitted to the valve chamber pipework on the Tee section and bend (as Figure D.4 in sectional plan in Design and Construction Guidance), they shall provide sufficient restraint and cover at least half of the pipework section. Where flange adaptors are fitted, these shall be tied as necessary to resist thrust loadings.

Sufficient room shall be allowed in the valve chamber to facilitate safe access and allow maintenance work to the valves to be carried out insitu. At least 300 mm shall be allowed between the pipe work and the walls, with at least 150 mm from any flange on outgoing pipe work and the wall.

D7.6 Flow Metering

1. When the duty pump is rated at 10kW or more, a flowmeter should be provided in the valve chamber or in a separate chamber to monitor discharge performance.

D7.7 Access to Wet Well, Valve Chambers and Flowmeter Chambers

3.	The wet well should not be vented through the upstream sewer system. Ventilation should be provided in accordance with one of the following methods. The selection of the method of venting should take into account the risk of odour nuisance.
3a.	The installation of a galvanized mild steel vent stack with a minimum diameter of 100 mm should be fitted with a mild steel mesh at the top. Where located in a fenced compound the vent stack should terminate at the same height as the boundary fencing. In residential areas the stack should be a minimum of one metre high or up to the height of the fence with a swan neck.
3b.	If security fencing to site compound is provided, open mesh covering of the wet well may be considered. A site impact on odour complaints, septicity and hazardous area requirements shall be carried out to determine if this option is viable.
4.	Vent pipes should open at the 'high point(s)' of the wet well. Bends in vent pipes should be large radius; elbow bends should not be used. Vent pipes should be installed in such a way to avoid them becoming ineffective due to trapped water (rain, condensation, etc.). The external colour of the vent stack should be coated black unless local planning requirements state otherwise.
6.	Access to below ground valve chambers or flowmeter chambers should be by a galvanised mild steel fixed retractable (telescopic) ladder.

D7.11 Kiosk Construction

7.	Alternative forms of kiosk construction instead of GRP encapsulated marine quality plywood (e.g. steel) may be used in locations subject to vandalism risk (as advised by local police). Approval of the design must be obtained from Yorkshire Water.
8.	The doors of the kiosk should be fitted with vandal-proof, stainless steel hinges and self-latching stays to restrain the doors to a minimum opening angle of 90 degrees and a maximum of 110 degrees. One door should have stainless steel shoot bolts at the top and bottom.
14.	Doors on kiosks shall be fitted with a hasp and staple locking mechanism with triangular bit locks at the top and bottom to maintain the IP rating and to lock the doors to the frame. The hasp and staple should be at least 90 mm long horizontally and 30 mm wide vertically, to take a Yorkshire Water abloy padlock.

D7.12 Kiosk Mounting Arrangements

1.	The kiosk should be mounted on a 200 mm thick GEN 3 concrete plinth (150 mm above the finished surface level or the wet well cover slab level) on a 150 mm Type 1 stone sub base. The plinth should extend a minimum of 125 mm beyond the kiosk walls and have 20 mm chamfered edges. The area to the front of the plinth shall gently slope away from the kiosk to allow surface water to run off.

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Yorkshire Water Services Limited,
Western House, Halifax Road, Bradford, BD6 2SZ.
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