
SEWERS FOR ADOPTION 6TH EDITION
UNITED UTILITIES GUIDELINES
PUMPING STATIONS FOR ADOPTION

INTRODUCTION

This document is intended to advise developers of United Utilities' specific requirements in relation to pumping stations to be offered for adoption under a Section 104 agreement of the Water Industry Act 1991.

This document should be read in conjunction with 'Sewers for Adoption 6th edition' published by the Water Research Centre.

General Design of Pumping Stations SfA ref 2.17

As a general rule, United Utilities will not consider for adoption any pumping station serving less than six properties. This is considered uneconomic as the cost of operating and maintaining a station serving less than ten properties usually outweighs the income received. However, each case should be considered on its own merit and discussed with United Utilities.

The developer should liaise with United Utilities prior to undertaking detailed design to ensure proposals meet the required criteria.

Proposals involving pumping stations greater than 30kW are to be discussed with United Utilities on an individual basis prior to design commencing.

Where the pumping rate of any pumping station exceeds 70l/s, a flow meter will be required in the valve chamber to monitor discharge performance.

A potable water supply will not normally be required. Where specific circumstances dictate otherwise, United Utilities should advise the developer.

Wet Well Additional Storage Capacity SfA ref 2.17.7 & 2.17.8

Wet wells shall incorporate additional wet well storage capacity above the High Wet Well alarm to allow for an operational response time in the event of equipment or power failure. Storage capacity within the upstream network shall be included in the calculation of this additional storage. The additional storage requirements that should be provided equates to a minimum of 4 hours storage based on 160 litres per dwelling plus trade effluent (where appropriate) or the minimum storage requirement to ensure consent compliance if greater than the 4 hour volume.

By-Pass / Over-pumping

An over-pumping facility should be provided to allow flow to be passed forward from the station by portable equipment in the event of a station failure. This would prevent the wet well surcharging to cover level and flooding. For most stations the capacity of this facility should be equal to the dry weather flow, but for any station associated with an overflow, the capacity should be equal to the minimum consented pass forward flow.

The facility will normally be provided by single or multiple-valved Tee connections with Bauer couplings installed in a chamber on the rising main within the compound to allow bypassing of the station. The chamber should drain back to the wet well. Bauer couplings will normally be a maximum of 150mm diameter.

For stations where there is a very short or no rising main, (lift stations), consideration should be given to installing a high level by-pass pipe from the wet well to the discharge manhole so that flow can continue by gravity in the event of a station failure. The upstream network flood level and the level of the receiving sewer in the discharge manhole will determine the feasibility of this. This by-pass pipe should be sized to accommodate the design flow. The discharge manhole should be situated inside the compound where possible.

Layout of Pumping Stations SfA ref 2.18

Pumping stations should be sited in their own compound, the area of which should be conveyed to the Undertaker in accordance with clause 20.1.1(a) of the Model Form of Agreement. Particular attention is drawn to the need to locate pumping stations at least 15m from habitable buildings so as to minimise the risk of odour and noise nuisance.

Submersible pumping stations do not implicitly require a superstructure. A kiosk of adequate size may be all that is required to house the electrical equipment, telemetry and any other equipment that requires storing on site. However, in certain areas, a superstructure may be desirable. In residential areas, a superstructure designed to look like a detached garage may help to blend the pumping station into its environment, whilst in other areas, prone to vandalism, a superstructure may be desirable for security reasons.

Pumping stations should be secure in their own right without having to rely on security fencing. This applies equally to all chambers, kiosks, tanks, superstructure etc. The type of perimeter fencing should be appropriate to the location.

For the purposes of this document, an electrical control cubicle is to be considered as a superstructure. Developers may be required therefore to provide fencing to pumping stations.

When required, the type and height of fencing should be agreed with United Utilities and the local Planning Authority prior to erection. The normal requirement is 1.8m high palisade fencing. High solid walls or fences should be avoided as these prevent any intruders from being seen from outside the compound.

Proposals to site pumping stations in highways will not be accepted.

Submersible stations should generally be arranged in accordance with the typical layout detail in Figures 2.11 and 2.12 in Sewers for Adoption.

Consideration should also be given to the gradient of the site. The compound should be as level as possible to facilitate vehicle movements.

For submersible and other small stations, the compound should be entirely hardstanding unless Local Authority Planning considerations dictate otherwise. Where reinforced grass (e.g. 'Grasscrete') is provided, a tarmac or concrete hardstanding at least one metre wide should be provided around all access covers and in front of the kiosk. For larger stations, hardstanding areas should be provided as required including turning heads where possible. The remainder of the compound should be grassed or landscaped, if appropriate, but the emphasis should be on ease of maintenance. Small grassed areas should be avoided.

Emergency Overflows and Flooding SfA ref 2.19

The general presumption shall be not to provide an emergency overflow. If one is required to prevent flooding of property, it should be by means of a discrete pipe and a consent to discharge is necessary from the Environment Agency. The overflow should be sized to accommodate the design flow. UU Environment Regulation should be consulted on this matter.

Where an overflow is provided it may be necessary to provide storage capacity before the spill pipe to satisfy the requirements of the Environment Agency. United Utilities Environmental Regulation should be consulted for specific requirements relating to storage

volume, telemetry, standby equipment, generator etc. If an overflow is to be provided, a hydraulic model will be required to confirm the adequacy of the storage volume.

Rights of way for access and for any emergency overflow pipe should be included in the conveyance.

Wet Wells SfA ref 2.20

Wet wells will normally be classified as Zone 2 as defined in BS EN 60079: Part 10. However, it is recognised that sewers, when associated with certain discharges, present an increased degree of risk. For this reason, the United Utilities Hazardous Area Policy requires that all electrical installations in sewage pumping station wet wells shall conform to Zone 1 standards. If, following assessment, the wet well is classified as Zone 1, there will be consequent Zone 2 areas associated with all openings.

Separate, purpose built, underground ducts must be provided to accommodate power and signal cables including the incoming supply cable. To ensure that the control building/kiosk is classified as non-hazardous to BS EN 60079, it must be situated in a non-hazardous area and the ducts must be sealed with a water resistant, two component polyurethane (froth/foam spray) kit. Ducts between the wet well and the control building/kiosk shall be sealed at both ends to a depth of 300mm.

Isolation equipment e.g. penstocks, valves and stop logs, shall be fitted to all incoming pipes either within the wet well or in an upstream manhole if there is one immediately adjacent to the pumping station. Alternatively, partitioning of the wet well may be necessary.

Access into Wet Well and Chambers SfA ref 2.22

Permanent access to wet wells shall not be provided. Access to all other below ground chambers shall be by fixed stainless steel ladders without hoops. The ladder should incorporate a retractable safety handhold to extend 1.2m above ground level. The ladder and grid should be arranged so that the handhold can be raised and locked into position before the grid is removed.

All openings in cover slabs and floors with a vertical drop below greater than 2m shall be protected in accordance with Sewers for Adoption, i.e. a removable safety grid below the cover and de-mountable stainless steel hand-railing with toe boards.

Access to valve chambers on submersible stations should be by galvanised steel or plastic coated step rungs.

Additional safety requirements will be necessary for maintenance purposes in very deep wet wells, the details of which should be agreed in advance with United Utilities.

Ventilation SfA ref 2.22.4

Wet wells require some means of venting to prevent a build up of pressure when the water level rises. However, specific provision for on-site ventilation can give rise to odour nuisance and should only be provided when necessary. For example, foul only stations and stations with emergency overflows can vent naturally via the connecting sewers.

For surface water and combined stations, vent pipes should be provided in accordance with Sewers for Adoption. The preference is for natural ventilation wherever possible but forced

ventilation may be necessary on larger and / or deep stations. For forced ventilation systems, inlet and exhaust vents should be sited so that the exhaust air is not recycled.

Odour

The need for odour control should be assessed and will be particularly relevant whenever ventilation is installed and where there is a serious risk of septicity and the site is close to property. In most situations, a passive system will be adequate. This is one in which foul air - which is displaced as the water level rises - is exhausted through an odour control unit. Fresh air is drawn in as the water level falls.

Pumps and motors SfA ref 3.1

Pump configuration and control should be agreed with United Utilities. The general requirement is for two identical pumps for each pumping station - one duty, one standby. In certain locations, pumps of different sizes or variable speeds may be required. All plant should be designed to minimise operational input consistent with providing the minimum whole life cost solution. Common problems are siltation, fat build up and blockages. To minimise siltation, where benching is unlikely to be self cleansing, an automatic wet well flushing & mixing system is to be provided. Fat build up can be reduced using the facilities of the ultrasonic unit by setting a variable range of top water levels for pump starts, to prevent a ring of fat forming.

Kiosk SfA ref 3.11

The kiosk should be constructed from materials agreed with United Utilities and, if appropriate, the local Planning Authority.

Access to the electricity meters and equipment should be via a lockable, hinged external door. The lock should be of a different type than the main kiosk door.

A switch should be fitted to the kiosk doors to provide an open contact when the door is open and a closed contact when the kiosk door is closed. These contacts will be used by the telemetry to determine whether an unauthorised entry has been made into the kiosk.

Telemetry SfA ref 3.11.7

Telemetry shall be installed in all pumping stations and will need to be compatible with United Utilities existing system.

United Utilities can install and commission the telemetry outstation, and all costs associated with this would need to be borne by the Developer.

Should the Developer choose to install the outstation himself, United Utilities will need to commission the outstation and this cost must be borne by the Developer.

Marshalling for the following telemetry signals should be provided:

- Mains power failure.
- Level control system failure.
- Individual pump tripped alarms.

- Wet Well High.
- Intruder on site.
- Pump running / stopped
- Pump available (hand / auto)
- Remote reset for pump trip
- Emergency overflow operating
- Depth of water in well (analogue signal)

Signals Connected with Remote Control of equipment

- Remote control select
- Remote pump start
- Remote pump stop
- Remote pump trip reset

Note on Wet Well High level:

In accordance with SfA Ref 2.20.5 the wet well should incorporate additional storage above the wet well High Level alarm. This alarm should therefore be set as low as possible to maximise the available storage but not so low as to generate unnecessary alarms during storm conditions.

As a general guide, for foul-only stations, this should be set at approximately 200mm above the pump start level; for other stations at approximately half wet well depth depending on storage requirements, overflow level and normal depths expected in storm conditions.

In addition, for stations with an overflow - Overflow operating event.

Analogue signals shall be provided when appropriate (e.g. for flow and wet well level).

UU Environmental Regulation should be consulted for telemetry requirements at overflows. If accurate spill time and duration data is required it may be appropriate to specify a dedicated level detection system, such as a series of probe electrodes, immediately adjacent to the overflow weir / pipe. In this situation the telemetry system should be configured such that it sends a signal on both rising and falling water level in order to register the start and finish of a spill event.

Satisfactory end to end testing of the telemetry system will be required prior to adoption.

Power Factor Correction SfA ref 3.10

The site power factor shall be corrected to a minimum of 0.93 lagging as specified by United Utilities and the local REC.

Pump Control

The primary pump control should be level switching using ultrasonic level detection equipment that should be consistent with the existing system in use in the Operational Unit. 'High Level' detection shall also be provided using a separate float switch or a secondary ultrasonic system. Low level detection is not required.

Auto-rotation of pump duty (duty cycling) shall be provided.

If foaming is liable to occur at an installation, this may prevent ultrasonic detectors from working reliably. Other options, such as floats, probes, pressure transducers or radar type instruments may have to be used.

Special site-specific pump control requirements, such as pump inhibition due to downstream conditions, should be discussed with United Utilities.

Pump switching should be controlled by the ultrasonic system wherever possible. A programmable logic controller (PLC) should only be used when the required method of control is beyond the capability of the ultrasonic system.

Auto Restart

The control panel shall be provided with a facility to restart the pumping station automatically following a mains power failure. This shall not override the necessity to reset the panel manually in the event of an Emergency Stop button being activated.

Remote Control

The Pumping Station shall be provided with a 3rd operational mode in addition to the Hand mode and Auto control mode.

This 3rd mode is to be called 'Remote Control'.

'Remote Control' mode shall **ONLY** be selectable when the panel selector switch is set in the Auto control position

'Remote Control' mode shall **NOT** be selectable if the panel selector switch is in Hand control position

The 'Remote Control' mode shall be selected remotely via the telemetry. An output from the telemetry outstation will present a closed contact to the MCP for the duration of the time the PS is to remain in 'Remote Control' mode.

If no output is presented to the MCP then the PS will remain in the mode selected by the Hand / Auto selector switch

A flashing indicator lamp should be provided on the MCP to show when 'Remote Control' has been selected. The lamp shall be marked CAUTION REMOTE CONTROL SELECTED

Remote Start and Stop of Pumps

The pumps shall be provided with contacts such that when Remote Control mode is selected, a 2 second pulsed closed contact from the telemetry shall start the pump. The pump will then run until either a separate 2 second pulse is sent to stop the pump or 'Remote Control' is dropped.

When 'Remote Control' is dropped the PS shall return to normal Auto Control mode.

Remote Pump Trip Reset

The control panel shall be provided with a facility to remotely reset the pump(s) in the event of a pump trip.

The pump overload or over temperature trip will be reset by

- a) Being in receipt of a constant Remote Control signal
- b) Receiving a 2 second pump reset signal (one signal per pump)

This shall **not** override the necessity to reset the panel manually in the event of an Emergency Stop button being activated

Marshalling for Remote Control signal shall be provided alongside the telemetry marshalling.

Cable Termination

Submersible pumps should be capable of electrical disconnection remote from the control panel. This should be provided either via an appropriately rated plug and socket within the wet well or via an appropriately rated junction box within the valve chamber.

Where the plug and socket arrangement is provided, the cable duct should run from the kiosk to the wet well. The plug/socket should be located above the protective grid so that the pump can be disconnected before the grid is removed.

Where the junction box is provided, the cable duct should run from the kiosk to the valve chamber. The junction box should be located where it is readily accessible. A further unsealed duct should run from the valve chamber to the wet well.

Contact Numbers

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| Sewer Adoption Applications | 01925-679-364 |
| Installation of Pumping Station telemetry, System Support Group | 01925-233-202 |