Fingal County Council
Comhairle Contae Fhine Gall

Appendix: 2: Specifications & Standards

Pumping Stations

Transportation & Water Services

SPECIFICATION AND COMPLETION SRANDARDS FOR SUBMERSIBLE SEWAGE PUMPING STATIONS

Transportation & Water Services
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REQUIREMENTS AND STANDARDS FOR

SUBMERSIBLE SEWAGE PUMPING STATIONS

1. GENERAL

1.1 This document is for use by Developers/Contractors who are planning, designing and constructing a sewage pumping station with the intention that it be taken-in-charge by Fingal County Council.

1.2 Pumping stations are expensive to operate and maintain, and will only be considered as an alternative to a gravity sewer if the Developer/Contractor can clearly demonstrate to the satisfaction of Fingal County Council, that a gravity sewer is an uneconomic option based on whole life-cycle costs.

1.3 Sewage systems such as vacuum, pressure or other specialist systems are outside the scope of this document and should be discussed separately with Fingal County Council.

1.4 These requirements shall be fully complied with except where Fingal County Council has formally agreed, subject to sound technical reasoning, to alternative equipment/installation proposals. Unapproved modification will not be accepted for taking-in-charge.

1.5 Should a Developer/Contractor decide retrospectively to request Fingal County Council to take a pumping station in-charge, the responsibility rests with the Developer/Contractor for any additional works that may be necessary to bring the pumping station to the taking-in-charge standard current at the time of application.

1.6 The Developer/Contractor shall provide evidence at the commissioning stage that a contract maintenance agreement is in place for the pumping station. Fingal County Council on taking-in-charge of the pumping station may decide to dispense or continue with this agreement.

1.6 Fingal County Council is committed to the promotion of products, services and construction which have the lowest and safest impact on the environment and humans, in terms of natural

resources, consumables, performance, operation and waste. Pumping stations shall therefore, be constructed and designed to operate with the minimum negative environmental impact.

2. PROCEDURE

2.1 The Developer/Contractor should discuss the pumping station proposal with Fingal County Council as early as possible. Ideally, the layout arrangements should be agreed in principle before a planning application is made.

2.2 On receipt of planning permission the Developer/Contractor shall forward the following information quoting the Planning Reference No. to:

Water Services Department,
Grove Road,
Blanchardstown,
Dublin 15.

E-mail: waterservices@fingalcoco.ie

- **Site Plan** showing: levels, site boundary, pumping station site, rising mains, sewers, manholes.
- **Pumping Station Construction** showing: general arrangement, wet well, valve chamber, storage tanks, control building/kiosk
- **Pumping Station Design Information**: pump flow, static head, rising main(length, diameter, material), wet well capacity, storage tank capacity, pump curve, pump cut-in cut-out levels, agreed emergency overflow, surge calculations, control philosophy, control panel diagram.

2.3 During the pumping station maintenance period (normally 12 months) and no sooner that 9 months from the date of commissioning, and provided that the planned sewer network is complete, the Developer/Contractor may apply to Fingal County Council to have the pumping station taken-in-charge.

2.4 Within a month of the request to have the pumping station taken-in-charge, Fingal County Council, will jointly inspect the pumping station with the Developer/Contractor and Maintenance Contractor. Subject to

the handover of the Safety File and 2 No. copies of the Operation and Maintenance Manuals, Fingal County Council will issue a certificate confirming that there are no outstanding works. Fingal County Council will also confirm their intention to formally take the pumping in-charge subject to there being no land/legal matters outstanding.

3. INSPECTION

3.1 During construction of the pumping station, at the stage when the pump pedestals, risers, guide rails, valves and penstock(s) have been installed, the Developer/Contractor will notify Water Services Department, that the pumping station is ready for initial inspection. If the installation is found to be defective with regard to materials, workmanship or not to be in compliance with the agreed layout, the Developer/Contractor will be requested (in writing) to remedy the defects without delay.

3.2 The Developer/Contractor or his representative should be present during this inspection. The Developer/Contractor shall provide all necessary attendance, plant and equipment to ensure that these inspections are carried out in full compliance with current Health and Safety Regulations.

3.3 When the pumping station is at the commissioning stage, Fingal County Council will inspect and function test the pumping system. If the installation is found to be defective with regard to materials, workmanship or not to be in compliance with the specified performance, the Developer/Contractor will be requested (in writing) to remedy the defects without delay.

3.4 Once commissioned Fingal County Council will connect the pumping station to its telemetry system and monitor the operational performance of the station with particular reference to the ratio of DWF(dry weather flow) to WWF(wet weather flow). Should the observed trend indicate defects in the sewer network the Developer/Contractor will be requested (in writing) to investigate and remedy the defects without delay.

3.5 At each inspection stage, the Developer/Contractor will make available to the Fingal County Council Inspector the Safety File. The File must include all relevant documentation, drawings, standards and certificates, that will allow the Inspector

to satisfy himself that the equipment and material installed in the pumping station or stored on site comply with the requirements and standards of this document and any other relevant standards set down by Fingal County Council.

2. DESIGN

1.1 These requirements apply to small and medium size submersible sewage pumping stations up to 30 kW or a pump weight of 500kg,with a site constructed concrete or precast sump, valve chamber and control building.

1.2 Pumps in excess of 30kw or 500kg in weight shall be installed in a dry-well. The requirements for dry-well installation should be discussed separately with Fingal County Council.

1.3 The pumping station should be designed to cater for DWF (dry weather flow) multiplied by a factor between 4 and 6 to cater for variations in flow and for surface water during wet weather. The design flow should be further increased by up to 10% for infiltration. Design flows must be agreed with Water Services Department as variations may be required depending on the catchment.

1.4 In cases where the pumped flow is less than 2 l/sec approved propriety pumping systems may be used. These small package pumping stations must comply with the requirements of this document except where the use of macerating pumps and a rising main diameter less than 100mm has been agreed with Fingal County Council.

1.5 The equipment and installation must comply with all Statutory Regulations and the latest editions of all relevant Irish, British and harmonized European Standards. The pumping station must also comply with any special conditions that Fingal County Council may set down from time to time.

1.6 The electrical installation must comply with the current requirements of the Electro-Technical Council of Ireland

ET 101: National Rules for Electrical Installations, Third Edition and including Amendments 1,2 and 3.

ESBN - National Code of Practice for Customer Interface

1.7 The pumping system shall be so designed as to ensure maximum energy efficiency and minimum life cycle costs by optimising the selection of pumps, rising main diameter and control systems.

1.8 The layout and positioning of equipment should facilitate its safe and efficient maintenance.

1.9 The land on which the pumping station is constructed and the right of access, shall be transferred to Fingal County Council as part of the taking in charge procedure

2. LOCATION

2.1 The site shall be chosen so as to provide access for maintenance vehicles (mobile pump and 3/4 axle vacuum tanker) reasonable security and access to the power and telecommunications network.

2.2 The pumping station shall not be located closer than 50 metres from any habitable buildings and shall not give rise to noise or odour nuisance.

2.3 The type of security fencing, gates and landscaping shall be agreed with Fingal County Council.

3. SUMP AND VALVE CHAMBER

3.1 The sump and valve chamber which are classified as **Hazardous Zone 1**, shall be of concrete construction, circular or rectangular in design.

3.2 The sump design shall allow a free flow to the pumps without the formation of vortices and have an effective volume so as to limit the number of pump starts to ten (10) per hour.

3.3 The pump operating levels will be chosen to ensure that the pump motor housing shall be submerged at all times.

3.4 The inflow to the sump shall incorporate a macerating unit and/or screen located in a separate chamber.

3.5 The sump floor shall be suitably benched to achieve maximum self-cleaning.

3.6 The inflow pipe(s) shall be fitted with a penstock and baffle. The penstock spindle shall extend to the sump roof slab where it shall be accessed through a hinged cover.

3.7 Both the sump and valve chamber shall be adequately ventilated.

4. ADDITIONAL STORAGE

4.1 To minimize the risk of raw sewage being discharged during plant or power failure, storage equivalent to a volume of 24 hours flow at 1 x D.W.F. shall be provided.

4.2 Should it not be possible to provide this storage within the pump sump, additional concrete tank(s) must be installed.

4.3 The overflow to these tanks shall be located above the sump high level alarm level and below the lowest sewer invert.

4.4 The tank flow and return to the sump shall be fitted with penstock isolation.

4.5 The tank(s) shall be fitted with a tipping bucket flushing system to automatically wash out the tank following a storage cycle.

4.6 Tanks in excess of 100m3 storage capacity shall be fitted with submersible jet aerators equipped with quick release couplings complete with galvanised guide rails, galvanised lifting chains, cable suspenders and chain hooks.

4.7 Tank(s) shall be fitted with approved access covers and ventilation.

4.8 The sump/storage tank(s) shall incorporate an overflow with a screen chamber incorporating a Copa sac or equivalent system to retain floating debris and discharge to a location as directed by Fingal County Council.

5. RISING MAIN

5.1 The rising main diameter shall be chosen to ensure a velocity in the range of 0.8 to 2m/sec.and empty at least six times per day to avoid septicity.

5.2 In circumstances where longer retention times may arise, a separate chemical dosing system may be required.

5.3 The rising main diameter shall be 100mm diameter minimum.

5.4 The rising main shall be adequately braced at any change in direction with provision for air valves at high points.

5.5 Consideration shall also be given at the design stage to ensure that the effects of hydraulic surge are within the pressure rating of the pipes and fittings.

5. PUMPS

5.1 The pumps, duty/standby, shall be of the centrifugal, unchokeable, submersible type, with a non-overloading characteristic.

5.2 The pumps shall operate at a maximum speed of 1500 rpm.

5.2 The impellers to be keyed to the motor shaft and provide a solids passage of 90mm minimum.

5.3 The integrally coupled squirrel cage induction motors to be suitable for a 400v, 3ph, 50hz supply, designed for use in a **Hazardous Zone 1** area, with protection as defined in **BS EN 60079.**

5.4 The pumps shall operate near maximum efficiency at the duty point.

5.5 The pumps to be equipped with quick release couplings complete with galvanised guide rails, galvanised lifting chains, cable suspenders and chain hooks.

5.6 Lifting chains shall be to BS EN 818-1 and BS EN 818-3 providing a larger 50mm link at 1m intervals to assist with pump

lifting.

6. PIPEWORK AND VALVES

6.1 The pumping station pipework shall be cast iron double flanged PN 16 (minimum).

6.2 All pipework shall be adequately braced and assembled with zinc plated bolts, nuts, washers and gaskets.

6.3 The pump discharges shall be fitted with gate valves (clockwise closing) BS 5150 and non- return valves BS 5153 located in a valve chamber adjacent to the pump sump.

6.4 Dismantling joints may be used where appropriate to facilitate valve removal.

6.5 The valve chamber shall also house a by-pass connection to the rising main fitted with a gate valve and Bauer coupling.

7. CHAMBER COVERS

7.1 The sump and valve chamber access covers shall hinged, lockable, gas or spring assisted and provide a clear opening of at least 600mm to enable the removal of each pump vertically.

7.2 A hinged safety grid shall be provided below the covers.

7.3 The covers shall be capable of taking vehicular traffic if required.

8. LIFTING EQUIPMENT

8.1 A certified 500kg SWL galvanised mild steel (BS EN ISO 1460) lifting davit shall be provided complete with chain block (Drg. No. M/01/01).

8.2 The davit socket shall be cast into the sump roof slab.

8.3 The davit socket shall be fitted with a cover plate.

9. MAGNETIC FLOWMETER

9.1 A Magnetic Flowmeter (IP68) shall be installed in a separate chamber adjacent to the valve chamber.

9.2 The instrument display shall mounted in the same enclosure as the ultrasonic unit.

9.3 The meter shall record both forward and reverse flow and transmit outputs to telemetry system.

10. CONTROL BUILDING

10.1 The power supply and pump control panel will be located in a control building adjacent to the pump sump.

10.2 The building 3m x 2.5m (Drg.No.M/01/02) shall be to a design compatible with the surroundings buildings or as directed by Fingal County Council.

10.3 In locations where a building is not appropriate a GRP cabinet of minimum dimensions 2000mm x 1500mm x 750mm may be used. Photo---

10.4 Provision shall be made for a meter cabinet(s), main switch fuse, distribution board and earthing as required.

10.5 All cables shall be run on cable tray or in trunking within the control building.

10.6 A twin 13amp socket outlet, twin polycarbonate fluorescent fitting, 2kw covector heater (with timer) and undersink water heater (for wash-hand basin) shall be provided.

10.7 All supplies to this equipment shall be run in 20mm galvanized conduit BS 4568.

10.8 Ducting shall be provided for the ESB supply and telephone line (telemetry) to the control building. The ducts between the sump and the control building (minimum cover 600mm) shall be adequately sealed at the sump so as to preserve the control building as a non-hazardous area.

10.9 A hose reel shall be located in the control building to facilitate the washing down of the pumps.

10.11 In certain circumstances it may be required to install a w c in the control building.

10.12 Provision shall be made for the installation of a key safe in the external wall of the control building as required by the ESB.

11. PUMP CONTROL PANEL

11.1 The pump operation (**duty/standby**) or (**duty/assist**) shall be controlled by means of an ultrasonic level controller with the transducer head mounted in a convenient location in the pump sump.

11.2 Pump cabling shall be PVC /SWA/PVC to **BS 6346.**

11 .3 Pump and control cables shall be terminated in enclosures to comply with **BS 5345** located in a minipillar adjacent to the sump.

11.4 Pump lock-stops shall also be located in this minipillar.

11.5 The control panel shall be a dust and damp-proof enclosure IP 54 as defined in **BS 5420,** wall mounted. The pump control equipment shall be to **BS 4941:** Parts 1,2,3 or 4 as appropriate.

11.6 **An integrated VSD pump control system may be required in certain circumstances.**

11.7 Control circuit drawings must be approved by Fingal County Council before the manufacture of the control panel. The control panel shall incorporate the following equipment as a minimum:

- Main interlocked isolator
- DOL or ASD Contactors and Overloads- Drives greater than 5 kW to have ASD starters
- Ammeters
- **Hours run meters**
- Run lights
- Trip lights
- Hand-off-Auto switches
- Duty select by ultrasonic unit (flip/flop)
- Reset buttons

- Moisture/Overheat indicators
- Ultrasonic control unit
- Voltmeter c/w select switch
- Main H.C.R.fuses
- Control fuses
- Low voltage transformer 240/24volt
- Anti condensation heater
- Phase Failure relay
- Generator connection /changeover facility

11.8 Power Factor equipment (correction to 0.95) to be located in separate enclosure fixed to the main control panel.

11.9 The power supply to the ultra sonic controller shall be fitted with a surge suppressor.

11.10 The telemetry equipment, ultrasonic controller and magnetic flowmeter display units shall be located in a separate enclosure fixed to the main control panel.

11.11 The panel(s) shall be complete with labeling, cable numbering and a circuit diagram.

11.11 A Completion Certificate shall be provided for the electrical installation.

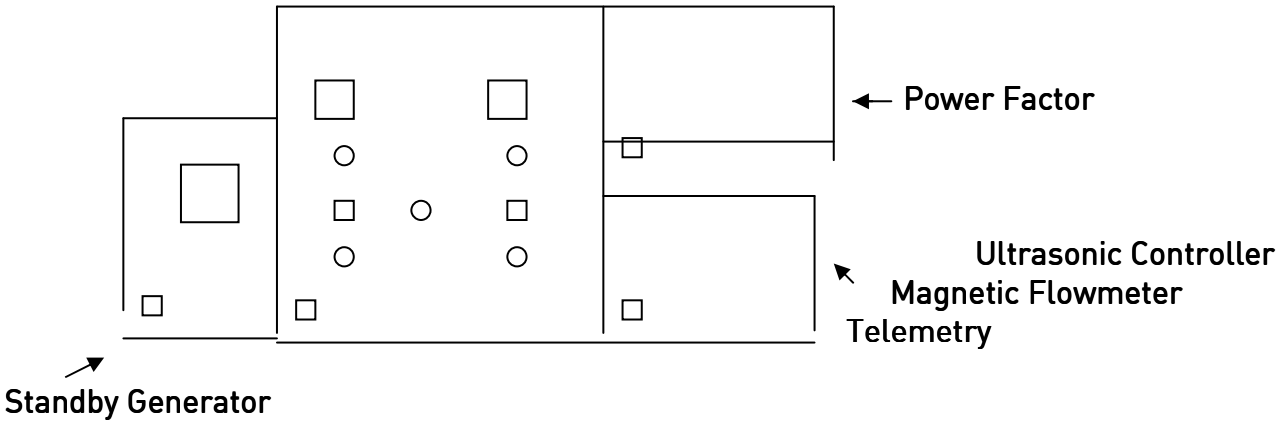
12. TELEMETRY

12.1 The telemetry enclosure shall be fitted with relays to give volt-free contacts for the following conditions:

1. Pump no.1 run
2. Pump no.2 run
3. Pump no.1 trip
4. Pump no.2 trip
5. Phase Failure
6. Pump no.1 overheat
7. Pump no.2 overheat
8. Pump no1 moisture
9. Pump no.2 moisture
10. Sump high level

12.2 Signals from the magnetic flowmeter shall be available at terminals in the telemetry enclosure.

TYPICAL CONTROL PANEL LAYOUT



13. REPLACEMENT PUMP

13.1 A replacement pump of equivalent specification to the duty pumps shall be supplied: