

6. DESIGN TO MINIMISE FOG IN NEW PUMPING STATIONS

6.1 Introduction

Relatively minor changes to design specifications could significantly reduce the likelihood of FOG deposition in newly constructed pumping stations. These are described in the following sections.

6.2 Wet well

6.2.1 Minimise 'dead zones'

Wet wells should be designed to minimise 'dead zones' and promote turbulence.

Experience has shown that wet well shape can be important, in particular:

- Circular wet wells are less prone to dead zones than square or rectangular wells.
- Deep and narrow wet wells provide more mixing and turbulence than shallow large diameter wells.

Clutter should be avoided, for example:

- Is there really a need to fix a ladder to the side of the wet well?
- Chains, cables etc. should be kept to a minimum.
- Dividing walls within the wet well should be avoided if at all possible.



Photograph 8 FOG and debris build up in a ‘dead zone’ caused by a combination of a square tank and cables

Every opportunity should be taken to use the force of the incoming flow to cause disturbance in the wet well and in doing so increase turbulence. For example:

- Baffles should be avoided if at all possible.
- If there are multiple incoming flows into the wet well they should outfall into the wet well separately and not join into one flow before the wet well. This will enable several inputs to stir up the wet well and increase the mixing effect.
- All incoming flows should be above the highest pump ‘on’ level, thereby avoiding backing up of flow in the incoming pipe.

6.2.2 Wet well floor

The wet well floor should be designed to be self cleansing during drain down. Awkward isolated areas should be avoided or given special attention to ensure that they don’t become sediment/FOG traps.

6.2.3 Mixing of wet well effluent

An automatic wet well flushing/mixing/cleaning system should be provided as part of the pumping regime. This may be a solenoid-operated flushing valve, hydraulically-actuated flushing valve or other device that stirs up the wet well prior to 'pump on'.

6.2.4 Access for wet well cleaning

Adequate access should be provided for the cleaning of covered wet wells. As required by confined space entry legislation all activities should be capable of being undertaken without the need to enter the confined spaces, unless man-entry can not be avoided.

6.3 Wet well level sensors

Ultrasonic level sensors should be used. The sensor beam should be a relatively narrow cone and be capable of being calibrated 'in situ' to avoid erroneous signal returns from features in the wet well, including accumulations of FOG and sediment.

6.4 Easy clean materials

Wherever possible easy clean materials/surfaces should be used, as previously explained in Section 5.5.

6.4.1 Pump 'on/off' levels

Consideration should be given to using a variable pump on/off level regime. This will reduce the rate at which FOG shelves build up, especially at the duty and storm 'pump on' levels.

6.5 Pumps

Sewage pumps should be able to cope with moderate levels of FOG and debris provided that this is not hard and settled into a mass. The recommendations made regarding minimising dead zones and avoidance of FOG shelves should significantly help to avoid this.

Pump impellers should be coated with a non-stick compound.

6.6 Two stage wet wells.

In some circumstances wet wells are an ideal location to settle out FOG and remove it from the flow. However, the presence of large quantities of FOG in the pump wet well can result in a variety of operational problems, as previously explained in Chapter 5.

An option may be to use a two stage wet well. The first wet well is used as a stilling tank to enable excess FOG, sediment and sewage debris to be removed from the flow. Flow then passes to a second/adjacent well for pumping.

Dual well pumping stations could be particularly useful in catchments where there is/likely to be a high FOG loading, for example town centre catchments or other catchments serving a concentration of hot food outlets. This will prevent fouling of the pumping station equipment and allow easy removal of the FOG and debris.

6.7 Rising mains

Rising mains should be designed to, amongst other aspects:

- Enable an adequate effluent velocity to avoid FOG settlement in the pipe.
- Avoid long retention times, thus reducing the likelihood of FOG settlement in the pipe.