

**Thames Water - Addendum to Sewers for Adoption 7<sup>th</sup> Edition July 2015.  
Sewers, Pumping Stations, & Products**

This addendum supplements and qualifies the nationally agreed Sewers for Adoption 7<sup>th</sup> Edition to reflect nuances in the adoption policies of Thames Water. It is intended to be of assistance to developers in clarifying areas that often lead to exchanges of correspondence or disputes on site which can incur both costs and delays.

## Information Required

Item	Paper Application	Online Application	Notes
	2 Paper Copies. (posted along with application)	PDF File Upload. (pdf's to be merged into one file)	
Developers programme, or list of key dates.			Sufficiently detailed to show construction phasing, occupation dates, and defects periods.
Location Plan	1:2500 (Minimum)	PDF scaled 1:2500 @ appropriate paper size	
Site Plan; <b>Spot levels related to OS Benchmark.</b> <b>Site boundary</b> <b>Site contours</b> <b>Roads</b> <b>Sewers and Lateral Drains</b> <b>Wastewater Treatment Plant</b> <b>Pumping Stations</b> <b>Rising Mains</b> <b>Road gullies/highway drains</b> <b>Watercourses</b> <b>Private drainage</b> <b>Flood Routing</b> <b>Proposed buildings</b> <b>Ground floor levels</b> <b>Storage/attenuation</b> <b>Outfalls/headwalls</b> <b>Borehole locations</b> <b>Flood Risk Assessment</b> <b>Contaminated land reports</b> <b>Existing trees and proposed landscaping</b>	1:500	PDF scaled 1:500 @ appropriate paper size	Site plans for straightforward sites can be shown on one drawing. More complex applications may require the information to be displayed on separate drawings.
Longitudinal Sections (Sewers and Rising Mains) showing; <b>Existing Levels</b>	1:500 Horizontal 1:100 Vertical	PDF scaled 1:500 Horizontal, and 1:100 Vertical @ appropriate paper size	

<b>Proposed cover and invert levels</b> <b>Pipe material</b> <b>Pipe Strength</b> <b>Pipe Diameters</b> <b>Bedding Classification and details</b> <b>Air valves and washouts</b> <b>Groundwater / watercourse levels</b>			
Structural Design of Buried Pipes (Low Stiffness Only); <b>Finite Element Analysis.</b> <b>Initial maximum ovality, and cover thickness details.</b>	FEA Output Design Statement		Can be included on proprietary layout drawing by specialist pipeline designer
Hydraulic Design Calculations; <b>Foul water</b> <b>Surface Water (including impermeable area plan)</b> <b>Design parameters used</b>	Paper copy of design		
Construction Details Showing: <b>Manholes</b> <b>Demarcation Chambers</b> <b>Pumping Stations</b> <b>Manhole schedules</b>			
Pumping Stations Information showing; General arrangement details Wet well capacity/storage/time to spill Rising main capacity Surge calculations Structural calculations & drawings Floatation check			
Estimated Value of Construction Work; Estimated Value of Pumping Stations and Rising Mains			

Statutory Consents; Discharge Consents Rights to lay pipes on third party land Permission of riparian owner Planning Consent Land Drainage Consent			
Details of Land Transfers and Ownership Solicitors Details Completed Model Agreement			

## **A5 Procedure**

Thames Water utilises the model agreement from SfA 6<sup>th</sup> edition until new arrangements come into force.

### **A1 (5) & B6 & C8 Design of low stiffness or shallow pipes**

Pipes with low stiffness require careful design and embedment to ensure they do not deform either during construction, or as a result of insufficient support from the backfill. The following requirement shall apply to all structured wall plastic pipes offered for adoption;

Any plastic pipes used for adoption must be kitemarked. In the absence of an accepted tabulated design process, design calculations in accordance with BS EN1295 or an accredited Finite Element Analysis, are required for each application. These calculations must clearly state the pipe stiffness, initial maximum ovality, soil conditions and embedment assumed, backfill specification & compaction requirements.

The information above shall be recorded on the layout drawings, so that any deviation from these can be readily checked and appropriate action taken during installation. (NB the installation should be stopped if the site circumstances are worse than those set out in the design).

Buoyancy calculations shall assume that groundwater is at ground level and the pipe is empty. The calculated short (1 year) and long term (50 year) deflections must be within limits acceptable to the highway authority or landowner within whose land the pipe is to be sited.

## **E7.3 Testing**

### All Pipeline Types

All pipelines are to be tested by the developer as construction progresses, and in line with SfA 7th Edition.

### Additional Testing - Plastic Pipelines

The nature of Thames Water's sewerage system (predominantly separate foul and surface water systems) and the high groundwater that can easily arise in the geology in our region makes us particularly vulnerable to leaks in foul sewers leading to groundwater infiltration, or the potential for contaminated groundwater entering surface water sewers. The Environment Agency has recently strengthened its policy in dealing with the pollution that arises when sewer become overwhelmed by groundwater and overflow. Thames Water has experienced such groundwater leakage arising from plastic pipes that had become damaged by jetting undertaken by developers.

Therefore, Thames Water requires any plastic pipes to be subjected to an air test as part of the final inspection to verify that they have not been damaged while under the developers control, irrespective of any earlier testing that may have been done. (NB this requirement does not include fittings such as inspection chambers and junctions where these comprise less than 25% of the length). Developers shall carryout the air testing during the final inspection with TWUL as witness.

Developers are recommended to consider the selection of non-polymeric components in locations where the air testing requirements will be hard to achieve during final inspection, or in areas where the rectification of jetting damage will be costly to access and repair. Adoptions Engineers, may stipulate the use of rigid materials where no suitable method of air-testing is available for review during the adoptions application.

#### Additional Testing - Low Stiffness Pipes (ie structured wall plastic pipelines)

At the completion of construction, structured wall plastic pipelines will be subject to either;

- i) A light ring & CCTV survey, or;
- ii) An appropriate Inspection and Quality Assurance certification scheme administered by the manufacturer;

to confirm that any deformation of the pipework is within the acceptable limits identified in the design. Developers shall issue the survey or manufacturers certificate to Thames Water prior to the end of the maintenance period. See also (A1 (5) & B6 & C8 - Design of low stiffness or shallow pipes, earlier in this addendum).

#### **Figure B15 Typical backdrop detail**

SFA7 indicates that the type of backdrop should be agreed with the undertaker. In general Thames Water has no preference between vertical and ramped external backdrops. Internal backdrops are not acceptable.

Rodding eyes should be left open and not be fitted with screw caps

#### **B3 (1) 13 & B6 (6) & C3 (1) 13 & C8 (6) Tree root resistant pipes.**

An appropriate barrier to roots is deemed to be either:

- a pipe with no joints in the high risk zone approximated by the mature tree canopy limits,
- a pipe suitably lined post installation,

- a welded pipe or a pipe with a 50 year joint contact stress exceeding  $1.5\text{N/mm}^2$

Note: Geotextiles, shrink wrap, amalgamating tape or copper inserts are not deemed acceptable means of providing root resistance.

#### B4 (5) Connection Method

Where the point of connection is an existing manhole the following shall apply;

1. Existing polymeric manhole
  - a. New connection shall be made using an existing spare connection, or where this is not possible;
  - b. New connection shall be made by modifying the manhole to the manufacturers recommendations, or where this is not possible;
  - c. New connection shall be made by replacing the manhole with a new manhole to SFA 7.
2. Existing rigid manhole
  - a. The manhole shall be suitably modified to accommodate the new connection and the completed manhole shall comply with SFA7.
  - b. The manhole shall be replaced with a new manhole to SFA7.

#### **B4 (6) & (8) Connections**

Refer to guidance supplied with the relevant Consent to Connect letter for details on specific requirements.

#### **C5.1 Hydraulic design.**

For small areas with less than  $4000\text{m}^2$  of impermeable surface, Thames Water expects developers to produce a peak flow surface water design using a constant rate rainfall approach (50mm/hr) as recommended in BSEN752 NA 4.2.2. Whilst it is acceptable to use this approach on larger sites it is acknowledged that a more economic drainage design is likely to be achieved using a more complex method such as a computer simulation model.

#### **C7 Flow Attenuation for surface water systems**

Due to the unreliability of operation associated with small orifice flow control structures, developers are encouraged to provide storage and flow control in a small number of locations of greater size rather than many small ones. This will enable static control structures such as HydroBrakes, Hydro Valve Slider or simple orifice plates with clear openings of 150mm or more, to be used.

Where the flow control device would have a clear pathway of less than 150mm diameter, the system shall incorporate a self clearing throttle slide valve with sufficient space to maintain it in its chamber. An accepted product is: APA Abwassertechnik Float Slide Throttle Valve, available from First Water or Hydro Valve Slider by JFC plastics Ltds. Other products offering equivalent functionality may be acceptable but will require appraisal.

Where storage systems are provided as part of an adoptable sewer where these should comprise either:

- Large diameter pipes or culverts
- Concrete tanks
- SUDS (where approved by Thames Water)

Thames Water will not adopt geocellular structures, balancing ponds or swales of any type but may allow them to be constructed privately offline and communicate with the adoptable sewers but not be put forward for adoption. Where such features are incorporated as part of a drainage design for a site, the developer should arrange for the Local Authority, the SUDS Adopting body or a properly constituted management company to maintain them.

### **D3 (1) Pumping stations**

When considering different sewerage options, developers should consider possibility of requisitioning a gravity sewer or other gravity options.

Any new pump station will need to comply with DSEAR regulations and provide a full assessment report prior to vesting. BRE are aware of the typical requirements of the Water Industry however other companies may be used.

#### **D4.2.3 Site Access by Tanker**

Tanker access shall be provided at each pumping station in accordance with the table below;

## Sewage Treatment Works

### Indicative Tanker Access Information (To inform site design)

All completed works will be subject to a tanker loading trial by TWUL prior to acceptance

STW Size & Load Requirement		Tanker Selection for Site				
Site Size (PE)	Removal Capacity (m3)	No of Wheels	Bed	Capacity	Width (m)	Length (m)
<25	10	6 (4 with waiver)	Rigid	18,000l	2.5	8.5 (7.5 with waiver)
50	10	6 (4 with waiver)	Rigid	18,000l	2.5	8.5 (7.5 with waiver)
100	18	6	Rigid	18,000l	2.5	8.5
150	18	6	Rigid	18,000l	2.5	8.5
200	18	8	Rigid	22,000l	2.5	9.5
>250	30	12	Art		2.5	16

STW Size & Load Requirement		Road Dimensions		Parking Space Size**	
Site Size (PE)	Removal Capacity (m3)	Min Width*	Min Radius	Width (m)	Length (m)
<25	10	3	9	4	10 (8 with waiver)
50	10	3	9	4	10 (8 with waiver)
100	18	3	10	4	10
150	18	3	10	4	10
200	18	3	10	4	11
>250	30	3	15	4	18

\*\* Additional requirements apply. Parking must not obstruct other access rights, create a nuisance for other users, and comply with H&S regulations.

Sites which can only be accessed by 4 wheel tanker, or require any special access provisions (such as additional supervision, traffic controls, etc) will generally not be acceptable unless a specific TWUL waiver is obtained.

Site access from the nearest Public Highway shall be designed; in accordance with HSG136; and avoid reversing; and be in accordance with the following hierarchy;

- 1) Vehicles shall be able to enter site facing forward, navigate the site by means of a designated one-way 'traffic route', and leave the site facing forward, or if this is not possible;
- 2) Vehicles shall be able to enter the site facing forward, navigate the site by means of a designated 'traffic route', and turn at either a 'banjo' or 'hammerhead' specifically provided for vehicle manoeuvring, or if this is not possible;
- 3) Vehicles shall be able to enter and exit the site via different gates to remove the need for turning onsite.

The need for using reverse gears on third party land, or Public Highways shall be avoided as the requirements for segregated routes for pedestrians are difficult to meet. Reversing routes greater than 2.5 vehicle lengths are not acceptable unless entirely within TWUL owned land, and pedestrians are appropriately segregated from the traffic route, and designated pedestrian crossings are provided where necessary.

Access to the curtilage of the STW shall be via public highway, TWUL owned road, or provided via an easement to pass over private land. Where access is via an easement, the maintenance obligations for the right of way are to be

clearly defined in the corresponding title deeds. Access is required 24hrs / 356 days per year. The right to remove trees and other obstructions are to be clearly set-out in the easement. The Owner should approach TWUL early in the adoptions process if access is to be provided via an easement over private land.

Access to site by maintenance vehicles, or road tanker shall not require; any special permissions, permits, temporary signals, prior parking restrictions, to be sought, or any notice to be given to land owners.

Appropriate visibility splays shall be provided at junctions / bends to ensure safe access.

Parking spaces for TWUL vehicles shall not straddle and / or restrict any public or private right of way. Parking points should be appropriately designed, and arranged to maintain the relevant accesses at all times.

Vehicle / tanker parking point are to be sited within or directly adjacent to the curtilage of the STW. Severe long-term issues can arise for operations and maintenance staff if suitable access is not available. If the tanker loading point is not located within a fenced compound, then a legal means of preventing nuisance parking (ie land to be transferred to TWUL, or protected by an easement, or suitable restrictive covenant) will be required to allow the adoption to progress.

In rare cases where reversing cannot be avoided, the Owner shall contact the Undertaker for guidance. The Undertaker may require widened access routes, signage, line marking, segregation measures, fixed mirrors, CCTV provisions, etc. to ensure practical and safe operation of the site prior to adoption.

## **D5 Rising Mains**

Where developers are providing rising mains all materials covered by European Standards deeming them suitable for sewerage applications, are acceptable. However polyethylene PE100 SDR11 is our preferred rising material and class.

The minimum rising main size of 80mm bore stated in D5.2 (1) is limited to locations where all the following conditions apply:

1. The station serves a catchment where both foul and surface water public sewerage will exist and serve all the properties contributing to the pumping station. [Such catchments have a low risk of becoming combined sewers due to unpredicted surface water connections.]
2. The upstream catchment is topographically limited such that further development within it is not feasible. [This avoids the risk of the pumping station being overwhelmed by reasonably foreseeable growth.]
3. There are no other pumping stations feeding or planned to feed into the catchment of the pumping station. [So there is no possibility that they may pump more in than the rising main can practicably convey out]

4. The main is reasonably straight between potential access points. [So that a CCTV camera can pass along it]
5. The access points (hatch boxes, air valves, washouts and ends) are no more than 100m. apart. [So that the camera has traction or can be pushed on rods]

### **D5.2 (2) Rising mains & Macerator pumps.**

Macerator pumps will only be acceptable where there are at most two properties connected to it and all conditions 1-5 above apply.

Where macerator pumps are used, then the rising main size may be reduced to 50mm bore up to 100m long, continuously rising without air valves and reasonably straight where drain rods can be used (note 50mm is deemed too small to jet).

For all other circumstances the minimum bore diameter should be 100mm and the required maximum spacing of access points may be increased to 500m.

### **E1.6 Safety in Sewers**

Developers or their contractors must not physically enter sewers (including manholes) without first obtaining our authority. The approval of a connection under Section 106 of the Water Industry Act 1991 is deemed to be sufficient approval for the purpose of making the connection.

Opening manhole or inspection chambers for the purposes of survey, inspection or maintenance by the developer, within the developers site is permitted.

### **E2.22 Thermoplastic Structured Wall Pipes and Manholes**

We will only accept WRC approved thermoplastic products. Thermoplastic manholes may be used on manholes up to Class 2. Thermoplastic Class 1 manholes may not be used unless agreed otherwise with Thames Water. Please see table for standard approved thermoplastic products below. Any products not listed below will require full assessment prior to approval. You will be required to provide full technical specifications and calculations as part of your submission for non standard approved thermoplastic products.

<b>Pipe product</b>	<b>Conditions for use</b>
AquaSpira	See design of low stiffness pipes below. Compaction of sidefill to be verified on site. Sizes 600mm. – 2250mm.
Asset Weholite	See design of low stiffness pipes below. Compaction of sidefill to be verified on site. Sizes 600mm or greater. As tank sewers (foul & combined & surface?)

RidgiStorm XL	See design of low stiffness pipes below. Compaction of sidefill to be verified on site. Sizes 750mm to 3000mm. As tank sewers (foul & combined & surface?)
Pipex Manholes	Buoyancy calculation to be provided with groundwater assumed at ground level. Compaction of sidefill to be verified on site. Maximum 225mm sewer channel in base of manhole (unless agreed otherwise with Thames Water)

### **E2.32 Manhole Covers & Frames**

Research has identified serious issues with the leak tightness of manhole covers. In foul water only catchments this can lead to unacceptably high levels of surface water ingress. Accordingly Thames Water has worked with its Framework suppliers to develop covers with enhanced leak tightness for use in foul sewer applications. Such “Low Leak” covers are now available through the Framework Agreement and shall be used on all “foul sewer only” catchments.

- i) Minimum clear opening for covers and frames for man-entry chambers shall be;
  - Sewer Diameter less than 1075mm – 600 x 600mm clear opening.
  - Sewer Diameter more than 1075mm – 675 x 675mm clear opening.

### **E2.36 Handrails and Balusters & E2.37 Ladders**

Stairways, Ladders and Handrails (including Access Platforms and Ramps) shall comply with EEMUA Publication 105. Handrail standards shall be tubular galvanised steel, with tubular hand-railing. Designs should be presented to TWUL prior to construction for comment.

Ladders in manholes shall be galvanised mild steel.

### **E2.42 Access Covers for Pumping Stations**

Pumping Station covers shall be selected from the following table;

#### Typical TWUL Manhole Cover Requirements

Chamber Type	Low Vandalism Risk Location*		High Vandalism Risk Location*	
	Standard Cover	Techno' or similar**	Standard Cover	Techno' or similar**
<b>Upstream Network</b>				
Foul Water Manhole	Min 600x600 BS EN 124 & BS7903 E2.32 & SFA 7th Ed. B125 to D400 to suit location.	only where specified by TWUL	only where specified by TWUL	SHH1/4/XX-XX*/Y*/G1W
<b>Sewage Treatment Works</b>				
Influent Sample Point	Not allowed	SHH1/WW/3/XX-XX*/Y*/G1W	Not allowed	SHH1/4/XX-XX*/Y*/G1W
Process Tank (such as Humus or Septic)	Not allowed	SHH1/WW/3/XX-XX*/Y*/G1W	Not allowed	SHH1/4/XX-XX*/Y*/G1W
Final Effluent Sample Point	Not allowed	SHH1/WW/3/XX-XX*/Y*/G1W	Not allowed	SHH1/4/XX-XX*/Y*/G1W
Outfall Demarcation Chamber	Min 600x600 BS EN 124 & BS7903 E2.32. B125 to D400 to suit location.	only where specified by TWUL	only where specified by TWUL	SHH1/4/XX-XX*/Y*/G1
Electrical / Pipework / Valve Chamber	only where specified by TWUL	SHH1/DW/3/XX-XX*/X*/G1	only where specified by TWUL	SHH1/4/XX-XX*/Y*/G1
<b>Pumping Stations</b>				
Electrical / Pipework / Valve Chamber	Not allowed	SHH1/DW/3/XX-XX*/X*/G1	Not allowed	SHH1/4/XX-XX*/Y*/G1
Pumping Station - Wet Well	Not allowed	SHH1/WW/3/XX-XX*/Y*/G1W	Not allowed	SHH1/4/XX-XX*/Y*/G1W

Notes:

\* refer to site risk assessment for details.

Y\* Load ratings to suit exposure / location. Substitute Y with appropriate load rating code.

XX-XX\* Size code to suit clear opening. Substitute XX-XX with the appropriate size code.

\*\* Technocover or similar approved

Cover sizes to suit Sewers for Adoption 7th Edition.

### E5.5.3 Pipe jointing generally

Sewers for Adoption references WIS 4-32-08 as the specification for welding polyethylene pipes. Clause 3.5.8 of this WIS allows for the internal bead to be removed if required, Thames Water confirms that for all sewerage applications, it requires that polyethylene butt fusion welds shall be both internally and externally de-beaded.

### E6.4 Precast Concrete Manholes, Chambers and Wet Well

In general Sewers for Adoption defines the acceptability of products using compliance with National or European Standards. It is natural for such standards to lag behind technological development of new product types and materials. The following is a list of additional products, for which standards are awaited, that have been appraised and are acceptable. Other products will be added to the list after appraisals have been undertaken and some may be removed as standards are extended to include them or performance experience causes their suitability to be re-assessed.

Manhole product	Conditions for use
Easibase	Buoyancy calculation to be provided with groundwater assumed at ground level.
Perfect	Buoyancy calculation to be provided with groundwater assumed at ground level.
Kjilstra	Buoyancy calculation to be provided with groundwater assumed at ground level.

## **Pumping Stations Addendum**

### ***Framework Agreements***

*Thames Water has established a number of technical standards for its own work and has set up Framework Agreement purchasing arrangements for the supply of products and services (e.g. pump/motor sets, valves, pipework, control panels and telemetry outstations) in accordance with these standards and at competitive rates. Developers may wish to take advantage of the technical standardisation and discounted prices that may apply and are welcome to discuss such arrangements.*

*It should be noted that there is no obligation on Developers to use Thames Water's Framework Agreements, however, should the use of such Framework Agreements prove attractive, then a list of the current framework suppliers is available from the Service Desk.*

*The telephone number of Thames Water Service Desk is 0118 959 3666*

**Figure D4.** Provision for over pumping is required.

### **D4.3 Fencing and security**

If a steel fence is proposed, it shall be galvanized welded mesh security fencing suitably coloured.

Fencing shall be effective in preventing unauthorised access to the works. If there is evidence that the fencing is being defeated, then the fencing should be upgraded. The Designer of the works shall assess the risks, and specify appropriate security equipment. New fencing or brick walls will require a specific design for each site to suit the location, exposure, ground conditions, and site history.

All equipment within the site shall be tamperproof – ie either tools, or keys must be required to open or uncover any plant item which could present a hazard to trespassers.

2.4.3.7 - Fencing in high risk areas, shall be galvanized steel welded mesh. Chain link or palisade fencing is a suitable alternative in low risk areas only. Timber fencing should be avoided, unless required by planning or conservation, and is not acceptable in high risk locations. Other forms of enclosure may be acceptable if mandated by planning or heritage authorities, providing the enclosure will be durable, and effective in preventing access (local stone walls, clay bricks, flint etc).

Fencing shall be free of vegetation, and debris.

Suitable padlocks to TWUL specification are to be supplied at the Owners expense.

**D 6.5** A 25mm tapped boss, plugged, shall be provided on the crown of the riser pipe of each pump in the valve chamber upstream of the isolation valve

of each pump riser to allow the future installation of pressure monitoring equipment.

**D6.6** All new foul sewage pumping stations with forward flows greater than 10 l/s, shall be fitted with this on a straight piece of the rising main at least 10 times the pipe diameter from any fittings close to the pumping station.

**D6.9** Thames Water has standardised on the Reid ADV500 davit for lifting up to 350kg at 800-1300mm radius, one or two sockets as appropriate, 65mm dia and 240mm deep, they shall be cast flush into the cover slab and a davit shall be supplied.

For lifting over 350kg a fixed gantry shall be provided and for depths greater than 5 metres and weights over 0.5 tonnes a power lifting system shall be provided.

Proof load test certificates are required including a site test for sockets.

**D6.11.8** The Developer should seek advice from Thames Water on expected vandalism levels.

**D6.12.2** The plinth shall also incorporate a cross fall of 1:250 back to front to prevent ponding.

## **Sewers**

Domestic foul only sewers shall be classified as zone 2. Surface water (or combined surface and domestic foul) sewers shall be classified as zone 2 if there are less than 20 petrol stations in the catchment otherwise they shall be classified as zone 1 with a 2m radius zone 2 bubbles around open manholes and vents based on table below.

**Table: Zone Extents for Zone 1 Surface/Combined Sewer Vents**

Vent Diameter	50mm	80mm	100mm	250mm
	Zone 2 Hazard Radius			
High Level (more than 5m above ground)	0.2m	0.4m	0.5m	1.5m
Low Level (less than 5m above ground)	0.3m	0.5m	0.7m	1.7m

## **Sewage Pumping Stations**

Domestic foul only pumping stations shall be classified as zone 2 unless open topped or covered and with greater than 15m<sup>3</sup> headspace then these can be classified as non hazardous. Surface water (or combined surface water and domestic foul) pumping stations shall be classified as zone 2 if there are less than 20 petrol stations in the catchment otherwise they shall be classified as zone 1 with zone 2 bubbles around openings based on table below.

**Table: Hazard Distances from Openings in Zone 1 Surface/Combined Wet Wells**

Covered Surface Area		Wet Well Ventilation (less than 3ACH min. 1ACH)	Wet Well Ventilation (less than 1ACH)
2.5m <sup>2</sup>	Zone 2 hazard radius =	0.3m	0.5m
3.5m <sup>2</sup>	Zone 2 hazard radius =	0.4m	0.6m
4.5m <sup>2</sup>	Zone 2 hazard radius =	0.4m	0.7m
5.7m <sup>2</sup>	Zone 2 hazard radius =	0.4m	0.7m
7.1m <sup>2</sup>	Zone 2 hazard radius =	0.5m	0.8m
10.5m <sup>2</sup>	Zone 2 hazard radius =	0.6m	0.9m
12.6m <sup>2</sup>	Zone 2 hazard radius =	0.6m	1.0m
15m <sup>2</sup>	Zone 2 hazard radius =	0.7m	1.1m
20m <sup>2</sup>	Zone 2 hazard radius =	0.8m	1.2m
80m <sup>2</sup>	Zone 2 hazard radius =	1.0m	2.5m
120m <sup>2</sup>	Zone 2 hazard radius =	1.0m	3.2m
150m <sup>2</sup>	Zone 2 hazard radius =	1.0m	3.6m
200m <sup>2</sup>	Zone 2 hazard radius =	1.0m	4.2m

**Note:** The term 'covered surface area' relates to the enclosed liquid surface area within the wet well and not to the surface area of any associated structures such as a manhole cover or wet well roof. Surface areas under 15m<sup>2</sup> are for standard pre-cast concrete rings.

**F1.2.** In addition to the specified information identified in SFA7 Thames Water requires one electronic copy of the Health & Safety File, in accordance with the Construction Design & Management Regulations and Operation Maintenance Manual in the form of three hard and one electronic copies."

Thames Water have developed a standard template for a CDM Health & Safety File which can be provided if required to assist in the production of the CDM H&S Files ([www.hse.gov.uk/construction/cdm.htm](http://www.hse.gov.uk/construction/cdm.htm) or [www.legislation.gov.uk/ukxi/2007/320/contents/made](http://www.legislation.gov.uk/ukxi/2007/320/contents/made))

The Operation and Maintenance Manual shall contain record drawings, wiring diagrams, pump details and one copy of each of the following:

- a) For the Control Panel - The signed Declaration of Conformity with the Low Voltage and Electromagnetic Compatibility Directives stating the standards against which the control panel was built and tested.
- b) For the Electrical Installation - The completed Electrical Installation Certificate.
- c) Site Documentation - The contractor shall fill in the appropriate proforma with pump data and panel data as required by the Thames Water Engineer.

## **F2.2 Performance Requirements**

To accommodate the possibility of a control system failure, the pump shall be capable of operation at snore level every 6 to 8 hours for at least 30 seconds without damage.

### **F2.3.10 Motors**

Where the motor is to be driven by a variable speed drive it shall be derated such that its temperature rise is within Class B limits at its lowest operating speed corresponding to minimum flow rate. It shall not exceed Class B temperature limits when operated at any speed in a dry well or partially submerged configuration.

### **F2.3.14 Pump Unit Lifting**

The contractor shall liaise with local operations to determine whether chains or lifting location system are used.

### **F3.3.6 Control Panel**

Pushbuttons shall be coloured as follows:

RESET - Blue

OPEN or STOP or EMERGENCY STOP – Red

CLOSE or START – Green

ALARM ACCEPT – Yellow

OTHERS – Blue

Indicators shall be suitable for 110V supply and shall incorporate high intensity LED's to provide extended lamp life, they shall have a front removable lamp offering a degree of protection to IP2X and coloured lenses as follows:

AVAILABLE - White

TRIPPED – Yellow

SUPPLY ON or CLOSED or RUNNING - White

SUPPLY OFF or Opened or STOPPED – Green

DANGER – Red

OTHER - Blue

### **F3.3.7 Generator Connection**

Connection for a standby generator shall be of the Marechal appliance inlet type, and shall be provided complete with cap and mating in-line connector.

The Distribution Board shall comprise a minimum of 5 MCB's rated and labelled for the following duties:

- 1 - Building/Kiosk AntiCondensation Heating
- 2 - Building/Kiosk Lighting
- 3 - Building/Kiosk Socket Outlet
- 4 - Telemetry Outstation
- 5 - Spare

All 5 circuits shall be wired to outgoing terminals

An emergency stop pushbutton shall be provided on the control panel door for each starter, the emergency stop pushbutton shall be 40mm diameter, mushroom head, pushes to OFF, latching with quarter turn or pull to release.

The pumps shall be controlled by the Ultrasonic level controller as primary control with float switches for backup control and alarming using float switches.

The mode of operation of primary control and backup Float Switches shall be as follows:-

- a) Six level set points shall be recognised, four (level 1, level 2, level 3, level 4) monitored for control only by the ultrasonic level detector head.
- b) The fifth (level 5 - high level) monitored for hardwire backup control and remote alarm by the first float switch.
- c) The sixth (level 6 - high high level) monitored for remote alarm only by the second (Red) float switch

Control via primary control output relays

level rising through level 1 - (Duty/Standby Pump Inhibit) no action

level rising through level 2 - (Duty/Standby Pump Stop) no action

level rising through level 3 - (Duty Start) start duty pump

level rising through level 4 - (Standby Start) stop duty pump and start standby pump

level falling through level 4 - no action

level falling through level 3 - no action

level falling through level 2 - stop duty pump if duty pump running or stop standby pump if standby pump running

level falling through level 1 - inhibit both pumps

The ultrasonic level control unit shall be programmed in such a way as to equalise the run time of the two pumps and allow one of the pumps (pump no.1) to overrun down to level 1 once per week.

Under ultrasonic level control, the duty pump shall alternate between pump no.1 and pump no.2.

Under hardwire backup control the duty pump shall always be pump no.1 unless the pump is not available/failed then it shall revert to pump No.2.

Control via first float switch hardwire backup interface relays

Level rising through level 5 start duty pump and initiate a telemetry alarm A1.

The start command derived from the first float switch shall override any inhibit command derived from the ultrasonic level control unit.

Level remaining above level 5 - stop duty pump and start standby pump after preset time delay T1 (default setting 30 seconds)

Level falling through level 5 - after preset time delay T2 (default setting 60 seconds) stop duty pump if duty pump running or stop standby pump if standby pump running and cancel remote alarm A1

## Float Switches

All float switches must use a IS barrier to comply with DSEAR.

The certification for EEX rated equipment must be produced upon adoption and included in the Operation and Maintenance Manuals.