# Specification for

# Small Wastewater Treatment Works (WwTW)

# for Adoption by NI Water

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## 1. INTRODUCTION

This Specification provides a Developer with NI Water's requirements for a Wastewater Treatment Works (WwTW) to service developments up to 249 Population Equivalent (PE) where NI Water shall then adopt the WwTW under Article 161 of the Water and Sewerage Service (Northern Ireland) Order 2006 (as amended Water and Sewerage Services Act (Northern Ireland) 2016).

The provision of a WwTW shall only be considered where a gravity or pumped solution to an existing NI Water Waste Water Treatment Works catchment is not feasible or available.

The Specification is for use by Developers who are required to construct a WwTW in association with and to service all or part of the sewerage system where an Article 161 Approval is to be issued for new developments under the Water and Sewerage Services (Northern Ireland) Order 2006 (as amended Water and Sewerage Services Act (Northern Ireland) 2016). If the development is later found to exceed the 249PE threshold the WwTW will not be accepted for NI Water adoption under this process.

WwTW for developments for 250PE and above shall require separate consultation between Developers and NI Water.
NI Water will only adopt a separate sewerage system serving the development: i.e. wastewater flows only, with a separate system collecting storm water for separate discharge direct to the environment. No storm water flows shall be connected into the development foul sewerage system.

Any queries relating to the requirements contained in this document shall be directed to the appropriate NI Water Developer Services team at developersevices@niwater.com

## 2. STATUTORY CONSENTS

The Developer shall obtain the required consents applicable to the construction of a WwTW including:

- Planning Service approval to construct a WwTW;
- Northern Ireland Environmental Agency (NIEA). Water Order Consent (WOC): to discharge to a receiving watercourse for the treated wastewater from the proposed WwTW from the development.
- Rivers Agency for Consent to discharge stormwater and treated effluent to a watercourse.

Approvals may also be required from:

- Utilities (e.g. electricity and water connections)
- Local Council Building Control and Environmental health.
- DfI Roads

### 2.1 Planning Approval

All new WwTWs require planning permission; the Developer shall submit a planning application including environmental review to Local Planning Authority.

The planning application may identify potential environmental impacts, including but not limited to: visual, noise, odour, traffic and the mitigating measures proposed.

An odour assessment and, if necessary, proposed mitigation measures to achieve Target Odour Standards may be necessary in the environmental review, to inform the Planning Service decision.

### 2.2 NIEA Consent - Water Order Consent Application

Prior to any technical submission to NI Water the developer must provide evidence of Water Order Consent to discharge.

Under the Water (Northern Ireland) Order 1999, the consent of NIEA is required for discharges to a receiving watercourse. NIEA shall issue, if appropriate, a Water Order Consent (WOC): a Discharge Standard for quantity and concentration of pollutants for discharge to a receiving watercourse. These are normally stated in measures of effluent discharged and of final effluent in terms of flow, Biological/Chemical Oxygen Demand (BOD/COD), Suspended Solids (SS) and potentially Ammonia ($NH_3$). In circumstances whereby NIEA determine an agglomerated catchment, more stringent effluent quality standards may be applied by NIEA, such as phosphorus and bacterial reduction.

The Developer shall confirm the total number of dwellings to be served and the associated population. Following identification of discharge point(s) a Water Order Consent “pre-app” is prepared and forwarded by the Developer to NIEA: who shall issue design standards for the WwTW. The receipt of design standards does not constitute a full Water Order Consent (WOC). To obtain a Full WOC a further full application must be submitted to NIEA.

Six months prior to WwTW commissioning a full WOC application is forwarded to NIEA by the Developer: NIEA will issue a full Water Order Consent.

### 2.3 Small WwTWs

Where the future projected population equivalent is < 250PE NIEA shall normally offer a Descriptive Standard but require service level discharge standards to determine the level of treatment required for the new WwTW to ensure protection of the receiving watercourse.

In circumstances whereby NIEA determine an agglomerated catchment, where there total catchment PE equals or exceeds 250 (ie the sum of any NI Water WwTW in the catchment plus the proposed developer WwTW), a numeric standard will be applied by NIEA and may include more stringent effluent quality standards, such as phosphorus and bacterial reduction, in addition to the sanitary parameters of BOD, SS and NH3.

Once the WwTW has been commissioned the Developer will be required to submit commissioning data to meet the requirements of NIEA to establish compliance with the service level Standards set out in the WOC.

Note that other statutory requirements are also required, see section 7.4.5 for details.

### 2.4 Rivers Agency

All watercourses and culverts are the responsibility of Department for Infrastructure (DfI) Rivers Agency and the Developer shall adhere to the following requirements:

- Works affecting any watercourse shall be subject to DfI Rivers Agency Approval and the Developer shall obtain a Schedule 6 approval.

## 3. NI WATER DESIGN CRITERIA

The flows to the WwTW shall be calculated using the formula listed below:

**Table 3 NI Water Design Criteria**

| | |
|---|---|
| Dry Weather Flow (DWF) (m3/day) | PG + I + E |
| Flow to Full Treatment: FFT(m3/day) | 3PG + I + 3E |
| Formula A (m3/day) | DWF + $1.36P_C$ + 2E + $2P_SG$ (m3/day) |
| Ps is the population served by a separate sewerage system<br>Pc is the population served by a combined sewerage system; equals 0 for new development.<br>Where the sewerage system is 100% separate Formula A = FFT<br>The WwTW shall treat FFT: the septic tank primary zone does not require stormwater storage.<br>NIEA may offer a condition requiring emergency storage: 2 hours at FFT: which shall be included in the septic tank primary settlement zone. | |

The WwTW shall be designed to treat:

- Flow to Full Treatment;
- The population served: P, is typically based on ward census data occupancy rate of X person per property (or 3.5 person per property if data unavailable);
- Daily water Consumption, G, 145 litres / head / day
- Infiltration (I) 40litres/head/day
- Biological Oxygen Demand loading 60 grams / head / day
- Suspended Solids 75 grams / head / day
- Ammonia 8 grams / head / day
- Trade Effluent (E) head / day
- NIEA Water Order Consent: The solution to be constructed is determined by the design standards issued by NIEA in response to the “pre-app”.

The population and flows shall populate the WOC Pre-app. The Grid co-ordinates of the discharge point to the receiving watercourse shall also be detailed.

The parameters for the design of the WWTW unit will be determined by the design standards issued by NIEA. The NIEA design standards shall stipulate conditions including: service level Discharge Standards (quantity of discharge, concentration of pollutants), works operation and maintenance schedule, sampling, flow recording, requirement for emergency storage and overflow and provision of telemetry to enable remote monitoring.

It is required that Developers address allof the following when undertaking the design.

- Requirement for emergency overflow or storage (detailed in WOC)
- Provision of telemetry to enable remote monitoring (detailed in WOC)

- Civil structures, such as Sample chamber, location & access of plant, site works and access to site, boundary demarcation and water supply

- Mechanical Electrical Instrumentation Control Automation & Telemetry (MEICAT) elements required to provide the WwTW in accordance with applicable Water Order Consent (WOC), Standards and Specifications.

- Power supply to the site

- As a part of the Article 161 process there is a requirement to obtain Consent to Discharge for storm water to a watercourse from Rivers Agency. (RA)

- Access arrangements

Details of all these issues will need to in place when making application under Article 161 of the Water and Sewerage Service (Northern Ireland) Order 2006 (as amended Water and Sewerage Services Act (Northern Ireland) 2016). Failure to do so will result in the application being returned.

The necessary application form can be downloaded from Sewers - Northern Ireland Water (niwater.com)

The Developer shall be responsible for the design of all civil, architectural, structural, process, hydraulic, MEICAT and Health & Safety elements required to provide the WwTW in accordance with applicable Water Order Consent (WOC), Standards and Specifications and Regulations.

*NI Water's acceptance of any documentation does not relieve the Developer of responsibility for his design, if any of the accepted documentation is subsequently found to be incorrect in any regard*.

### 3.1 Design Information to be Submitted – with Article 161 application.

The following information must be submitted: (If not included your application will be returned)

- A copy of the Planning Approval issued by Planning Service for the proposed WwTW;
- A copy of the "Pre-App" design standards offered by NIEA: both for the wastewater discharge;
- A copy of the Schedule 6 approval offered by Rivers Agency;
- Any other consents issued to the Developer;

Details and drawings of the proposed wastewater treatment works including, but not limited to:

- Drawing outlining area to be transferred to NI Water- lands transfer map;
- Arrangement for access to Discharge point;
- A 12 figure grid reference indicating the location of the antenna on of the proposed WwTW site: for telemetry path profiling;

- Detailed site layout including discharge points, scale 1:20;
- Overall site plan showing access arrangement;
- Hydraulic profile through the WwTW, and to the discharge point to Ordnance Datum (Belfast);
- Emergency storage and overflow arrangement including overflow screening;
- Supporting calculations for sizing the plant;
- Construction details of the proposed WwTW: inlet chamber with static screened overflow, sample chamber, flow meter chamber, outlet chamber, discharge headwall structure, manholes, site drainage and lighting, access to plant, site works, access to site, boundary demarcation and water supply;
- Location of all existing underground and overhead services;
- Written confirmation from Rivers Agency whether or not the proposed WwTW is located within a flood plain;
- Confirmation from the electricity service provider of availability of power to supply the WwTW power loading;
- The electrical installation must be connected to a Protective Multiple Earthing's (PME) terminal
- Names and Addresses of manufacturers of various items of proposed plant and spares;
- Description literature and materials specification for plant;
- Odour dispersion model and details of mitigation measures if required.
- Ground investigation

Mechanical & Electrical details and drawings shall include, but not limited to:

- Motor Control Centre wiring diagrams;
- Detailed kiosk layout drawings; ref Appendix J for typical panel layout drawings.
- Telemetry arrangements
- Mechanical, Electrical, Instrumentation, Control, Automation and Telemetry plant;
- The Developer shall provide a Fire Risk Assessment for the site to be adopted. Advice available from http://www.nifrs.org/firesafe/guidance.php

### 3.2 Design submission

The Developer's design submission shall be in the following format:

- Drawing/Document Title and reference number;
- Most recent revision number;
- Date of issue of most recent revision;
- Drawings – 1 No. DWG and 1 No. PDF
- General Reports and Calculations – MS Office

### 3.3 Design acceptance

Construction work shall not begin on any element of the WwTW until there is an Article 161 agreement approved and authorised by NI Water. Any orders placed prior to NI Water acceptance shall be at the Developer's risk.

The Developer's programme shall make allowances for a period of assessment by NI Water to appraise and accept drawings and design calculations.

The Developer shall provide and submit revisions or alternatives, or carry out further tests if the initial submissions do not meet the requirements of NI Water.

## 4. NI WATER REQUIREMENTS

There are a number of standard features that NI Water require the Developer to include within their WwTW design. This Section provides engineering detail on each of the standard features. A typical site layout and arrangement of the standard features are illustrated in Appendix A.

### 4.1 Treatment Process

The treatment process provided shall treat the wastewater to ensure compliance with the service level Discharge Standards included in the design standards offered by NIEA. Installed treatment processes that do not meet with the NIEA standards WILL NOT be adopted by NI Water. Installation of WwTW's without NI Water approval is at the Developers "OWN RISK" and will not be adopted by NI Water.

In the interests of consistency and efficiency NI Water's process selection matrix will apply. For small WwTW serving a population equivalent of less than 250, the permitted treatment process is the use of Rotating Biological Contactors (RBCs). NI Water has extensive positive operational and regulatory experience in the use of RBCs for the treatment of domestic wastewater. NI Water's aim is to standardise wherever possible on the type of treatment plant employed for wastewater treatment.

The Developer will apply the same design parameters as used by NI Water for the treatment of wastewater using RBC package units. These are detailed in Appendix B.

A schematic diagram of the flow and treatment arrangement for a RBC package plant is provided in Appendix C. This has been accepted by NIEA.

### 4.2 Hydraulic Considerations

Where the topography permits, the WwTW shall be designed to provide a hydraulic gradient between WwTW inlet and outfall. If pumping is unavoidable due to site conditions, the preferred arrangement is to pump the incoming flow to the WwTW inlet to enable gravity flow through the treatment process stages.

Treatment processes respond best to steady state flow conditions. The impact of the pumping regime on the downstream processes shall be considered and the pumping system designed accordingly. Flow delivery to the WwTW must be in accordance with WwTW's manufacturers recommendations. As a result balancing/ attenuation upstream of the WwTW inlet may be necessary.

### 4.3 Tertiary Treatment:

The WOC conditions may include stringent Discharge Standards and to comply with this Discharge Standard tertiary treatment may be required. The tertiary treatment process selected shall depend on the particular Discharge Standard. The Developer shall consult NI Water following NIEA issuing the design standards to discuss their design proposals.

### 4.4 Desludging Arrangements

All sludge holding compartments shall be connected to sludge evacuation pipework. This shall comprise of a stainless steel manifold system, stainless steel manifold dropper pipes isolation valves, all stainless steel support brackets, fastenings, thrust blocks and terminate at a bauer coupler positioned at waist level for tanker connection.

### 4.5 WwTW Location

#### 4.5.1 Odour Assessment

Where the proposed location for the WwTW is within the distances of the nearest existing or proposed property boundary as set out in Table 4.4, then the Developer shall undertake an odour assessment as part of the planning application. A copy of this odour assessment must be submitted to NI Water when making application to NI Water.

**Table 4.4 Odour Assessment distances**

| Number of Properties | Distance from WwTW perimeter to nearest property boundary(m)<br>(nearest receptor) |
|---|---|
| 2-14 | Less than 50m |
| 15-50 | Less than 75m |

The odour assessment and, if necessary, proposed mitigation measures to achieve Target Odour Standards shall be included in the environmental review, to inform Planning Service decision.

The odour assessment shall be carried out in accordance with the specification included within the NI Water Odour Management Strategy; 'Appendix H Odour Assessment Standard' and the guidance included in the Asset Standard for Odour Management. Copies of these documents are attached as Appendix D.

#### 4.5.2 Flood Protection

The WwTW shall be constructed above any 1 in 100 year storm flood plain. The Main Control Centre kiosk shall be located above the 1 in 200 year flood plain level.

#### 4.5.3 Availability of Electricity

Prior to confirming the location of WwTW the electricity service provider shall be consulted regarding the provision of the requisite power supply. (The cost of providing the power supply may be a contributing factor in the location of the WwTW.)

### 4.6 Discharge Location

Due care should be exercised in the location of the discharge point, which is designated by the NIEA. The discharge location should not be difficult to access from the housing development. Access should be within a

secured facility that prevents entry by members of the public. A non-return device must be fitted on the outfall. This can be a Flap Valve fitted at the headwall (Ref Appendix J) or an in-line Tide Flex valve located within a manhole in the site compound for ease of access by NI Water. Design should incorporate safe access to non-return device for maintenance. NI Waters standard detail for headwalls can be provided on request.

### 4.7 Access

An access road to the WwTW shall be provided together with any necessary turning bays and/or passing bays. Access shall be directly off a public road or dedicated access road.

- Shared access with domestic driveways is not acceptable.
- The minimum width of the access road shall be 4.0m and the road (route alignment and manner of construction) should be suitable for a lorry mounted vacuum tanker (up to 16 tonne G.V.W.). Vehicle tracking path is required as part of the design review.
- Road construction shall be asphalt or concrete and shall comply with the Civil Engineering Specification for the Water Industry (latest edition) and NI Water Additions to CESWI. Non trafficked areas shall be covered with weed controlled fabric and decorative gravel finish.
- The layout of the WwTW shall enable vehicular access for tank emptying, maintenance, repair or replacement.
- Tanker access shall be available to within 3m of the treatment plant.
- All covers C250 rated for vehicular movement.
- Layout should be designed so that vehicles cannot pass over any part of the Waste Water Treatment Plant. Kerbs or bollards are required on site to prevent vehicle access over the Waste Water Treatment plant.

**The ownership of the land for the dedicated vehicular access shall be transferred free of all charges at the expense of the developer to NI Water.**

### 4.8 Site Drainage

Gullies within the site shall be trapped and drain to a designated storm pipe. Roadways and other outside areas shall not drain to gullies within the site. Rain water run off must not drain to the Waste Water Treatment Plant.

Within the WwTW site a designated sludge removal area with an impermeable surface shall be provided to facilitate tank desludging or emptying. Within this area a trapped gully shall return all wash down sludge to the inlet sewer. Kerbs, or appropriate alternative, shall be used to bund the sludge removal area to prevent sludge spillages migrating.

Any chambers open to rainwater must have drain connected to surface water discharge to prevent flooding.

Signage & appropriate labelling of valves shall be erected on site.

### 4.9 Site Boundary Demarcation

All elements of WwTW shall be enclosed within a fenced boundary. **The ownership of the land within the boundary shall be transferred free of all charges at the expense of the developer to NI WATER.**

- The fence should be a minimum of 2.4m high paladin from the finished ground level and be cast in a concrete plinth.
- Double leaf paladin gates shall also finish with a minimum 2.4m high from the finished ground level and incorporate an approved locking arrangement.
- The access gates shall 2no 2.4m high, 2.4m wide paladin gates.
- Slip bolts to suit ASSA / Abloy close shackle padlocks shall be fitted.
- Gate support columns shall be 150mm x 100mm RSJ with base plates set into concrete foundations.
- The top of the gates shall be level with the top of the fence.
- Concrete bedding for the posts shall be Grade C20 concrete.
- The bases of the fences shall be embedded in Grade C20 concrete.
- Surfaces within the site shall be concrete finish 150mm in depth: in accordance with CESWI.
- Where the local Planning Authority stipulates the requirements for fencing and site layout, Health and Safety considerations shall take priority.
- NI Water site name with signage and CAR:ID (Site name and CAR:ID will be notified NI Water) is required prior to hand-over of Waste Water Treatment Works.

### 4.10 Chambers

#### 4.10.1 Sampling Chamber

- To have hinged mesh flooring for ease of access and viewing purposes.
- A sample chamber minimum size 1200mm diameter shall be provided within the WwTW site. Reference Appendix J for standard detail.
- The location of the access point should not be on a “trafficable area” within the site.

#### 4.10.2 Inlet Chamber

- To have hinged mesh flooring for ease of access and viewing purposes.

#### 4.10.3 Screening Chamber

- To have hinged mesh flooring for ease of access and viewing purposes.

#### 4.10.4 Any other open pits or chambers (for example RBC gearbox pit)

- To have hinged mesh flooring for ease of access and viewing purposes.

### 4.11 Other Regulatory Requirements

The design should comply with all relevant regulations, including but not limited to the following:-

- Dangerous Substances and Explosive Atmospheres Regulation 2002 (DSEAR)
- Lifting Operations and Lifting Equipment Regulations 1998 (LOLER)
- Pressure Systems Safety Regulations 2000 (PSSR)
- Electricity at Work Regulations 1989 (EAW)

Specifically the following requirements must be complied with:-

- All WwTW's must be assessed for the need of either Lifting Equipment & Fall Protection Equipment to protect the ongoing operational needs for WwTW's being adopted by NI Water. This assessment must be related to maximum wet weight calculations & risk.
- The minimum requirements of inspection; testing and certification of all such equipment which will be adopted and used by NI Water and its Contractors in accordance with all relevant Statutory Legislation.
- All lifting appliances and accessories, provide new to NI Water must undergo testing, inspection and Report of Thorough Examination certification. Prior to first use.
- All lifting equipment shall be prepared by the asset holder/custodian prior to periodic inspection. It is the responsibility of the asset holder/custodian to provide any required manufacturers documents i.e. previous inspection certificates, test & conformity certification, manuals and maintenance records including arrangement of test loads etc.

### 4.12 Wastewater Pumping Station

Any WwPS required as part of the WwTW shall comply with the requirements of NI Water's "*SPECIFICATION FOR THE CONSTRUCTION OF A WASTE WATER PUMPING STATION TO SERVICE A DEVELOPMENT FROM 5TO 500 PROPERTIES*".

### 4.13 Wash Water Specification. (Potable Supply)

#### 4.12.1 Wash Water Booster Sets

General

Potable water shall be used for wash down and for normal duty washing of any process which cannot be enclosed to contain aerosols.

The wash water booster set system and installation shall be in accordance with The Water Supply (Water Fittings) Regulations (Northern Ireland) 2009.

All mechanical and electrical component parts of the Works shall, unless otherwise agreed, comply with the provisions of this Specification.

#### 4.12.2 Single Pump Wash Water Booster Set

The ‘small’ hose reel booster set system shall be a standalone package comprising a 450 litre water holding tank, 1 No self-priming pump, low level/dry run protection built in, frost protection heater, associated electrical controls, associated pipe work with piped-in retractable hose reel complete with trigger operated gun style outlet shall also be supplied with the hose reel.

The pump shall be controlled by a dedicated controller. The pump shall run to a pre-determined pressure setting with the pump operating once the gun trigger has been activated. The pump shall achieve an output at the water gun of 2 litres/second and provide a boosted pressure at the water gun of 6.0 bar.

The pump shall also be protected by an emergency stop, located close to the kiosk door opening, which will prevent operation of the pump if activated. The emergency stop must be IP65 rated and a stand-alone item separate from the Local Control Panel (LCP).

Unit shall be sited such that the hose/water gun can readily reach the area or item that is to be maintained through regular pressure washing.

The Booster set technical specifications are detailed in Appendix F.

### 4.14 Instrumentation

The Developer shall provide all instrumentation required to operate the wastewater treatment works in automatic mode and provide specified signal information to Telemetry Development no later than 6 weeks of planned commissioning date.

### 4.15 Main Control Centre Panel

4.15.1 The control panel shall be manufactured in accordance with Northern Ireland Water Standard Specification SS200E and WIMES 3.01 and the accompanying drawings in the appendices.

4.15.2 The control panel shall be CE marked by the manufacturer before delivery. Appropriate reference to the relevant CE directive (Low Voltage and/or EMC Directives) shall be provided adjacent to the CE mark.

4.15.3 The control panel drawings utilised shall be that as issued with the NI Water MEICA specification. Any panel manufactured without approval shall be deemed unacceptable.

4.15.4 The control panel shall be mounted on the backboard of kiosk.

4.15.5 The control panel shall incorporate the following functional units as shown on Northern Ireland Water standard Waste Water Treatment Works drawings: Detailed kiosk layout drawings; ref Appendix K for typical panel layout drawings.

- An incomer compartment,

- RBC & Sludge return pump starter compartment;
- Pump and vent fan starter compartment (if required);
- Common control compartment;
- Generator Terminals compartment. Generator changeover – 3 positions for mains isolator – On, Off or Generator.
- Cable marshalling compartment or cable-way.

14.15.6 Digital Signals – refer to section 4.19.5

4.15.7 All electrical components shall comply with BS EN 60947 Parts 1-7.

4.15.8 Type Testing

- The control panel shall be type-tested or partially type-tested in accordance with BS EN 61439-2:2009
- For both cases, documentation, in the form of test certificates, calculations and/or declarations of conformity, shall be provided to confirm compliance with BS EN 61439-2:2009 with respect to the following:
    - Temperature rise limits
    - Dielectric properties (if applicable)
    - Short-circuit withstand strength tests
    - Effectiveness of protective circuits
    - Clearance and creepage distances (if applicable)
    - Mechanical operation tests
    - Degree of protection (IP rating)
    - Electro Magnetic Compatability (EMC)
- With respect to the short-circuit withstand testing element of effectiveness of protective circuits, verification is not required for:
    - control panels having a rated short-time withstand current or rated conditional short-circuit current not exceeding 10kA; or
    - control panels protected by current limiting devices having a cut-off current not exceeding 17kA at their rated breaking capacity.

4.15.9 Construction

4.15.9.1 The control panel shall comprise an ‘enclosed assembly’ of the cubicle type, as defined in BS EN 61439-2:2009. The IP rating of the control panel shall be IP54 (minimum).

4.15.9.2 The control panel shall be constructed from mild steel with either of the following substrate pre-treatment /protective coating systems, designed to achieve a minimum 20 year life expectancy:

4.15.9.3 The control panel shall be Form 4a, sub-division type 1, with bottom or side cable entry.

4.15.9.4 The control panel, including doors and covers, shall be suitably braced to produce a rigid structure.

4.15.9.5 Gland plates shall be a minimum of 2.0mm thick or, if thinner, be of braced construction to avoid distortion.

4.15.9.6 Gland plates shall maintain the IP rating of the enclosure.

4.15.9.7 The control panel shall be mounted in such a way that all components are accessible from the front and there is adequate clearance to enable easy installation, removal and maintenance.

4.15.9.8 Doors shall open without fouling or damaging adjacent door mounted equipment and shall have vertical hinges providing an angle of opening of at least 95 degrees.

### 4.16 Main Control Centre Kiosk

Refer to WIMES 3.06 Section 6.17 Enclosures for details on kiosk construction.

The key factors in arranging the layout of the WwTW shall be Health & Safety requirements, including minimising confined spaces, and ease of maintenance.
The superstructure or kiosk shall be positioned so that:

- There is minimum of 3 metre clear space in front of the superstructure or kiosk (the first metre to be hard standing);
- Operators can have an unobstructed view of the top of the WwTW whilst attending the control panel;
- The doors of the superstructure/ kiosk do not open onto any access cover/manhole or cause an obstruction;
- No danger shall arise to operators through working on or operating the plant whilst any access covers on the WwTW, etc. are open;
- The kiosk is above flood level; and outside the hazardous areas.
- There is sufficient space to offload and position a standby generator adjacent to the kiosk;
- The base of the kiosk is above the 1:200 year flood level;
- The kiosk is outside any hazardous areas;
- The enclosure is to be complete with a generator flap to allow cable access. This flap shall be secured in the closed position with a spring loaded catch fitted to interior of the flap.

A kiosk shall have minimum external dimensions of 1800mm(H) x 2100mm(W) x 1000mm(D) or 500mm(D); the depth dependant on individual site requirements. The Developer shall confirm the depth with NI Water technical advisor. The kiosk shall be mounted 150 mm above the finished ground level on a concrete plinth. The plinth shall extend a minimum of 125 mm beyond the kiosk walls and have chamfered edges. The bottom flange of the kiosk and plinth shall be sealed to prevent water ingress. The Developer shall submit the

dimensions, appearance, construction and siting of a larger superstructure for acceptance by the NI Water technical advisor: early consultation with Planning Service is recommended.

### 4.17 Telemetry Installation & Configuration

The Developer / Contractor shall supply, install and commission all equipment necessary telemetry to permit remote monitoring of the site on the NI Water Regional telemetry system. NI Water will require the telemetry outstation to communicate with the NI Water telemetry system via a digital radio. In extenuating circumstances where UHF radio communications is not possible, NI Water may consider the use of other forms of telecommunications such as 4G.

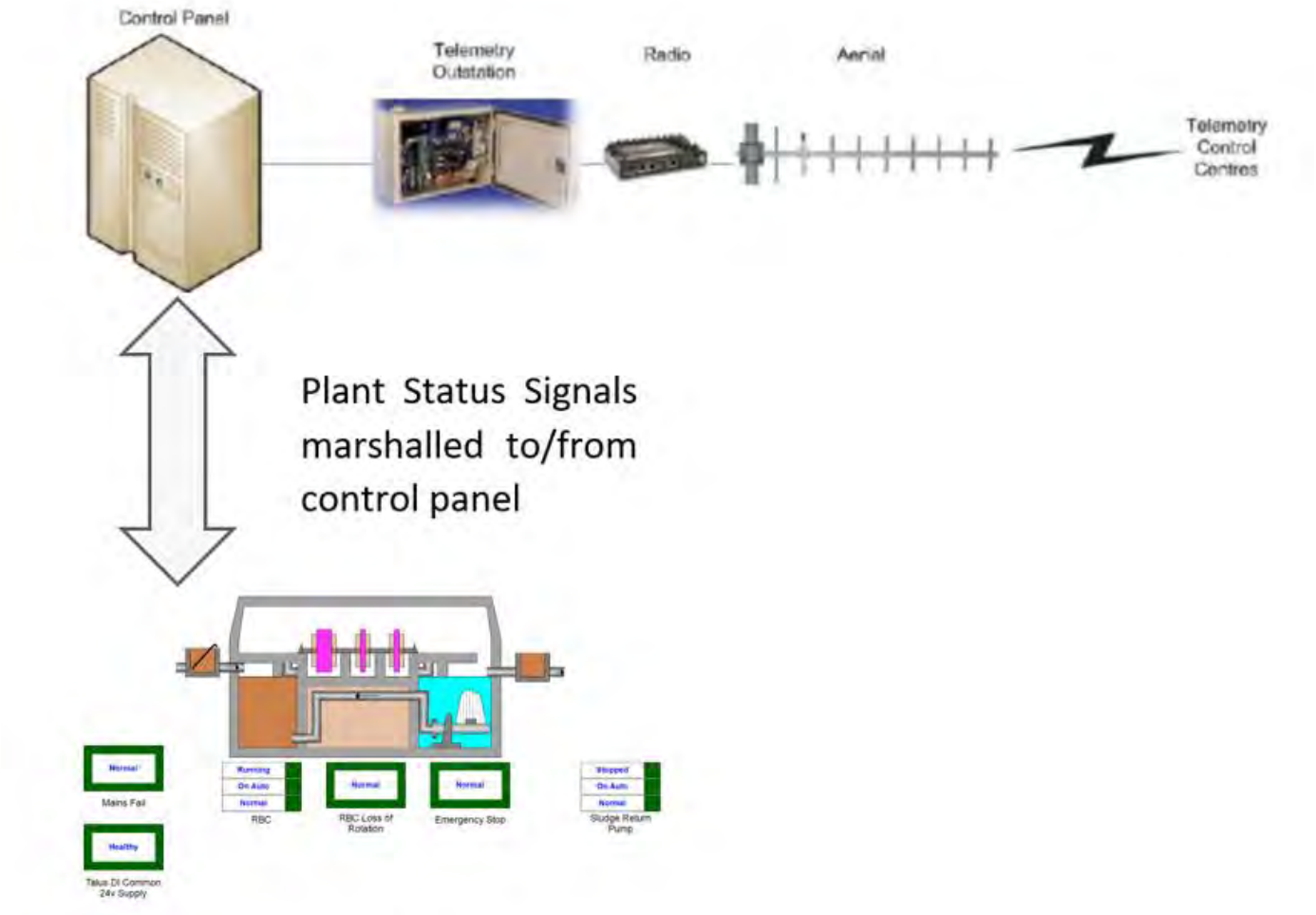
The complete on site telemetry installation and commissioning will require liaison with
Northern Ireland Water
ICT Telemetry Development Centre
Email: telemetrydevelopment@niwater.com

The installation will include

- A telemetry Talus outstation, which should be provided to the Telemetry Development Centre no later than 6 weeks prior to install.
- Communications Modem: Digital Radio.
- Suitable antenna pole for Digital Radio.
- Appropriate antenna and coaxial cabling for Digital Radio.
- All liaison with relevant NI Water personnel.

The Telemetry Development Centre shall provide guidance on which Talus outstation should be used along with the appropriate Aprisa radio.

**Example of an Asset Telemetry Connectivity WwTW**




### 4.18 Selection of Communications Modem

The selection of the appropriate communications modem method shall be decided in consultation with the NI Water ICT Telemetry CentreICT Telemetry Development Centre.

Developers / contractors shall contact the NI Water ICT Telemetry Development Centre to ensure the necessary procedures are followed. It is suggested this is undertaken at the earliest possible stage of the project to avoid delays.

The preferred NI Water Telemetry communications methodology utilises a digital radio modem via a licensed digital UHF radio path. To ascertain if this methodology is viable a digital radio path profile must be undertaken by the NI Water ICT Telemetry Development Centre.

The following information must be supplied to the NI Water ICT Telemetry Development Centre:

- Site Facility Name:
- Facility CAR ID:
- SiteFacility Grid reference: (taken from proposed position of telemetry antenna).
- Antenna type including make and model (required to obtain Antenna Gain and Feeder Losses):
- Antenna pole height:

- Site specific information of any impediment to radio propagation from site to proposed radio scanner, including photographs.

Upon a satisfactory path profile, and relevant communications site information and results of a physical communications test being provided a radio path license application will be submitted.

The lead in time for this application and resultant reply will be in the region of 4 to 6 weeks.
As part of the adoption procedure and or site commissioning the developer / contractor will produce written documentation from the NI Water ICT Telemetry Development Centre specifying the agreed choice of communications.

Modem Radio outcome. This outcome will provide Documentation from the NI Water ICT Telemetry Development Centre at specifying the Aprisa communications radio model required.

The following documentation will be provided by the NI Water ICT Telemetry Development Centre to the requesting Developer / contractor, and must be included in the Site Operations and maintenance manual.

- A copy of the NI Water radio path profile and power loss RF Input Into Feeder in dB/Watts.
- A copy of the licensing authority radio path profile and radio transmit power.
- The selected radio telemetry scanner and associated radio channel.
- The azimuth from the Waste Water Treatment Works Site to the scanner.

### 4.19 Telemetry Specification - WwTW Specification

The telemetry outstation set number.
In exceptional circumstances, where a licensed radio path is not available then the developer must make early contact with NI Water ICT telemetry centreICT Telemetry Development Centre to approve an alternative communications methodology.

#### 4.19.1 Telemetry Outstation

- Latest version of the Schneider Electric Talus Build T4e Mk2 outstation (RTU).
- 110/230VAC powered Talus T4e Mk2 outstation with WITS Proteus or DNP3 protocol WITS software, fitted with 20x DI, 4x AI, 6x DO, 2x auxiliary
- Inputs, 2x RS232 and 2x RS485 serial ports, Ethernet 4x 10/100 Base-T, Wireless GSM / GPRS MODEM +PSTN, 120W PSU,
- 2x 7Ah Batteries, fuses, marshalling terminals, MCBs, trunking, fully wired and tested fitted on a back plate and inside an enclosure 500mm x 500mm x 250mm (WxHxD).
- Radio mounting bracket (fitted) and space for Aprisa SRx radio (to be supplied and fitted by others). Space is to be available on the back-plate to add I/O modules in the future.

Details of the NI Water Supplier can be obtained from the NI Water ICT Telemetry Development Centre advisor (telemetrydevelopment@niwater.com) upon request.

- Should a Telemetry Outstation be required then the outstation shall be mounted on the wooden backboard of the kiosk adjacent to the control panel. The mains supply to the outstation shall be derived from the control panel.
- To be compatible with the NI Water Regional Telemetry system, the outstation shall be purchased from the relevant NI Water Telemetry Outstation Framework.
- Details reference the outstation model and supplier framework can be obtained from NI Water ICT Telemetry CentreICT Telemetry Development Centre.
- The outstation shall be supplied and configured with the appropriate communications modem and standby battery capable of supporting the outstation for 4 hours. This battery is normally supplied, on request, by the outstation suppler.
- The signals from the outgoing terminal rail in the common control section of the control panel shall be wired to the telemetry outstation using 5 pair Belden cable, or equivalent.

Telemetry configuration is undertaken by the NI Water ICT Telemetry Development Centre. Configuration of the Talus T4e outstation Mk2 needs to be arranged between the developer and the NI Water ICT Telemetry Development Centre. This will require the Talus T4e outstation Mk2 to be issued to the telemetry centre for pre-configuration.

The Developer must contact NI Water ICT Telemetry Development Centre at least 4 weeks in advance to arrange a suitable commissioning date.

The developer is advised that the Talus outstation should be delivered to the ICT Telemetry Development Centre no later than 6 weeks prior to commissioning and that Mk2 pre-configuration of the outstation is completed by the NI Water ICT Telemetry Development Centre. Signal lists should be sent to the ICT Telemetry Development Centre via a Configuration Request Form no later than 6 weeks prior to the planned commissioning date. All signal configuration including alarm levels must be completed on this pro forma. A copy can be obtained from telemetrydevelopment@niwater.com

### 4.19.2 Telemetry Digital Radio:

- The digital radio shall be mounted adjacent to the Controller or within the outstation.
- To be compatible with NI Water Regional Ttelemetry system, the digital radios utilised is are currently an Aprisa SR or SRx digital radio and are available from

Details of the NI Water Supplier can be obtained from the NI Water ICT Telemetry Development Centre advisor (telemetrydevelopment@niwater.com) upon request.

### 4.19.3 Telemetry Aerial Pole

- The Developer shall supply a 5 metre, or greater if required, standard street lighting column complete with end cap.

- The lighting column shall be installed optimally on site for radio signal propagation i.e. avoiding obstructions such as buildings, trees, high voltage power lines, transformers etc. and as close to the kiosk as possible. Ducting shall be installed from the column to the kiosk.
- If the street lighting column is greater than 5m high then the Developer shall obtain planning permission from the appropriate planning office.

### 4.19.4 Telemetry Aerial

- The aerial shall be mounted on top of the lighting column using suitable fixings to allow for full adjustment in any direction at the commissioning stage.
- The co-axial aerial feeder shall be one autonomous length, i.e. without joints, and be wired back, through ducting, and connected to the radio within the telemetry outstation.
- The standard antenna utilised by the Regional Telemetry System be compatible with NI Water telemetry system, the aerial shall be a 12-element Yagi antenna, to operate at 450-470 MHz.
- Digital radio set up, antenna installation and commissioning shall be undertaken by qualified and competent radio engineers to ensure the site communication characteristics are optimal.
- A Certification of Competence including onsite comms test results for the engineers, on site, will be required by the NI Water ICT Telemetry Development Centre at Bretland House prior to commissioning being undertaken.

### 4.19.5 Standard List of Signals

The table below lists the standard I/O signals which shall be available from the control panel and hard-wired to the telemetry outstation: Ni Water may require additional I/O signals and this will be confirmed when the Telemetry requirements are under discussion. Signals to be confirmed as per the Waste Water Treatment Work Design.

*Standard List of RBC Signals:*

Digital

- Mains failure – hard wired signal.
- LPU healthy – hard wired signal (if applicable).
- Common control 24 V dc healthy – hard wired signal.
- Intruder Alarm, unauthorised entry – hard wired signal.
- RBC Run – Hard wired signal.
- RBC Trip - Hard wired signal.
- RBC Auto - Hard wired signal.
- Sludge Pump Run - Hard wired signal
- Sludge Pump Trip - Hard wired signal.
- Sludge Pump Auto - Hard wired signal.
- Emergency Stop Activated - Hard wired signal
- Loss of Rotation - Hard wired signal.
- O/S battery - Hard wired signal.
- O/S main fail - Hard wired signal.

### 4.19.6 Commissioning of Telemetry System.

Installation and commissioning of the outstation shall be undertaken by qualified and competent radio technicians to ensure the site communication characteristics are optimal. A Certification of Competence for the engineers, on site, will be required by the NI Water ICT Telemetry Development Centre prior to commissioning being undertaken.

Failure to comply with these procedures may result in NI Water completing the work and recovering the costs from the Developer under due process.

A 28 day automatic performance trial (level 3 test) must be undertaken to prove proper function of the telemetry system.

Telemetry signals must be achieved tested for accuracy and proven before Level 3 Testing can commence. In order to satisfy the 'Online in Telemetry' status, signals are online but majority are placed within an uncommissioned folder (signals are being monitored in order to assist with testing but are not continuously monitored in real-time).

When the NI Water Telemetry Development Centre configures a site, they endeavour to build mimics at the same time. If there is insufficient information, it is sometimes necessary to wait until more input is received from the field manager. It can be assumed that mimics should be in place before 'Online in telemetry.'

The developer shall allow in his costs for all testing and commissioning of the telemetry system in accordance with Northern Ireland Water telemetry procedures. The developer shall allow in his costing's for all resources deemed necessary to install, test and commission the complete telemetry system following procedure as stated below;

1. Configuration list – the developer shall provide a telemetry signal configuration list for each site, this shall be provided in the Northern Ireland Water standard template and shall include all ranges and scaling's for analogue signals. Each configuration should have NIW's corporate asset register details on the configuration sheet, field manager name and agreed scanner. Details can be obtained from the NI Water ICT Telemetry Development Centre advisor (telemetrydevelopment@niwater.com) upon request.

2. Telemetry programming meeting - the developer shall attend a meeting with Northern Ireland Water telemetry development centre to agree and programme the full commissioning of the telemetry system, resources shall be made available for completion of this programme. The Talus outstation (just the outstation RTU, not the enclosure) should be left into the Telemetry Development Centre for programming. Allow up to 2 6 weeks for programming.

3. Site testing – following completion of level 1 pre commissioning & level 2 functional testing, the contractor shall ensure that all telemetry signals as agreed in the telemetry configuration sheet are available at the telemetry outstation.

4. End to End telemetry testing - the developer shall simulate and verify all telemetry signals from source to Telemetry Development Centre. Each individual signal shall be confirmed and signed off by Telemetry Development Centre and the developer. The telemetry signals will remains in an uncommissioned folders for at least two 2 weeks for evaluation too make sure it is not generating spurious alarms. When that period is over, and the site is formally adopted, telemetry is put live. Telemetry testing and commissioning shall not be deemed complete until all signals have been tested, verified and confirmation documentation provided by Telemetry Development Centre.

5. Documentation – A copy of all testing and verification documentation shall be included in the operation and maintenance manual for handover.

The following conditions must been met:

- End-to-end validation of all telemetry signals.
- Instrument-to-server testing successfully completed.
- Telemetry sends Commissioning Test sheets for each point to the contractor.
- Must be complete by end of Level 2 testing

### 4.20 Electrical Specification:

This Specification defines the requirements for electrical equipment forming part of the Small Waste Water Package Treatment Plant (WwTW) for use within Northern Ireland Water.

This electrical equipment shall typically comprise:

a) a kiosk;
b) a control panel;
c) an incoming power supply including GSM half hour electricity meter;
e) all associated interconnecting cabling and wiring;
f) MCC controller, surge protection and Protective Multiple Earthing's (PME)

#### 4.20.1 General:

- The Developer shall obtain an 'Application to Connect' form from the electricity service provider.
- This shall be completed and signed by the Developer and submitted to the electricity service provider when the installation is ready for connection to the electricity supply.
- Before the form is sent to the electricity service provider, it shall be submitted to Northern Ireland Water so that the tariff agreement can be checked.
- The Developer shall obtain electricity service provider approval of the starting arrangements.
- The incoming electricity supply to the Small Waste Water Treatment Works shall be 3 phase 415 volt supply.
- A dedicated earth rod arrangement shall be installed on site for mobile generator, with a reading of less than 20 ohms. Earth rod/rods should have their location recorded, (should be included on the EIC) and provision of ducted inspection box/boxes for future EIT.

- A GSM half hour electricity meter, complete with modem shall be installed.
- The WwTW shall comply with the requirements of the electricity service provider.
- All electrical equipment shall be suitable for the environmental conditions present on site, particularly with respect to corrosion resistance.
- The Small Waste Water Treatment Works shall be suitable for use by electrically unskilled persons.
- On completion of the electrical installation, the Developer shall carry out the following tests:
  a) All relevant tests specified in current BS 7671: with particular reference to IEE Guidance Note 3: Inspection and Testing; and
  b) Functional tests of control circuitry to confirm that the plant operates in accordance with the schematic diagrams and the required control sequence.
- Following the satisfactory completion of tests, the Developer shall provide Northern Ireland Water with:
  a) A valid Electrical Installation Certificate, as required by current BS 7671 and
  b) a copy of the test schedule relating to functional tests above, detailing the times and dates when all tests were performed. A signed declaration that the Small Waste Water Treatment Works operates in accordance with the schematic diagrams and the required control sequence shall also be provided.
  c) Certificates of Conformity , & cable calculations.
  d) Include single line diagram of installation.

#### 4.20.2 Labels and Safety Signs:

Labels and safety signs shall be written in English and be unambiguous, durable and legible.
Labels shall be attached directly or adjacent to the electrical equipment to which they refer but not to trunking covers or other easily removable or transferable items.
The fixing of labels, safety signs and notices shall not affect the IP rating of the electrical equipment.
Labels shall be attached using an appropriate number of corrosion resistant, mechanical fixings.
Labels mounted on the outside of an enclosure (e.g. control panel, junction box, local control station etc.) shall be manufactured from laminated plastic, engraved so as to produce black letters on a white background.
Labels mounted on the inside of an enclosure shall be to the same standard.
Characters shall be upper case and for:

a) application labels are not less than 6mm in height;
b) designation labels be not less than 4mm height; and
c) component identification labels to be not less than 3mm in height.

Internal components shall be clearly identified by individual labels and have circuit designations which correlate with the installation drawings and documentation.
Where this is not practical due to space restrictions, common labels (e.g. laminated diagrams) may be used.
Fuse labels shall detail the fuse rating.
The lettering, colour and layout of safety signs shall comply with BS 5499-5:2002 and the Health and Safety (Safety Signs and Signals) Regulations, 1996.
Safety Signs shall be provided to avoid danger to personnel and to provide compliance with current BS 7671 and Statutory Regulations.

As a minimum, safety signs shall be fitted to removable covers over busbars and live connections, and to doors of compartments containing:

a) incoming supply cable termination points;
b) incoming supply switching and isolation devices;
c) an internal switching and isolation device;
d) more than one supply or multiple control circuits originating elsewhere;
e) equipment located within a 'safe area' but associated with certified apparatus located within a hazardous area; a sign shall also be fitted at the safe area cable termination rail; and
f) voltages greater than or equal to 230V, where such voltages would not be expected.

Self-adhesive, vinyl safety signs may be used where there is no requirement for a special legend and proprietary safety signs are available.

# 5. NI WATER ASSET STANDARD AND ENGINNERING SPECIFICATIONS

## 5.1 Asset Standards

The Developer should adhere to the latest NI Water Asset Standards where applicable. Those applicable to a standard <250PE RBC WwTW would include the following. Copies can be obtained from NI Water technical advisor upon request.

- Wastewater Non-Infrastructure Asset Standards Vol 1: General Requirements
- Wastewater Non-Infrastructure Asset Standards Vol 2 Population Determination
- Wastewater Non-Infrastructure Asset Standards Vol 5 Primary Settlement
- Wastewater Non-Infrastructure Asset Standards Vol 7 RBCs

## 5.2 Engineering Specifications

The Developer should adhere to NI Water Asset Standards where applicable. Those applicable to a standard <250PE RBC WwTW would include the following. Copies can be obtained from NI Water technical advisor upon request.

- MEICA Engineering Specification For Rotating Biological Contactor's (RBC's)

## 5.3 Civil Specifications

### 5.3.1 The Standard Specification

The Standard Specification is The Civil Engineering Specification for the Water Industry as published by UK Water Industry Research Ltd. The Developer will be deemed to possess a copy of the Standard Specification, be familiar with and apply its contents.

### 5.3.2 The Supplementary Specification

The Supplementary Specification is Sewers for Adoption Northern Ireland current Edition as published by WRc. The Developer will be deemed to possess a copy of the Supplementary Specification, be familiar with and apply its contents.

### 5.3.3 Specific Civil Specifications

The Developer shall satisfy himself of the suitability and stability of his proposals. All design shall comply with the relevant British Standards / Eurocodes, where they exist, and shall conform to recognized good engineering practice.

## 6. DEVELOPER'S DESIGN

The Developer will be responsible for ensuring compliance with NIW Asset Standards and Engineering Specifications through all aspects of design development, construction, testing and commissioning of the proposed WwTW.

### 6.1 General

The Developer shall be responsible for all aspects of design necessary to complete the works in accordance with NI Water's requirements.

The Developer shall also be responsible for the design of all temporary works required to complete the construction of the works.

The new WwTW shall be fully automated and shall be capable of operating unattended for prolonged periods.

### 6.2 Design Life

The minimum design life of all civil and structural works shall be 60 years.

The minimum design life of all mechanical and electrical works shall be 20 years unless stated elsewhere in the Specifications.

The minimum design life of all instrumentation, control and automation works shall be 7 years.

### 6.3 Design Submission

All elements of the Developer design shall be submitted to NIW for review and acceptance, this shall include all relevant investigations, calculations, engineering drawings and equipment details. The following list is not exhaustive:-

- Site investigation report
- Manufacturers process guarantees
- General Arrangement and Reinforcement Drawings
- Copy of the Water Order Consent (WOC)
- Full design calculations
- Equipment fabrication drawings
- Adequate drawings showing proposed pipelines. Drawings shall be to scale and as a minimum shall provide the following information:
    (i) The plan position of the pipeline with reference to area maps including roads, structure, other pipework;
    (ii) The location of all pipeline features;
    (iii) Invert levels and ground levels along each pipeline route with levels of any other relevant pipework or structures.
- Lifting Strategy . This will include installation of appropriate Fall Arrest and Davit Socket points where required.

The Developer's programme shall make allowances for a period of assessment by NI Water to appraise and accept drawings and design calculations.

### 6.4 Construction Stage

The following inspections, testing and samples must be facilitated by the Developer at their own expense and they must provide NI Water a minimum of 5 days notice. If the Developer fails to provide notice or fails to facilitate inspection then NI Water reserve the right to have completed works uncovered to allow inspections. This will be at the Developers expense:-

- Inspection by NIW of the foundation soils under the proposed process unit base slab prior to covering.
- Inspection of reinforcement for any structural concrete.
- Laboratory test reports of compressive strength for concrete samples taken from structural concrete (in particular the process unit base slab).
- Inspection of the process unit installation and records that the unit has been installed in accordance with the manufacturers tolerances.

The Developer will meet the following requirements before submission of the Preliminary Adoption application:-

(i) All pre-commissioning and functionality tests should be in accordance with the Process, MEICA & Commissioning Specifications. (Please refer to section 7.4.1).

(ii) All civil and building works are satisfactorily complete and successfully tested, inspected and approved.

(iii) All mechanical and electrical plant has been installed and successfully tested, inspected and approved.

(iv) All instrumentation and control systems have been installed and successfully tested, inspected and approved.

(v) Copies of the Operation and Maintenance Manuals and Record Drawings have been completed.

(vi) Where required, a staff training schedule and programme has been submitted to NIW

### 6.5 Warranty / Defect Correction

The Developer will be responsible for the WwTW until final adoption by NIW. Any defects or snagging identified prior to Adoption will be rectified by the Developer.

If any equipment fails before adoption it shall be replaced by the Developer at their expense. The warranties for all equipment shall apply from the issue of the Preliminary Adoption Certificate and shall run for 12 months.

# 7. ADOPTION

## 7.1 General

The Wastewater Treatment Works shall form part of the Developer's Article 161 Approval and shall be included in the Adoption process with the sewerage system, but shall be subject to a separate Adoption Certificate.

The sewerage system conveying flows to the WwTW shall not be Adopted until such times as the WwTW Adoption has been satisfactorily completed.

NI Water reserves the right for all works to be inspected prior to its being covered or hidden. The Developer shall give notice in writing to NI Water prior to such work shall be covered or hidden. Should any work be covered or hidden before notice is given and without an inspection by NI Water, the Developer shall be required to uncover same.

## 7.2 Adoption Procedure

The procedure for Adoption by NI Water and the timescale is illustrated by the flowchart contained in Appendix G and as detailed in the table below:

**Table 7.3 Adoption Procedure**

| | | |
|---|---|---|
| Prior to Site Inspection | Commissioning shall not commence until the development is 70% occupied. | Timescale |
| The Developer shall have completed the associated separate sewerage system for the development.<br>The Developer shall have completed Level 1 and Level 2 testing (refer to Table 7.4.1) and should submit all relevant test certificates. | | |
| The Developer applies for Preliminary Adoption to NI Water | | |
| Site Inspection; | NI Water shall carry out an inspection of the WwTW prior to Preliminary Adoption. | |
| Preliminary Adoption Tests | Acceptance Testing i.e. process testing with continuous sampling of Inlet and Final Effluent prior to preliminary adoption to confirm compliance with the NIEA Discharge Consent. Ref Section 9. | 28 days |
| Preliminary Adoption | NI Water shall issue a Preliminary Certificate of Adoption | |
| Preliminary Adoption period | The Proving period shall be the 12 months of the Preliminary Adoption period. Ref Section 9. | 12 months |
| Final Adoption Certificate | NI Water shall issue a Final Adoption Certificate | |

### 7.3 Land Transfer

The ownership of the WwTW site shall be legally transferred to NI Water, without cost and with all the associated running costs paid up to date before the WwTW shall be adopted. Any lands transferred to NI Water must have clear title.

In the unlikely event of NI Water paying the electrical running costs in advance of adoption the Developer shall pay back to NI Water all monies outstanding.

An accurate site dimension plan suitable for land registration from the Developer's solicitor to NIW must be included with the application for preliminary adoption. The land registry drawing must be adhere to the following requirements:-

- Scale 1:2500
- Show transfer land bounded by a blue line
- Show transfer land area in Hectares
- Show registered owner
- OS Map Reference
- Townland
- It must state that the land indicated is ready for transfer to NI Water, as a prerequisite to the adoption by NI Water under Article 161 of the Water and Sewerage Services (Northern Ireland) Order 2006 (as amended Water and Sewerage Services Act (Northern Ireland) 2016).

The land shall be transferred to the ownership of NI Water: prior to final Adoption.

Any easement from the WwTW to the Discharge Point shall be registered in NI Water.

Please refer to Appendix G/I (to be reviewed)

### 7.4 Preliminary Adoption

Commissioning of the WwTW shall commence when the development has reached 70% design biological loading and hydraulic flows.

It is the responsibility of the developer to ensure the WwTW is operated and maintained to meet the discharge consent issued by NIEA until it is adopted by NIW.

#### 7.4.1 Testing

The Developer shall test and commission the WwTW to confirm the correct operation of the WwTW; in both automatic mode and manual mode. Testing shall include all items of civil, mechanical and electrical plant, instrumentation, control, automation and telemetry configuration and operation. All items shall be in accordance with the Developer's design, previously submitted to and accepted by NI Water.

The Developer shall have completed Level 1and Level 2 testing

### 7.4.1 Table 7.4.1 Level 1 and Level 2 Testing

| **Level 1 testing comprises:** | **Level 2 testing comprises** |
|---|---|
| Factory Acceptance Tests (FATs) | Wet Testing (SATs)<br>(non-operational fluids where appropriate) |
| Installation Checks/ Dry Testing | Plant Start-up & System Commissioning |
| Completion of installation inspection | Construction Inspection |
| | Construction Completion |

When Level 2 testing is complete the Developer shall submit an application for Preliminary Adoption.

### 7.4.2 Preliminary Adoption Site Inspection

When requested by the Developer through an application submission, NI Water shall carry out an inspection of the WwTW prior to consideration for Preliminary Adoption.

At the inspection NI Water will visit site & collate a list of any Civil and MEICA&T defects for remedial action by the Developer. This shall include any additional items which are required for compliance with NI Water's Standards and Specifications.

If it is determined at a second pre-adoption meeting that defects highlighted at the previous meeting have not been remedied NI Water reserve the right to charge the Developer for each of the subsequent adoption inspections. A final site inspection shall confirm that the defects have been remedied.

Any defects notified prior to consideration for preliminary adoption must be remedied by the Developer.

### 7.4.3 Acceptance Testing Level 3

The Developer shall demonstrate that the WwTW complies with the service level Discharge Standards: stated in the NIEA WOC.

The Developer shall operate the WwTW to treat the incoming flows. The influent and treated effluent quality tests shall be carried out under a minimum of 70% occupancy design biological loading and hydraulic flows. Refer to Section 9 – Compliance Sampling for further information.

Telemetry functionality shall be in place prior to proceeding with the Acceptance testing.

### 7.4.4 Procedure in the Event of Failure of Acceptance Tests

Failure to meet the WOC service level Standards shall result in NI Water not adopting the WwTW and consequently the associated sewerage system.

In the event of test failure or sample failure the Developer shall review the reasons behind the failure with NI Water, rectify any faults and restart the 28 day acceptance period. Consideration may be given to extenuating circumstances, however this will be taken on a case by case basis and will need to evidentially based.

Upon failure of any sample during the 28 day Acceptance Period the Period shall be reset to start, following completion of the remedial work. Similarly, failure during the Proving Period may result in reset to start. Any costs associated with this shall be the responsibility of the Developer.

Records of any failures and reasons for such shall be retained and passed to NI Water as part of the Adoption documentation.

### 7.4.5 Documentation

The Developer is responsible for submitting the Handover documentation including Infrastructure and/or Non-Infrastructure asset records.

NI Water shall provide the Developer with a “Developer’s Pack”, prepared by NI Water Asset Information Management. This Developer Pack provides the requirements and guidance on the Handover documentation to be provided by the Developer including the O&M Manual and records. The Developer shall complete the appropriate parts and return to NI Water. Handover of documentation shall be complete prior to Acceptance Testing commencing.

The information required for a complete asset data return for each site is:-

1. Operation & Maintenance manual (1no Hard Copy & 3no CDs)
2. Health & Safety File (1no Hard Copy & 3no CDs)
3. As constructed Plan Layout Drawings (in pdf and AutoCAD format)
4. As constructed Section Drawings (in pdf and AutoCAD format)
5. Process & Instrumentation Design
6. Process Flow Diagrams
7. BUDI return
8. A Lifting Equipment register which includes the following minimum information:-
   a. Manufacturer.

b. Equipment type/description.
c. Unique Identification number.
d. SWL (in Kgs)
e. Dates of Reports of Thorough Examination inspection and next due date.
f. Date of test & certification.

### 7.4.6 Preliminary Adoption Period

NI Water shall issue a Preliminary Certificate of Adoption: following testing confirming compliance with the WOC.

The WwTW shall be assessed over the Preliminary Adoption period of 12 months. Sampling shall inform the performance of the WwTW and compliance. NI Water and the Developer shall collect and analyse effluent samples as described in Section 9.

### 7.4.7 Maintenance

The Developer shall be responsible for maintenance until NI Water issues the Final Adoption Certificate. Maintenance shall be carried out in accordance with the plant manufacturer's guidance, records maintained and forwarded to NI Water.

## 7.5 Adoption

The WwTW should be satisfactorily completed and offered to NI Water for adoption at least 6 months prior to the end of the construction period as stated on page 11 of the 161 Agreement. A full service history on the plant shall be submitted by the developer at hand-over. Failure to do so will involve the Developer bringing the WwTW up to the NI Water Specification current at the time of requested adoption.

NI Water shall carry out an inspection of the WwTW prior to Adoption. The Developer shall be informed of any issues identified and these shall be remedied prior to the Adoption Certificate being issued and the Works vested in NI Water.

NI Water shall then issue the Article 161 Final Adoption Certificate and take over the operation and maintenance of the WwTW provided lands transfer has been completed.

## 7.6 Bond surety / rechargeable costs

In the event of recurring problems within the WwTW and complaints from residents of public health and noise/odour related problems caused by the WwTW and failure by the Developer to respond to complaints, NI Water reserve the right to carry out remedial works and recover the costs from the Bond Surety or carry out the work on a rechargeable basis.

## 8. HEALTH AND SAFETY

The Developer is responsible for all Health & Safety compliance during construction and until Adoption has been certified.

The WwTW and the contributing sewerage systems, shall comply with the Health and Safety at Work (NI) Order 1978, and all statutory rules and regulations in force at the time of submission for Adoption.

All persons involved in the design, management or undertaking of construction work shall ensure that the requirements of the Construction (Design and Management) Regulations (Northern Ireland) 2016 (CDM 2016) are complied with.

The Developer shall comply with NI Water's Health and Safety Policies and Procedures. NI Water's Health and Safety Policies and Procedures shall be accessed on the NI Water's CPMR external website.

General site identification shall be carried out by NI Water following Article 161 Adoption.
Post Adoption Health and Safety signage at site, kiosk and panel shall be the responsibility of NI Water.

## 9. COMPLIANCE SAMPLING

Independent tests on the Inlet (composite sample) and final effluent (composite and spot samples) quality shall be carried out to prove compliance.

The Water Order Consent offered by NIEA shall include the concentration limits for listed parameters.

The parameters shall include but not be limited to:

- Biological Biochemical Oxygen Demand BOD
- Chemical Oxygen Demand COD (Inlet sample only)
- Total Suspended Solids SS
- Ammonia as Nitrogen NH3-N; TKN
- pH (Hydrogen Ion concentration) pH

The Developer shall arrange for all required sampling and analysis to be carried out during the Acceptance Testing period and the proving period. All samples must be collected by a competent operator with experience collecting wastewater samples in the Water Industry in the UK or Ireland. Samples must be tested in a UKAS accredited laboratory.

NI Water shall require the Developer to conduct a sampling regime to demonstrate that the WwTW is compliant with the NIEA WOC Discharge Standards. Sample results to be submitted to the NI Water DSCT technical advisor.

A valid sample is defined as a sample of minimum volume 1 litre which once taken, shall be kept at an ambient temperature of 40C prior to analysis including transport from site to an UKAS accredited laboratory and analysed within 24 hours of being taken. All sample results from the UKAS accredited laboratory shall be considered acceptable providing they comply with the Analytical Quality Control (AQC) limits. The results obtained from the Developer's sample shall be binding on him.

### 9.1 Acceptance Period sampling

Independent tests (including independent collection of samples) on the Inlet (composite sample) and final effluent (composite and spot samples) quality shall be carried out daily over the 28 (continuous) day acceptance period. Developer will not be permitted to proceed to *Proving Period sampling* until 28 day *Acceptance Period samples* have all passed and have been accepted by NI Water. If any of these samples fail NI Water may require samples to repeated.

### 9.2 Proving Period sampling

Following satisfactory completion of the 28 day *Acceptance period sampling*. The Developer must arrange for independent collection and testing of 6no bi-monthly for a duration of 12 months. If any of these samples fail NI Water may require samples to repeated.

### 9.3 Composite Sampling

A composite sample is defined as a time-proportional sample taken by automated means for a given 24-hour period. A composite sample of crude sewage entering the plant and a separate composite sample of final effluent leaving the WwTW shall be lifted in any given 24-hour period. A composite sample should be taken from a multi bottle final effluent auto-sampling machine.

### 9.4 Spot (Discrete) Sampling

A spot (discrete) sample is defined as a sample taken at one moment in time by either manual or automated means, which is retained and stored and kept separately for analysis. A separate Spot sample of final effluent leaving the WwTW shall be lifted at varying times within the 24-hour period

### 9.5 Laboratory Accreditation

Any laboratory used by the Developer shall be UKAS and ISO/IEC 17025 accredited and hold valid wastewater matrices for the analysis required.

The Developer shall submit the details of the proposed laboratory to NI Water. The choice of laboratory shall be UKAS and ISO/IEC 17025 accredited. The Developer shall not be permitted to change laboratories during the course of the sampling unless such change is accepted, in writing, by NI Water. This shall only be granted in exceptional circumstances.

Procedural and Statistical Analytical Quality Control (AQC) for the nominated laboratory shall be demonstrated, and documentary evidence of the same system shall be required. NI Water may require inspecting the UKAS Accredited laboratories utilised by the Developer, and may also wish to inspect the written procedures in use for AQC methodology. The cost of any visit deemed necessary by NI Water or its representatives shall be borne by the Developer.

In addition the laboratory shall have established the performance of all relevant analytical methods before they are used to analyse samples; maintain analytical quality control charts for each method of analysis; and participate in an external quality control scheme (for example, WRc Aqua check or similar).

For the purposes of all tests undertaken during the Acceptance Period and Proving Period it shall be the Developers responsibility to ensure that the laboratory complies with the above requirements. Any non-compliant samples shall be logged and reported to NI Water within 48 hours.

## 10. ADVICE TO HOUSEHOLDERS

### 10.1 Fats, Oil, Grease Grease

WwTW processes are sensitive to heavy debris such as fat, oil or grease discharges (FOG). The Developer should inform occupants not to dispose of cooking oil & grease into the sewerage system. This has the potential of disrupting the biological process within the WwTW and therefore potentially failing NIEA WOC compliance. More information is available on the NI Water website at https://www.niwater.com/fats-oil-and-grease-fog/

### 10.2 Screenings

The Developer is responsible for informing the occupants of the development regarding the damage that the flushing of inappropriate items into the sewerage system. Refer to the “Bag it and Bin it” pamphlet. This information is available through Developers Services & on the NI Water website https://www.niwater.com/bag-it-and-bin-it/

Failure to control the flushing of inappropriate items or fats, oils and grease, may lead to the treatment process failing. If the process fails during any period of testing, NI Water shall not adopt the WwTW until a full series of testing has demonstrated compliance.

## 11. ELECTRICITY SUPPLY

The Developer shall obtain an 'Application to Connect' form from the electricity service provider.

This shall be completed and signed by the Developer and submitted to the electricity service provider to confirm that a power supply is available to the location. The reply from the electricity supplier should contain a proposed tariff agreement. A copy shall be forwarded to NI Water to check and accept the proposed tariff agreement.

The incoming electricity supply to the WwTW shall be 3phase 415 volt supply and neutral, 4 wire, 50 Hz.

The WwTW shall comply with the requirements of the electricity service provider.

All electrical equipment shall be suitable for the environmental conditions present on site, particularly with respect to corrosion resistance.

The Developer shall obtain electricity service provider approval for motor starting arrangements. If applicable motors above 3.75kW shall have assisted start.

A GSM half hour electricity meter, MV90 compatible complete with modem shall be installed.
The meter shall have an internal modem with GSM communications or alternatively if there are communications problems then an internal modem capable of connection to a BT line. This shall enable NI Water to dial up electricity service provider electricity meters for data acquisition and energy management. The Developer shall discuss this with NI Water prior to meter installation.
At Preliminary Adoption NI Water shall require the MPRN, (Meter Point Reference Number, 11 digit No. provided by the electricity service provider) and the electricity meter serial number.

NI Water shall take over payment of electrical costs when the WwTW has been Adopted by NI Water and the Final Adoption Certificate issued.

The Developer shall arrange for a meter reading at the handover date and shall be responsible for the payment of this reading. The meter shall then be signed over to NI Water.

### 11.1 Site Ducting

Ducts shall be provided for installation of the following:

- The electricity service provider incoming power cable. One duct shall be provided, sized according to the electricity service provider's requirements and routed between the point of supply / WwTW site boundary and the kiosk plinth;
- The installation earth cable. One duct shall be provided, 50mm in diameter, routed between the point of supply and the kiosk plinth. All Earthing to comply with current BS7671 regulations.
- The WwTW unit. One duct shall be provided, 100mm in diameter, routed between the WwTW unit and the MCC kiosk plinth for air pipelines to diffusers or electrical supply to motor/gearbox & sludge return pump.

- If applicable to the design unit the ultrasonic level / probe sensor and float switch cables shall have one duct provided, 100mm in diameter, routed between overflow manhole and the kiosk plinth.
- The telemetry aerial antenna cable. One duct shall be provided and routed between the kiosk plinth and the 5 metre lighting column.
- The power cable for the wash water booster set. One duct shall be provided, 100mm diameter, routed between the MCC kiosk and the wash water kiosk
- Ducts shall consist of rigid black or grey uPVC pipe, complying with CESWI and NI Water Additions The duct for the electricity service provider's incoming power cable shall be black, embossed with the word 'ELECTRICITY' and may be flexible ribbed.

## 12. ENVIRONMENTAL MANAGEMENT

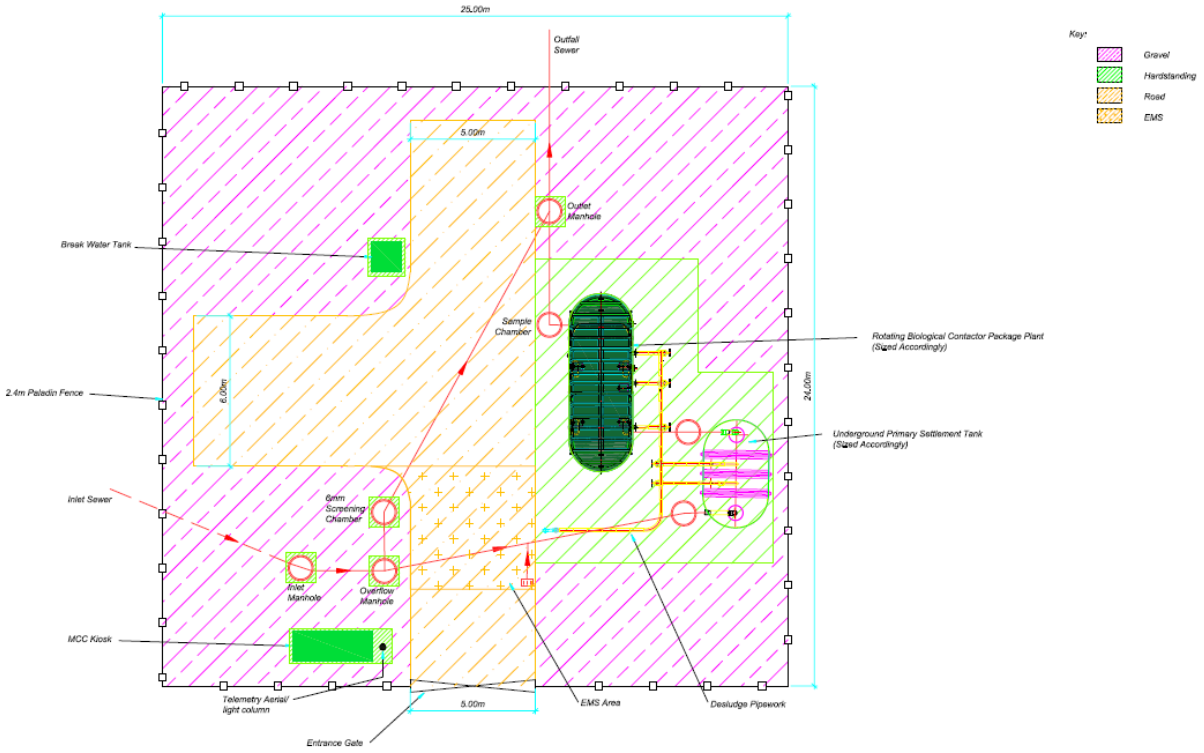
The design and construction of small WwTW's to be adopted by NIW shall take account of relevant provisions within NIW's Environmental Management System (EMS) to ensure that the WwTW can be operated in an environmentally sustainable manner and prevent environmental pollution.

Copies can be obtained from NI Water technical advisor upon request. Please refer to the following documents:

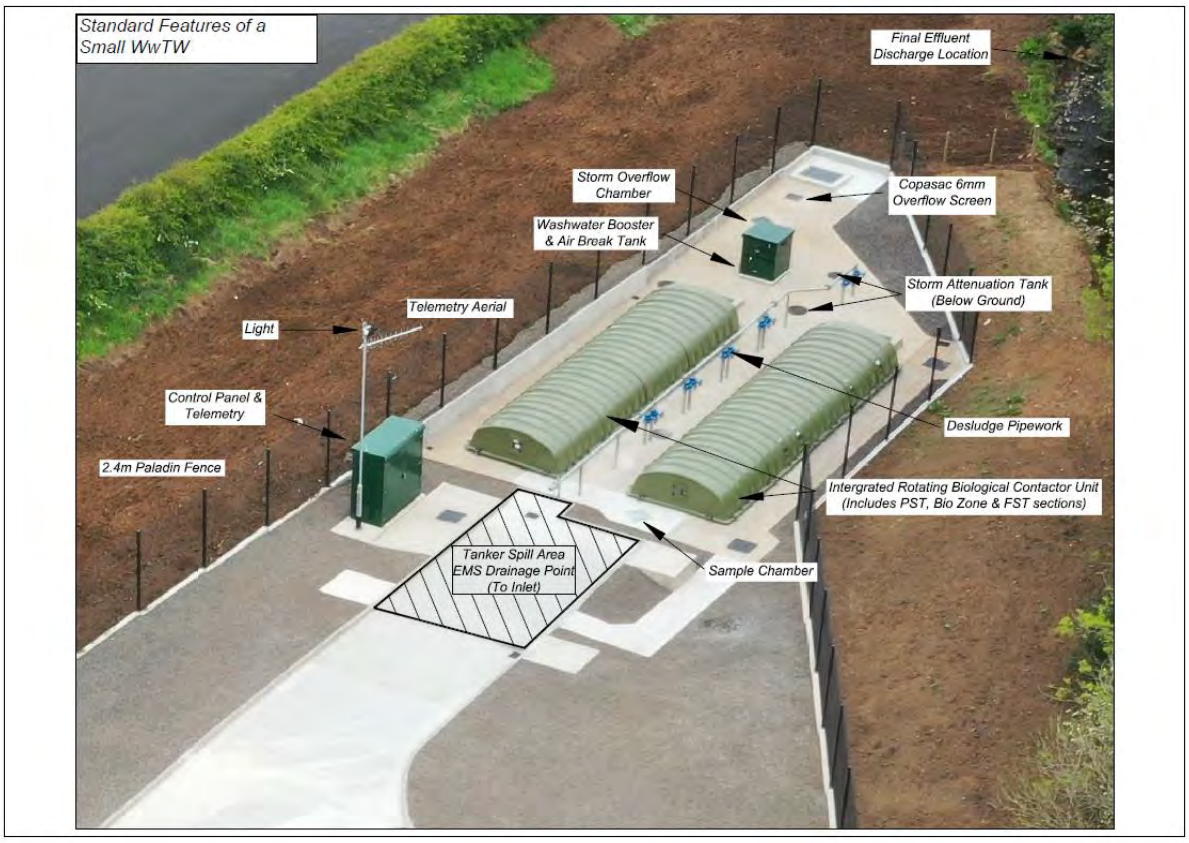
*EMSD8 Reclamation Operations & Maintenance*
*EMSD7 Networks Operation and Maintenance*
*EMSD10 Sewage Sludge Management*

## APPENDIX A TYPICAL SITE LAYOUT AND STANDARD FEATURES OF A SMALL WWTW

Typical Site Layout – for illustration purposes only




Standard Features of a Small WwTW – for illustration purposes only



## APPENDIX B NI WATER ASSET STANDARD FOR RBCS

### RBC Design Parameters

RBC package plants incorporate an integral primary settlement septic tank, RBC biological treatment zone and final settlement tank within a single covered GRP tank. Screening and grit removal shall be effected in the primary settlement septic tank which serves as combined preliminary and primary treatment. The unit is fabricated in a factory environment. For pe ≤ 250 inlet screening is not required.

The table below is an extract from the NI Water Asset Standard for RBCs.

**Table 3.5 RBC Parameters Values**

| **Parameter** | **Description** | | | |
|---|---|---|---|---|
| RBC Package Unit | Flow to Treatment FFT m3/day | | | |
| | Minimum capacity in primary settlement zone ($m^3$)<br><br>1.33 hrs x FFT (3PG +I + 3E)<br>+<br>2hrs @ Formula A – FFT<br>+<br>Sludge production @1.5 l/pe/day<br>(90 days recommended) | | | |
| Biological Loading kg/d | The total BOD loading for the projected design population equivalent | | | |
| | WOC Discharge Consent mg/l | | | |
| | WOC<br>= 40:60 | 40:60<br>> WOC ≥<br>20:30:10 | 20:30:10<br>> WOC ≥<br>10:15:5 | WOC<br>2≤ $NH_3$ < 5 |
| Average organic loading rate per $m^2$ of disc<br>gm BOD/$m^2$/d | 6 | 3 | 2 | 1.5 |
| Maximum loading rate | the organic loading to the first stage shall not exceed 20g BOD/$m^2$/d | | | |
| Minimum retention time Biological treatment zone (hr) | 1.0 | | 1.0 | 1.0 |
| Sludge Yield<br>kg SS/kg BOD removed | 0.8 | | 0.8 | 0.7 |
| Minimum No of Stages | 3 | | 3 | 4 |
| Disc diameter | 3.8 m maximum dia | | | |
| Depth of wastewater | typically 40% of disc submerged, | | | |

| | | | |
|---|---|---|---|
| | no less than 35% of disc submerged at any time | | |
| Maximum recommended shaft length | 8.25 m<br>Deflection < 4 mm | | |
| Rotational speed W | Continuous operation at not less than 1 rev/min < W < not greater than 2 rev/min | | |
| Specific surface area of media | Spacing between adjacent discs | Biomass thickness | Maximum Loading gm BOD/$m^2$.d |
| 150 $m^2/m^3$ | 20-40 mm | < 5mm | 15 |
| 180 $m^2/m^3$ | 15–30 mm | <5mm | 7.5 |
| 210 $m^2/m^3$ | 10-20 mm | <3mm | Only suitable for nitrification |
| 225$m^2/m^3$<br>For final effluent of $NH_3$-N= 3mg/l | <8mm spacing<15mm | <3mm | Only suitable for nitrification |

**3.11.1 Design values**

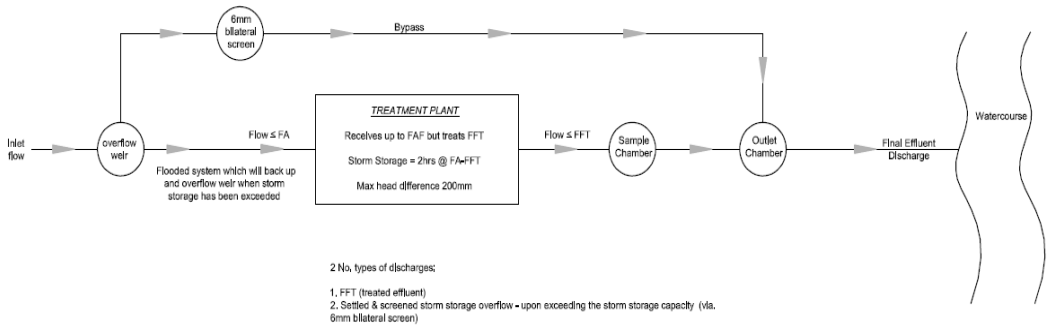
For RBC package plants Table 3.11.1 below details the recommended design values for each zone:

**Table 3.11.1**

| | | | |
|---|---|---|---|
| Primary Settlement Zone | Capacity | 1.33 hrs x FFT<br>+<br>2hrs @ Formula A – FFT<br>+<br>Sludge Storage | 30% reduction in BOD assumed |
| Biozone | Retention Time | Minimum of 1 hr. | |
| Final Settlement Zone | Retention Time | Minimum of 2 hrs. | |
| Final Settlement Zone | Upward Flow Velocity | <1 m/hr at FFT | |

## APPENDIX C RBC PACKAGE UNITS

## SCHEMATIC OF FLOW REGIME




Standardised RBC Solution 2
16 - 249 PE

# APPENDIX H – ODOUR ASSESMENT STANDARD

When a detailed odour assessment is required it would comprise:

- Compilation of an odour emissions inventory;
- Detailed dispersion modelling; and
- Reporting.

This Appendix describes the standard for each component and the requirements for the consultants carrying out the odour assessment.

### Guidance on Odour Emission Surveys

Where NI Water have appropriate site specific data additional sampling may not be required. Where sampling is required the dates of sampling shall be agreed by NI Water, but will commonly be during the summer months. The consultant shall supply a detailed methodology and risk assessment prior to the commencement of any site investigation.

### Preparing Samples for Olfactometry

Make a note of the process conditions, weather conditions and any other factors which may affect the emission of odour from the site on the sampling day. In addition to the continuously operating sources to be sampled, assess the intermittent sources. If they are of sufficient frequency and duration they should be included in the modelling assessment using sampled or reference emissions rates.

### Area Sources

For open sources odour samples are usually taken using a Lindvall hood. The hood would be placed over the area of interest and ventilated with odour free-air (having passed through an activated carbon filter) at a known rate to give an air velocity over the surface of around 0.3 to 0.4 m $s^{-1}$. Odour samples would then be collected at the outlet of the Lindvall hood using the rigid lung method. In the rigid lung method, the flux box is connected to an inert sampling bag held in a rigid container. The air in the container is removed using a portable pump, which causes the odour bag to inflate ensuring no contamination of the odour sample. Where the use of a Lindvall hood is not appropriate a micro-meteorological method may be used. Using the hood area, volumetric flow and odour concentration an odour emission rate for the source can be calculated in odour units per square meter per second ($ou_E$ $m^{-2}$ $s^{-1}$).

### Point Sources

For point sources, or where hood sampling is not appropriate, extractive samples should be taken using the rigid lung method. A sample of the emission of air is taken directly from the stack of the odour control unit. Additional measurements should be made of duct/ stack velocity, gas temperature and the physical dimensions of the duct. These measurements should be used to establish volumetric flow rates, an odour emission rate

in odour units per second and odour removal efficiencies for each of the units measured if appropriate.

**All Samples**

Samples should be collected as duplicates at least i.e. two samples at each sampling location, so that the geometric mean of samples can be calculated, to reduce the uncertainty due to short term variations.

All samples prepared for olfactometry should also be analysed on-site for the concentrations of hydrogen sulphide using a Jerome Gold Leaf Analyser. The Jerome draws a small amount of the sampled air over a gold leaf. Reduced sulphide compounds adsorb onto the gold leaf and in so doing change the electrical resistance and hence there is a change in electrical current that is directly proportional to the concentration of reduced sulphide in the collected sample.

**Olfactometry**

All samples shall be analysed in accordance with BS EN 13725:2003 by a UKAS accredited laboratory to determine the odour concentration.

Odour concentration of a gaseous sample of odorants is determined by presenting a panel of selected and screened human subjects with that sample, varying the concentration by diluting with neutral gas in order to determine the dilution factor at $D_{50}$.

At that dilution factor the odour concentration is 1 $ou_E/m^3$ by definition. The odour concentration of the sample is then expressed as a multiple (equal to the dilution factor at 1 $ou_E/m^3$) of one European odour unit per cubic metre at standard conditions for olfactometry.

**Example emission rates**

Table H.1 shows typical emission rates for processes based on a limited set of monitoring data collected in Northern Ireland, and this is compared with data collected across the UK as a whole.

**Table H.1 Example Odour Emission Rates for WwTW Sources**

| Process Source | Odour Emission Rate ($ou_E$ $m^{-2}$ $s^{-1}$) Northern Ireland Sites | Odour Emission Rate ($ou_E$ $m^{-2}$ $s^{-1}$) UK Average |
|---|---|---|
| Inlet works | 5.65 | 6.99 |
| Primary Settlement Tank (PST) | 4.18 | 7.03 |
| Activated Sludge Plant (ASP) | 1.49 | 1.85 |
| Final Settlement Tank (FST) | 0.62 | 1.11 |
| Storm Tank | 1.17 | 2.42 |
| Sludge Cake Storage | * | 2.19 |

**Guidance on Detailed Dispersion Modelling**

**Requirements of the Detailed Modelling Assessment**

The consultant will make use of the most recently available versions of the new generation dispersion models AERMOD and ADMS, at the time of writing this was 12345 and 5 respectively:

- The consultant shall use five years of hourly sequential data from the most appropriate metrological station. The predictions from each individual year of met data shall be compared against the odour criteria;
- Where the model requires the input of point sources, the consultant shall include for the influence of downwash from structures, including building, storage tanks etc.
- Should the consultant exclude the use of terrain, the consultant would provide justification for this choice;
- Shall be based on the design load of the WwTW (not the current load), and take into consideration any capital expenditure planned and included within the applicable (current) strategic business plan;
- The model input files and all calculations of emission rates shall be submitted to NI Water to allow for peer review.

In the absence of detailed guidance on dispersion modelling from NIEA, the Environment Agency (England & Wales) 2011 document: *H1 Annex F – Air Emissions* (Ref. 26) provides some useful guidance. This guide gives advice on assessing the impact of releases to air from listed activities when applying for a bespoke permit under the Environmental Permitting Regulations but the approach to undertaking a good modelling assessment can be generalised:

- Describe the emissions and receptors;
- Describe the emission rates;
- Present predicted and measured data;
- Consider the uncertainty in the data and the method; and
- Assess impact against the relevant standards.

This is captured in the example of a Modelling Assessment report given in Figure H.1.

**Outputs of the Detailed Modelling Assessment**

Model files and all supporting data and reports in original digital format (not PDF) for NI Water to retain:

- Digital copies of the draft report & drawings; and
- Digital copies of the final report & drawings.

Drawings should include:

- D line showing boundary of the proposed development restraint without additional odour control plant (drawn on CAD so position can be defined to +/- 0.5m); and
- D line showing boundary of the proposed development restraint with additional odour (drawn on CAD so position can be defined to +/- 0.5m).

**Reporting**

It is noted that each consultancy would have a house style. Nonetheless, the Consultant should include a discussion of all aspects given below, Figure H.1, which takes the example of a study with two phases of mitigation investigated: Phase A and Phase B.

**Figure H.1 Detailed Dispersion Modelling Assessment: Expected Contents**

Generic Contents Page
1 Scope of Study
1.1 Introduction
1.2 Project Objectives
2 Process Description
3 Methodology
3.1 Northern Ireland Water Odour Policy
3.2 Odour Sampling
3.3 Detailed Odour Modelling
4 Assessment of Baseline Conditions
4.1 Quantification of Emissions

**Guidance on Selection of Consultant Support**

The consultancy undertaking assessments for Northern Ireland Water and Contractors needs to have experience in undertaking such assessments to ensure that the outputs of the assessment can be relied upon. The lead personnel undertaking the exercise shall have an appropriate level of experience and that junior members of staff are adequately trained and supervised.

The consultancy (and any sub-contractors) undertaking the work will therefore have:

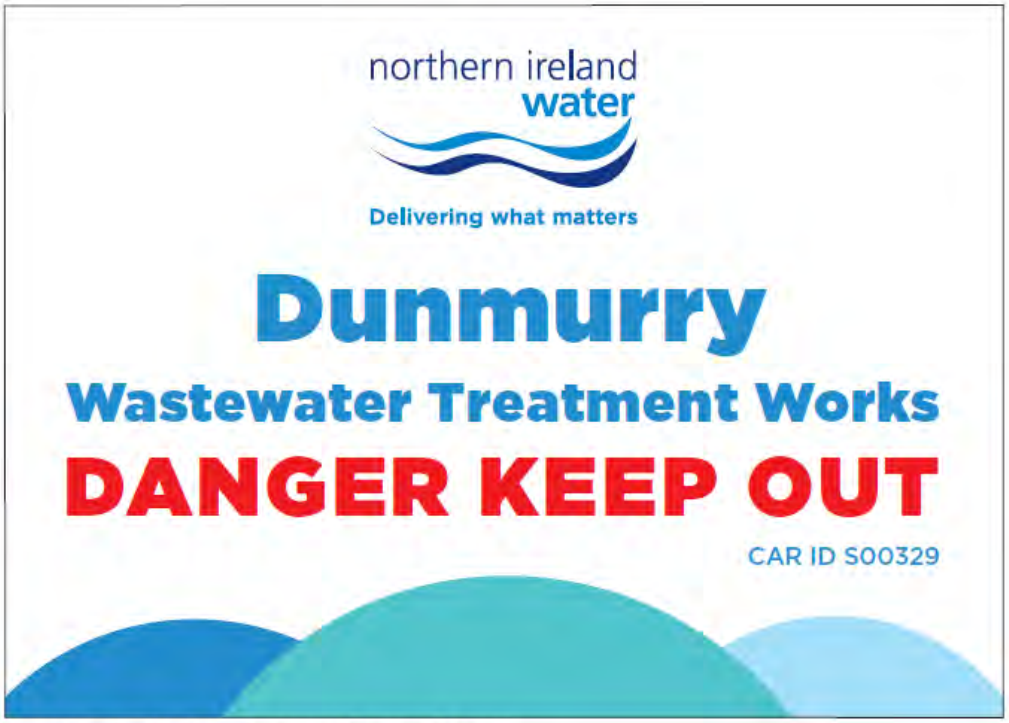
- A track record of undertaking similar assessments;
- Appropriate level of staffing to ensure prompt turnaround of assessments;
- Provide detailed experience of working with other water companies (including Achilles and references where required);
- Process of validating sub-contractors/ associates;
- Operate a quality system (BS EN 9001:2000) or similar;
- Have an appropriate Professional indemnity;
- Laboratories used by the consultancy to be UKAS accredited for analysis of odour to BS EN 13725;
- In-house use of the AERMOD and ADMS dispersion modelling systems, with experienced staff to use such systems; and
- The lead consultant shall therefore have a minimum of five years experience in undertaking odour assessments.

**APPENDIX E NIW SITE SIGNAGE REQUIREMENTS**

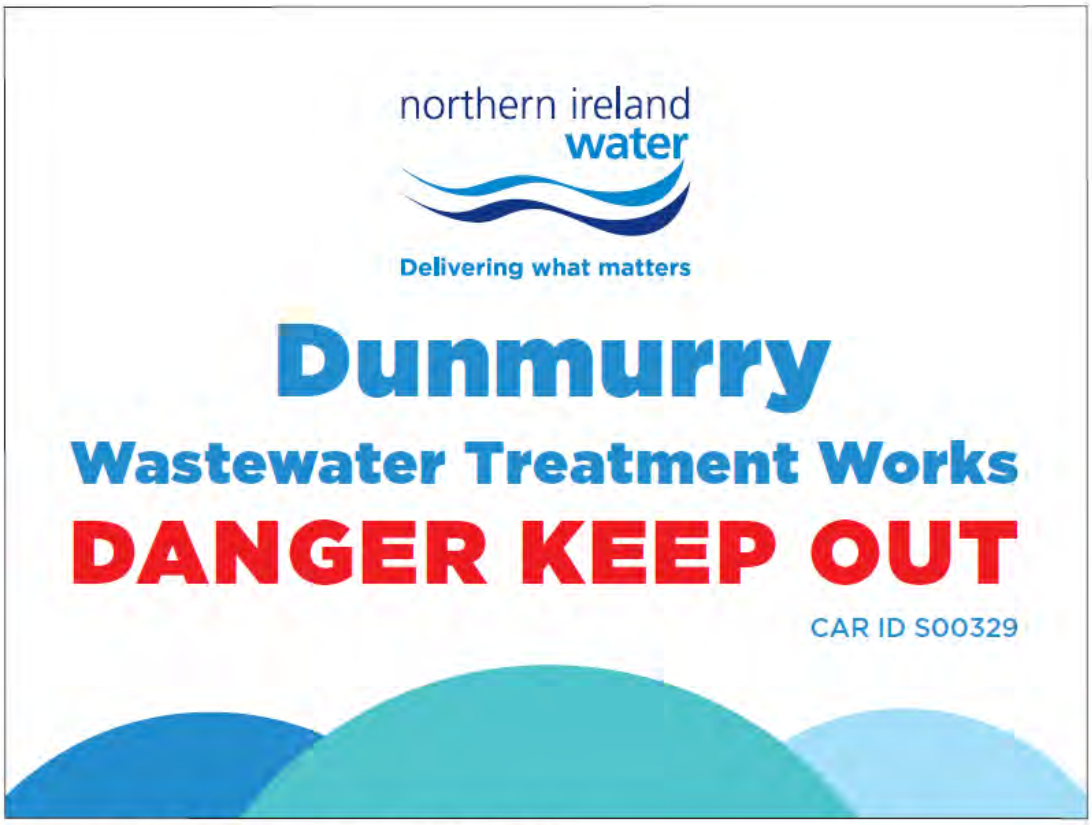
# Specification for Small and Medium Signs

• All signs shall comply with the requirements of Northern Ireland Water Brand guidelines June 2017 (working with our brand). Particular note should be paid to the typefaces used (see pages 19 and 20 of guidelines) and to the colours used
(see page 18 of guidelines).
• Sign to be 3mm thick aluminium sign with exterior grade digital printing (flat print) with clear anti-vandal over laminate (non reflective). Dye bonded or other composite material is not acceptable.
• Signs to be provided either as a small sized sign = 350 x 250mm or a medium sized sign = 600 x 450mm.
• An example of a small sign to be provided is shown on appendix A and an example of a medium sized sign is shown on appendix B. Please note logo positions etc are not to be changed.
• Appendix C shows required measurements and text sizes for small sign.
• Appendix D shows required measurements and text sizes for medium sized sign.
• One sign of each size is to be supplied for inspection and acceptance prior to manufacturing complete sign schedule. Signs provided for acceptance will be fitted on site provided they are found acceptable.
• The required sign and fixing details for each particular site are to be advised by a separate sign schedule.
• Wall mounted signs are to be supplied with 4 nr fixing holes and to be fixed to wall at agreed position by contractor on site. Redundant signs/posts/fixings to be removed off site.
• Fence or gate mounted signs are to be supplied with 2 nr aluminium mounting plates/strips complete with stainless steel bolts, washers and lock nuts.
• Pole mounted signs (ie 600 x 450mm Signs) are to be supplied with aluminium back track complete with 2 nr 75mm stainless steel clips, bolts, nuts and washers. Back track to be fixed to sign with 3M adhesive tape in accordance with manufacturers instructions/recommendations.
• Medium sized signs are to be supported by 1 nr 75mm dia galvanised post 2400mm long fitted with a 150mm square base plate and plastic cap on top. The sign shall be erected at a height of 1200mm from ground level to the bottom edge of the sign. Postholes shall measure 600mm square x 850mm deep. The posts shall be set centrally in the holes to a depth of 750mm, with the holes backfilled with grade C20 concrete to ground level and “weathered” on top to prevent water ponding. Concrete to be adequately compacted.

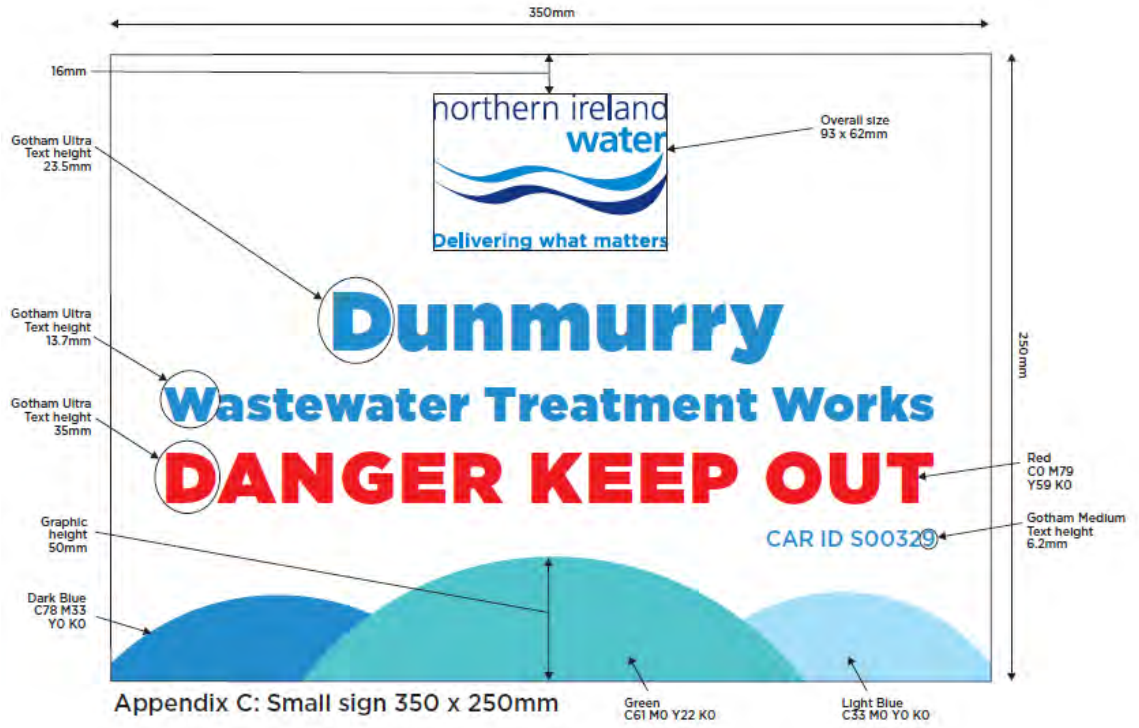
Dunmurry has been illustrated as an example but this design can be applied to any water or wastewater base maintenance treatment works or pumping station. Please get the sign maker to apply the relevant site name and CAR ID.



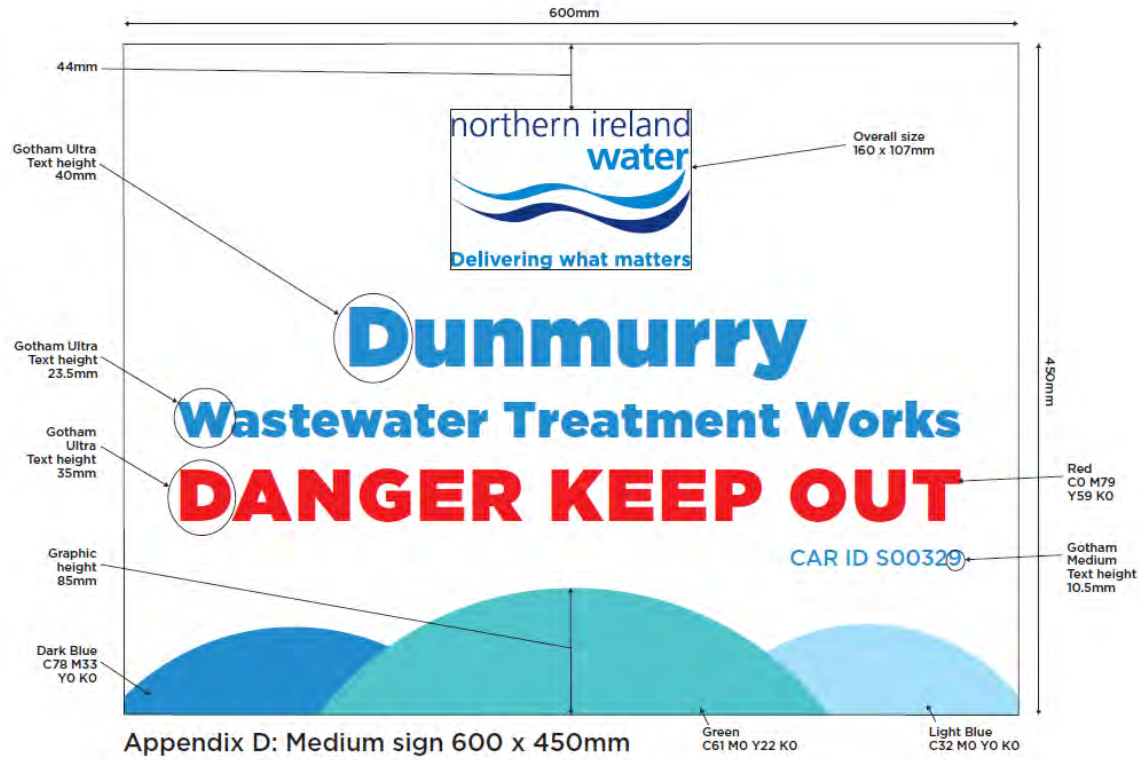

Appendix A: Small sign 350 x 250mm




Appendix B: Medium sign 600 x 450mm




Appendix C: Small sign 350 x 250mm



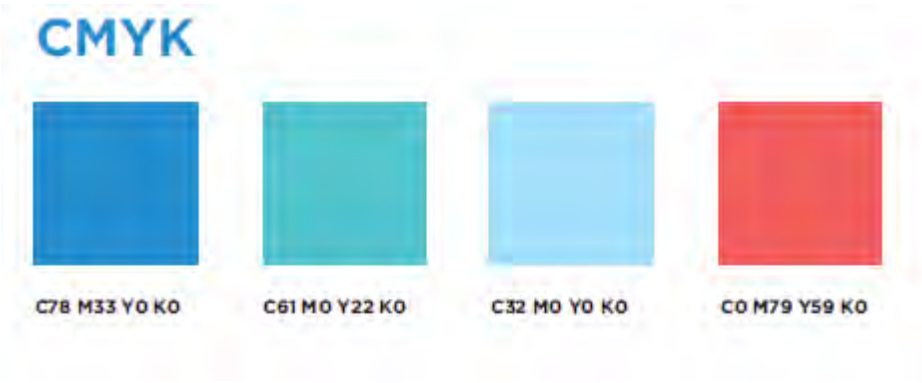

Appendix D: Medium sign 600 x 450mm

# Signage Colour palette

Colours are very important to us. We have carefully selected the ideal colours and tones to complement and enhance our brand. The pastel blues and aquatic greens work with our graphic style to create a sense of friendliness and approachability.

You can see the breakdown options here for CMYK.

These are our core brand colours and it's important we use them throughout our signage materials.




# Signage Typography

## Print

The Northern Ireland Water typeface for signage is Gotham Ultra (main text).
Gotham Medium is used only for the CAR ID number

## Typeface

**Gotham Ultra**

Gotham Medium

**APPENDIX F**

**DETAILED SPECIFICATION FOR WASHWATER BOOSTER SETS**

**Single Pump Wash Water Booster Set For Potable Water Supply (450L)**

The 450 litre design booster set system shall be a standalone package comprising a 450 litre water holding tank, 1 No self-priming pump, low level/dry run protection built in, frost protection heater, associated electrical controls, associated pipe work with piped-in retractable hose reel complete with trigger operated gun style outlet shall also be supplied with the hose reel.

The pump shall run to a pre-determined pressure setting with the pump operating once the gun trigger has been activated. The pump shall achieve an output at the water gun of up to up to 2l/s at hose outlet with a boosted pressure at hose outlet of up to 10 bar. Min flowrate and pressure at hose outlet to be 1.15l/s and 6 bar pressure.

The pump shall also be protected by an emergency stop, located close to the kiosk door opening, which will prevent operation of the pump if activated. The emergency stop must be IP65 rated and a stand-alone item separate from the Local Control Panel (LCP).

Unit shall be sited such that the hose/water gun can readily reach the area or item that is to be maintained through regular pressure washing.

The Booster set technical specifications are summarised as follows:

**Kiosk**

- Twin compartment kiosk 1680 x 1710 x 1300 mm (w x h x d) total.
- Minimum 1310 x 965 mm double front door to allow access to hose reel, pump and LCP with 3 point locking mechanism secured by Abloy padlock. A safety restraint is required to prevent the door from closing when a NI Water operator is operating/inspecting the system.
- Minimum 580 x 965 mm single side door to allow access to hose reel with 3 point locking mechanism secured by Abloy padlock. A safety restraint is required to prevent the door from closing when a NI Water operator is operating/inspecting the system.
- Insulated breakwater / storage tank, minimum 450 litre capacity.
- The break tank is filled with potable water and a water supply isolation valve shall be installed on the incoming MDPE pipe prior to the break tank.
- 25mm brass ballcock controlled tank inlet. The inlet must be above the invert level of the overflow weir.
- The water storage tank must have an overflow piped to the outside of the kiosk so that any overflowing water is clearly visible. All overflows must discharge directly to a trapped gulley which in turn is laid to the appropriate site drainage system.
- The water storage tank must have a 300 x 80 mm AB air gap weir complete with 10mm wire mesh. Weir is to be located away from the inlet.

- The air gap weir must be covered by a hood to act as a wind break to prevent freezing.
- The water storage tank must have a low level drain down, isolation valve and treaded cap located within the kiosk to facilitate the drain down of the tank if required.
- The water storage tank must be segregated from the pump, electrical equipment and hose reel – i.e. a twin compartment kiosk – in order to protect electrical equipment from water in the event of a tank breach.
- All penetrations for pipes / electrical cables between compartments to be sealed using a proprietary water tight penetration sealing collar system.
- The kiosk roof is to be split into two sections, a hinged cover to access water tank and a fully removable section above the pump/LCP kiosk compartment.
- The hinged section of the roof is to provide access from the side not the rear. A safety restraint (hinged roof design) may be required to prevent the cover from closing when an operators is inspecting the system. A stainless steel lockable latch is required suitable to accommodate an Abloy lock.
- Consideration should be given to a “peak style roof” located at open aspect sites.
- Preventative measures required for openings to ensure no hazards presented in the event of strong winds catching the doors/covers when opening.
- All doors/covers to be secured by an Abloy Padlock
- Any removable sections secured from inside kiosk.
- Ensure adequate ventilation for heat management from the Kiosk - Pump / LCP Kiosk section only.
- Two number drainage gulley’s are required:
  - A 100mm trapped drain gulley must be provided in the kiosk plinth to drain the bottom of pump / hose reel compartment.
  - A 100mm trapped drain gulley must be provided to capture Overflow from Water Storage Tank (external of Kiosk).
  - Both drain gully systems are to be connected direct to the Pumping Station Wet Well or if this is not viable connected to existing site drainage.
- All equipment within the kiosk to be so arranged / laid out that the pump / motor is readily accessible for maintenance or removal without necessitating the removal and / or dismantling other items of equipment.
- Consideration should be given for davit sockets for pump removal if pump set is above manual lifting weight.

**Pump & Hose Reel**

- Pump and Hose reel are to be mounted on a skid.
- Hose reel to be used only in an application where potable water is stored in the storage tank.
- Pressure gauge has to be fitted on delivery pipework & clearly visible from access door.
- 1 no 230V 1 Phase 2.2KW self-priming vertical multistage pump.
- Pump Control is based on activating start push button; pumps will operate for a 10 minute period then stop.

- a. Label to be displayed on LCP to confirm operation
- b. Pump Stop button to be made available

- Adjustable flowrate up to 2l/s at hose outlet with a boosted pressure at hose outlet of up to 10 bar. Min flowrate and pressure at hose outlet to be 1.15l/s and 6 bar pressure.
- Pump Low Level Protection using a Low-Level Float Switch within Water Storage Tank.
- Suitably sized pipework and valves with appropriate pressure rating.
- Pump suction isolation valve.
- Pipework to be lagged using synthetic rubber pipe insulation to reduce risk of freezing damage to minus 20 degrees Centigrade.
- All fixtures and fittings to be stainless steel.
- A retractable hose reel complete with trigger operated pressure gun style outlet. The length of the hose (max 25m) is to be determined by site specific investigation and a proposal sent to the *Project Manager* for acceptance.
- Hose reel is to be able to rotate 90° within Kiosk Section for works with restricted access. Hole fixings to be drilled and tapped for ease of hose reel rotation.

**Control Panel & Electrics**

- Local Control Panel (LCP) to include:
  - Mains isolator for entire unit.
  - Mains Available Lamp.
  - ON/OFF switch for control of the Booster Pump.
  - Pump Run lamp.
  - ON/OFF Selector switch for control of the Kiosk Heating.
- Electrical LCP and installation to comply with WIMES 3.02, 3.04 specifications and current BS 7671 Regulations.
- CP to be IP65 rated. Correct cable glands associated with IP65 rating to be used.
- LCP to be mounted onto Marine spec plywood.
- Emergency stop – IP65 rated to be mounted in the kiosk close to the door opening, such that it is readily accessible in the event of a burst pipe or tank breach.
- Appropriate RCD/RCBO protection of the mains supply to the booster set kiosk to be provided remotely, and clearly identified, in the site's main MCC panel.
- Kiosk heater:
  - Heavy duty tubular fin heater and spur unit to be located where it is easily accessible for maintenance tasks. Integrated thermostat, protective cover guard to be included in the heater arrangement, must be IP65 rated, minimum 500W to ensure that the hose reel section is protected to minus 20 degrees centigrade.
  - Ensure that the heaters are mounted in the horizontal position with the wiring gland pointing down towards the ground to ensure that water cannot access the electrical connections easily.

**Safety Signage & Labelling**

The *Contractor* must provide all safety signage and labelling.

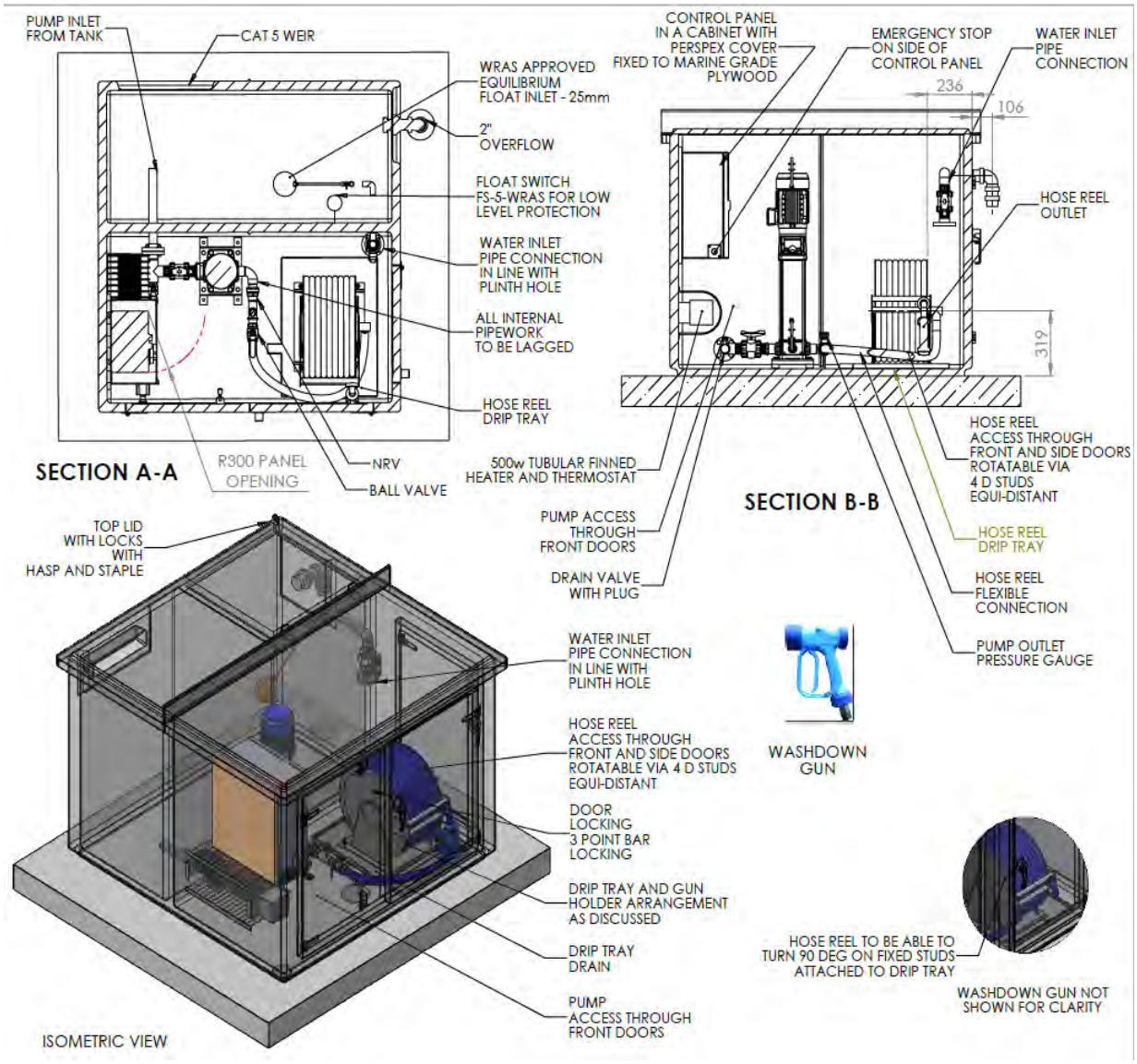
- All Pumps to be labelled.
- All Isolators to be labelled.
- All Cables to be labelled.
- RCBO in the MCC to be labelled and MCC drawings updated.
- Earthing cable to have appropriate warning signage.
- An electrical warning sticker shall be fixed to the door of the wash water booster set (400V or 230V).

**Kiosk Plinth**

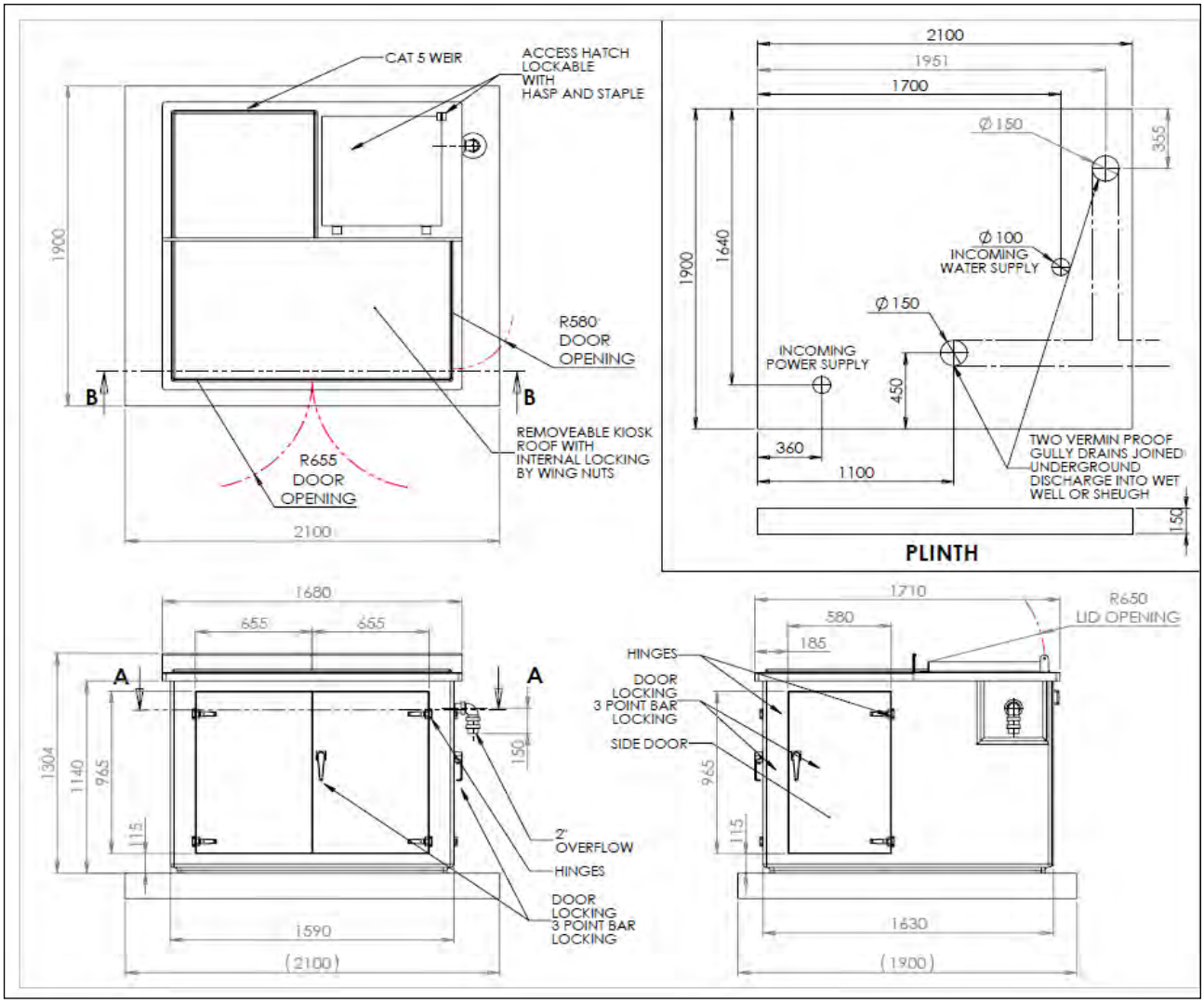
A new concrete plinth is to be installed for the wash water booster set to be mounted. The *Contractor* is to ensure that the ground below can accept the loading.

- Works to be in accordance with CESWI 7th Edition.
- The slab depth will meet the minimum manufacturer's requirements for the supported weight of the kiosk cabinet enclosure.
- Height of top of plinth slab to be a minimum of 150mm above proposed ground level.
- C30 Grade Concrete (minimum).
- Steel Reinforcement to Concrete Plinth.
- Minimum 150mm extension of concrete base to all four sides beyond edge face of Cabinet.
- The plinth is to receive a floated monolithic top surface finish.
- Shuttered concrete finish to formed vertical faces and cast 25mm chamfered edges.
- Curing of Concrete to be undertaken in accordance with supplier's recommendations.
- Complete with formed penetrations for installation of pipework or pipework cast in-situ, in accordance with the manufacturers recommendations.
- Suitable ground bearing to be achieved, from virgin ground level, to receive the proposed booster set and kiosk.
- The plinth must have an independent foundation and is not be cast onto an existing slab/roadway.
- The booster set kiosks should be sufficiently protected against water/gas ingress.
- Cable and water ducts should be sealed using a proprietary gas/flame retardant duct sealing product (not expanding foam).
- Drainage requirements:
    - A 100mm minimum drain must be provided in the kiosk plinth to drain the bottom of pump compartment.
    - Drainage must be provided to capture all overflow from the water storage tank (external of kiosk).
    - Both to be connected to either the site drainage system or EMS drainage.

450L Sectional & Third Dimensional Layout.


PUMP INLET FROM TANK
CAT 5 WEIR
WRAS APPROVED EQUILIBRIUM FLOAT INLET - 25mm
2" OVERFLOW
FLOAT SWITCH FS-5-WRAS FOR LOW LEVEL PROTECTION
WATER INLET PIPE CONNECTION IN LINE WITH PLINTH HOLE
ALL INTERNAL PIPEWORK TO BE LAGGED
HOSE REEL DRIP TRAY
R300 PANEL OPENING
NRV
BALL VALVE
SECTION A-A
CONTROL PANEL IN A CABINET WITH PERSPEX COVER FIXED TO MARINE GRADE PLYWOOD
EMERGENCY STOP ON SIDE OF CONTROL PANEL
WATER INLET PIPE CONNECTION
236
106
HOSE REEL OUTLET
319
500w TUBULAR FINNED HEATER AND THERMOSTAT
PUMP ACCESS THROUGH FRONT DOORS
DRAIN VALVE WITH PLUG
HOSE REEL ACCESS THROUGH FRONT AND SIDE DOORS ROTATABLE VIA 4 D STUDS EQUI-DISTANT
HOSE REEL DRIP TRAY
HOSE REEL FLEXIBLE CONNECTION
PUMP OUTLET PRESSURE GAUGE
SECTION B-B
TOP LID WITH LOCKS WITH HASP AND STAPLE
WATER INLET PIPE CONNECTION IN LINE WITH PLINTH HOLE
HOSE REEL ACCESS THROUGH FRONT AND SIDE DOORS ROTATABLE VIA 4 D STUDS EQUI-DISTANT
DOOR LOCKING 3 POINT BAR LOCKING
DRIP TRAY AND GUN HOLDER ARRANGEMENT AS DISCUSSED
DRIP TRAY DRAIN
PUMP ACCESS THROUGH FRONT DOORS
ISOMETRIC VIEW
WASHDOWN GUN
HOSE REEL TO BE ABLE TO TURN 90 DEG ON FIXED STUDS ATTACHED TO DRIP TRAY
WASHDOWN GUN NOT SHOWN FOR CLARITY

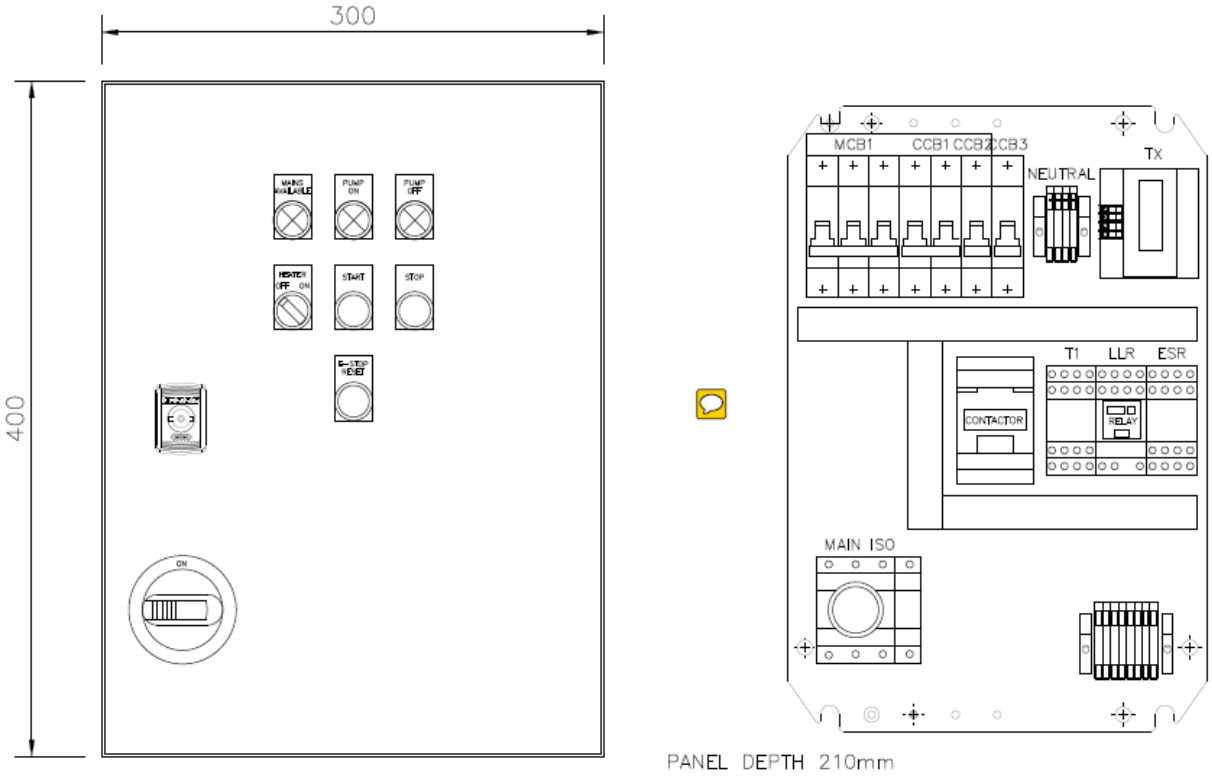
450L Tank Plan and Isometric Drawing



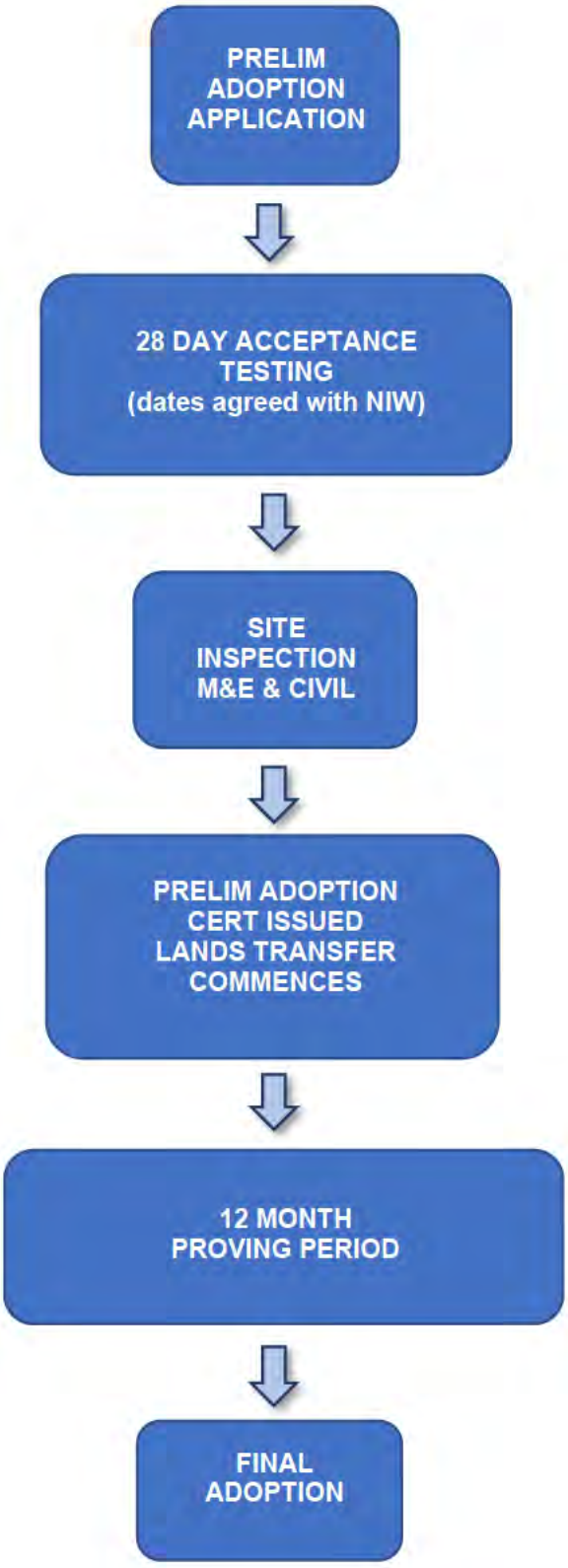
Wash Water Control Panel Layout

IF IN DOUBT ASK

DO NOT SCALE

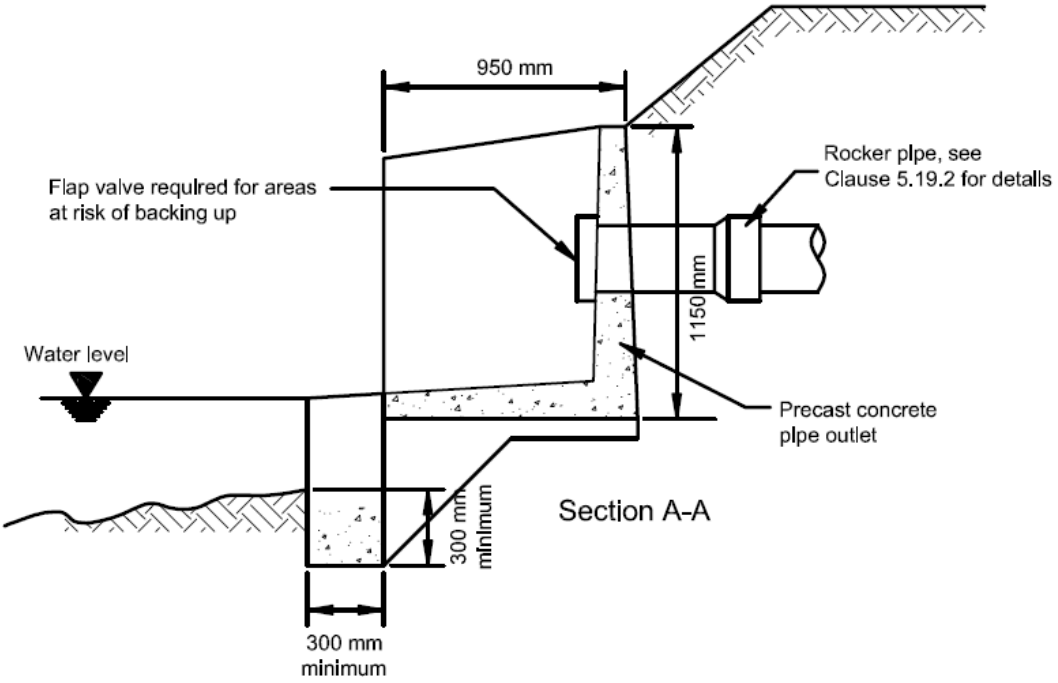


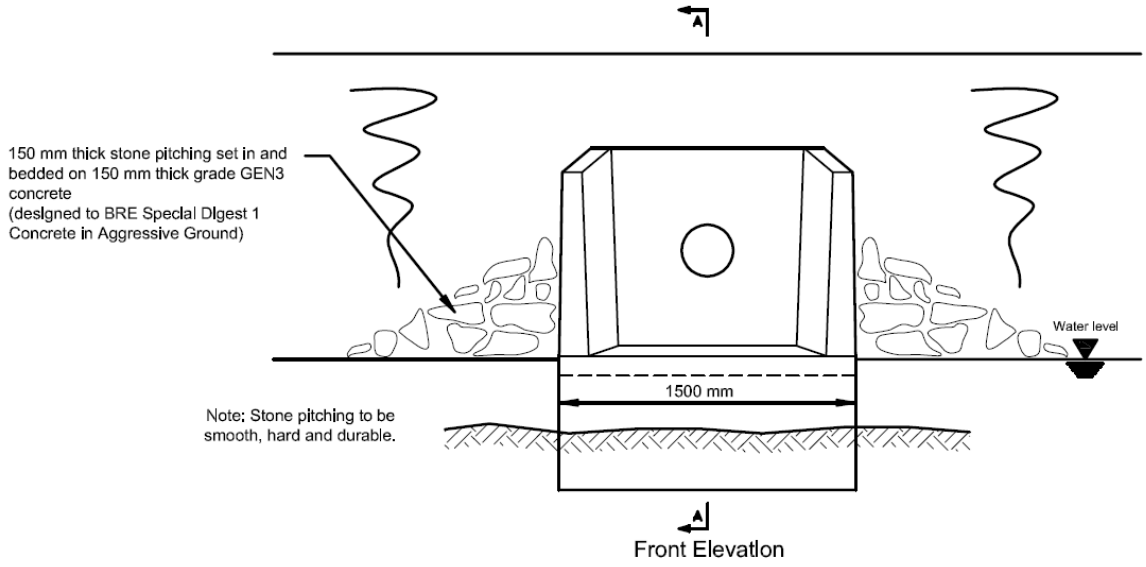
## APPENDIX G ADOPTION FLOW CART



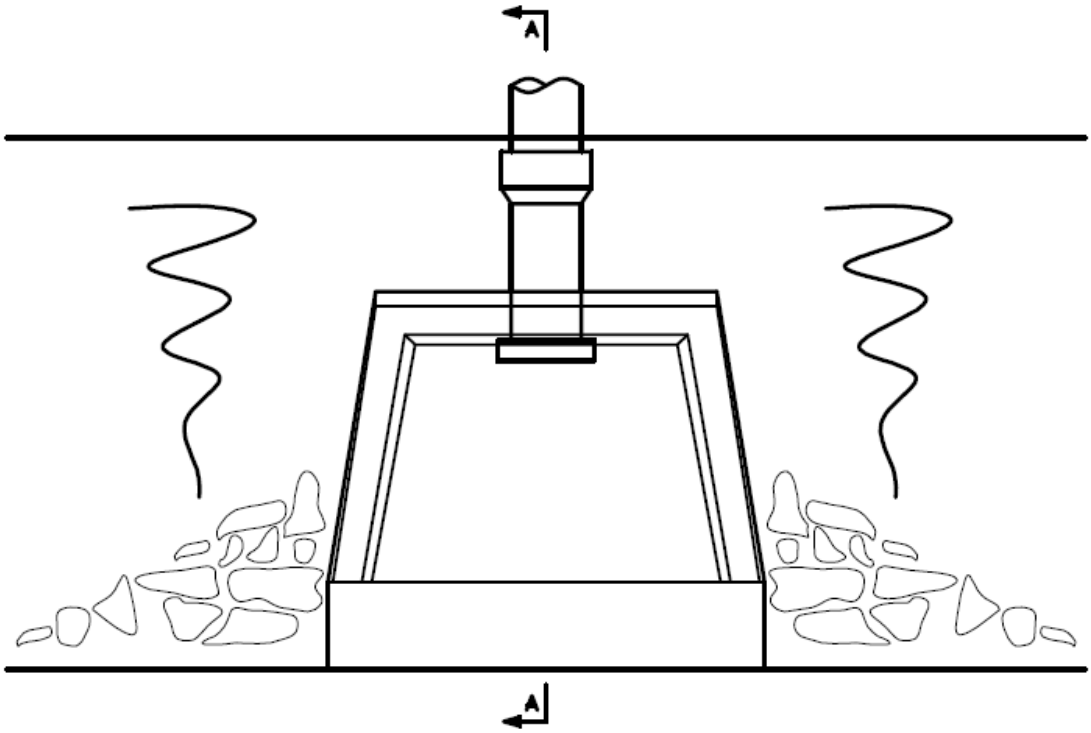
## APPENDIX I – STANDARD HEADWALL DETAIL

**TYPICAL DETAIL OF OUTFALL TO WATERCOURSE**



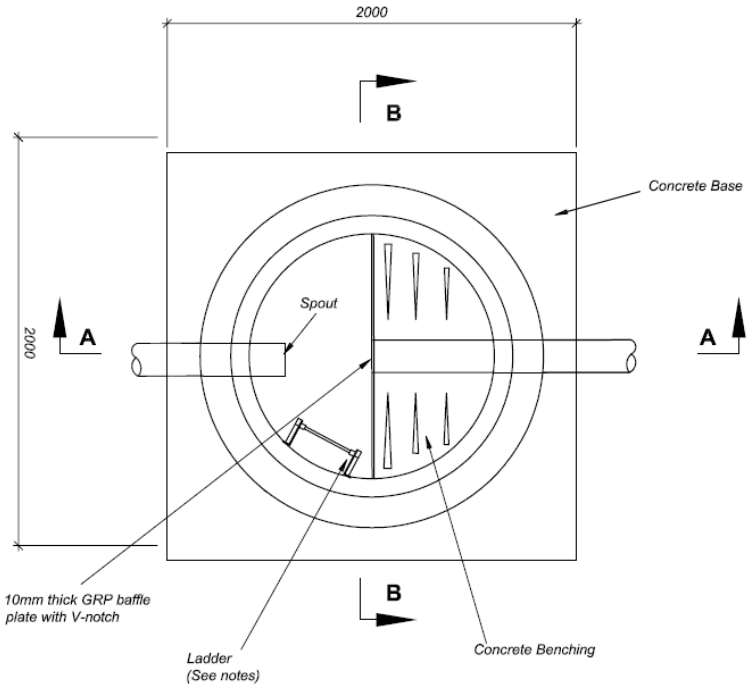




Front Elevation




Plan

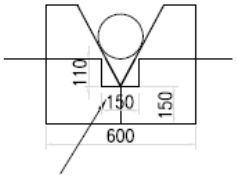
## APPENDIX J – STANDARD SAMPLE CHAMBER DETAIL




SAMPLE CHAMBER
PLAN VIEW

*Provision for Turbidity Sampler installation to be enabled (submerged Min depth of 150mm)*

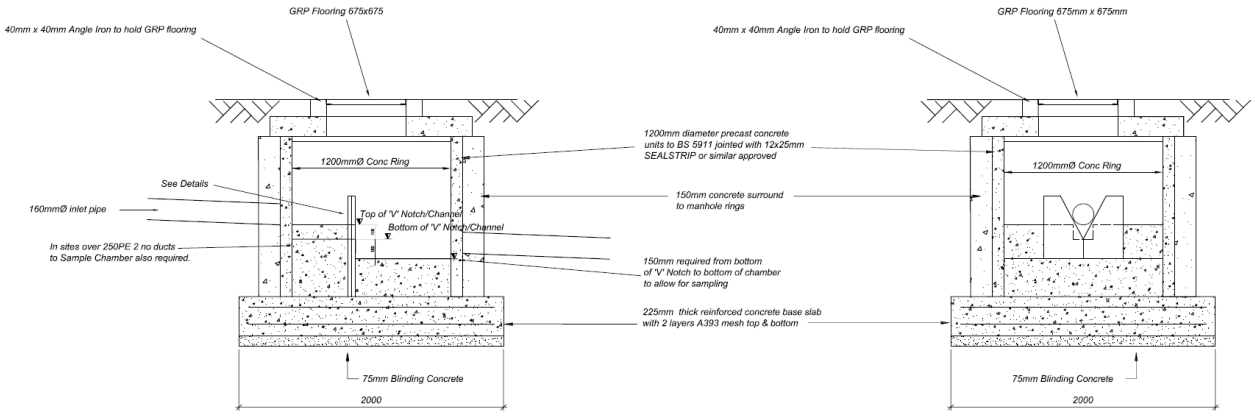
*Provide 300mm square access opening with a handle in the GRP flooring.*




**110mm x 150mm Channel**

V-NOTCH WEIR PLATE DETAIL

*NB: Cost for V-notch Weir Plate not included in BOQ2 Standard Sample Chamber item. Accounted for in Item 232 of BOQ1.*




SAMPLE CHAMBER
SECTION A-A

SAMPLE CHAMBER
SECTION B-B

NOTES

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT DRAWINGS.

2. ALL DIMENSION ARE IN MILLIMETRES AND ALL LEVELS ARE IN METRES (NOT TO ORDNANCE DATUM) UNLESS OTHERWISE NOTED.

3. OBSERVE AND FOLLOW ALL DIMENSION SPECIFICATIONS AND ALLOWANCES FOR DEPTHS, SURROUNDS, CENTERS etc.

4. "CIVIL ENGINEERING SPECIFICATION FOR THE WATER INDUSTRY" 6TH EDITION PUBLISHED ON BEHALF OF UK WATER INDUSTRY RESEARCH LTD. SHALL APPLY.

5. STRUCTURAL CONCRETE C35A CEMENT CONTENT 325-330 KG/M³, MAX. WATER/CEMENT RATIO 0.55, VIBRATED AND COMPACTED IN SECURE FORMWORK, ALL WORKMANSHIP, MATERIALS, ETC. TO BS8007 AND BS8110.

6. REINFORCEMENT IN ACCORDANCE WITH BS 4449:2005 SCHEDULED AS CLASS H SHALL BE GRADE B500A, GRADE B500B OR GRADE B500C. SCHEDULING, DIMENSIONING, BENDING AND CUTTING OF STEEL REINFORCEMENT FOR CONCRETE I.A.W. BS 8666:2005. STEEL FABRIC FOR REINFORCEMENT OF CONCRETE TO BS 4483:2005, MINIMUM LAP 400MM. ALL SECURELY FIXED AND HELD WITH MINIMUM COVER 40MM. MINIMUM LAP FOR H20 = 1000MM, MINIMUM LAP FOR H16 = 768MM, MINIMUM LAP FOR H12 = 600MM, MINIMUM LAP FOR H10 = 500MM. UNLESS NOTED OTHERWISE.

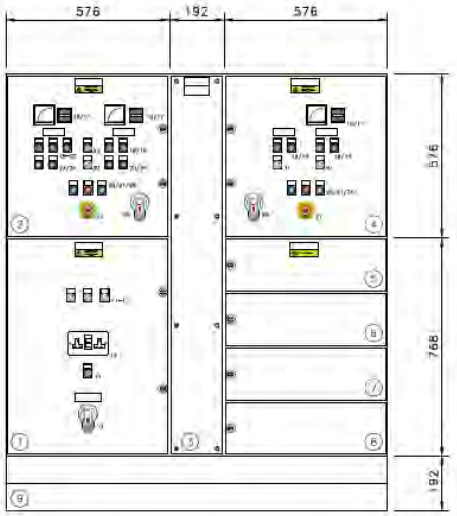
7. JOINT FILLERS, SEALANTS, WATERSTOPS INCLUDING SECURA CLIPS, ETC. SHALL BE INSTALLED STRICTLY I.A.W. MANUFACTURER'S INSTRUCTIONS.

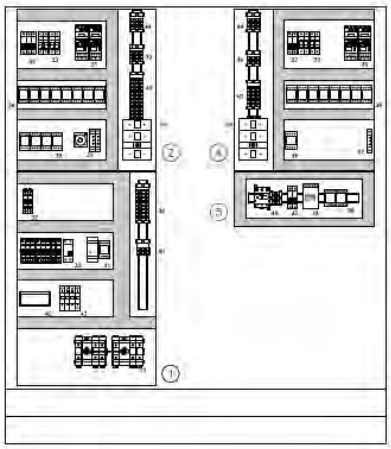
8. FORMWORK FINISHES SHALL BE IN ACCORDANCE WITH CL 4.22 OF CIVIL ENGINEERING SPECIFICATION FOR THE WATER INDUSTRY, 6TH EDITION.

9. BLINDING LAYER NOT LESS THAN 75MM THICK OF GRADE C20 CONCRETE TO BE PLACED UNDER ALL CONCRETE STRUCTURES.

10. ALL SURFACES TO BE CLEAN, FREE OF WATER & LOOSE MATERIAL BEFORE PLACING OF THE CONCRETE.

## APPENDIX K – TYPICAL PANEL LAYOUT



| ITEM No. | DESCRIPTION |
|---|---|
| 1 | MAINS AND DISTRIBUTION SECTION |
| 2 | RBC & SLUDGE RETURN PUMP STARTER SECTION |
| 3 | CABLE CHAMBER |
| 4 | OUTLET PUMP & VENTILATION FAN STARTER SECTION |
| 5 | COMMON CONTROL SECTION |
| 6 | SPARE SECTION |
| 7 | SPARE SECTION |
| 8 | SPARE SECTION |
| 9 | DOUBLE PLINTH |
| 10 | MAINS/GENERATOR CHANGEOVER 63A FUSESWITCHES |
| 11 | KIOSK HEATING OFF/ON SELECTOR SWITCH |
| 12 | KIOSK LIGHTING OFF/ON SELECTOR SWITCH |
| 13 | SITE LIGHTING OFF/ON SELECTOR SWITCH |
| 14 | SOCKET OUTLET 240V/30mA RCD PROTECTED |
| 15 | INDICATING WHITE LED (MAINS HEALTHY) |
| 16 | AMMETER (72x72mm) |
| 17 | HOURS RUN METER (230V) |
| 18 | INDICATING GREEN LED (RUNNING) |
| 19 | INDICATING RED LED (OVERLOAD TRIP) |
| 20 | INDICATING RED LED (LOSS OF ROTATION) |
| 21 | INDICATING RED LED (EMERGENCY STOP ACTIVATED) |
| 22 | INDICATING AMBER LED (AUTO AVAILABLE) |
| 23 | PUSHBUTTON GREEN (START) |
| 24 | PUSHBUTTON RED (STOP) |
| 25 | PUSHBUTTON BLUE (FAULT RESET) |
| 26 | PUSHBUTTON BLUE (LAMP TEST) |
| 27 | PUSHBUTTON RED LATCHING (EMERGENCY STOP) |
| 28 | SELECTOR SWITCH 3-POSITION (HAND-OFF-AUTO) |
| 29 | DOOR INTERLOCKED 32A SWITCH FUSE |
| 30 | SELECTOR SWITCH 3-POSITION (HAND-OFF-AUTO) |
| 31 | SELECTOR SWITCH 2-POSITION (OFF-ON) |
| 32 | CONTROL MCBs |
| 33 | MOTOR SUPPLY FUSE CARRIERS |
| 34 | 24VDC POWER SUPPLY UNIT |
| 35 | DOL STARTER c/w OVERLOAD PROTECTION |
| 36 | 230VAC 2POLE CONTROL RELAYS |
| 37 | CONTROL TIMERS |
| 38 | 24VDC 3POLE CONTROL RELAYS |
| 39 | FIELD TERMINAL BLOCK |
| 40 | COMMON CONTROL TERMINAL BLOCK |
| 41 | PHASE FAILURE RELAY |
| 42 | 3P+N MAINS DISTRIBUTION BLOCK |
| 43 | SURGE ARRESTOR |
| 44 | MAINS CONTROL TERMINAL BLOCK |
| 45 | TOGGLE ISOLATOR |