SECTION C1: OPERATIONAL INFORMATION REQUIREMENTS

Tramore Wastewater Treatment Works was constructed on a green field site in the townland of Crobally Upper, to the east of Tramore, approximately 150 m. from the Riverstown Road. The area of the site is approximately 3.7 hectares and is located close to residential housing, holiday homes and the Backstrand area (Refer to the drawings and photographs in Attachment No. A1). Construction commenced in November 2005. Final commissioning is currently (December 2007) ongoing.

The plant has the hydraulic design capacity to treat for wastewater discharges from up to 20,000 p.e. (at 65g/c/d BOD) during the peak summer season and an average of 11,000 p.e. for the remainder of the year.

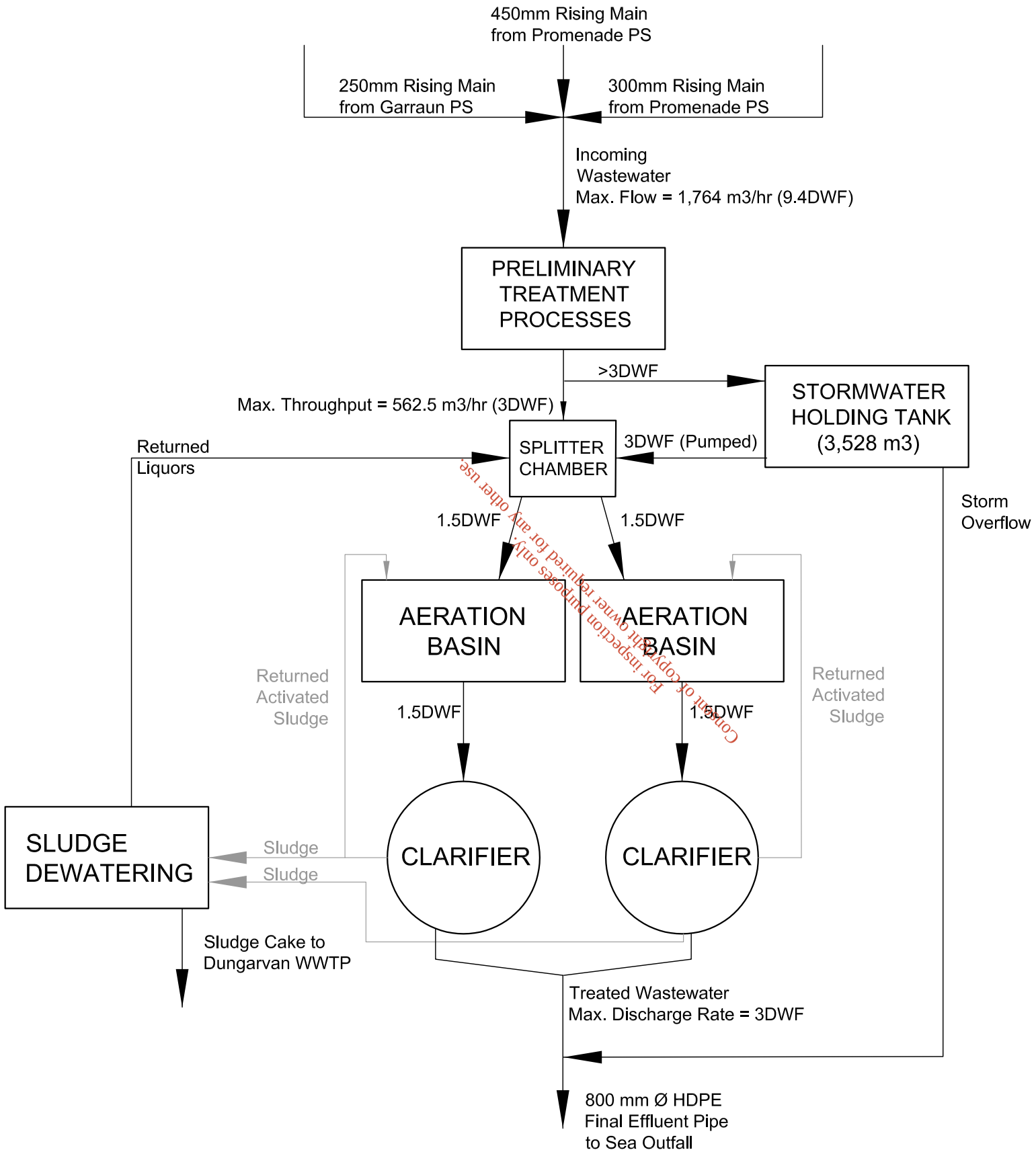
The design dry weather flow (DWF) for the plant is 4,500 m^3/day, which is based on a population equivalent of 20,000 contributing 225 l/head/day. This equates to an average flow of 187 m^3/hr.

A provision has been made in the design of the plant to allow for expansion to 35,000 p.e. should it be required in the future. This is to be reviewed within the 20 year O&M period that is currently in place.

Attached is an extract from the Employers Requirements for Design & Build Works for Tramore Wastewater Treatment Plant. This extract sets out the technical requirements pertaining to the treatment plant. It specifically outlines the requirements relating to design loadings, performance standards and process requirements. The treatment plant has been constructed in accordance with the technical requirements outlined in the attached document. Included in this attachment is a copy of Drg. No. 2 from Attachment No. A1.

Table of Attachments

Item	Title	Drg. No.
1	Schematic Showing Treatment Plant Processes (Copy of drawing from Attachment A1)	Drg. No. 2
2	Employers Requirements for Design & Build Works for Tramore WWTP	Not Applicable



COMHAIRLE CONTAE
PHORT LÁIRGE
WATERFORD COUNTY COUNCIL
Civic Offices, Dungarvan, Co. Waterford.
Dierctor of Services and
County Engineer; J. S. O'FLYNN,
B.E., C.Eng., F.I.E.I., M.I.C.E.

RPS Consulting Engineers
RPS Consulting Engineers, Inishmore,
Ballincollig, Co. Cork, Ireland.
T: +353 21 4870200 - F: +353 21 487 3742
E: ireland@rpsgroup.com W: www.rpsgroup.com/ireland

NOTES
1. This drawing is the property of RPS Consulting Engineers. It is a confidential document and must not be copied, used, or its contents divulged without prior written consent.
2. All levels are referred to Ordnance Survey Datum, Malin Head.
3. DO NOT SCALE, use figured dimensions only, if in doubt ask.

A01	ISSUE FOR APPROVAL	NOV. '07

Job Title.
TRAMORE
WASTEWATER DISCHARGE
LICENCE APPLICATION

Title of drawing.
SCHEMATIC SHOWING
TREATMENT PLANT
PROCESSES

Drawn.	S.Hunter	Job No.	MCW0498DG0014
Checked.	V. Coleman	Date.	NOV.2007
Approved.	B. Brice		
Scale.	AS SHOWN	Dwg. No.	2
		Rev.	A01

2.0 TECHNICAL REQUIREMENTS

2.1 Design Basis

2.1.1 Hydraulic Design Load

The design DWF to the plant shall be 4,500m^3/d based on a population equivalent of 20,000 contributing 225l/c/d. This equates to an average flow of 187.5m^3/h.

The hydraulic capacity of the plant shall be 3 times the design DWF equivalent to 562.5m^3/hr.

A stormwater balancing tank shall be provided to ensure retention of the maximum pumped flow (1,764 m^3/h) to the treatment plant for a two hour period prior to overflowing.

Although there is a significant variation in the summer and winter population of Tramore the flow and load survey did not record any major variation in flow between the seasons. This is largely due to infiltration in the collection system, which is currently being investigated with a view to being substantially reduced.

2.1.2 Organic Design Load

The organic design loading for the treatment plant is detailed in Table 2.1 below.

The above design parameters are for the average day in the peak week in both periods. The plant offered has to be able to cope with short (up to 2 day) peaks of up to 50% in excess of the above values. These would typically occur on Sunday/Mondays of fine Bank Holiday weekends both in the "summer" and "winter" periods.

The above design parameters shall be used in the evaluation of the yearly Operation and Maintenance costs during Tender assessment based on the following growth assumptions:-

- At commissioning the "current" values will apply.
- The "design" values will be reached at the end of year 10 of the Operation and Maintenance Period and will continue at those levels for the remainder of the period.
- At commissioning the DWF will vary from 1750m3/d ("winter" season) to 3,500m3/d ("summer" season).
- At the end of year 10 of the Operation and Maintenance Period these DWF values will have risen to 2,190 and 4,500m3/d respectively and will continue at these values for the remainder of the Operation and Maintenance Period.
- An even growth shall occur between current and design values over the first 10 years of the Operation and Maintenance Period.

Table 2.1 - Organic design load for Tramore WwTP (Phase 1)

*Season	Parameter	Unit	Current Average	Design
"Summer"	Chemical Oxygen Demand, COD	kg/d	1,797	**2,025**
	Biological Oxygen Demand, BOD	kg/d	1,029	**1,300**
	Suspended Solids, SS	kg/d	1,402	**1,590**
"Winter"	Chemical Oxygen Demand, COD	kg/d	921	**1,150**
	Biological Oxygen Demand, BOD	kg/d	527	**715**
	Suspended Solids, SS	kg/d	752	**940**

* "Summer" season defined as 1st June - 31st August.
"Winter" season defined as 1st September - 31st May

Wastewater Characteristics

The expected composition of the wastewater arriving at the plant under DWF conditions is set out in Table 2.2 below.

Table 2.2 – Expected composition of wastewater at DWF

Parameter	Unit	Average	St. dev.
COD	mg/l	305	186
BOD	mg/l	221	139
Suspended solids	mg/l	393	401
Ammonia	mg/l	50	49
OFG	mg/l	19	11
Total phosphorus	mg/l	13	9
Ortho phosphate	mg/l	23	38

2.2 Performance Standards

2.2.1 General

The Works shall meet the following performance standards which are set out in detail in the following sections:-

- Environmental Standards with respect to final effluent quality, odour and noise set out below.
- Performance Standards for individual process units contained in Section 2.3.
- The Works Performance Guarantees contained in Volume 4.

2.2.2 Final Effluent Quality

The final effluent quality standards to be applied at Tramore Wastewater Treatment Plant are primarily governed by the Council Directive of 21 May 1991-91/271/EEC concerning urban waste water treatment, effected in Ireland by S.I. No. 419 of 1994 as amended by S.I. No. 254 of 2001: Urban Waste Water Treatment Regulations, 2001. However, the final effluent quality stipulated in the Environmental Impact Statement is stricter than that set out in the Regulations, with respect to BOD and total suspended solids. A COD limit was not set out in the Environmental Impact Statement but the Contractor shall apply the value to be achieved as detailed in Table 2.3 below.

With the exception of the final effluent quality standards, the Contractor shall abide by the requirements of S.I. No. 419 of 1994 as amended by S.I. No. 254 of 2001 in every respect.

The Works shall be capable of producing final effluent meeting the standards set out in Table 2.3 below.

Table 2.3 - Final Effluent Quality Standards

Parameter	Unit	Standard
COD	mg/l	125
BOD_5	mg/l	20
Total Suspended Solids	mg/l	30

Compliance with the above standards shall be monitored by daily flow proportional samples.

The above final effluent quality standards shall apply to the effluent discharged to the head of the outfall pipe prior to the stormwater discharge point.

2.2.3 Sludge Quality

All surplus sludge produced at Tramore Wastewater Treatment Plant shall be de-watered to produce a sludge cake to a minimum dry solids content of 16% and a maximum dry solids content of 23%.

2.2.4 Plant Upgrades

The beach at Tramore is required to comply with the provisions of S.I. No. 155/1992: Quality of Bathing Waters Regulations, 1992.

The treated wastewater from Tramore WwTP will be discharged to sea via a 2000 m long marine outfall. A marine outfall study, carried out in 1997, shows that under these conditions further treatment for removal of pathogens will not be required, to comply with the bathing water quality standards.

The Contractor must, however, make provision in the design of the treatment plant for the retrofitting of dis-infection facilities, in the event that it may be required to meet more stringent standards in the future.

In addition the Contractor shall design the works to make appropriate allowance for future upgrading to achieve the following:-

- Total Nitrogen Standard of 15mg/l

- Total Phosphorus Standard of 2 mg/l
- Inclusion of primary settlement.

The Contractor's design shall clearly demonstrate how he has made provision for such upgrading.

2.2.5 Modularity of Plant Design

The design shall be based on a modular format so that future extensions or modifications can be incorporated without any undue disturbance to the operation or maintenance of the Wastewater Treatment Plant.

Projections to the year 2035 show that that the plant at that stage might have to accommodate a flow and load from an equivalent population of 35,000. The COD, BOD and SS design loads for such a plant would be 4,200, 2,275 and 3,150 kg/d respectively. DWF would be 7,875m^3/d with 3DWF (984m^3/h) passing forward to full treatment. The necessary expansion to achieve this treatment capacity could include for a primary settlement phase.

The Contractor shall ensure that items such as, pipework, inlet channels, splitter chambers, machinery buildings and sludge treatment facilities are designed so as not to involve the need for significant upgrading works in the future.

The Contractor shall clearly indicate in the Tender, how a future extension to the expected future full capacity can be implemented.

2.2.6 Odour Control

The EIS proposed that foul air be collected from the screening house, dewatering house and picket fence thickener by forced ventilation and drawn through a peat odour scrubbing bed.

The EIS identifies these areas as possible sources of odour and states that the various treatment stages will be 'designed to be odour free'.

To comply with the EIS requirements the Contractor shall provide an odour control system at all potential sources of odour to the standards specified below.

The concentration of Hydrogen Sulphide (H_2S) shall be less than 0.5 ppb at the boundary of the site and 2 ppb within the site (including the outlet to any odour control unit).

The concentration of Methyl Mercaptans and Butyl Mercaptans shall be less than 2 ppb and 0.25 ppb respectively at the boundary of the site, within the site and at the outlet to any odour control unit.

The Contractor shall comply with the National Authority for Occupational Safety and Health, 2002 Code of practice (Ireland) for the Safety, Health and Welfare at Work (Chemical Agents) Regulations 2001 (S.I. 619 of 2001) in relation to occupational exposure limits within process buildings.

The odour control system shall be capable of achieving 95 and 98 percentile concentrations of less than 3 and 5 o.u./m^3 above background levels at the boundary of the site as determined by olfactometric measurements taken in the gas stream discharge to atmosphere. The Contractor shall supply with his tender an odour dispersion model showing that his proposals in this regard comply with these requirements.

The Contractor shall implement an odour monitoring regime as part of the operation and maintenance of the works as specified in the 'Employer's Requirements for Operation and Maintenance of the Works' (Volume 6). Consequently the Contractor shall ensure that the required monitoring equipment is made available at all times at the treatment plant to carry out this work.

2.2.7 Noise Control

The Environmental Impact Statement sets out generally acceptable noise level criteria in the following ranges:-

Night : 35 to 45 dB(A)
Day : 45 to 55 dB(A)

The works shall be designed to ensure that the following noise levels are not exceeded during the operation of the plant, when measured at the treatment plant site boundary.

Night	0800 hrs to 2000 hrs	:	45 dB(A) 30 Minute LAeq
Day	2000 hrs to 0800 hrs	:	55 dB(A) 30 Minute LAeq

The Contractor shall be required to measure noise levels at specific locations and at set intervals as specified in the 'Employer's Requirements for Operation and Maintenance of the Works' (Volume 6).

2.3 Interface with Collection and Discharge System

2.3.1 Collection System

The wastewater to be treated will be transported to the site by three ductile iron rising mains. The pumps and rising mains have been designed to discharge at 12.0 m O.D. to the following parameters:-

Table 2.4 – Design Parameters for Rising Mains

Location	Diameter (mm)	Capacity (l/s)	Design length (m)	
			Total	Within WwTP Site
Promenade Pumphouse	450	300 l/s	850	126
	300	100 l/s	850	126
Garraun Pumping Station	250	90 l/s	180	130

The rising mains will be constructed in ductile iron by others to the boundary of the Treatment Plant Site at the locations and invert levels indicated on Drawing No. 2 (Volume 15). The Contractor shall complete the rising mains within the site and supply and install the necessary fittings to connect to the plain ends of the rising mains laid to the boundary of the site.

2.3.2 Discharge System

The final effluent from the Treatment Plant shall discharge to a 800mmPE100 SDR 17.6 polyethylene outfall pipe at the location shown on Drawing No. 2 (Volume 15). The Contractor shall construct the section of outfall pipe within the Treatment Plant site in the same material, and supply and install the necessary fittings to connect it to the plain end of the outfall at the site boundary.

In order to maintain a gravity discharge from the Treatment Plant the Contractor shall ensure that the hydraulic level at the head of the outfall pipe is at least 6.5 m O.D (Malin Head). In order to cater for future expansion of the plant the Contractor shall ensure that this minimum hydraulic level can be increased to 10.2 m O.D. The Contractor shall show in his design how he has made provision for increasing this hydraulic level.

2.4 Specific Process Requirements

2.4.1 General

The Contractor is free to submit a proposal for the general layout of the Plant. However, the following overall requirements for the process layout and functional demands shall be fulfilled.

The elements specified in this section shall comply with the Civil, Mechanical and Electrical Specifications contained in Volumes 9 and 10.

2.4.2 Proven Technology

The Contractor shall use only treatment processes, plant and equipment that:-

- Have been in use for at least three years on similar municipal wastewater treatment facilities
- Have been shown to operate satisfactorily and consistently on at least three municipal wastewater treatment plants of similar or greater size and in similar climatic conditions to that prevailing at Tramore
- Are the most modern and up to date without entailing excessive cost.

Full details of the processes, plant and equipment being offered shall be submitted with the tender.

2.4.3 Operational Flexibility

The Contractor shall ensure that operational flexibility is given priority throughout the Wastewater Treatment Plant design by adoption of the following principles:-

- The provision of standby facilities
- The provision of by-passes, to maintain plant operability during maintenance and/or breakdown
- The standardisation of plant components, where practicable, to permit interchangability and reduction of spare parts holdings

2.4.4 Standby Capacity

The Contractor shall ensure that sufficient standby capacity is provided to maintain the operation of the Wastewater Treatment Plant on a continuous basis in the event of breakdown or planned maintenance.

2.4.5 Space for Maintenance

An adequate amount of space shall be provided around plant and equipment to ensure that operational tasks and maintenance can be carried out safely and efficiently.

2.4.6 Flow Measurement

The flow through the Wastewater Treatment Plant shall be measured at the following locations, as a minimum:-

- At the common inlet to the Wastewater Treatment Plant prior to preliminary treatment (Point A on Figure 2.1)
- On the return and overflow from the stormwater holding tank (Points F and G on Figure 2.1)
- Before secondary treatment on every stream, if the flow is split into more than one stream (Point B on Figure 2.1)
- At the common outlet of the Wastewater Treatment Plant before final discharge and upstream of the stormwater overflow connection (Point E on Figure 2.1)
- On sludge return and sludge waste lines (Points H and I on Figure 2.1)
- On all by-pass flows, stormwater returns and any wastewater returns (Point J on Figure 2.1) to the inlet of the Wastewater Treatment Plant
- On potable water inlet (Point M on Figure 2.1)
- A weighing system for dewatered sludge shall furthermore be established (Point K on Figure 2.1)

The Contractor may include any additional flow monitoring, where it is considered necessary, at locations to be determined by the Contractor in his/her design. The flows shall be measured on a continuous basis by means of flow meters that are based upon ultrasonic (open channel) or electromagnetic measuring principles. In addition, measurement at the common inlet prior to preliminary treatment and at common outlet of the Wastewater Treatment Plant before final discharge and upstream of the storm water discharge (Points A and E on Figure 2.1) shall be measured with open channel fitted with an ultrasonic level device. Flow measurement with an open channel flume shall be calibrated in accordance with the manufacturers instructions. Safe access shall be provided at open channel flumes to allow visual inspection and the taking of samples.

Electromagnetic flow meters shall include electronic fingerprint to enable calibration to be conducted on site.

The minimum requirements for flow measurement are listed in 'Table A: Schedule of Analysis' in Volume 6 – Employer's Requirements for Operation and Maintenance of the Works.

2.4.7 Sampling Locations

Sampling equipment shall be provided at the following locations and as shown on Fig. 2.1 and listed in 'Table A: Schedule of Analysis' in Volume 6 – Employer's Requirements for Operation and Maintenance of the Works, as a minimum:-

- At the common inlet to the Wastewater Treatment Plant prior to preliminary treatment (Point A).
- Before secondary treatment (Point B).
- At the common outlet of the Wastewater Treatment Plant before final discharge and upstream of storm connection (Point E).
- Secondary treatment plant – aeration cells (Point C)
- Stormwater return to treatment plant (Point F).
- Stormwater overflow (Point G).
- Activated Sludge Return (Point H).
- Waste Activated Sludge (Point I).
- Return liquors from Sludge dewatering (Point J).
- After sludge de-watering (Point K).
- Screenings and grit removed (for organic content) at Point N.
- Returned Liquors from Sludge thickener (Point O)

The Contractor may include any additional sampling equipment, where it is considered necessary, at locations to be determined by the Contractor in his/her design. Sampling of the wastewater at the various locations shall be carried out using automatic flow proportional sampling units. Samplers located immediately before secondary treatment and at the common outlet, upstream of the stormwater overflow connection, shall be refrigerated (Points B and E on Figure 2.1).

The Contractor shall ensure that the sampling point at the common outlet of the Wastewater Treatment Plant (Point E on Figure 2.1) has an open section with suitable safe access to allow for the taking of grab samples of the treated wastewater before discharge to the outfall.

2.4.8 Continuous Monitoring

The Contractor shall provide multiple stream continuous monitoring stations at the following locations to monitor the listed parameters, as a minimum:-

Table 2.6

Location	Parameter
At a point immediately before secondary treatment (Point B on Figure 2.1)	COD, pH and temperature
Secondary treatment plant – aeration cells (Point C on Figure 2.1)	DO and MLSS
At the common outlet of the Wastewater Treatment Plant before final discharge (Point E on Figure 2.1)	COD, pH and temperature

The Contractor may include any additional continuous monitoring, where it is considered necessary, at locations to be determined by the Contractor in his/her design. The parameters being monitored shall be continuously fed back to the telemetry system at the treatment plant.

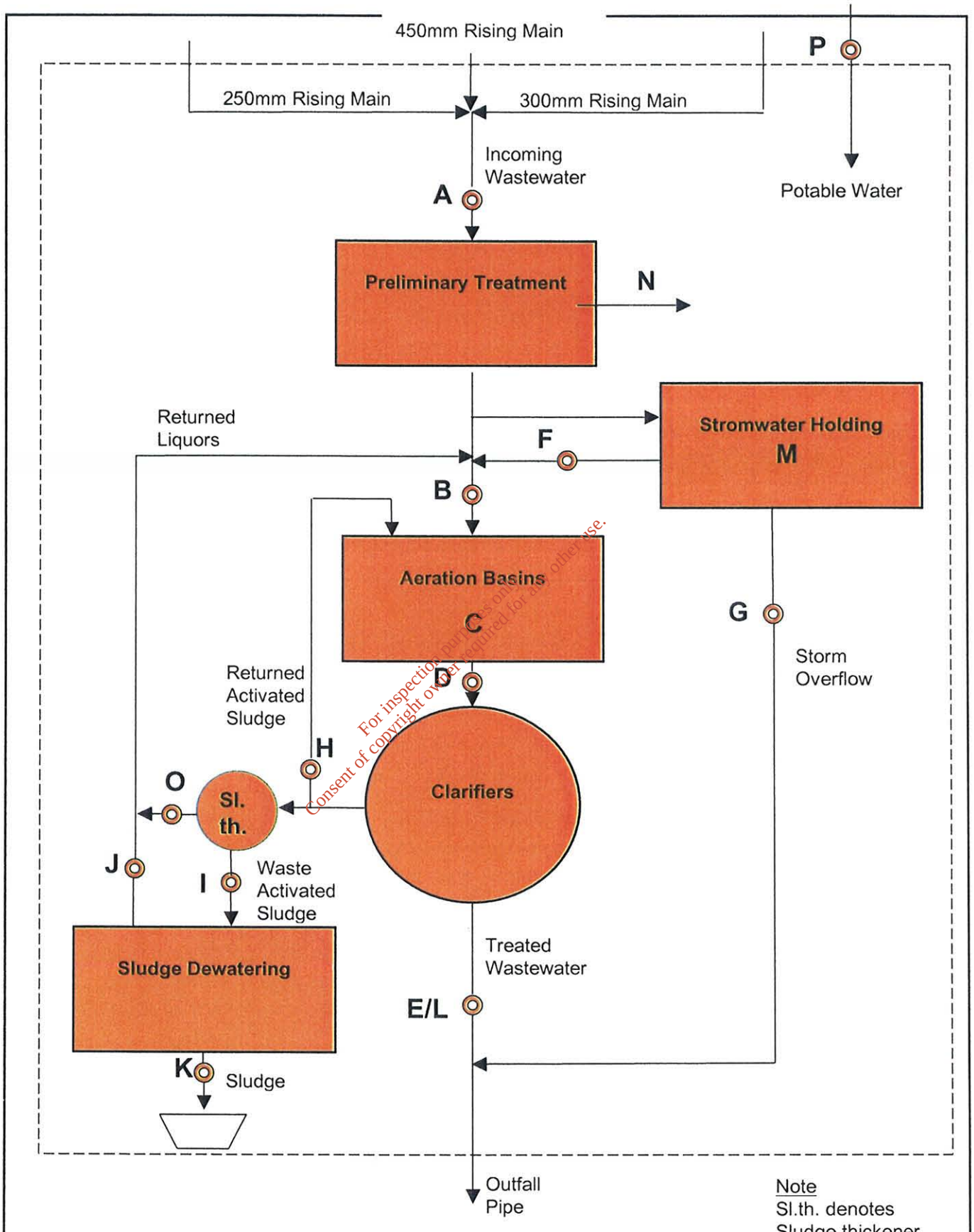


Figure 2.1 Schematic of Sampling and Flow Measuring Points

2.4.9 Laboratory and Analytical Equipment

The Contractor shall provide a laboratory as detailed in Clause 2.5.2(h) of this Volume. The laboratory shall be equipped with analytical instruments, furnishings and equipment necessary for carrying out the testing of wastewater and sludge samples taken at the Works. The laboratory shall, as a minimum, be capable of carrying out testing for BOD, COD, SS, total nitrogen (TN), phosphate (PO_4^{3-}), determination of DO, PH, temperature, SSV, SVI, total dry solids (TDS) of samples and microscopic assessments at the Works. All other analysis may be carried out at the Works or by an independent laboratory, approved by the Employer's Representative.

The Contractor shall ensure that the laboratory is fitted with appropriate ventilation equipment and all other ancillary equipment necessary to ensure a safe working environment for its personnel.

2.4.10 Storm Water Holding

When the wastewater flow exceeds the flow to treatment capacity of the Wastewater Treatment Plant, i.e. 562.5 m^3/h, the excess flow shall be diverted automatically, following screening and grit removal, via an overflow weir, to a storm water holding tank. The overflow weir shall be located downstream of the preliminary treatment facilities. The maximum wastewater flow at the inlet to the works is 1,764 m^3/h. The storm water holding tank shall have sufficient capacity for 2 hours retention of storm water at maximum flow.

As soon as the incoming wastewater flow is lower than the capacity of the Wastewater Treatment Plant, the collected storm water shall be automatically pumped back to the Plant (after preliminary treatment facilities). The flow rate of the combined incoming wastewater and storm water return shall not exceed the flow to treatment capacity of the plant.

The stormwater holding tank shall be designed to ensure that the operation of the stormwater treatment system and the return of the storm tank contents does not cause odour nuisance. Automatic washing facilities and mixing to prevent sludge settlement shall be provided in order to ensure that, after the tanks are drained, all exposed surfaces are cleaned and that no residual sludge remains in the tank.

It shall be possible to carry out maintenance of the equipment such as pumps and mixers without entering the tank. A scum baffle shall be installed at the overflow from the storm water tank.

2.4.11 Preliminary Treatment

2.4.11.1 General

The raw wastewater shall be treated for the removal of heavy solid material, grit and grease at the preliminary stage of the treatment process. The preliminary treatment facilities shall have capacity for treatment of the maximum wastewater flow coming to the plant (490 l/s).

Comminution shall not be permitted. Macerated screenings shall not be permitted to enter the wastewater flow.

The plant, equipment and infrastructure required at the preliminary stage of treatment with the potential to produce foul odour shall be housed. The housed area shall be ventilated via an odour control system.

2.4.11.2 Screened Materials

Larger inorganic solid material shall be removed by way of screening so that only material of 5mm or less in size is passed through to the next stage of treatment. This material shall be removed using automatically operated screens, proven for this specific application. The velocity through the screens shall not exceed 1.2m/h at full flow (1,764m^3/h)

The Contractor shall provide enough standby capacity to enable continuous screening to take place at maximum wastewater flow during maintenance and in the event of breakdown.

The screening installation shall have a design, which avoids sedimentation of solids before the screens, due to low wastewater velocity.

Each screen shall be:-

- provided with automatic cleaning system to prevent blocking.
- capable of being lifted and removed for inspection, maintenance and repair. All necessary lifting equipment shall be provided to ensure that the screens can be removed easily when required
- provided with serviced penstocks for closing each line. A penstock shall be installed before and after each fine screen
- controlled by means of a level transmitter installed upstream of the screen
- provided with an automatic release system
- provided with a ventilated cover, to avoid the emission of foul odour. Foul air from each screen shall be ducted via an odour control system
- able to operate in the event of a compactor breakdown
- secured against overload

The collected screenings shall be washed to minimise the organic content and pass through compression devices to achieve a minimum dry solid content of 30%. The resulting washwater stream shall be returned to the wastewater stream. Washed compacted screenings shall be transferred to a suitable reception container prior to final disposal.

An emergency bypass, for bypassing the automatic fine screens, in an emergency, in the event of failure of the latter, due to power failure etc., shall be installed. The emergency bypass shall be equipped with a coarse screen for manual cleaning. The coarse screen shall have a maximum bar spacing of 10 mm.

2.4.11.3 Grit Removal

After screening, the wastewater shall undergo an effective treatment to remove grit particles down to 0.2mm in size. The grit removal process shall be capable of removing at least 95% of particles with a specific gravity of more than 2.65 g/cm^3.

Removal by means of aerated grit traps is the preferred method of treatment. However, the Contractor may propose an alternative method of treatment provided it can be demonstrated to produce similar or greater grit removal efficiency and is compliant with these contract documents.

The Contractor shall provide enough standby capacity to enable continuous grit removal to take place during maintenance and in the event of breakdown.

The grit removed from the wastewater shall be classified and washed prior to discharge into a reception container. The washing system shall be designed to achieve an organic content less than 10% of the dry solids content measured on a weight-by-weight basis. The washwater from grit shall be returned to the main inlet flow.

2.4.11.4 Grease Removal

A grease scraper system shall be provided to effectively remove all grease from the surface of the wastewater.

A grease trap for the collection and holding of grease shall be provided. The collected grease shall be capable of being easily discharged to a reception container for subsequent disposal off site. The Contractor shall ensure that manual handling of the grease is avoided.

2.4.11.5 Containers for Screenings, Grit and Grease Removal

The container(s) to be used for the collection and transportation off site of the screenings, grit and grease shall be designed such that no discernible odour can be detected from it(them). The container(s) shall be capable of being completely sealed to ensure that no spills occur during transportation and shall be protected against corrosion.

2.4.11.6 Removal of Waste Materials from the Plant

The Contractor shall ensure that screenings, grit and grease are removed from the Wastewater Treatment Plant regularly to avoid the production of odour and attraction of vermin. The reception containers shall, therefore, be removed and emptied at least once a week.

2.4.12 Secondary Treatment

2.4.12.1 General

The secondary treatment process i.e. the reduction of organic matter and suspended solids, shall be based on the activated sludge system and comply with the certified EIS.

The aeration system for the aeration tanks shall be based on diffused air technology controlled by the actual oxygen concentration in the tanks. The design shall include a selection process (if appropriate) to ensure returned sludge is introduced to the incoming wastewater.

The Contractor shall ensure that tanks and sumps are of a sufficient height above ground level or are suitably railed to prevent access except via a locked off entry point. A minimum free board of at least 0.4 m shall be provided in all aeration tanks. Tops of tanks (excluding handrailing) shall not extend more than 1.2 m above adjacent ground level to comply with the certified EIS.

The Contractor shall observe the restrictions placed on heights of tanks when designing the secondary treatment facilities.

The wastewater treatment facilities shall have at least two separate process streams with the provision for the isolation of each stream. The design of the secondary treatment facilities shall ensure sufficient modularity to handle the relatively high variations in summer-winter loads (see Section 2.1). Furthermore the Contractor shall, in his design, ensure that the treatment plant is prepared for future expansion and/or retrofitting with nitrification-denitrification facilities.

The secondary treatment system shall be designed such that the wastewater can be continually treated while enabling the maintenance and repair, in the case of breakdown, of plant and equipment associated with it.

2.4.12.2 Aeration System

The aeration system shall transfer oxygen to the sludge/water-mixture in the aeration tanks as efficiently as possible, with a minimum oxygen transfer coefficient of $15gO_2/Nm^3$ per m submergence in clean water at 10°C.

The blower system shall comprise at least 3 blowers. Blowers shall be capable of delivering maximum air requirements with the largest single unit out of operation. Duty blowers, diffusers and piping shall be capable of delivering at least 150 per cent of the air requirements based on the maximum design loading.

The Aeration System shall operate at MLSS concentrations below $5kg/m^3$.

Suitable dissolved oxygen (DO) measurement, display and recording shall be provided and shall be used for automatic control of airflow to the aeration tanks within a pre-set range.

With the Tender, the Contractor shall provide details of and guarantee the Standard Oxygen Transfer Efficiency (SOTE) and 'Alpha' factor for the diffusers he proposes to provide, together with expected tolerances.

2.4.12.3 Aeration Tank Mixing

Each aeration tank shall be provided with mixing equipment to ensure that sludge remains in suspension in the mixed liquor at all times. The maximum allowable deviation of sludge concentration measured at different levels and spots in the aeration tank shall be no greater than 20%.

The mixers shall be mounted in a way that allows them to be lifted easily from the tank for inspection and maintenance. Suitable lifting mechanisms shall be held permanently on the treatment plant site for this purpose.

The design shall include a system for the removal of foam.

2.4.12.4 Sludge Return System

The Contractor shall ensure that the necessary quantities of sludge are returned to the aeration system to maintain an adequate level of mixed liquor suspended solids (MLSS).

The system shall be flexible enough to ensure that sludge can be returned from any clarifier to any aeration tank and that an adequate quantity of sludge can be pumped at all times.

The Contractor shall ensure that appropriate, easily accessible, tapings are provided on each of the sludge return lines provided to enable the taking of sludge samples.

The Contractor shall provide enough standby capacity to enable continuous return sludge pumping to take place during maintenance and in the event of breakdown.

2.4.12.5 Surplus Sludge/Wastewater Removal

Surplus sludge/wastewater shall be removed from the secondary treatment stage by pumping to the sludge treatment facility on site.

It shall be possible to adjust the throughput of the pumps by means of frequency invertors. The variance in capacity of each pump shall be, as a minimum, between 45 - 100 % of design capacity.

2.4.12.6 Secondary Clarification

The mixed liquor produced from the aeration system shall enter secondary clarifiers for the purpose of settling sludge, to give a final effluent quality to the standards set in Section 2.2. Each aeration lane shall have at least one dedicated clarifier.

Each clarifier shall be circular and equipped, as a minimum, with a rotating half-bridge sludge scraper, inlet, scum and sludge draw-off pipework, sludge return pipework, v-notch weir plate, and a system to prevent scum entering the treated effluent flow.

The upward flow velocity shall not exceed 0.9m/h during normal operation and 1.2m/h when a tank is temporary out of service for maintenance or other reason. The minimum sidewall depth to overflow level shall not be less than 2.1m.

The Contractor shall ensure that the clarifiers are of a sufficient height above ground level or are suitably railed to prevent access, except via a locked off entry point.

It shall be possible for operators to work within the confines of each tank while connected via harness to a permanently fixed safety rail.

2.4.13 Sludge Treatment

2.4.13.1 General

The Contractor shall design the sludge treatment facility to adequately handle the volumes of sludge produced by the Wastewater Treatment Plant and to the standards stipulated below.

The sludge treatment facility shall be designed to provide optimal operating efficiency with respect to energy and chemical usage while ensuring the achievement of consistent dry solids content on an ongoing basis.

All raw sludge pumping arrangements shall be provided with 100% standby capacity using variable speed progressive cavity pumps.

All of the sludge treatment facilities, except sludge storage, gravity thickening and aerobic stabilisation tanks shall be housed within a building, which shall be ventilated via an odour control system.

The Contractor shall observe the restrictions placed on heights of tanks when designing the sludge storage and treatment facilities.

Dewatered sludge shall be transported to Dungarvan WWTW for further treatment.

2.4.13.2 Raw Sludge Storage

Storage facilities shall be provided at the Wastewater Treatment Plant for the holding of raw sludge for up to five days. Some of this storage may be provided through the use of a picket fence thickener.

All storage tanks shall be completely covered and ventilated to an odour control system. Storage tanks, other than PFT's, shall be provided with mixing equipment, to prevent the deposition of sludge on walls and floors of tanks and to ensure that a homogeneous mix of sludge is produced for consistent de-watering.

2.4.13.3 Sludge Thickening

The Contractor may thicken the sludge prior to de-watering and for this purpose is permitted to use gravity or mechanical thickening devices.

2.4.13.4 Sludge Dewatering

All surplus sludge produced at the Wastewater Treatment Plant shall be de-watered to produce a sludge cake between a minimum dry solids content of 16% and maximum dry solids content of 23%. The quality of filtrate produced during dewatering shall be to the highest possible quality. Therefore a solids capture of 95% or greater shall be achieved.

The dewatering plant provided shall be capable of handling the sludge quantity produced at the treatment plant at all times. The whole plant shall be capable of automatic operation without plant operators permanently present. The installation be sized such 5 days per week, 10 hours per day operation shall be sufficient to handle the sludge produced in the design "summer" period.

De-watering by means of centrifugal decanter is preferred. However, the Contractor may propose an alternative method of de-watering provided it can be demonstrated to produce a similar or greater standard of sludge cake and feed solids recovery rate to that specified above and is compliant with these contract documents. The Contractor shall give due consideration to the restrictions on building size in the selection of the dewatering equipment.

In order to provide for dismantling and maintenance of the de-watering plant, the Contractor shall supply and install a suitable lifting device, located directly over such plant, of capacity 50% in excess of the total unit dead weight. The Contractor shall include for all site testing and test certification of the installed system. The installation of lifting equipment is an absolute requirement for health and safety reasons.

The Contractor's design shall include for a maximum of 1 vehicle traffic movement for sludge transportation per working day to Dungarvan Wastewater Treatment Works and a minimum 3 days cake sludge storage on site.

2.4.13.5 De-watered Sludge Conveyance

The Contractor may use either screw conveyors or variable speed progressive cavity cake pumps for the removal of de-watered sludge from the dewatering devices.

The dewatered sludge produced shall be discharged into a reception container for transportation off site. The reception container shall be designed such that no discernible odour can be detected from it. The container shall be capable of being completely sealed to ensure that no spills occur during transportation and protected against corrosion.

The dewatered sludge shall be transported to Waterford County Council's sludge hub centre at the Dungarvan wastewater treatment plant where following weighing it will be tipped into a suitable receptor. Reception of sludge at Dungarvan shall only take between 9.00am and 4.30pm on normal working days. The Tramore reception containers shall be of sufficient size to allow for storage over weekends and delivery to Dungarvan on working days only as detailed above.

2.4.13.6 Polyelectrolyte Preparation and Dosing System

The polyelectrolyte preparation and dosing system shall be provided in a bunded area to control spillage, which shall be easily drained without causing contamination or blockage to other areas of the Wastewater Treatment Plant. Adequate clean and dry space shall be provided for the storage of neat liquid or powder polyelectrolyte.

The minimum bund capacity shall be 110% of the capacity of the tanks within the bund. The bund design shall allow for access for routine visual inspection and maintenance. Where applicable, rainwater should be removed from bunded areas by pumping only.

The Contractor shall ensure that the installation is designed so that the risk of spillage is minimised. In choosing the system, emphasis shall be placed on efficiency with respect to space required, labour input for operation and maintenance, chemical and energy usage.

2.4.13.7 Sludge Sampling

The Contractor shall provide suitable sampling points so that samples of raw feed sludge, dewatered sludge and filtrate may be taken.

2.4.13.8 Reception Facility for Importation of Sludge/Wastewater

No wastewater or sludge shall be imported from any source at the Wastewater Treatment Plant. Therefore, a sludge/wastewater reception facility is not required.

2.4.14 Automation

Key processes within the WWTP shall be controlled, regulated and monitored through a centralised telemetry system. With his tender the Contractor shall supply full details his proposals in this regard.

The system shall have restricted web-based access to allow the Employer and Employer's Representative to remotely view data generated by the system.

2.4.15 Treated Effluent Re-use

Treated effluent may only be re-used as washwater where there is no requirement for manual handling or direct human contact.

2.4.16 Weather Station

The Contractor shall provide an automated weather station at the Wastewater Treatment Plant, which shall be designed to measure rainfall, temperature, atmospheric pressure and wind direction. The weather station shall be linked to the telemetry system at the Wastewater Treatment Plant to give continuous data. The Contractor shall consult with Met Eireann before deciding on the position of the weather station to ensure that the optimum location is found.

The Contractor shall also provide a windsock in a position to be agreed with the Employer's Representative.

2.5 Specific Requirements For Building and Infrastructural Works

2.5.1 Restrictions on building design due to visual impact

The general layout and details of the buildings shall be in accordance with Section 3.7 Volume 2 of the Environmental Impact Statement – December 1997.

Buildings shall be single storey structures and be residential in scale and character. Building roofs shall have a minimum roof pitch of 30° with black tile, slate or slate effect finish. External finish to building walls shall be scud and smooth sand cement render (min. 10 mm thickness) with acrylic render finish equivalent to PAREX External Finish System. External finish shall be coloured pale grey. The windows shall be PVC double glazed and all windows and external doors on all buildings shall be similar in style, scale and number to the building elevations included in the EIS. The visual impact of all buildings shall be in compliance with the requirements of Section 6.6 Volume 2 of the Environmental Impact Statement – December 1997. The heights of buildings shall not be greater than the heights of the buildings indicated on the EIS drawings. The top of tanks etc. (excluding handrails) shall not project in excess of 1.2m above adjacent ground level.

All buildings shall be fully furnished, fitted and provided with the adequate lighting (artificial and natural), heating, power and potable running water (hot and cold) to provide a safe and comfortable working environment for the contractors operation and maintenance staff.

The Contractor shall clearly indicate in his building layouts how the future expansion of the plant can be accommodated without affecting the operation and maintenance of the Phase 1 plant.
As a guideline to EIS compliance the Contractor shall ensure that:

- The positive visual impacts of his proposed buildings is greater than or equal to the positive visual impacts of the buildings proposed in the EIS

- The negative visual impacts of his proposed buildings is less than or equal to the negative visual impacts of the buildings proposed in the EIS

The EIS indicated that the visual impact of the treatment plant would be minimised due to the fact that 'there will be no tanks or other installations (other than single storey houses) above ground level'.

The Contractor shall ensure that this condition is satisfied when designing tanks, sumps, reception areas and buildings.

The Contractor shall construct buildings, which shall comfortably accommodate the various functions as described in the following specification clauses.

Building design and construction shall be in compliance with all applicable and relevant laws, regulations and administrative provisions and in particular the Specification for Civil Engineering and Building Works and the 1997 Building Regulations (S.I. No. 497 of 1997).

2.5.2 Control / Administration Building

The Contractor shall provide a control building with architectural and layout details and facilities equivalent to those included in Section 3.7 of Volume 2 of the EIS. The building shall have a floor area of not more than 200 m^2

The maximum allowable height of the Control / Administration Building is 6.1 m above adjacent finished ground level and 16.8 m O.D. Malin Head.

All internal walls and ceilings are to be plastered and painted to the relevant standards given in the General Specification for Civil Engineering and Building Works. Internal floor finishes in the Control / Administration building shall be equivalent to those included in the EIS

The building shall be located adjacent to the site entrance and a minimum of 15 m from the site boundary such that all vehicles entering the wastewater treatment works shall pass immediately in front of the control building before gaining access to the plant.

The control house shall include the following facilities, outlined in the EIS, of sufficient size and fitted out in such a way that the Contractor can complete his duties under the Employer's Requirements for the operation and maintenance of the Treatment Plant:-

(a) Entrance Hall Area.

(b) Control Room: The control room shall provide space for the main control console, the SCADA system, the plant mimic and the equipment control panels. The room shall be orientated and have sufficient glazing so as to provide a good view of the whole treatment plant.

(c) Site Managers Office

(d) Changing Rooms: Two changing rooms shall be provided (1 Ladies, 1 Gents) and each area shall include a shower, toilet and wash hand basin. Lockers and changing benches shall also be provided.

(e) Canteen/ Kitchen Area: The canteen shall be equipped to modern standards and shall include a sink unit, refrigeration, cooking and eating facilities.

(f) Storeroom: The storeroom shall include shelving space and an area for general storage.

(g) Machinery Store: The machine house shall include a storage area and workshop to accommodate the necessary tools and working space for the maintenance of the Treatment Plant.

(h) Laboratory (Extra over requirement to the provisions of the EIS): The laboratory shall be of sufficient size and fitted out to enable the Contractor to complete his duties specified in Employer's Requirements for the Operation and Maintenance of the Treatment Plant (Volume 6).

(i) Office for the Employer - ≥ 15 m^2. Equipped with office furniture and serviced with phone/fax/e-mail connections and 2 number double sockets.

2.5.3 Process Buildings

Process buildings shall be constructed to the extent necessary to comply with the environmental standards described in the EIS.

Buildings shall be sized and fitted out to allow for comfortable and safe access to all mechanical and electrical equipment for operation, maintenance and removal purposes.

The floors within the areas of the building requiring routine washing shall have appropriate falls to drains to allow ease of cleaning. All floors shall have a dust free durable non-slip surface (untreated concrete surface is not acceptable). All areas of floors, walls and ceilings shall be provided with protective finishes suitable for normal operating conditions.

Sufficient space shall be provided in all process buildings to allow for the planned future expansion.

The following process buildings shall be provided:

(a) Screening House

The Contractor shall provide a screening house (maximum area 200 m^2) in accordance with the general architectural details and layout requirements included in Section 3.7 of Volume 2 of the EIS or alternatively locate all preliminary treatment processes below existing ground level.

The maximum allowable height of the Screening House is 6.1 m above adjacent finished ground level and 16.8 m O.D. Malin Head.

The screening building shall house all the preliminary treatment processes. In addition an air scrubbing unit shall be provided in the building to reduce odours from the air from within the building before it is expelled to the atmosphere. The level of odour reduction shall be in accordance with the requirements in Section 2.2.

(b) De-watering House

The Contractor shall provide a de-watering house (maximum area 475 m^2) in accordance with the general architectural details, and layout requirements included in Section 3.7 of Volume 2 of the EIS. or alternatively locate all de-watering plant below existing ground level.

The maximum allowable height of the De-watering House is 6.9 m above adjacent finished ground level and 15.6 m O.D. Malin Head.

All required mechanical plant (including air filter unit, generator, air compressor, sludge transfer pumps etc.) and polymer tanks shall be located within the sludge de-watering house.

The air blowers and standby generator shall be housed in a separate room within the building. They shall be complete with acoustic hoods to reduce the noise level to an acceptable level within the house. In addition this room shall be so designed that the noise levels outside the room will be reduced to 55db(A).

A separate room shall be provided for chemical storage.

2.5.4 Services

The Contractor shall make all necessary arrangements with the relevant service providers for the provision of the following services:-

(a) Temporary and permanent potable water supply at the site for his work and the operation of the Plant. The route for the potable water supply shall follow the access road to the site. The Contractor shall provide a potable water storage facility equivalent to at least one day's storage at maximum usage.

The Contractor may utilise either suitably treated groundwater or final effluent as process and washwater. Final effluent may only be used as washwater where there is no requirement for manual handling or direct human contact.

Hose points with hose reels shall be provided around the site and within buildings, which will enable all parts of each process unit to be washed down. Hose reels and hose points are to have adequate corrosion protection and adequate protection from freezing.

A mobile pressure washer shall also be provided having a flow of at least 15l/min at 100 bar pressure.

A permanent vehicle wheel wash facility shall be installed along the main access road within the confines of the site. All truck and tanker vehicles shall be required to cross the wheel wash prior to exiting the site.

A truck washing area is to be provided at the treatment works. This area is to have a dedicated fixed pressure washer to enable all trucks and tankers to be washed down. The area shall have an appropriate drainage system discharging to the treatment works.

At least one external hydrant shall be provided adjacent to the administration and staff buildings. Five additional hydrants shall be located throughout the site to provide adequate fire fighting (minimum 1 m^3/min.) cover for the site. The precise location of these hydrants shall be provided in the Contractor's design.

All costs including any capital charges for water supply connection shall be fully borne by the Contractor.

(b) Temporary and permanent power supply to the site for construction and the subsequent operation of the treatment works respectively.

A standby diesel generator is to be provided to ensure that any breakdown of the main power supply will not affect the smooth operation of the Treatment Plant. It may also be used during periods of maximum demand to reduce electricity costs.

(c) Temporary and permanent dedicated communication lines required under the Contract.

2.5.5 Roads and Hardstandings.

Site roads and hard standings shall have an asphalt wearing course on a macadam base course and shall be designed to cater for the loading from all traffic expected to use the site. Design shall be in accordance with the relevant sections of the NRA's "Design Manual for Road and Bridge Works"

Site roads shall be 5.5m in width except for roads to be used by sludge vehicles, chemical delivery trucks etc., which shall be 6.0m in width. Kerb radii at junctions shall be sufficient to comfortably accommodate vehicle-turning movements. The edge of all site roads and hardstandings shall be kerbed.

The layout of roads and paved areas shall provide access to all process elements sufficient to facilitate access, maintenance and removal/replacement of plant by mobile crane. Sufficient manoeuvring space shall be provided at buildings to facilitate sludge transfer, delivery of chemicals, removal of equipment etc. Ramps shall be provided at equipment access doors to enable a vehicle to be driven into the building, where required. Except for access ramps, road grades shall not be steeper than 1:10. The Contractor shall provide adequate turning areas for delivery trucks, sludge handling vehicles etc. within the site.

All site roads, paved areas, concreted areas and hard standings shall be constructed to falls with all appropriate/ necessary gullies and drains discharging to the surface water system.

Eight car-parking spaces shall be provided adjacent to the control building. These shall be lined using thermoplastic material.

Waterford County Council shall complete the access road from the adjoining housing estate as far as the site boundary at the proposed entrance.

The Contractor shall construct an internal access road to the gate on the eastern boundary of the site at the location shown on drawing No. 2 (Volume 15) to allow access to the Gurraun Pumping Station.

Footpaths of 1.2m minimum width shall be provided around and between all buildings, tanks and chambers.

2.5.6 Site Lighting

The Contractor shall design and provide site lighting around buildings and to illuminate work areas where work or inspections have to be carried out. The design shall provide an average 15 lux, minimum 5 lux and overall uniformity of 20%. Duplicate circuits shall be installed to power external lights with alternate lights connected to alternate circuits to avoid full loss of external lighting in case of single circuit failure. Each circuit shall be controlled by a photoelectric cell with independently powered time clock and manual over-rides. Design of lighting to site roads shall provide an average 10 lux, minimum 3 lux. In addition, security lighting shall be provided to meet basic security requirements.

Emergency lighting shall be provided for all buildings and shall comprise exit and escape route luminaries to facilitate the safe evacuation of personnel from all buildings and structures in the event of power failure.

Emergency lighting shall also be provided in any area where work may be required during such a power failure, e.g. starting of standby generators or other essential plant control operations.

2.5.7 Surface Water Drainage

All surface water run-off and roof drainage shall be collected on site and disposed of to the final effluent outfall downstream of where the storm water overflow discharges to it. Prior to discharge to the outfall the storm water shall be treated to remove grit. Suitable methods of grit removal include screening, detention pond or settlement tanks.

Surface water run-off shall not be discharged onto public roads.

All roads and hard standing areas with potential for contamination shall be drained via a foul drain to discharge to the Inlet Works upstream of the preliminary treatment plant with the exception of areas that might become contaminated with substances that might be harmful to the treatment plant.

2.5.8 Boundary Fence and Gates

A 2.4m high plastic coated pallisade fence shall be erected along the entire perimeter of the site for security purposes.

The main site entrance gate, wall and piers shall be designed to be both an attractive feature and to be secure against intrusion. The gates shall be 2.4m high and be of heavy-duty construction and designed so as to discourage/ prevent climbing.

The entrance gate shall be capable of being opened automatically by remote control from the control building and through the use of a swipe card system.

In addition to the site entrance gate an additional gate shall be provided on the eastern boundary of the site at the location shown on Drawing No. 2 (Volume 15) to allow access to the Gurraun Pumping Station. The gates shall be wide enough to allow vehicular access for maintenance purposes.

Both gateways shall be provided with separate pedestrian access. All gates shall be lockable.

2.5.9 Signage

A main sign shall be erected at the entrance to the Treatment Plant. The sign shall include "Tramore Wastewater Treatment Plant" and " Waterford County Council/Choraile Contae Portlairge" together with the Council's crest. This sign shall be approved by the Employer's Representative prior to manufacturer. The sign shall be a minimum of 2m. wide and 1m. high.

All safety and direction signs within the Treatment Plant shall be in accordance with current safety legislation and the 1997 Building Regulations.

2.5.10 Landscaping

Landscaping to the site shall be in accordance with the provisions of the EIS and shall consist of grassed areas and planted areas. Planted areas shall be divided into two distinct types as follows:-

(a) Screen Planting and mounding adjacent to boundary fence.

As stated in the EIS, continuous screen planting inside the boundary fence in native woodland and coastal species shall be provided. Earthen mounds shall also be constructed and planted to the same extent as shown in the EIS to provide further screening and to reduce the visual impact of the site structures.

The area of mounding and screen planting shall be equivalent to that shown on the EIS Drawing No. 2 (Volume 12). This screen planting shall be at 1.5m centres and consist of the following mix of trees and shrubs:-

Trees at 85% of total planting (7 to 10 per group):
5% Acer Pseudoplatanus 4% Alnus Glutinosa, 8% Betula Pendula, 6% Betula Pubescens, 10% Crataegus Monogyna, 10% Pinus Maritima, 30% Pinus Sylvestris, 6% Populus Tremula, 6% Quercus Petraea, 15% Sorbus Aucaparia.

Shrubs at 15% of total planting (5 to 7 per group):
15% Ilex Aquifolium, 5% Juniperus Communis, 45% Salix Caprea, 20% Salix Cinerea and 15% Ulex Europeus.

The existing hedgerow along the eastern boundary shall be reinforced with additional planting as detailed above.

(b) Site Landscaping.

The general site landscaping shall be laid out so as to soften the visual effect of buildings, structures and paved areas. This shall be achieved as follows:-

- Small clusters of trees shall be planted around the site to enhance the general visual appearance and give year round colour. A selection of trees from those listed above and the following list shall be used :

  Acer Platanoides, Albus Glutinosa "Imperialis", Populus Alba and Sorbus Aria.

  Each tree cluster shall occupy an area of $20m^2$, with a total allowance of $140m^2$ over the entire site. Trees shall be planted at 4m centres.

- Planted beds shall be provided around parking areas, footpaths and adjacent to buildings and structures so as to soften the impact of the immediate environs. Shrubs shall be of a mixed variety that will provide coloured foliage all year round to each bed. Shrubs shall be planted at 0.9m centres in beds varying from $5m^2$ to $20m^2$ with a total allowance of $100m^2$ for the entire site. Shrubs shall be from the following list:

  Berberis Candidula "Amstelveen", Cornus Alba "Sibirica", Cornus Stolonifera "Flaviramea", Cotoneaster Conpicuus "Decorus", Griselinia Littoralis, Rosa Rugosa "Alba", Rosa Rubrifolia, Rubus Tricolor and Symphoracarpus Chenaultii "Hancock".

  The remainder of the site shall generally be grassed. However in areas where it would be impractical to maintain grass rounded 12mm gravel shall be spread over a weed barrier.

2.5.11 Vermin Control

The Contractor shall ensure that facilities are put in place at the treatment plant for the most effective control of vermin.

2.6 Specific Design Requirements

2.6.1 General

The Specification for the works shall be in accordance with this Volume and the General Technical Specifications for Civil, Mechanical, Electrical and ICA in Volumes 9 and 10.

2.6.2 Codes and Standards

Any Standard or Code of Practice referred to in the Construction Documents, or any other Standard or Code of Practice that may be substituted therefor, shall be held to be the latest edition published three months prior to the last date for submission of tender.
Nothing stated in this Specification is to be construed as discriminating against products and materials manufactured in any of the Member States of the European Community.

Where items to an Irish Standards Specification (IS) or British Standards Specification (BS), or any other Standard Specification of a Member State of the European Community are called for, this requirement shall be read as including items to a relevant national standard of any Member State of the European Community, which provides an equivalent guarantee of safety and suitability.

Where items certified by the National Standards Authority of Ireland as complying with an Irish Standard are called for, this requirement shall be read as either certified by the National Standards Authority of Ireland as complying with the Irish Standard, or shall be certified as complying with a relevant national standard of another Member State of the European Community which provides an equivalent guarantee of safety and suitability.

Where items certified by the National Standards Authority of Ireland as complying with an Irish Standard are called for, the provisions of Circular Letter BM2/87 as amended by Circular Letter BC14/92 shall apply, i.e., the requirement shall be read as either certified by the National Standards Authority of Ireland as complying with the Irish Standard, or shall be certified as complying with a relevant International Standard or with the relevant National Standard of another Member State of the European Community which provides an equivalent guarantee of safety and suitability.

2.6.3 SI Units

The International System of Units (SI) shall be used for all designs, specifications, drawings, submissions and tenders.

2.6.4 Design Life

The Wastewater Treatment Plant and all ancillary equipment, services and infrastructure shall be designed for the following minimum design life times:

Table 2.7 Design Life of the Plant

Item	Years
Concrete structure	50
Building structures	50
Steelwork and fixings	50
Internal Pipework	50
External Pipework	40
Buried/underground services	50
Mechanical & electrical plant and equipment	25
Steel tanks	25
Process control equipment	12
Instrumentation & SCADA Software	12

The assumption of a service life shall not mean that equipment will no longer be fit for service at the end of the specified period, or that it will not require regular inspection and maintenance during that period. It shall be the minimum period for which the equipment may be expected to remain functional to its design specification under the specified and anticipated conditions of use.

2.6.5 Hazard and Operability Review

The Contractor shall carry out a Hazard and Operability Review during the design stage of the Project. The Review shall ensure that the Wastewater Treatment Plant is designed and subsequently constructed to minimise hazards that may impact adversely on its operation and maintenance. The Contractor shall give priority to the need to involve operational personnel in the Review to ensure that the operability of the treatment plant is optimised at the design stage.

The Review shall be carried out in a workshop type format and shall involve the Contractor's key design, construction and operational staff; the Employer and the Employer's Representative. The Review workshop shall be chaired by a member of the Contractor's staff who shall be qualified and experienced in the execution of such reviews.

The Contractor shall include a sample format for the Review, in the Tender. Review dates shall also be identified in the Project programme to be submitted with the Tender.

The Contractor shall also carry out Reviews at various stages during the construction phase of the Project to ensure that the recommendations of the design stage review are being implemented. These reviews shall also incorporate any subsequent modifications that may be required by the Contractor.

The Employer and the Employer's Representative shall be present at the reviews only in an advisory capacity. Any modifications incorporated during these reviews shall be the entire responsibility of the Contractor.

2.6.6 Involvement of Operational Personnel at Design and Build Stage

The Contractor shall ensure that the operations personnel, designated in the Tender, have an involvement throughout the design and construction phases of the Contract.

2.6.7 Climatic Conditions

The Works shall be located in a salt laden atmosphere adjacent to a marine environment less than 20 m O.D. on an exposed site. Temperature variations between –10°C and 30°C can be expected.

The works shall be designed for continuous operation in all climatic conditions and at a range of temperatures of 5°C above and below the range indicated above (i.e. –15°C to +35°C). Wind loading shall be determined in accordance with BS6399: Part 2.

2.6.8 Computer Systems – Year 2000 Compliance.

All computer systems provided under this contract, shall comply with DISC PD 2000-1 or equivalent standard for conformity to Year 2000 requirements. The contractor shall provide written confirmation to the client of such compliance.

Computer System shall mean any computer, data processing equipment media or part thereof, or system of storage and retrieval, or communications system, network, protocol or part thereof, or storage device, microchip, integrated circuit, real-time clock system or similar device or any computer software (including, but not limited to, application software, operating systems, runtime environmentals or compilers), firmware or microcode.

Year 2000 compliant shall mean that neither performance nor functionality of the Computer System is affected by dates prior to, during and/or after the Year 2000. In particular:-

Rule 1 No value for current date will cause any interruption in operation of the Computer System.

Rule 2 Data based functionality and performance of the Computer System must behave consistently for dates prior to, during and/or after the Year 2000.

Rule 3 In all interfaces and data storage of the Computer System the century in any date must be specified either explicitly or by unambiguous algorithms or inferencing rules.

Rule 4 The Year 2000 must be recognised as a leap year by the Computer System.

2.6.9 Civil Design Requirements - Codes and Standards

The Civil works shall comply with the requirements of Volume 9 of these documents.

The following non-exhaustive list of codes and standards, or equivalent European Standards, shall be used in the design of the Civil/Structural Works:-

Schedule of weights of building materials
BS 648: 1964

Structural use of timber
BS 5268 - 2: 1996, BS 5268 - 3: 1998, BS 5268 – 4.1: 1978, BS 5268 – 4.2: 1990,
BS 5268 - 5: 1989, BS 5268 – 6.1: 1996, BS 5268 – 7

Concrete
BS 5328 - 1: 1997, BS 5328 - 2: 1997.

Code of practice for protective coating of iron and steel structures against corrosion
BS 5493: 1977.

Code of practice for use of masonry
BS 5628 - 1: 1992, BS 5628 - 2: 2000, BS 5628 - 3: 1985.

Structural use of steelwork in building
BS 5950 - 1: 2000, BS 5950 - 2: 1992, BS 5950 - 3: 1990, BS 5950 - 4: 1994, BS 5950 - 5: 1998,
BS 5950 - 6: 1995, BS 5950 - 7: 1992, BS 5950 - 8: 1990, BS 5950 - 9: 1994.

Code of practice for earthworks
BS 6031: 1981

Loading for buildings
BS 6399 - 1: 1996, BS6399 - 2: 1997, BS6399 - 3: 1988

Code of Practice for foundations
BS 8004: 1986

Code of Practice for design of concrete structures for retaining aqueous liquids.
BS 8007: 1987

Code of practice for pipelines
BS 8010 - 1: 1989, BS 8010 - 2.

Structural use of concrete.
BS 8110 - 1: 1997, BS 8110 - 2: 1985, BS 8110 - 3: 1985

Code of practice for foundations for machinery
CP 2012.

2.6.10 Mechanical Design Requirements

Codes and Standards

The Mechanical works shall comply with the requirements of Volume 10 of these documents.

The following non-exhaustive list of codes and standards, or equivalent European Standards, shall be used in the design of the Mechanical Works:-

Code of practice for basic information and procedures for noise and vibration control
BS 5228 - 1: 1997.

Safety Signs and Colours
BS 5378 - 1: 1980 (1995), BS 5378 - 2: 1980 (1995), BS 5378 - 3: 1982 (1995),

Safety for machinery. Emergency stop equipment functional aspects. Principles for design.
BS EN 418: 1992

Rating Plates, Name Plates and Labels

Each item of Plant shall have permanently attached to it in a conspicuous position a rating plate of durable material engraved with any identification name, type or serial number, together with details of the loading conditions under which it is designed to operate.

All switchboard cubicles shall be clearly labeled with their function and the function of each instrument, indication or control. The type of labels and the inscription shall be to the approval of the Employer's Representative.

Emergency Stop and Isolation

Each item of electrically operated plant shall be provided with easily accessible and clearly labeled local start and emergency stop pushbuttons.

2.6.11 Electrical Design Requirements

Codes and Standards

The Electrical works shall comply with the requirements of Volume 10 of these documents.

The following codes and standards, or equivalent European Standards, shall be used in the design of the Electrical Works:-

Intruder alarm systems
BS 4737 - 1: 1986, BS 4737 - 2: 1986, BS 4737 – 3.1 to 3.30, BS 4737 - 4.1 to 4.3,
BS 4737 - 5.2: 1988.

Fire detection and alarm systems for buildings
BS 5839 - 1: 1988, BS 5839 - 2: 1983, BS 5839 - 3: 1988, BS 5839 - 4: 1988, BS 5839 - 5: 1988,
BS 5839 - 6: 1995, BS 5839 - 8: 1998,

Emergency lighting
IS 3217:1989

Code of practice for protection of structures against lightning
BS 6651: 1999.

Workplace atmospheres. Electrical apparatus used for the direct detection and direct concentration measurement of toxic gases and vapours
BS EN 45544 - 1: 2000, BS EN 45544 - 2: 2000, BS EN 45544 - 3: 2000, BS EN 45544 - 4: 2000,

Fire Alarm System

The Contractor shall design and install a fire alarm and protection system to cover the whole site in accordance with BS 5839. The system shall have a local internal and external audible alarm for each building and shall be linked to the central telemetry system.

The fire detection system in each building shall consist of automatic detectors/alarms and manual break glass alarms.

Security System

The Contractor shall design and install a site security system to cover all buildings and enclosures. The system shall have a local external audible alarm and shall be linked to the central telemetry system.

Each building/enclosure shall be protected by a separate intruder alarm, which shall be controlled by a keypad in the administration building. Each intruder alarm shall include window and door contacts and PIR motion detectors under separate alarm zones.

Building services (Heating, ventilation, lighting etc.)

The following Chartered Institute of Building Services Engineers' (CIBSE) guides or equivalent European guides shall be used for the design of building services.

CIBSE Guide A (1999) – Environmental Design
CIBSE Guide B1 -Heating
CIBSE Guide B2 -Ventilation and Air Conditioning
CIBSE Guide B3 -Ductwork
CIBSE Guide B5 -Noise and Vibration Control
CIBSE Guide C -Reference Data
CIBSE Guide E -Fire Engineering
CIBSE Guide F -Energy Efficiency in Buildings
CIBSE Guide G -Public Health Engineering
CIBSE Guide H -Building Control Systems

Gas Detection System

The Contractor shall design and install gas detection systems in areas of the works where explosive or toxic atmospheres may occur. The systems shall have local audible alarms and shall be linked to the central telemetry system.

2.6.12 ICA Design Requirements – SCADA System

The ICA works shall comply with the requirements of Volume 10 of these documents.

The Contractor shall design and install a computer based SCADA system that will monitor and have some control over the operation of the works. The systems shall be located in the Administration Building Control Room.

The SCADA system shall be capable of carrying out the following functions:-

- Display and log all instrumentation readings and the status of all items of plant and equipment (including provision for graphical display)
- Display and log all alarms (including provision for operator to acknowledge alarms).
- Provide for the operator to change operating set points and plant duty/standby modes.
- Prepare daily, weekly, monthly and yearly reports (including adjustable graphical log of all continuous measurements, plant status etc. against time)
- Totalise all flows, plant running hours etc.
- Archive and store all data for the preceding six months.

The SCADA system shall be capable of carrying out the above functions automatically while being used simultaneously to monitor the works.

The Contractor shall provide and install a telemetry software package for the operation, monitoring and control of telemetry, supervisory and communication functions, designed for use on a PC based system. The software package shall operate in a menu driven windows environment and shall have a proven track record in the wastewater industry.

The SCADA system hardware shall consist of the following:-

- 1 No. computer terminal complete with monitor, keyboard, mouse etc.
- 1 No. colour A4 plotter configured for direct print of screen displays and printing of any system information on demand.
- 1 no. colour continuous form alarm and event printer.
- A CD-ROM based data back-up and storage system.
- 1 No. computer terminal in the Employer's office complete with monitor , keyboard, mouse etc. capable of viewing and configuring the data generated by the SCADA system.

The SCADA system shall have restricted web-based access to allow the Employer and Employer's Representative to remotely view data generated by the system.