Attachment A

PART 3 – SCOPE

CONTENTS

APPENDICES

3.1 INTRODUCTION AND BACKGROUND

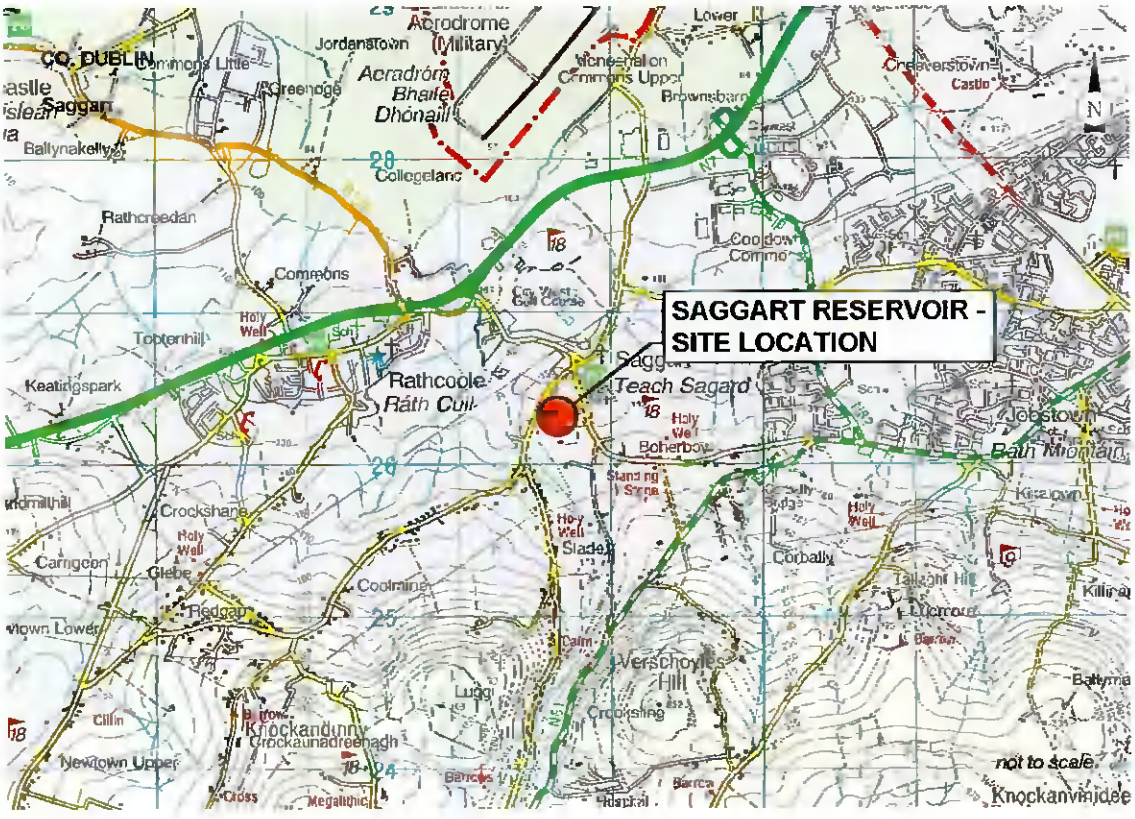
3.1.1 Name, Nature & Location of the Works

The name of the Contract is "Saggart Reservoir – Design and Build Contract".

The site is located on Slade Road at Saggart Waterworks, Saggart, Co. Dublin. The area is within the County of Dublin in the administrative area of South Dublin County Council.

The site location is represented in **Figure 1**.

Figure 1 – Site Location



3.1.2 Project Background

3.1.2.1 Existing Saggart Waterworks Facility

The existing facility in Saggart comprises two separate operational reservoir complexes: Saggart reservoirs and Boherboy reservoir. The Saggart reservoir complex comprises three separate tanks supplied by trunk transfer systems from Ballymore Eustace Water Treatment Plant (BME) and a secondary chlorination facility dosing supplies at the inlets. The trunk transfer system from BME comprises:

- an aqueduct that discharges to twin 33" (assumed cast iron) mains at Windmillhill approximately 3km upstream of the Saggart site (known as the BME culvert); and
- a 1600mm diameter prestressed concrete (Macrete) trunk pipeline.

The Saggart reservoir complex is operated by Dublin City Council (DCC) and the Boherboy complex by South Dublin County Council (SDCC) on behalf of Irish Water (IW).

Figure 2 – Existing Site Layout

The Boherboy reservoir is supplied from a branch off the 1600mm pipeline from BME.

A proposed supplementary supply (pumped) from Leixlip (Peamount reservoir) is planned as part of a separate project and will deliver water initially to the 4.5Ml reservoir and then to the new reservoir at Saggart.

Schematics of the existing arrangement at Saggart facility are shown on drawing **DG0103_01** included in **Appendix 1**.

3.1.2.2 Summary Description of Works

Irish Water has identified a requirement to provide additional effective storage of 100Ml (100,000m^3) at the existing reservoir site at Saggart and associated upgrade works. This is to provide security of supply and resilience by the provision of sufficient storage capacity at the site for operations and transfer of treated water from the complex to strategic service reservoirs in the Greater Dublin Area.

A new On-Site Electro Chlorination Plant building (OSEC building) housing a new replacement secondary chlorination plant is also required as the existing chlorination plant has reached the end of its service life. The new OSEC building shall house an ESB substation, chlorination plant and associated equipment, de-chlorination plant, a backup power generator, controls and welfare facilities.

The development shall comprise in summary the following works (non-exhaustive list):

Section 1 Works:

- 100,000m^3 effective capacity covered potable water reservoir in two compartments with integrated inlet and outlet valve houses;
- New OSEC building;
- Diversion of existing 1600mm diameter pipeline to connect to the existing 4.5Ml reservoir;
- New pipelines to connect existing inlet and outlet supplies to new reservoir;
- Re-laying of a section of the existing overflow/drainage pipeline and provision of overflow attenuation area and overflow de-chlorination system;
- New scour pipeline to connect to existing foul sewer on Páirc Mhuire;
- Surface water collection systems and attenuation tank;
- Foul collection system connecting to the existing system on site;
- New watermain for fire hydrants and supply to new OSEC building;
- Temporary relocation of above ground kiosks for water quality sampling;
- Demolition of existing buried storage reservoirs;
- Demolition of redundant above ground buildings/structures;
- Site hardstanding and access roads / pathways on the site;
- New entrance from Castle Road.

Section 2 Works:

- Refurbishment of existing OSEC building;
- Reinstatement works;
- Landscaping.

Section 3 Works:

- 90 day Operation and Maintenance period of the Works excluding operation of all valves and management of inlet and outlet flows.

The works required in this Contract shall be constructed in phases as set out in this Scope such that the existing facilities shall remain operational throughout to continue to supply potable water to the Greater Dublin Region.

3.1.3 Names and Addresses

Employer

Irish Water
Colvill House
24-26 Talbot Street
Dublin 1

Employer's Representative

RPS
West Pier Business Campus
Dun Laoghaire
Co. Dublin

PSDP

RPS
West Pier Business Campus
Dun Laoghaire
Co. Dublin

The Contractor will be appointed as the Designer and PSDP upon Contract award.

Assigned Certifier

RPS
West Pier Business Campus
Dun Laoghaire
Co. Dublin

3.2 PLANNING AND CONSENTS

3.2.1 **Planning, Consents and Areas Provided by the Employer**

3.2.1.1 Planning Permission

The Contractor shall design and construct the Works to comply with the requirements of the planning permission obtained by the Employer together with the conditions issued by the Planning Authority.

If any changes are required by the Contractor for his proposed design then he shall be responsible for obtaining the necessary planning permissions from the relevant Planning Authority and take due cognisance of the time required to obtain the additional consent in his proposal. The Contractor shall also be responsible for all commencement notices and fees/charges required by the Planning Authority.

3.2.1.2 Fire Safety Certificate

The Employer has submitted applications for Fire Safety Certificates based on the Specimen Design for the following buildings:

- New OSEC Building;
- Inlet Valve House (Reservoir Inlet Manifold Building);
- Outlet Valve House (Reservoir Outlet Manifold Building)

in accordance with Part B (Fire Safety) of the Second Schedule to the Building Regulations.

The Contractor shall prepare and submit all necessary documentation required for the issue to South Dublin County Council for any further revisions to the Fire Safety Certificate applications or any new Fire Safety Certificate application required during the extent of this Contract (including period up to issue of a Defects Certificate) and bear all associated costs and fees for the process.

3.2.1.3 Areas Provided by the Employer and Wayleaves

Scope drawings are provided in **Appendix 1** of this document showing Areas Provided by the Employer, pipe corridors and the Site for the design and construction of the reservoirs, OSEC building and other site works required.

The Contractor will be permitted to access the proposed working areas along wayleaves agreed by Irish Water or along dedicated access routes to the wayleaves which the Contractor agrees with the individual landowner.

The Employer will provide the names and addresses of wayleave owners and occupiers to the Contractor. The Contractor shall notify the Employer, the owner and the occupier of the wayleaves in writing 14 days in advance of his intention to start work within each area of the Works.

The Contractor shall make his own arrangements with and make all payments to the owners and occupiers for the use of any additional land outside of the Site, which he may require for the purposes of the Contract, including land for temporary storage of materials, topsoil, sub-soil, site accommodation etc. The Employer's Representative shall be notified in writing of the details of any such arrangements made.

The Contractor shall allow for the arrangement of any temporary wayleaves/access he may require, in addition to those consents already in place, in its Works programme. The Contractor shall also be required to provide details of the liability insurance in respect of these temporary wayleaves to ensure that the insurance provides sufficient indemnity for the Employer. The Employer's Representative shall be notified of the details of any such arrangements made. Any costs associated with such temporary wayleaves and insurances shall be deemed to have been included within the Contractor's Pricing Document.

The Contractor shall keep written records of the dates of his entry onto and departure from all property and lands of each owner and occupier, together with the dates of the erection and removal of all enclosures and shall furnish copies of these records when required by the Employer's Representative.

3.2.1.4 T1 Licence

The Employer will submit any T1 licence applications for the Works and pay associated fees and charges.

The Contractor shall prepare and submit to the Employer all necessary documentation required for the issue to South Dublin County Council for any revisions to or a new T1 required during the extent of this Contract (including period up to issue of a Defects Certificate).

For the purposes of clarity, this shall also be taken to include for any initial or ongoing adjustments (including signage) to cycle lanes or footways which may be required. Refer to South Dublin County Council's website for details of the necessary procedures.

3.2.1.5 New Permanent Power Supply

The Employer has applied for a new increased permanent power supply for the new OSEC building and associated works. The Employer will obtain the agreement for the permanent power supply connections with the Electricity Supply Board (ESB).

The Employer has executed an agreement with the ESB for permanent power supplies for the proposed Works based on the following preliminary estimates of power requirements at the time of application:

- Long term load requirement – MIC 350.75kVA;
- Short term load requirement – 190.63kVA;
- 3-phase ESB connections from an underground MV line running along southern boundary (loop type connection).

However it will be a requirement for the Contractor to confirm the power requirements and submit his schedule to the Employer within 6 weeks of the Starting Date. The Contractor shall facilitate the Employer with load schedule, data, drawings, specifications, information and documents required to facilitate the process of application, if required.

The Contractor shall carry out all necessary interface works (e.g. new sub-station, new ducting, mini-pillars etc.) with the ESB supply and to ESB standards.

The Contractor shall note that a power supply is already on site for the existing OSEC building. As part of the Contractor's scope, the existing OSEC building power supply shall be supplied from the new OSEC building.

All works required for this reconfiguration shall be the responsibility of the Contractor.

3.2.2 **Planning and Consents by Contractor**

The Contractor shall obtain and comply with all Consents necessary to complete the Works, and be responsible for payment of all fees and costs associated directly or indirectly with obtaining and compliance with Consents for the Works, except in so far as these are listed as Employer's responsibility under **Section 3.2.1**.

3.2.2.1 Commencement Notices

The Contractor shall ensure that his final building design complies with all the requirements of the Fire Safety Certificates and any conditions imposed by the relevant authority in this regard.

The Contractor shall be fully responsible for ensuring that all required information in order to complete the Commencement Notice/7 Day Notice procedure is forwarded to the Assigned Certifier for processing, in a timely manner in accordance with the Contractor's Programme. The

Contractor shall be responsible for all costs and fees associated with obtaining a Commencement or 7 Day Notice.

An online system (BCMS) for lodging commencement notices and 7 Day Notices and complying with the various new requirements is available at www.localgov.ie. The basis for the fees is available on the website.

3.2.2.2 Water Supply Connection

The Contractor shall make an application for a metered potable water supply connection to the Employer's new connections department for temporary use during the Contract duration, and shall pay for all application fees, connection charges and all other costs in relation to the connection.

The Contractor shall obtain any T2 to T5 road works licence(s) that are required for the purpose of completing any element of the Works that are within the public road. The Contractor shall apply for T2 licence(s) under the umbrella of T1 licence(s) obtained by the Employer. The Employer will pay fees and charges associated with T2-T5 road works licence(s).

The Contractor will be required to notify the Employer a minimum of 30 days prior to the date for which a road works licence is required for the purpose of undertaking any element of the Works that are within the public road. The Contractor will be required to provide a draft version of a completed road works licence application form and all supporting documentation, with the above advance notification to the Employer of his requirement for a road works licence.

Local Authorities use MapRoad Roadworks Licencing system as the platform for submitting applications.

The Contractor shall be required to comply with all the conditions of each road works licence obtained for the purpose of completing any element of the Works that are within a public road.

3.2.2.3 Construction Stage Traffic Management Plan Consent

The Contractor is required to prepare and submit a site specific Construction Stage Traffic Management Plan to South Dublin County Council for agreement within two (2) weeks of the Commencement Notice as per conditions attached to the final grant of planning.

The required Construction Stage Traffic Management Plan shall include:

- Details of the agreed number, location and use of suitable facilities for vehicle cleansing and wheel washing provided on site prior to commencing of construction and a written commitment that such facilities will be maintained in a satisfactorily operational condition during all periods of construction;
- Location of all on-site car parking facilities provided for site workers during the course of all construction activity;
- Provision for dust suppression measures in periods of extended dry weather;
- Provision for the flexible use of a road sweeper if an acute situation on the adjoining public road requires it;
- Location of material compound and site huts;
- Details of security fencing;
- Name and contact details for site manager;
- Methodology for the use and control of spoil on site during construction;
- Details of access arrangements/routes to be used by construction traffic, to include details of arrangements to manage potential conflicts with site specific issues i.e. schools, playing pitches etc.;
- Measures to obviate queuing of construction traffic on the adjoining road network. In this regard the Contractor shall consult with the Council's Traffic Section before any works are carried out;
- Details of measures to protect watercourses on or adjoining the site from the spillage of deposit of clay, rubble or other debris;

- Alternative arrangements to be put in place for pedestrians and vehicles in the case of the closure of any public road or public footpath during the course of site development works;
- Construction waste management plan outline and any traffic issues that may arise from such a plan.

The Contractor is required to develop and agree the Construction Stage Traffic Management Plan with the relevant stakeholders.

The Contractor is referred to **Section 3.4.5** of the Scope for the specific requirements of the Construction Stage Traffic Management Plan.

The Contractor is not permitted to commence any works on the Site until written approval of the Construction Stage Traffic Management Plan has been issued by the Planning Authority as required by the final grant of planning.

3.2.2.4 Consent for Temporary Road Closures

The Contractor will be required to obtain a Consent from the Road Authority for any temporary road closure(s) that are required for the purpose of completing any element of the Works that are within the public road in accordance with Section 75 of the 1993 Roads Act and the Regulations published under Statutory Instrument S. I. No. 119 of 1994.

The Contractor should note that applications for temporary closure of roads must be submitted (in writing) to the Road Authority at least 6 weeks before the proposed date of road closure to allow enough time for the Road Authority to meet its statutory obligations.

The application must state the reason for the road closure, duration, location and alternative route along with a map and evidence of adequate public liability insurance cover. The Contractor will be responsible for all Roads Authority costs (including advertising costs) relating to the road closure and these will be payable by the applicant prior to the event taking place.

3.2.2.5 T4 Licence (Emergency Road Works)

The Contractor will be required to obtain a T4 (Emergency Road Works) licence from the Roads Authority for any road works that are deemed to be required to prevent, or reduce the risk of, loss, injury or damage to persons or property in accordance with the 'Guidelines for Managing Openings in Public Roads', April 2017, as published by the Department of Transport, Tourism and Sport.

The Contractor shall pay all fees/charges required by the Road Authority in respect of any T4 licence(s).

The Contractor shall be required to comply with all the conditions of each T4 licence obtained for the purposes of completing any element of the Works that are within the public road.

3.2.2.6 Consent for Use of Abnormal and Indivisible Loads

The Contractor is required to obtain a Consent for any use of off road dumper machines or other abnormal loads on public roads in completing the Works. There are two Permit Schemes for the movement of Abnormal and Indivisible Loads, one administered by Local Authorities and one administered by an Garda Síochána. The Contractor is required to:

- Obtain any necessary permits related to abnormal or indivisible loads from South Dublin County Council and An Garda Síochána;
- Inform South Dublin County Council and the local Gardaí of the commencement of the Works.

Where permission has been granted by South Dublin County Council, the Contractor shall be required to ensure that a permit is carried at all times by the driver.

3.2.2.7 Consent for Waste Management

The Contractor is required, via the Waste Management (Collection Permit) Regulations 2007 (SI 820 of 2007) as amended by the Waste Management (Collection Permit) (Amendment) Regulations 2008 (SI 87 of 2008), to:

- Obtain a Waste Collection Permit directly through South Dublin County Council; or
- Employ Licenced Waste Collector Contractor(s) with valid Collection Permit(s).

The Contractor is required to check the validity of the permit(s) held by any Waste Collection Contractor with South Dublin County Council and to confirm that the waste material is disposed of at an authorised facility. An authorised facility is a facility which has been granted waste authorisation in the form of a waste licence, a waste facility permit or a certificate of registration.

3.2.2.8 Consent for Discharge of Dewatered Material

The Contractor shall be responsible for obtaining any wastewater discharge licence(s) required for his temporary and permanent works.

The Contractor shall obtain the consent of Inland Fisheries Ireland and relevant authorities for discharges to a watercourse in accordance with the Water Services Act 2007 with amendments.

The Contractor is required to obtain a Consent of South Dublin County Council in relation to the discharge of any dewatered material or similar to the existing storm water collection network.

The Contractor is required to obtain a Consent of Irish Water in relation to the discharge of any dewatered material or similar to the existing foul/combined collection network.

The Contractor shall make due allowance in his programming and sequencing of the Works for the time required to obtain all Consents.

3.2.2.9 Bat Licences

Where trees or structures are required to be removed, the Contractor shall comply with legislation in respect of protection of bats, and apply for any licences or derogations necessary.

3.2.2.10 Archaeological Licence

The Contractor shall obtain a licence for archaeological monitoring and excavation works from the National Monuments Service of the Department of Arts, Heritage and the Gaeltacht prior to commencement of Works on site. The licence shall be maintained for the Contract.

3.2.2.11 Hoarding Licences

The Contractor shall be responsible for obtaining any hoarding licences deemed necessary.

3.2.2.12 Disability Access Certificate

The Contractor shall comply with and obtain a Disability Access Certificate (DAC) from the building control authority in respect of all building to which Part III of the Building Control Regulations 1997 applies (all buildings/structures currently requiring a Fire Safety Certificate).

3.3 THE SITE

3.3.1 Site Boundaries

The Site as defined in the Conditions of Contract is shown on drawing **DG0102** in **Appendix 1.**

Access to the Site, with exclusion of Areas Provided by the Employer, is subject to the Contractor obtaining necessary Consents.

All site access and boundaries shall be secured to prevent unauthorised access and for public safety. The Contractor shall provide for a 24 hour manned security system at the reservoir site. Remote monitoring will not be acceptable.

Temporary site fencing to sites/wayleaves shall be suitable for the location and agreed with the adjacent landowners where relevant. This shall include stock proof fencing if required.

Immediately before entering on any part of the Site for the purpose of constructing the Works, the Contractor and the Employer's Representative shall have made a mutually agreed written and photographic record of the conditions of the surface and of adjacent structures. They shall also keep a record of the period of time spent therein. In particular the Contractor shall note requirement for a condition survey as described in **Section 3.4.9**,

The Contractor shall not enter on any part of the Site without written approval from the Employer's Representative.

The Contractor shall reinstate all properties, whether public or private, affected by the Works, temporary works, constructional plant, labour, materials or transport, to a condition at least equal to that present before the Contractor's first entry thereon. Where applicable the reinstatement shall be in accordance with Guidelines for Managing Openings in Public Roads 2017 and as set out in the road opening licence(s).

The Contractor is deemed to have visited the Site to ascertain any and all conditions and restrictions likely to affect the execution of the Works.

3.3.2 Means and Restrictions on Access

The Saggart Waterworks facility has a main entrance on Pairc Mhuire Road secured by an automated alarmed gate, operated by phone entry. This is the access for daily operation and maintenance by Irish Water and their agents.

During the construction period, the main access for construction will be through a new secure manned gated entrance on Castle Road (to be constructed by the Contract in compliance with planning permission granted with conditions attached to it).

Access via the existing gates on Pairc Mhuire Road (restricted access area 1 as shown on drawing **DG0109** in **Appendix 1)** shall only be used in so far as is necessary for specific periods and by prior notification to both DCC and SDCC under a permit to work system. Where access is required for construction works via Pairc Mhuire Road entrance, the Contractor shall submit details of projected plant and vehicle movements at least 7 days in advance and coordinate and liaise with DCC/SDCC to ensure no impact on operations.

Access to restricted access area 2 as shown on drawing **DG0109** in **Appendix 1** shall be limited to necessary works only for specific periods and by prior notification to both DCC and SDCC under a permit to work system.

Access to restricted access area 3 as shown on drawing **DG0109** in **Appendix 1** shall be limited to necessary works only for specific periods and by prior notification to both DCC and SDCC under a permit to work system. The Contractor shall avoid any works in the area until completion of Phase 3 (refer to **DG0104** in **Appendix 1**). The Contractor shall provide temporary fencing to delineate restricted access area 3 from his construction works. The temporary fencing shall be paladin or equivalent.

The Employer has made arrangements to lease adjacent lands for a 2 year period from the Contract date and make these available to the Contractor for that period. These lands are shown as areas 4 & 5 on **DG0109_02** in **Appendix 1**. Area 4 is shared access with the landowner and the Contractor shall not use this area for any other purpose except for access to other lands within Areas Provided by the Employer. A temporary access gate between area 5 and the existing site shall be provided along the boundary and the hedgrow/boundary reinstated at the end of the 2 year period. he Contractor shall provide temporary fencing to delineate restricted access area 4 from area 5. The temporary fencing shall be paladin or equivalent with access gates as required to area 5.

The Employer will require fenced off vehicular access to the locations shown on drawing **DG0109** in **Appendix 1** for day to day operations and any emergency works arising. The Contractor shall ensure that these locations are accessible by vehicle requiring 3m width on a suitable hard surface for the duration of the Works.

3.3.2.1 Deliveries to the Works Site

No deliveries will be permitted outside the specified working hours (as specified in **Section 3.4.1)** without the written approval of the Employer's Representative in advance.

3.3.2.2 Trespass by Contractor's Employees

The Contractor shall take every precaution to ensure that his Personnel do not trespass or cause nuisance to any lands outside the Site. Trespass of any kind will be regarded as a serious offence and may lead to a request by the Employer for the removal of the offending work-person from the Site. At the Employer's discretion, the offending work-person may or may not be allowed to return to the Site for the duration of the Contract.

Upon possession for use of the Site from the Employer, the Contractor shall be responsible for activities of trespassers, protestors and others that are not Employer's Personnel.

3.3.3 **Information on Adjacent or Abutting Structures**

The Contractor shall be solely responsible for the stability and integrity of all the existing buildings, structures and underground infrastructure in the Works areas during the Contract.

All necessary precautions shall be taken by the Contractor during the course of the Works to prevent movement or damage to any existing premises, buildings, walls, embankments, boundary fencing, access gates, watermains, drains, ducting, utilities etc.

The Contractor shall be deemed to have included in his Pricing Document for the support and protection of existing infrastructure during construction and/or for the rebuilding and repair of existing infrastructure directly or indirectly damaged or affected by the construction operations.

There are several existing properties, retaining walls and chambers located within or adjacent to the Site, including but not limited to:

- Existing OSEC building;
- 4.5Ml reservoir (to be kept in service until the new reservoir is commissioned);
- Boherboy reservoir,
- Boherboy pump station;
- ESB sub-station;
- Residential houses;
- Apartment blocks;
- Commercial units.

A number of valve and flowmeter chambers are located within the Site. Retaining walls are located north of the Site.

The Contractor shall refer to **Section 3.4.9** of this document for condition survey minimum requirements.

3.3.4 Work on Site by Others or Concurrent with the Works

The Contractor shall allow in his programme and his Pricing Document for all time and costs required to accommodate the Employer's Agents for their operation and maintenance of all existing works. In particular, the Contactor shall allow for delivery chemicals to the existing OSEC building.

The Contractor shall provide temporary fencing to delineate specific areas of the Site from his construction works as shown on **DG0109** in **Appendix 1**. The temporary fencing shall be paladin or equivalent.

Various utility providers supply, maintain and occasionally upgrade their existing services and install new services in the work areas. The Contractor shall allow in his programme and his Pricing Document for all time and costs required to accommodate these utility providers for their maintenance of these services.

These providers are:

- ESB;
- GNI;
- Telecom providers.

The Contractor shall ensure minimum disruption to vehicular and pedestrian traffic, in accordance with Local Authority road opening/road closure licences.

The Contractor shall be aware that there is another contract under construction on the Site that may affect his Works, including but not limited to:

- Strategic Watermain Link Between Leixlip and Saggart.

3.3.5 Facilities to be Operated and Maintained by the Contractor

The Employer will continue to operate the existing facilities on the Site.

The Contractor shall ensure that the water supply transfer capacity of existing mains is maintained 24 hours a day, 7 days a week during the construction period, except where planned agreed shutdowns are required for the Works.

The Contractor shall handover operation of a control valve (C1 on **DG0103_02** in **Appendix 1)** on the interim 1600mm pipeline diversion supplying the 4.5ML tank to the Employer immediately on commissioning this line.

3.3.6 Specific Site Rules and Regulations

3.3.6.1 Asbestos Cement Pipes

There is an existing 24" asbestos cement outlet pipe to which the Contractor is required to make a connection.

The Contractor shall note that there may be more asbestos cement pipes present, which may need to be connected to the new infrastructure, diverted or removed and disposed. The Contractor shall refer to relevant sections of this Scope regarding the Contractor's duties under the Safety, Health and Welfare at Work (Exposure to Asbestos) Regulations 2006 (S. I. No. 386 of 2006) and 2010 (S.I. No. 589 of 2010).

The Contractor shall obtain asbestos insurance for Employers' Liability and Public Liability before interacting with any asbestos containing material or any item assumed to be an asbestos containing material. The Contractor shall have sufficient asbestos insurance cover to indemnify the Employer from any liability connected to the discovery of asbestos, removal and disposal of identified or assumed asbestos containing materials. The Contractor will be deemed to have included all costs related to the obtaining of sufficient asbestos insurance in his Pricing Document. Copies of asbestos insurance certificates shall be supplied to the Employer's

Representative prior to commencing any Works on the Site. Copies of the asbestos insurance certificates shall be held on site and shall be presented to the Employer's Representative if so requested.

The Contractor shall carry out an asbestos survey of the structures to be demolished or refurbished.

3.3.6.2 Site Clearance

The Contractor is deemed to have included in his Pricing Document for all site clearance works that will be required for the temporary and permanent Works, including removal of items cleared and (unless expressly stated otherwise in this Scope) their disposal off site.

The Contractor is deemed to have visited the Site in order to gain a full appreciation of the site clearance works that will be necessary.

The Contractor shall take every reasonable care to preserve the amenities of the Site and surroundings and to avoid unnecessary disturbance, damage or injury during the progress of the Works. Any damage caused by the Contractor to any street furniture item or planting shall be repaired or replaced to the satisfaction of the Employer's Representative at the Contractor's expense.

The Contractor shall relocate the Macrete pipes on the existing Site by transferring these as follows:

(i) 10 nr 1200mm diameter macrete pipes shall be delivered to Ballyboden Treatment Plant site, Stocking Lane, Dublin 16, Co. Dublin;
(ii) 12 nr full length 1600mm diameter macrete pipes shall be delivered to Ballymore Eustace Treatment Plant site, Ballymore Eustace, Co Kildare;
(iii) 12 nr short length 1600mm diameter macrete pipes shall be delivered to Ballymore Eustace Treatment Plant site;

The Contractor is required to excavate the pipes at Saggart as these are covered with sand for protection from the environment. The relocated pipes shall be stored by wrapping the pipes in plastic and surrounding/covering with sand in accordance with the manufacturers' recommendations for storage of Macrete pipes.

3.3.6.3 Pumping for Temporary Works

Pumps for use outside normal working hours shall be electrically powered. The power shall be either mains supplied, or by a suitably powered and adequately silenced generator set. The generator shall be sited at a location that will result in the lowest possible noise disturbance at the nearest residence, hotel or other premises.

Diesel powered pumps will not be allowed outside normal working hours, due to the noise suppression requirements. The Contractor shall adhere to noise restrictions during construction as set out under **Section 3.4.7.2** of this Scope.

The Contractor shall comply with the planning permission and conditions attached to it.

3.3.6.4 Ordnance Datum, Pre-Contract Levels, and Reference Points

All existing levels shall be verified on site by the Contractor in agreement with the Employer's Representative prior to construction work commencing. Any discrepancies or disagreements with any levels shown on the drawings or given in this Scope shall be notified to the Employer's Representative in writing, with sufficient notice to enable the Employer's Representative to carry out his own checks in advance of the Works.

Any such approval given by the Employer's Representative will not relieve the Contractor of its responsibility to construct the Works adequately and accurately. In connection with setting out, the Contractor shall maintain on site all instruments, measuring equipment, pegs, sight rails, and other things necessary for the proper setting out and checking of the Works.

The Contractor shall establish and maintain reference pegs and temporary bench marks of approved design appropriate for setting out and checking the Works. Before removal of any reference pegs or bench marks the Employer's Representative's approval must be obtained.

All surveys shall be referenced to the Irish Transverse Mercator and to the Malin Head Ordnance Datum.

3.3.6.5 Cleanliness of the Site

The Contractor shall be responsible for the proper maintenance of all lands made available for his use. The land shall be kept clean and tidy and all materials shall be kept neatly heaped and stacked before and after use. The quality of materials and components stored on the Site shall be consistent with that necessary for efficient work.

The Contractor shall use bunds for storing fuels, chemicals or other dangerous substances on Site. Appropriate spill kits must be used.

The Contractor shall take all reasonable steps to the approval of the Employer's Representative to protect from injury or deterioration from weather or other causes, all work and materials, which may be affected thereby.

Public roads, footpaths and cycling lanes used for access to and from the Site and other public roads shall be kept clean and swept daily (where applicable in the vicinity of the Works), or more frequently if directed by the Employer's Representative, to keep them dirt free and free of loose material.

3.3.6.6 Electricity and Telecom Supply

The Contractor shall make his own arrangements for the provision of an adequate temporary power supply, and back-up supplies for the duration of the Contract.

The Contractor shall satisfy the Employer's Representative, by production of any required "connecting up" certificates, etc., of the worthiness of any electrical installations by the provision of RECI certificates of any electrical installations.

The Contractor shall install, maintain, and disconnect on completion of the Contract, an electricity supply and a telecom service to the Employer's Representative's site office. Any associated costs shall be included in the Pricing Document.

3.3.6.7 Water Supply

All water required for the execution of the Works shall be provided by the Contractor, the cost of which shall be included in the Pricing Document.

The Contractor shall apply to Irish Water for a new connection, pay all associated charges and all water charges incurred during the course of the Contract.

There will be no charge for the connection for construction works. There will be no charge for water needed for use during the testing and commissioning of the reservoir, except in the instance where water is wasted by the Contractor in the event of pressure testing failures and failures of bacteriological testing resulting in additional water usage for testing. Rate for water over and above that required water for testing without failure €1.16/m^3.

The Contractor shall install, maintain, and disconnect on completion of the Contract, a potable water supply and a means for supplying hot water to the site offices for use. Any associated costs shall be included in the Pricing Document.

The Contractor shall note requirements of **Section 3.2.2.2** of this document.

3.3.6.8 Rock Excavation / Vibration

Rock shall mean naturally occurring material in mass formation which requires blasting or rock breakers for its removal.

Rock excavation by mechanical methods shall have regard to the noise limitations in **Section 3.4.7.2.**

Vibrations in buildings associated with mechanical rock breaking shall be monitored and shall not exceed 3mm/s. The Contractor shall have regard to the proximity of the reservoirs in operation and dwellings in his method of rock breaking.

A minimum of 6 sets of vibration recording equipment must be maintained on site at all times during rock breaking, each set to be capable of yielding a permanent visual record of vibrations in all three perpendicular directions simultaneously and must record accurately from 6 to 60 Hz. Each instrument shall be of the type employing velocity sensitive transducers.

The vibration recorded on each instrument at a minimum of 6 agreed locations shall be recorded in 3 mutually perpendicular directions, one of which shall be in the horizontal plane and directed radially towards the centre of the rock breaker.

The peak particle velocity in the vertical direction or in the horizontal radial direction or in the horizontal tangential direction at the ground surface level shall not exceed +/-3mm per second. The instantaneous sum of the peak particle velocities in any three mutually perpendicular directions shall not exceed +/-3mm per second.

The Contractor shall be responsible for setting up and maintaining the vibration monitoring equipment specified above and for providing to the Employer's Representative copies of all vibration recordings.

The Contractor shall employ the best practical means to minimise vibrations produced by his operations; measurements and analysis of the vibration monitoring shall be carried out in accordance with BS 7385.

3.3.6.9 Soil Sampling Excavation and Disposal

Suitable sampling and chemical analysis of the soil/sub-soil shall be undertaken prior to its excavation. Any soil that is to be excavated and disposed of shall be sampled, analysed and classified to determine the most suitable disposal outlet. Any soil that is to be reused on-site shall be sampled and analysed to confirm its suitability.

3.3.6.10 Disposal of Materials

All material disposal shall adhere to strict licensing and permitting requirements. All contaminated material is to be carried away to a licensed disposal site in compliance with the Waste Management Act 1996 and amendments and with the relevant statutory instruments including (SI No. 133 of 1997 and SI No. 162 of 1998) and in particular the European Communities (Amendment of Waste Management Act, 1996) Regulations, 1998 (S.I. No. 166 of 1998). No contaminated materials shall be reused in the construction without the permission of the Employer's Representative.

All appropriate licences and permits must be obtained by the Contractor. All waste must be transported by licensed vehicles. A clear paper trail, adhering to statutory and legislative requirements will be required to identify and track the disposal of all waste material. A waste register must be maintained for audit purposes.

The Contractor should note in this regard that the regulations governing the disposal of excavated material/builder's rubble require the transfer of such waste material only to sites authorised for the acceptance of the material by the EPA.

The Contractor shall acquire all permits or licences in this regard that are required as a result of the Works and shall pay all costs for same, and all fees or other costs associated with recycling or disposing of all surplus or waste materials. Any associated costs shall be included in the Pricing Document. The Contractor must allow sufficient time to obtain all necessary disposal licences.

3.3.6.11 Disposal Log Record

The Contractor shall maintain a written Disposal Log Record for examination by the Employer's Representative, which will include the following information for all disposed material:

- The date the material was removed;
- A description of the material;
- The amount of material removed at that time;
- By whom the material was removed (Name and Company);
- The intended destination of the material;
- Receipt for acceptance of material.

3.3.6.12 Material Storage

Materials can only be stored with the Areas Provided by the Employer or in the compound areas procured by the Contractor. It is the responsibility of the Contractor to identify lands appropriate for compounds and areas for the storage of materials. The Contractor shall ensure he complies with all legislation and best environmental practice in his use of lands outside of the Site."

Material storage at roadsides or in public areas will not be permitted. The storage of dangerous compounds including contaminated materials will not be permitted unless 24-hour security arrangements are in place and have been approved by the Employer's Representative.

All materials stored shall ensure no contamination or pollution of the water supply.

3.3.7 **Utility Data and Site Investigations**

The Contractor shall be responsible for liaison with utility providers. He shall obtain the most current available records.

The Contractor shall notify the Employer's Representative of any meetings he arranges with utility providers for the co-ordination of services diversions and outages. He shall keep a record of all such meetings and provide the Employer's Representative with a copy of the minutes or record of the meetings.

The Contractor shall carry out any site investigation works required for completion of the Works.

The Employer has liaised with the ESB in relation to the construction of the Heritage Trail.

3.4 RESTRICTIONS AND OBLIGATIONS

3.4.1 Working Hours

The following working hours shall be permitted with the exceptions described hereunder:

- Monday to Friday – 07.30 to 19.00;
- Saturday – 09.00 to 13.00;
- No Sunday or Bank Holiday working permitted.

Rock breaking or demolition shall be permitted only from Monday to Friday 08.00 – 18.00. No rock breaking or demolition shall be permitted on Saturdays, Sundays or Bank Holidays.

If the Contractor wishes to undertake work outside the normal working hours, he shall obtain the Employer's Representative's written approval in advance and shall not proceed without such approval. At least 48 hours' notice must be given of any work outside the working hours, which require supervision by the Employer's Representative on site. Failure to give adequate notice will result in approval being withheld.

3.4.2 Programme Constraints

In determining his ordering and programming of work, the Contractor shall be obliged to minimise the extent of disruption to consumers, to the water supply and to the public in general.

3.4.2.1 Sequencing of Works

The Works shall be constructed in the following sequence (refer to **DG0104** in **Appendix 1**):

- **Phase 1:** Construction, testing and commissioning of 1600mm dia. bypass pipeline from the existing 1600mm pipeline branch (off the Boherboy supply) to supply the existing 4.5Ml tank (including tank tie in/connection). Relocation of the dosing lines for chlorination of the supply using existing dosing pumps. Handover of anew butterfly valve on this pipeline (C1 as shown on **DG0103_02** in **Appendix 1**) to enable the Employer to manage flows;
- **Phase 2:** Decommissioning and demolition of the existing 1.2Ml and 13.6Ml tanks and associated pipework/chambers. Demolition of the existing above ground structures on site. Refer to drawing **DG0106** in **Appendix 1** to this document.
- **Phase 3:** Construction, testing and commissioning of the new OSEC Plant, new reservoir and associated pipelines including the connections to existing outlet and inlet pipelines.
- **Phase 4:** Decommissioning and demolition of the existing 4.5Ml tank and associated pipework/chambers. Decommissioning and refurbishment of the existing OSEC building. Reinstatement and landscaping works.

The Contract shall phase connections to the existing inlets and outlets in sequence under the specified shutdown periods set out in this Scope.

3.4.2.2 Commissioning Sequence

In order to demonstrate that the constructed Works conforms to the Scope the Contractor shall carry out testing and commissioning in accordance with **Section 3.8**.

Except in so far as is necessary under planned shutdowns to carry out the necessary interfacing with the existing facility, the entire Saggart Waterworks facility (Saggart and Boherboy works) shall remain operational. The Contractor shall prepare a commissioning plan in accordance with IW-TEC-600-05 (refer to **Section 3.8** of this Scope).

The Works shall be commissioned in the following sequence:

- Commission all inlet lines and valves to the new reservoir including bypass pipeline;
- New OSEC Plant (operating via the 4.5Ml tank using new dosing points and existing sampling points on existing outlets);
- New Reservoir to operate in parallel with the existing 4.5Ml tank;
- Connection to 1200mm dia. Ballyboden/Stillorgan pipeline;
- Supply the 1200mm dia. Ballyboden/Stillorgan pipeline from new Reservoir;
- After a period of 7 days, remove the connection from the 4.5Ml tank to the 1200mm dia. Ballyboden/Stillorgan pipeline;
- Connection to 1200mm dia. Belgard/Cookstown pipeline;
- Supply the 1200mm dia. Belgard/Cookstown pipeline from new Reservoir;
- After a period of 7 days, remove the connection from the 4.5Ml tank to the 1200mm dia. Belgard Cookstown pipeline;
- Connection to the existing 24" dia. to Tallaght pipeline;
- Connection to the existing 27" dia. to Cookstown/Belgard pipeline;
- Connection to the existing 24" dia. to Ballyboden/Stillorgan pipeline.

3.4.2.3 Water Supply Outages

The final connections to the existing watermains shall only be completed when the new watermains have been flushed, cleaned, swabbed, tested and disinfected in accordance with **Appendix 2** to the Scope and approved by the Employer's Representative.

The Contractor shall coordinate shutdowns for connections with the Employer and Employer's Agents.

No two mains may be shutdown concurrently. A minimum recovery time of 14 days shall be provided to allow for recharge and security of supply. No less than 14 days shall be permitted between recharge of one main and shutdown of the next watermain.

In addition, the Contractor shall note that one connection shall be fully completed and commissioned to the satisfaction of the Employer's Representative, including both Civil and all MEICA works, before work on another connection may commence.

3.4.2.4 Testing and Commissioning of the Reservoir

The new reservoir shall be designed such that the reservoir roof must be completed prior to water testing and backfilling the structures.

The Contractor shall carry out testing of the new reservoir in accordance IW-TEC-300-01 (refer to **Appendix 2**). To minimise quantity of potable water required and wastage the Contractor shall programme his testing to provide for testing of each reservoir compartment in sequence.

The reservoir rate of filling during testing shall not exceed 1m (depth) per 24 hours.

The reservoir roof shall be tested by continuous hosing for a period of not less than 6 hours. This test shall be carried out prior to the installation of any waterproof membrane.

3.4.2.5 Water for Construction, Testing, Chlorination and Commissioning

The Contractor shall give the Employer and his Agents three months' notice of his intention to test or fill the reservoir and pipelines with potable grade water. The Contractor shall note that all water used for scouring, chlorination and commissioning must be potable water and the use of water from streams, rivers or surface water sewers for this purpose shall be prohibited.

The Contractor shall procure an adequate supply of potable water for the purposes of the Contract. He may apply to Irish Water to procure a metered water supply for testing, chlorination or for any other purpose during the construction and commissioning of the Works.

The Contractor shall pay all water charges incurred. Any costs associated with provision of water for the Contract shall be deemed to have been included within the Contractor's Pricing Document. Only water for testing of the reservoir will be exempt from charges.

The Contractor must allow for delays due to restricted volumes of water if he is to rely on public water supplies due to the limited spare capacity in the existing system. Details of the provision of water for testing and the location of the temporary supply/supplies shall be agreed with the Employer.

The Employer's Agents will provide water for testing the reservoirs and pipelines from the existing network at a maximum rate of 1,000m^3 per day. The Contractor shall note that depending on other works ongoing concurrently on the water supply network and headworks/treatment plants, or the prevailing circumstances for water supply in the area at the time, this volume may be reduced and the availability may be subject to other requirements at the time. The Contactor shall liaise with the Employer and his Agents in regard to availability of water supply for testing.

The Contractor shall be responsible for obtaining all necessary licences to discharge water from testing to foul and/or surface waters systems, as permitted. Disposal of water for testing will not be permitted to be discharged to any nearby watercourses without obtaining necessary licences and stakeholders approvals.

The Contactor shall also note requirements in **Sections 3.2.2.2** and **3.3.6.7** of this document.

3.4.2.6 Department of Defence Restrictions

Baldonnel aerodrome is located nearby and operations may require restrictions on certain activities for the construction of the Works.

The Contractor shall notify the Department of Defence (DoD) of his temporary works requirements where plant and equipment on the Site exceed 10m above existing ground level at any location. This applies to fixed and mobile plant and other temporary works.

Notification to the DoD shall be as set out in the form in **Appendix 8.**

3.4.2.7 Construction Traffic Management Plan

The Contractor shall refer to the requirements listed in **Section 3.2.2.3** of this document.

Construction traffic arising from the site shall be managed in accordance with a method statement for the management of the construction phase in accordance with an agreed site specific Construction Traffic Management Plan that fully accords with requirements of the South Dublin County Council's Traffic Section.

The plan shall also be informed by any Project Construction Waste and Demolition Management Plan required to be prepared and agreed that addresses intended construction waste management and any traffic issues that may arise from such a plan. A record of daily checks that the works are being undertaken in accordance with the site specific Construction Traffic Management Plan shall be kept for inspection by the Planning Authority

Storage of construction materials is not permitted on any public road or footpath, unless agreed in writing with the Planning Authority, having regard to the prior reasonable justification and circumstances of any such storage.

The Contractor shall keep a record of daily checks that the works are being undertaken in accordance with the Construction Stage Traffic Management for inspection by the Planning Authority.

3.4.2.8 Environmental Programme Constraints

The Contractor shall have regard to the planning requirements to carry out the following surveys prior to commencement of construction work on the site, including setting up of temporary compounds, offices, hardstandings or site clearance:

- Full Badger Survey;
- Otter survey 150m upstream and downstream of any discharge points to River Camac or Millrace;
- Crayfish and salmonid survey upstream of the Millrace on the Camac and downstream of the Millrace confluence with the Camac in the period July to September;
- Invasive Alien Species Survey.

Refer to **Section 3.4.7** for environmental management requirements.

Removal of any vegetation including trees and shrubs shall be carried out in the period September to February only. This timeline may change subject to the requirements of the National Parks & Wildlife Service and conditions of any derogation licence issued in relation to tree felling on-site.

The Contractor shall programme the pipeline and outfall works to the River Camac by agreement with Inland Fisheries Ireland.

3.4.2.9 Landscape Plan and Works Specification

The Contractor is required to comply with site specific landscape plan agreed with South Dublin County Council under Planning Condition No.2. Refer to **Section 3.6.25** and **3.6.26** for details.

3.4.3 **Connections to Existing Watermains and Operation of Valves**

The Employer or his Agents' personnel will carry out the final physical connections to the trunk pipelines. The Contractor shall provide all necessary materials, labour and plant to assist them in making the final connections.

The locations for connections to the existing watermains are only nominally indicated on the Scope drawings **DG0103_02** to **DG0103_07** and their precise locations and diameter shall be designed by the Contractor. The Contractor shall carry out his own investigations to establish the precise requirements.

The Contractor shall submit to the Employer's Representative a detailed schedule of connections to be undertaken and shall show all resources required to carry out the works. The procedure for connections to existing live watermains shall be as follows:

- The Contractor shall expose the existing main for the purposes of locating the main and calipering the main by the Employer's Agent's personnel. Location, depth and sizes shall be recorded at the connection point and the excavation shall be backfilled and the ground reinstated.
- The Contractor shall supply all materials (pipes, specials, fitting, valves, couplings etc.) necessary for the proper and adequate execution of the connection. Prior to placing an order for connection materials the Contractor shall submit his schedule of proposed materials to the Employer's Representative for approval.
- The Contractor shall give the Employer's Representative an initial 28 day notice in writing before a break into a live main is required. A further 10 day notice shall be given by the Contractor when all materials required for the connection are available and on Site. Materials shall be made available for checking and verification by the Employer's Representative at this time.
- Subsequent to receiving approval to proceed, the Contractor shall excavate and expose the existing pipe at the previously approved connection point to allow the physical connection works to proceed by the Employer's Agent's personnel. The Contractor shall then carry out the connection works including excavation, shoring, pumping and other temporary works.

- All works other than the actual physical connection, draw-down and recharge (operation of valves, hydrants on the network for the shut down) shall be the responsibility of the Contractor.
- Upon completion of the in-line connection works, the Contractor shall be responsible for the design and construction of anchor blocks, the supply and installation of valve chambers (including shafts, base and cover slabs, tobies, valve marker posts, extension spindles), pipe bedding, haunch and cushion, backfilling and reinstatement all in compliance with the contract drawings and specification's requirements. The Contractor shall complete such works in an expeditious manner.

The Contractor shall not operate any valve or any other apparatus on the existing network, except with the written authority of the Employer's Representative.

Safe access shall be provided by the Contractor, at the earliest opportunity, to permit manual operation of the valves by the Employer's personnel and his Agents in the event of having to operate a valve in advance of overall completion of the Works and commissioning of equipment.

Scheduled work will at all times be dependent on the current water supply situation in the Dublin region. This may necessitate works being re-scheduled or cancelled at short notice. It may also restrict the days and times on which shutdowns will be possible. The Employer shall not be held liable for the consequences of such alterations.

3.4.4 Hoarding, Fences, Screens and Advertising

Where there is a risk to the public due to excavations, moving plant or any other Works related activities, the Contractor shall erect and maintain suitable temporary fencing. Following the completion of the Contractor shall dismantle and remove temporary fencing.

3.4.5 Traffic Management

The Contractor shall comply with planning submission, grant of planning and any planning conditions relating to traffic management, construction access routes, consultations, working hours and timing restrictions including those for working concurrently on roads set out in this Scope in addition to the planning conditions.

The Contractor shall consult with the relevant Local Authority/Road Authority/TII in relation to requirements for works in roads and public areas. He shall prepare and implement a Construction Stage Traffic Management Plan as stated in **Section 3.4.2.7**, which will fulfil these requirements, particularly in relation to road opening licenses, consultation with Gardaí, schools, Dublin Bus, private Bus operators, public relations and notifications, general traffic management, and provisions for pedestrians.

The Contractor shall, after consultation with any statutory or other authorities concerned Submit in writing to the Employer's Representative for his approval a programme showing the scheme of traffic management he proposes before commencing any work which affects the use of a public road and thereafter furnish such further details as the Employer's Representative may require. Particular details shall be given to lane closures, road closures and associated diversions that may be required.

The Contractor shall not commence any work, which affects a public road until all necessary traffic safety measures are fully operational.

The Contractor shall ensure minimum disruption to vehicular and pedestrian traffic, in accordance with Local Authority road opening/road closure licences, if any.

The Construction Stage Traffic Management Plan shall be a living document and subject to ongoing revisions and updates as necessary.

The Contractor shall employ a suitably qualified independent Temporary Traffic Management (TTM) designer and sub-contractor to design and implement the Construction Stage Traffic Management Plan. The plan shall be prepared (and reviewed as required) by a competent

Designer (TTM) with experience in traffic management and road construction or civil engineering works, and having regard to the nature and complexity of the Works. As a minimum, the Designer (TTM) shall hold an accredited Level 7 Engineering Qualification, shall have a minimum of 5 years post graduate experience in an engineering role and shall have a Certified qualification in Temporary Traffic Management Design i.e. have successfully completed the LASNTG Temporary Traffic Management Design Course (Levels 1 – 4) or an approved equivalent. The Contractor should note that a further Certified course, LASNTG Temporary Traffic Management Design Course (Levels 5 & 6) or an approved equivalent, is required for the designers of Temporary Traffic Management arrangements on Level 5 and 6 roads.

The Construction Stage Traffic Management Plan shall be developed from the Design Process TMP and be in accordance with:

- Guidelines for the Control and Management of Traffic at Roadworks (Department of Transport, Tourism and Sport, Second Edition 2010);
- Traffic Signs Manual, Chapter 8 – Temporary Traffic Measures and Signs for Road Works (Department of Transport, Tourism and Sport 2010);
- Guidelines for the Opening, Backfilling and Reinstatement of Openings in Public Roads (Department of Transport, Tourism and Sport, Second Edition (Rev 1) April 2017);
- Specification for the Reinstatement of Openings in National Roads (TII, Issue 2 2013);
- Guidelines for Working on Roads (HSA, 2008).

A Temporary Traffic Operations Supervisor (TTOS) appointed by the Contractor shall be responsible for the implementation of the plan. The TTOS shall carry out site inductions and routine inspection of traffic arrangements and assess whether or not the Site is operating within the traffic management parameters specified in the plan. Inspections shall be documented. Completed inspection sheets (including providing details of traffic accidents, dangerous occurrences and corrective actions) shall be submitted to the PSCS and Employer's personnel on site at the end of each working day. No work shall take place without the presence of a suitably qualified TTOS.

In addition, the Contractor shall maintain the requisite number of accredited personnel within his workforce with their site activities related to their relevant accreditation. The Contractor must nominate an appropriately trained and accredited (CSCS, or equivalent) Signing Lighting and Guarding gang member, where required, to be responsible for the installation, modification, maintenance and removal of appropriate traffic management arrangements at all times.

A communications plan is to be agreed in advance by the Contractor with the Employer's Representative and Irish water. The Contractor shall make allowance for providing ongoing information on traffic management arrangements to AA Road Watch, through public notices in local papers, website updates, local radio notices etc.

The Contractor shall also note the requirements of the Guidelines for the Opening, Backfilling and Reinstatement of Openings in Public Roads in respect of notifications to residents and businesses where works are due to continue outside the normal working hours.

3.4.6 **Waste Management**

The Contractor is required to comply with the full requirements of all Waste Management Legislation and amendments, including but not limited to:

- Waste Management Acts 1996 to 2010;
- Waste Management (Hazardous Waste) Regulations;
- Movement of Hazardous Waste Regulations;
- The Carriage of Dangerous Goods by Road Act;
- Environmental Protection Act 1990: Waste Management, the duty of care;
- (Shipments of Waste) Regulations;.
- The Safety, Health and Welfare at Work (Exposure to Asbestos) Regulations (including amendments)
- The Safety, Health and Welfare at Work (Construction) Regulations, 2013;
- HSA Guidelines on Asbestos-containing Materials (ACMs).

The Contractor is required to provide for the removal, collection, transportation, treatment and disposal of any waste material arising from the construction of the Works to appropriately licenced waste facilities.

The Contractor is required to prepare and submit a Waste Management Plan taking into account all waste sources associated with the construction of the Works.

The Contractor shall be responsible for identifying, removal, screening, transportation and disposal to an approved facility, of all hazardous waste.

The Contractor shall refer to **Section 3.3.6** for requirements in relation to sampling and disposal of materials.

3.4.7 **Environmental Management**

3.4.7.1 Dust

All necessary precautions to contain dust arising from excavations and construction works shall be taken so as to prevent a nuisance being caused to occupiers of buildings and properties in the vicinity of the Works.

During the construction and or demolition works, best practicable means shall be employed to minimise air blown dust being emitted from the Site. This shall include covering skips and slack heaps, daily washing down of pavements or other public areas, provision and mandatory use of wheel washing facilities, use of water spray as required to suppress dust emissions and any other precautions necessary to prevent dust nuisances. The Contractor shall comply with BS 6187 Code of Practice for demolition.

The Contractor shall sample and test dust levels in accordance with best practice. The Contractor shall establish at least 8 key monitoring points on the site, taking into account the specifics of the activity and area. The Contractor shall report to Employer's Representative on dust sampling and testing results weekly.

The Contractor shall designate an area for wheel and plant washing facilities. This area shall be securely constructed with no overflow and shall be designated to operate on total recirculation or the water generated be contained by the use of a vacuum attached to the spray nozzle. In the event of these options not being available, discharges to controlled waters may only take place with adequate settlement and treatment prior to discharge to a foul sewer.

The Contractor shall clean out all road gullies within 200m of his site operations prior to commencing any works. He shall be responsible for ensuring that all road gullies in the area affected by the works are maintained in a clean condition.

3.4.7.2 Noise

The Contractor shall be required to establish the appropriate sensitive noise receptors adjacent to the Site and organise his plant and working arrangements to minimise nuisance due to noise accordingly.

Construction Stage

All works to comply with S.I. No. 140/2006 - Environmental Noise Regulations. All work shall be carried out without unreasonable noise. For the period during construction the Contractor shall ensure that the impact of noise due to construction activities is minimised through the use of good site management, plant maintenance and communications with adjoining property owners. The Contractor shall organise his operations with regard to the positioning of plant and the location of haul routes, etc., so as to minimise construction noise to adjacent properties.

The Contractor shall employ the best practical means to minimise noise produced by his operations, including plant maintenance, and shall comply with the recommendations in BS 5228 (Noise Control on Construction and Open Sites) and the World Health Organisation (WHO) – Guidelines for Community Noise (1999).

The Contractor shall engage in local consultation in respect of any noise sensitive location within 30m of the Site prior to construction activities commencing. Sensitive locations shall be provided with the following information in advance:

- Schedule of works to include time periods and duration;
- Name and contact details of person nominated to manage noise complaints;
- Hours of operation including any scheduled times for the use of equipment likely to be a source of significant noise.

All vehicles and mechanical plant used on the works shall be fitted with effective exhaust silencers and shall be maintained in good and efficient working order for the duration of the works in compliance with BS 5228. Machines in intermittent use shall be shut down in the periods between work or throttled down to a minimum. The Contractor shall remove from the works any item of plant, which in the opinion of the Employer's Representative, is ineffectively silenced.

All compressors shall be "sound reduced" models fitted with properly lined and sealed acoustic covers which shall be kept closed whenever the machines are in use. All ancillary pneumatic percussive tools shall be fitted with mufflers or silencers of the type recommended by the manufacturers. Pumps and mechanical static plant shall be enclosed by acoustic sheds or screens where directed by the Employer's Representative.

Sound levels shall be monitored by methods set out in Appendix B of BS 5228. All measurements shall be made on the works side of the site boundary of each property in question using a sound level meter conforming to IS EN 60651 on SLOW response.

Any plant, such as generators and pumps, which is required to work outside the working hours stated in **Section 3.4.1**, shall be suitably silenced to the approval of the Employer's Representative which shall restrict the noise level to not less than 5 dB(A) below levels quoted hereunder.

Piling, including temporary piling, shall be carried out by recognised noise reduced systems. Piling should not be carried outside of working hours stated in **Section 3.4.1** without the written consent of the Employer's Representative.

The Contractor shall ensure that at all properties outside the site boundaries the sound levels arising from activities do not exceed the following values:

Table 1 – Noise Limits during Construction

Working Period	Mean Noise Limit dB(A)	Peak(1hr) dB(A)
(a) Monday – Friday 0700-1900	75	80
(b) Monday – Friday 1900-0700	55	65
(c) Saturdays 0900-1300	65	75
(d) Sundays and Bank Holidays	55	65

At all other times, the sound level of 50 dB(A) L10 (18hr) and a maximum noise level of 55 dB(A) must not be exceeded unless the existing ambient noise levels are higher. In such cases, the ambient noise level can be exceeded by up to 5 dB(A).

Proposed Works

Limit values for the noise from the proposed Works measured outside any dwelling shall be:

- Night (1900 hrs to 0700 hrs): 45 dB LAeq (30 min)
- Day (0700 hrs to 1900 hrs): 55 dB LAeq (30 min)

There should be no significant pure tones or impulsive elements in the noise spectrum of the emissions from the plant.

All main sources of noise in the proposed Works will be required to incorporate noise control measures, as appropriate, to meet the above criteria.

- Night (1900 hrs to 0700 hrs): 45 dB(A) 30 Minute LAeq
- Day (0700 hrs to 1900 hrs): 55 dB(A) 30 Minute LAeq.

3.4.7.3 Protection of Surface Waters from Pollution

Particular care shall be taken to prevent the discharge of deleterious material to watercourses and streams. The Contractor shall rigorously conform to the provisions of Local Government (Water Pollution) Act, 1977 and subsequent amendments.

During the period of execution of the Works, the Contractor shall take all necessary precautions to prevent the pollution or silting of rivers, streams, watercourses, reservoir catchment areas or surface water drains by any matter arising from his operations, and shall provide any settling ponds or purifying equipment required.

The Contractor is required to submit to the Employer's Representative a detailed method statement and risk assessment clearly setting out the pollution control measures he intends to implement. The pollution control measures put forward by the Contractor will be subject to the approval of the Employer's Representative.

Suitable storm water pollution prevention measures shall include, but not be limited to, the following or a combination of the following:

- filter drains;
- check dams;
- silt fences;
- covering of exposed stockpiles;
- the use of attenuation lagoons;
- sedimentation units (i.e. Siltbuster, or similar high rate sedimentation system).

No site water runoff shall be connected directly to any watercourse/drain/ditch. All discharges shall be made via a sedimentation unit (i.e. Siltbuster, or similar high rate sedimentation system).

Vegetation shall not be removed from existing drains, ditches or watercourses without the written consent of the Employer's Representative.

The Contractor shall use information from National and Local Weather Forecasts as a means to implement measures to assist in the prevention of polluted storm water discharges. In particular, in advance of forecasted rainfall, the Contractor shall ensure that the following measures have been undertaken:

- All areas designed to retain sediments - including filter drains, settlement ponds/sedimentation units, etc. shall be inspected and all sediment and debris shall be removed and disposed of to a Licensed Facility or as otherwise agreed with the Employer's Representative and in accordance with the Contractor's Waste Management Plan;
- The amount of exposed ground and stockpiles has been minimised;
- All open excavations have been secured.

The amount of ground stripped of its vegetation at any one time shall be minimised to avoid risks of sediment loaded runoff occurring during wet weather.

Silt fences and filter drains shall be used to reduce silt runoff from exposed areas and stockpile areas as required. The Contractor shall inspect and clean any filter drains at regular intervals including before and after heavy rainstorms.

All pumped water from excavations shall be directed to sedimentation units for treatment before discharge to the receiving water.

Where required, the Contractor shall ensure that overland flow from existing undisturbed areas shall be intercepted and conveyed off site in a manner that closely mimics in terms of quantity and quality pre-construction conditions. Locations and outfalls for such interceptor drains shall be agreed on site with the Employer's Representative.

Fuel

The Contractor shall take precautions to prevent spillage of diesel fuel or other solvents which shall include the use of spill kits and drip trays and the use for refuelling purposes of impermeable surfaces located remotely from watercourses.

The Contractor shall note requirements stated in **Section 3.3.6.5** of this document.

Concrete

The Contractor shall take all necessary precautions when undertaking concrete works to ensure that that no spillages occur.

Any concrete wash water on site shall be inspected and treated prior to discharge or disposal. Disposal of concrete and liquid waste shall be done in accordance with relevant waste management legislation to an off-site licensed disposal facility in accordance with the Contractor's Waste Management Plan.

Minimum measures following a pollution incident

In the event that a pollution incident is identified, the Contractor shall adhere to the following steps:

- work in the immediate area and the areas contributing runoff shall be stopped and the source of pollution shall be identified;
- the source of pollution shall be bunded using a suitable method agreed with the Employer's Representative;
- Notify the Employer and the Employer's Representative immediately.

The Employer's procedure for environmental incident management is provided in **Appendix 5** of the Scope.

3.4.7.4 Trees and Bats

The Contractor shall comply with planning permission and conditions attached to it.

Care shall be taken to preserve the natural amenities of the areas and to avoid damaging any trees, bushes or hedges on or in the vicinity of the Works.

The lands at Saggart were found to be used for foraging and commuting bats (Common pipistrelle, Soprano pipistrelle, and Leisler's bat). The locations of roosts for these species are unknown, although they are unlikely to be immediately adjacent to the site given the time post-emergence that activity was recorded.

For areas for which Medium to High Roost potential was identified (i.e. removal of mature trees with medium bat roost potential), the Contractor shall carry out a detailed bat activity survey by a suitably qualified and licenced bat surveyor to inform species and population status. Where bat roosts are confirmed, the suitably qualified and licenced bat surveyor shall advise on the appropriate course of action, including the need for application for a derogation licence from the National Parks & Wildlife Service (NPWS).

The Contractor shall implement the following mitigation measures:

- Visible cordons shall be erected around trees/vegetation that have been identified as important for bats and shall not be felled/cleared unless clear instruction is given from the Bat Specialist that it is safe to do so and/or under supervision of the Bat Specialist where required;
- In advance of any tree felling works on-site, the Contractor shall liaise with a licenced bat specialist. Any trees showing crevices, hollows, for example, shall be removed while a bat specialist is present to manage any bats found therein;
- Care shall be taken when removing branches as removal of loads may cause cracks or crevices to close, crushing any animals within. These cracks should be wedged open prior to load removal. The dead branches should be lowered to the ground using ropes to avoid impacts which may injure or kill bats within;
- In the event that bats are found on the site during construction works, works shall immediately cease in that area and the local NPWS Conservation Ranger shall be contacted;
- The bats shall be removed by hand by a suitably qualified and licenced bat handler, under licence from the NPWS;
- All trees requiring removal in the proposed development area shall be felled and left in place on the ground for 24 hours prior to removal/disposal to allow any bats beneath foliage to escape overnight;
- Artificial light creates a barrier for commuting bats so lighting should be avoided where possible. If any external lighting is required to facilitate night time working or security lighting in the construction areas, it shall be sensitive to the presence of bats in the area;
- Directional lighting (i.e. lighting which is focussed on work areas and not nearby countryside) shall be used to prevent overspill. This can be achieved by the design of the luminaire and byusing accessories such as hoods, cowls, louvers and shields to direct the light to the intended area only. Lighting levels should be the minimum required for health and safety requirements, and vertical light spill at light sources should be below 3m to avoid potential bat flight paths.

Where construction activity takes place adjacent to hedgerows, treelines or dense scrub the Contractor shall:

- Restrict activity to the footprint required for construction of the Works;
- The proposed works area shall be clearly demarcated with temporary fencing or another suitable method to restrict access to areas adjacent to the works area;

- Trees and hedgerow located adjoining/adjacent to the construction area shall be protected from root damage by machinery by an exclusion zone/root protection area. This is generally calculated as an area equivalent to a circle with a radius of 12 times the stem diameter at breast height, or more roughly, it should extend to below the edge of the outermost branches of the tree. Such protected trees shall be fenced off by adequate temporary fencing prior to other works commencing;
- NRA guidelines on the protection of trees and hedges prior to and during construction shall be followed (NRA, 2006b). No soil, spoil, construction materials or rubbish shall be stored or tipped and no construction plant or vehicles will be parked within the spread of existing trees or hedgerows;
- All site personnel shall be made aware of the trees/vegetation on-site that are known to be important for commuting/foraging bats and the legal protection afforded to bats and their habitat.

3.4.7.5 Badgers

The Contractor shall engage the services of a suitably qualified ecologist to conduct a pre-construction badger survey of the development area including habitat features within 50m of same. The Contractor shall note in particular the probable badger setts along the hedgerows on the southern and western boundaries of the site. A 50m exclusion zones around setts, if any, shall be demarcated by fencing. The Contractor shall liaise with the local Conservation Ranger of the National Parks & Wildlife Service before the destruction or direct interference with any badger sett. The Contractor shall obtain a licence to carry out such works from the Department of Culture, Heritage and the Gaeltacht.

In addition the Contractor shall maintain a regular watching brief along all topsoil stored on site for potential establishment of badger setts during the construction phase.

3.4.7.6 Otters

There is evidence that otter utilise the Camac River (spraints).

Prior to construction works commencing, the Contractor shall engage a suitably qualified ecologist to conduct an otter walkover survey 150metres up and downstream of the proposed discharge point along the Camac River, and also the Millrace by virtue of the proximity of watermain installation and reconnection to the five outgoing watermains pipes. The survey should be undertaken in accordance with Guidelines for the Treatment of Otters Prior to the Construction of National Road Schemes (NRA, 2006a).

If an active otter holt is confirmed in the development area then the Contractor shall contract he local NPWS Ranger. This may require an application for a derogation licence from the NPWS to exclude the otter holt. If required, any further mitigation measures required will follow those outlined in the Guidelines for the Treatment of Otters Prior to the Construction of National Road Schemes (NRA, 2006) and shall be agreed with the NPWS at the time of licence application.

During construction of a proposed emergency outflow discharge main and the drainage discharge main the Environmental Clerk of Works (EnCOW) shall be present on site to monitor works in close proximity to all watercourses. Where otter activity is confirmed onsite, the EnCOW shall engage a suitably qualified Ecologist to advise and or supervise works during construction of the discharge infrastructure.

The Contractor shall maintain a ten metre riparian zone alongside all watercourses within the site boundary or lands for which the contractor may require as a working corridor for the construction of the discharge pipes. A narrow working corridor, clearly delineated shall be put in place alongside the Camac River during the construction period. No works or storage of materials outside of the working corridor shall be permitted. Works in the area shall be scheduled to coincide with dates that will be approved by IFI and/or NPWS and shall be completed in a timely manner to reduce tall unnecessary environmental impacts/disturbance to otter.

3.4.7.7 Invasive Alien Species

The Contractor shall ensure that his works employ best practice and comply with the following guidance relating to Invasive Alien Species:

- Environment Agency UK, (2013). Managing Japanese Knotweed on Development Sites (Version 3, amended 2013);
- Inland Fisheries Ireland guidance regarding aquatic invasive species control (http://www.fisheriesireland.ie/Research/invasive-species),;
- Invasive Species Ireland guidance (http://invasivespeciesireland.com);
- Irish Water Information and Guidance Document on Japanese knotweed Asset Strategy and Sustainability (IW-AMT-SOP-009);
- Irish Water Information and Guidance Document on Management of Giant Hogweed (IW-AMT-GL-001);
- Irish Water. Information and Guidance Document on Management of Himalyan Balsam (IW-AMT-GL-002).

The medium impact Buddleia species was recorded along the western boundary of the study area.

Prior to undertaking any construction works of the proposed development, the contractor must engage a suitably qualified ecologist to undertake an invasive species survey, within the appropriate botanical survey season, of the development area to satisfy themselves as to the presence/absence of IAPS.

The Contractor is required to include in his detailed construction methodology best practice measures in relation to invasive species, with reference to biosecurity, preventing introduction and/or spread of invasive species.

If any invasive species are encountered the appropriate measures shall be put in place by the Contractor to prevent introduction and/or spread of same. The Contractor shall produce a specific Invasive Species Management Plan which shall include the best practice measures including those outlined in the Irish Water specifications and guidance document listed above.

Where any new record of IAPS is noted and confirmed during pre-construction or construction surveys, they should be, with Irish Water approval, notified to National Biodiversity Data Centre for inclusion on its database.

3.4.8 **Existing Utility Apparatus**

The Contractor's attention is drawn to the fact that there are existing services in the vicinity of the proposed pipelines and structures. These services include ESB services (including underground HV cables), gas mains (including high pressure gas mains), trunk watermains, surface water and foul sewers, telecommunication services and other ducts, pipelines and cables.

The Contractor shall be responsible for the design, construction, testing and commissioning of all diversions of utility apparatus and all other existing services required in order to facilitate construction of the Works. The Contractors attention is drawn to Clause 3.4 of the Conditions of Contract.

3.4.8.1 Protection of Existing Utility Apparatus

No underground works shall be allowed to commence in advance of the relevant section of the Works before the location of all services are physically confirmed by liaison with the relevant utility or asset owner/operator and trial holes/trenches, if required, under supervision of utility owner.

The Contractor must comply with the current Code for Avoiding Danger from Overhead ESB Lines, and the Code of Practice for Avoiding Danger from Underground Services published by the Health and Safety Authority in January 2010, second edition.

Liaison with Gas Network Ireland is essential in advance of the relevant sections of the Works requiring crossing of the high pressure transmission lines in accordance with the GNI Transmission Code of Practice AO/PR/127 Rev 1. The Contractor should familiarise himself with Bord Gáis Safety Advice for working in the vicinity of Natural Gas Pipes document.

Liaison with Eir Network's personnel is essential in advance of the relevant section of the Works in accordance with Eir approved codes of practise.

The Contractor shall protect existing drains/sewers/pipelines which are in use, ensuring that:

- Manholes, gullies etc. are not damaged;
- Pipes and drains are kept clear of debris at all times;
- Any damage caused during works is made good and drains are left in clean and working order.

The Contractor shall notify the Employer's Representative in writing of any damage to public or private utility apparatus and where applicable notify the utility apparatus authorities and/or private owners and shall make arrangements for repair to the satisfaction of the Employer's Representative on site and where applicable the appropriate authorities and owners. The Contractor shall accept any arrangements made by the Employer's Representative on site for urgent repairs, which shall not affect liability.

3.4.8.2 Diversion of Utility Apparatus

If a diversion of any other existing utility apparatus is required in order to construct the Works then the relevant utility provider and the Employer's Representative shall be contacted well in advance and the Contractor shall comply with all their requirements for diversions of same.

The Contractor shall allow in its programme and Pricing Document for all time and costs associated with the diversion of underground utility apparatus as part of this Contract.

3.4.9 **Condition Survey**

A pre-construction condition survey shall be undertaken by the Contractor prior to the commencement of works on site on all roads and dwellings, buildings and structures as identified on **DG0107** in **Appendix 1**, and those the Contractor considers to be at risk which could be impacted by the Works. The findings of the survey and any photographic records obtained during the survey shall be furnished to the Employer's Representative prior to commencement of works on site.

If deemed necessary, tell-tale crack monitors may be installed at locations during the survey.

Following construction, a post-construction condition survey shall be undertaken within a two (2) to six (6) week period after to the Completion of Section 2 of Works and will include the same properties and areas surveyed pre-construction. A copy of all conditions surveys shall be provided to the Employer's Representative.

These surveys shall be completed by a suitably qualified structural surveyor independent of the Contractor.

The reports shall comprise the following:

- Name and address of property;
- Details of property owner;
- Survey of property boundary (including walls, fences, driveways, garden areas, footpaths etc.) and any other features (e.g. sheds);
- Internal (if required) and external condition survey with photographs;
- Cracks and other defects shall be identified.

3.4.10 Archaeological Monitoring

The Contractor shall employ a qualified archaeologist, licenced to carry out monitoring all sub-surface works carried out as part of the Works. This shall include archaeological monitoring of the removal of topsoil, the excavation of trenches for foundations, services and access roadways.

Should archaeological material be found during the course of monitoring, the archaeologist may have work on the site stopped, pending a decision as to how best to deal with the archaeology. The Contractor will be responsible for implementation of recommendations of the archaeologists and/or the Department of Environment, Heritage and Local Government at his expense.

The appointed archaeologist shall prepare and submit a report, describing the result of the Archaeological Monitoring, to the Local Authority and the Development Application Unit of the Department of Environment, Heritage and Local Government within six weeks following completion of Archaeological Monitoring..

3.4.11 Temporary Accommodation and Facilities for use by the Employer

3.4.11.1 Site Accommodation for Employer

Minimum requirements for site accommodation for the Employer are stated in **Appendix 2** (Section 1.2) and shall comply with the Guidance Section 7 of new General Application Regulations 2007.

Accommodation, facilities, equipment and training for the Employer's Representative personnel shall comply with this Scope unless otherwise agreed in advance by the Employer's Representative and approved in writing.

On commencement of the Contract, the Contractor shall supply and erect offices for the exclusive use of the Employer's Representative's staff, in a secure compound area which is fenced off using temporary close boarded temporary fencing, to be located adjacent to the Contractor's site offices for this Contract.

The Contractor shall provide all office consumables, kitchen utensils, crockery, computer consumables, and supplies etc. and as described in this Scope for the use of the Employer/Employer's Representative.

For the purpose of sizing the temporary accommodation for use by the Employer, the Contractor shall assume a team of 6 employees of the Employer/Employer's Representative at all times during the Works.

Accommodation shall be minimum plan area of minimum 30m^2. It shall comprise 4 separate offices, a separate canteen/kitchen and a separate meeting room capable of accommodating up to 25 persons for workshops. A separate room for storing PPE with wall hooks for up to 6 staff shall be provided directly from the main entrance door. Door mats shall be provided both inside and outside the temporary offices. Separate male and female bathroom facilities shall be provided with hot and cold running water and a shower. The meeting room shall be equipped for workshops with facilities for overhead projector and a whiteboard. A conference table shall be provided of sufficient size for 25 persons and 25 padded weatherproof chairs shall be supplied. The kitchen area shall have seating and table for 10 persons, a cooker, microwave, toaster, kettle and fridge.

All rooms shall be serviced with lighting, heating and ventilation and weatherproof.

The following shall be provided in each office:

- 1 no. 1.75m x 1m kneehole desk with locking drawers
- 1 no. adjustable, padded, five legged armchair with castors
- 1 no. desk/ table 1.8m x 1.2m
- 2 no. padded chairs

- 4m x 250mm x 25mm shelving
- 5m2 of framed cork or strawboard panelling mounted on a wall
- 4 no. coat hooks
- 1 no. 4 drawer locking steel filing cabinet
- 1 no. waste paper bin
- 1 no. three tier filing tray
- 1 no. steel personal locker approximately 1830mm high x 450mm wide
- 1 no. A0 plan cabinet with vertical hangers
- 1 no. telephone
- First aid kit to be provided in accordance with the HSA Guidelines on First Aid at Places of Work 2008.

Offices shall be cleaned twice weekly.

3.4.11.2 Communication and IT Equipment for Employer

The Contractor shall provide a separate wireless broadband connection for the exclusive use of the Employer's Representative for the period of execution of the Works.

The following computer equipment (minimum requirements) shall be provided for the sole use of the Employer's Representative's staff:

5 number new laptop computers, each with at least (or better):

- Intel I5 processor;
- 8Gb RAM;
- Shared Intel HD graphics 4000;
- 500 GB HDD or 250 GB SDD;
- Integrated 10/100 BASE-T Ethernet LAN modem;
- CD-RW/DVD/ROM (integrated or portable);
- Windows 10 operating system;
- MS Office 2016;
- MS Project 2016;
- AutoCAD 2016 (two licences in total);
- anti-virus software;
- dual band wireless connectivity;

and the following peripherals:

- docking station;
- 24" colour screen;
- optical mouse,
- keyboard
- charger;
- carry case.

The Contractor shall provide 2 wireless colour all-in-one photocopier, printer and scanners capable for both A3 and A4 size paper.

The Contractor shall provide for 2 number digital cameras and associated software for the sole use of the Employer's Representative's staff to the minimum standard outlined below:

- 12 Mega pixels photographs;
- 3 x optical zoom;
- Video function with sound;
- 2.5 inch LCD screen;
- USB 2.0.

Each camera shall be supplied with a 32 GB memory card, spare battery pack, battery charger and carry case.

The Contractor shall provide 6 mobile phones (Smart type) with a monthly 10GB data package and unlimited calls/messages to Irish mobiles and landlines for the use of the Employer's Representative site staff during the Contract. If the Contractor is based outside of the Republic of Ireland the package should also include for unlimited calls/messages to mobiles and landlines abroad related to the Contract.

All of the above shall remain the property of the Employer on completion of the Works.

The IT equipment shall be of the most up-to-date models available at the time of Contract commencement.

3.4.11.3 Survey and Testing Equipment

The Contractor shall provide the following survey equipment, as a minimum, for the exclusive use of the Employer's Representative:

- 3 number automatic level with tripod and 5m staff;
- 1 number Leica TC1201 total station or similar approved;
- 4 number 30 metre line, 1 number 30 metre steel tape and 3 number 10 metre steel tapes;
- 4 number measuring wheel with read off in metres;
- 20 number ranging rods, arrows, hammers, pegs, spray road marking paint and other equipment as may from time to time be required.

3.4.12**Public Relations**

The Contractor shall within one week of the commencement of the Contract, appoint a Community Liaison Officer (CLO). The CLO will be the principal point of contact between the Contractor and the public for the duration of the Works. Written notification of the CLO appointment shall be forwarded to the Employer's Representative within the above timeframe with an initial programme of meetings.

The CLO shall organise and attend meetings as deemed required by either (or a combination of) the Contractor, the Employer, the Employer's Representative, Local Authorities, statutory bodies, utility companies, local businesses, local property occupiers or members of the public to discuss issues related to the activities of the Contractor.

The CLO shall be available to meet the community during normal working hours and at evenings and weekends, unless other arrangements are agreed with the Employer's Representative. The CLO shall inform the Employer's Representative of any meeting arranged and arrange for the presence of a member of the Employer's Representative staff at all meetings. The Employer's Representative shall be notified of all meetings at least one day in advance and shall be asked whether they wish to attend.

Records of all meetings and communications (i.e. emails, letters, telephone conversations etc.) shall be retained by the CLO on site and shall be forwarded to the Employer's Representative on request.

The Contractor shall comply with the following requirements:

- Contractor's training and induction must ensure that relevant day to day site issues affecting the public are clearly stated in the employee customer care induction; for example, if a site vehicle associated with the works is required to be parked across a residents drive, the driver shall knock on the customer's door and obtain prior permission. The Contractor must forward the induction material to the Employer's Representative for comment and approval, prior to the customer care induction given to the site team.
- The Contractor must ensure that all customer contacts with his site team are directed to his site supervisor. No member of the Contractors' team should pass on information such as when their particular element of the works will be finished, because their work may finish in a day but reinstatement may be planned at a later date. False information can lead to customer complaints.

- 48 hour notifications must be delivered to all properties and apartments for planned water shut-down area. The Contractor must ensure that all customers receive the full 48 hours' notice. The Contractor shall not deliver shut notices to customers until microbiological test results have been received and the main is proved to be sufficiently disinfected prior to installation. Where the Contractor cancels the shut, the Contractor must deliver cancellation notices to all effected customers as soon as possible.
- The Contractor must report all customer contacts within the required timescales. Weekend, public holidays and out of hours calls must be reported the next working day stating whether it is closed or needs attention by the Employer's Representative.
- The Contractor must ensure that the 24 hour hotline records all customer details such as, name, contact no, address and issue.

The Contractor shall comply with Irish Water guidance and procedures provided in **Appendix 5** of the Scope.

3.4.13 Attendance on Employer's Representative

The Contractor shall provide for attendance on the Employer's Representative's staff and Employer's personnel and all associated costs shall be deemed to be included in its Pricing Document. This attendance shall be available on demand at all hours during which the Contractor is working on Site. Such labour and attendance may include:

- Assistance in checking the setting out of the Works;
- Assistance in measuring the Works;
- Cleaning and maintaining the equipment provided to the Employer's Representative's staff;
- The provision of tools, pegs or other equipment required for setting out and checking the Works;
- Compliance with all health and safety reviews.

3.5 HEALTH AND SAFETY

3.5.1 Health & Safety

The Employer has safety as one of its core values and the Contractor is expected to reflect this throughout the project.

The Contractor shall ensure that all safety, health and welfare measures required under, or by virtue of, the provisions of any enactment or regulations or working rules of any industry are strictly complied with.

The Contractor shall by his working methodology, sequence of works operation, management, control and supervision of all temporary and permanent works design and installation on the Site ensure compliance with Safety, Health and Welfare at Work Act 2005, the Safety, Health and Welfare at Work (Construction) Regulations 2013 (S.I. No. 291 of 2013) and the Safety, Health and Welfare at Work (General Application) Regulations 2007 (S.I. No. 299 of 2007) and any amendments thereof as well as any other Regulations or Approved Codes of Practice pertinent to the proposed Works.

3.5.2 Statutory Appointments

The Contractor shall be appointed as the Project Supervisor for the Design Process (PSDP) and as the Project Supervisor for the Construction Stage (PSCS) in accordance with the Safety, Health and Welfare at Work (Construction) Regulations 2013 (S.I. No.291 of 2013). Such appointments shall be for the duration of the whole of the project including the Design, Build and Operation Service Period to facilitate any repair, maintenance and demolition works required.

Where applicable, the appointment of the Contractor as PSDP and/or PSCS is separate to, and independent of, the contract for the construction of the Works.

Where the Contractor is acting as Designer, PSDP, PSCS, and Contractor, he shall have full responsibility for all health and safety matters relating to the design, construction and operation throughout the Contract Period. In his role as Designer, the Contractor shall prepare design risk assessments and make all relevant information available to the PSDP to allow him to fulfil his duties.

Where, on appointment the Contractor is to assume the role as PSDP, he shall, in accordance with the duties of the PSDP organise cooperation and co-ordination between all designers (temporary and permanent works) and shall review the Preliminary Safety and Health Plan contained in the Contract documents and further develop it based on the Works Proposals proposed by him in his detailed design. He shall also make available the Safety File on completion of the works as detailed elsewhere.

Where, on appointment the Contractor is to assume the role as PSCS, he shall prepare the construction stage Safety and Health Plan for the Works and undertake all of the tasks assigned to him under the Safety, Health and Welfare at Work (Construction) Regulations. A copy of the construction stage Safety and Health Plan shall be submitted to the Employer's Representative prior to the commencement of construction works.

Where changes required to the works (e.g. changes to design during construction, additional works of a different scope or nature, etc.) occur, the party initiating the proposed change shall provide such information as may be required by the PSDP to enable him to assess such works prior to any implementation. The PSDP shall ensure that where additional risks are encountered as a result of such proposals that the Designer(s) has properly considered such risk. On receipt of all pertinent information, the PSDP shall also assess any potential impact on time related aspects of the project.

In his roles as PSCS and Contractor, the Contractor shall provide such information to the PSDP as shall be required for him to prepare the Safety File.

3.5.3 Management Systems – Safety, Quality and Environmental

The Contractor shall be required to develop, maintain and implement management systems for quality, safety and environmental related matters. These may be separate or integrated systems but where integrated they shall clearly capture the three individual components. The management plans shall cover all stages of the project; design, construction, and operation phases (where appropriate) and a full copy shall be retained on site for inspection at all times.

3.5.4 Environmental Awareness

The Employer requires that works are carried out in an environmentally responsible manner.

The Contractor shall familiarise himself with the Employer's environmental commitments and requirements for the Contract as contained in the Contract documents and ensure compliance with those requirements as well as any applicable Acts, Regulations and standards.

The Contractor shall ensure that all persons engaged for the Works are aware of their environmental responsibilities as contained in the environmental management plan and the potential impacts on the environment of their activities and behaviours.

3.5.5 Emergency Preparedness

The Contractor shall ensure that emergency plans and procedures relevant to the risks of the work being undertaken shall be documented, readily accessible and clearly communicated to all.

Interfaces between the Contractor, Employer and external organisations in the management of emergencies shall be identified. All personnel shall be made aware of their individual roles and responsibilities in the event of an emergency.

Personnel shall be provided with such training as they may require enabling them to perform their respective duties.

First aid facilities and qualified first aiders shall be provided based on the number of personnel and risks present at each location, taking into account, where appropriate, the transient and isolated nature of the Works and the associated risks.

Plans, procedures, equipment and personnel shall be tested at regular intervals through drills and exercises. Where relevant, these shall involve the Employer and external organisations. Responses to emergencies, both real and simulated, shall be reviewed and any improvements identified shall be incorporated into the emergency management systems.

3.5.6 HAZOPs and CHAZOPs

The Hazard and Operability study (HAZOP) technique is qualitative, and aims to identify potential hazards and operability problems; structure and completeness and determine whether existing, designed safeguards are sufficient, or whether additional actions are necessary to reduce risk to an acceptable level.

The Employer requires that for all sites containing a process system (water or wastewater treatment plants, pumping stations, etc.) a HAZOP be conducted during the detailed design and be repeated where changes are subsequently made to the proposed system.

The Contractor shall advise the Employer's Representative in advance of his intent to conduct the HAZOP to permit the Employer or his representatives to be present. An independent HAZOP chairperson (pre-approved by the Employer's Representative) shall be provided by the Contractor at the Contractor's expense.

No construction activities can take place until this HAZOP study is complete and submitted for final review to the Employer's Representative. The design shall be provided in a 3D format for the HAZOP/CHAZOP reviews. The Report shall be completed in a format agreed by the Contractor and the Employer's Representative, prior to the commencement of the HAZOP study.

The Report shall clearly define the hazards identified, mitigation strategies devised and resultant actions required to ensure implementation of the mitigation strategies.

A final safety audit and review of the HAZOP study shall be carried out and recommendations implemented before commissioning the Works.

Control Hazard and Operability Study (CHAZOP) is a procedure for carrying the safety and reliability analysis of existing or planned Control and Computer systems. The Contractor shall also be required to show evidence of the preparation of a Control Hazard and Operability Studies (CHAZOPs) where appropriate to the works. The Contractor shall be responsible for modifying and revising his design and providing any additional equipment or modifications required as a result of these safety studies before commissioning the Works. Any such modifications/revisions and/or additional equipment shall be provided by the Contractor.

3.5.7 ATEX and Electrical Apparatus

The Contractor shall be required to show evidence that he has given due consideration to ATEX (Explosive Atmospheres) Regulations in his design and he shall clearly demonstrate how any plant or equipment he proposes to install ensures the integrity of the zoning and ensure that the appropriate measures are implemented to control the associated risks.

The Contractor may be carrying out works on existing operational sites. In such cases, he shall be required to familiarise himself with the layout of the works and any relevant zoning under the ATEX Regulations.

Where plant and equipment is currently installed in areas which the Contractor considers should have an ATEX zoning but such rating is not present or where zoning is in place but plant or equipment is not of suitable type (ATEX rated for the zone) and upgrading works are not proposed to be undertaken as part of the contract in those areas, he shall notify such issues to the Employer's Representative as soon as he becomes aware of it. However, this shall not absolve the Contractor of his requirement to satisfy the regulations.

3.5.8 Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH)

REACH regulations are intended to afford a high level of protection of human health and the environment from the use of chemicals. Under these regulations the Employer is classified as a 'downstream user'. The Contractor shall ensure that where chemicals are proposed for use as part of his process and where such chemicals are hazardous, he shall supply a Safety Data Sheet (SDS) complying with REACH. The SDS supplied must be in the language of the country in which it is placed on the market and must contain the 16 headings as set out in Article 31(6) of the REACH Regulation.

3.5.9 Online Induction for All Workers/Frequent Visitors

It is a requirement that all personnel working on or regularly visiting Irish Water construction sites must complete the Employer's online induction course. On successful completion of the course, each person will be issued with a certificate of confirmation which will remain valid for a period of 6 months. It shall be the duty of the Contractor to ensure that every person engaged in the Works or regularly attending the Site is in possession of a current certificate and that a copy is retained in the construction stage safety and health plan for inspection. No persons shall be permitted to work on any of the Employer's sites that have not successfully completed the course.

3.5.10 Training

The Employer requires that all persons engaged in activities on sites be in possession of a valid SafePass card and shall have undergone manual handling training. In addition to this, where activities being undertaken require specialised training, personnel must be in possession of the appropriate valid training card.

3.5.11 Works on Existing Operational Sites

The Contractor shall be afforded the opportunity following appointment to familiarise himself with the operation of the existing sites and all documentation present relating to that operation. Where necessary the Contractor shall prepare detailed standard operating procedures (SOPs) and such other documentation as he shall consider necessary to facilitate his safe operation of the works prior to commencing the operation, which shall usually be 28 days following the commencement date.

The Contractor shall also undertake an assessment of the existing works and shall arrange to have available any items which he considers necessary for the safe operation of the works. Where he considers it necessary to install any items of plant or equipment to permit the safe operation of the plant, he shall arrange to undertake such works during that 28 day period. Such works will be carried by prior arrangement and under a permit to work provided by the Employer/Employer's Agent.

Where the works involve the expansion or significant upgrade of an existing plant and the said plant is being operated by the Contractor during the design and build phases of the project, the Contractor shall be required to provide delineation between the existing operational area and the construction area insofar as it is possible. Where works are required to be undertaken within the operational area of the site, the Contractor shall ensure that his method of work suitably manages risks arising from the proposed works.

3.5.12 Traffic Management

The Contractor shall be required to put in place appropriate traffic management for the proposed Works.

Where works are to be undertaken within an enclosed site area, the Contractor shall implement a traffic management plan to ensure insofar as possible the clear division of pedestrian and machinery movements and shall also include methods for managing such items as speed restrictions for vehicle movements within the site.

Where parking is permitted on the Site, this shall be in a controlled clearly delineated area and where possible, reverse only parking shall be utilised.

All site vehicles or machinery shall comply with the requirements of the Safety Health and Welfare at Work (Construction) Regulations with respect to vehicles requiring auxiliary devices and visual aids, certification, etc. as well as complying with all statutory requirements such as licence plate, motor tax etc. where operating in a public place.

3.5.13 Security of the Works Area

The Contractor shall be responsible for the security of the Site in accordance with the Regulations (under the Health and Welfare at Work Act 2005).

The Employer requires that all of its construction sites are clearly delineated and secured from the surrounding uses and that access is restricted to those who are permitted to be on the site only.

Control of the general access gate(s) is considered to be paramount in this regard and the Contractor shall be required to make such arrangements as are necessary to ensure such control. The methodology for such control shall be either closed gate with contact numbers displayed for obtaining access, no direct access to the works area with access being through a controlled area such as the Contractors' compound or by full time security guard at the access gate. The chosen method for access control should be set out in the Construction Stage Safety and Health Plan.

3.5.14 Entrance Gate(s) Signage

At each entrance gate(s) to the site the Contractor shall display signage clearly indicating the minimum requirements for PPE for the site together with such other signage as may be required to suitably inform those entering the site of the anticipated risks contained therein. He shall also display such items as emergency contact details, site rules, etc. as he may require. All signage shall be in accordance with the Safety, Health and Welfare at Work (General Application) Regulations 2007 and any amendments thereof.

3.5.15 Welfare Facilities

The Employer will not be providing any welfare facilities to the Contractor.

The Contractor shall make available such welfare facilities as are necessary and appropriate for the anticipated number of persons to be engaged on the works as defined by the Safety, Health & Welfare at Work (General Application) Regulations. These shall be maintained in a clean and hygienic manner at all times.

For sites where crews may consist of 5 or less persons, the Contractor shall be required to demonstrate that sufficient consideration has been given to the provision of suitable and adequate facilities so as to promote a hygienic work environment.

3.5.16 Personal Protective Equipment (PPE)

All persons engaged on Irish Water construction sites shall as a minimum be required to wear high visibility clothing (minimum vest or jacket), a hard hat fitted with chin strap for working at height, eye protection, gloves and safety boots with steel toe caps and mid sole. All personal protective equipment shall be maintained in a clean and presentable manner at all times. High visibility clothing shall be of a colour suitable for the location for which the works are being undertaken.

Where the Contractor has his own requirements for personal protective equipment which exceed those required by the Employer, he shall ensure that all persons entering the site are made aware of such additional requirements.

In addition to these requirements suitable and sufficient personal protective equipment as determined by task specific risk assessments shall be available on site at all times and shall where identified as a requirement, be utilised by persons engaged in such tasks. Where works involve the saw cutting of roads or footpaths, all personnel engaged in such activities shall be required to wear dielectric footwear as a minimum for the duration of the activity.

The Contractor shall provide for a minimum of six (6) sets of PPE for use by visitors to the Site. The minimum PPE requirements for visitors to the Site shall be high visibility vest or jacket, a hard hat fitted with chin strap for working at height, eye protection, gloves and safety boots with steel toe caps and mid sole. Additional PPE shall be worn where visitors are accessing areas governed by task specific risk assessment which determined such a requirement (e.g. hearing protection) or where such other items are reasonably directed by the Contractor to conform to his standards. Visitors shall not be allowed entry into areas where specialised training is required unless evidence is available that they possess the appropriate training.

Eye protection may only be removed where a signed risk assessment demonstrates that to not do so would, in the circumstances, present a greater risk. Appropriate equipment for cleaning safety glasses (e.g. cleaning solution and tissues) shall be available at all times.

3.5.17 Contractor Induction

For Persons Engaged on the Site

The Contractor shall ensure that all persons engaged in works on the site undertake an induction prepared by him. In addition to reminding persons of the Employer's expectations such as availability of SafePass and CSCS cards for inspection on demand, clean water worker forms (where appropriate), etc., he shall also set out his expectations which as a minimum shall include:

- Behaviour on site,
- Site rules which may apply,
- Parking of vehicles,
- PPE types required and suitable usage,
- Welfare facilities available,
- Waste disposal expectations,
- Attendance at toolbox talks,
- Sign on to Method Statements,
- Any other expectation as he may require.

Such induction shall also provide information as to the particular risks present on the site and the methodology to be utilised to notify changes in risks as the works progress.

For IW Personnel

The Contractor shall ensure that all IW personnel visiting the site or carrying out works as part of the Scope are informed of the site rules and provided with the relevant inductions, PPE requirements, behavioural expectations, etc. and provided with such information covering general risks on site and regarding the works being undertaken on the day as is necessary to ensure their safety and wellbeing whilst on the site.

For Visitors to the Site

The Contractor shall ensure that all persons entering the site are informed of the site rules, PPE requirements, behavioural expectations, etc. and provided with such information covering general risks on site and regarding the works being undertaken on the day as is necessary to ensure their safety and wellbeing whilst on the site. One-off or irregular visitors to site shall be accompanied at all times.

3.5.18 Sign in Requirements

The Contractor shall ensure that he keeps a record of all persons entering and exiting the site on a daily basis. This record shall include as a minimum the name of the entrant to site as well as the time of entry and exit and shall be retained for inspection if sought.

3.5.19 Permits to Work

The Employer requires that as a minimum the Contractor utilises a permit to work system for the following types of works:

- Confined space entry;
- Hot works;
- Asbestos;
- Electrical works (LOTO);
- Pressure Testing;
- Working at Height;
- Excavations (permit to excavate);
- Demolition;
- Works carried out in areas under the control of others.

Where such permits are in operation, they shall be signed off by the responsible person who shall in turn ensure that all parties engaged in the works are familiar with the terms of the permit and that all control measures identified are in place and remain so until the works are completed and the permit is closed.

The Contractor may utilise permits to work for such other activities as he deems necessary.

3.5.20 Accident/Incident/Dangerous Occurrence Reporting

The Contractor shall immediately notify the Health and Safety Authority (HSA) of any reportable accidents or dangerous occurrences and provide copies of such reports to the PSDP, PSCS and the Employer.

The Contractor shall also comply with the Employer's requirements with regards to the reporting of accidents, incidents and dangerous occurrences in accordance with the processes and using the form set out in **Appendix 5** of this document and shall co-operate with the Employer in relation to the provision of information and any investigation the Employer may undertake.

Immediately that the Contractor becomes aware of any environmental accidents or incidents, he shall, follow his own procedures and without delay shall notify the Employer.

3.5.21 Employer Inspections

The Employer recognises that it is in a position to influence safety standards on sites. To this end the Contractor shall note that the Employer shall carry out regular health and safety related inspections (at least once per month or once per project for shorter duration works) of the site. The Contractor shall be required to facilitate and co-operate with such inspections. Where issues are identified the Contactor shall be required to remedy those issues within a stated timeframe. Where the score achieved is less than the required percentage to achieve a pass rate, the Employer may carry out more frequent inspection(s) of the site until he is satisfied that the standards present are meeting his expectations.

The Employer's inspector may be on site for up to 5 hours to undertake such inspections, depending on the conditions found and the nature and extent of the works. The Contractor is not required to accompany the inspector on such inspections, but should make himself available at the end of the inspection to enable the inspector to convey his findings.

The Employer shall undertake an operational based safety inspection of the works not later than one (1) month prior to the issue of the Completion Certificate. Should that inspection identify issues which are as a consequence of poor design or maintenance by the Contractor, the Contractor shall be required to remedy such items without delay. The Completion Certificate may be withheld in circumstances where the Contractor fails to remedy such items.

3.5.22 Employer's Representative HSQE Review

The Contractor shall be aware that the Employer's Representative (where applicable) on site shall carry out a weekly review of safety conditions on the site using the Employer's template (copy included in **Appendix 5** of this document). On completion, the Contractor shall make himself available to meet with the Employer's Representative to review his findings and where issues are identified the Contactor shall be required to remedy same.

3.5.23 Safety File

The contents of the Safety File shall be in accordance with the Employer's requirements as stated in the form IW-HSQE-SOP-064-FM-01 provided in **Appendix 5** of this document.

3.5.24 Operation and Maintenance Manual

The contents of the Operation and Maintenance Manual shall be in accordance with the Employer's requirements as stated in Section 7.3 of IW-TEC-600-05 and the form IW-HSQE-FM-107 as contained in **Appendix 5** of this document. The Contractor shall make available at least two (2) hard copies and three (3) soft copies of the complete manual indexed in accordance with the Employer's form.

3.5.25 Monthly Reporting

The Employer requires that the Contractor provide information on a monthly basis relating to quality health, safety and environmental issues as pertain to the site. By not later than the tenth working day of the month, the contractor shall submit the following data on a monthly basis:

Quality Information

1. Details of Inspections/Audits
   a) Audits and inspections carried out
   b) Audits/ Inspections Findings/Reports
   c) Number of audits Planned for Month ahead

Health & Safety Information

2. Number of hours worked
   a) Number of man hours completed during the month including those of sub-contractors
   b) Cumulative number of annual man hours

3. Number of employees
   a) Details of new employees
   b) Details of employees having left the project
   c) Number of inductions for the month
   d) Training Matrix of all personal involved in the project to be attached in the appendices
   e) Details of planned training

4. Accident/Incidents and Insurances Stats
   a) Number of lost time injuries (> 3 day HSA. reportable).
   b) Number of lost time injuries (< 3 day non-reportable).
   c) Number of non-lost time injuries (e.g. first aid only).
   d) Number of injuries to members of the public (regardless of whether liability is accepted).
   e) Number of reportable dangerous occurrences.
   f) Number of non-injury near miss incidents.
   g) Number of Public liability claims.
   h) Number of Damage to property.
   i) Number of Employers' liability claims.

5. Utility Strikes
   a) Number and information on ESB strikes. (Depth/Cause of damage/ Size of Service)
   b) Number and information on Gas strikes. (Depth/Cause of damage/ Size of Service)
   c) Number of Other strikes. Eir/ Ducts/ Water main etc.

6. Details of Inspections/Audits
   a) Irish Water inspection score
   b) Contractor inspection average
   c) Number of audits Planned for Month ahead

7. Details of site visits
   a) Number of visits H.S.A, Other
   b) Finding from visits/inspections/ enforcements and correspondences

8. Number of hazards reported on site

9. Safety Initiatives
   a) Details of any Safety initiatives for the coming month
   b) Comment on outcome of initiatives for the previous month

Environmental Information

10. Details of Inspections/Audits
    a) Audits and inspections carried out
    b) Audits/ Inspections Findings/Reports
    c) Actions Arising/Corrective actions put in place
    d) Number of audits Planned for Month ahead

11. Environmental Incidents and Information
    a) Environmental Incidents.
    b) Environmental violations/non-compliances with permits, licenses, regulations or similar statutory or contractual requirements.
    c) Environmental near miss incidents.
    d) Environmental Complaints

12. Details of site visits
    a) Number of visits
    b) Finding from visits/inspections/ enforcements and correspondences

13. Waste records
    a) Quantities and types of materials used.
    b) Waste management records
    c) Tonnage of various waste streams generated and treatment /disposal routes implemented for all wastes generated

14. Details of any Environmental initiatives for the coming month

3.5.26 Contamination of Water Supplies

Structures

In coming into contact with potable water, numerous organic chemicals, notably phenols, react to give rise to unacceptable taste and odours in the water. The Contractor shall protect surfaces of pipelines and water retaining structures from contamination with phenolic compounds such as oil, petrol and bituminous products, other than those approved for use in the Works according to a specified working method.

The Contractor shall be responsible for decontaminating any area of accidental spillage and for any consequential costs of testing the effectiveness of remedial measures.

Personnel

The Contractor's attention is drawn to the fact that any contamination of the water supplies could create dangers to public health and in this respect the Contractor is expected to take every precaution to prevent contamination.

Before any person engaged on the work described in the Contract commences, he shall be notified of the need for personal hygiene and the dangers of contamination. The Contractor shall arrange for all personnel operating in and around the Contract to be screened by an approved medical facility for all water transmittable diseases and maintain records of these screenings. No persons shall be allowed to commence work in or around the Contract until their screenings are complete and the successful results, as issued to the Contractor' medical advisor, are provided to the Employer.

The Contractor's staff and any sub-contractors working on potable water systems shall be registered under an approved water hygiene scheme. The Contractor's staff and any sub-contractors must carry their water hygiene card at all times whilst on Site and present it on request.

If any staff employed by the Contractor or sub-contractor contract illnesses, such as infective jaundice, gastro-enteritis, persistent diarrhoea or prolonged unexplained fevers, it must be reported through the Contractor to the Employer immediately. Medical advice must also be sought. Infected people will not be permitted to work on the activities included in the Contract or to enter the Employer's operational Sites without first obtaining authorisation from an appropriate medical authority.

The Contractor shall ensure that all personnel operating in and around the contract have received appropriate training in hygiene requirements prior to commencing work in or around the project. The Contractor shall provide evidence of such training to the Employer.

The Contractor shall ensure that he has sufficient chlorine wipes available at all times to maintain an appropriate level of cleanliness for his tools, equipment, pipe, fittings and about his person. All fittings must be kept within sealed wrappings and must not be stored on the floor of vans or warehouses at any time.

Where the Contractor suspects that a contamination incident has occurred, the Contractor shall notify the Employer immediately and the necessary action will be determined.

The Contractor shall submit a completed Health Questionnaire for every person employed on Public Water Supply Sites. The completed forms will be treated with the utmost confidentiality. The Clean Water Worker Medical Certificate / Questionnaire is provided in Appendix B to IW-TEC-300-01 included in **Appendix 2** of this document.

3.6 DESIGN REQUIREMENTS

3.6.1 General Design Requirements

3.6.1.1 Specimen Design

The Contractor may make use of and/or adopt the whole or any part of the Specimen Design, but is not obliged to do so. If adopting the specimen design in whole or in part the Contractor shall accept full responsibility for it. The Employer shall not have any responsibility or liability in respect of the Specimen Design, and gives no representation or warranty in respect of it.

The Specimen Design consists of drawings, calculations and reports available to the Contractor.

3.6.1.2 General

The Contractor shall be deemed to have obtained all information as necessary for the purpose of preparing his designs.

The design of the Works shall be in accordance with current best practice and of proven technology, and shall be such as to facilitate operation, inspection and maintenance of all processes and equipment. All mechanical and electrical equipment supplied shall have a proven reliability record in similar works.

The Works shall be designed for continuous operation in all climatic conditions and at a range of temperatures between -20°C to +35°C and for the design life as required under **Section 3.6.1.4** herein.

A high standard of operator safety and comfort shall be provided by the incorporation of good access, equipment, lifting devices, separate storage facilities for chemicals, ventilation and lighting to all operating areas, machinery guards, proper electrical insulation facilities, noise suppression and insulation, stairs, handrails, covers, etc. The design of the Works shall take account of the Safety, Health and Welfare at Work Act 2005, and of all Regulations made in accordance with that Act.

The Contractor shall provide a full time site based Designer Site Representative for the duration of the Contract. The Designer Site Representative shall be a Chartered Engineer with minimum 10 years relevant experience.

The Contractor shall appoint a suitably qualified person, or persons to the role of Environmental Clerk of Works (EnCoW) to monitor the construction works. The EnCoW will work closely with Employer's Representative and Ecological Clerk of Works to monitor activities and ensure compliance with all relevant environmental legislation and that the requirements of the final/authorised CEMP are implemented. This will include checks for any changes in activity for protected species (e.g. otter holts; badger setts).

3.6.1.3 Irish Water Derogation Process

Should the Contractor wish to apply for a derogation from any aspect of the Scope, he shall submit a Derogation Application to the Employer's Representative and designstandards@water.ie in advance of any proposed departure from the requirements. The submission of the application does not confer permission to proceed, and the application should be submitted allowing sufficient time for the Employer to evaluate. Works can only proceed on the basis of the derogation once they have received permission from the Employer.

The submission of a Derogation Application shall not impact on the programme of works and shall be made at the risk and expense of the Contractor. The Employer or the Employer's Representative shall retain the right to reject the application in favour of compliance with the Contract documents.

All derogation requests shall include the following details as a minimum:

- Title of Correspondence — Stating 'Derogation request';
- Originator's name;
- Originator's company or organisation;
- Contact details of originator (phone and email);
- Date of submission of request;
- Subject: — brief details of the subject of the request;
- Relevant specification or standard;
- Detailed explanation of the nature of the request;
- Detailed justification of why a request is being made;
- Impact of request — cost, time, compliance, purchasing, specification, other;
- Proposal if the derogation request is refused by IW.

3.6.1.4 Design Life

The definition of design life here is taken to mean the minimum period that plant and installations are expected to remain functional in compliance with the plant/installations' design specification, under specified and anticipated conditions of use.

The design life of the Permanent Works shall be not less than:

- 50 years in the case of all structures, buildings and civil engineering works including pipework;
- 20 years in the case of mechanical and electrical plant and equipment (except for air valves and sluice valves which shall be 50 years);
- 15 years in the case of instrumentation, control and automation.

All items of mechanical and electrical plant shall be selected so as to give a minimum running cost of the whole installation, when projected over a period of 20 years, taking into account predicted energy consumption, routine testing and inspection, maintenance and replacement costs.

Written guarantees from the suppliers and the Contractor shall be provided (if so requested by the Employer) and included in the final documents to demonstrate the design life of any plant or equipment.

3.6.1.5 Materials and Construction

All materials shall comply with the appropriate Irish standard or alternatively with an equivalent international standard or an equivalent national standard of another member state of the European Union.

Wherever, in respect of any Irish standard, an Irish standard mark licensing scheme is available, all materials required to comply with that standard, or the containers of such materials, shall be marked with the Irish standard mark or shall be certified to an international standard or a national standard of another member state of the European Union, which provides an equivalent guarantee of safety and suitability.

Workmanship in all parts of the Works shall conform to Irish Standards. Where no relevant Irish Standard exists, all parts of the Works shall conform to British or equivalent European Standards. This requirement will also be satisfied by conformance to an equivalent international standard or national standard of another member state of the European Union, where such standard provides workmanship of equal or better quality.

In addition to the above, workmanship in all parts of the Works shall conform to the recommendations and guides provided by the manufacturers of the material or piece of equipment provided or installed as part of the Works.

Reference to a standard in the Scope shall be deemed to refer to the latest edition of that standard and any amendments thereof.

3.6.1.6 General Civil Engineering Specification

The General Civil Engineering Specification for the Works shall be IW-TEC-300-01 included in **Appendix 2** to the Scope.

3.6.1.7 General Mechanical and Electrical Specification

The General Mechanical and Electrical Specifications are:

- IW-TEC-200-01 General Mechanical and Electrical Engineering Specification; and
- General MEICA specification prepared by RPS for items not covered in IW-TEC-200-01.

All the above is included in **Appendix 3** to the Scope.

3.6.1.8 Order of Precedence

The clauses contained in this Scope document shall be read in conjunction with the other sections and clauses of the Contract documents, the Irish Water (IW) standard documents, and other standards, specifications and documents referred to in the Contract documents.

Unless specifically stated otherwise, the order of precedence for specification documents to be used for MEICA and Civil Works shall be as follows:

1. This Scope (main document);
2. IW-TEC-200-01 & 02 General Mechanical & Electrical Engineering Specification - Irish Water Amendments to Water Industry Mechanical and Electrical Specifications (WIMES);
3. IW-TEC-300-01 & 02 General Civil Engineering Specification - Irish Water Amendments to Civil Engineering Specification for the Water Industry (CESWI);
4 General Technical Specification for MEICA Works (included in **Appendix 3**);
5. Water Industry Mechanical and Electrical Specifications (WIMES).

Where no specification is referenced for a section of the Works to be provided under the Contract, that section of the Works shall comply with the appropriate current IS Eurocodes, EN or British Standards and provide an acceptable operational performance.

Copies of WIMES specifications may be obtained from www.pumpcentre.com and of CESWI from www.ceswi.wrcplc.co.uk.

3.6.2 **Hydraulic Design Requirements**

The Contractor shall design the Works in accordance with the hydraulic requirements described below.

3.6.2.1 Reservoir

- Effective storage capacity 100Ml (i.e. excluding columns, unusable water at the bottom of the reservoir etc.) between to the top and the bottom water level in the reservoir;
- The top water level (TWL) shall be 145.0mOD;
- The bottom water level (BWL) shall be 141.7mOD;
- Throughput 400Ml/d (it shall also be achieved via each compartment with the other being out of service);
- Minimum depth of unusable water at the bottom of the reservoir – 0.2m.

3.6.2.2 Inlets and Outlets

The Contractor shall arrange the inlets and outlets as shown on drawings **DG0103_02** to **DG0103_07** in **Appendix 1**.

The Contractor shall optimise his design of all connections to inlets and outlets to minimise hydraulic losses.

All inlets shall discharge to a common wet well.

The reservoir shall be provided with a 1600mm dia. by-pass arrangement to allow for each reservoir and/or wet well out of service.

The Contractor shall provide for the following inlets:

Table 2 – Reservoir Inlet Pipelines

Pipelines to Connect to the Inlet Valve House	Capacity (Ml/d)
Inlet connections from the existing 2 x 33" dia. mains from BME	89.5*
Inlet connection from the existing 1600mm dia. main from BME	244
Inlet connection from the 1200mm dia. rising main inlet from Leixlip (via Peamount) with possibility of gravity backflow	135
1200mm dia. provision for future water transfer from Eastern & Midlands Water Supply Project	-
1600mm dia. provision for future water transfer pipe from BME	-

* 89.5Ml/d is the capacity of the culvert achieved during a test carried out in June 2018, with water by-passing the BME outlet reservoir. Water level in the tank in Saggart was below the bellmouths level during duration of the test. Bellmouths are installed below TWL.

Due to limited head available and to maximise aqueduct capacity, the Contractor shall set the bellmouth levels for the connections of the existing 2 x 33" dia. mains to hydraulically match the existing arrangement. In particular this applies for a scenario where wet well/reservoir levels are below the bellmouth levels.

The Contractor shall provide the following outlets:

- New outlet to connect to the existing 24" dia. to Ballyboden/Stillorgan;
- New outlet to connect to the existing 27" dia. to Cookstown/Belgard;
- New outlet to connect to the existing 24" dia. to Tallaght (currently not in use);
- New outlet to connect to the existing 1200mm dia. to Belgard/Cookstown;
- New outlet to connect to the existing 1200mm dia. to Ballyboden/Stillorgan;
- Future provision for a new 1200mm dia. pipeline to Merrion Gates.

Outlet pipe sizes to connect to the existing outlets shall be equivalent to the existing outlet pipe diameters as set above.

All potable water pipelines shall be ductile iron IS EN 545 and comply with the following:

Table 3 – DI Pipe Specification

Nom Bore	Class	Internal lining system	External Coating
600mm	30	BFC to EN 545	Zinc alloy 400g/m2, 15% aluminium with blue epoxy coat
700-1000mm	25	BFC to EN 545	Zinc alloy 400g/m2, 15% aluminium with blue epoxy coat
>1000mm	25	BFC to EN 545	Zinc , 200g/m2, with black bitumen

The following items are available on site at Saggart and have been taken in charge by the Employer from adjoining projects.

Table 3a – Items Available on Site

AI	Qty
All flange tee piece DN1200	1
D/F pipe 2000m	1
Extensions, spindles brackets, couplers, and head stock for 4 valves	4
Supply Erhard flanged butterfly valves DN1200	3
S/S DN1200 pipe 5800mm	15
1200mm studded convertors NP16/NP10	2
1200mm FF Gasket NP10	2

3.6.2.3 Boherboy Reservoir System

Boherboy reservoir system is cross-connected to the Saggart reservoir outlets. The Contractor shall investigate cross-connectivity of the Boherboy reservoir system with the Saggart reservoir system and include for rationalisation of that arrangement in his design and construction Works. There is an existing arrangement in place allowing Boherboy reservoir to be back fed from the Saggart system. This arrangement should be maintained or improved as part of the Works.

3.6.3 **Phase 1 Works**

The Contractor is required to divert the existing 1600mm dia. inlet pipeline from BME as shown on the drawing **DG0103_02** in **Appendix 1** for the interim configuration of supplies. This is to facilitate demolition of the existing 1.2Ml and 13.6Ml reservoirs. The interim supply shall be connected to the existing 4.5Ml reservoir. The pipe shall discharge above existing top water level.

The connection to the 4.5Ml reservoir will require a shutdown of the reservoir and advance notification for this shutdown shall be not less than 6 weeks. This shall be done in advance of decommissioning of the existing 1600mm dia. supply to a chamber adjacent to the 4.5Ml reservoir.

The interim supply pipeline shall be fitted with a new butterfly valve (C1 on drawing **DG0103_02)** on the line at a suitable location that is accessible by the Employer for day to day operation from the surface using an actuator. The function of this valve is to provide flow control upstream to ensure sufficient flow and pressure is available to supply Castlewarden and Boherboy Reservoir. It shall replace the existing butterfly valve (EC1 on drawing **DG0103_01)** located on the 1600mm inlet pipeline to the 13.6Ml reservoir. This new butterfly valve shall be remotely operated through the existing telemetry system, similar to the current arrangement.

The operation of this valve shall be handed over to the Employer immediately after installation, testing and commissioning as part of the phase 1 works.

As part of the permanent works, this interim butterfly valve shall be replaced with the new flow control valve (C2 on drawing **DG0103_03)** installed under this Contract on the permanent inlet supply from the 1600mm pipeline. C1 will no longer be required after control C2 has commenced operational service; however, it shall be left in place should it be required in future for operational purposes.

To facilitate Phase 2 works, a new isolation butterfly valve has been installed as advance works (V1 on drawing **DG0103_02)** downstream of the 1600mm tee in order to isolate the line for removal. This pipeline is a Macrete concrete pipe and the entire pipeline from downstream of the new valve shall be replaced with the new permanent DI pipeline to the inlet valve house. No Macrete pipe shall be retained or re-used on the new pipeline.

The Contractor shall note that a temporary thrust block is in place at this tee location and a new permanent anchor system is required at the tee and a temporary anchorage system for the isolation valve is required.

The Employer will draw down the treated water from the existing 1.2Ml and 13.6Ml reservoirs by continuing to deliver in to the supply network, if possible. The Contractor shall dispose of all remaining water and silt/sludges and shall obtain all necessary discharge licenses required. The Contractor shall assume that all of the treated water in the reservoirs requires draindown and disposal in the event (to include works related contamination) that it is not possible for the Employer to deliver into supply. Testing shall be carried out of the water/silt/sludge remaining in order to ascertain the most suitable disposal methods. On no account shall chlorinated water be discharged to any surface water system.

The extent of cleaning and disinfection works [in the existing 4.5ML reservoir] will depend on the Contractor's final design and methodology. There shall be no impact on quality of water supply downstream of the tank permitted.

The above will also apply to draining down the existing 4.5Ml reservoir during Phase 4 Works.

3.6.4 Reservoir Design Requirements

The reservoir shall be constructed within the confines of the Areas Provided by the Employer and in accordance **Section 3.2.1.1**. It shall be compartmentalised - 2 compartments of equal volume, separated with a full height dividing wall. Maximum internal length of each compartment shall not exceed 215m. Maximum total internal width of the reservoir (2 compartments plus internal wall) shall not exceed 124m at Western side and 164m at Eastern side. Maximum finished roof level (including screed, drainage blanket, waterproofing, grass layers etc.) shall not exceed 147.95mOD.

The reservoir shall be provided with an inlet valve house at the western side and outlet valve house at the eastern side of the new reservoir(i.e. at opposite sides). Inlet valve house finish roof level shall not exceed 155mOD. Its maximum footprint shall not exceed 59.1mx 26.9m. Outlet valve house finish roof level shall not exceed 150mOD. Its maximum footprint shall not exceed 51.7m x 11.5m.

The reservoir shall be designed and constructed in accordance with the following criteria:

- The reservoir (including inlet and outlet valve houses) shall be designed and constructed in accordance with IS Eurocodes.
- The reservoir shall be watertight (min. Class 1) for its design life.
- The reservoir and inlet/outlet valve houses shall be designed to resist uplift.
- The gradient of the roof shall be not less than 1 in 200, fall in the southern direction
- The roof of the reservoir shall be watertight and completely sealed with a waterproof coating that is bonded to the supporting roof structure and has a minimum service life of 20 years.
- The roof of the reservoir shall be designed to accommodate an imposed load capacity of at least 5kN/m^2. This load excludes all permanent loads and any temporary construction loading required by the Contractor. It shall also be design to accommodate a load imposed by a vehicle accessing the roof for delivery of tools and equipment or emergency vehicle access purposes. The imposed load requirement of 5kN/m^2 shall apply to the reservoir roof.
- The reservoir shall be covered with a sedum grass roof and grassed embankment. Low maintenance grass shall be used to seed embankments. The Contractor shall design the low maintenance grass roof in accordance with the planning permission and to the CIRIA SUDS manual (C753) for extensive green roofs.
- The pipework and valving arrangement shall be such that each compartment of the reservoir can be independently operated and taken out of service for maintenance.
- Positioning of inlets and outlets shall be designed to prevent stratification or short circuiting of flows, or alternatively a baffle wall arrangement shall be provided.
- The reservoirs shall be designed for all combinations of full and empty conditions including any temporary conditions during construction or testing.
- Adequate ventilation shall be required in the water compartments in order to permit air movement caused by changing water levels or rapid fill or drawdown of the reservoir. Same applies to the wet well design and construction.
- A safe means of access and egress shall be provided to each compartment of the reservoirs. Access covers and vents shall be rated by the Loss Prevention Certification Board of the

United Kingdom and certified LPS 1175: latest version, Security Rating 4 No. 450a/01. All covers shall be manufactured from 4mm thick mild steel plate, hot dip galvanised to BS EN ISO 1461. All reservoir roof, inlet and outlet roof openings shall be provided with these secure covers fitted with a padlock certified to 450a/01, 03 & 04. An internal mounted alarm package shall be included. Roof opening covers shall be double skinned and fitted with a retractable handhold. The load class shall be suitable for the access cover location taking into account the reservoir operation and future maintenance.

- Access openings shall be installed in pairs, one opening for personnel access with steps and the other unobstructed (no ladder or steps) opening for emergency access and lifting tools/equipment. The openings shall be dimensioned so as to permit entry for personnel, materials and equipment for cleaning, maintenance. The minimum width of openings shall be 1100mm for maintenance and minimum size of 1100mm x 2000mm for emergency access. The Contractor shall take due cognisance of the location of suitable access points with regard to future maintenance and possible emergency evacuation of personnel who undertake maintenance within the covered reservoir. With regards to all covers greater than 1m^2 the Contractor shall refer to IW-TEC-300-01 section 2.74 in Appendix 2 to Part 3-Scope.
- At all access covers on the reservoir roof for emergency evacuation of personnel, davitt lifting sockets and lifting arms shall be provided;
- The covered reservoir shall be designed and constructed to prevent the ingress of external water or other contaminant either through the structure or any opening, entrance or pipework. Permanent exposure of the water to daylight shall be avoided.
- The Contractor's design shall take due regard to the security of the reservoir with respect to acts of terrorism, vandalism and other unlawful activity.
- Inlets, vents openings etc. shall be suitably designed and constructed so that the water within the reservoir cannot be contaminated. The design shall prevent the ingress of extraneous matter during routine operational maintenance of the reservoir roof.
- Freeboard between top level of the reservoir and underside of the lowest point of the roof/roof beam shall be minimum 500mm and minimum 300mm freeboard shall be provided above the maximum overflow water level.
- The design shall allow for the sampling of water, without entry by personnel, to each compartment of the covered reservoir. Water sampling points shall also be provided on all inlet and outlet pipework.
- Safety handrailing shall be provided around the perimeter of the valve houses, and on top of retaining walls supporting embankments.
- Roof run-off shall be collected and attenuated and/or infiltrate the ground via infiltration systems prior to discharge to any surface water sewer system or watercourse.
- The reservoirs shall be provided with overflow arrangements (via a de-chlorination system) discharging to the existing overflow/scour pipeline at the northern part of the Site via an attenuation area.
- Low level scour (washout) outlets are required from each cell. The scour outlets shall be connected to the foul sewer with a facility for tankering off-site depending on the capacity of the foul system. Each scour pipe shall be fitted with an isolation valve. The scour pipe shall be sized to discharge one reservoir compartment in 24 hours.
- Inlet and outlet valve houses shall be provided with sumps for collecting any spillage or leakage with a facility to pump it out and tanker off-site.
- Wet well shall be provided with a scour drain.

The following concrete finishes shall apply:

Table 4 – Concrete Finishes

Location	Exposure Class	Finish
Reservoirs/Valve Houses base	XC2	Power Floated
Reservoirs/Valve Houses walls	XC2	Fair Worked
Valve Houses - external walls	XC2	Fair Worked with rekli panels (type 1/126 B Larnaca)
Reservoirs/Valve Houses roofs (including screeds)	XD1	Power Floated (Top) Fair Finished (Soffit)

The Contractor shall construct a sample wall panel to demonstrate the finish of the reservoir walls. This shall be completed prior to pouring concrete for any reservoir wall.

3.6.4.1 Water Circulation

The Contractor shall carry out computational fluid dynamic modelling (CFD) of the proposed reservoir system to demonstrate that there will be no dead zones, short circuiting of flows or long water age.

The modelling shall consider the following scenarios for each reservoir compartment:

- Minimum flow and reservoir at top water level;
- Maximum flow and reservoir at top water level;
- Minimum flow and reservoir at mid depth;
- Maximum flow and reservoir at mid-depth.

A report shall be issued summarising the findings with graphical outputs to demonstrate configurations modelled and the final configuration adopted.

3.6.4.2 All Reservoirs Panel Engineer (ARPE)

The Contractor shall engage the services of an All Reservoirs Panel Engineer (ARPE) or a Non-impounding Reservoirs Panel Engineer - as defined in the UK Reservoirs Act 1975. The duties of the ARPE shall be to supervise the design and all temporary and permanent construction works and advise the Contractor on all issues relating to reservoir safety. The Contractor shall confirm details of his ARPE on commencement of the Contract.

The construction schedule, method statements, and safety plan(s) submitted during the tender shall be supported by a technical report by the Contractor's ARPE indicating his approval of these documents. Subsequently the ARPE shall certify that all works have been carried out to his full satisfaction. In reviewing designs and Method Statements the Employer's Representative shall be entitled to request information and or clarifications from the Contractor's ARPE.

3.6.4.3 Access to the Reservoirs

The Contractor shall provide a corridor for vehicular access around the reservoir and to the reservoir roof (at its South East corner). The access to the reservoir roof shall have a physical barrier preventing any unplanned/accidental vehicular access.

The underground walls of the reservoir, valve houses and chambers shall be designed to take a surcharge load of a mobile crane, if required.

Access roads, entrances and paved access areas to the buildings, valve houses and reservoir sties shall be in blacktop finish and kerbed with drainage with sufficient turning areas provided for operation and maintenance.

3.6.5 **Connections to the Trunk Mains**

The following connections to the existing trunk mains will be required as part of the Works:

- Connection to the 1600mm branch of Boherboy supply;
- Interim connection to supply 4.5Ml reservoir;
- 2 connections to the existing 33" dia inlets;
- Connection to a tee off 1600mm BME inlet;
- Connection to a tee off the rising main inlet from Leixlip;
- Connection to the existing 24" dia. outlet to Ballyboden/Stillorgan;
- Connection to the existing 27" dia. outlet to Cookstown/Belgard;
- Connection to the existing 24" dia. outlet to Tallaght;
- Connection to the existing 1200mm dia. outlet to Belgard/Cookstown;
- Connection to the existing 1200mm dia. outlet to Ballyboden/Stillorgan.

The Contractor shall design and programme connections to minimise disruption to the supply system. He will be required to agree the proposed outages with the Employer's Representative and Employer's Agents in advance.

The Contractor shall also note requirements stated in **Section 3.4.2** of this document.

3.6.6 **Overflow**

The Contractor shall set up a system which allows managing water levels in the new reservoir to prevent overflow.

The Contractor shall provide an emergency overflow for the reservoir to avoid spilling out of the tank and flooding adjacent lands/properties. The overflow must be discharged free-flowing and unobstructed to a watercourse to prevent flooding and be capable of discharging the maximum flow of 244Ml/d. The overflow arrangements shall not permit the contamination of stored potable water.

The overflow pipeline shall discharge to the existing overflow/scour pipeline located at the northern site boundary via a de-chlorination system and a new attenuation area and as agreed during the planning process. The existing overflow pipeline has sufficient capacity for the design overflow rate.

The Contractor shall confirm the exact levels as part of his own design development.

Overflow attenuation area shall cater for at least 10Ml. It shall be seeded with a low maintenance grass. The Contractor shall provide a safe access to its inlet and outlet for maintenance. The attenuation area shall be surrounded by a post and wire fence for safety with access gates provided at the access points. The location of this attenuation area shall be west of the Boherboy Reservoir and north of the proposed OSEC building.

The Contractor shall provide attenuation area inlet fitted with a light weight flap valve (e.g. HDPE) arrangement preventing ingress of vermin. The flap valve shall be UV resistant and suitable for outdoor installation.

The Contractor shall provide attenuation area outlet with an arrangement providing for draining down the area, fitted with a device limiting flow to a green field run-off. He shall also provide an unobstructed overflow outlet from the attenuation area at high level. The Contractor shall design outlets to prevent blockage.

3.6.7 **Drainage**

The Contractor shall design and construct surface water collection, attenuation and discharge system in accordance with SUDS and in accordance with the planning permission and conditions attaching.

The reservoir under-floor drainage system shall comprise porous pipes surrounded in gravel in a trench below the floor to facilitate checking for leakage from the cells. The porous pipes shall be connected to closed pipes under the wall and embankment and discharge to inspection chambers. The layout shall enable leakage flows from separate cells to be observed by inspection of the termination manholes, which may need to be pumped out and then checked for flows.

Drainage will be provided around the walls with granular backfill and geotextile and a collector pipe at the base which shall connect to the outlet of the attenuation tank and discharge to the Camac River. These flows shall not pass through any attenuation system.

Rain water run-off from the roof not collected in the wall drainage shall be collected by means of a drain at the toe of the embankments.

Surface water run-off from the roof of the new covered reservoir, its embankments and any hard standing areas as a result of the new development shall be collected and diverted to a new surface water system. This surface water runoff shall be collected and pass through a

hydrocarbon interceptor and attenuated prior to discharging to the Camac River to limit outflow to the green-field runoff rate.

The Contractor can select his own construction methodology for an attenuation tank subject to compliance with the Scope and the Planning Permission.

The pipeline corridor for the surface water outlet to the River Camac is shown on drawing **DG0101** in **Appendix 1** of this document.

The outfall structure shall be constructed as per NRA detail RCD/500/53.

3.6.8 Chambers

All underground chambers housing valves and flowmeters shall comply with the "Code of Practice for the Construction of Arterial Watermains", by Dublin City Council, in Appendix 7 and be design in accordance with IS Eurocodes.

Key requirements to be included as a minimum are:

- Chambers shall be designed to be watertight (min. Class 1);
- Chambers shall be designed to resist uplift;
- All opes, covers and seals and joints shall be fully sealed;
- Sump to be provided (with removable safety floor grid/cover) and an automatically controlled pump with high level outlet pipe discharging to suitable sewer; floor to fall to sump;
- Chambers shall be provided with flood alarm;
- Access to valves /flowmeters etc. installed shall be provided by means of access ladders/stairs/walkways;
- Access ladders shall be extendable 1m above cover;
- Adequate clearance around pipework and between side pipe and wall shall be minimum 600mm for pipes;
- Davitt sockets shall be provided for lifting in and out equipment and for man access.

3.6.9 OSEC Building

3.6.9.1 General

The OSEC building envelope including architectural finishes shall comply with the planning permission and the requirements set out in this Scope. The building roof level shall not exceed 153.02mOD. Its maximum footprint shall not exceed 25m x 17.125m.

The Contractor shall also construct a bund for salt tanks adjacent to the Northern site of the building. The tanks shall be surrounded by a wall constructed on the bund, Top of the wall shall not exceed 149.5mOD. The wall shall not be lower than the salt tanks.

The Contractor shall comply with the current Building Regulations and any specific requirements of the Fire Safety Certificate.

The building structure shall be designed to IS Eurocodes for the loads expected arising from all conditions taking into account the maintenance and operational requirements for the installed plant and equipment.

The external structure shall be cladded steel frame insulated, with the fabric designed to be similar to the existing OSEC building.

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

The OSEC building shall include the following as a minimum:

- Entrance lobby with external door access and access to WC room and main building from the lobby;
- Roller shutter door access to main plant area;
- Accessible WC, shower cubicle with electric shower – min 6.25m² floor area, with direct external access;
- Office - min 12.5m² floor area with viewing panel (glazed partition) to main plant area
- ESB transformer substation to standard ESB specifications, adjacent to the MCC Room;
- Generator room – to accommodate the existing generator and associated connections adjacent to MCC Room/ESB transformer substation;
- Generator fuel tank room with external access door, adjacent to generator room;
- Control room (MCC Room) with control panels, desk and chair for computer- min 50m² floor area. Direct access is required externally for the ESB to meet their requirements and separate direct access externally in addition to internal access within the building;
- Electrolyser room with external door access and internal access door;
- Store room minimum floor area 8.75m², accessed from within the building;
- Area for product storage tanks with facility to be provided to enable replacement of the tanks from the building;
- Central area housing the water softeners, brine pumps, analysers, chlorine dosing pump sets and de-chlorination system;
- Salt saturators shall be housed externally with a solid walled security enclosure with access for operation and maintenance;
- Intruder alarm system;
- Floor ducting for services;
- Floor drainage.

3.6.9.2 Finishes

All finishes shall be durable and low maintenance and suitable for the environment as appropriate.

Floor and wall finishes shall be as follows:

Table 5 – OSEC Building Finishes

Area	Floor	Walls	Ceiling
WC Room	Non slip tiles, cream in colour	Tiled	Plastered and painted in white
Lobby	Non slip tiles, grey in colour, with skirting	Plastered and painted in white	Plastered and painted in white
Office	Tiled with skirting	Plastered and painted in white	Plastered and painted in white
MCC Room	Tiled with skirting	Fair faced blockwork painted white with masonry paint	
All other areas	Heavy duty epoxy paint finish to floors with integrated skirting	Fair faced blockwork painted white with chemical resistant paint	

3.6.10 Decommissioning and Refurbishment of the Existing OSEC Building

The Contractor shall remove existing plant and equipment and either pack and relocate it to the location agreed with the Employer's Agents or dispose it off site.

The Contractor shall provide 3 longspan shelving units of a minimum 2m length at location agreed with the Employer's Agents. The shelving unit shall be as follows:

- Bolted frames;
- Provided with steel safety lock preventing accidental lifting or movement of beams;
- Comply with European guidelines for safe storage;
- Quick and easy to assemble without tools;
- Suitable (adjustable) for uneven surfaces;
- Modular;
- Fully adjustable shelves supporting loads up to 500kg;
- Durable.

3.6.11 MEICA General Requirements

The Contractor's design shall fully comply with Irish Water Design Standard IW-TEC-600-04 Energy Efficient Design and all current building energy regulations, specifically Part L of the Second Schedule to the Regulations as inserted into the Building Regulations 1997 by Building Regulations (Part L Amendment) Regulations 2011 (S.I. No. 259 of 2011).

The Contractor shall design and build the proposed Works to cater for the projected flows and storage capacities and to achieve the defined disinfection and emergency overflow discharge standards.

The Contractor shall provide all necessary MEICA works associated with the following:

- construction of storage reservoir and inlet and outlet valve houses;
- provision of secondary disinfection system;
- provision of de-chlorination system to deal with emergency overflow spill events;
- provision of flow control valve to throttle the flow to Saggart reservoir and increase the flow to Boherboy reservoir;
- ESB power supply and distribution;
- construction of OSEC building to accommodate the secondary disinfection system, de-chlorination system and power supply;
- building services in the new OSEC building, inlet and outlet valve houses and reconfiguration of building services in the existing OSEC building;
- lifting equipment in the new OSEC building and inlet and outlet valve houses;
- instrumentation and chemical analysers;
- relocation of the existing standby power generator from the existing to the new OSEC building and provision of new fuel storage facilities;
- decommissioning and disposal of all plant and equipment from the existing OSEC building.

3.6.11.1 Control Philosophy

The Contractor shall prepare a Control Philosophy and Functional Design Specification in accordance with IW-TEC-400-03.

3.6.11.2 Power Supply

The Contractor shall provide, install and commission new power supply to the new OSEC Building. The existing OSEC building power supply shall be transferred from the new OSEC building incomer unit.

3.6.11.3 Energy Efficiency

For ease of comparison, the energy efficiency of the Works is expressed in terms or the kWh consumed per kg of chlorine equivalent generated. This metric is referred to as the Energy Performance Indicator (EnPI).

The Contractor's proposal shall provide for the optimum plant arrangement; with appropriate energy performance monitoring and reporting for the generation system and sub-systems, subject to the following boundary conditions:

For two OSEC systems operating in parallel at full capacity, i.e. transformers/rectifiers, brine pumps, water softeners and air blowers, the maximum total final energy consumed per kg of chlorine equivalent generated shall not exceed 5.30kWh, expressed as a minimum achievable EnPi of 5.30kWh/kg of chlorine, at a reference point of 255 kg of chlorine per day and 340MLD of flow treated over a period of 20 years.

The EnPI of 5.30kWh/kg of chlorine is for two OSEC generation systems operating in parallel at full capacity. It is based on the energy absorbed by the transformers/rectifiers, brine pumps, water softeners and air blowers.

The Contractor shall carry out an Energy Efficient Design (EED) in accordance with IW-TEC-600-04 for the Works.

The Contractor shall monitor and report the energy performance via appropriate and representative automatic measurement and reporting system(s). The maintenance interval i.e. the time between calibrations and maintenance, on such systems shall not be less than 12 months and have an up time of not less than 80%.

The Contractor's Performance period tests shall demonstrate, measure, verify and report the energy performance and EnPI achieved. The measurement and verification of the energy performance shall be in accordance with the Contractors Measurement &Verification (M&V) Plan. The M&V Plan and Report shall comply with the main procedural requirements of ISO 50015 – "Energy management systems — Measurement and verification of energy performance of organizations — General principles and guidance". The duration of the performance tests shall be as specified in IW-TEC-600-05 section 7.9.

The Contractor's operation during the O&M period (Section 3 of the Works) shall demonstrate, measure, verify and report the energy performance and EnPI achieved during works operation on an ongoing basis. The measurement and verification of the energy performance shall be in accordance with the Contractors M&V Plan. The M&V Plan and Report shall comply with the main procedural requirements of ISO 50015 – "Energy management systems — Measurement and verification of energy performance of organizations — General principles and guidance" and applicable Irish Water policies and procedures.

At all times, where the Contractor's proposals set out a better energy performance and an EnPI that is lower than the minimum achievable EnPI, then the performance and EnPI as proposed by the Contractor shall take precedence over the minimum achievable EnPI.

The Contractor shall use best practice to report the measured and verified EnPI Measure Value. The protocol for deriving the EnPI Measure Value shall be detailed in the Contractor's M&V Plan and results reported in the Contractor's M&V Report and satisfy the following as a minimum:

a) Be representative of no less than 98% of the O&M period;
b) Include no less than 2 witnessed energy performance tests, one of which shall be during Performance Testing Period and one prior to Handover Date;
c) Monitoring shall be carried out in accordance with CEN standards or, if CEN standards are not available, ISO, national or other international standards which ensure the provision of data of an equivalent quality;
d) All monitoring results shall be recorded, processed and presented in such a way as to enable the Employer or the Employer's Agents to verify the Tendered Energy Performance.

Table 6 – Measurement Uncertainty

Energy Flow	Maximum Measurement Uncertainty
Fuel Inputs	± 2.0% of reading
Electric power, kWh	Metering to applicable BS and Class dependant on rating, see **Classification of Electricity Metering Equipment Uncertainty** below.
Indirect measurement or calculation of energy input or output, kWh	±5.0% of value

The EnPI difference shall be the EnPI Measured value achieved compared to the Tendered EnPI.

The Tendered EnPI shall be used to establish whether or not the performance tests to demonstrate, measure and verify the EnPI's are successful and achieve the tendered energy performance.

Prior to the Handover Date the Contractor shall repeat the performance demonstration tests completed as part of the Demonstration of Works for measurement and verification of the EnPI with the same criteria to achieve successful tests applying. The Contractor shall also submit the Contractors M&V Report.

3.6.12 OSEC Plant

The Contractor shall provide a secondary disinfection system to generate sodium hypochlorite solution and dose it into the incoming water supply and to the 1200mm dia. outlet trunk main to Belgard/Cookstown. The disinfection system shall utilise on-site electrolytic chlorination (OSEC). The disinfection system shall be accommodated in a dedicated building (OSEC building).

The sodium hypochlorite generation and dosing system shall be provided in accordance with IW-TEC-900-05 unless otherwise specified in the following sections. The Contractor shall also comply with IW-TEC-600-06, IW-TEC-600-06-01 and IW-TEC-600-06-02, where required.

After the trial operation, the Contractor shall decommission the existing OSEC plant in the existing building and dispose of it off site.

3.6.12.1 Electrolysers

The Contractor shall provide 2 No. OSEC generation systems designed to operate independently from each other. In low demand, the systems shall operate as duty/standby with automatic changeover. In high demand, these shall operate in parallel.

Each system shall be provided with its own saturator, electrolyser, product tank and control system.

Sizing of the electrolysers shall be based on the following information:

- Design flow rate: 400MLD
- Dosage rate: 0.75mg/l
- Solution strength: 0.8% (to be confirmed by the OSEC manufacturer)
- Operation: Duty/assist and duty/standby (selectable from the main PLC/HMI panel)
- Hours of operation: Chlorine demand to be generated by 2 no. electrolysers during the low electricity tariff period. (night operation)

The production capacity shall exceed the maximum chlorine demand by 10%. The 10% extra capacity is based on both units in operation during the 9 hours of low electricity tariff period.

Each electrolyser shall be equipped with a dedicated control panel.

The electrolysers shall be provided in accordance with IW-TEC-900-05.

3.6.12.2 Product Storage Tanks

The Contractor shall supply and install 2 no. cylindrical, vertically mounted, bunded product storage tanks in the OSEC building. Tank sizing shall be based on the following information:

- Maximum future flow: 400MLD
- Average future flow: 400MLD
- Dosage rate: 0.75mg/l
- Holding capacity: 36-hour supply of 0.8% sodium hypochlorite

If the sodium hypochlorite solution strength is less than 0.8%, the storage capacity shall be increased accordingly. Tank sizing shall be as per General Design and General Layout as determined by interactive Spreadsheets in IW-TEC-900-05. When operating in parallel, the two product storage tanks shall be capable of maintaining a 36 hour supply of 0.8% sodium hypochlorite solution. The storage capacity is to be divided equally over the capacity of both tanks. The bulk storage volume is to be based on standard industry tank sizes. Smaller tanks with be acceptable if their holding capacity is 32 hours or more.

The tanks shall be installed on concrete plinths with a minimum height of 150mm. To minimise the stresses in the tank base the tanks shall have a 'cushioning pad' installed between the plinth and the tank base.

3.6.12.3 Hydrogen Blowers

The product storage tanks shall be provided with Hydrogen dilution system to dilute hydrogen to below 25% of LEL, complete with airflow switch for automatic shut-down of process in the event of low ventilation rate.

The Contractor shall supply and fit 2 no. duty/standby hydrogen/air blowers for each product tank. He shall also provide 2 no. duty/standby air blowers for each electrolyser unit if that is located within a zoned enclosure vented outside.

The blowers shall be provided in accordance with IW-TEC-900-05 and the OSEC manufacturer's recommendations.

3.6.12.4 Salt Saturators

The Contractor shall supply and fit 2 no. cylindrical, vertically mounted salt saturators in the bunded area outside the OSEC building. The saturators shall be provided complete with heating system, fill points, dust collection system, access covers, instrumentation, etc.

The saturators shall be sized based on the following information:

- Maximum future flow: 400MLD
- Average future flow: 400MLD
- Dosage rate: 0.75mg/l
- Storage capacity: 60 days
- Salt requirement: kg of salt per kg of chlorine equivalent to be advised by the OSEC manufacturer

Each salt saturator shall have a minimum holding capacity of 25 tonnes so as to be able to receive the full load from a standard 20-tonne delivery truck. The storage capacity of 60 days is to be divided equally over the capacity of both saturators.

The saturators shall be installed on concrete plinths with a minimum height of 150mm.

The tanks shall be provided in accordance with IW-TEC-900-05. Tank sizing shall be as per General Design and General Layout as determined by interactive Spreadsheets in IW-TEC-900-05.

The Contractor shall provide each salt saturator with an initial fill of 25 tonnes of salt.

3.6.12.5 Brine Pumps

Each electrolyser shall be provided with 2 no. duty/standby brine pumps. The pumps shall be provided in accordance with IW-TEC-900-05.

3.6.12.6 Sodium Hypochlorite Dosing Pumps

The Contractor shall provide disinfection in the following mains:

- Inlet connection from 1600mm line from BME 200,000m^3/d
- Inlets from 33" lines from BME 50,000m^3/d each
- Inlet to Boherboy 44,000m^3/d
- Inlet from 1200mm line from Leixlip 100.000m^3/d
- Outlet connection to 1200mm line to Belgard 135,000m^3/d

The flows stated above for disinfection system design are provided taking into account different operational scenarios and future flows leaving the reservoir.

The dosing pumps shall be sized based on a dosage rate of 0.75mg/l and a solution strength of 0.8%. Each main shall be provided with a pump set comprising two pumps in duty/standby configuration with automatic changeover.

The dosing pumps shall be provided in accordance with IW-TEC-900-05.

The dosing system for the 1200mm line from Leixlip shall operate on flow proportional control based on signals from the flow meter F1 on drawing **DG0103_03** (from Peamount pumping station) as described in other sections. As that watermain can transport flows in both directions, the control system shall be able to stop the dosing pumps automatically if reverse flows are detected.

Under normal conditions, the disinfection system shall operate with sodium hypochlorite at 0.8% concentration. A facility shall be provided in the system to allow the pumps to be connected to an alternative chemical supply in case of an emergency. In that case the disinfection agent will be sodium hypochlorite at 10% concentration and the chemical will be brought close to the dosing pumps in an IBC. The Contractor shall provide all necessary valves and pipework required for the switchover.

A selector facility shall be provided in the main PLC/HMI panel to adjust the pace of the dosing pumps automatically when the chemical concentration is changed from 0.8% to 10%.

The Contractor shall confirm the exact levels of pipes, dosing and sampling points as part of his own design development.

3.6.12.7 Chlorine Analysers

All chlorine analysers shall be housed in the new OSEC building.

The Contractor shall provide on-line chlorine analysers to monitor the total and residual chlorine concentration in the system and to provide control signals for the dosing system as shown on drawings **DG0103_03** in **Appendix 1** (as a minimum). Additional analysers shall be provided as required.

Configuration of sampling lines from the outlet manifold shall allow for sampling of water from each section of the manifold depending on configuration of valves.

The Contractor shall provide a complete installation including sampling pumps, sampling lines and drainage system. Each analyser shall be supplied complete with reagents.

The Contractor shall provide all necessary cabling and ducting between the analysers and the control panels.

The sampling pumps shall have a maximum capacity of not more than 20% higher than the maximum sampling rate required by the analyser. The pumps shall be capable of delivering the required flow under all possible operating conditions. If there is a possibility of suction lift, the pump shall self-priming or be suitable for that application, e.g. peristaltic pump.

The analysers shall be able to operate satisfactorily under all possible operating conditions. The analysers shall be provided in accordance with IW-TEC-900-05.

The analysers shall be Hach/Lange model CL17. Alternative chlorine analysers are not permitted.

The Contractor shall provide a tee connection on each sampling line for manual sampling. Each connection shall be fitted with a stainless steel ball valve.

3.6.12.8 Softened Water Supply

The OSEC system shall be provided with duty/standby or duplex water softeners to produce softened water for the salt saturators and electrolysers. Duplex softeners if used, shall be a regenerative type softener of twin tank design with automatic changeover and regeneration. Regeneration of exhausted resin bed shall be accomplished by back flushing with brine. The Contractor shall provide all necessary pipework and fittings for the backwash discharge.

The water supply to the softeners shall be taken from the water main adjacent to the existing OSEC building. It is envisaged that the softened water will be stored in an overhead tank and then flow to the saturators and electrolysers by gravity. The Contractor shall provide a duty/standby booster pump set to lift the softened water to the overhead storage tank if the pressure in the mains is not sufficient. The system shall be provided complete with tank filling system, actuated valves, etc.

3.6.12.9 Hydrogen Detection System

The Contractor shall supply and install hydrogen detectors in the OSEC building as specified in IW-TEC-900-05 and as recommended by the OSEC plant manufacturer.

3.6.12.10 Services in OSEC Building

The Contractor is required to carry out a risk assessment and identify the hazardous areas where explosions may occur as specified in the ATEX Directives. All electrical services within hazardous areas in the OSEC building shall be EEx rated. Area classification shall be as advised by the OSEC plant manufacturer.

3.6.13 **De-chlorination System**

Chlorine residual is toxic to aquatic life and therefore any overflows from the reservoir will require treatment before discharge by injection of a chemical de-chlorination agent in the overflow process stream followed by an appropriate contact time.

The Contractor shall use Sodium Thiosulphate, which is the preferred chemical in the EPA publication 'Water Treatment Manual: Disinfection', as it minimises the dissolved oxygen depletion impact on the receiving water

The design is based on liquid Sodium Thiosulphate ($Na_2S_2O_3$) at 20% w/w concentration which is readily available in the market.

3.6.13.1 Basis of Design

- Maximum overflow rate 244 MLD (10,167 m^3/hr)
- Free chlorine residual in reservoir 0.8 mg/l
- Free chlorine limit post treatment <0.1 mg/l
- Contact time 40s (20s required by EPA with a factor of safety 2)

3.6.13.2 Process Operation

The proposed de-chlorination system shall comprise the following equipment:

- chemical storage tank;
- duty/standby dosing pumps with variable speed control;
- flowmeter on reservoir overflow pipeline (capable of measuring partial flows);
- underground contact tank (de-chlorination chamber);
- chlorine residual monitor;
- control system.

All components of the de-chlorination system including tank, pipework, dosing lines and valves shall be suitable for use with liquid Sodium Thiosulphate ($Na_2S_2O_3$) at 20% w/w concentration.

The Contractor shall provide a chemical storage tank of a minimum capacity of 1,000 litres. It shall be placed in a plastic bund capable of holding 110% of the volume of the tank. A leak detection level indicator shall be provided in the bund. The Contractor shall provide an ultrasonic level indicator at the top of the tank to indicate the level in the tank and provide low-level and high-level alarms.

Delivery of Sodium Thiosulphate shall be via 25-litre drums transferred to the storage tank by a barrel pump. For that purpose, the Contractor shall provide the Employer with a barrel pump complete with steel reinforced PVC hose fitted with hand nozzle in PVDF. All parts of the pump and hose shall be suitable for use with Sodium Thiosulphate solution at 20% concentration. The Contractor shall also provide a drum spill pallet within the de-chlorination room for storage of 4No. drums.

The Contractor shall provide the initial 1,000-litre fill of chemical for testing and commissioning and for subsequent operation.

The Contractor shall provide an ultrasonic flow meter on the overflow pipe to detect partial flows when the overflow event is at its initial stage. The meter shall provide control signals for the Sodium Thiosulphate dosing pumps and for record purposes.

Two sets of duty/standby dosing pumps shall be provided to dose chemical into the overflow pipe when an overflow event occurs. The pumps shall be activated by an electrode type level transducer in the de-chlorination chamber and controlled by flow signals provided by the flowmeter in the overflow pipe, i.e. dosing shall be flow proportional utilising 4-20mA signals from the flowmeter. The estimated pump capacity is 8 l/hr based on 80% stroke.

The dosing pumps may be installed on top of the chemical storage tank, provided their location does not interfere with refilling of the bulk tank. If is not possible to have the pumps at the top of the tank, these shall be installed in a fully enclosed, wall mounted cabinet adjacent to a bund. The spill tray in the dosing cabinet shall drain into the bund.

The pumps and their isolation and non-return valves shall be placed over a spill tray and all spillages shall be routed to a bunded area. Each dosing pump shall have its own independent suction pipework, delivery pipework and injection fitting. The pumps shall be capable of delivering the maximum flow at 80% stroke.

Chemical flow meters shall be provided where the proposed pumps do not incorporate a digital display showing instantaneous and totalised flow rates.

The local control system shall interface with the main control system to report healthy and generate appropriate alarms in the event of system malfunction or failure.

The Contractor shall size the de-chlorination chamber to assure that required contact time is achieved at maximum flow.

3.6.13.3 Chlorine Residual Analyser

The Contractor shall provide a chlorine analyser at the outlet of the de-chlorination chamber to monitor the operation of the de-chlorination system and to provide evidence that the free chlorine in the final treated overflow discharge to the river is below the required level. An alarm shall be generated if the free chlorine exceeds a maximum setpoint.

As the sampling point will be located on a line which will be normally empty, the Contractor shall provide an alternative source of water supply to the analyser. The changeover from alternative supply to sampling line shall be automatic.

3.6.13.4 Emergency Eye Wash

The Contractor shall provide an emergency eye wash facility adjacent to the de-chlorination plant in the OSEC building to comply with the chemical handling and safety regulations. This shall be provided in accordance with WIMES 8.02 – Chemical Dosing Equipment (General Requirements).

The unit shall be fitted with limit switches with volt-free contacts for initiation of a remote alarm when the eye wash is operated.

The eye wash shall be connected to a secure potable water supply to ensure that this is always in operation. A pressure gauge shall be provided at the point of connection.

The collecting basin tray shall be connected to an approved discharge point.

3.6.14 **Control Valve**

The Contractor shall supply, install and commission 1 no. electrically actuated flow/pressure control valve (C2 as shown on **DG0103_03** in **Appendix 1)** at the inlet to Saggart reservoir as per the following specification.

The 1600mm trunk main from Ballymore WTP conveying water to the existing Saggart reservoirs and Boherboy reservoir has a preferential flow path to Saggart reservoirs. The current method for increasing the flow to Boherboy reservoir and to sustain pressure upstream is to throttle the flow to Saggart reservoirs using an actuated butterfly valve. The same type of flow control will be used in the upgrade. The existing butterfly valve is not suitable for throttling service and shall be replaced with a more suitable valve. For an interim solution refer to **Section 3.6.3** of this document.

The new control valve shall be a ¼ turn eccentric plug valve suitable for shut-off and throttling service. The valve shall be suitable for the following operating conditions:

- Normal flow 10,000 m^3/hr
- Throttled flow 8,000 m^3/hr
- Outlet pressure 1 bar

The head loss through the fully open valve operating at normal flow shall be less than 0.4m w.g. The flow rate vs head loss graph shall be submitted with the tender.

The valve shall be able to operate across the whole range of operating conditions without any cavitation or vibration.

The valve shall be WRAS approved and suitable for drinking water applications.

The valve shall require no scheduled lubrication or maintenance other than regular exercising and occasional inspection of the plug.

The valve shall be flanged and drilled to BS EN 1092 PN16 and be complete with gearbox and hand wheel.

Gland replacement shall be accomplished with the minimum of dismantling. Asbestos packing is not permitted.

Valve materials shall be as follows:

- Body: Ductile iron
- Plug: Ductile iron with EPDM encapsulation
- Seats: Ni-resist plug and resilient seat face
- Spindle: Stainless steel supported in heavy duty bearings
- Bearings: 316 stainless steel, permanently lubricated
- Thrust bearing: PTFE
- Coating: Fusion bonded epoxy coating internally and externally, WRAS approved
- Pedestal: Cast iron or stainless steel

All non-metallic parts of the valve that come into contact with water shall be in compliance with Regulation 31(4)(b) of Water Supply Regulation 2000; DWI (Drinking Water Inspectorate) Advice Sheet 8.

The valve shall be fitted with a modulating type, electric actuator mounted on a pedestal above ground. The electric actuator shall be provided in accordance with the General Technical Specification for MEICA Works included in **Appendix 3** of this document. This shall be Rotork IQ. The extension spindle shall be provided in stainless steel grade 304.

The Contractor shall provide a pressure sensor and pressure gauge at the inlet and outlet of the valve for monitoring and control purposes.

The valve shall be controlled through the main PLC/HMI in the OSEC building via pressure signals received from the pressure sensor downstream of the valve. The system shall also allow control via flow signals from the existing flowmeters EF1 and EF2 (refer to drawing **DG0103_03** in **Appendix 1**). A selector switch shall be provided in the HMI to allow the operator to choose control via pressure signals or flow signals.

The system shall allow the operator to enter the desired pressure or flow rate from the HMI. The status of the valve shall be displayed on the HMI.

The valve shall be provided with the following certification:

Table 7 – Control Valve Certification

Certificate of Compliance with the order – EN10204 – 2.1
Compliance with Flow vs Head Loss Graph
Certificate of Origin (where manufactured outside the EU)
Material Certificate
Certificate of Conformity / Quality
Certificate of Compliance to WIMES 8.09
Test Report – EN10204 – 2.2
Compliance with Regulation 31(4)(b) of Water Supply Regulation 2000; DWI Advice Sheet 8
WRAS Material Certificates for O-Ring, Gaskets, Seals, Packing and Coating
Management System of Valve Manufacturer to ISO 9001
Inspection Certificate
Certificate of Paint Thickness
Holiday Test Results
Valve Body and Plug Material
Hydrostatic Test Certificate
Functional Test Certificate of Actuated Valve
Inspection Report – EN10204 – 3.2
Hydraulic & Hydrostatic Performance Test – 3rd Party Witnessed

3.6.15 Isolation Valves

The Contractor shall install permanent isolation valves as shown on drawings **DG0103_02** to **DG0103_07** in **Appendix 1**.

Table 7a - Valves

ID (as per drawings DG0103_02 to DG0103_07 in Appendix 1)	Type	Actuated	Local Control	HMI Control	Remote Control**	Chamber	Comment
V1	isolation	N	N/A	N	N	N	installed already
V2	isolation	N	N/A	N	N	N	on the Leixlip inlet to the by-pass line
V3	isolation	N	N/A	N	N	N	on the future inlet to the by-pass line
V4	isolation	N	N/A	N	N	N	on the by-pass line
V5	isolation	N	N/A	N	N	N	on the by-pass line
V6	isolation	N	N/A	N	N	Y	on a 33" inlet
V7	isolation	N	N/A	N	N	Y	on a 33" inlet
V8	isolation	Y	Y	N*	N	N/A	in the inlet valve house
V9	isolation	Y	Y	N*	N	N/A	in the inlet valve house
V10	isolation	Y	Y	N*	N	N/A	in the inlet valve house
V11	isolation	Y	Y	N*	N	N/A	in the inlet valve house
V12	isolation	Y	Y	N*	N	N/A	in the inlet valve house
V13	isolation	Y	Y	N*	N	N/A	in the inlet valve house
V14	isolation	Y	Y	N*	N	N/A	in the inlet valve house
V15	isolation	N	N/A	N	N	N	on the by-pass line
Valves in the outlet valve house	isolation	Y	Y	N*	N	N/A	
Valves in the flowmeter chamber	isolation	Y	Y***	N*	N	N/A	
Temporary works valves	isolation	N	N	N	N	N	
C1	control	Y	Y	Y	Y	N	to be redundant post construction
C2	control	Y	Y	Y	Y	Y	

*) The signals shall be available at HMI for future inclusion
**) From a central (telemetry) office
***) Local control in the valve house

All butterfly valves in the contract shall be Erhard Roco.

All electric actuators in the contract shall be Rotork IQ.

Isolation valves shall be butterfly valves to the "Code of Practice for the Construction of Arterial Watermains" by Dublin City Council, included in **Appendix 7**.

3.6.16 Instrumentation

3.6.16.1 Flowmeters

The Contractor shall supply, install and commission electromagnetic flowmeters as follows:

Table 8 – Flowmeters

Flow Meter	Flow Meter Location	Max. Flow (m^3/hr)	Min. Flow (m^3/hr)
F3	Inlet from 33" Watermain from BME (Left)	1,450	1,128
F4	Inlet from 33" Watermain from BME (Right)	1,275	965
F6	Outlet to 24" Watermain to Ballyboden/Stillorgan	1,083	542
F7	Outlet to 27" Watermain to Cookstown/Belgard	1,782	1,375
F8	Outlet to 24" Watermain to Tallaght	650	251
F9	Outlet to 1200mm Watermain to Belgard/Cookstown	6,792	4,083
F10	Outlet to 1200mm Watermain to Ballyboden/Stillorgan	3,718	2,598

The transmitters for flow meters F3 and F4 shall be in the control panel in the inlet valve house and those for flow meters F6 to F10 in the control panel in the outlet valve house. All signals shall be displayed on the HMI in the OSEC building and also relayed to the telemetry system.

The incoming flow to the new reservoir from 1600mm trunk main from BME shall be measured using readings from the existing flowmeters EF1 and EF2. Those signals will also be used to control the pace of the dosing pumps injecting sodium hypochlorite into that line. The Contractor shall include for relocation of the flow meter transmitters from the existing OSEC building to the inlet valve house.

The Contractor shall install a flowmeter in the overflow pipe inside the inlet valve house to provide control signals for the de-chlorination system. The flowmeter shall be able to operate satisfactorily under all possible hydraulic conditions, i.e. minimum and maximum flows, irregular flows, partial flows, etc. The flowmeter shall be an ultrasonic transit-time flowmeter measuring discrete path velocities using one or more pairs of transducers. The flowmeter shall be complete with level sensors, flow sensors and transmitter. The level sensors shall be withdrawable through ball valves and the velocity sensor through a flanged opening at the top of the pipe. The total accuracy of the instrument including sensor, transmitter and uncertainties due to installation tolerances shall be +/-1%.

Flowmeter EF5 on the 1200mm watermain to/from Leixlip will be provided under the Peamount Pumping Station contract. The flow signals will be transmitted to Saggart via a telemetry link described in more detail in the following sections. Those signals will be used for flow proportional control of the chlorine dosing pumps and for monitoring purposes.

All electromagnetic flow meters shall be ABB Watermaster.

3.6.16.2 Ultrasonic Level Meters

The Contractor shall supply, install and commission 9 No. ultrasonic level meters in the following locations:

Table 9 – Ultrasonic Level Meters

Ref.	Location	Function
US1	Wet well at the inlet of the reservoir	An overflow will trigger an alarm and start the de-chlorination system
US2	Reservoir cell No.1	To monitor the water level in cell No.1
US3	Reservoir cell No.2	To monitor the water level in cell No.2
US4	Sodium Thiosulphate storage tank	To monitor the contents in the tank and provide alarm signals for overfilling and re-ordering
US5	Fuel storage tank	To monitor the contents in the tank and provide alarm signals for overfilling and re-ordering
US6	Sodium hypochlorite product storage tank No.1	As per IW-TEC-900-05. Also linked to electrolyser controls.
US7	Sodium hypochlorite product storage tank No.2	As per IW-TEC-900-05. Also linked to electrolyser controls.
US8	Saturation tank No.1	As per IW-TEC-900-05
US9	Saturation tank No.2	As per IW-TEC-900-05

Ultrasonic level meters provided in the bulk storage tanks shall be provided in accordance with IW-TEC-900-05.

The signals from level meters US1, US2 and US3 shall be relayed to the control panel at the inlet valve house and from there to the main MCC in the OSEC building. The transducers shall be located below the access hatches and be accessible from appropriate surface (e.g. reservoir roof).

The signals from meters US4 to US9 shall be relayed to the main MCC panel in the OSEC building.

Each ultrasonic level meter shall provide the following volt-free signals:

Inputs (Analogue)
- Liquid level

Alarms
- High liquid level
- Low liquid level
- Ultrasonic level meter fault

The high and low-level alarms shall be adjustable from the HMI.

3.6.16.3 Level Probes

Level probes shall be provided in the following locations:

Table 10 – Level Probes

Location	Function
Overflow weir	Overflow to trigger an alarm and start the de-chlorination system
Control valve chamber	To alert the operator of any leakages in the chamber
Flow meter chambers	To alert the operator of any leakages in the chamber
Inlet valve house	To raise an alarm locally and in the main PLC/HMI panel
Outlet valve house	To raise an alarm locally and in the main PLC/HMI panel
Chemical bund - Sodium Hypochlorite product tanks	As per IW-TEC-600-05
Chemical bund - Sodium Thiosulphate storage tank	To trigger an alarm in the main PLC/HMI panel
Chemical bund - salt saturators	As per IW-TEC-600-05
Bund – fuel storage tank	To trigger an alarm in the main PLC/HMI panel

The probes in the chemical bunds shall be as specified in IW-TEC-900-05.

All other probes shall be of the heavy-duty type manufactured in Grade 304 stainless steel and shall be cut to the correct length on site. The housing of the electrode electrical contacts shall be contained in a polypropylene container.

When the conductivity between the pipe and the probe is broken, a control relay located in the motor control centre shall change state giving a volt free contact. The system shall have adjustable sensitivity to prevent activation due to electrode tracking and foam content of water.

3.6.16.4 Pressure Monitoring

At the inlet and outlet of the control valve on the 1600mm line from BME the Contractor shall provide pressure sensors with 4-digit alphanumeric display. The 4-20mA signals generated by the sensors shall be displayed on the HMI in the OSEC building. The housing and all wetted parts of the instrument shall be manufactured in stainless steel. The unit shall have an operating voltage of 18 – 36V DC.

3.6.17 **Lifting Equipment**

3.6.17.1 Lifting Plan

Bridge cranes shall be provided at the inlet and outlet valve houses to allow direct vertical access to heavy equipment. The runway beams shall be extended over loading bays. The design allows trucks to reverse into the loading bays (in the inlet and outlet valve houses) and under the crane for loading the equipment directly onto the truck bed. The cranes shall enable complete withdrawal from the buildings without the need for secondary handling. The crane hoists shall be electrically operated.

The bulk storage tanks in the OSEC building shall be replaceable using overhead monorails provided over the tanks. A monorail shall be provided over each tank to allow the corresponding tank to be lifted over the bund. One or more dosing pump cabinets may need to be removed if tank removal is obstructed. The tank shall be brought to a central corridor and using the hoist of the second tank, the tank position shall be changed from vertical to horizontal. The tank supply

shall include all necessary lifting eyes for this operation. The tank shall be positioned onto trolleys or skates and brought outside the building through the roller shutter door.

3.6.17.2 Inlet and Outlet Valve Houses

The Contractor shall provide electric overhead traveling cranes at the inlet and outlet valve houses to provide for lifting of valves, pipe fittings and other equipment if required.

The design, materials and construction shall be in accordance with the supplier's standard practice or recommendation for the intended service.

The lifting equipment shall have general use such as lifting pipework and valves. This shall have a capacity 20% in excess of the weight of the heaviest item to be lifted. The safe working capacity in "kg" shall be indicated on both sides of the gantry in figures large enough to be easily read from the ground. The Contractor shall include for all necessary testing and test certificates for the equipment provided.

Each lifting system shall be provided with electric hoist and power-driven trolley. The long travel shall terminate over the drop zone to facilitate off-loading of loads. The Contractor shall submit full details of the proposed gantries for review and approval before any fabrication commences.

Each lifting system shall include but not be limited to:

i) Hoist carrying structure, including travel rails, struts, etc.
ii) Hoist block with electric powered travel and power-driven trolley.
iii) All necessary mechanical and electric assemblies for long travel, cross-travel and hoisting including wheel assemblies, gears, reduction units, motors, end stops, couplings, ropes and hooks, together with all the necessary guards and lubrication facilities.
iv) A two-bridge girder with platform, handrailing and access ladder for inspection, maintenance and thorough examination of the lifting equipment.
v) Electrical cabling.
vi) All electrical control gear.
vii) Pendant control box fitted with lockable isolation facility.
viii) Site performance tests including statutory testing to comply with government regulations.

All hooks shall be fitted with spring-loaded safety catches. Hook blocks shall have safe working capacity label fitted.

Brakes on all motions shall, in the event of power failure, operate on the "fail to safe" principle. Brakes shall be designed to bring all motions to a complete standstill and hold this position when operating normally and during a power failure. All speeds on travelling and traversing shall be protected against over-travel by adjustable limit switches.

The hoist shall have overload protection devices fitted and calibrated.

Protective Coatings.

All parts of the gantry shall be adequately protected against corrosion in accordance with BS EN ISO 12944 and BS EN ISO 14713. All parts manufactured from corrosion resistant materials shall not be provided with corrosion protection.

Application of coating materials shall be carried out in accordance with the paint manufacturer's recommendations. The coating system shall be subject to approval by the Employer's Representative. Each coat shall be of a different colour and the final coat shall be subject to approval by the Employer's Representative and the Employer. Colour samples should be submitted for approval.

3.6.17.3 OSEC Building

The Contractor shall provide an overhead handling system in the OSEC building to facilitate the replacement of the sodium hypochlorite product tanks at the end of their service life.

The system shall be capable of lifting the tanks over the bund wall and place them on trolleys in horizontal position, so they can be brought outside the building. The system shall comprise a runway beam over each tank and each beam shall be provided with an electric hoist and trolley.

It is envisaged that the two hoists will be operated together when changing the position of the tanks from vertical to horizontal and when placing them on the trolleys. The Contractor shall provide all necessary lifting eyes and reinforcement on the tanks to facilitate that operation.

Hoist, trolley and beam shall be sized to a load 20% in excess of the weight of the tank.

3.6.17.4 Standby Generator

At present, the existing OSEC plant is provided with a standby power generation system comprising a diesel generator set Olympian GEP165 rated to 150kVA Prime/165kVA Standby, fuel storage tank and automatic changeover facility. The generator is to be relocated to the new OSEC building to ensure that the critical plant equipment in the upgrade is kept operational in the event of a power outage.

The generator shall be fed from a new fuel storage tank installed in a room adjacent to the generator room. The Contractor shall provide the initial fill of fuel for testing and commissioning and for subsequent operation.

The generator shall be wired for automatic changeover from mains to standby genset when the power from the mains goes off or if the quality of power supply is poor.

The standby generator shall be connected to the following loads:

- All plant and equipment in the upgrade except the transformers/rectifiers, in-line water heaters and brine pumps in the new OSEC system.
- Building services in the existing OSEC building, i.e. lighting, ventilation, water heaters, space heaters, etc.
- All security and alarm systems and monitoring and control system.

The system shall meet the requirements set out in the table below.

Table 11 – Requirements for Standby Generation & Fuel Storage

Parameter	Requirement
Fuel storage capacity	1,000 litres net capacity.
Automatic changeover	The generator shall be fitted with an automatic mains failure system to maintain operation of the plant and equipment listed above in the event of a power outage.
Bund Requirements	
Bund capacity	Sized to contain 110% of the total fuel storage volume.
Bund construction	Reinforced in-situ concrete and coated with a suitable sealant.
Bund freeboard	300mm
Bund sump	Incorporate a 300mm x 300mm x 200mm deep sump located at the lowest point of the bund to facilitate the installation of a portable pump for removal of any spilled fuel.
Service entry to the generator	Electrical cabling or fuel pipes shall not be permitted to pass through the floor or the walls of the bund
Bund spillage alarm	The bund shall be fitted with a fuel spillage alarm that will enable closing of an actuated valve on the outlet from the storage tank and generator shutdown
Fuel tank protection	Tank double skinned and fitted with high and low-level alarms linked back to the main PLC/HMI panel.
Inlet and Outlet Air	
Inlet air	The generator room shall be fitted with an inlet air louvre sized to provide the combustion and cooling air requirement of the generator.
Outlet air	The generator room shall be provided with an outlet air louvre. An air outlet transition shall be provided between the genset canopy and the outlet louvre.
Sound Attenuation	
Generator	The generator shall be provided with a new sound attenuated canopy if the existing cannot guarantee the noise requirements in the contract.
Exhaust system	The generator shall be provided with a new exhaust silencer if the existing cannot guarantee the noise requirements in the contract.

All redundant components of the standby generation system in the existing OSEC building, i.e. fuel storage tank, fuel pipework, cables, etc., shall be removed and disposed of site.

3.6.18 Building Services

3.6.18.1 Extent of Work

The Contractor is required to design all the necessary Mechanical and Electrical Services systems to create a comfortable and safe environment for plant staff and maintenance personnel. All systems provided shall be simple to operate and easy to maintain.

Building services shall be provided in the following locations:

- OSEC Building;
- Inlet Valve House;
- Outlet Valve House.

3.6.18.2 Internal Lighting Installation

The Contractor shall supply, install, wire, connect and commission a complete internal lighting installation at the OSEC building and inlet and outlet valve houses including luminaires, fittings, switches, etc.

Some lighting shall be provided at crane level to facilitate the inspection and certification of the cranes.

The Contractor shall provide local switching for all lighting circuits. Local switching shall be at entrance doors where applicable. Two-way switching shall be provided for all areas where entrance/exit can be achieved from more than one point, e.g. corridors, platforms, stairs, etc.

All wall mounted luminaires shall be mounted at a height of not more than 3m from the floor and where they can be safely reached by user.

All internal lights shall be low energy, low maintenance, LED lights with a minimum lifecycle of 50,000 hours @L70, Ta 25^{0}C.

All luminaires shall be corrosion resistant with environmental protection to IP65.

The lighting system shall be provided in accordance with the CIBSE Guides for lighting and the ETCI regulations.

3.6.18.3 External Lighting Installation

The Contractor shall provide site lighting around the OSEC building and the inlet and outlet valve houses for emergency maintenance operations. The lights shall be mounted on columns or on the building structures.

The external lighting system shall be vandal proof and shall be operated manually from inside the buildings.

In addition, the Contractor shall provide external lighting for the salt storage area. The lighting system shall cover the area around the saturators, the access ladder and the salt fill point. The lights shall be activated from inside the storage area and from the OSEC building.

All external luminaires shall be corrosion resistant with environmental protection to IP65.

The external lighting system shall be provided in accordance with the CIBSE Guides and the ETCI regulations.

Emergency Lighting

Each building shall be provided with emergency lighting. The system shall comprise exit and escape route luminaries to facilitate the safe evacuation of personnel from the building in the event of power failure.

The emergency lighting system shall be provided in accordance with IS 3217.

3.6.18.4 Heating Installation

The Contractor shall provide panel heaters in the office and store room in the OSEC building. The heaters shall be thermostatically controlled to maintain a pre-selected background temperature.

The Contractor shall also provide infra-red radiant heaters in the OSEC plantroom area for use by the maintenance staff in cold weather and for frost protection. The heaters shall be selected so that their beam width and throw can cover the working area around the plant. One of the heaters shall be controlled by a room thermostat. The heater shall be activated automatically if the room temperature drops below 4^0C (adjustable from the HMI).

Heaters shall be operated manually via wall mounted switches.

3.6.18.5 Occasional Power

The Contractor shall install throughout the three buildings (i.e. OSEC building, inlet and outlet valve houses) a general-purpose socket outlet and fixed power installation as detailed below.

Generally, socket outlets shall be 230V two-gang switched type.

110V, 230V and 400V type socket outlets shall be provided throughout the OSEC plantroom and the inlet and outlet valve houses.

All sockets including 230V and 400V 3-phase shall be RCD protected.

The installation shall be provided in accordance with the ETCI regulations.

3.6.18.6 Water Supply

The Contractor shall supply and install a cold water storage tank in the OSEC building for provision of potable water services and hot water service feed as required. The Contractor shall provide a suitably sized supply pipe from the mains to a point inside the building for feeding a storage tank at high level. The Contractor shall also provide a potable water service distribution system to all appliances within the building and the salt saturators outside the building.

The storage tank shall be sized as per the recommendations of the OSEC manufacturer.

All water served appliances shall be provided with an isolation valve and draincock.

The Contractor shall provide taps in the salt saturator area and the OSEC plantroom for washing purposes.

All pipework and the storage tank shall be thermally insulated.

The water supply system shall be provided in accordance with BS EN 806-1:2000 Specifications for installations inside buildings conveying water for human consumption.

3.6.18.7 Water Heaters

The Contractor shall provide and install an under-sink water heater in the WC room in the OSEC building.

3.6.18.8 Ventilation

The Contractor shall supply, install and wire complete ventilation systems in the OSEC building. inlet and outlet valve houses.

The MCC room in the OSEC building shall be provided with normal ventilation and also cooling ventilation to neutralise the heat released by the transformers/rectifiers and other electrical equipment in that room. The cooling fans shall be thermostatically controlled.

The amount of heat released will depend on the make and model of the equipment he is proposing to use. The cooling system shall comprise supply louvres and thermostatically controlled extract fans.

Design of the cooling ventilation system shall be based on the following conditions:

Maximum room temperature	40°C
External temperature	31°C
Heat load	Heat released by the pumps and motors when operating at maximum design conditions

The Contractor shall provide a complete system, including louvers, grilles, fans, ductwork, etc.

All extract fans shall be fitted with speed controllers.

The toilet extract fan shall be time-switch controlled.

Adequate ventilation shall be provided in the inlet and outlet valve houses to prevent moisture condensation. The ventilation system shall cover all areas of those buildings. The Contractor shall provide a complete ventilation system including fans, louvres, air ducts and controls as necessary.

The ventilation system shall be provided in accordance with the CIBSE Guides and DW/144 Specification for Sheet Metal Ductwork - Low, medium and high pressure/velocity air systems.

Portable Fire Extinguishers

The Contractor shall provide portable fire extinguishers in the OSEC building in accordance with BS5306 Fire extinguishing installations.

3.6.19 **Telemetry / SCADA Requirements**

3.6.19.1 General Requirements

The Contractor shall supply, install and commission telemetry works in accordance with Irish Water Signal Provision Standard IW-RAM-SPEC-5000-001 and the Scope document.

The processes to be included in telemetry works are:

- On Site Electrolytic Chlorination (OSEC);
- Service Reservoir;
- Secondary Disinfection;
- De-chlorination;
- Metering.

If the Contractor is not an approved System Integrator himself, he shall employ an approved integrator in accordance with IW Telemetry Requirements IW-TEC-400-02 (ICA – Telemetry Outstation Specification.

The Contractor shall include for all signal communication via the telemetry works to meet the minimum signalling requirements set out in Irish Water Signal Provision Standard IW-RAM-SPEC-5000-001, and any additional signals required to complete the Contractors final design of the Works to ensure effective operation of the scheme.

The Contractor shall provide for all signals generated by the MEICA plant and equipment in the contract to be relayed to the PLC/HMI at the OSEC building for local display and control.

The Contractor shall also allow for the splitting of existing fire alarm and intruder alarm signals from the existing OSEC building and integrating the signals into the new monitoring and alarm system. The Contractor shall ensure that the existing signals and telemetry remain operational in the same manner as they had done prior to the works.

The Contractor shall transfer all signals collected at the main MCC to the Dublin City Council Water Services Telemetry Office, located at Marrowbone Lane, Dublin 8. The relaying of signals shall be provided in accordance with Irish Water Signal Provision Standard IW-RAM-SPEC-5000-001.

Signal transmission to Marrowbone Lane shall be via a telemetry outstation Metasphere MMIM RTU. The Contractor shall include in his Tender for relocating the broadband connection from the existing OSEC building to the new and for connecting to the telemetry equipment.

The telemetry outstation shall be in compliance with IW Engineering Specification for Telemetry Outstations (iNTS) and IW drawing STD-ELEC-001 included in **Appendix 5**.

The Contractor shall provide a new Site Monitoring and Control system at the OSEC building in line with Irish Water Instrumentation, Control and Automation – Site SCADA and HMI Specification IW-TEC-400-001.

As a minimum, the Contractor shall provide a HMI at the OSEC building and inlet and outlet valve houses in line with Irish Water Instrumentation, Control and Automation – Site SCADA and HMI Specification IW-TEC-400-001.

The Contractor shall conduct Factory Acceptance Testing, Site Acceptance Testing, Communications Tests on each individual element of the telemetry works in accordance with Irish Water Site SCADA and HMI Specification IW-TEC-400-01 and IW Telemetry Requirements IW-TEC-400-02 (ICA – Telemetry Outstation Specification) as part of his Pre-Commissioning Tests.

A schedule of tests shall be provided to the Employer and the Employer's Representative for comment and agreement as per the timelines set out in Irish Water Design Specification: Commissioning, Testing and Handover – General Specification IW-TEC-600-05. These tests shall be conducted by the Contractor's approved system integrator and witnessed / signed off by the Employer's Representative as having achieved the required or desired outcomes prior to commissioning period commencing.

Where specialist processes are involved, the Contractor shall define the specific test methodology as part of the Commissioning Plan and conduct as part of the Pre-Commissioning Tests. Where these tests originate from the approved system integrators own testing and commissioning procedures then the Contractor shall ensure these tests are recorded and included in the Commissioning Report and Hand Back Documentation.

Failure to meet the required or desired outcomes for all the tests outlined before the scheduled start date of the commissioning period shall result in delay at the Contractors expense.

The Contractor shall allow adequate time in his schedule for re-testing of any failed tests to be conducted prior to the scheduled commissioning period start date.

The Contractor shall conduct commissioning of all telemetry works and signal communications from each works location to various destinations in accordance with Irish Water Design Specification: Commissioning, Testing and Handover – General Specification IW-TEC-600-05 in line with the approved Commissioning Plan.

The Contractor shall allow adequate time in his schedule for re-testing of any failed tests to be conducted during commissioning.

3.6.19.2 Communications with Peamount Reservoir Pumping Station

As part of the Strategic Watermain Link between Leixlip and Saggart, a new pumping station will be constructed at Peamount to link the two principal water sources at BME and Leixlip. The pumping station will pump water from Peamount Reservoir site to the existing 4.5Ml reservoir at Saggart.

The pumps will be controlled by level signals in Saggart Reservoir and the level in the reservoir will be constantly relayed back to the main MCC at Peamount reservoir PS via telemetry panels on both sides. The telemetry panels will be installed and commissioned under the Peamount Pumping Station contract and will be operational before this contract is completed. The signals will be transmitted via radio.

The Contractor shall include for removing the telemetry cabinet from the existing OSEC building and installing it to the new. The Contractor shall include for connecting the cabinet to the Main PLC/HMI and for re-programming the unit. The telemetry cabinet shall be relocated together with its associated equipment, e.g. UPS, aerial, etc.

As a minimum, the following signals shall be relayed to Peamount pumping station:

- Level signals in new reservoir;
- Status of chlorine dosing system.

The chlorine dosing rate for the water supply from Peamount will be based on flow proportional control or chlorine residual. The signals for flow proportional control will be provided by the electromagnetic flowmeter installed under the Peamount PS contract. The Contractor shall include for receiving the flow signals from the telemetry cabinet and for connecting them to the Main PLC/HMI.

The flowmeter in the Peamount contract shall be included in the screenshots, trends, alarms, etc.

3.6.19.3 Telemetry Works General Requirements

The Contractor shall provide each system complete with all necessary cabling, communication network interface modules, power distribution module(s), PLCs, I/O modules, operator interfaces (HMI's), Uninterruptible power supplies/battery backups etc. The Contractor shall include for all necessary electrical and signalling work and for generating the screenshots, trends, alarms, etc., in the proposed HMI system.

All PLCs shall be Omron.

The extent of telemetry supply shall include all hardware, software, wiring, communication facilities, programming and configuration required to ensure a complete installation and integration of the scheme with the various existing and proposed elements.

All intellectual rights and comments relating to PLC/HMI programming and software in the tender shall be made available to the Employer.

The Contractor shall generate graphical displays, complete with dynamic data, alarm and state changes as per Irish Water Site SCADA and HMI Specification IW-TEC-400-01. The Contractor shall include whatever additional displays that may be necessary or adjust existing displays for clear, safe and comprehensive operator monitoring and control of the scheme to allow rapid identification of faults and abnormal operating conditions.

The Contractor shall include for generating the screenshots, trends, alarms, etc., for all MEICA plant and equipment installed in those locations. The operator shall be able to operate all motorised valves installed in each valve house from the local HMI.

The ICA works shall comply with the General Technical Specification for MEICA Works and all current European standards.

Where necessary, SIM cards will be free issue to the Contractor for the communication of telemetry data to existing Employer's SCADA and Telemetry systems.

The Contractor shall provide a telemetry link for communicating alarms to the telemetry system at Ballymore Eustace. Alarms shall include, but not be limited to, those associated with the power supply and OSEC plant and those received from the instruments in the reservoir and the control valve and actuated valves.

Alarms shall be signalled as specified in Irish Water Signal Provision Standard IW-RAM-SPEC-5000-001 directly to the telemetry systems at Ballymore Eustace and Marrowbone Lane. An Alarm Notification System shall be provided by the Contractor and detailed in the following sections, specifically for this function.

Monitoring and Control System

The Contractor, through an approved system integrator, shall supply, install and commission a PLC/ HMI at the new OSEC building to monitor and control the plant and equipment installed.

HMIs shall also be installed at the inlet and outlet valve houses. The units shall graphically represent the equipment installed in those areas and process mimics exactly as displayed on the HMI at the new OSEC building.

The Contractors approved system integrator shall develop a User Requirement Specification (URS) for works locations where Graphical HMI's are required as per Irish Water Site SCADA and HMI Specification IW-TEC-400-01.

The Contractor shall submit this URS to the Employer for approval within 60-days of the contract commencement date for approval and/or comment by the Employer. The Employer shall not unduly delay the Contractor by withholding decision or comments on the FDS that will allow the Contractor to proceed with developing the URS into a HMI Functional Design Specification (FDS).

The Contractor or sub-contractor (approved System Integrator) shall further develop the URS into a HMI Functional Design Specification (FDS). When the design is completed and approved the HMI system(s) shall be constructed in accordance with Irish Water Site SCADA and HMI Specification IW-TEC-400-01.

The Contractor shall submit this FDS to the Employer for approval within 30-days following approval of the URS by the Employer. Again, the Employer shall not unduly delay the Contractor by withholding decision or comments on the FDS that will allow the Contractor to proceed with his programme.

3.6.19.4 Alarm Notification System

The monitoring system at Saggart shall include an alarm callout system.

The alarm callout system shall have the capability to deliver real-time alarm information via each of the following:

- e-mail;
- voice;
- SMS text;

The alarm management system shall have the ability to:

- Deliver an alarm message to at least 4 different telephone numbers;
- Send text or call a contact from a list of contacts (in order of pre-selected priority) and if, after a configurable amount of time, the first contact does not respond or acknowledge the alarm, then the unit contacts the second contact on the list. This process is repeated until at least one contact responds to the alarm;
- The alarm management system shall have the ability to configure a dead-band period or pre-set time for an alarm to be present the alarm is called out;
- Receive coded text messages for alarm condition acknowledgement.

The callout alarm unit shall be configurable from the HMI.

The purpose of the callout system is to send critical alarms to the plant staff in BME as they are responsible for the operation of the plant. Primarily, the callout system shall send alarms for overflow events.

The alarm call out system shall be capable of generating 10 alarms.

3.6.19.5 Power Supply

The Contractor shall provide the telemetry outstation and each HMI/PLC with an Uninterruptible Power Supply unit (UPS) of 2 hours capacity to protect and maintain the instruments in the event of power surges or losses and to allow the interface system(s) employed in the Contractors design to transmit "Power Failure" alarm signals.

3.6.20 **Intruder Alarm**

An intruder alarm system shall be provided to cover the new reservoir, inlet/outlet valve houses and OSEC building. The intruder alarm system shall be provided in accordance BS EN 50131 Series - Alarm systems. Intrusion and hold-up systems.

The Contractor shall provide a complete intruder alarm system comprising but not limited to door contacts, detectors, sounders, communication device, dedicated control panels and wiring.

Alarm sensors shall be installed on all reservoir hatches and accesses into the inlet and outlet valve houses and the new OSEC building.

The system shall include a multi-zone intruder alarm panel complete with 6-hour rechargeable battery supply. The alarm panel shall have the facility to send alarm signals to the operator via GSM communication link. The alarm signals shall also be relayed to the main PLC/HMI system. The main alarm panel shall be in the OSEC building.

Additional keypads shall be provided in the inlet and outlet valve houses and the existing OSEC building.

The existing OSEC building is provided with its own alarm system. This shall be incorporated into the new system as a separate zone.

3.6.21 **Fire Alarm and Suppression System**

The Contractor shall design and install a complete fire detection and alarm system to cover the whole site. The system shall be provided in accordance with IS 3218 – Fire Detection and Alarm Systems for Buildings.

The system shall provide coverage for the following areas:

- OSEC Building;
- Inlet Valve House;
- Outlet Valve House.

The system shall have a local internal and external audible alarm for each building and shall be linked to the telemetry system. Each building shall be provided with automatic detectors and manual break glass units as necessary.

The fire detectors shall be suitable for the areas they are intended for and be easily accessible for inspection and maintenance. Due to the dimensions and configuration of the inlet and outlet valve houses, some areas may need to be provided with optical beam detectors.

The fire detection system shall be provided with a multi-zone, analogue, addressable panel located in the OSEC Building. Addressable fire repeater panels shall be provided in the other two buildings. The repeater panels shall display the system information on the main fire alarm panel and indicate the panel that has fire activation.

The existing OSEC building is provided with its own fire alarm system. That system shall be incorporated into the new fire alarm system in the OSEC building as a separate zone. The Contractor shall replace the existing fire alarm panel with an addressable repeater panel if that is necessary.

Fire suppression shall be provided in all electrical enclosures in the control room, i.e. main MCC, control panels, transformers/rectifiers, etc. The system shall be able to automatically detect and suppress a fire where it begins. The system shall be provided complete with heat sensors, tubing and control panel.

The system shall remain fully operational during power outages. The fire suppression agent shall be non-toxic, non-corrosive, odourless and have a small footprint.

Fire suppression is not required in the inlet and outlet valve houses but fire detection is necessary.

3.6.22 Lightning Protection

The Contractor shall refer to BS EN 62305 Series - Protection against lightning and establish the overall assessment of lightning risk associated with the site.

The new OSEC building, reservoir and inlet and outlet valve houses shall be provided with lightning protection in accordance with that assessment.

The Contractor shall supply, install and connect lightning protection to all external signal and instrumentation equipment in accordance with the General Technical Specification for MEICA Works included in **Appendix 3** of this document.

Final connection to the main LV switchboard terminal bar shall be via a surge protection device.

3.6.23 Site Security System

The Contractor shall install a sitewide security system in accordance with IW-TEC-600-01 included in **Appendix 5** and in compliance with the planning permission and conditions attached to it. The site is classified as "Enhanced +".

Figure 3 – Location of Cameras

Table 12 – Details of Cameras

Id	Cam ref	Cam type	Prod	Cam Focal Angle(H/V)	Pixel size (thermal cam)	Max cam resolution	Analysed img resolution	Cam height	Used Focal Angle(H/V)	Field of view elevation (Tilt)	Field of view distance	Min detection distance	Max detection distance	Lighting IR Fog	Camera height requirement
1	Q1941-E-7mm	Thermal	APD	7.0mm 55°/43°	17µm	384x288	384x288	3.0m (9'10")	7.0mm 55.0°/43.0°	2.5m (22.0°)	60.0m (65.6yd)	3.2m (3.5yd)	69.4m (75.9yd)	Good (>50 lux) IR:No Fog:No	ok
2	Q1941-E-7mm	Thermal	APD	7.0mm 55°/43°	17µm	384x288	384x288	3.0m (9'10")	7.0mm 55.0°/43.0°	2.5m (21.9°)	70.0m (76.6yd)	3.2m (3.5yd)	69.4m (75.9yd)	Good (>50 lux) IR:No Fog:No	ok
3	Q1941-E-7mm	Thermal	APD	7.0mm 55°/43°	17µm	384x288	384x288	3.0m (9'10")	7.0mm 55.0°/43.0°	2.5m (21.9°)	70.0m (76.6yd)	3.2m (3.5yd)	69.4m (75.9yd)	Good (>50 lux) IR:No Fog:No	ok
4	Q1941-E-19mm	Thermal	APD	19.0mm 19.4°/14.6°	17µm	384x288	384x288	4.0m (13'1")	19.0mm 19.4°/14.6°	2.5m (7.8°)	188.5m (206.1yd)	14.9m (16.3yd)	188.5m (206.1yd)	Good (>50 lux) IR:No Fog:No	ok
5	Q1941-E-7mm	Thermal	APD	7.0mm 55°/43°	17µm	384x288	384x288	3.0m (9'10")	7.0mm 55.0°/43.0°	2.5m (21.9°)	70.0m (76.6yd)	3.2m (3.5yd)	69.4m (75.9yd)	Good (>50 lux) IR:No Fog:No	ok
6	Q1941-E-13mm	Thermal	APD	13.0mm 28°/21°	17µm	384x288	384x288	4.0m (13'1")	13.0mm 28.0°/21.0°	2.5m (11.2°)	129.0m (141.0yd)	10.1m (11.0yd)	129.0m (141.0yd)	Good (>50 lux) IR:No Fog:No	ok
7	Q1941-E-13mm	Thermal	APD	13.0mm 28°/21°	17µm	384x288	384x288	4.0m (13'1")	13.0mm 28.0°/21.0°	2.5m (11.2°)	129.0m (141.1yd)	10.1m (11.0yd)	129.0m (141.0yd)	Good (>50 lux) IR:No Fog:No	ok
8	Q1941-E-19mm	Thermal	APD	19.0mm 19.4°/14.6°	17µm	384x288	384x288	4.0m (13'1")	19.0mm 19.4°/14.6°	2.5m (7.8°)	188.5m (206.1yd)	14.9m (16.3yd)	188.5m (206.1yd)	Good (>50 lux) IR:No Fog:No	ok
9	Q1941-E-13mm	Thermal	APD	13.0mm 28°/21°	17µm	384x288	384x288	4.0m (13'1")	13.0mm 28.0°/21.0°	2.5m (11.2°)	129.0m (141.1yd)	10.1m (11.0yd)	129.0m (141.0yd)	Good (>50 lux) IR:No Fog:No	ok
10	Q1941-E-19mm	Thermal	APD	19.0mm 19.4°/14.6°	17µm	384x288	384x288	4.0m (13'1")	19.0mm 19.4°/14.6°	2.5m (7.8°)	170.0m (185.9yd)	14.8m (16.2yd)	188.5m (206.1yd)	Good (>50 lux) IR:No Fog:No	ok
11	Q1941-E-19mm	Thermal	APD	19.0mm 19.4°/14.6°	17µm	384x288	384x288	4.0m (13'1")	19.0mm 19.4°/14.6°	2.5m (7.8°)	189.0m (206.7yd)	14.9m (16.3yd)	188.5m (206.1yd)	Good (>50 lux) IR:No Fog:No	ok
12	Q1941-E-13mm	Thermal	APD	13.0mm 28°/21°	17µm	384x288	384x288	4.0m (13'1")	13.0mm 28.0°/21.0°	2.5m (11.4°)	97.0m (106.1yd)	10.0m (10.9yd)	129.0m (141.0yd)	Good (>50 lux) IR:No Fog:No	ok
13	Q1941-E-13mm	Thermal	APD	13.0mm 28°/21°	17µm	384x288	384x288	4.0m (13'1")	13.0mm 28.0°/21.0°	2.5m (11.4°)	97.0m (106.1yd)	10.0m (10.9yd)	129.0m (141.0yd)	Good (>50 lux) IR:No Fog:No	ok
14	Q1941-E-13mm	Thermal	APD	13.0mm 28°/21°	17µm	384x288	384x288	4.0m (13'1")	13.0mm 28.0°/21.0°	2.5m (11.4°)	97.0m (106.1yd)	10.0m (10.9yd)	129.0m (141.0yd)	Good (>50 lux) IR:No Fog:No	ok
15	Q1941-E-7mm	Thermal	APD	7.0mm 55°/43°	17µm	384x288	384x288	3.0m (9'10")	7.0mm 55.0°/43.0°	2.5m (22.0°)	60.0m (65.6yd)	3.2m (3.5yd)	69.4m (75.9yd)	Good (>50 lux) IR:No Fog:No	ok

The system shall be primary design based on thermal imaging technology and as such not having a requirement for light. Primary function of the system shall be detection/verification of intrusion. The Contractor may replace some of the thermal cameras (particularly in and around the site entrances) with standard CCTV cameras using IR lighting subject to the Employer's Representative's approval.

In addition to the cameras shown/listed above the Contractor shall add at least 3 cameras to monitor the area in front of the inlet and outlet valve houses and the salt delivery area. These can be standard, high resolution, colour cameras.

Some of the pole shall have a PA system speakers on board to allow a preliminary response to any intrusion by a remote alarm receiving centre (ARC). This response is typically a warning message.

3.6.24 Site Roads and Hardstandings

Site roads shall have an asphalt wearing course on a macadam base course and shall be designed to cater for the expected loading from all traffic expected to use the site.

Site roads shall be a minimum of 6.0m in width. The site roads shall allow for access and turning for a 6 six axle articulated unit with a GVW of 44 Tonnes. Kerb radii at junctions shall be sufficient to comfortably accommodate vehicle-turning movements. The edge of all site roads and hardstandings shall be kerbed.

Plant access gateways and access roads shall be designed to allow access for a minimum of a 6 six axle articulated unit with a GVW of 44 Tonnes. Appropriate turning circles or hammerheads shall be provided within the plant to allow such a HGV to drive in, turn and drive out.

The layout of roads and paved areas shall provide access to all areas sufficient to facilitate access, maintenance and removal/replacement of plant by mobile crane. Sufficient manoeuvring space shall be provided at buildings and structures to facilitate removal pipework, valves, flowmeters, 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.

All site roads, paved areas, concreted areas and hard standings shall be constructed to falls with all appropriate/ necessary gullies and drains. Paved footpaths of 1.5m minimum width shall be provided around and between all buildings, tanks and chambers.

All areas on the site which are neither roadways nor pathways shall be grassed.

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

The area around every chamber shall be paved with concrete 100 mm thick (20 N/mm^2 minimum). Sufficient hardstanding must be provided around any manhole or hatch which could be the subject of a confined spaces entry – to allow for safe setting up of tripods etc. Concrete footpaths shall be provided on all circulation routes between parts of the site requiring routine checks/visits.

3.6.25 **Vegetation, Landscaping Works and Fencing**

3.6.25.1 General

The Contractor shall implement the agreed landscaping plan in accordance with this Section, the Planning Grant (with conditions attached) and the drawings 1810_10 and DG0051 in **Appendix 1** as follows:

The Contractor shall employ a landscape architect to deliver the landscaping works and shall be retained to the Defects Date with periodic site visits to supervise the implementation of the landscaping plan and provide the Planning Authority with a certificate of completion.

The Contractor shall ensure that the landscape Architect is present on site during the setting out of the planting areas and during the planting operations.

The landscaping works shall be implemented within the first planting season (1st November to 31st March).

3.6.25.2 Standards

All pre-planting site preparation, planting and post-planting maintenance works shall be carried out in accordance with the requirements of BS 4428 (1989) Code of Practice for General Landscape Operations.

All trees, shrubs and hedge plants shall comply with the requirements of BS 3936, Specification of Nursery Stock.

All new tree plantings shall be positioned in accordance with the requirements of Table 3 of BS 5837 Trees in relation to Design, Demolition and Construction – Recommendations.

Tree Protection measures shall be in accordance with BS5837.

3.6.25.3 Planting preparation and timing

The Contractor shall:

- Remove any rubbish, concrete, metal, glass, decayed vegetation, contaminated topsoil, and stones with largest dimension exceeding 75mm. Contamination includes subsoil, rubble, fuel, lubricants or other substances injurious to plant growth.

- Grub up and dispose of any dead large roots occurring within planting areas without undue disturbance of soil and adjacent areas.
- Not use materials containing concentrations of toxins, pathogens or other extraneous substances harmful to plant, animal or human life.
- Clearly mark boundaries of planting areas and location of trees and obtain approval of landscape Architect before starting work.
- Carry out the work while soil and weather conditions are suitable for the relevant operations. He shall not plant during periods when the ground is excessively wet or dry, frozen, covered by snow or in excessively windy conditions.
- Cultivate and plant into moist friable soil that is not waterlogged.
- Planting will be carried out during favourable weather and soil conditions during the period from 1st November to 31st March, unless agreed otherwise with the Landscape Architect.
- Not deliver more plants to the site than can normally be planted in one working day.
- Use only machinery and tools suitable for the site conditions and the work to be carried out. He shall use hand tools around trees, plants and in confined spaces where it is impracticable to use machinery.
- Protect existing grass during planting operations by laying boards or tarpaulins. He shall not place excavated material directly on to grass.

3.6.25.4 Existing Trees & Tree Protection

Before starting work the Contractor shall verify with Landscape Architect which trees, shrubs and hedges are to be removed or pruned. The Contractor shall:

Erect a tree/hedgerow protection fence to BS BS5837 along the line as shown in the Landscape Masterplan.

- Avoid damage to neighbouring trees, plants and property.
- Carry out all works affecting trees in accordance with the relevant recommendations of BS 3998, unless otherwise specified or instructed by Landscape Architect.
- Comply with all relevant Safety Guides.
- Tree work must be carried out by a suitably qualified Tree Surgeon.

The Contractor shall implement tree protection measures as set out in the table below before construction commences and in compliance with Planning Condition No.2.

Tree Reference No. (Refer to Appendix 1 for drawings showing tree locations)	Root Protection Radius
2001	6.48
2002	6.84
2003	7.08
2004	6.72
2005	7.32
2006	7.44
2007	7.2
2008	8.64
2009	NA
2010	6.84
2011	NA
2012	6
2013	2.4
2014	8.4
2015	6.24
2016	4.2
2017	3.84
2018	6

3.6.25.5 Handling Topsoil

When moving topsoil within the site, or when stripping topsoil and importing to site the Contractor shall:

- obtain instructions from the Landscape Architect before moving topsoil if aggressive weeds are present.
- Select and use plant to minimise disturbance, trafficking and compaction.
- Avoid contamination by subsoil, stone, hardcore, rubbish or material from demolition work.
- Keep different grades of topsoil separate from each other when handling and stockpiling.
- Inform Landscape Architect where the depth of topsoil is difficult to determine. He shall minimise multiple handling of topsoil. He shall use topsoil immediately after stripping wherever possible.
- Handle topsoil in the driest condition reasonably possible and shall not handle topsoil during or after heavy rainfall or when it is wetter than the plastic limit.

3.6.25.6 Imported Topsoil for Trees and Hedgerows

Topsoil shall comply with the following:

- Texture: Medium.
- Soil Reaction: 6.0 to 7.5Ph.
- Reasonably free of stones.
- Maximum size of stones in any one direction: 50mm.
- Free of weed seeds, roots of perennial weeds, sticks, subsoil and foreign matter.
- From an approved source.
- Obtain a sample load of not less than 5cu.m and approval of sample by Landscape Architect. Retain for comparison with subsequent loads.

3.6.25.7 Subsoil for Grassed Areas

The Contractor shall note that areas planned for wildflower meadow/grassland do not need topsoil and a layer of subsoil will form the best growing medium for these areas.

The Contractor shall not use topsoil contaminated with subsoil, rubbish, oil based products, or other materials toxic to plant life.

Topsoil shall be spread in layers not exceeding 150 mm and gently firm each layer before spreading the next, over prepared subsoil. At the time of spreading both the materials and the weather must be reasonably dry.

Overall minimum depths of topsoil after firming and settlement to be:

- 450mm for shrub and hedgerow planting areas;
- 600mm for tree planting areas;
- only subsoil to be used for grassed/wildflower areas.

The Contractor shall not compact topsoil. The Contractor shall preserve a friable texture of separate visible crumbs wherever possible.

Finished levels of topsoil/subsoil after settlement, unless otherwise stated, to be:

- 30mm below adjoining paving or kerbs;
- not less than 150mm below d.p.c. of adjoining buildings;
- married in with adjoining soil areas.

Final grading in broader grassed/wildflower areas of the top 150mm to be uneven to create micro-habitats.

The Contractor shall carry out any necessary finishing-off by hand in the vicinity of paths, fences, walls, lighting columns and other features. The use of a heavy roller to roll out humps or other surface irregularities will not be permitted.

3.6.25.8 Protection & Care of Topsoil Areas

The passage of heavy machinery over topsoiled areas shall be avoided. Should this occur, all consolidated wheel tracks and compacted areas shall be repaired by appropriate reinstatement by the Contractor under the supervision of the Landscape Architect.

3.6.25.9 Supply of Plants

Trees and plants supplied shall be:

- Materially undamaged, sturdy, healthy, vigorous, of good shape and without elongated shoots.
- Grown in a suitable environment and hardened off.
- Free from pests, diseases, discoloration, weeds and physiological disorders.
- Budded or grafted plants to be bottom worked, unless otherwise specified or approved.
- With balanced root and branch systems, root system and condition in accordance with the relevant part of the National Plant Specification.
- True to name.
- Of Irish provenance.

Plant sizes shall correspond with those given in BS 3936-1 1992 as follows:

(i) **Standard trees:** shall have an overall height of between 2.5 and 3m, a clear stem height of 1.75 to 2m and a girth of 8-10cm. Each tree shall, according to species, have a well-defined, straight, central leader and well-balanced branching crown with branches growing out from the stem in reasonable symmetry.
(ii) **Feathered trees:** shall have an overall height of between 2.0 and 2.5m. Trees shall have a defined, upright central leader and a stem furnished with evenly spread and balanced lateral shoots down to near ground level, according to its species.
(iii) **Transplant**: a transplant shall have been transplanted or undercut at least once and shall be of the size(s) specified in the planting schedule on the Landscape Drawings. Transplants shall be supplied either with a single, straight, well-defined leader or as bushy plants, according to species.
(iv) **Shrubs:** Shall be container-grown. Container- or pot-grown shrubs shall have been established in the container long enough for substantial new root growth to have been produced within the container without the plant becoming pot-bound. The shrubs shall have been cut back or trimmed (according to species) and grown with sufficient space to have encouraged bushiness. The size of the container shall be in reasonable proportion to the size and mass of the plant, and the container volume, in litres, shall be as specified in the planting schedule on the Landscape Drawings. Plants shall be measured in terms of their overall height from root collar level, excluding any root-ball or container. All container and pot-grown plants shall be fully hardened-off.
(v) **Conifers:** Shall be well furnished with growth according to species. The size of conifers shall be as stated in the Landscape Drawings. Upright conifers shall be measured by their overall height from root collar level, excluding any root-ball or container. Conifers grown in open ground shall have been transplanted sufficiently often in relation to their age to ensure an adequately fibrous root system. Container-grown conifers shall comply with the description for container-grown shrubs.
(vi) Trees shall be supplied as specified in the planting schedule on the Landscape Drawings.
(vii) Bare-rooted trees shall have well-developed, extensive fibrous root systems.

Plant material will be inspected either at the Contractor's depot or on its delivery to site. Any plants, which fall short of the Specification or are damaged, poorly packaged, pot-bound, root-dry, or exhibiting signs of die-back, leaf-fall or stress shall be rejected. If plant material is planted on site prior to an inspection being made by the Landscape Architect, then the Contractor shall

be deemed to have done this at his/her own risk. If the plants are subsequently considered to be adequate, they shall be lifted and removed from site at the Contractor's expense.

Plants which are not to be planted on day of delivery to site shall be stored as follows or by other approved methods:

- Root-balled plants: Place close together and cover root balls with sand, or wet straw to prevent drying out.
- Bare-rooted plants: Heel in prepared trenches, cover with soil ensuring that there are no air pockets to prevent the roots from drying out and water thoroughly. All backfill shall be kept permanently damp by watering until the time of planting.
- If at any time before planting plant roots are exposed, then the Contractor shall protect them with planting bags to prevent them from drying out. Any plant which is suffering due to the Contractor's failure to comply with this Clause will be rejected and replaced by the Contractor at his/her own expense.
- Container grown plants:
- Supplied in a growing medium with adequate nutrients for the plant to thrive until permanently planted.
- Centred in the container, firmed and well-watered.
- With root growth substantially filling the container, but not root bound, and in a condition conducive to successful transplanting.
- Grown in the open for at least two months before being supplied.
- Grown in containers with holes adequate for drainage when placed on any substrate commonly used under irrigation systems.

All plants shall be clearly labelled, indicating the supplier, the plant species, size and quantity and in accordance with relevant part of BS 3936. Labels shall be attached to individual trees in the case of larger nursery stock or to bundles or individual lots of one species in the case of bare-rooted shrubs, whips, forestry transplants, feathered whips and trees of less than 100mm girth.

3.6.25.10 Tree and Hedge Panting

All planting shall be carried out in accordance with BS 4428.

Cultivation shall comply with the following:

- Break up any compacted topsoil to full depth.
- Within a few days before planting, but in suitably dry weather and ground conditions, cultivate top 300 mm of all planting beds, using suitable plant to loosen, aerate and break up the soil into particles of 2-8 mm.
- Leave surface regular and even.
- Remove weeds, perennial weed roots and undesirable material brought to the surface including stones and clods larger than 50 mm in any dimension, roots, tufts of grass and foreign matter.
- Do not dig or cultivate within the root spread of trees and shrubs to be retained.

Spread non-peat-based compost, over all shrub planting beds at 50mm depth and rotovate into soil to a depth of 200mm.

All planting pits shall be excavated carefully by hand or machine to allow adequate clearance between the root ends (when fully spread) or the perimeter of the ball and the side of the pit. The depth of pits shall be greater than the depth of the root system, and the base and sides shall be forked over to break up the subsoil. When excavating planting pits, all good topsoil shall be placed to one side for re-use and all other material removed from site to tip. Care shall be taken when excavating pits in existing seeded or paved areas to minimise damage, and any damage caused to such areas shall be fully reinstated by the Contractor at his/her own expense.

Tree wounds shall be kept as small as possible and cut cleanly back to sound wood using sharp, clean tools. Cuts shall be set so that water will not collect on cut area.

Surplus material, including subsoil, stones, debris, wrapping material, canes, ties, temporary labelling and prunings shall be removed from site.

The Contractor shall water plants as necessary to ensure the establishment and continued thriving of all planting.

Planting Feathered Tree:

- Ultimate tree root growth should not be closer than 5m to reservoir embankment.
- Planting pits shall be 600 x 600 x 600mm or sufficiently wide and deep enough to accommodate the fully spread roots or root ball, whichever is the greater.
- The tree shall be placed centrally and upright in the pit with the roots fully teased out and the stakes positioned so that it passes through the root system at a point where it causes minimal damage.
- The stakes shall be pressure-treated chestnut, larch or oak, round, smooth and peeled, and of 100 to 125mm diameter at the pointed end and not less than 75mm diameter at the butt end. Drive stake to leave 400mm above ground. Trees shall be secured to the stakes firmly but not rigidly to cross bar using tree ties and spacers, so that the tree and stake are completely vertical. The tree stem shall not touch the stake at any point and there should be no excessive movement. Galvanised round-headed nails of a minimum length of 25mm with 10mm head diameter shall be used to secure the tie to the stake. The tree ties shall be special reinforced rubber belts.
- Backfill: The pit shall then be backfilled in consolidated layers and the plant rocked to remove air pockets. All pits shall be backfilled with a base of subsoil and an upper layer of 3 to 1 mixture (by volume) of topsoil and non-peat based compost. The finished level shall allow for settlement, so that the pit and adjacent levels are the same, and the plant is at its original nursery depth.
- Watering: after backfilling, the Contractor shall apply a minimum of 54 litres (12 gallons) of water to the base of each tree so that it is thoroughly watered-in.
- Fertiliser Application: On completion of the planting operations, the Contractor shall apply a top-dressing of a suitable organic fertiliser to all planted areas. The fertiliser to be applied at the rate and by the method as specified by the manufacturer.

Planting Transplants:

- Prior to and during planting, the Contractor shall take all the necessary precautions to protect the plants, particularly from the drying out of the root systems. Any plants, which are in a root dry condition prior to planting, shall be rejected.
- Each plant shall then have its roots gently teased out and shall be placed in the centre of a pit 300 x 300 x 300mm or sufficiently large enough to accommodate the root system without restriction, whichever is the greater.
- Bare-rooted plants shall have their roots fully extended, but not damaged, so as to allow for optimum root growth.
- The pit shall then be backfilled in layers with the excavated material and gently firmed as filling proceeds, rocking the plant to avoid air pockets. All pits shall be backfilled with a base layer of subsoil and a 3 to 1 mixture (by volume) of topsoil and non-peat based compost. After settlement, each plant shall be at the original soil mark on the stem of the plant.
- After backfilling, the Contractor shall apply a minimum of 4.5 litres (1 gallon) of water to the base of each plant so that it is thoroughly watered-in.
- Fertiliser Application: On completion of the planting operations, the Contractor shall apply a top-dressing of a suitable organic fertiliser to all planted areas. The fertiliser to be applied at the rate and by the method as specified by the manufacturer.

Shrub Planting:

- Planting: Prior to and during planting, the Contractor shall take all the necessary precautions to protect the plants, particularly from the drying out of the root systems. Any plants which are in a root dry condition prior to planting shall be rejected.

- Each plant shall then have its roots gently teased out and shall be placed in the centre of a pit. Planting pits shall be 300 x 300 x 300mm or sufficiently wide and deep enough to accommodate the fully spread roots or root ball, whichever is the greater.
- The pit shall then be backfilled in layers with the excavated material mixed with compost and fertiliser and gently firmed as filling proceeds, rocking the plant to avoid air pockets. Lightly firm soil around plants and fork and/or rake soil, without damaging roots, to a fine tilth with approved gentle cambers and no hollows. After settlement, each plant shall be at the original soil mark on the stem of the shrub.
- Watering: After backfilling, the Contractor shall apply a minimum of 4.5 litres (1 gallon) of water to the base of each shrub so that it is thoroughly watered-in.
- Fertiliser Application: On completion of the planting operations, the Contractor shall apply a top-dressing of a suitable organic fertiliser to all shrub areas. The fertiliser to be applied at the rate and by the method as specified by the manufacturer.

Hedge Planting:

Plant transplants in trenches large enough to take full spread of roots. Set out plants evenly as scheduled. Water plants thoroughly immediately after planting, using a fine rose or sprinkler where necessary to avoid damaging plants. Apply a minimum of 4.5 litres (1 gallon) of water to base of each plant so thoroughly watered in. Lightly firm soil around plants and fork and/or rake soil, without damaging roots, to a fine tilth with approved gentle cambers and no hollows.

Grassed Areas:

Where existing grassed areas have been disturbed by construction activities, any compacted ruts are to be broken up if necessary, to ensure adequate drainage. An adequate layer of poor quality soil/subsoil is to be spread and grass/wildflower mix reinstated to marry in with existing levels. Grass seeding to be appropriate wildflower mix and seed mix/sowing conditions to be checked on site by Landscape Architect before spreading. Gaps in seed establishment shall be filled in with new seed as necessary for continuous sward.

3.6.25.11 Maintenance and Making Good Defects

Maintenance shall be carried out as follows:

- Carry out the following operations from completion of planting for 24 months maintenance or as instructed by the Landscape Architect.
- Make visits at approximately monthly intervals during the growing season in order to determine any preventative or remedial action required and as necessary to fulfil the requirements of this specification. It shall be the Contractor's sole responsibility to ensure that the inspections and programme of maintenance works are adhered to.
- During the Maintenance Period, the Contractor shall be responsible for undertaking with due care all operations required to ensure the establishment and maintenance of healthy, vigorous plants. The Contractor shall be responsible for planning and executing a programme of maintenance works to both improve the condition of the plants or to prevent defects from arising.

Plant replacements:

- All losses, other than those due to theft and vandalism, will be made good at the Contractor's expense. There will be a final joint inspection towards the end of the first and second growing seasons and a jointly agreed schedule of replacement planting will be prepared. Replacement planting shall be carried out at end of first and second growing seasons.
- Newly-planted stock will only be accepted at the end of the first and second growing seasons if it is healthy, in full leaf and has put on reasonable growth. Acceptance of plants will be at the entire discretion of the Landscape Architect.
- All plant losses resulting from vandalism or theft shall be replaced by the Contractor at the Employer's expense. The losses shall be jointly assessed by the Contractor and Landscape Architect at an agreed time during the course of the Maintenance Period and a schedule of replacement planting will be prepared. Replacement planting will normally be carried out at the end of the first and second growing seasons.

- Replacement plants shall conform to the original specification and replacement planting shall be carried out in accordance with the original planting details.

Planting maintenance:

- A weed free area 600mm diameter must be maintained around individual transplants and one metre diameter around tall feathered trees.
- Herbicides which have adverse ecological effects on soils and wildlife will not be permitted.
- Fork over beds as necessary to keep soil loose, with gentle cambers and no hollows, taking care not to reduce depth or effect of mulch.
- Ensure that trees and shrubs are not damaged by the use of any machinery.

Throughout the Maintenance Period the Contractor shall inspect the plants at monthly intervals and after strong winds or frosty weather and re-firm as necessary.

The Contractor shall be responsible for keeping all shrub and grass areas free from litter and debris during the Defects Period. Litter collections shall be carried out at monthly intervals, and all material shall be collected in bags and removed from site to tip. The Contractor shall pay particular attention to the removal of litter from the base of fence lines and other obstacles

The Contractor shall:

- Remove soil and arisings from hard surfaces and leave the works in a clean, tidy condition after maintenance operations.
- Water as necessary to ensure the continued thriving of all planting.
- Obtain Landscape Architect's approval before using a supply other than potable mains water.
- Ensure the full depth of topsoil is thoroughly wetted.
- Use a fine rose or low pressure hose where appropriate to avoid damaging or loosening plants.
- Where necessary, loosen soil or form depressions around the stem base of plants to ensure that water reaches the root zone instead of dispersing on the surface.

Tree stakes and ties - inspect and carry out the following:

- Check stakes for looseness, breaks and decay and replace as necessary to original specification. If a tree with a defective stake has grown sufficiently to become self-supporting, inform Landscape Architect and, if instructed, remove stake(s) and fill the hole(s) with lightly compacted soil.
- Adjust, refix or replace loose or defective ties as necessary, allowing for growth since planting and to prevent chafing. Where chafing has occurred, reposition or replace ties to prevent further chafing.
- Where stakes are longer than half the height of the clear stem of the tree, cut the stake to this height in spring and retie to tree firmly but not tightly with a single tie.
- Remove redundant tapes, tags, ties, labels and other encumbrances.

Pruning:

- Prune in accordance with good horticultural practice. Prune larger branches and woody stems in accordance with good arboricultural practice.
- Thin, trim and shape appropriately to each species, location, season, and stage of growth, leaving a well-balanced natural appearance.
- Use clean sharp secateurs, hand saws or other tools approved by the Landscape Architect. Trim off ragged edges of bark or wood with a sharp knife.
- Remove branches without damaging or tearing the stem.
- Keep wounds as small as possible and cut cleanly back to sound wood. Make cuts above and sloping away from an outward facing healthy bud, angled so that water will not collect on cut area.
- Prune larger branches neither flush nor leaving a stub, but using the branch bark ridge or branch collar as a pruning guide.

- Notify the Landscape Architect of any disease or fungus.

Pruning of excessive overhang: Remove regularly any growth encroaching onto paths, roads, signs, sightlines and light fittings.

Prevention of wound bleeding: Comply with the recommendations of BS 3998, clause 8.

Prevention of disease transmission: Comply with the recommendations of BS 3998, clause 9 and Appendix B.

Cleaning out and deadwooding by removing:

- Dead, dying, or diseased wood, broken branches and stubs.
- Fungal growths and fruiting bodies.
- Rubbish, windblown or accumulated in branch forks.

Trimming establishing hedges:

- Cut back in June and September to encourage bushy growth down to ground level.
- Allow to reach planned dimensions by gradual degrees, depending on growth rate and habit.

Removal of dead plant material: At the end of the growing season, check all shrubs and remove all dead foliage, dead wood, and broken or damaged branches and stems.

Remove dead plants as soon as possible, and replace in the next scheduled round of replacement planting.

Weed control:

- Remove and/or prevent plant growth that is not required in the landscape.
- Ensure that the methods used cause the minimum of damage to adjacent plants, trees or grass.

Hand weeding: Remove all weeds, including roots, by hand using hoes, trowels or forks, taking care to remove not more than a minimum quantity of soil, causing minimum disturbance to trees, plants, mulched surfaces and leaving the area in a neat, raked, clean condition.

Tree and plant stems: Do not allow nylon filament rotary cutters or other mechanical tools closer than 100 mm to the stem of any tree or plant. Complete operations close to stems using hand tools.

Soil level adjustment: Reduce the level of the soil/mulch at the edges of beds to 50 mm below the adjacent grass or hard surface. Spread arisings evenly over the bed.

Winter leaf removal: Collect and remove from site accumulations of drifted leaves and from planting beds.

Maintenance of meadow grassland area:

- Two manual cuts per year – July and September/October and adapted as necessary to follow best practice management of emerging species.
- Clippings removed after cutting.
- Leave an area of grass uncut over winter, cut sections of grassland at different times of year to encourage a mosaic of grassland heights.
- Manage and remove thistles, nettles and docks as necessary.
- Do not use fertiliser or herbicide.

Landscape maintenance record sheets: The Contractor shall be maintain record sheets for each maintenance carried out (as template below). The contractor shall submit completed record sheets for tree/shrub maintenance as verification that maintenance operations have been carried out.

Sample maintenance record sheet:

Contractor: _____ _____ _____ _____ your Ref.: _____	Site: _____ _____ Date(s): _____ Weather: _____ Visit No.: _____

PERSONNEL	EQUIPMENT			
_____		☐	Strimmers	☐
_____	Pruners	☐	Tractors	☐
_____	Irrigation	☐	Hand Tools	☐

OPERATIONS (Please underline those carried out)

Litter Clearance	Watering (in dry conditions – state conditions)
Weeding	
Fertiliser	
Tie adjustment	Pruning/removal of dead wood/plants
Replacement of stakes and ties broken or loosened by wind	Other _____

OBSERVATIONS

OK	ACTION		OK	ACTION	
Trees	☐	☐	Moisture	☐	☐
Grass/wildflower	☐	☐	Deaths	☐	☐
Other (state)	☐	☐	Vandalism	☐	☐

For Office Use only:

Our Ref.: _____

Signed: _____

Filed: _____

Forward sheet to:

3.6.26 **Heritage Trail**

The Contractor shall construct the Slade Valley Heritage Trail in accordance with the agreed Landscaping Masterplan.

The Contractor shall provide rolled in quarry dust on gravel surface over a 3m width constructed on existing ground levels with no excavation for the surfacing.

The Heritage Trail shall have a paladin fence erected along the boundary as shown on the Landscape Masterplan. The fence shall be constructed with a concrete plinth along its entire base to prevent growth of vegetation along the fence line. The area assigned for the trail shall not be accessible for the public (fenced off) until all Works are complete.

The Contractor shall note requirements stated in **Section 3.6.25** of this document.

3.6.27 Spare Parts

The following list of Spare Parts shall be provided by the Contractor. delivered to site and stored in the OSEC building.

Saggart Reservoir - Spares Required for Sodium Hypochlorite Generation System and Chemical Dosing and Monitoring System	
Item	Description
Spare dosing pumps and motors for sodium hypochlorite system	
1	1No. Dosing pump for each model installed. This to be a complete unit including pump, motor, display/control unit, control cable, etc.
2	1No. Drive motor for each pump model installed. If two different models have the same motor, then a single unit will be adequate for all.
3	1No. Electrical plug and connecting cable for each spare motor provided
Spare parts for sodium hypochlorite dosing pumps	
4	Pump body kit including mounting kit for each pump model provided
5	Cover kit for each pump model provided
6	Setting kit for each pump model provided
7	Two sets of suction/pressure valves for each pump model provided
8	One spare check valve for each size of check valve installed
Wearing parts for sodium hypochlorite dosing pumps	
9	A set of wearing parts for each diaphragm pump installed including:
	Drive diaphragm kit
	Diaphragm leak detector
	Intermediate diagram
	Valve kit including O-ring kit and seals
Spares for brine metering pumps	
10	1No. Brine metering pump. This to be a complete unit including pump, motor, display/control unit, control cable, etc.
11	1No. spare drive motor
12	1No. electrical plug and connecting cable for the spare motor
Wearing parts for brine metering pumps	
13	A set of wearing parts for each metering pump installed including:
	Drive diaphragm kit
	Diaphragm leak detector
	Intermediate diagram
	Valve kit including O-ring kit and seals
Wearing parts for sodium thiosulphate dosing pumps	
14	A set of wearing parts for each diaphragm pump installed including:
	Drive diaphragm kit
	Diaphragm leak detector
	Intermediate diagram
	Valve kit including O-ring kit and seals
Spare parts for sodium hypochlorite and brine transfer systems	
15	1No. pressure relief valve for each size installed
16	1No. pulsation dampener for each size installed
17	1No. pressure loading valve for each size installed
18	1No. line strainer for each size installed
19	1No. pressure switch for each model installed
20	1No. pressure transmitter for each model installed
Spares for product storage tanks and salt saturators	
21	1No. spare drive motor for the blowers/fans on the product storage tanks

22	1No. Hydrogen leak detector
Spares for sodium hypochlorite generation system	
23	1No. Set of spares for 5-year operation of the electrolysers
24	1No. Set of spares for 5-year operation of the control panels of the electrolysers (only parts that are not readily available in the market)
25	1No. Set of spares for 5-year operation of the transformers/rectifiers of the electrolysers
26	1No. flowmeter for each size installed on the hypochlorite generation system (brine, hypochlorite, dilution water, etc)
27	1No. extract fan and airflow sensor for the electrolyser enclosure/cabinet if the system is not subject to the ATEX directive.
Spares for chlorine analysers	
28	1No. Chlorine anaylser for total chlorine
29	1No. Chlorine anaylser for free chlorine
30	1No. Maintenance kit for each analyser provided
31	1No. Colorimeter assembly
32	1No. Non-relieving regulator
33	1No. Compact analyser reagent block
34	1No. Compact analyser sample block

3.7 QUALITY ASSURANCE AND INSPECTION REQUIREMENTS

3.7.1 General

The Contractor shall implement a Quality Assurance System, accredited to IS EN ISO 9000 or equivalent, and ensure that the works are carried out in accordance with the Employer's Scope, whether on site or by off-site manufacturers, suppliers, fabricators and others. Details shall be provided of the personnel involved, both on and off-site, and the name of any third party and/or testing agency, which the Contractor proposes to employ.

3.7.2 Auditing and Quality Assurance System

The Contractor shall, during the contract, audit the Quality Assurance System on a regular basis, as stipulated by the system.

After each audit, the Employer's Representative shall be provided with an Audit Report, which details the Audit findings along with recommendations and time frames for implementation of any changes.

The Employer's Representative reserves the right to audit the Contractor's Quality Assurance Systems to verify compliance with the specified quality requirements. The Contractor shall provide full assistance to the Employer's Representative in carrying out such an audit at no extra cost.

3.7.3 Testing

The Contractor will be required to demonstrate compliance of the works through a systematic testing regime covering tanks (separate cells), pressure testing of pipelines, demonstration of disinfection systems, valves and flow control devices, performance and efficiency, telemetry monitoring and control systems, failure notification and failsafe operation.

There will be a large quantity of potable water required for carrying out tests on the works and the Contractor shall ensure that his testing arrangements uses water efficiently. The Contractor shall make his own arrangements with IW to procure water for cleaning, swabbing, flushing, testing, disinfection or for any other purpose during the construction and commissioning of the Works.

The Contractor must satisfy himself regarding the adequacy of streams or other outlets to accommodate the quantity of water to be discharged from a test section after testing and when cleaning having regard to the pollution of watercourses and without giving rise to complaints by Inland Fisheries, Local Authority, landowners or other stakeholders. The Contractor shall be responsible for carrying out, or arranging to be carried out, all tests required and shall arrange for copies of the test results to be supplied direct to the Employer's Representative immediately when available. The Contractor shall nominate a member of his/her staff with the necessary authority to be responsible for all inspection matters to the satisfaction of the Employer's Representative.

The Contractor shall establish and maintain clear and current inspection and test procedures, agreed with the Employer's Representative prior to commencement of the works, for each inspection and test operation. If the Employer's Representative requests notice of any work being done under the Contract, the Contractor shall provide agreed notice to enable the Employer's Representative to witness whatever inspections or tests are performed by the Contractor. The Contractor shall maintain records of all inspections and tests performed to substantiate conformity with the Scope including those carried out by sub-contractors and/or third party testing agencies and manufacturer's or supplier's certificates of tests.

All records shall be retained on site and made available to the Employer's Representative on request. These records shall include, inter alia, identification of the element, item, batch or lot, the nature and number of the observations and tests, the number and type of deficiencies found and details of any corrective action taken. Any records, which indicate that the work or materials

inspected or tested does not comply with the Specification, shall be submitted to the Employer's Representative without delay in order that the Contractor's proposals for rectification may be assessed.

Where possible, materials shall be certified as complying with the relevant Irish Standard Specification and shall bear the Irish Standard Mark or shall be certified to a national standard of another Member State of the European Community which provides an equivalent guarantee of safety and suitability - certification to be by the National Standards Authority of Ireland. Manufacturers' or suppliers' certificates of compliance with the Standard shall be provided when requested by the Employer's Representative.

Where appropriate, all materials delivered to the site should bear the manufacturers name, brand name, standard mark or any other data that may be required to verify the exact nature of the material and relate it to the requirements of the Scope.

Water retaining structures shall be water tested in accordance with **Appendix 2** to the Scope prior to backfilling.

3.7.4 Materials Testing

Testing shall be carried out by the Contractor to demonstrate compliance of materials incorporated into the Works.

Testing to be carried out by the Contractor is outlined in **Appendix 6** to the Scope. The schedule states the minimum frequency of testing to be carried out by the Contractor to demonstrate compliance with the Scope. Testing shall be carried out immediately after sampling and results shall be passed to the Employer's Representative on completion of testing.

3.8 TESTING AND COMMISSIONING REQUIREMENTS

3.8.1 General

The Contractor shall comply with the requirements of IW-TEC-600-05 – Design Specification: Commissioning, Testing and Handover General Specification and the following requirements in this Scope in completing his tests under Clause 2.7 of the Conditions of Contract.

A Commissioning Certificate will be issued under Clause 5.1 of the Conditions of Contract for Section 1 Works when the Contractor has complied with all the requirements set out to achieve all the elements of Step 3 in IW-TEC-600-05 including all the documentation specified in Section 7.11 of IW-TEC-600-05.

3.8.2 Commissioning Plan

The Commissioning Plan shall be submitted not less than 60 days prior to the commencement of the tests to allow for a review by the Employer's Representative.

The finalised Commissioning Plan shall be submitted not less than 21 days prior to the commencement of the tests.

The Commissioning Plan shall be submitted as a single standalone document for the entire project.

3.8.3 Tests

The Contractor shall give notice to the Employer's Representative no less than 21 days prior to the date after which the Contractor will be ready to commence the tests.

The tests shall consist of the following stages:

i) Pre-Commissioning Tests;
ii) Commissioning Tests;
iii) Trial Operation Period;
iv) Performance Tests.

The Contractor shall provide under Clause 2.7.2 of the Conditions of Contract all equipment, Data, suitably qualified and experienced people to carry out the tests. All calibration certificates for instruments used for the tests shall be supplied 7 days in advance of the test.

3.8.4 Pre-Commissioning Tests

Pre-Commissioning Tests shall be carried out in accordance with Section 7.5.2, 7.5.3 and 7.5.4 of IW-TWC-600-05 and the following additional requirements:

Testing of pipelines shall be in accordance with IW-TEC-300-01.

The inspection shall consider the following elements of the Works as appropriate to the Contractor's particular design:

- Pipelines:
  All watermains shall be cleaned and swabbed in accordance with IW-TEC-300-01;
  All valves are operating and in the correct position;
  All chambers are completed with marker posts and labelling, covers fitted correctly;
  All pipelines other than watermains shall have a CCTV survey completed;
  Ducting to chambers on pipelines are sealed.

- Structures and underground tanks:
  All structures are finished and cleaned out;
  All finishes to floors, walls, roofs are completed;
  Ensure all ducts and openings are sealed and/or fitted with covers;
  All fixtures are in place and bolts/fixing are completed and secured;
  All walkways, ladders, platforms, safety railing, safety chains are securely installed and no sharp edges, no trip hazards.

- Buildings and kiosks:
  External and internal doors open, stay open, close and lock;
  Lighting and heating works manually and automatically as required;
  Fire and intruder alarms function correctly;
  All floor, wall and ceiling finishes are completed;
  Drainage internal and external is connected;
  Ducts are all sealed.

3.8.5 Commissioning Tests

Commissioning Tests shall be carried out in accordance with Section 7.6 of IW-TEC-600-05.

3.8.6 Trial Operation Tests

Trial Operation Tests shall be carried out in accordance with Section 7.7 of IW-TEC-600-05 and the following additional requirements:

The trial operation period shall be 14 consecutive days. If any functionality failures occur during the trial operation test period the Contractor shall recommence the trial operation period.

The Contractor shall ensure that nuisances are not caused by the following during the trial operation period:

- Noise
- Vibration
- Settlement
- Dust
- Light
- Surface Water
- Spillages
- Solid Waste
- Animal Nuisance

A Commissioning Report in accordance with Section 7.8 of IW-TEC-600-05 shall be submitted to the Employer's Representative for review.

The Contractor shall not proceed to the next stage until the Commissioning Report has been deemed completed by the Employer's Representative.

3.8.7 Performance Tests

The Performance Tests shall be carried out in accordance with Section 7.9.1 of IW-TEC-600-05. The duration of the Performance Test shall be 28 consecutive days.

3.8.8 Training before Completion of Section 1 Works

The Contractor is required to provide training for the staff nominated by the Employer for the operation and maintenance of the Works prior to the Completion of Section 1 Works.

Training prior to the Completion of Section 1 Works shall take place during the Performance Test period. The training shall comprise an initial full active training day, followed by ongoing passive training, with daily interactive training sessions as required.

The Employer's Representative will convene a meeting with the Employer and the Contractor to discuss the specific training requirements not later than 4 weeks prior to the commencement of training. The Contractor will nominate a representative, at this meeting, who will be responsible for organising the training on behalf of the Contractor and who will be the contact for the Employer to notify the specific training requirements. Subsequent to this meeting the Employer will confirm to the Contractor, not less than 2 weeks prior to the commencement of training, the staff that will be available for training and the date of the first training day. The Contractor shall allow for training of up to 15 staff.

The first training day shall be a full active training session and will be primarily concerned with the operation and control of the Works. The following topics, at a minimum, shall be covered during the training session:

- Health and safety aspects of the operation and maintenance of the Works;
- Description of the function of each of the individual works operations;
- Tour of the individual structures and equipment, describing the function of each element in the context of the overall system and noting any particular features of the different elements;
- Description of the operation of the sites and the parameters available to control and monitor the works operations;
- Operation of the site using the computerised monitoring system, including production of reports;
- Demonstration and practice of particular elements of the Works operation;
- Basic troubleshooting and remedies;.
- Safe work practices.

3.8.9 Training after Completion

The Contractor is required to provide training for the staff nominated by the Employer for the operation and maintenance of the Works after the Completion of Section 1 Works.

Training after the Completion of Section 1 Works will commence during the Section 3 (operation and maintenance) Works. The training will comprise the mentoring of the facilities operating staff (minimum of 15 number) with 3 training sessions, i.e. one day per month.

Additionally, a 4 day period of training shall be provided at the end of Section 3 Works for the 15 operating staff.

3.9 DOCUMENT REQUIREMENTS

3.9.1 Submittal Procedures

Submissions shall be made in accordance with Clause 4.4 of the Conditions of Contract and the additional requirements as detailed in this Scope.

Unless stated otherwise, the Contractor shall submit these in electronic copy containing all data requested in **Section 3.9** of this Scope and of any other Contractor's Data required under the Contract. The Contractor shall prepare and maintain a register of all submissions Submitted to the Employer, which shall be titled the Register of Submissions. Each submission shall be recorded as a unique entry on the Register of Submissions which shall include a unique reference ID, description of the submission, date of the submission, details of all Data included with the submission, originator of the submission and the addressee. An up-to-date copy of the Register of Submissions shall be included with each submission to the Employer and shall highlight the data currently being submitted.

All Data detailed in **Section 3.9** shall be submitted a minimum of 30 days prior to the commencement of the relevant section of the Works. Any works carried out prior to submitting the complete design submission shall not be certified for payment by the Employer.

3.9.2 Design Certification and Checking

The Contractor shall be required to submit Temporary and Permanent Works Design Certificates for the following elements of the works as a minimum to cover the design or design element, execution and completion of the Works:

- Reservoir structure;
- Inlet and outlet valve houses;
- Chambers;
- OSEC building;
- Pipeline works including connections to existing watermains/pipelines;
- Traffic management works;
- Utility and services diversions;
- Control Philosophy;
- Functional Design Specification;
- Chlorination plant and associated MEICA works;
- De-chlorination plant system;
- Telemetry/SCADA works;
- Drainage and SuDS.

Templates of design certificates are given in **Appendix 8** to the Scope. The Employer shall not accept modifications or qualifications to any of these Certificates, other than those that have the prior written agreement of the Employer.

The certification procedure associated with a part of the Design or Design Element shall be deemed to cover all aspects of the part of the Design or Design Element as set out in Scope.

The Contractor shall ensure that all individuals referred to in the Certification Procedure shall comply with all of the following:

- be suitably qualified to undertake the procedures referred to therein;
- be at all relevant times appointed and properly authorised to carry out the procedures referred to therein; and
- at all times comply with the Certification Procedure.

3.9.3 Contractor's Data

All Contractor's Documents shall be in English. The following sections detail the requirements for the major Contractor Submissions, this does not limit the Submissions required by the Contractor to achieve the permissions required for the undertaking of the Works.

All design and as built data shall be developed and prepared in accordance with BIM to PAS 1192-2 and shall comply with the Irish Water Employer Information Requirements (EIR) detailed in Appendix 9 to this document.

3.9.4 Design Statement

Prior to the commencement of the design of each section of the works and each individual works element the Contractor shall submit a completed Design Statement for the relevant section of the works fully defining the design assumptions and the parameters to be used in the design of that section of the works. As a minimum the Design Statement will be required to include the following:

- Reservoir structure;
- Inlet and outlet valve houses;
- OSEC building;
- Chambers;
- Pipeline works including connections to existing watermains/pipelines;
- Traffic management works;
- Utility and services diversions;
- Chlorination plant and associated MEICA works;
- Telemetry/SCADA works;
- Overflow works;
- Drainage and SuDS;
- CHAZOP/HAZOP Report.

3.9.5 Final Design Statement

Following completion of the design a final version of the Design Statement (for Construction) shall be submitted to the Employer, including a record of all decisions made by the Contractor or his Designer that affect the standard of the design of the Works.

3.9.6 Detailed Design Calculations and Documentation

The Contractor is required to submit a detailed design calculation package for each section of the works, in accordance with the relevant Final Design Statement, a minimum of 30 days prior to commencing construction of any section of the works. The detailed design calculation package shall include:

- Hydraulic design calculations;
- Structural design calculations - reinforced concrete and steel detailed calculations, schedules and structural details for all temporary and permanent civil works and mechanical works, including all precast and cast in-situ elements, chambers and shafts, platforms, access stairs, handrails, pipe supports, lifting devices, access covers, and all finishes on steel and concrete components;
- Pipeline design;
- Overflow design;
- Access roads design;
- Geotechnical design;
- Drainage design including SuDS;
- Reservoir ventilation design;
- Building services design;
- Chlorination system design calculations;
- De-chlorination system design;
- Mechanical & Electrical design including technical data sheets;

- Telemetry/SCADA design;
- Control philosophy including schedule all input and output signals;
- CHAZOP/HAZOP Report
- Commissioning Strategy and phasing of works;
- Landscaping proposals;
- Traffic Management Plan.

3.9.7 **Drawings**

The Contractor is required to submit detailed design drawings to accompany the detailed design calculation package. As a minimum the following drawings will be required at each work location:

- Layout overview drawings showing the proposed location and size of the permanent works and relevant temporary works;
- Overall scheme layout plan drawings showing proposed phasing of the works;
- Detailed plans of proposed reservoir, inlet outlet valve houses, OSEC building, to include plans, sections and elevations;
- Details of access arrangements to the reservoir (stairs/walkways/platforms);
- Combined layout plan and cross section drawings of the horizontal and vertical alignment of the proposed pipelines. The longitudinal section shall show the vertical alignment of the proposed pipelines and shall detail the pipe diameter, material, pipe gradient, bedding, ground level and pipe invert levels, location of manholes and chambers for valves, hydrants, air valves, flowmeters, flow control valves, sampling and dosing lines;
- Drawings showing overflow details from reservoirs;
- Drawings of the de-chlorination system;
- Drawings showing details of pipeline connections with pipework schedule;
- Drawings showing details of thrust blocks;
- Drawings of all chambers;
- Drawings showing details of drainage/SuDS proposals;
- Drawings showing details of the working areas, access points and temporary access routes;
- Drawings showing the traffic management plans for immediate and surrounding areas, including measures for pedestrian and cyclist protection;
- Drawings of landscaping works including reinstatement works.

The Employer may request additional drawings if deemed necessary to make a purposeful review of Data submitted.

3.9.8 **Method Statements**

The Contractor is required to prepare and submit method statements detailing his proposed methods, temporary works designs and design criteria, timing and sequence of construction, including the use and design of temporary works and equipment. The method statements and risk assessments shall contain sufficient information to enable the Employer to assess any likely detriment to either the existing works or the Works. The Contractor shall programme the timely issue of method statements in advance of the relevant section of work and method statements shall be provided for review not less than 21 days before the work is to be undertaken.

The method statements must clearly identify how the Contractor proposes to carry out the works and identify, mitigate and deal with any scheduled and non-scheduled particular risks including those identified within the Preliminary Safety and Health Plan.

Method statements and risk assessment shall be submitted by the Contractor for the following activities as a minimum (non-exhaustive list):

- Supplementary site investigations;
- Demolition works;
- Excavation works for the proposed reservoir, inlet and outlet valve houses;
- Excavation works for the proposed OSEC building;
- Construction of the proposed reservoir, to show sequence of floor and wall and roof elements, including all temporary works;

- Construction of pipelines;
- Connections to existing watermains/sewers/drains/tanks;
- Works near or adjacent to existing trunk watermains;
- Works near or adjacent to existing high pressure gas mains;
- Excavation and spoil disposal arrangements;
- Temporary works and ground supports;
- Groundwater monitoring and control;
- Works near ESB lines;
- Dewatering;
- Diversion of existing Utility services;
- Discharges to watercourses due to dewatering activities;
- Reinstatement of the site compound;
- Testing of new pipes and chambers;
- Testing of structures;
- Commissioning of each element of Works.

Each method statement shall include but not be limited to the following aspects of the relevant site operation:

- Health and safety measures including site specific risk assessment;
- Construction risks and mitigation measures;
- Extent of working areas and protective barriers;
- Temporary working area layout, traffic management details;
- Access to working areas, including confined spaces;
- The implementation of relevant statutory regulations;
- The design and construction of temporary works;
- Plant requirements, siting and mode of operation;
- Manpower requirements and supervision;
- Delivery and storage of materials;
- Provision of access by third parties;
- Details of the construction sequence;
- Details of working methods;
- Requirements for shutting down or limiting any power supply, water supply, signalling or other live services;
- Result of any consultation with relevant authorities;
- Coordination of works with existing site operations;
- Liaison and Coordination requirement with Operators;
- Contingency plans in the event of unforeseen difficulties. Contingency plans shall address the possibility of delayed completion of critical sections of the Works by the Contractor.
- Details of emergency plans for implementation in the event of an incident or accident on Site.

The Contractor shall include Temporary Works Certificates in accordance with each method statement covering the main works elements or which required temporary works design.

3.9.9 Project Programme

Upon execution of the Deed of Agreement the Contractor shall expand and detail his tender stage programme in accordance with the requirements of this Section.

The Contractor is required develop and submit a project programme to the Employer in accordance with Clause 4.3 of the Conditions of Contract. The Contractor shall submit the programme prior to the Starting Date. Submission of separate programmes from the Contractor and the Supply Chain shall not be accepted.

The Contractor's programme must take account of all information provided in the Contract including the programme constraints included in this Scope.

The Contractor's programme shall be submitted in the form of a GANTT and PERT chart; the computer software shall be compatible with 'Microsoft Project' software or an approved other. Hard copies of the Contractor's programme shall be submitted on A1 size paper. Electronic copies of the Contractor's programme shall be submitted in both (*.pdf) format and in (*.mpp) format.

The project programme shall tie in with P6 headings as set out in the pricing document. The project programme shall reflect the proposed chronological sequencing of works.

The programme shall contain precisely identified 'milestones' showing the key dates of important events including but not limited to:

- The dates for commencement of works on site;
- Completion dates of the stages of the works;
- Submission of documentation to the Employer;
- Dates for achievement of activities necessary to determine payment entitlement.

3.9.10 Quality Management Plan

The Contractor shall prepare and submit a project-specific Quality Management Plan in line with the requirements of **Section 3.7** of this Scope.

The Contractor's Quality Management Plan shall address how the Contractor will manage the Contractor's Personnel and in particular the Supply Chain.

The Contractor shall submit the Quality Management Plan within 40 days of the commencement of the Contract.

3.9.11 Traffic Management Plan

The Contractor shall prepare and submit a project-specific Traffic Management Plan in line with the requirements of **Section 3.4.5** of this Scope.

The Contractor's Traffic Management Plan shall address all works to be undertaken under the Contract including any works by the Contractor's Personnel.

3.9.12 Traffic Emergency Plan

The Contractor shall prepare and submit a project-specific Traffic Emergency Plan in line with the requirements of this Scope.

The Contractor shall submit the Traffic Emergency Plan within 30 days of the commencement of the Contract.

3.9.13 Environmental Management Plan

The Contractor shall prepare and submit a project-specific Environmental Management Plan which shall take due consideration of the requirements of:

- Current Environmental Management Legislation;
- Environmental Designations of the Site;
- NPWS Guidance;
- Inland Fisheries Ireland Guidance;
- Fishery Guidelines for Local Authority Works.

The Environmental Management Plan shall address risks and mitigation measures for the following:

- Noise and vibration;
- Dust, odours and air quality;
- Traffic and transport;

- Water quality (surface water, groundwater and water bodies);
- Land contamination;
- Monitoring and sampling;
- Other.

The Contractor's Environmental Management Plan shall address all works to be undertaken under the Contract by the Contractor and the Contractor's Personnel.

The Contractor shall submit the Environmental Management Plan within 40 days of the Starting Date.

3.9.14 Waste Management Plan

The Contractor shall prepare and submit a project-specific Waste Management Plan in line with the requirements of **Section 0** of this Scope and the planning permission and which shall take due consideration of the requirements of:

- Current Waste Management Legislation;
- Best Practice Guidelines on the Preparation of Waste Management Plans for Construction & Demolition Projects;
- "Changing Our Ways" Waste Management Policy Statement;
- Waste Management Plan for the Dublin Region.

The Contractor's Waste Management Plan shall address all works to be undertaken under the Contract including any works by the Contractor's Personnel.

The Contractor shall submit the Waste Management Plan within 40 days of the Starting Date.

3.9.15 Progress Reporting

3.9.15.1 Site and Progress Meetings

Progress Meetings shall be held at scheduled monthly intervals from the Starting Date for the duration of the Contract and in accordance with Clause 4.7 of the Conditions of Contract.

The Contractor is required to report on the progress of construction and related activities at the progress meetings.

3.9.15.2 Progress Reports

The Contractor is required to submit written Progress Reports to the Employer on a monthly basis or as requested by the Employer and in accordance with Clause 4.14 of the Conditions of Contract.

Failure to submit the monthly progress report within the timeframe allowed, or failure to provide any of the information to be included in the monthly progress report, shall constitute a non-compliance of the Reporting KPI.

Each Progress Report shall include the following elements:

- Cover Sheet;
- Project Name;
- Employer's Name;
- Employer's Representative Name;
- Contractor's name;
- Date of progress report;
- Period covered in Progress Report;
- Anything else that the Contractor considers relevant to a progress report or that the Employer may direct during the Contract.

Community/Third Parties/Utility Issues

To include an updated Communications Record from the Community Liaison Officer. Details of any interaction, consents, delays, complaints, agreements, scheduled meetings, labour relations, public relations, third party, environmental problems concerning or affecting the Works.

Traffic Management

Status report on Traffic Management issues such as traffic management measures implemented, impact of same on traffic, complaints, etc.

Programme Section.

The Contractor shall submit a detailed description of progress of each stage of the Works against the Contractor's current programme; this shall include detail of works completed, planned works for the month ahead (detailed on a weekly basis), contingency thresholds and an up-to-date works programme (with baseline against original contract programme). The Employer may comment on the programme. In this case the Contractor shall take the Employer's comments into account and amend the programme accordingly.

The Contractor shall submit the programme, amended to Employer's satisfaction, within 7 days from the date the Employer's comments were sent; failure to comply with this requirement will constitute a noncompliance of the 'Monthly Progress Report' KPI.

Contractor's Personnel and Things Section

Details of the Contractor's Personnel and Contractor's Things (to include date/time on site).

Contractor's Data Section

Status of preparation and review of Contractor's Data.

Supply Chain Section

The names of the Supply Chain, with particular regard to off-site suppliers of Things for the Works and the Contractor's Things, and progress and location of the design, manufacture, fabrication, delivery, installation, testing and commissioning of the same.

QA, Tests and Certificates Section

Copies of quality assurance documents and test results and certificates.

Statutory inspection records Section

The PSCS must provide the Employer with copies of all statutory inspection records required for but not limited to the following:

- Lifting appliances;
- Lifting gear;
- Powered access equipment.

Confirmed Directions Section

Details of any Directions issued by the Employer. Should include the date the Direction was issued, a brief description of the scope of the Direction and details of any impact on the Contract.

Required Directions Section

Details of when any Directions to be given by the Employer will be required, and any that are outstanding.

Change Order Section

Details of any Change Order that have occurred during the period, or are unresolved.

Noise and Vibration Monitoring Section

Details of any noise and vibration monitoring conducted over the preceding month. To include levels measured compared against imposed limitations of the Contractor's Proposal.

Financial Summary

Table outlining financial status of project and up to date cash flow profile.

Photographic record

Photographic record of works completed for the month of the report.

As-Constructed Records

Status report regarding completion of the as constructed drawings including record of drawings issued and planned to be issued to the Employer.

Safety File

Status report regarding compilation of the Safety File.

Plant and Labour

Weekly plant and labour records detailing all plant and labour for each site broken down by name and grade (labour) and plant details on an hourly basis

Third Party Design and Works Schedules

Updated works schedules detailing - works completed for the period of the monthly report, dates on site, location, company, works completed, any issues which arose and projected works schedule for the following month.

3.9.16 As Built Information

The Contractor shall compile, collect and deliver as built documentation in accordance with Section 7.11.1 of IW-TEC-600-05 to include (not limited to):

- Topographical survey of all as-constructed works;
- General Arrangement drawings;
- Sectional layouts;
- Fabrication drawings;
- Electrical line diagrams;
- Motor and instrumentation lists;
- Control System Functional Design Specification;
- Detailed as-constructed drawings of all pipelines including services encountered;
- CCTV surveys;
- SCADA/PLC hardware configuration diagrams;
- Control panel and switchgear drawings including wiring diagrams;
- P&ID diagrams.

Electronic copies of the as built information shall be submitted in (*.pdf) format, (*.dwg) format and in ESRI ArcGIS format.

Details of the required information is contained in the following Irish Water Specifications:

- IW-TEC-100-001 As-Constructed CAD Standard;
- IW-TEC-100-002 As-Constructed GIS Standard;
- IW-TEC-100-003 GPS Data Capture Standard;
- IW-TEC-100-004 Above-Ground Asset Data Capture Standard;
- IW-TEC-100-006 Process & Instrumentation Diagram (P&ID) Standards.

The effective and consistent management of project documents/records throughout the lifecycle of a project is a crucial part of project management. It is important that all required information, documents / records are uploaded to the designated Electronic IW IT Systems. These systems and method of electronic upload can and may change during the course of a project lifecycle and any changes shall be fully communicated. All Records shall be received in soft copy and hard copy only where instructed and required. Documents / Records will not be accepted in zipped format. Documentation in relation to AD Project Records Management is available in the IW Standards and Specifications site and upon request. Please refer to IW-AD-EDS-SOP-004 for required information.

The Contractor shall comply with the Irish Water Asset Delivery Project Records Governance Procedure (IW-AD-EDS-SOP-004) throughout the project lifecycle to promote the consistent and effective management of project documents and records. The Contractor shall ensure all required project documents and records are submitted to Irish Water through the designated Irish Water IT Systems ensuring records can be centrally stored, accessible and retrieved when required. The project documents/records shall be those identified in this document, those as a result of any further works identified in the Employer's Requirements together with those referenced in any Part.

3.9.17 **Asset Capture**

The Contractor shall asset information for the works in accordance with the Section 7.11.4 of IW-TEC-600-05.

The relevant Irish Water Standards are included in **Appendix 5** to the Scope.

3.9.18 **Operation and Maintenance Manuals**

The Contractor shall submit the Operation and Maintenance Manuals for the Works in accordance with Section 7.11.2 of IW-TEC-600-05.

Electronic copies of the Operation and Maintenance Manuals shall be submitted in both (*.docx) format and (*.pdf) format; these copies shall be fully searchable and all headings and sections shall be hyperlinked from the table of contents.

3.10 OPERATION AND MAINTENANCE (O&M)

3.10.1 General O&M Requirements

On Completion of Section 1 the Contractor shall operate and maintain the Works for a period of 90 days (Section 3 Works).

The Employer will be responsible for the operation of all valves for the management of water supply at all times.

The Employer will manage and control the volumes of water in to and out of the new reservoir. The Contractor shall ensure that all signals, data, alarms and faults are available to the Employer through his telemetry system.

Operation and Maintenance includes maintenance, provision of spares and appropriate disposal of all waste arising. All personnel required for the Operation and Maintenance, including staff as required for committees and meetings shall be provided by the Contractor. The Operation and Maintenance including documentation and reporting shall be in accordance with the Performance Management System as issued by the Water Services National Training Group. The Employer may review the documentation and reporting requirements during the Operation and Maintenance period. The Contractor must provide an electronic copy of all reports and documentation.

The Operation and Maintenance shall be carried out in an efficient and cost effective manner.

To ensure that the processes are operated effectively, maintenance routines shall be established to ensure that all plant deliver levels of performance to meet their specified performance criteria. All operating procedures developed shall observe a formal documented system that is auditable and traceable. Efficient operation procedures shall ensure that adequate cover, standby arrangements and emergency procedures are in place to ensure the smooth running of the Works at all times.

All waste derived from the operation of the plant shall be minimised, suitably treated and disposed of in a responsible fashion. This shall be carried out in consultation and in cooperation with regulatory agencies and relevant bodies.

The Contractor shall ensure that records are kept of the Operation and Maintenance period as specified in the Scope.

The Contractor shall notify the Employer's Representative of all incidents affecting or likely to affect materially the Operation and Maintenance of the Works, immediately he becomes aware of the incident and/or its effect.

The Contractor shall provide all labour (to include 24/7 availability) as part of his Operation and Maintenance. The Contractor shall provide for a full time site based operator for the Section 3 Works.

3.10.2 Performance Standards

After the commencement date of the Operation and Maintenance period, the Contractor shall operate and maintain the Works to meet the requirements stated below.

For the purposes of Operation and Maintenance period, compliance with standards shall be deemed to have been achieved if the measured concentration of free chlorine on the outlet manifold pipe from the reservoir is equal or above 0.75mg/l and the measured concentration of free chlorine on the overflow pipe on activation is <0.1mg/l.

3.10.3 Operation and Control

The Contractor shall be responsible for the Works at all times and shall ensure that sufficient automatic control and dial-out alarm systems are provided to ensure that the required performance standard is met at all times. Information from the plant instrumentation must be automatically trended and logged together with any relevant faults, actions and alarms. In the event of alarms occurring when the system is unmanned, an automatic call-out facility to relevant personnel shall be activated. The Contractor shall make provision for the Works to be operated under manual control when necessary. The equivalent of 24 hour 7 day cover is required 365 days per year. The Contractor shall make provision for the operating range of the control systems and plant to be adjusted as and when necessary in order to achieve the performance standards.

All operations shall be carried out in accordance with the Operation and Maintenance Manuals, the manufacturers' recommendations and in accordance with the Contract. The Contractor shall prepare and maintain an Operation and Maintenance Plan in accordance with IW-HSQE-FM-107, including maintenance schedules for all plant, which shall be submitted to the Employer's Representative for approval 4 weeks prior to the commencement of the Operation and Maintenance. These procedures shall include full operating procedures, detailed maintenance procedures and maintenance schedules for all plant including health and safety procedures and emergency procedures. The Contractor shall inform the Employer's Representative in advance of any proposed changes to any of the procedures for operations service.

3.10.4 Performance Monitoring

The Contractor shall submit to the Employer or Employer's Representative not less than 14 days prior to the commencement of Operation and Maintenance period a method statement stating and risk assessment how he shall measure and demonstrate compliance with all aspects of the Works as set out in the Scope.

The Contractor shall monitor; record and report on the provision of the Operations and Maintenance in accordance with the Operation Management Requirements. The Contractor will utilise the Maximo system, under licence from the Employer and the control system to record and manage the asset management of the Works during the Operation and Maintenance period. The recording of the asset management shall be carried out using the Maximo system. The Contractor will be expected to attend training on the Maximo system for five days on an annual basis and will report progress on the Asset Management Plan on a monthly basis.

If the chlorination system fails to meet the Employer's requirements, the Contractor shall take immediate remedial action to ensure that the Scope is met as soon as reasonably practicable. The Contractor shall advise the Employer's Representative immediately of the cause of the failure and report actions taken or proposals which are aimed at correcting the deficiency. The Contractor shall confirm such advice and proposals in writing within 7 days.

3.10.5 Requirements for Process Residuals

The Contractor shall be responsible for treatment and disposal of all process residuals for the duration of the Operation and Maintenance period for the chlorination system.

3.10.6 Additional Requirements

In addition to the above requirements, the Contractor shall ensure that;

- All required plant, labour insurances and documentation as required for Operation and Maintenance are set up and implemented;
- The site health and safety procedures are established and followed at all times including on-going training and maintenance of health and safety equipment;
- All health and safety equipment is properly maintained;
- All quality assurance procedures are established and followed at all times;
- All copies of the Operation and Maintenance Manuals and as-built drawings are maintained up-to-date;

- The Works are operated within the specified performance requirements and carry out routine monitoring as specified;
- Routine recording procedures for the operational, monitoring and maintenance activities carried out are developed and reported to the satisfaction of the Employer's Representative for submission to the Employer;
- Schedules for maintenance of all plant including general site maintenance are developed and submitted to the Employer for approval;
- Daily records of all operations and maintenance activities are kept on site, including records of site staff and weather conditions;
- Any other operation or procedure which shall ensure that the Works are operated in accordance with Good Industry Practice;
- Co-operate with others in relation to possible works on the Saggart Waterworks site.

3.10.7 Key Performance Indicators

The Contractor's performance for the duration of the Operation and Maintenance period shall be measured against a suite of Key Performance Indicators (KPI's) which are detailed in **Part 2 – Schedule 4.**

3.10.8 Sampling and Testing Requirements

The Contractor shall develop, operate and maintain proper procedures for the sampling and analysis for the Works. The tests detailed shall be carried out at least at the frequency specified. Sampling procedures shall be in accordance with EU and Irish Regulations. All laboratory analysis shall be performed in accordance with the latest edition of the 'Standard Methods for the Examination of Water and Wastewater' by the APHA or an approved equivalent standard. The Laboratory shall be accredited and hold approved QA certification for the tests being undertaken.

The Contractor shall also ensure that the flow is continuously monitored at inlet and outlet stages. In order to confirm compliance, the Contractor shall provide monitoring and recording for reservoir levels and flow monitoring of the inlets and outlets.

For final water, sampling and analysis is to be at the minimum frequency required by EU Drinking Water Directive (98/83/EC) and Drinking Water Regulations S.I.122 of 2014 shall be carried out, unless otherwise stated here.

Independent testing at times not previously notified to the Contractor may be carried out by the Employer to audit and verify data provided by the Contractor.

All sampling and analysis at all stages of the Contract including commissioning and performance tests shall be at the Contractor's expense.

Sampling and testing shall be carried out for the duration of the Operation and Maintenance period at the frequency specified in **Table 13**. The Contractor shall arrange for all laboratory testing.

Table 13 – Sampling and Testing Requirements on Reservoir Inlets and Outlets

Parameter	Frequency
Total Coliforms	As per minimum frequency stipulated in S.I. 122 of 2014
Escherichia coli (E.Coli)	As per minimum frequency stipulated in S.I. 122 of 2014
pH	Continuous
Colour (True)	Daily
Ammonium	As per minimum frequency stipulated in S.I. 122 of 2014
Odour	As per minimum frequency stipulated in S.I. 122 of 2014
Taste	As per minimum frequency stipulated in S.I. 122 of 2014
Clostridium perfringens	As per minimum frequency stipulated in S.I. 122 of 2014
Cryptosporidium	As per minimum frequency stipulated in S.I. 122 of 2014
Free Chlorine	Continuous
Residual Chlorine	Continuous

The Contractor shall include for independent analysis of each of the parameters monthly. The Contractor shall include for all costs associated with the independent analysis. The Contractor shall, upon the request of the Employer provide additional samples for independent analysis.

The Contractor is responsible for lab testing of final water during Section 3 Works.

3.10.9 Maintenance and Calibration

All mechanical plant shall be regularly serviced and maintained in accordance with manufacturer's recommendations and best practice

All pieces of Plant considered critical to keeping treated water to Drinking Water Regulations standards shall be calibrated as per the calibration schedule. Records of calibration shall be kept on in-house maintenance and calibration cards.

It will be the responsibility of the plant manager to issue and review maintenance and calibration schedules and to follow up on their completion. Files containing completed maintenance and calibration cards shall be kept on site and made available to the Employer upon request.

3.10.10 Consumables

The Employer will supply consumables required with the exception of the chemicals required for operation and maintenance of the HACH CL17 analysers and initials fills as stated in other sections of this document.

The Employer will be responsible for the following:

- Provision of salt for the OSEC plant;
- Payment of electricity charges for the works.

3.10.11 Fire Protection

The Contractor shall ensure that all fire protection equipment and installations are operated to the manufacturer/installer's instructions and are adequately maintained and tested. The Contractor shall ensure that regular fire drills are conducted to include all staff at the facilities. He shall also ensure that adequate records are kept in relation to fire protection.

The Contractor shall take account of the potential for forest fires in the area and shall include appropriate mitigation measures in his design and shall include appropriate emergency measures in his site emergency procedures and Operation and Maintenance Plan.

3.10.12 **Reporting Information**

A monthly report shall be sent to the Employer's Representative giving an overview of the operation of the Works for the previous month. It shall detail results of laboratory analysis, trends in flows and loading to the plant, operational information and highlights outstanding issues. The report shall also provide details on the number, if any, of complaints received during the previous month.

Copies of the monthly reports should be available on site.

The following list of typical standard forms is required in connection with the operation of the plant:

- Daily Inspection Sheet;
- Weekly Inspection Sheet;
- In-House Maintenance and Calibration Card;
- Daily Analysis Record;
- Sample Reference Number List;
- Calibration Schedule;
- Analysis Record (External Samples);
- Complaint report form;
- Complaint register.

3.10.13 **Audits**

3.10.13.1 Health and Safety

These shall be carried out by competent Contractor's personnel on a frequent basis.

3.10.13.2 Documentation

A documentation audit shall be carried out by competent Contractor's personnel on a frequent basis to determine the presence and correct use of all documents.

3.10.13.3 Quality assurance

On a frequent basis, management of the site shall carry out a quality assurance audit. The format of these audits shall follow the format of this plan and shall assess each aspect of it. Records of this shall be kept in the management review logbook on site.

The Employer may also periodically undertake its own quality audits of the site. The Contractor shall be required to fully co-operate with any such audit.

3.10.13.4 Environment

Weekly and monthly reports are to be sent to the Employer's Representative.

3.10.14 **Boundaries and Constraints**

The Contractor shall not use the Site for any purpose other than the provision of delivery of the service as described in the Scope.

3.10.15 **Contractor's Personnel**

The Contractor shall provide all the necessary managerial, technical, analytical, supervisory, administrative and any other staff necessary to ensure the proper Operation and Maintenance, safely and efficiently on a continuous 24-hour basis and in accordance with Good Industry Practice. The Contractor shall ensure that all staffs are qualified and suitable for the position for which they are appointed.

The Contractor must detail the number and grades of staff to be provided at tender stage. Any changes in staff over the Contract Period must be approved by the Employer's Representative. New staff must have an equivalent level of training and experience as the staff proposed at tender stage.

All staff shall be provided with training on an on-going basis including refresher courses where required. Full training records shall be kept for all staff on site and available for inspection by the Employer's Representative at any time.

The Employer reserves the right to remove any person employed by the Contractor upon submission of a written reasoned request.

APPENDIX 1

SCOPE DRAWINGS

(also included on the enclosed DVD 2)

APPENDIX 2

GENERAL CIVIL SPECIFICATION

IW-TEC-300-01

(included on the enclosed DVD 2)

APPENDIX 3

GENERAL MEICA SPECIFICATION

IW-TEC-200-01

General Technical Specification for MEICA Works

(included on the enclosed DVD 2)

APPENDIX 4

EMPLOYER'S CONSENTS

(not applicable)

APPENDIX 5

IW STANDARDS

(included on the enclosed DVD 2)

IW-TEC-100-001	As-Constructed CAD Standard
IW-TEC-100-002	As-Constructed GIS Standard
IW-TEC-100-003	GPS Data Capture Standard
IW-TEC-100-004	Above-Ground Asset Data Capture Standard
IW-TEC-100-006	Process & Instrumentation Diagram (P&ID) Standards
IW-TEC-100-010	Asset Data Standards: Instructions for Use
IW-TEC-100-013	Asset Tagging Standard
AMT-SPEC-5020-002	Water Network Monitoring Point
AMT-SPEC-5020-003	Water Network Pumping Station
AMT-SPEC-5020-004	Water Network Storage
IW-RAM-SPEC-5000-001	Signal Provision Standard
IW-TEC-1000-01	Water Pipeline Specification
IW-TEC-400-001	Instrumentation, Control and Automation, Site SCADA and HMI Specification
IW-TEC-400-002	Instrumentation, Control and Automation, Telemetry Outstation Specification
IW-TEC-400-003	Instrumentation, Control and Automation, Automation and Control Specification
-	Engineering Specification for Telemetry Outstations (iNTS)
IW-STD-ELEC-001	Standard Details - Telemetry Outstation
IW-CDS-5020-01	Water Infrastructure Standard Details Connections and Developer Services
IW-CDS-5030-01	Wastewater Infrastructure Standard Details Connections and Developer Services
IW-TEC-600-01	IW Physical Site Security Policy
IW-TEC-600-04	Energy Efficient Design Standard
IW-TEC-600-05	Design Specification Commissioning, Testing and Handover
IW-TEC-600-06	Design Specification: Chemical Storage Systems
IW-TEC-600-06-01	Design Specification: Chemical Storage Systems - Bulk Storage of Liquid Chemicals
IW-TEC-600-06-02	Design Specification: Chemical Storage Systems - Bulk Storage/Batching of Solid Chemicals
IW-TEC-600-07	Specification: Construction Signage
IW-TEC-900-05	Design Specification: Disinfection
IW-HSQE-FM-107	Operation and Maintenance Manual Requirements
IW-HSQE-SOP-064-FM-01	Safety File Requirements Capital Projects
IW-HSQE-FM-095	Site Supervisor HSQE Weekly Inspection Sheet
IW-HSQE-SOP-002-FM-037	Design Risk Assessment Form
IW-HSQE-SOP-024-PRO-18	High Level Major Capital Projects Environmental Process Map
IW-HSQE-SOP-024-PRO-19	Low Level Major Capital Projects Environmental Process Map
IW-HSQE-SOP-024-PRO-23	Low Level H&S Incident Management Process Map

IW-HSQE-SOP-024-PRO-24	High Level H&S Incident Management Process Map
IW-AMT-POL-024	Working with Asbestos Cement (AC) Pipes (Water)
IW-AMT-SOP-009	Information and Guidance Document on Japanese knotweed
IW-AMT-GL-001	Guidance on the Management of Giant Hogweed
IW-AMT-GL-002	Guidance on the Management of Himalayan Balsam
IW-CUS-SOP-074	Contractor Identity Passes
IW-HSQE-SOP-058	Health, Safety, Quality and Environment Contractor Pre-requisites for IW MWCE Projects
-	Customer Communications Work-flow
-	LWA04_Saggart Reservoir_Code of Practice_REV 1.4

APPENDIX 6

TESTING SCHEDULE

(included on the enclosed DVD 2)

APPENDIX 7

DCC CODE OF PRACTICE FOR THE CONSTRUCTION OF ARTERIAL WATERMAINS

(included on the enclosed DVD 2)

APPENDIX 8

OTHER FORMS

Checklist for Notification of Crane Activity to Irish Air Corps

Permanent Works Design Certificate Template

Temporary Works Design Certificate Template

(included on the enclosed DVD 2)

APPENDIX 9

EIR

(included on the enclosed DVD 2)

DG0109_01

DG0109_02

KEY MAP Scale:1:5,000

SAGGART
Co. Dublin

SLADE ROAD

PAIRC MHUIRE

137.2

135

135.0

144.3

143.7

156.0

10kV

N

LEGEND

- SITE BOUNDARY
- EXISTING WATERMAINS
- RESTRICTED ACCESS - AREA 1
- RESTRICTED ACCESS - AREA 2
- RESTRICTED ACCESS - AREA 3
- SHARED ACCESS ONLY - AREA 4
- TEMPORARY COMPOUND AREA - AREA 5
- AREAS THE EMPLOYER REQUIRES VEHICULAR ACCESS TO DURING THE CONTRACT
- (1) EXISTING 1600mm CONTROL VALVES UNTIL PHASE 2 WORKS ARE COMPLETE
- (2) EXISTING ISOLATION VALVE
- (3) NEW BYPASS ISOLATION VALVE AND DOSING
- (4) ISOLATION VALVE ON 33" INLET AND DOSING
- (5) ISOLATION VALVE ON 33" INLET AND DOSING
- (6) OUTLET CONTROL VALVES FROM BOHERBOY RESERVOIR (NO VEHICULAR ACCESS EXISTING)
- (7) BOHERBOY INLET CONTROL VALVES AND DOSING
- (8) SAGGART OUTLET VALVES

NOTE: FOR DETAIL REQUIREMENTS, REFER TO PART 3 - SCOPE

10m SCALE 1:500

R:\MDW0756_12085-205 - Saggart Water Bundle\10.0 BIM\00\01 WIP\DR-C\DGN\MDW0756A-RPS-00-XX-DR-C-DG0108.dwg

Client: UISCE ÉIREANN EIRANN IRISH WATER

General Notes
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(v) All Levels refer to Ordnance Survey Datum, Malin Head.

Rev	Date	Drn	Chk	Amendment / Issue	App
P03	31/01/19			Issue for Approval	
P02	26/10/18			Issue for Approval	
P01	05/09/18			Issue for Approval	

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Model File Identifier

Scale: 1:1000 @ A1, 1:2000 @ A3
Created on: 28/08/18
Sheets: 02 of 02

Project: SAGGART RESERVOIR
Title: SCOPE DRAWINGS
Access Restrictions and Requirements

File Identifier: MDW0756A-RPS-00-XX-DR-C-DG0108.dwg
Status: S4
Rev: P03

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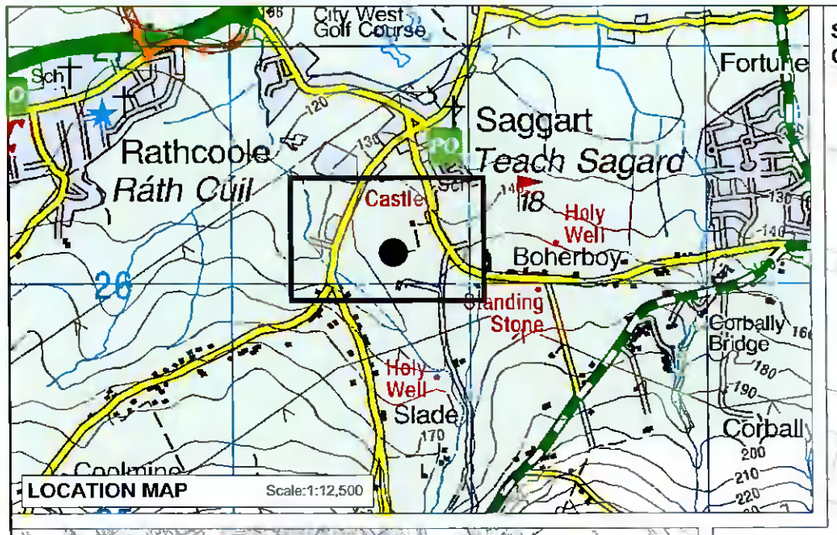
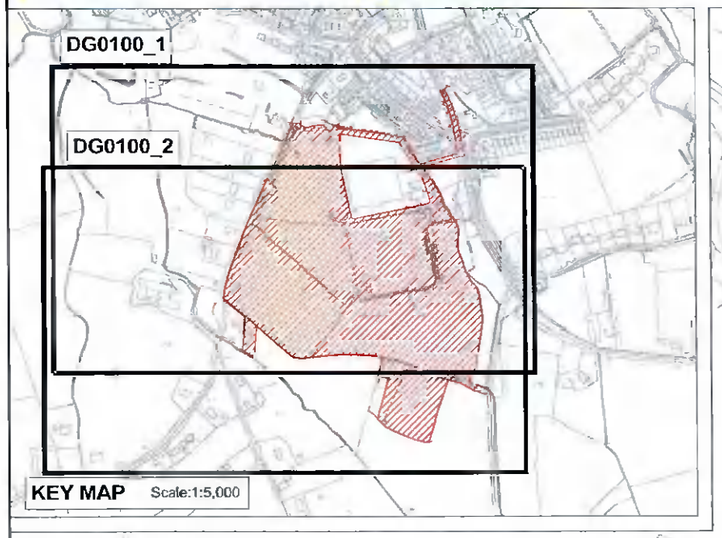
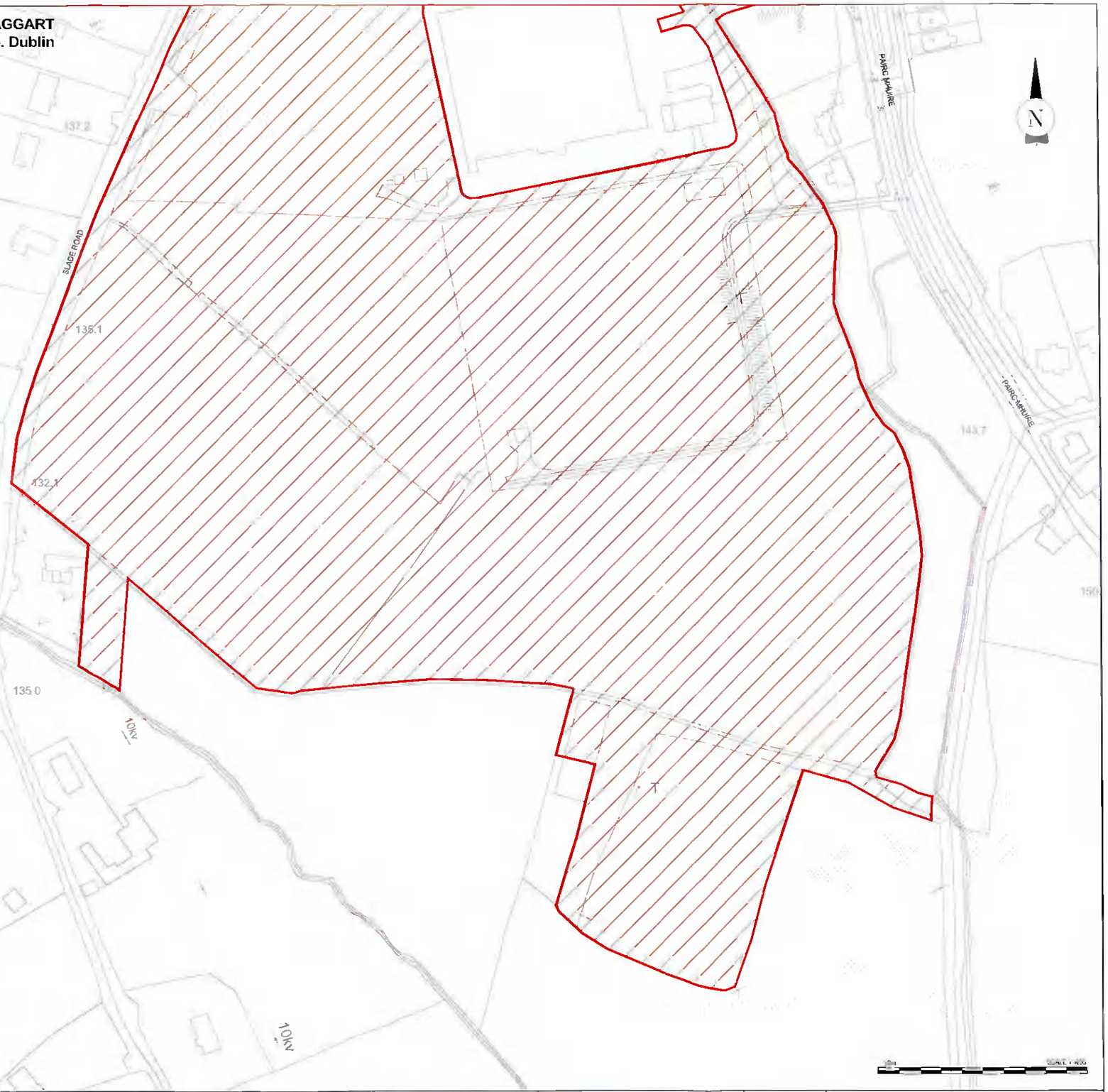
SAGGART
Co. Dublin







LEGEND

- AREA PROVIDED BY THE EMPLOYER

Client: UISCE ÉIREANN : IRISH WATER

General Notes

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Rev	Date	Dm Chk	Amendment / Issue	App
P04	31/01/19	KB MC	Issue for Approval	MC
P03	26/10/18	KB MC	Issue for Approval	MC
P02	08/10/18	KB MC	Issue for Approval	MC
P01	05/09/18	KB MC	Issue for Construction Approval	MC

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Title	SCOPE DRAWINGS Areas Provided by the Employer (Sheet 2 of 2)
File Identifier	MDW0756A-RPS-00-XX-DR-C-DG0100.dwg
Status	S4
Rev	P04

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