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Greener Ideas

PROFILE PARK POWER PLANT

ENVIRONMENTAL IMPACT ASSESSMENT REPORT (EIAR)

VOLUME III – EIAR APPENDICES

JUNE 2021

PROFILE PARK POWER PLANT

VOLUME III - ENVIRONMENTAL IMPACT ASSESSMENT REPORT APPENDICES

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2.1 SCHEDULE OF MITIGATION MEASURES

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1.0 SCHEDULE OF MITIGATION MEASURES

1.1 INTRODUCTION

Mitigation of potential impacts has been incorporated into the proposed development either by avoidance of potential impacts or by the design of the proposed development (as described in Chapter 5, Consideration of Alternatives). Where relevant, these measures are detailed in each chapter of the EIAR.

In addition, during the construction and operational phases of the development, all personnel working on the project will be responsible for the environmental control of their work and will perform their duties in accordance with the requirements and procedures of the Construction Environmental Management Plan (CEMP).

During the construction phase of the development, all works associated with the construction of the proposed Profile Park Power Plant will be undertaken with due regard to the guidance contained within CIRIA Document C741 'Environmental Good Practice on Site' (CIRIA, 2015).

1.2 SCHEDULE OF MITIGATION MEASURES FROM EIAR

This section provides a summary of mitigation measures proposed within each chapter of the EIAR.

1.2.1 Mitigation Measures Chapter 7 - Population and Human Health

Item	Mitigation Measure	Project Stage
Chapter 7 – Population and Human Health		
7.1	Best practice construction methodology and measures to minimise impacts from excavation works, as described in Chapter 8 (Land, Soils and Geology), will keep the development area to a minimum and reduce land use changes. The proposed development is not anticipated to have a significant effect on the local or regional population, therefore no mitigation measures in respect of population trend impacts are required. From an economic perspective, the proposed development will provide employment opportunities to the local community and wider region during construction, operations and decommissioning. The project, primarily at construction stage, is also likely to increase spend in local businesses as persons involved in the project stay locally or purchase goods. Overall, there will be a positive impact on the local economy and no mitigation measures are required.	Construction Phase
7.2	No specific mitigation or monitoring measures are proposed in terms of population and human health outside of those specified in the respective technical chapters of this EIAR as referenced in Section 7.1.	Operational Phase
7.3	It is envisaged that the proposed development will be operational for at least 25 years and on cessation of activities, the plant will either be redeveloped as a power related facility, or the site will be redeveloped in an alternative form. In the event where the facility is decommissioned, details of provisions to decommission and render safe or remove all materials, waste, ground, plant, or equipment contained on or in the site that may result in environmental pollution will be agreed with the Environmental Protection Agency as part of the Industrial Emissions Licensing process.	Decommissioning Phase

1.2.2 *Mitigation Measures Chapter 8 – Land, Soils and Geology*

Item	Mitigation Measure	Project Stage
Chapter 8 - Land, Soils and Geology		
8.1	The disturbance and excavation of soil, subsoil and bedrock is an unavoidable effect of the development, but every effort will be made to ensure that the amount of earth materials excavated is kept to a minimum in order to limit the effect on the geological aspects of the site. The management of geological materials and spoil is an important component of controlling dust and sediment and erosion control. These measures will prevent the erosion of soil in the short and long term. Soils, overburden, and rock will be reused on site to reinstate any excavations where appropriate.	Construction Phase
8.2	To ensure slope stability, excavations will be battered back (sloped) to between 1:1.5 and 1:2 depending on depth and type of material. The works programme for the construction stage of the proposed development will also take account of weather forecasts, and predicted rainfall in particular. Large excavations and movements of subsoil or vegetation stripping will be suspended or scaled back if heavy rain is forecasted. Works should be suspended if forecasting suggests any of the following is likely to occur: • >10 mm/hr (i.e. high intensity local rainfall events); • >25 mm in a 24 hour period (heavy frontal rainfall lasting most of the day); or, • >half monthly average rainfall in any 7 days. Prior to works being suspended the following control measures should be completed: • Secure all open excavations; • Provide temporary or emergency drainage to prevent back-up of surface runoff; and, • Avoid working during heavy rainfall and for up to 24 hours after heavy events to ensure drainage systems are not overloaded.	
8.3	All excavation works during the construction stage will be monitored by an experienced engineer. Mitigation measures will be put in place during the construction of the scheme to reduce the likelihood of an excavation collapsing. Mitigation measures include construction of a granular berm or temporary sheet pile wall to support the clays during construction. There is a very low risk of landslide (high factor of safety) which is further reduced by implementation of the mitigation measures.	
	A construction phase Waste Management Plan (WMP) will control the management of all site-generated construction waste and the storage and disposal of the waste. Waste streams (including material-related streams such as soils, stone, metals, paper and cardboard, plastics, wood, rubber, textiles, bio-waste and product-related streams such as packaging, electronic waste, batteries, accumulators and construction waste) will be managed, collected, segregated and stored in separate areas at the temporary compound and removed off site by a licensed waste management contractor at regular intervals during the works. Appropriated facilities are included in the WMP, Appendix 3.3.	
8.4	The CEMP provides details on measures and mitigation in relation to the management of fuels and oils on site. These include:	

	• Minimal refuelling or maintenance of construction vehicles or plant will take place on site. Off-site refuelling will occur at a controlled fuelling station; • Mobile bowsers, tanks and drums will be stored in secure, bunded, impermeable storage area, away from drains and open water; • Fuel containers will be stored within a secondary containment system e.g. bund for static tanks or a drip tray for mobile stores; • Ancillary equipment such as hoses, pipes will be contained within the bund; • Taps, nozzles or valves will be fitted with a lock system; • Fuel and oil stores including tanks and drums will be regularly inspected for leaks and signs of damage; • Only designated trained operators will be authorised to refuel plant on site; • An emergency plan for the construction phase to deal with emergency accidents or spills is contained within the CEMP; and • An emergency spill kit with oil boom and absorbers will be kept on site in the event of an accidental spill. All site operatives will be trained in its use.	
8.5	The area within the site boundary will require a drainage network to be in place for the construction and operation phases of the site. Fundamental to any construction phase is the need to keep clean water (i.e. water running along the Baldonnell Stream which enters the development site from the south-eastern boundary, flowing along the eastern boundary) separate from construction area runoff and manage all other run off and water from construction in an appropriate manner. This will necessitate the implementation of the measures in the CEMP to mitigate against sediment loss and erosion, with associated settlement ponds and silt traps. The Sediment and Erosion Plan forms part of the CEMP for the site. The Sediment and Erosion Plan is included as a design feature thereby applying mitigation by design. The good management of material on site will reduce any indirect risk to water.	
8.6	With regards to excavation, the materials to be encountered are likely to be relatively stable during the excavation for the power plant infrastructure foundations. A physical barrier can be implemented between the excavations and the potentially unstable material at unstable conditions, in the form of a granular berm or sheet piles. The long-term stability of the area around the proposed development will be achieved by filling the area back up to existing ground level following installation of the foundation and sealing the subsoil environment with artificial surfaces with managed drainage network. Excavation works will be monitored by a suitably qualified and experienced geotechnical engineer or engineering geologist. The earthworks will not be scheduled to be carried out during severe weather conditions.	
8.7	In order to comply with CRU requirements, low sulphur diesel oil will be stored as a backup fuel. Up to 72 hours (3 days) maximum running capacity of diesel oil is required to be stored on site (approximately 3000m^3) in 2 x bunded tanks. The tanks will be bunded in accordance with the requirements set out in the EPA publication, 'Storage and Transfer of Materials for Scheduled Activities' (2004), which states bunds are to contain 110% of the volume of the tank in the event of a tank rupture. The height of the bund wall will be 2.8m.	Operational Phase

8.8	Diesel oil will be delivered to site by road tankers. The maximum number of expected tankers travelling to and from the site in any one day will be in the region of 2- 3 tankers, however this would be an extremely infrequent occurrence of once every 12 months. A standard operating procedure will be followed during tanker unloading and filling of the bulk tank. The bulk tank will be fitted with a high level alarm to prevent overfilling. There will be a dedicated tanker unloading area surrounded by a drainage channel which will drain to a petrol interceptor. This separator will provide for full retention of any material in the event of a rupture and spillage of a tanker compartment. A shut-off device incorporated into the separator will close the outlet in the event of its capacity being exceeded.	
8.9	The operational team will carry out maintenance works (to power plant infrastructure, drainage network) and will put in place mitigation measures to reduce the risk of hydrocarbon or oil spills during the operational phase of the power plant. The proposed mitigation measures during the operational phase are as follows: • Minimal refuelling or maintenance of operational vehicles or plant will take place on site. Off-site refuelling will occur at a controlled fuelling station; • Potential impact of spillages and/ or leaks will be mitigated against by proper management and design of plant including impermeable bunded areas, were required. All storage areas will be designed in accordance with current oil storage regulations, local fire authority requirements and in accordance with BS8007:1987, Code of Practice for design of concrete structures for retaining aqueous liquids; and • Fuel Storage areas where required will be bunded appropriately for the fuel storage volume for the time period of the operation and fitted with a storm drainage system and an appropriate oil interceptor; • On site re-fuelling will be undertaken using a double skinned bowser with spill kits on the ready for accidental leakages or spillages; • Re-fuelling will be undertaken by suitably trained personnel only; • Surface water discharges from the site will be regulated by the EPA under the Industrial Emissions Licensing regime and will undergo pre-treatment, where required, to prevent pollution of the receiving watercourse.	
	In order to minimise the potential impacts to Land Use, the following mitigation measures are proposed: • Minimising areas for earthworks thereby reducing land take requirements; • Restricting areas for construction works and temporary storage to a minimum within site boundary; • The handling, storage and re-use of excavated materials are of importance during the construction phase of the project. Stockpiles will be located away from the watercourses and drainage ditches. Topsoil and subsoils will be stored near the landscaping and in the reinstatement of development site areas. Topsoil will be stockpiled no higher than 2.5m and follow the recommendations set out in the NRA Guidelines for the Management of Waste from National Road Construction Projects (NRA, 2014); • No permanent spoil or stockpiles will be left on site.	
8.10	Decommissioning will comprise the removal of all over ground elements of the power plant.	Decommissioning Phase

	The site roadways / access roads may be in use for additional purposes to the operation of Profile Park or future use of the development area (e.g., for commercial access/ egress) by the time the decommissioning of the project is to be considered, and therefore the site roads will remain in-situ for future use. Some of the hardstand material will be removed where required, and along with the power plant foundations, covered in topsoil and revegetated. The substation and grid connection infrastructure would likely form part of the permanent national grid network. The risks associated with leaving roads and site entrance in-situ are relatively low. The decommissioning phase will not require any significant works that will impact the land and soils environment. A fuel management plan to avoid contamination by fuel leakage during decommissioning works will be implemented as per the construction phase mitigation measures. Mitigation measures applied during decommissioning activities will be similar to those applied during construction where relevant. Some of the impacts will be avoided by leaving elements of the Proposed Development in place where appropriate. The foundations will be rehabilitated by covering with local topsoil in order to regenerate vegetation which will reduce runoff and sedimentation effects. Roads and site entrances will be maintained for future users. Mitigation measures to avoid contamination by accidental fuel leakage and compaction of soil by on-site plant will be implemented as per the construction phase mitigation measures in Section 8.5.	

1.2.3 Mitigation Measures Chapter 9 - Hydrology and Hydrogeology

Item	Mitigation Measure	Project Stage
Chapter 9 - Hydrology and Hydrogeology		
9.1	As outlined in Chapter 2 of the main EIAR, Description of the Proposed Development, the design of the proposed development has considered a range of best practice construction measures which will ensure avoidance, prevention and reduction of impacts throughout the construction, operational and decommissioning phases. Additional measures have been developed to mitigate the impacts identified in the preceding section.	Construction Phase
9.2	During the construction phase, all works associated with the construction of the power plant and associate grid connection to the substation will be undertaken in accordance with the guidance contained within CIRIA Document C741 'Environmental Good Practice on Site' (CIRIA, 2015). Any groundwater encountered will be managed and treated in accordance with CIRIA C750, 'Groundwater control: design and practice' (CIRIA, 2016).	
9.3	The implementation of the Surface Water Management Plan will be overseen by a suitably qualified ecologist/engineer and will be regularly audited throughout the construction phase. The assigned ecologist/engineer will be required to stop works on site if he/she is of the opinion that a mitigation measure or corrective action is not being appropriately or effectively implemented.	

9.4	It is recommended that local surface water features in the immediate vicinity of the site boundary are monitored pre-construction and during construction to take account of any variations in the quality of the local surface water and groundwater environment as a result of activities related to the proposed development. Monitoring of Baldonnell Stream (for water quality and turbidity), will be undertaken pre-construction and during the construction period. A programme of inspection and maintenance will be designed, and dedicated construction personnel assigned to manage this programme. A checklist of the inspection and maintenance control measures will be developed and records kept. During the construction phase, field testing and laboratory analysis of a range of parameters will be undertaken at adjacent watercourses, specifically following heavy rainfall events (i.e. weekly, monthly and event based as appropriate).	
9.5	To minimise any impact on the underlying subsurface strata from material spillages, all oils and solvents used during construction will be stored within specially constructed dedicated bunded areas. Refuelling of construction vehicles and the addition of hydraulic oils or lubricants to vehicles will take place in a designated area of the site, away from surface water gullies or drains. Spill kits and hydrocarbon absorbent packs will be stored in this area and operators will be fully trained in the use of this equipment. For certain vehicles which are less mobile, refuelling may need to occur elsewhere on site. A spill kit will be stored with the bowser and the person operating the bowser will be trained in their use. When not in use this will be stored in the designated area of the construction compounds. All construction waste will be sorted and stored in on-site skips, prior to removal by a licensed waste management contractor.	
9.6	Concrete is required for the construction of the power plant infrastructure and tank farm foundations. After concrete is poured at a construction site, the chutes of ready mixed concrete trucks must be washed out to remove the remaining concrete before it hardens. Wash out of the main concrete bottle will not be permitted on site; wash out is restricted only to chute wash out of trucks, mixers and concrete pumps. Wash down and washout of the concrete transporting vehicles will take place at an appropriate facility offsite. The best management practice objectives for concrete chute washout are to collect and retain all the concrete washout water and solids in leak proof containers or impermeable lined wash out pits, so that the wash material does not reach the soil surface and then migrate to surface waters or into the ground water. The collected concrete washout water and solids will be emptied on a regular basis. Washout will be undertaken at the construction compounds.	
9.7	With regards to on-site storage and handling of potentially pollutant materials: • Fuels and chemicals will be stored within bunded areas as appropriate to guard against potential accidental spills or leakages. The bund area will have a volume of at least 110 % of the volume of such materials stored; • All on-site refuelling will be carried out by a trained competent operative. • Mobile measures such as drip trays and fuel absorbent mats kept with all plant and bowsers and will be used as required during all refuelling operations; • A spill kit will be stored with the bowser and the person operating the bowser will be trained in their use; • All equipment and machinery will have regular checking for leakages and quality of performance and will carry spill kits;	

	• Any servicing of vehicles will be confined to designated and suitably protected areas such as construction compounds; and • Additional drip trays and spill kits will be kept available on site, to ensure that any spills from vehicles are contained and removed off site.	
9.8	In-stream construction work will only be carried out during the period permitted by Inland Fisheries Ireland for in-stream works according to the Eastern Regional Fisheries Board (2004) guidance document "Requirements for the Protection of Fisheries Habitat during Construction and Development Works at River Sites", that is, May to September inclusive. This time period coincides with the period of lowest expected rainfall and, therefore, minimum runoff rates. This will minimise the risk of entrainment of suspended sediment in surface water runoff, and transport via this pathway to surface watercourses. It should be noted the only instream works will comprise of the installation of a surface water outfall to the stream. Runoff will be maintained at Greenfield (pre-development) runoff rates. The layout of the development has been designed to collect surface water runoff from hardstanding areas within the development and discharge to associated surface water attenuation adjacent to the proposed infrastructure. It will then be managed by gravity flow at Greenfield runoff rates. Suspended solid (silt) removal features will be implemented in accordance with CIRIA C697 SuDS Manual, and CIRIA C648 Control of water pollution from linear construction projects.	
9.9	Interceptor drains/diversion ditches will be installed ahead of the main earthworks activities to minimise the effects of collected water on the stripped/exposed soils once earthworks commence. This drainage will integrate into the existing site drainage. These drainage ditches will be installed on the upgradient boundary of the areas affected by the foundation edge earthworks operations and installed ahead of the main foundation construction operations commencing. They will generally follow the natural flow of the ground. The interceptor drains will intercept any storm water surface run-off and collect it to the existing low points in the ground, allowing the clean water flows to be transferred independently through the works without mixing with the construction drainage.	
9.10	Infrastructure drainage/swales are required to control run-off from the running surface to lower water levels in the subgrade, to control surface water and to carry this flow to outlet points. Swales wills be installed in advance of the main construction phase. Swales will provide additional storage of storm water where located along gradient. Swales will be re-vegetated by hydro-seeding with indigenous seed mix as soon as is practicable following excavation. This will reduce the flow velocity, treat potential pollutants, increase filtration and silt retention. All stockpiled material will be side cast, battered back and profiled to reduce rainfall erosion potential. The stockpiling of materials will be carefully supervised as per the mitigation measures listed in Section 8.5.1 within Chapter 8, Soils and Geology. A number of ephemeral drainage features (drains) are also present on site. These appear dry except during dry weather. Culverting of these will only take place during dry weather periods. Culverts will be designed to be of a size adequate to carry expected peak flows. Culverts will be installed to conform, wherever possible, to the natural slope and alignment of the drainage line. Where required, culverts will be buried at an appropriate depth below the channel bed and the original bed material placed at the bottom of the culvert. The sizing of	

	any new internal drainage crossings will maintain existing depth of flow and channel characteristics.	
9.11	Silt fencing will be erected at the location of stream crossings along the grid connection route. Silt curtains and floating booms will also be used where deemed to be appropriate and this will be assessed separately at each individual location. Excavated material will not be stockpiled or side-cast within 10m of a watercourse. Appropriate steps will be taken to prevent soil/dirt generated during the grid connection route works from being transported on the public road. Road sweeping vehicles will be used to ensure that the public road network remains free of soil/dirt from the location of the grid connection when required. This will reduce the potential for sedimentation of surface watercourses locally. Further mitigation measures in relation to the grid connection cable route works are outlined in the CEMP. There will be no natural watercourse crossings along the grid connection route.	
9.12	Notwithstanding the negligible risk of serious spillage, additional spillage protection measures are included in the mitigation measures for the Proposed Development. In the unlikely event of a minor spill, the spill will be collected by the dedicated refuelling hardstand area, only completed by trained operatives and spill kits to be made readily available. Additional measures in relation to hydrocarbon or oil spills are further discussed in Section 9.6.4.1. Section 8.5 outlines mitigation measures in relation to potential contaminants.	
	The volumes of hydrocarbons and chemical storage or will be kept to a minimum (as required), subject to a COSHH (Control of Substances Hazardous to Health) assessment and compliance with the requirements of REACH, i.e., European Communities Regulation 1907/2006 for the Regulation, Evaluation, Authorisation and Restriction of Chemicals. Operators will receive specific training on the handling, containment, use and disposal for all hazardous substances on site.	
9.13	The operational team will carry out maintenance works such as servicing of the power plant infrastructure, upkeep of access, any hardstand and sealed areas (i.e., foundations for power plant buildings, car park, bunded structures), ensuring drainage system remains functional throughout the operation of the power plant.	Operational Phase
9.14	Mitigation measures for the potential release of hydrocarbons or oil spills include: • The plant and vehicles to attend site should be regularly inspected or at least prior to the scheduled site visit to be free from leaks and is fit for purpose; • Fuels stored on site will be minimised, any storage areas will be bunded appropriately for the fuel storage volume for the time period of the operation; • Operational team to be competent and trained in an emergency plan for the operation phase to deal with accidental spillages; and • Spill kits will be available to deal with accidental spillages.	
9.15	All fuel will be stored in bunded areas. The bund capacity will be sufficient to accommodate 110% of the largest tank's maximum. The exception to this being double walled tanks equipped with leak detection, which do not require additional retention. A hydrocarbon interceptor will be installed at the proposed fuel (fuel tanks, lubricating oil storage) site with regular inspection and	

	maintenance, to ensure optimal performance. Regular bund testing will be undertaken in accordance with BAT guidance. In order to comply with CRU requirements, low sulphur diesel oil will be stored as a backup fuel. The tanks will be bunded in accordance with the requirements set out in the EPA publication, 'Storage and Transfer of Materials for Scheduled Activities' (2004), which states bunds are to contain 110% of the volume of the tank in the event of a tank rupture. Diesel oil will be delivered to site by road tankers. A standard operating procedure will be followed during tanker unloading and filling of the bulk tank. The bulk tank will be fitted with a high-level alarm to prevent overfilling. There will be a dedicated tanker unloading area surrounded by a drainage channel which will drain to a petrol interceptor. This separator will provide for full retention of any material in the event of a rupture and spillage of a tanker compartment. A shut-off device incorporated into the separator will close the outlet in the event of its capacity being exceeded.	
9.16	As part of the surface water drainage design strategy, the following items have been included in order to effectively manage surface water at the site: • Surface Water Pumps in Duty/Standby Arrangement – A standard duty/standby arrangement including high level alarms, float switches, and associated telemetry will be provided; • Petrol Interceptor – Full retention petrol interceptors have been included in the surface water collection system on a precautionary basis. The full retention petrol interceptors will be fitted with visual and audible alarms to ensure containment facilities are adequately maintained. In addition, this alarm will be linked to telemetry facilities such that relevant staff will be alerted if oil is detected at trigger levels; and • Down Pipes/Gullies – It is proposed that surface water will be collected from roofed buildings via standard rainwater down pipes while runoff from un-roofed structures will drain to the access roads where it will enter the drainage network via road gullies. It is also proposed that gullies and drain entry points will incorporate silt traps to remove any grit or silt which may be washed into the drainage system. • Flow Control Device – It is proposed to limit the surface water runoff from the site to be similar to the Greenfield runoff as per the requirements of the Great Dublin Strategic Drainage Study. It is proposed to install a Hydrobrake downstream of an attenuation tank to limit the flow from the site to 4.1l/s. • Attenuation Tank – it is proposed to attenuate all storm water accumulated on site within an underground attenuation tank, which will be discharged to the Baldonnel stream via a Hydrobrake. • Swale – it is proposed to install a swale to collect runoff from the adjacent Northeast Road. The water once permeated into the swale will be directed towards the surface water drainage infrastructure via a perforated pipe and above ground falls. The swale will also slow the surface water at source, increase the quality of water which is intercepted by the system through infiltration, biodegradation and pollutant settlement. • Permeable Paving – It is proposed to install permeable paving within the car parking areas of the site. The water once permeated into the pavement will be directed towards the surface water drainage infrastructure via a perforated pipe and above ground falls. The permeable paving will also slow the surface water at source, increase the quality of water which is intercepted by the system through infiltration, biodegradation and pollutant settlement.	

	• Infiltration Basin – It is proposed to install an infiltration basin within the site to allow for surface water collected from the southern end of the site to infiltrate into the ground water. The infiltration basin will also be provided with a perforated overflow pipe to direct the excess surface water to the attenuation tank during heavier rainfall events.	
9.17	Operators will receive specific training on the handling, containment, use, and disposal requirements for all potentially polluting products on site. All chemicals stored on site will be subject to a COSHH (Control of Substances Hazardous to Health) assessment and compliance with the requirements of REACH, i.e., European Communities Regulation 1907/2006 for the Regulation, Evaluation, Authorisation and Restriction of Chemicals. Chemicals will be managed in accordance with European Chemicals Agency's Guidance for Downstream Users (2014). Final selection of bulk chemicals will be subject to an assessment of trace elements to ensure that they are within acceptable limits. In addition to this: • All potentially polluting substances, including waste, will be stored in designated areas in appropriate UN approved containers within bunds, drip trays, or spill pallets, as deemed necessary; • All containers and bunds will be inspected regularly to ensure they have not become damaged or degraded; • Hazardous compressor cleaning products will be segregated in a locked cabinet with limited access to prevent misuse. This cabinet will be made of suitably fire rated material; • All areas on site with potentially polluting substances will be hardstanding with drainage networks directing run-off to contained areas; • Accidental spillages will be contained and cleaned immediately by suitably trained personnel; • Spill equipment stocks will be stored at strategic locations around the site. Stocks will be subject to regular inventory checks. Incidents, accidents, and near-misses will be recorded on site and notified to the appropriate authorities in accordance with licence requirements; and • An Emergency Incident Response Plan will be developed and implemented in consultation with the local emergency services. This plan will include emergency response contact details for site personnel and emergency services, maps and plans of the facility, emergency procedures, chemical inventories, and equipment lists.	
9.18	The fire-fighting protection system philosophy is based on widely recognized National Fire Protection Association (NFPA) standards. Piping and equipment may still follow standards used by the fire protection equipment supplier. The standpipe system inside the engine hall will follow 'NFPA14 class II standpipe system' requirements. Additionally, mobile foam units will be provided. For immediate action against small local fires, the engine hall will be equipped with a number of powder extinguishers at strategic locations and CO2 extinguishers for electrical fires (spacing as per NFPA10). The fire main will be built using the design guideline 'NFPA24 Private fire service main'. The firefighting pump will operate on diesel. The pump will be located within the fire pump house. The pump will only be used in an emergency and for short duration testing.	
9.19	In the event that the facility is decommissioned, the following programme will be implemented: • All plant equipment and machinery will be emptied, dismantled, and stored under appropriate conditions until it	Decommissioning Phase

	can be sold. If a buyer cannot be found, the material will be recycled or disposed of through licensed waste contractors and hauliers. If plant and machinery is required to be cleaned on site prior to removal, all necessary measures will be implemented to prevent the release of contaminants; • All waste will be removed from the facility; and • The site and all associated buildings will be secured. • Waste will be recycled wherever possible. Licensed waste contractors will control all waste movement, recycling, and disposal operations. Details of provisions to decommission and render safe or remove all materials, waste, ground, plant, or equipment contained on or in the site that may result in environmental pollution will be agreed with the Environmental Protection Agency as part of the Industrial Emissions Licensing process. Mitigation measures applied during decommissioning activities will be similar to those applied during construction where relevant. Mitigation measures to avoid contamination by accidental fuel leakage and compaction of soil by on-site plant will be implemented as per the construction phase mitigation measures in Section 9.4.3. These impacts have therefore been assessed as similar to the construction phase. Mitigation measures for the construction phase will therefore also be implemented during decommissioning.	

1.2.4 Mitigation Measures Chapter 10 – Air Quality and Climate

Item	Mitigation Measure	Project Stage
Chapter 10 - Air Quality and Climate		
10.1	The objective of dust control at the site is to ensure that no significant nuisance occurs at nearby sensitive receptors. In order to develop a workable and transparent dust control strategy, the following management plan has been formulated by drawing on best practice guidance from Ireland, the UK and the USA based on the following publications: • 'Guidance on the Assessment of Dust from Demolition and Construction' (IAQM, 2014); • 'Planning Advice Note PAN50 Annex B: Controlling The Environmental Effects Of Surface Mineral Workings Annex B: The Control of Dust at Surface Mineral Workings' (The Scottish Office, 1996); • 'Controlling the Environmental Effects of Recycled and Secondary Aggregates Production Good Practice Guidance' (UK Office of Deputy Prime Minister, 2002); • 'Controlling Particles, Vapours & Noise Pollution From Construction Sites' (BRE, 2003); • 'Fugitive Dust Technical Information Document for the Best Available Control Measures' (USEPA, 1997); and • 'Compilation of Air Pollutant Emission Factors, AP-42, Fifth Edition' (periodically updated) (USEPA, 1986).	Construction Phase
10.2	In terms of dust soiling and PM_{10} effects, best practice mitigation measures for the proposed power plant as outlined in guidance from the IAQM are presented below. These mitigation measures should be	

incorporated into the proposed development's Construction Environment Management Plan (CEMP).

- Communication and Site Management
  - Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary;
  - Display the head or regional office contact information; and
  - It is recommended that community engagement be undertaken before works commence on site explaining the nature and duration of the works to local residents.
  - Record all dust and air quality complaints, identify causes and take appropriate measures to reduce emissions in a timely manner and record the measures taken;
  - Make a complaint log available to the local authority, when requested; and
  - Record any exceptional incidents that cause dust and or air emissions, either on or off site, and the action taken to resolve the situation in the log book.
- Monitoring
  - Carry out regular site inspections to monitor compliance with the DMP, record inspection results and make an inspection log available to the local authority, when requested; and
  - Increase the frequency of site inspections by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions
- Preparing and maintaining the site
  - Plan site layout so that machinery and dust causing activities are located away from receptors as far as possible;
  - Erect solid screens or barriers around dusty activities or the construction site boundary that are at least as high as any stockpiles;
  - Fully enclose site or specific operations where there is a high potential for dust production and the site is active for an extensive period;
  - Avoid site runoff of water or mud;
  - Keep site fencing, barriers and scaffolding clean using wet methods;
  - Remove materials that have a potential to produce dust from site as soon as possible unless being re-used on site; if they are being reused on site, cover as described below;
  - Cover seed or fence stockpiles to prevent wind whipping;
  - Ensure all vehicles switch off engines when stationary – no idling vehicles;
  - Avoid the use of diesel- or petrol-powered generators and use mains electricity or battery powered equipment, where practicable; and
  - Impose and signpost a maximum-speed limit of 15mph on surfaced and 10mph on unpaved surface haul roads and work areas
- Operations
  - Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction;
  - Ensure an adequate water supply on the site for effective dust/ particulate matter suppression/ mitigation using non-potable water, where possible and appropriate;
  - Use enclosed chutes and conveyors and covered skips;
  - Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use

	fine water sprays on such equipment wherever available; and o Ensure equipment is readily available on site to clean any dry spillages and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods o Measures specific to construction o Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a particular process in which case ensure that appropriate additional controls measures are in place • Measures specific to trackout; o Use water-assisted dust sweepers on the access and local roads to remove as necessary any material tracked out of site; o Avoid dry sweeping of large areas; o Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport; o Inspect on-site haul routes for integrity and instigate necessary repairs to the surface as soon as reasonably practicable; o Record all inspections of haul routes; and o Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable)	
10.3	For the operational scenarios associated with the proposed power plant (either operating on natural gas or oil backup), no mitigation measures in addition to those already inherent to the design of the proposed plant are required. These inherent design features are considered within the dispersion modelling which demonstrates compliance with BAT associated emission levels, IED emission limits and appropriate stack height. The stack heights of the proposed power plant emission points have been designed in an iterative fashion to ensure that an adequate height has been selected to aid dispersion of the emissions and achieve compliance with the EU ambient air quality standards beyond the site boundary (including background concentrations). It should be noted that the proposed power plant will be licensed by the EPA under the industrial emissions licensing process. The licence will state the limits for atmospheric emissions that the proposed power plant will be required to comply with.	Operational Phase
10.4	It is envisaged that the proposed development will be operational for at least 25 years and on cessation of activities, the plant will either be redeveloped as a power related facility, or the site will be redeveloped in an alternative form. In the event where the facility is decommissioned, details of provisions to decommission and render safe or remove all materials, waste, ground, plant, or equipment contained on or in the site that may result in environmental pollution will be agreed with the Environmental Protection Agency as part of the Industrial Emissions Licensing process.	Decommissioning Phase

1.2.5 Mitigation Measures Chapter 11 – Noise

Item	Mitigation Measure	Project Stage
Chapter 11- Noise and Vibration		
11.1	BS 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Noise offers detailed	Construction Phase

	guidance on the control of noise and vibration from construction activities. It is proposed that various practices be adopted during construction as required, including the following: • limiting the hours during which site activities likely to create high levels of noise or vibration are permitted; • establishing channels of communication between the contractor/developer, Local Authority and residents; • appointing a site representative responsible for matters relating to noise and vibration; • monitoring typical levels of noise and vibration during critical periods and at sensitive locations; and • keeping the surface of the site access roads even to mitigate the potential for vibration from lorries. Furthermore, a variety of practicable noise control measures will be employed. These include: • selection of plant with low inherent potential for generation of noise and/ or vibration; • placing of noisy / vibratory plant as far away from sensitive properties as permitted by site constraints, and • regular maintenance and servicing of plant items.	
11.2	The contract documents shall specify that the Contractor undertaking the construction of the works will be obliged to take specific noise abatement measures when deemed necessary to comply with the recommendations of BS 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Noise. The following list of measures will be considered, where necessary, to ensure compliance with the relevant construction noise criteria: • No plant used on site will be permitted to cause an on-going public nuisance due to noise. • The best means practicable, including proper maintenance of plant, will be employed to minimise the noise produced by on site operations. • All vehicles and mechanical plant will be fitted with effective exhaust silencers and maintained in good working order for the duration of the contract. • Compressors will be attenuated models, fitted with properly lined and sealed acoustic covers which will be kept closed whenever the machines are in use and all ancillary pneumatic tools shall be fitted with suitable silencers. • Machinery that is used intermittently will be shut down or throttled back to a minimum during periods when not in use. • Any plant, such as generators or pumps, which is required to operate before 07:00hrs or after 19:00hrs will be surrounded by an acoustic enclosure or portable screen. • During the construction programme, supervision of the works will include ensuring compliance with the limits detailed in Table 12 1 using methods outlined in BS 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Noise. • The hours of construction activity will be limited to avoid unsociable hours where possible. Construction operations shall generally be restricted to between 7:00hrs and 19:00hrs weekdays and between 7:00hrs and 19:00hrs on Saturdays. However, to ensure that optimal use is made of good weather period or at critical periods within the programme (i.e. concrete pours) or to accommodate delivery of large turbine component along public routes it could be necessary on occasion to work outside of these hours. Any such out of hours working will be agreed in advance with the local Planning Authority.	

11.3	Site investigations have indicated that no piling activities are anticipated. Therefore, no mitigation measures are proposed.	
11.4	In the unlikely event of vibration levels giving rise to human discomfort, in order to minimise such impacts, the following measures shall be implemented during the construction period: • A clear communication programme will be established to inform closest building occupants in advance of any potential intrusive works which may give rise to vibration levels likely to exceed perceptible levels. The nature and duration of the works will be clearly set out in all communication circulars. • Alternative less intensive working methods and/or plant items shall be employed, where feasible. • Appropriate vibration isolation shall be applied to plant, where feasible. • Cut off trenches to isolate the vibration transmission path shall be installed where required. • Monitoring will be undertaken at identified sensitive buildings, where proposed works have the potential to be at or exceed the vibration limit values.	
11.5	Noise from external plant will be minimised by the following measures: • Purchasing low noise generating equipment, and; • Incorporating appropriately specified in line attenuators for stacks and exhausts where necessary.	Operational Phase
	The mitigation measures that will be considered in relation to any decommissioning of the site are the same as those proposed for the construction phase of the development.	Decommissioning Phase

1.2.6 Mitigation Measures Chapter 12 – Biodiversity

Item	Mitigation Measure	Project Stage
Chapter 12 – Biodiversity		
12.1	In accordance with Section 40 of the Wildlife Acts, the vegetation (wet grassland) which is proposed to be removed, which may be used as nesting sites by breeding birds, will be cleared outside of the birds nesting season (1st March to 31st August inclusive). This will ensure there is no loss of nests as a result of the proposed construction works. In the event that clearance of vegetation is required within the bird nesting season, vegetation will be first surveyed by an experienced ecologist to identify the presence of active nests. The survey will specifically target ground nesting birds including lapwing and snipe. Only vegetation confirmed to be nest free may be cleared. In the event that a nest is confirmed as present, the nest will either be removed under license obtained from NPWS or the nest will be cordoned off until the chicks have fledged or until nesting has failed. The construction work areas will be demarcated prior to the construction works commencing. No clearance of vegetation will be undertaken outside of the demarcated areas. Disturbed areas of ground will be fully reinstated flowing completion of the works.	Construction Phase
12.2	The implementation of control measures will ensure that there is no potential for impact to ecological receptors in the receiving environment. However, a summary of the sediment and pollution control measures which will be implemented are provided hereunder:	

	• All works must comply with the guidance set out in the guidance document entitled, "Control of Water Pollution from Construction Sites. Guidance for Consultants and Contractors (C532)" (CIRIA, 2001). • Silt fences will be installed along the entire inside boundary of the Baldonnell Stream. Silt fences will also be installed around large stockpiles of material. Silt fences will be constructed using a permeable filter fabric (Hy-Tex Terrastop Premium silt fence or similar). Silt fencing will be installed as per the manufacturer's guidelines and shall be maintained until vegetation on the disturbed ground has been re-established. Once installed, the silt fence shall be inspected regularly during construction and more frequently during heavy rainfall. • Excavation activities will not be carried out during or following heavy rainfall. All stockpiled material will be stored within the site construction compound a minimum of 50m from the Baldonnell Stream. • All concrete will be mixed off site and poured in place at site. All concrete browsers will be washed down at a dedicated concrete washout onsite located within the construction compound or off site. Concrete washings will not be disposed of onsite to any surface or ground water feature. All washings will be removed offsite and treated at a licensed facility. No chemicals that are deleterious to aquatic organisms are to be used in cleaning works. All raw, uncured waste concrete must be cured at a designated location within the construction compound or off site. • Re-fuelling of construction equipment and the addition of hydraulic oil or lubricants to vehicles / equipment will take place in designated hard surface, bunded areas within this construction compound or off site only. If it is not possible to bring machinery to the refuelling point, fuel will be delivered in a double-skinned mobile fuel bowser. A drip tray will be used beneath the fill point during refuelling operations in order to contain any spillages that may occur. Refuelling will only occur within the construction compound or off site.	
12.3	Access routes and entrance sites with the potential to give rise to dust will be regularly watered as appropriate. All stocked piled material will be covered with tarpaulin when not in use. Water misting or bowsers will operate on site as required to reduce dust in dry weather conditions. The transport of sediment or other materials with the potential to generate dust will be undertaken in tarpaulin covered vehicles.	
12.4	All temporary lighting associated with the construction works will be placed strategically by the Contractor following consultation with a suitably qualified ecologist. This will ensure that illumination beyond the works area is controlled. Lighting will be cowled and directional to reduce significant light splay. No lighting will be directed towards the hedgerows and treelines located around the outer boundary of the proposed development site. Only low-pressure sodium, high pressure sodium or LED luminaires will be used on site to ensure that there are no significant negative impacts on bats. In addition, the column height of the temporary lights will be carefully considered to minimise light spill.	
12.5	In the event that any lapwing or snipe nests are identified within the ZoI during the nest survey appropriate mitigation measures in	

	consultation with Bird Watch Ireland will be implemented. Hoarding will be erected between the nest and the proposed development site to limit both noise and visual disturbance.	
12.6	In order to comply with Regulations 49 and 50 of the European Communities (Birds and Natural Habitat) Regulations (2011), the appointed Contractor will ensure biosecurity measures are implemented throughout the construction phase to ensure the introduction and translocation of new invasive species is prevented. The following mitigation measures are prescribed to control the translocation or spread of invasive species and / or pathogens: • Biosecurity measures will be employed during the construction works associated with the drainage ditch instream works. The biosecurity measures will have regard to IFI Biosecurity Protocols including: 'IFI Biosecurity Protocol for Field Survey Work (December 2010)'. • All machinery and equipment used will be inspected and will be completely dry prior to works commencing to prevent the risk of pathogen translocation. A 'Check, Clean, Dry' protocol will be undertaken with all equipment, machinery and vehicles entering and leaving the proposed development site. All equipment/machinery used within the drainage ditch will checked for living plants and animals. Equipment and machinery used will be washed thoroughly and then allowed to dry for at least 48 hours.	
12.7	All new external lighting proposed within the development site will be designed in consultation with a suitably qualified ecologist and in accordance with the Bat Conservation Ireland guidelines; 'Bats and Lighting Guidance Notes: Planners, Engineers, Architects and Developers' (BCI 2010). Lighting will only be switched on when manned. Light shields and directional lighting will be used to minimise light spill. All lighting will be directed away from surrounding linear features including treelines and hedgerows.	Operational Phase
12.8	The same mitigation measures implemented during the construction phase, will be applied during the decommissioning works.	Construction Phase

1.2.7 Mitigation Measures Chapter 13 – Cultural Heritage

Item	Mitigation Measure	Project Stage
Chapter 13 – Cultural Heritage		
13.1	All topsoil/overburden stripping associated with the proposed power plant will be monitored by a suitably qualified archaeologist. If any features of archaeological potential are discovered during the course of the works further archaeological mitigation may be required, such as preservation in-situ or by record. Any further mitigation will require approval from the National Monuments Service of the Department of Housing, Local Government and Heritage (DoHLGH). The mitigation measure identified above would also function as a monitoring system during construction to allow the further assessment of the scale of the predicted impacts and the effectiveness of the recommended mitigation measures.	Construction Phase
13.2	As there are no potential impacts on the cultural heritage resource, no mitigation is deemed necessary	

13.3	No mitigation relating to the operational phase and the archaeological and cultural heritage resource is required.	Operational Phase
13.4	It is envisaged that the proposed development will be operational for at least 25 years and on cessation of activities, the plant will either be redeveloped as a power related facility, or the site will be redeveloped in an alternative form. In the event where the facility is decommissioned, details of provisions to decommission and render safe or remove all materials, waste, ground, plant, or equipment contained on or in the site that may result in environmental pollution will be agreed with the Environmental Protection Agency as part of the Industrial Emissions Licensing process.	Decommissioning phases

1.2.8 Mitigation Measures Chapter 14 – Landscape / Townscape and Visual

Item	Mitigation Measure	Project Stage
Chapter 14 – Landscape and Visual		
14.1	The site is already a much-modified, anthropomorphic site zoned for such purposes. Construction / decommissioning stage impacts on landscape/townscape character will be 'short-term' (i.e. lasting 1-7 years), in accordance with the EPA definitions of impact duration. Furthermore, the context of this construction activity is within an industrial area where HGV movements are frequent and the will be no site access through residential streets/estates. No specific landscape/townscape and visual mitigation is considered necessary.	Construction Phase Decommissioning Phase
14.2	The main mitigation by avoidance measure employed in this instance is the siting of the proposed power plant in a robust, appropriately zoned business park that avails of topographic screening to minimise open visibility from within the study area, as well as availing of existing vegetative screening so that the proposed plant will not be prominent within the surrounding landscape. From the surrounding community, the proposed power plant may appear to be 'clustered' with the pre-existing Digital Realty data centre, located to the immediate south of the site, so both developments will read as one coherent and legible industrial/commercial complex. This is further reinforced by the choice of high quality cladding evident on the proposed structures (specification to be confirmed by SDCC), similar to the Digital Realty data centre. In that regard, there is a strong tonal and textural relationship with adjacent land use, and, when viewed from outside the business park, will read as a modest increase to the visual envelope of development. Furthermore, mitigation has been embedded into the colour scheme of the proposed structures. This has been partly informed by the colour scheme of large buildings existing within the business park, but also through a form of horizontal stratification of the proposed colour scheme. By adopting a tonal transition, from darker tones to lighter shades from the ground upwards, it will help diminish the perceived height of taller structures such as these. In summary, the lighter shades on the tallest structures (i.e. from about 7m high upwards) help to 'visually merge' with the sky backdrop; mid-layer tones are designed to merge with building and tree tops, while lower down (e.g. the bottom 2-3m of each structure) the darker tones help assimilate to earthy soil tones and/or vegetation. In addition, the proposed tanks	Operational phase

	will alternate between two different tones, to help deter perceptions of 'massing.' A Landscape Mitigation Plan has also been prepared for the proposed power plant, which incorporates a buffer of native woodland thicket on the road-facing sides of the site. Along with a proposed native hedgerow and wild grass seeding elsewhere on the site, it will soften the appearance of buildings and to help integrate the site into the surrounding landscape setting. Overall, the landscape proposals serve to add a high quality landscape finish to the apron of the facility and help to anchor and establish it within its business park setting. However, the site landscaping is mainly apparent within the immediate visual context of the facility and is not intended as screen planting in respect of receptors within the wider area.	

1.2.9 Mitigation Measures Chapter 15 -Traffic and Transportation

Item	Mitigation Measure	Project Stage
Chapter 15 – Traffic and Transportation		
15.1	Mitigation measures to reduce or eliminate construction phase impacts will be implemented as part of a Construction Traffic Management Plan (CTMP). An Outline CTMP has been prepared for planning application purposes and the final Site-Specific Construction Traffic Management Plan will be produced by the appointed Contractor and PSCS in conjunction with the PSDP for the project. The final TMP will address the following issues: • Site Access & Egress; • Traffic Management Signage; • Routing of Construction Traffic / Road Closures; • Timings of Material Deliveries to Site; • Traffic Management Speed Limits; • Road Cleaning; • Road Condition; • Road Closures; • Enforcement of Traffic Management Plan • Details of Working Hours and Days; • Details of Emergency plan; • Communication; • Construction Methodologies; and • Particular Construction Impacts.	Construction Phase
15.2	It is not envisaged that there will be mitigation measures required for the operation phase of the proposed power plant due to the minimal impact of traffic during this phase.	Operational Phase
15.3	It is envisaged that the proposed development will be operational for at least 25 years and on cessation of activities, the plant will either be redeveloped as a power related facility or the site will be redeveloped in an alternative form. In the event where the facility is decommissioned, details of provisions to decommission and render safe or remove all materials, waste, ground, plant, or equipment contained on or in the site that may result in environmental pollution	Decommissioning Phase

	will be agreed with the Environmental Protection Agency as part of the Industrial Emissions Licensing process.	

1.2.10 Mitigation Measures Chapter 16 – Material Assets

Item	Mitigation Measure	Project Stage
Chapter 16 – Material Assets		
16.1	There are no mitigation measures relating to existing properties outside of Profile Park. Within Profile Park impacts on the neighbouring Digital Realty data centre will be mitigated in accordance with the CEMP	Construction Phase
16.2	The proposed works will require the crossing of road infrastructure and the opening of some roads to lay underground electrical cables and a gas pipeline. Chapter 15 (Traffic and Transport) details specific mitigation measures to be undertaken during the construction phase to eliminate and reduce any impacts on the road network	
16.3	During the project detailed design stage, further consultation will be undertaken with all communication utility providers to confirm the current locations of their infrastructure. This information will be considered in the detailed design of the project and the infrastructure avoided where possible.	
16.4	While it is unlikely that any cranes used during construction will reach the aerodrome's Inner Horizontal Surface, it will be necessary [under S.I. 215 of 2005 – 'Irish Aviation Authority (Obstacles to Aircraft in Flight) Order'] for prior notification of the use of any crane/s to be submitted, at least 30 days in advance, to the Irish Aviation Authority and to Casement Aerodrome (through the Department of Defence)	
16.5	All impacts to land resources will be mitigated in accordance with the CEMP. In summary, the application of general construction best practise will ensure limited nuisance is experienced at this location.	
16.6	No specific mitigation measures are required during the construction phase with regards to geological resources.	
16.7	Mitigation measures for the protection of watercourses are detailed in Chapter 9 (Hydrology & Hydrogeology) and will be adhered to throughout the construction phase.	
16.8	Consideration will be given to the sustainable sourcing of all materials. Materials will be reused where possible. The methodologies chosen at design stage, will result in a decrease in the amount of imported material, which in turn will reduce the impact of traffic on the surrounding roads and will result in less demand on non-renewable sources such as quarries. Other mitigation measures which will be employed in relation to raw materials are as follows: • Design will be optimised to minimise the requirements for raw materials; • Materials will be reused where possible; • Raw materials will be sourced locally where possible; and Raw materials will be managed in accordance with the CEMP for construction.	

16.9	The only mitigation and monitoring measures required during operations relate to aviation. The Department of Defence has advised on the following requirements: • Due the proximity to Casement Aerodrome and site location within EIR23 airspace, should negative impacts to Air Corps flight operations occur from flue emissions or otherwise, Greener Ideas Limited will take immediate actions to mitigate such impacts to an acceptable level. • Due to the proximity to Casement Aerodrome, Greener Ideas Limited will implement adequate bird control measures during the construction phase to mitigate the effects of birds on Air Corps flight operations.	Operational phase
16.10	It is envisaged that the proposed development will be operational for at least 25 years and on cessation of activities, the plant will either be redeveloped as a power related facility, or the site will be redeveloped in an alternative form. In the event where the facility is decommissioned, details of provisions to decommission and render safe or remove all materials, waste, ground, plant, or equipment contained on or in the site that may result in environmental pollution will be agreed with the Environmental Protection Agency as part of the Industrial Emissions Licensing process.	Decommissioning Phase

1.2.11 Mitigation Measures Chapter 17 – Major Accidents and Disasters

Item	Mitigation Measure	Project Stage
Chapter 17 – Major Accidents and Disasters		
17.1	The proposed power plant will be designed and constructed in line with good industry practice, and, as such, mitigation against the risk of major accidents and/or disasters will be embedded through the design and in accordance with planning and Industrial Emissions License requirements. Below are various mitigation and monitoring measures which will ensure this to be the case: • To mitigate against Extreme heat or cold weather and storm events, the power plant will be constructed, operated and decommissioned in accordance with all relevant planning, building and environmental licensing codes during Construction / Operation / Decommissioning phases • No mitigation is required against flooding during Construction / Operation / Decommissioning phases • To mitigate against pollution to soils / groundwater / surface waters, the CEMP during Construction will be implemented, EIAR and IE licence conditions will be implemented during operations, and a Decommissioning Management Plan will be implemented during decommissioning • To mitigate against atmospheric emissions during operation which exceed EPA Industrial Emissions Licensed parameters, exhaust gases from the gas engines will be emitted to atmosphere through the exhaust stack. The stack will incorporate an in-situ proprietary Continuous Emission Monitoring System (CEMS). The selection, installation, calibration, ongoing quality assurance and annual surveillance testing of the CEMS will be undertaken in accordance with BAT.	Construction/ Operation/ Decommissioning Phase

	• To mitigate a leak of natural gas during operation, the engine house will be fitted with pressure monitoring to detect a pressure drop and a gas detection system that will be interlocked with the plant control system • To mitigation a leak from the lubricating oil cooling system during operation, the entire lubricating oil system will be subject to regular inspection and maintenance to avoid leaks • To mitigate against fire in a transformer resulting in emissions of combustion products during operation, all transformers are fitted with protection systems to protect against faults and prevent explosion. • To mitigate against low sulphur diesel oil spillages during tanker unloading/delivery operations during operation, Where refuelling is to take place on site it will be in an impermeable bunded area which will be subject to regular inspection and integrity testing in accordance with Industrial Emissions licensing requirements. • To mitigate against leaks and catastrophic failure of storage tanks during operation, in order to prevent escape of liquid fuel oil, in the unlikely event of a catastrophic failure of the tanks, a secondary containment system in the form of a tank bund will be provided. The bund will be fitted with pumping facilities to enable drainage of collected surface water. The storm water will pass through a silt trap and hydrocarbon interceptor prior to discharge. The bund will be fitted with ramps to allow access by the emergency services and maintenance personnel. All tanks, bunds and pipe networks will be designed and tested in accordance with BAT. • To mitigate against Tank fire or bund fire during operation, In the improbable event of a major leak from the tank to the bund it is unlikely that this will lead to a fire as diesel has a flash point of greater than 55°C and is not classified as flammable. There will be no sources of ignition in the bund • To mitigate against failure of pipework during operation, pipes, bunds and storage facilities will be regularly checked for deterioration, damage and leaks. Integrity testing and the maintenance of all abatement, control and monitoring equipment will be incorporated into the onsite maintenance programmes. • To mitigate against leakage of chemical from storage containers or pipework during operation, Conditioning chemicals will be stored relatively small quantities in a dedicated chemical storeroom within the water treatment plant which will be provided with appropriate ventilation and temperature control. Drums and IBC's will be stored on drip trays / spill pallets. The store will be enclosed and shall be capable of fully containing any spills within. A spill kit will also be located in close proximity to the chemical store. Only experienced and trained personnel will be permitted access to the chemical store on site. As required, conditioning chemicals will be transferred from the storeroom to the water treatment plant to replenish the dosing tanks. The transfer route will be kept clear of all obstacles to allow the safe transfer of chemicals. Dosing tanks will be fitted with level indicators and located within bunds. Transfer of chemicals will be undertaken by trained personnel only. The dosing tank level indicators and bunds will be subject to regular inspections. Cleaning products will be of a water based biodegradable nature wherever possible. Any hazardous cleaning products will be segregated in a locked cabinet with limited access to prevent misuse. • To mitigate against building fire during operation, fire prevention policy procedures will be followed.	

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3.1 IRISH WATER PRE-CONNECTION ENQUIRY CONFIRMATION

Mark McCarthy

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Irish Water
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Delivery Office,
Cork City

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11 May 2021

Re: CDS21002228 pre-connection enquiry - Subject to contract | Contract denied

Connection for Business Connection of 1 unit at Profile Park, Baldonnel, Co. Dublin

Dear Sir/Madam,

Irish Water has reviewed your pre-connection enquiry in relation to a Water & Wastewater connection at Profile Park, Baldonnel, Co. Dublin (the **Premises**). Based upon the details you have provided with your pre-connection enquiry and on our desk top analysis of the capacity currently available in the Irish Water network(s) as assessed by Irish Water, we wish to advise you that your proposed connection to the Irish Water network(s) can be facilitated at this moment in time.

SERVICE	OUTCOME OF PRE-CONNECTION ENQUIRY THIS IS NOT A CONNECTION OFFER. YOU MUST APPLY FOR A CONNECTION(S) TO THE IRISH WATER NETWORK(S) IF YOU WISH TO PROCEED.
Water Connection	Feasible without infrastructure upgrade by Irish Water
Wastewater Connection	Feasible without infrastructure upgrade by Irish Water
SITE SPECIFIC COMMENTS	
The design and construction of the Water & Wastewater pipes and related infrastructure to be installed in this development shall comply with the Irish Water Connections and Developer Services Standard Details and Codes of Practice that are available on the Irish Water website. Irish Water reserves the right to supplement these requirements with Codes of Practice and these will be issued with the connection agreement.	

Stiúrthóirí / Directors: Cathal Marley (Chairman), Niall Gleeson, Eamon Gallen, Yvonne Harris, Brendan Murphy, Maria O'Dwyer
Oifig Chláraithe / Registered Office: Teach Colvill, 24-26 Sráid Thalbóid, Baile Átha Cliath 1, D01 NP86 / Colvill House, 24-26 Talbot Street, Dublin 1, D01 NP86
Is cuideachta ghníomhaíochta ainmnithe atá faoi theorainn scaireanna é Uisce Éireann / Irish Water is a designated activity company, limited by shares.
Uimhir Chláraithe in Éirinn / Registered in Ireland No.: 530363

General Notes:

1) The initial assessment referred to above is carried out taking into account water demand and wastewater discharge volumes and infrastructure details on the date of the assessment. **The availability of capacity may change at any date after this assessment.**
2) This feedback does not constitute a contract in whole or in part to provide a connection to any Irish Water infrastructure. All feasibility assessments are subject to the constraints of the Irish Water Capital Investment Plan.
3) The feedback provided is subject to a Connection Agreement/contract being signed at a later date.
4) A Connection Agreement will be required to commencing the connection works associated with the enquiry this can be applied for at https://www.water.ie/connections/get-connected/
5) A Connection Agreement cannot be issued until all statutory approvals are successfully in place.
6) Irish Water Connection Policy/ Charges can be found at https://www.water.ie/connections/information/connection-charges/
7) Please note the Confirmation of Feasibility does not extend to your fire flow requirements.
8) Irish Water is not responsible for the management or disposal of storm water or ground waters. You are advised to contact the relevant Local Authority to discuss the management or disposal of proposed storm water or ground water discharges
9) To access Irish Water Maps email datarequests@water.ie
10) All works to the Irish Water infrastructure, including works in the Public Space, shall have to be carried out by Irish Water.

If you have any further questions, please contact Marina Byrne from the design team via email mzbyrne@water.ie. For further information, visit **www.water.ie/connections.**

Yours sincerely,

Yvonne Harris

Yvonne Harris
Head of Customer Operations

Pre-connection enquiry form

Business developments, mixed use developments, housing developments

This form is to be filled out by applicants enquiring about the feasibility of a water and/or wastewater connection to Irish Water infrastructure. If completing this form by hand, please use BLOCK CAPITALS and black ink.

Please refer to the **Guide to completing the pre-connection enquiry form** on page 13 of this document when completing the form.

*** Denotes mandatory/ required field. Please note, if mandatory fields are not completed the application will be returned.**

Section A | Applicant details

1 *Applicant details:

Registered company name (if applicable): CENTRICA BUSINESS SOLUTIONS

Trading name (if applicable):

Company registration number (if applicable): 299715

If you are not a registered company/business, please provide the applicant's name:

*Contact name: C/O SHANE MINEHANE

*Postal address: HEAD OF BUSINESS OPERATIONS, CENTRICA, 1 SEAPOINT BUILDING, 44-45 CLONTARF RD, D3

*Eircode: D03F4A7

*Telephone: 0860108663

Mobile:

*Email: SHANE.MINEHANE@CENTRICA.C

2 Agent details (if applicable):

Contact name: MARK MC CARTHY

Company name (if applicable): TOBIN CONSULTING

Postal address: BLOCK 10-4, BLANCHARDSTOWN CORPORATE PARK, DUBLIN

Eircode: D15X98N

Telephone: 0863590949

Email: MARK.MCCARTHY@TOBIN.IE

3 ***Please indicate whether it is the applicant or agent who should receive future correspondence in relation to the enquiry:**

Applicant [ ] Agent [X]

Section B | Site details

4 ***Site address:** PROFILE PARK, BALDONNEL,
DUBLIN 22

5 ***Irish Grid co-ordinates of site:** Eastings (X) 303888 Northings (Y) 230484

Eg. co-ordinates of GPO, O'Connell St., Dublin: E(X) 315,878 N(Y) 234,619

6 ***Local Authority:**

Local Authority that granted planning permission (if applicable):

SOUTH DUBLIN COUNTY COUNCIL

7 ***Has full planning permission been granted?** Yes [ ] No [X]

If 'Yes', please provide the current or previous planning reference number:

Section C | Development details

8 Please outline the domestic and/or industry/business use proposed:

Property type	Number of units	Property type	Number of units	Property type	Number of units
House		Apartments		Agricultural	
Office		School		Retail unit	
Residential care home		Institution		Industrial unit	
Hotel		Factory		Other	
Other (please specify type)	Gas power plant				

9 *Approximate start date of proposed development: 01 / 10 / 2022

10 *Is the development multi-phased? Yes [ ] No [x]

If 'Yes', application must include a master-plan identifying the development phases and the current phase number.

If 'Yes', please provide details of variations in water demand volumes and wastewater discharge loads due to phasing requirements.

11 *Please indicate the type of connection required by ticking the appropriate box below:

Water [ ] Please go to Section D

Wastewater [ ] Please go to Section E

Both [x] Please complete both Sections D and E

Section D | Water connection and demand details

12 ***Is there an existing connection to public water mains at the site?** Yes [ ] No [x]

12.1 If yes, is this enquiry for an additional connection to one already installed? Yes [ ] No [x]

12.2 If yes, is this enquiry to increase the size of an existing connection? Yes [ ] No [x]

13 **Approximate date water connection is required:** 01 / 10 / 2022

14 ***What diameter of water connection is required to service the development?** 100 mm

15 ***Is more than one connection required to the public infrastructure to service this development?** Yes [ ] No [x]

If 'Yes', how many? [ ]

16 **Please indicate the business water demand (shops, offices, schools, hotels, restaurants, etc.):**

Post-development peak hour water demand	0.1157	**l/s**
Post-development average hour water demand	0.1	**l/s**

Please include calculations on the attached sheet provided. Where there will be a daily/weekly/seasonal variation in the water demand profile, please provide all such details.

17 **Please indicate the industrial water demand (industry-specific water requirements):**

Post-development peak hour water demand	0	**l/s**
Post-development average hour water demand	0	**l/s**

Please include calculations on the attached sheet provided. Where there will be a daily/weekly/seasonal variation in the water demand profile, please provide all such details.

18 **What is the existing ground level at the property boundary at connection point (if known) above Malin Head Ordnance Datum?** 74.80 m

19 **What is the highest finished floor level of the proposed development above Malin Head Ordnance Datum?** 74.90 m

20 **Is on-site water storage being provided?** Yes [ ] No [x]

Please include calculations on the attached sheet provided.

21 **Are there fire flow requirements?** Yes [x] No [ ]

Additional fire flow requirements over and above those identified in Q16-17		**l/s**

Please include calculations on the attached sheet provided, and include confirmation of requirements from the Fire Authority.

22 **Do you propose to supplement your potable water supply from other sources?** Yes [ ] No [x]

If 'Yes', please indicate how you propose to supplement your potable water supply from other sources (see **Guide to completing the application form** on page 12 of this document for further details):

Section E | Wastewater connection and discharge details

23 ***Is there an existing connection to a public sewer at the site?** Yes [ ] No [x]

23.1 If yes, is this enquiry for an additional connection to the one already installed? Yes [ ] No [x]

23.2 If yes, is this enquiry to increase the size of an existing connection? Yes [ ] No [x]

24 ***Approximate date that wastewater connection is required:** 01 / 10 / 2022

25 ***What diameter of wastewater connection is required to service the development?** 100 mm

26 ***Is more than one connection required to the public infrastructure to service this development?** Yes [ ] No [x]

If 'Yes', how many? [ ]

27 **Please indicate the commercial wastewater hydraulic load (shops, offices, schools, hotels, restaurants, etc.):**

Post-development peak discharge	0.0017	**l/s**
Post-development average discharge	0.001	**l/s**

Please include calculations on the attached sheet provided.

28 **Please indicate the industrial wastewater hydraulic load (industry-specific discharge requirements):**

Post-development peak discharge	0	**l/s**
Post-development average discharge	0	**l/s**

Please include calculations on the attached sheet provided.

29 **Wastewater organic load:**

Characteristic	Max concentration (mg/l)	Average concentration (mg/l)	Maximum daily load (kg/day)
Biochemical oxygen demand (BOD)		150-500	
Chemical oxygen demand (COD)		300-1000	
Suspended solids (SS)		200-700	
Total nitrogen (N)		22-80	
Total phosphorus (P)		5-20	
Other		above is typcial range as per IS EN 12566	

Temperature range	Standard temp as per wastewater from residential property
pH range	6-9

30 ***Storm water run-off will only be accepted from brownfield sites that already have a storm/surface water connection to a combined sewer. In the case of such brownfield sites, please indicate if the development intends discharging surface water to the combined wastewater collection system:**

Yes [ ] No [x]

If 'Yes', please give reason for discharge and comment on adequacy of SUDS/attenuation measures proposed.

31 ***Do you propose to pump the wastewater?** Yes [ ] No [x]

If 'Yes', please include justification for your pumped solution with this application.

32 **What is the existing ground level at the property boundary at connection point (if known) above Malin Head Ordnance Datum?**

7 4 . 8 0 m

33 **What is the lowest finished floor level on site above Malin Head Ordnance Datum?** 7 4 . 8 0 m

34 **What is the proposed invert level of the pipe exiting the property to the public road?**

7 4 . 2 0 m

Section F | Supporting documentation

Please provide the following additional information (all mandatory):

> Site location map: A site location map to a scale of 1:1000, which clearly identifies the land or structure to which the enquiry relates. The map shall include the following details: [X]

i. The scale shall be clearly indicated on the map.

ii. The boundaries shall be delineated in red.

iii. The site co-ordinates shall be marked on the site location map.

> Details of planning and development exemptions (if applicable). [X]

> Calculations (calculation sheets provided below). [X]

> Site layout map to a scale of 1:500 showing layout of proposed development, water network and wastewater network layouts, additional water/wastewater infrastructure if proposed, connection points to Irish Water infrastructure. [X]

> Conceptual design of the connection asset from the proposed development to the existing Irish Water infrastructure, including service conflicts, gradients, pipe sizes and invert levels. [X]

> Any other information that might help Irish Water assess this pre-connection enquiry. [X]

Section G | Declaration

I/We hereby make this application to Irish Water for a water and/or wastewater connection as detailed on this form.

I/We understand that any alterations made to this application must be declared to Irish Water.

The details that I/we have given with this application are accurate.

I/We have enclosed all the necessary supporting documentation.

Any personal data you provide will be stored and processed by Irish Water and may be transferred to third parties for the purposes of the water and/or wastewater connection process. I hereby give consent to Irish Water to store and process my personal data and to transfer my personal data to third parties, if required, for the purposes of the connection process.

If you wish to revoke consent at any time or wish to see Irish Water's full Data Protection Notice, please see **https://www.water.ie/privacy-notice/**

Signature: [ ] Date: 0 1 / 0 4 / 2 0 2 1

Your full name (in BLOCK CAPITALS):

M A R K M C C A R T H Y

Irish Water will carry out a formal assessment based on the information provided on this form.
Any future connection offer made by Irish Water will be based on the information that has been provided here.

Please submit the completed form to **newconnections@water.ie** or alternatively, post to:

Irish Water
PO Box 860
South City Delivery Office
Cork City

Please note that if you are sending us your application form and any associated documentation by email, the maximum file size that we can receive in any one email is 35MB.

Please note, if mandatory fields are not completed the application will be returned.

Irish Water is subject to the provisions of the Freedom of Information Act 2014 ("FOIA") and the codes of practice issued under FOIA as may be amended, updated or replaced from time to time. The FOIA enables members of the public to obtain access to records held by public bodies subject to certain exemptions such as where the requested records may not be released, for example to protect another individual's privacy rights or to protect commercially sensitive information. Please clearly label any document or part thereof which contains commercially sensitive information. Irish Water accepts no responsibility for any loss or damage arising as a result of its processing of freedom of information requests.

Calculations

Water demand

The gas plant will either be remotely opewrated or will have a small operational workforce.

There is no process water requirement.

The potable water suply has been calculated assuming there may be a maximim of 20 people on the site at the same time. This would be an inlikely and/or infrequent occurance. It is assumed on a worst case scenario that 500 liters per person per day would be required. This equates to 0.1157 l/s.

The attached mapping shows the location of the site and the existing water mains infrastructyre in Profile Park.

On-site storage

n/a

Fire flow requirements

TBC with final design but provisionally assumed there may be a tank on site which would not exceed 500m3.

The gas plant will either be remotely opewrated or will have a small operational workforce.

There is no process wastewater arising from the operation of ths plant.

The wastewater columes have been calculated assuming there may be a maximim of 20 people on the site at the same time. This would be an inlikely and/or infrequent occurance. It is asumed on a worst case scenario that 120 liters per person per day is the required volume for wastewater calcs. This equates to 0.1157 l/s.

The attached mapping shows the location of the site and the existing sewer infrastructure in Profile Park.

Flow balancing and pumping

N/A

Guide to completing the pre-connection enquiry form

This form should be completed by applicants enquiring about the feasibility of a water and/or wastewater connection to Irish Water infrastructure.

The Irish Water Codes of Practice are available at **www.water.ie** for reference.

Section A | Applicant Details

Question 1: This question requires the applicant or company enquiring about the feasibility of a connection to identify themselves, their postal address, and to provide their contact details.

Question 2: If the applicant has employed a consulting engineer or an agent to manage the enquiry on their behalf, the agent's address and contact details should be recorded here.

Question 3: Please indicate whether it is the applicant or the agent who should receive future correspondence in relation to the enquiry.

Section B | Site details

Question 4: This is the address of the site requiring the water/wastewater service connection and for which this enquiry is being made.

Question 5: Please provide the Irish Grid co-ordinates of the proposed site. Irish grid positions on maps are expressed in two dimensions as Eastings (E or X) and Northings (N or Y) relative to an origin. You will find these coordinates on your Ordnance Survey map which is required to be submitted with an application.

Question 6: Please identify the Local Authority that is or will be dealing with your planning application, for example Cork City Council.

Question 7: Please indicate if planning permission has been granted for this application, and if so, please provide the planning permission reference number.

Section C | Development details

Question 8: Please specify the number of different property/premises types by filling in the tables provided.

Question 9: Please indicate the approximate commencement date of works on the development.

Question 10: Please indicate if a phased building approach is to be adopted when developing the site. If so, please provide details of the phase master-plan and the proposed variation in water demand/wastewater discharge as a result of the phasing of the development.

Question 11: Please indicate the type of connection required by ticking the appropriate box and proceed to complete the appropriate section or sections.

Section D | Water connection and demand details

Question 12: Please indicate if a water connection already exists for this site.

Question 12.1: Please indicate if this enquiry concerns an additional connection to one already installed on the site.

Question 12.2: Please indicate if you are proposing to upgrade the water connection to facilitate an increase in water demand. Irish Water will determine what impact this will have on our infrastructure.

Question 13: Please indicate the approximate date that the proposed connection to the water infrastructure will be required.

Question 14: Please indicate what diameter of water connection is required to service this development.

Question 15: Please indicate if more than one connection is required to service this development. Please note that the connection size provided may be used to determine the connection charge.

Question 16: If this connection enquiry concerns a business premises, please provide calculations for the water demand and include your calculations on the calculation sheet provided. Business premises include shops, offices, hotels, schools, etc. Demand rates (peak and average) are site specific. Average demand is the total daily volume divided by a 24-hour time period and expressed in litres per second (l/s). For design purposes, please refer to the Irish Water Codes of Practice for Water Infrastructure.

Question 17: If this connection enquiry is for an industrial premises, please calculate the water demand and include your calculations on the calculation sheet provided. Demand rates (peak and average) are site specific. Average demand is the total daily volume divided by a 24-hour time period and expressed in litres per second (l/s). The peak demand for sizing of the pipe network will be as per the specific business production requirements. For design purposes, please refer to the Irish Water Codes of Practice for Water Infrastructure.

Question 18: Please specify the ground level at the location where connection to the public water mains will be made. This is required in order to determine if there is sufficient pressure in the existing water infrastructure to serve your proposed development. Levels should be quoted in metres relative to Malin Head Ordnance Datum.

Question 19: Please specify the highest finished floor level on site. This is required in order to determine if there is sufficient pressure in the existing water infrastructure to serve your proposed development. Levels should be quoted in metres relative to Malin Head Ordnance Datum.

Question 20: If storage is required, water storage capacity of 24-hour water demand must usually be provided at the proposed site. In some cases, 24-hour storage capacity may not be required, for example 24-hour storage for a domestic house would be provided in an attic storage tank. Please calculate the 24-hour water storage requirements and include your calculations on the attached sheet provided. Please also confirm that on-site storage is being provided by ticking the appropriate box.

Question 21: The water supply system shall be designed and constructed to reliably convey the water flows that are required of the development including fire flow requirements by the Fire Authority. The Fire Authority will provide the requirement for fire flow rates that the water supply system will have to carry. Please note that while flows in excess of your required demand may be achieved in the Irish Water network and could be utilised in the event of a fire, Irish Water cannot guarantee a flow rate to meet your fire flow requirement. To guarantee a flow to meet the Fire Authority requirements, you should provide adequate fire storage capacity within your development. Please include your calculations on the attached sheet provided, and further provide confirmation of the Fire Authority requirements.

Question 22: Please identify proposed additional water supply sources, that is, do you intend to connect to the public water mains or the public mains and supplement from other sources? If supplementing public water supply with a supply from another source, please provide details as to how the potable water supply is to be protected from cross contamination at the premises.

Section E | Wastewater connection and discharge details

Question 23: Please indicate if a wastewater connection to a public sewer already exists for this site.

Question 23.1: Please indicate if this enquiry relates to an additional wastewater connection to one already installed.

Question 23.2: Please indicate if you are proposing to upgrade the wastewater connection to facilitate an increased discharge. Irish Water will determine what impact this will have on our infrastructure.

Question 24: Please specify the approximate date that the proposed connection to the wastewater infrastructure will be required.

Question 25: Please indicate what diameter of wastewater connection is required to service this development.

Question 26: Please indicate if more than one connection is required to service this development. Please indicate number required.

Question 27: If this enquiry relates to a business premises, please provide calculations for the wastewater discharge and include your calculations on the attached sheet provided. Business premises include shops, offices, hotels, schools, etc. Discharge rates (peak and average) are site specific. Average discharge is the total daily volume divided by a 24-hour time period and expressed in litres per second (l/s). For design purposes, please refer to the Irish Water Codes of Practice for Wastewater Infrastructure.

Question 28: If this enquiry relates to an industrial premises, please provide calculations for the wastewater discharge and include your calculations on the calculation sheet provided. Discharge rates (peak and average) are site specific. Average discharge is the total daily volume divided by a 24-hour time period and expressed in litres per second (l/s). The peak discharge for sizing of the pipe network will be as per the specific business production requirements. For design purposes, please refer to the Irish Water Codes of Practice for Wastewater Infrastructure.

Question 29: Please specify the maximum and average concentrations and the maximum daily load of each of the wastewater characteristics listed in the wastewater organic load table (if not domestic effluent), and also specify if any other significant concentrations are expected in the effluent. Please complete the table and provide additional supporting documentation if relevant. Note that the concentration shall be in mg/l and the load shall be in kg/day. Note that for business premises (shops, offices, schools, hotels, etc.) for which only domestic effluent will be discharged (excluding discharge from canteens/ restaurants which would require a Trade Effluent Discharge licence), there is no need to complete this question.

Question 30: In exceptional circumstances, such as brownfield sites, where the only practical outlet for storm/ surface water is to a combined sewer, Irish Water will consider permitting a restricted attenuated flow to the combined sewer. Storm/surface water will only be accepted from brownfield sites that already have a storm/surface water connection to a combined sewer and the applicant must demonstrate how the storm/surface water flow from the proposed site is minimised using sustainable urban drainage system (SUDS). This type of connection will only be considered on a case by case basis. Please advise if the proposed development intends discharging surface water to the combined wastewater collection system.

Question 31: Please specify if the development needs to pump its wastewater discharge to gain access to Irish Water infrastructure.

Question 32: Please specify the ground level at the location where connection to the public sewer will be made. This is required to determine if the development can be connected to the public sewer via gravity discharge. Levels should be quoted in metres relative to Malin Head Ordnance Datum.

Question 33: Please specify the lowest floor level of the proposed development. This is required in order to determine if the development can be connected to the public sewer via gravity discharge. Levels should be quoted in metres relative to Malin Head Ordnance Datum.

Question 34: Please specify the proposed invert level of the pipe exiting the property to the public road.

Section F | Supporting documentation

Please provide additional information as listed.

Section G | Declaration

Please review the declaration, sign, and return the completed application form to Irish Water by email or by post using the contact details provided in Section G.

Notes

Water and wastewater calc as provided.

This is the initial query with IW based on the planning desing which is still a 'live' process. Follow up post planning connection application will also be made to IW.

It is hoped planning permissio will be secured in Q3 2021.

Notes

3.2 CONSTRUCTION ENVIRONMENTAL MANAGEMENT PLAN

TOBIN
CONSULTING ENGINEERS
BUILT ON KNOWLEDGE

Greener Ideas

PROFILE PARK POWER PLANT

CONSTRUCTION ENVIRONMENTAL MANAGEMENT PLAN

JUNE 2021

PROFILE PARK POWER PLANT

CONSTRUCTION ENVIRONMENTAL MANAGEMENT PLAN

Document Control Sheet	
Document Reference	11069
Report Status	Issue Copy
Report Date	June 2021
Current Revision	D01
Client:	GREENER IDEAS LIMITED
Client Address:	C/O Centrica Business Solutions, 1 Seapoint Building, 44-45 Clontarf Road, Dublin 3, D03 F4A7
Project Number	11069

Galway Office	Dublin Office	Castlebar Office
Fairgreen House, Fairgreen Road, Galway, H91 AXK8, Ireland. Tel: +353 (0)91 565 211	Block 10-4, Blanchardstown Corporate Park, Dublin 15, D15 X98N, Ireland. Tel: +353 (0)1 803 0406	Market Square, Castlebar, Mayo, F23 Y427, Ireland. Tel: +353 (0)94 902 1401

Revision	Description	Author:	Date	Reviewed By:	Date	Authorised by:	Date
D01	Issue Copy	LB	02/06/2021	MMC	08/06/2021	MMC	18/06/21

TOBIN Consulting Engineers

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QUALITY NSAI Certified ENVIRONMENT NSAI Certified HEALTH & SAFETY NSAI Certified

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ENGINEERS IRELAND cpd ACCREDITED COMPANY

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Table of Figures

1.0 INTRODUCTION

Greener Ideas Limited (hereafter referred to as the Developer) intend to apply for planning permission to develop a ca. 125 MW dual fuel gas fired power plant at a site located in Profile Park, Dublin 22.

The site of the proposed power plant is located in Profile Park, Dublin 22 which is approximately 3.15km west of Clondalkin town centre. Profile Park is a 100 acre (40.5 Ha) fully enclosed, private business park. The immediate area is predominantly commercial / industrial in nature. Outside of this, Grange Castle Golf Course is located approximately 120m east of the site and Baldonnel Aerodrome 450m south of the site. The nearest residential properties are located some 400m to the south of the site and some 450 m to the northeast.

Immediately adjacent to Profile Park is the Castlebaggot 110 / 220 kV substation which provides electrical transmission connectivity to the national electricity transmission grid system.

The electrical generator associated with the gas engines will connect to the main transformers where the voltage will be increased to 110 kV. Electrical power will then be exported via an underground cable from the plants main transformers to an off site electrical substation. The final route of connection is yet to be confirmed. Electrical power will be exported from the power plant's main transformers to the existing Castlebaggot 220 / 110 kV Substation which is operated by EirGrid or to a new proposed 110 kV substation in Profile Park. No confirmed details of this potential new substation were available for consideration as part of this EIAR.

It should be noted that planning permission is not sought for these connections as part of the power plant application to South Dublin County Council. Either Greener Ideas Limited or EirGrid will be responsible in the future for securing the necessary planning permission for these electrical connections. Similarly, in the event that Greener Ideas Limited and a data centre operator agree for a private power supply to be provided then this would also be subject to its own separate consenting process.

The planning application for the proposed development will be submitted to South Dublin County Council (SDCC) under Section 34 of the *Planning and Development Act 2000* (as amended). An Environmental Impact Assessment Report (EIAR) has been prepared to accompany the planning application and incorporate all elements of the proposed project works including the main power plant site, the electrical grid connection. Collectively this is referred to as the Profile Park Power Plant.

This Construction Environmental Management Plan (CEMP) has been prepared to outline the proposed management and administration of site activities for the Construction Phase of the proposed development, to ensure that all construction activities are undertaken in an environmentally responsible manner. This CEMP summarises the environmental commitments of the construction project, and the measures to ensure compliance with legislation and the requirements of statutory bodies, all as detailed in the EIAR.

This CEMP will be a live document and will be reviewed and updated, as necessary. Upon appointment, the Main Contractor for construction of the proposed development shall update this document to produce a Final CEMP which will account for any additional requirements set out in Planning Conditions.

The following relevant guidance has been referenced in the preparation of this CEMP:

- Environmental Protection Agency (EPA), *Guidelines on the Information to be contained in Environmental Impact Assessment Reports – Draft* (August 2017)

1.1 Proposed Development

The proposed development will comprise the construction and installation of the following:

- Site Entrance;
- Engine Hall, comprising up to 6 no. gas engines and 1 no. exhaust stack cluster with a flue tip height of 31.8m;
- Electrical Annex Building;
- Workshop Building;
- Security Hut;
- Radiator Coolers;
- 110 kV Electrical Transformer(s);
- Gas AGI;
- Tank Farm comprising:
    - 2 x Fuel Oil Storage Tank;
    - SCR reagent Tank;
    - Lube Oil Storage Tank;
    - Lube Oil Maintenance Tank;
    - Pilot Oil Tank;
    - Fire Water Storage Tank;
    - Cooling Water Run-Down Tank;
    - Surface Water Attenuation Tank
    - Bund wall, approximately 1.8m high;
- Perimeter Fencing, approximately 3m high;
- Car Park;
- Landscape planting around perimeter of site.

A 10-year planning permission is being sought and the power plant is expected to be operational for at least 25 years from the date of commissioning. On cessation of activities, the plant will either be redeveloped as a power related facility, or the site will be redeveloped in an alternative form.

1.2 Scope of this CEMP

This CEMP addresses all relevant environmental aspects of the management of site preparation and construction work within the proposed development works area as set out in Section 1.1. The scope of this CEMP includes:

- All construction elements of the proposed development;
- The proposed implementation and management of environmental controls and mitigation measures during each phase of construction works; and
- A documented process to ensure measures identified through the planning phase of the proposed development will be applied in practice.

This CEMP contains:

- A statement of the environmental aims and policy objectives of the proposed development;
- Roles and responsibilities of key individuals;
- Environmental management and reporting structure;
- Site management and construction activity details;

- Environmental mitigation measures;
- Environmental awareness training programmes;
- Environmental monitoring programmes and requirements;
- Inspection and auditing programmes; and
- Emergency response plans and procedures for any environmental incidents.

This CEMP should be read in conjunction with the EIAR and supporting documentation. In the unlikely event of any contradiction between this CEMP and the EIAR, the EIAR shall take precedence.

1.3 Implementation of the CEMP

Key to the implementation of this CEMP is the delegation of responsibility for the CEMP to the Construction Environmental Manager/Safety, Health, Environmental and Quality (SHEQ) Officer, or other suitably qualified appointed person on behalf of the Contractor, who will regularly liaise with and update the Developer on all environmental issues relating to the project during the construction phase. As part of the appointment of a Contractor and agreement of Contracts, the Developer will determine the lines of communication for environmental compliance with the local authorities and relevant stakeholders.

In terms of overall environmental responsibility, everyone on-site is responsible for ensuring that their actions constitute good environmental practice and will be provided with site specific information to ensure compliance as part of the site induction. All site personnel are charged with following good practice and encouraged to provide feedback and suggestions for improvements. All site personnel are also required to ensure compliance with the requirements of this CEMP and subsequent revisions thereof.

1.4 Aims and Objectives

The key project aims are:

- To ensure the project is undertaken in accordance with best practice guidance for the management of the environment during construction works;
- To ensure that mitigation measures to protect all aspects of the environment as set out in the EIAR are put in place;
- To ensure that construction activities are carried out in accordance with all planning conditions for the proposed development; and
- To carry out the proposed works with minimal impact on the environment.

The primary objectives to ensure the above aims are achieved during the construction phase are:

- Appointment and delegation of responsibility to an individual for monitoring environmental compliance and adherence to this CEMP;
- Updating the Final CEMP on a continuous basis in accordance with regular environmental auditing and site inspections. This will confirm the efficacy and implementation of all relevant mitigation measures and commitments identified in the application documentation;
- Providing adequate environmental training and awareness to all project personnel;
- Establishing documented schedules and records for monitoring and inspections;
- Establishing reporting procedures for any incidents on site with potential to impact on the environment;
- Providing opportunities for community feedback and submission of complaints; and
- Adopting a sustainable and socially responsible approach to construction.

1.5 Revisions of the CEMP

All the elements of this CEMP will be included in the final CEMP, which will be produced prior to construction by the contractor. In addition, the final CEMP will implement conditions attached to any planning permission granted. The final CEMP will be subject to ongoing review (throughout the construction phase of the proposed development), through regular environmental auditing and site inspections. This will confirm the efficacy and implementation of all relevant mitigation measures and commitments identified in the application documentation.

The appointed Contractor is required to include further details and/or confirmation in the final CEMP which will include:

- Details of emergency plan including personnel and contact numbers;
- Details of fuel storage areas (including location and bunding);
- Construction lighting details;
- Site and traffic signage; and
- Method statements.

1.6 Environmental Training and Awareness

In order to ensure that environmental awareness and compliance is communicated effectively at the start and throughout the construction works, this CEMP and its contents will be communicated to all site personnel, including management staff, operatives and sub-contractors. The key elements of this CEMP will form part of the site induction which will be mandatory for all employees, contractors and visitors attending the site.

Environmental toolbox talks will be provided to all site personnel and sub-consultants on a regular basis. These will be targeted at particularly sensitive environmental issues such as:

- Protection of sensitive ecological habitats and key ecological receptors;
- Works close to water bodies;
- Water pollution and silt control;
- Water pollution in relation to cement and concrete handling;
- Spill prevention and control;
- Dust management;
- Sensitive archaeological sites; and
- Waste management.

2.0 OVERVIEW OF THE EXISTING SITE

2.1 Site Location

The site of the proposed power plant is located in Profile Park, Dublin 22 which is approximately 3.15km west of Clondalkin town centre. Profile Park is a 100 acre (40.5 Ha) fully enclosed, private business park, which has been developed to the highest of standards. It is easily accessible from the major arterial roads in the city including the M50, M7 and M4, and is served by excellent public transport links.

Within Profile Park the proposed power plant will be located on greenfield lands immediately adjacent to the existing Digital Realty data centre. Existing tenants within Profile Park and the surrounding business and enterprise parks include Google, Microsoft, Digital Realty Trust, Telecity and others.

The immediate area is predominantly commercial / industrial in nature. Outside of this, Grange Castle Golf Course is located approximately 120m east of the site and Baldonnel Aerodrome 450m south of the site. The nearest residential properties are located some 400m to the south of the site and some 450 m to the northeast. Grange Castle Golf Course is located approximately 120m east of the site and Baldonnel Aerodrome 450m south of the site.

Immediately adjacent to Profile Park is the Castlebaggot 110 / 220 kV substation which provides electrical transmission connectivity to the national electricity transmission grid system. Electrical power will be exported from the power plant's main transformers to the existing Castlebaggot 220 / 110 kV Substation which is operated by EirGrid or to a new proposed 110 kV substation in Profile Park. No confirmed details of this potential new substation were available for consideration as part of this EIAR.

2.2 Existing Land, Soils and Geological Environment

The site of the proposed power plant measures c. 2 ha and is predominantly covered by rough grassland, surrounded by industrial, commercial and transport units. Access is via the existing road network within Profile Park, located off the R134. Agricultural areas exist within 1km to the west and 0.5km south of the proposed site, with artificial surfaces less than 100m to the east defined as artificial non-agricultural vegetated areas, used primarily for the Grange Castle Club. Artificial surfaces associated with Casement Aerodrome, Baldonnel is located approximately 400 south of the proposed site.

The proposed electrical connection considered in this EIAR is an underground 110 kV cable from the plant's main transformers to either a new proposed 110 kV substation on adjacent lands to the immediate west of the power plant or the existing Castlebaggot 220 / 110 kV Substation. Natural gas will be delivered to the power plant via a new below ground pipeline from the existing gas network from an existing AGI compound close to the Nangor Road. In the case of both the electrical and the gas connection, these will both be situated in existing private and public roads.

The topography of the proposed power plant site can be described as mostly flat with elevations from c. 73 mAOD to 76 mAOD. The GSI data does not indicate there are any geomorphology features within the site boundary.

The bedrock geology on the GSI 1:100 000 map indicate that this site is underlain by Lucan Formation limestone. The regional bedrock geology covering the proposed site and grid/ gas connection is shown in Figure 8-4 and a description of the formation is presented in Table 8 1. of Chapter 8 (Land, Soils and Geology) of the EIAR.

The GSI database contain records of verified borehole logs, groundwater wells and springs within and close to the site of the proposed power plant. Bedrock exposures in the local area indicate strong to moderately strong, dark grey, fine grained, argillaceous limestones with minor calcareous shales.

A historical (currently inactive) quarry lies approximately 0.6km to the south of the southern site boundary. No active mineral or aggregate sources have been identified by GSI data within 2km of the site boundary.

The GSI online Aggregate Potential Mapping Database shows that the site is located within an area mapped as being typically Moderate in terms of crushed rock aggregate potential, with some areas of low to high potential. There are no significant mapped areas of granular aggregate potential (i.e., potential for gravel reserves).

According to the Geological Survey of Ireland Spatial Resources, there are no Irish Geological Heritage sites inside the site boundary. No geological heritage sites have been identified within 2km of the site boundary. Belgard Quarry, a large active quarry is located 2.15 km southeast of the proposed development. Belgard is the largest limestone quarry in the country and is excavating the Lucan Formation limestones. It is a designated County Geological Site (Site Code: SD002) of vital economic importance and of geological heritage significance.

The regional soils in this area, including the grid and gas connection, are shown in Figure 8-2. Based on mapping by the EPA this indicates that this site consists of 2 no. types of soil, namely:

- BminPD – Basic deep poorly drained mineral;
- BminDW – Basic deep well drained mineral.

The development area within the red line boundary is underlain mostly by basic deep poorly drained material

The dominant subsoil occurring in the region is classified as till. The site is underlain by till derived from limestone (TLS). Figure 8-3 Chapter 8 (Land, Soils and Geology) of the EIAR presents the regional subsoils in this area, including the area within the red line boundary and grid/gas connection.

The till, which is Quaternary in age, formed as an extensive envelope of the landscape in the area since deglaciation approximately 7,000 – 10,000 years ago. Based on the site walkover date the site is underlain by firm, brown and grey slightly gravelly silty clay with occasional cobbles and pieces of broken rock. Gravel is subangular to subrounded, fine to medium. Cobbles are subangular to subrounded.

A review of the EPA website for both existing and historic licensed and illegal waste activities was carried out to identify any potential contamination sources present in the area and to identify any potential contaminating activities near the proposed development. The desk study indicated that no waste facilities, illegal waste activities within a 2km radius of the proposed site. The has is a greenfield site with no previous development. No visual or olfactory evidence of contamination was noted during the site walkover.

A review of the landslide information on the GSI Irish Landslides Database indicate that there are no recorded landslide events within 2km, or within a wider context of 6km of the site. The site walkover conducted in May 2021 confirmed the site is generally very flat comprising topsoil underlain by firm glacial till.

2.3 Existing Hydrological and Hydrogeological Environment

The proposed power plant site is located within the River Liffey and Dublin Bay catchment, located within the National River Basin District and on a regional scale, the proposed development site is located within the Liffey sub catchments.

The River Liffey and Dublin Bay catchment includes the area drained by the River Liffey and by all streams entering tidal water between Sea Mount and Sorrento Point, Co. Dublin, draining a total area of 1,616km^2. The largest urban centre in the catchment is Dublin City. The other main urban centres are Dun Laoghaire, Lucan, Clonee, Dunboyne, Leixlip, Maynooth, Kilcock, Celbridge, Newcastle, Rathcoole, Clane, Kill, Sallins, Johnstown, Naas, Newbridge, Athgarvan, Kilcullen and Blessington. The total population of the catchment is approximately 1,255,000.

The River Liffey rises on the western slopes of Tonduff in the Wicklow Mountains, from where it flows west, before being joined by the Brittas River from the north and then flowing into the

northern end of Pollaphuca Reservoir (created by the ESB in the 1930s). The Liffey flows out of the reservoir through the Pollaphuca generating station and into the lower reservoir and generating station at Golden Falls. The Liffey then flows west though Kilcullen before flowing through Newbridge, then past Sallins and Clane, after which it is joined by the Morell from the south.

The Liffey continues through Celbridge to Leixlip, before which it flows into Leixlip reservoir and generating station. The Liffey then enters a steep-sided valley, through which it flows past Islandbridge, where the river becomes tidal, and through the centre of Dublin City.

The main regional surface water features include the Griffeen River (located approximately 1km northwest of the development) and the Liffey River (located approximately 4.5km north of the development). The regional natural surface water drainage pattern, in the environs of the site is presented in Figure 9-1 'Regional Catchment Delineation Overview' of Chapter 9 (Hydrology and Hydrogeology) of the EIAR.

The Baldonnell Stream (IE_EA_09L012100) is located within the site boundary. The EPA maps show the stream to run through the central portion of the proposed development in a north-south orientation. The Baldonnell Stream joins the Griffeen River (IE_EA_09L012100) approximately 1.3km downstream from the proposed power plant The Griffeen River then joins the Liffey River (IE_EA_09L012350) at Lucan, located 4.8km north of and downstream from the proposed power plant.

The neighbouring data centre site has diverted the upstream section of Baldonnell Stream where it has been culverted under their site before it enters a 'V-Shaped' channel within the proposed development. The diverted stream enters the proposed development at the south-eastern corner, where it continues to flow northwards along the 'V-shaped' channel which has steep grassy banks up to 3m in height. The Baldonnell Stream follows the development site's eastern boundary before it is culverted beneath the existing road through a concrete circular culvert measuring approximately 1m in diameter. The Baldonnell Stream is 0.3 to 0.6m in width with water depths averaging at 0.2m in the winter period, the flow was mostly gentle, and the substrate varied from clayey cobbles to silt.

Minor surface water ponding occurs on the site. The surface water ponding is considered to be seasonal and mainly associated with periods of heavy, prolonged and intense rainfall. The ponding form as a result of acceptance of drainage from the adjacent site and of natural attenuation of rain. The ponding has minor connectivity with the Baldonnell Stream (EPA name, IE_EA_09L012100) through the small drainage pipe located at the south-eastern corner of the proposed site.

2.4 Existing Ecological Environment

This section presents a high-level summary of the existing ecological environment at the proposed development site. A more detailed description of desktop studies, field studies and species encountered is provided in Chapter 12 (Biodiversity) of the EIAR.

2.4.1 Designated Areas

Nine European sites (six SACs and three SPAs) occur within 15km of the proposed development site and are listed in Chapter 12 (Biodiversity) of the EIAR. The European sites; North Dublin Bay SAC, South Dublin Bay SAC and South Dublin Bay and River Tolka Estuary SPA are hydrologically to the proposed development site via the Baldonnell Stream, Grifeen River and River Liffey (hydrological route ca. 25km). North Bull Island SPA occurs 18km from the

proposed power plant but is also hydrologically connected to the proposed development site via the Baldonnell Stream, Grifeen River and River Liffey (hydrological route ca. 25km).

There are no Natural Heritage Areas (NHAs) located within 15km of the proposed power plant. Sixteen proposed NHAs (pNHAs) occur within 15km of the proposed development site and are listed in Table 12-4 of Chapter 12 (Biodiversity) of the EIAR. Three pNHAs; North Dublin Bay pNHA, South Dublin Bay pNHA and Dolphin Docks pNHA are all hydrologically connected to the proposed development site via the Baldonnell Stream, Grifeen River and River Liffey (hydrological route ca. 25km).

Other sites of natura conservation within 15km of the proposed power plant site are a wildfowl Sanctuary; Brittas Bay (WFS-18), which is located ca. 8km to the south.

2.4.2 Habitats

The Baldonnell Stream which occurs along the northern and north-eastern boundary of the site is a depositing/lowland watercourse (FW2). The watercourse flows in a north-westerly direction before discharging into the Grifeen River located approximately 2km downstream of the proposed development site.

The stream has been heavily modified and is culverted to the south of the site for a small section underneath the adjacent development, Digital Realty Profile Park, and is also culverted underneath the road located immediately north of the proposed development site and again underneath Profile Park Road located approximately 165m north of the proposed development site. The stream substrates consist of fine sediment (70%) with some small pebbles (30%) present in areas. The stream is heavily vegetated with mats of watercress (Nasturtium officinale) and brooklime (Veronica beccabunga). The flow of the stream is slow.

The proposed power plant site currently comprises wet grassland (GS4). Species present within the grassland includes abundant soft rush (Juncus effusus), ribwort plantain (Plantago lanceolata), white clover (Trifolium repens), silverweed (Potentilla anserina), meadowsweet (Filipendula ulmaria), with occasional self-heal (prunella vulgaris), cuckoo flower (Cardamine pratensis), horsetail (Equisetum spp.) and immature willow trees (Salix spp.). Carpets of Sphagnum magellanicum are present in areas within the grassland. Despite the number of species recorded, the grassland is considered to have a relatively low species diversity. The wet grassland has an uneven surface which suggests the habitat has previously been disturbed. In lower areas of the habitat, small pools of standing water are present.

Neutral grassland (GS1) occurs to the south-western boundary of the proposed development site. Species recorded included common bent (Argrostis capillaris), Yorkshire fog (Holcus lanatus), ribwort plantain (Plantago lanceolata), white clover, Lady's bedstraw (Galium verum) with occasional selfheal (Prunella vulgaris), bramble (Rubus fructicosus), and gorse (Ulex europaeus). There is evidence that the grassland is grazed lightly by horses.

A hedgerow comprising hawthorn (Crataegus monogyna) occurs along the southern outer boundary of the proposed development site.

A treeline of ornamental copper beech trees (Fagus sylvatica) occurs approximately 20m north-east of the proposed development site. All trees within the treeline were assessed as having 'Negligible' bat roost potential as per Collins (2016) due to the lack of any suitable features present.

A comprehensive description of the existing habitats encountered at the site is provided in Section 12.3.2.1 of Chapter 12 (Biodiversity) of the EIAR.

2.4.3 Flora

No plant species listed under the Flora Protection Order or habitats protected under the Habitat Directive were recorded within the footprint of the proposed development site during the surveys.

In addition, no invasive plant species listed in the Third Schedule of S.I No. 477 of 2011, European Communities (Bird and Natural Habitats) Regulations 2011 were identified within the proposed development site during the surveys.

2.4.4 Bats

No bat roost features were recorded within the proposed development site. There are no trees, hedgerows or structures present within the proposed development site. A number of beech trees were recorded along the outer boundary of the site. All trees were assessed as having 'Negligible' bat roost potential due to the lack of any suitable features.

A manual, dusk, activity survey was undertaken at the proposed development site on the 13th of April 2021. A total of three species of bat were detected during transect surveys – Common pipistrelle, Lesser noctule and Soprano pipistrelle.

Records of bat activity within the proposed development site were considered relatively low. Only seven bat activity events were recorded during the survey. The low levels of activity are likely due to the existing illumination within the site and limited linear features.

Further details of the survey results are provided in the EIAR.

2.4.5 Other Fauna

No evidence of badger, including their setts, were recorded within the proposed development site boundary, or within 150m of the development site. There are no hedgerows, treelines or embankments present within the proposed development site which are the favoured habitat for the establishment of setts by badgers (Smal, 1995 & Byrne et al., 2012).

A small patch of woodland was recorded to the south of the existing AGI Gas Station, approximately 10m south of the proposed gas line route. No evidence of badger activity was recorded within the woodland. Despite the lack of evidence recorded, there is potential that badger may forage within the area due the availability of suitable forage habitat.

An otter survey was undertaken along the Baldonnell Stream, 150m upstream and downstream of the proposed development site. No evidence of otter or their resting or breeding sites were recorded during the survey. Otter are unlikely to commute and forage along the section of the Baldonnell Stream located adjacent to the site due to the highly modified nature of the watercourse and the large sections of culverts present both upstream and downstream of the proposed development site.

There is potential however that otter may occur further downstream. The desktop assessment indicated that historic records of otter have previously been recorded further downstream within the Baldonnell Stream, Grifeen River and in proximity to the Grand Canal. In addition,

Scott Cawley in 2020 recorded an otter swimming in the Baldonnell Stream at a location approximately 600m north-west of the proposed development site.

There is potential that the proposed development site may support smaller protected mammal species such as hedgehog, pygmy shrew, Irish stoat and Irish hare. No evidence of the above listed species, or any other protected mammal species were recorded during the field surveys. However, the grassland habitats within the proposed development site provides suitable foraging habitat for these species.

Evidence of fox, which included tracks and scat, were recorded within the proposed development site on a number of occasions. Fox are not currently protected under National law, however there is an obligation to protect biodiversity within Ireland under the Convention on Biological Diversity.

Although no frogs or their spawn were recorded during the surveys, both the Baldonnell Stream and the large pools of standing water present within the wet grassland habitat are likely to provide suitable habitat for the protected amphibian species.

No suitable habitat to support common lizard or smooth newt was recorded within the proposed development site. The small ponds of standing water were deemed too shallow to support smooth newts, as the species generally utilises ponds with a depth of 0.5-1m.

2.4.6 Aquatic Species

The Baldonnell Stream was assessed as having no suitable habitat to support protected fish species, white-clawed crayfish or lamprey species. The stream at this location was assessed as having low fisheries value due to the heavily modified nature of the watercourse, the presence of culverts and the high levels of sedimentation present.

Further downstream however, within the Grifeen River, the fish species; three-spined stickleback, brown trout, roach and eel are known to occur.

A total of four fish species were recorded in the 'Grifeen Avenue' site which included three-spined stickleback *(Gasterosteus aculeatus)*, brown trout *(Salmo trutta)*, roach *(Rutilus rutilus)* and eel *(Anguilla Anguilla)*. Only one fish species, three-spined stickleback, was recorded at the 'Grange Castle' site.

2.4.7 Ornithology

The proposed development site and the surrounding habitat supports a variety of wintering and breeding bird species at a local level.

A single winter bird survey was undertaken on 25th of January 2021 and a breeding bird survey was undertaken on the 13th April 2021. A total of 10 bird species were recorded during the surveys and detailed in Table 12-8 of Chapter 12 (Biodiversity) of the EIAR.

The majority of species recorded during the survey are common species typically found within agricultural grasslands and are listed as having Green Conservation Status (Low Conservation Concern). Snipe and lapwing are currently listed as having Red Conservation Status (High Conservation Concern).

The snipe were recorded foraging in the small standing pools during both the winter and summer survey. It's likely that the snipe are also roosting within the site as the species was heard calling during the dusk bat surveys.

The pair of lapwing were confirmed to be breeding within the site due to the recording of a nest. The nest was located just outside the north-western boundary of the proposed development site.

A wood pigeon's (Columba palumbus) nest was recorded within the hedgerow during the survey.

3.0 DESCRIPTION OF CONSTRUCTION WORKS

3.1 Overview

It is expected that construction will commence in 2022 with design, construction, and commissioning activities lasting for approximately 20 months. The plant is expected to be fully operational in 2024/25 subject to timely receipt of the necessary statutory consents.

Construction activities will gradually phase out from pre-construction to predominantly civil activities followed by installation, commissioning and testing of the proposed power plant and equipment.

3.2 Pre-Construction

The pre-construction phase of development includes preparatory works (i.e., post planning surveys and reporting) and consultation with statutory bodies and the public.

Prior to the commencement of construction activities, the area for development will be fenced off.

Following this process, site clearance activities will commence. Typical activities will include preparation of the construction working area and topsoil stripping. The footprint of the proposed power plant will require clearing and levelling to 74.8 AOD. Preliminary volume calculations provide an approximate estimation of stone fill required for all of the hardstanding foundations of 8,500m^3. All vegetation clearance that is required during construction works will commence outside the breeding birds season, which runs from the 1st of March to the 31st of August. In the event that clearance of vegetation is required within the bird nesting season, vegetation will be first surveyed by an experienced ecologist to identify the presence of active nests. The survey will specifically target ground nesting birds including lapwing and snipe. Only vegetation confirmed to be nest free may be cleared. In the event that a nest is confirmed as present, the nest will either be removed under license obtained from NPWS or the nest will be cordoned off until the chicks have fledged or until nesting has failed.

A method statement for soils and soil stripping will be included in the final CEMP and will set out:

- The intended soil stripping depth;
- Options for separating and keeping different soils apart;
- Methods for handling soil;
- The location and height of soil storage mounds and how long they will be present; and
- Proposals for reinstating or disposing of soils.

Mobilisation will include the putting in place of staff, temporary facilities, plant and equipment, materials, and systems for construction.

A temporary contractor's compound will be erected on site for the duration of the construction works and will include temporary site offices (portacabins), staff welfare facilities, car parking, and equipment laydown areas.

Training in health and safety will be provided for all staff during the mobilisation period, and all staff will be required to hold SAFEPASS or equivalent certification.

The main tasks to be completed in line with the above phases are:

3.3 Civil and Plant Construction Works:

Concrete pouring and filling will be fully controlled to ensure that cement bound materials do not present any pollution risk. All concrete pouring and filing will be supervised and monitored.

Trucks, mixers, and concrete pumps that have contained concrete will be washed out in a designated impermeable area to prevent pollution. Where possible, washout water will be stored and re-used.

A Construction Traffic Management Plan (CTMP) will be prepared in consultation with South Dublin County Council in advance of the construction phase of development in order to ensure safe movements and interactions between vehicles and pedestrians, both on and adjacent to the site. The CTMP will cover all expected work activities, delivery and storage areas, and shall be expanded and / or amended to cover new or altered activities as they arise. The main components of the CTMP will be:

- Description and scope;
- Staging of the works;
- Traffic control during construction;
- Trucks movements to the site;
- Road signs for full and partial road closure;
- Parking for workers and subcontractors;
- Pedestrian safety;
- Site traffic management supervisor; and
- Abnormal load (i.e., for transformers/engines) and associated permit applications applied for and secured from/by South Dublin County Council in advance of abnormal load delivery to site.

The CTMP will also provide for the requirement that entrances and roads are kept clean and clear of obstructions to prevent the spillage or deposit of clay, rubble, or other debris on the entrance and other roads throughout the contract period.

3.4 Construction Hours

The proposed general construction hours are 07:00 to 18:00hrs, Monday to Friday and 08:00 to 14:00hrs on Saturdays. Occasional weekday evening works may also be required; however evening activities will be significantly reduced in order to manage any associated noise impacts in an appropriate manner and more stringent construction noise criteria will be applicable during any evening works that may be required. As a result, noise emissions from evening activities are expected to be significantly lower than for other general daytime activities.

3.5 Employment

It is anticipated that approximately 50 persons will be directly employed during peak construction activities.

3.6 Summary of Key Project Elements

3.6.1 Engine Hall and Electrical Annex Buildings

The primary engine hall building will include up to 6 no. dual fuel gas engines and supporting generating equipment.

The engine is rigidly mounted on a steel frame, acting as the lubricating oil service tank, which is resiliently seated on a simple concrete foundation by spring isolators. The alternator is connected to the engine by a flexible coupling, rigidly mounted and grouted onto a separate and elevated concrete foundation.

The engines will each have an exhaust flue which will connect into a single stack cluster located directly adjacent to the engine hall. The stack will be a steel structure with high quality cladding and will have a height (flue tip height) of 31.8m.

The electrical annex building will be located adjacent to the main powerhouse. the electrical annex will contain the compressor room, cable rooms, switch rooms, station transformers, Control Room and messing facilities.

Figure 3-1 Typical Gas Engine Configuration

3.6.2 Workshop Building and Security Hut

The Workshop building will include a water treatment room, fire equipment room, and fuel pump and pilot oil treatment room. A security hut will also be provided.

3.6.3 Radiator Coolers

The engines are cooled with a closed-loop, radiator cooling water system. The system consists of a high temperature circuit and a low temperature circuit. Air is drawn through the radiator coolers by fans driven with variable speed electrical motors.

3.6.4 110kV Electrical Transformer(s)

The electrical generator associated with the gas engines will connect to the main transformers where the voltage will be increased to 110 kV. Electrical power will be exported from the power plant's main transformers to the existing Castlebaggot 220 / 110 kV Substation which is operated by EirGrid or to a new proposed 110 kV substation in Profile Park. No confirmed details of this potential new substation were available for consideration as part of this EIAR.

3.6.5 Above Ground Gas Installation

On site there will be a dedicated Above Ground Installation (AGI) gas compound where the incoming gas supply pressure will be reduced prior to its use in the gas engines. Natural gas will be delivered to the power plant via a new below ground pipeline from the existing gas network. It is envisaged following on from consultations with Gas Networks Ireland that this connection will be via a new spur from the existing national gas transmission network which has an existing AGI compound close to the Nangor Road approximately 1km to the north of the proposed power plant.

3.6.6 Tank Farm

In order to comply with CRU requirements, low sulphur diesel oil will be stored as a backup fuel. The tanks will be bunded in accordance with the requirements set out in the EPA publication, 'Storage and Transfer of Materials for Scheduled Activities' (2004), which states bunds are to contain 110% of the volume of the tank in the event of a tank rupture. The height of the bund wall will be 1.8m.

The bulk tank will be fitted with a high-level alarm to prevent overfilling. There will be a dedicated tanker unloading area surrounded by a drainage channel which will drain to a petrol interceptor. This separator will provide for full retention of any material in the event of a rupture and spillage of a tanker compartment. A shut-off device incorporated into the separator will close the outlet in the event of its capacity being exceeded.

A tank will be installed for the purpose of emission control for NOX (NO and NO2). The tank will have a volume of a volume of approximately 26m^3.

In addition, a tank of approximately 26m3 is required on site to contain sufficient oil to refill an engine after an oil change.

A lubricating oil run-down tank will be used to hold the engine oil while maintenance work on the engine is being carried out. A tank with a volume of 26m3 will be installed.

A pilot oil tank will be installed 26m^3.

3.6.7 Utilities and Services

Water Usage

Water usage requirements for the proposed power plant will be required for potable water used for domestic purposes (drinking water, toilets etc.) and for fire-fighting purposes. Water supply for the proposed power plant will be taken from the public water mains which is located immediately adjacent to the site. Water for fire-fighting purposes will be stored in a tank with a volume of 1000m^3.

Wastewater infrastructure required will involve connection to existing foul wastewater infrastructure adjacent to the site.

Surface Water Drainage

Surface water runoff will be generated from all surfaces within the facility that are exposed to rainwater or to which water is applied in order to clean. This includes all hardstanding surfaces, roofs, and other impermeable surfaces. All surface water will be discharged to the Baldonnel steam adjacent to the site.

As part of the surface water drainage design strategy, the following items have been included in order to effectively manage surface water at the site:

- Surface Water Pumps in Duty/Standby Arrangement – A standard duty/standby arrangement including high level alarms, float switches, and associated telemetry will be provided;
  Petrol Interceptor – Full retention petrol interceptors have been included in the surface water collection system on a precautionary basis. The full retention petrol interceptors will be fitted with visual and audible alarms to ensure containment facilities are adequately maintained. In addition, this alarm will be linked to telemetry facilities such that relevant staff will be alerted if oil is detected at trigger levels; and
- Down Pipes/Gullies – It is proposed that surface water will be collected from roofed buildings via standard rainwater down pipes while runoff from un-roofed structures will drain to the access roads where it will enter the drainage network via road gullies. It is also proposed that gullies and drain entry points will incorporate silt traps to remove any grit or silt which may be washed into the drainage system.
- Flow Control Device – It is proposed to limit the surface water runoff from the site to be similar to the Greenfield runoff as per the requirements of the Great Dublin Strategic Drainage Study. It is proposed to install a Hydrobrake downstream of an attenuation tank to limit the flow from the site to 4.1l/s.
- Attenuation Tank – it is proposed to attenuate all storm water accumulated on site within an underground attenuation tank, which will be discharged to the Baldonnel stream via a Hydrobrake.
- Swale – it is proposed to install a swale to collect runoff from the adjacent Northeast Road. The water once permeated into the swale will be directed towards the surface water drainage infrastructure via a perforated pipe and above ground falls. The swale will also slow the surface water at source, increase the quality of water which is intercepted by the system through infiltration, biodegradation and pollutant settlement.
- Permeable Paving – It is proposed to install permeable paving within the car parking areas of the site. The water once permeated into the pavement will be directed towards the surface water drainage infrastructure via a perforated pipe and above ground falls. The permeable paving will also slow the surface water at source, increase the quality of

water which is intercepted by the system through infiltration, biodegradation and pollutant settlement.

- Infiltration Basin – It is proposed to install an infiltration basin within the site to allow for surface water collected from the southern end of the site to infiltrate into the ground water. The infiltration basin will also be provided with a perforated overflow pipe to direct the excess surface water to the attenuation tank during heavier rainfall events.

Foul Wastewater Drainage

Domestic type wastewater effluent will be generated on site. It is estimated that at any one time, there will be no more than 12 personnel on site, i.e., the maximum number of people on site at any given time for testing, maintenance, site meetings etc. An approximate volume of 0.1157 l/sec of domestic type wastewater was identified as the maximum domestic wastewater flow which may be generated on site. Wastewater will be pumped to the existing foul sewer in Profile Park which is directly adjacent to the site. Irish Water has confirmed via its 'Pre-connections Enquiry' process that the above water wastewater volume can be facilitated through the existing network (IW reference: CDS21002228).

Process Wastewaters

There will be no process wastewater generated from the power plant.

Lighting

Emergency lighting will be provided throughout the building in accordance with BS 5266-1 Emergency lighting. Code of practice for the emergency lighting of premises.

The escape lighting will be sited to provide an appropriate luminance near each door exit door and where it is necessary to emphasise potential danger or safety equipment. The following bullet points indicate:

- At each exit door intended to be used in an emergency;
- Near stairs so that each flight of stairs receives direct light;
- Near any other change in level;
- Mandatory emergency exits and safety signs;
- At each change of direction;
- At each intersection of corridors;
- Outside and near to each final exit;
- Near each first aid post;
- Near each piece of firefighting equipment and call point; and
- Within all stair cores.

It should also be noted that a Lighting Plan will be undertaken during the detailed design of the power plant to ensure there are no vertical spill or glare issues on neighbouring residential or commercial properties. This lighting plan will be designed in accordance with the International Standard IS EN 13201-2:2015 (Road Lighting).

3.6.8 Security Fencing

A 1.8m palisade fence will be constructed along the perimeter of the proposed power plant site.

3.6.9 Internal Underground Cabling & Grid Connection

The electrical generator associated with the gas engines will connect to the main transformers where the voltage will be increased to 110 kV. Electrical power will then be exported via an underground cable from the plants main transformers to an off site electrical substation. The final route of connection is yet to be confirmed. Electrical power will be exported from the power plant's main transformers to the existing Castlebaggot 220 / 110 kV Substation which is operated by EirGrid or to a new proposed 110 kV substation in Profile Park. No confirmed details of this potential new substation were available for consideration as part of this EIAR.

It should be noted that planning permission is not sought for these connections as part of the power plant application to South Dublin County Council. Either Greener Ideas Limited or EirGrid will be responsible in the future for securing the necessary planning permission for these electrical connections. Similarly, in the event that Greener Ideas Limited and a data centre operator agree for a private power supply to be provided then this would also be subject to its own separate consenting process.

3.6.10 Decommissioning

The power plant is expected to be operational for at least 25 years. On cessation of activities, the plant will either be redeveloped as a power related facility, or the site will be redeveloped in an alternative form.

In the event that the facility is decommissioned, the following programme will be implemented:

- All plant equipment and machinery will be emptied, dismantled, and stored under appropriate conditions until it can be sold. If a buyer cannot be found, the material will be recycled or disposed of through licensed waste contractors and hauliers. If plant and machinery is required to be cleaned on site prior to removal, all necessary measures will be implemented to prevent the release of contaminants;
- All waste will be removed from the facility; and
- The site and all associated buildings will be secured.
- Waste will be recycled wherever possible. All waste movement, recycling, and disposal operations will be controlled by licensed waste contractors.

Details of provisions to decommission and render safe or remove all materials, waste, ground, plant, or equipment contained on or in the site that may result in environmental pollution will be agreed with the Environmental Protection Agency as part of the Industrial Emissions Licensing process.

3.7 Roles and Responsibilities

An indicative organisational chart is provided below which identifies the typical roles and associated responsibilities for the construction of the proposed development. This will be subject to specific contractual agreements upon appointment of a Main Contractor and any additional/further appointments required in compliance with a grant of permission.

The Project Manager will have overall responsibility for environmental management and compliance during the construction works. He/she will be supported in this role by an SHEQ Officer, or Environmental Officer as appropriate, who will liaise directly with the relevant regulatory bodies and stakeholders throughout the construction phase. Additional specialist input will be included from an ecological clerk of works, archaeologist or other disciplines as required.

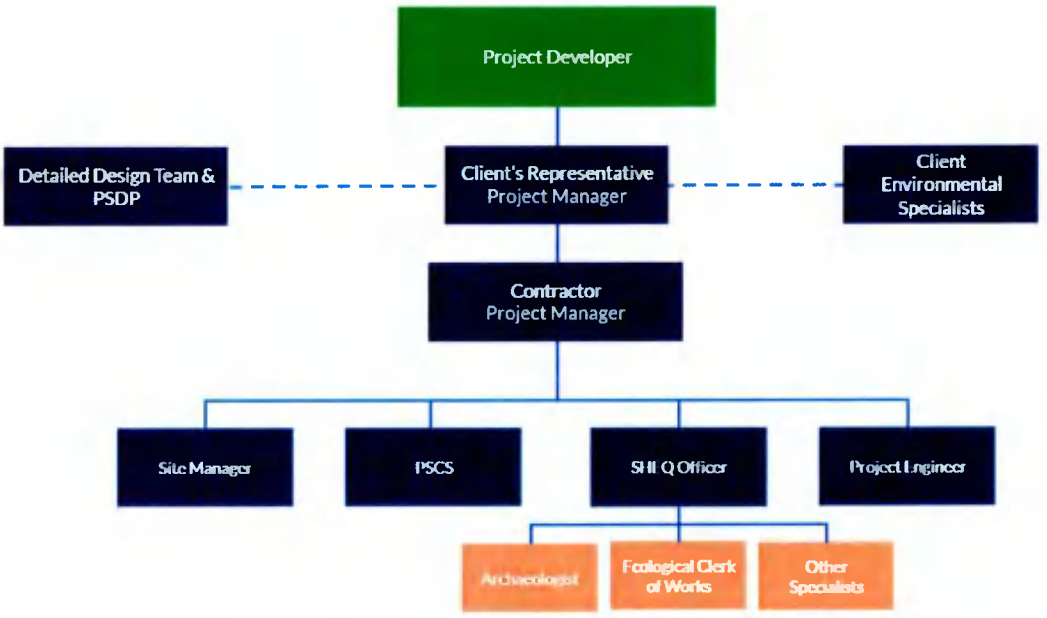

Figure 3-2 Project Development Organisation Chart

3.8 Consents, Licences, Notifications and Permissions

The key consents, licences, notifications and permissions which may be required for the project are summarised as:

- Planning permission and associated planning compliance;
- Commission for Energy Regulation (CER) Authorisation and Licence to Generate;
- A Commencement Notice for Development will be lodged with the Building Control Authority (BCA) via the online Building Control Management System (BCMS) not less than 14 days and not more than 28 days before development works commence on site;
- Road opening licences for underground cable works;
- 30-day prior notification to the Irish Aviation Authority (IAA) and Department of Defence ahead of crane erection works.
- Industrial Emissions Licence from the Environmental Protection Agency (EPA) for the operation of the proposed power plant

The above list is non-exhaustive but identifies the key consents, licenses, notifications and permissions required for the project. This list will be further populated as required through planning compliance and stakeholder engagement to ensure that any further consents are identified as early as possible and do not impact on the construction programme.

Additional method statement and monitoring programme submissions may be required by the Local Authority as part of the grant of planning.

4.0 CONTRACTOR FACILITIES, SAFETY AND SITE SECURITY

4.1 Construction Compound and Facilities

At the commencement of the construction phase, a temporary compound area will be located within the development site to provide office space, welfare facilities, car parking and material laydown areas. This compound will relocated within the site over the duration of the construction works, as required.

The compound will consist of temporary porta-cabins constructed on unbound, levelled hardcore aggregate. Soil covering will be stripped within the compound areas and stockpiled locally for reuse. Broken stone and appropriate capping aggregate will be used to create a base for the welfare facilities as well as a suitable surface for material lay-down areas and car parking.

The construction compound will be secured by means of a chain-link fence on timber posts which will be approximately 3m in height. There will be one access gate which will be secured and controlled by the Contractor. A combination of bottled water, tankered water supply and rainwater harvesting will be used to supply water for the welfare facilities in the compound during the construction works. Rainwater harvesting will be utilised to supplement the water supply for non-potable uses. Wastewater generated at the welfare facilities in the construction compound will be managed by means of a temporary sealed storage tank, with all wastewater being tankered off-site by a permitted waste collector to a wastewater treatment plant. The proposed temporary wastewater storage tanks will be fitted with an automated alarm system that will provide sufficient notice that the tank requires emptying.

Fuels, oils, lubricants and other hazardous liquids required for maintenance of equipment during the construction phase will be stored on a dedicated impermeable storage platform in the compound. This area will be away from drains and open water and will be easily accessible for machinery to refuel and to accommodate fuel deliveries to site. Fuel containers will be stored within additional secondary containment e.g., bund for static tanks or drip trays for smaller mobile containers. A fuel bowser, used for refuelling equipment on-site where off-site refuelling is not possible, will be stored in the compound area on a dedicated storage platform. Whenever possible, this bowser will be refilled off-site and brought to site for on-site refuelling. For certain vehicles which are less mobile, refuelling may need to occur elsewhere on site. A spill kit will be stored with the bowser and the person operating the bowser will be trained in their use. When not in use this will be stored in the designated area of the construction compounds.

A temporary self-contained wheel wash will be installed on the site access road to minimise the transfer of dirt and dust from the site onto the public road and to minimise the potential for transfer of alien invasive species onto the site. A system which utilises recirculated wash water will be used to minimise raw water consumption for washing activities. The wheel wash will be emptied on a regular basis in accordance with supplier recommendations and the nature of soiling on vehicles, with the collected material being removed off-site as waste material.

A road sweeper will be available if any section of the surrounding roads become soiled by vehicles associated with the proposed development.

4.2 Safety and Security

All activities carried out by the appointed Contractor on the proposed development will be in accordance with the requirements of the *Safety, Health and Welfare at Work Act 2005* as amended and Regulations made under this Act.

The scale and scope of the proposed development will require the appointment of a Project Supervisor Design Process (PSDP) and Project Supervisor Construction Stage (PSCS) in accordance with the provisions of the *Safety, Health and Welfare at Work (Construction) Regulations 2013 (S.I. No. 291 of 2103)*, as amended. These persons will be appointed by the Developer and notified to the Health and Safety Authority (HSA) prior to commencement of detailed design works (in the case of the PSDP) and prior to commencement of construction (in the case of the PSCS). The PSDP will prepare a Preliminary Health and Safety (H&S) Plan which will identify any particular risks, residual risks and particular sequences of work that are envisaged during the design of the works.

Prior to commencement of construction, this Preliminary H&S Plan will be provided to the Contractor and the PSCS will further develop the document to prepare a Construction Stage H&S Plan addressing all aspects of the construction process and providing relevant contact details and emergency response procedures for the project. This H&S Plan will be developed at the procurement stage and developed further at construction stage to the satisfaction of the Developer. The H&S Plan will identify the potential safety hazards associated with the site and the works and assess the associated risks. Mitigation and control measures will be implemented to minimise the identified risks.

Evidence of completion of construction safety training, typically in the form of a Safe pass Card, will be required for all construction personnel prior to commencing on site. A record of Safe pass Cards and personnel approved for entrance to site will be completed as part of a site induction process. The Contractor's H&S Plan will detail the site induction and access requirements. Where relevant, equipment operators or specialist works will require personnel to hold a valid Construction Skills Scheme Card. All equipment and machinery used on site will be appropriately certified for its intended purposes. The Developer will ensure that only competent contractors are appointed to carry out the construction works on the site.

Public safety will be addressed by restricting site access during construction works and the erection of security fencing as appropriate at construction works areas. Each of the proposed sites within the park has a pre-constructed access with a bellmouth width of approx. 20m to cater for all vehicle types. The entrance to the proposed plant site will be controlled by the Contractor. All traffic to Profile Park originates from the R134 New Nangor Road to the North and construction vehicle access to the site will be via this route. The site entrance gates will be securely locked outside of construction hours to prevent unauthorised entry and will be monitored during construction hours to regulate access to the site for authorised personnel.

4.3 Signage

Warning signs will be erected at the construction works areas clearly stating that construction works are underway . A notice board will be erected at the site entrance and at the construction compound gates with information on the contact details for site management, PPE requirements for the site and any other information deemed necessary in accordance with the H&S Plan.

Advanced warning signs will be required within Profile Park on the approach to the main site access from both directions indicating its use as for Construction traffic. Signage will be erected on both sides of the adjacent roadway both north and south of the site entrance location to warn approaching vehicles of the construction site entrance location and the potential presence of slow-moving vehicles. Prior to exit from the site signage will be erected directing construction traffic to the approved construction route.

Specifically, with regards to cyclists, it is not proposed to divert cyclists from their current routes as a result of the construction phase of the development as the cyclists will be able to maintain the current arrangements within Profile Park. The existing main access to the site has fully developed segregated facilities for cyclists and shall be maintained throughout the duration of construction. Signage will need to be erected informing all construction traffic of the likelihood of cyclists crossing the access point throughout.

Road signage on the public road will be in accordance with the current *Traffic Signs Manual*[1] Chapter 8 and associated best practice guidelines. Signage in respect of traffic management is discussed in the TMP in Appendix B and will be in accordance with the Local Authority recommendations and relevant planning conditions. Within the site, maximum speed signage will be erected along the access roads for construction vehicles and health and safety signage will be erected at excavation, or other areas of increased risk, are occurring. Signage will also be erected as a reminder to concrete delivery drivers that concrete truck wash-out is not permitted on-site and identifying the area(s) where concrete chute wash-out is permitted.

Figure 4-1 Indicative Safety Signage (Source: safetysigns.ie)

4.4 Emergency Response Plan

The Contractor will be responsible for developing a detailed Emergency Response Plan (ERP) for the proposed works, to cover health and safety emergencies as well as environmental emergencies, as part of the H&S Plan. This ERP shall be activated in the event of an emergency such as an accident, fire, spillage, collapse etc. and will provide details on who is required to be notified, first aid facilities and closest hospitals. The ERP will also include details of all personnel inducted and authorised to work on the site as well as next of kin contact details and relevant medical information.

In the event of an emergency, the SHEQ Officer and Project Manager will be notified immediately and will determine the scale of the emergency and the requirement for the assistance of emergency services. Works will cease in the area of the incident and contact will be maintained with the emergency services to direct them to the scene of the incident as required.

As part of the ERP, an evacuation drill will be carried out on a regular basis to make all personnel aware of the procedure to be followed in the event of an emergency where a full site evacuation is required. Emergency muster point(s) will be identified at suitable locations in the construction compounds and the ERP will outline the persons responsible for checking names at the safety muster points. Records will be maintained of such drills.

The ERP must include contact names and telephone numbers for the relevant local authorities (all sections/departments) including ambulance, fire brigade, An Garda Siochána and the HSA. Reporting of environmental emergencies to the local authority will be required as well as other relevant stakeholders such as IFI, NPWS or the EPA.

[1] Department of Transport, Tourism and Sport, *Traffic Signs Manual – Chapter 8: Temporary Traffic Measures and Signs for Roadworks* (August 2019)

Further information relating to the management of spills or leaks is provided in Section 4.6 and the procedure for responding to a health and safety or environmental incident is outlined in Section 4.7.

4.5 Fuels and Oils Management

Construction vehicles will be refuelled off-site, wherever possible. This will primarily be the case for road vehicles such as vans and trucks. However, for construction machinery that will be based on-site continuously, a limited amount of fuel will have to be stored on site. On-site refuelling of machinery will mainly be carried out using a mobile double skinned fuel bowser typical of that shown in Figure 4-2. Refuelling will be carried out at least 50m from any watercourse. The fuel bowser, typically a double axel custom-built refuelling trailer, will be re-filled off-site, where possible, or at either of the two construction compounds. For certain vehicles which are less mobile, refuelling may need to occur elsewhere on site. A spill kit will be stored with the bowser and the person operating the bowser will be trained in their use. When not in use this will be stored in the designated area of the construction compounds. The fuel bowser will be parked on a level impermeable area in either of the construction compounds when not in use.

Figure 4-2 Typical mobile fuel bowser (Source: Clarke Machinery Group)

Oils, lubricants and other hazardous liquids required for maintenance of equipment during the construction phase will be stored on the dedicated impermeable storage platform in the construction compounds as described in Section 4.1. Any additional fuel containers, other than the fuel bowser, used for smaller equipment (such as generators, lights etc.) will be stored within additional secondary containment e.g., bund for static tanks or drip trays for smaller mobile containers. Taps/nozzles for fuels and storage containers for oils will be fitted with locks to ensure their use is controlled. Only designated trained and competent operatives will be authorised to refuel plant on site.

New clean ancillary machinery equipment such as hoses, pipes and fittings required on-site will be contained within a bunded area, however any used or damaged parts will not be stored on-

site and will be removed immediately. Any repair works required on machinery involving fuel and oil control will be carried out off-site where practical, or in the construction compounds over an impermeable surface. Unless unavoidable, repair works carried out in the field where machinery is operational will use spill trays and absorbent materials to prevent release of contaminants to the ground. Maintenance and repair works will be carried out at least 50m from any watercourse.

At least daily checks prior to start-up of plant and machinery will minimise the risk of break-down and associated contamination risks for on-site repairs. Records of daily pre-start checks will be maintained and kept in the site office. A clean site policy and diligent housekeeping will also reduce the potential of hydrocarbon release on-site.

4.6 Spill Control and Response

Emergency spill kits with oil boom and absorbent materials will be kept on-site in the event of an accidental spill. Spill kits will be kept in both construction compounds, the 4x4 vehicle transporting the fuel bowser and smaller spill control kits will be kept in all construction machinery. All construction personnel will be notified of where the spill kits are located as part of the site induction and will be trained on the site procedures for dealing with spills.

In the event of a leak or a spill in the field, the spill kits will be used to contain and absorb the pollutant and prevent any further potential contamination. The absorbed pollutants and contaminated materials will be placed into leak proof containers and transferred to a suitable waste container for hazardous materials in the construction compounds. Where a leak has occurred from machinery, the equipment will not be permitted to be used further until the issue has been resolved.

The SHEQ Officer (or equivalent appointed person) will be notified of any spills on-site and will determine the requirement to notify the authorities as set out in Section 4.7.

4.7 Incidents

All safety or environmental incidents associated with the project will be reported and investigated in line with the ERP. Typically, the following procedures will be followed in the event of an incident:

- Works will stop immediately where safe to do so;
- The SHEQ Officer will be contacted;
- The size of the incident will be assessed and determined if it can be controlled by site staff or if emergency services are required to attend;
- The appropriate enforcing authority will be contacted;
- The SHEQ Officer will investigate after the incident;
- The findings will be sent to the appropriate authority; and
- An action plan will be prepared to set out any modifications to working practices required to prevent a recurrence.

4.8 Complaints

This section sets out a procedure to manage and resolve any complaints received from members of the public during the construction phase of the proposed development. The following measures will be adopted and refined, as necessary, taking account of any relevant planning conditions. The following measures will be implemented to deal with complaints and the Final CEMP will contain more specific details with regard to phone numbers to contact:

- Clearly display a notice board at the site entrance so that the public know whom to contact if they have a complaint or comment;
- Personnel on site, including sub-contractors are required to perform their duties in accordance with this CEMP, and in such a way as to minimise the risk of complaints from third parties;
- All complaints received regarding the construction works will be recorded and categorised (e.g., noise, property damage, traffic, dust etc.) within a central Site Complaints Log. This complaints log will include the following key details:
    - Name, address and contact details of the complainant (with the complainant's permission);
    - Brief outline of the complaint;
    - Date of Complaint;
    - Name of person receiving complaint details; and
    - Agreed timeline for response to complaint.
- All complaints will be communicated to the Project Manager and the Developer immediately;
- All complaints will be followed up and resolved in so far as is practicable; and
- The complainant, Developer and other stakeholders will be kept informed of the progress in resolving the complaint.

5.0 ENVIRONMENTAL MANAGEMENT

As part of the development of this CEMP, a series of Environmental Management Plans (EMPs) have been prepared to ensure appropriate environmental management of specific aspects of the proposed works. The EMPs have been prepared in accordance with the design and mitigation measures set out in the EIAR. The particular requirements outlined within the following plans are a summary of key implementation constraints, site specific obligations and best practice requirements with which the Contractor shall comply. The construction methodology for the proposed development is set out in Chapter 3 (Description of the Development) of the EIAR.

Construction of the proposed development will be carried out in line with best practice guidance in all areas of potential environmental impact and these specific guidance documents are identified within the following sections. Across the full project duration, the Contractor will utilise the general guidelines set out in the CIRIA C741 publication *Environmental Good Practice on Site (4th Edition)*[2].

Following grant of planning for the proposed development, the appointed Contractor will further develop this planning stage CEMP into a final CEMP which will incorporate any additional measures identified during the planning assessment process, specified in planning conditions and associated post-planning statutory body consultation for the management of the environment during the construction works. The final CEMP will include an updated and refined construction phase programme of works and will set out specific timings and requirements for surveys and monitoring prior to and throughout the construction works. The final CEMP will be a dynamic document and will be continuously reviewed and updated throughout the construction works to ensure it takes account of all environmental auditing and site inspections.

[2] CIRA *Environmental Good Practice on Site (4th Edition)* (C741) (2015)

5.1 Noise and Vibration

The Contractor will be required to have regard to BS 5228-1:2009+A1:2014 *Code of practice for noise and vibration control on construction and open sites*[3], which sets out detailed guidance on the control of noise and vibration from construction activities.

An assessment of construction phase noise emissions has been carried out in Chapter 11 (Noise and Vibration) of the EIAR and outlines the predicted noise levels from construction activities at the closest noise sensitive locations (sensitive receptors). The SHEQ Officer, or equivalent, will supervise the works to ensure compliance with the noise and vibration limits set out in the Standards document referred above and the EIAR.

The following general measures for control of noise and vibration from construction works will be implemented:

- Construction working hours are limited to those set out in Section 3.2 to avoid noise generation during unsociable hours;
- Duration of works which create high levels of noise or vibration, such as piling, will be limited and staggered to prevent constant annoyance;
- Communication channels will be established between the Developer/Contractor and local residents to inform of upcoming works which may generate higher than normal construction noise or vibration and provide a means for local residents to register complaints with regard to noise and vibration;
- The local authority will also be informed of the communication channels;
- The SHEQ Officer, or equivalent, will address complaints relating to noise and vibration;
- Periodic monitoring of construction noise and vibration during critical periods will be carried out at sensitive receptor locations; and
- Internal access roads will be maintained in good condition to minimise noise and vibration generation from heavy goods vehicles.

In addition to the above, the Contractor will be required to select plant and equipment with a low inherent potential for generation of noise and/or vibration in lieu of noisier alternatives and place noisy/high vibration equipment as far away from sensitive receptors as permitted by site constraints. Where possible, contractors will use noise dampers or other attenuation methods for particularly noisy operations. Compressors will be attenuated models, fitted with properly lined and sealed acoustic covers which will be kept closed whenever the machines are in use and all ancillary pneumatic tools shall be fitted with suitable silencers. Any noisy plant, such as generators or pumps, which is required to operate outside of the typical working hours (for maintaining water levels or safety lighting etc.), will be surrounded by an acoustic enclosure or portable screen. Regular maintenance of plant and equipment will be carried out to ensure that the equipment is operated efficiently and generating minimal noise emissions. Plant or equipment which is not in use will be shut down while not required or throttled back to a minimum.

Further requirements with regard to noise and/or vibration monitoring which may be set out in planning conditions will be updated in the final CEMP.

[3] British Standards Institute (BSI), *BS 5228-1:2009+A1:2014 Code of Practice for noise and vibration control on construction and open sites* (2008)

5.2 Air Quality

The Contractor will have due regard to relevant guidance such as *The Control of Dust and Emissions during Construction and Demolition* published by the Greater London Authority (GLA) in 2104 and *Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes* published by the NRA (now TII) in 2011.

During the construction phase, dust or air pollutants generated from the proposed development will typically arise from:

- Movement of construction vehicles;
- Transportation of powerplant equipment and construction materials to and within the site;
- Excavation, movement and placement of soil stockpiles; and
- Wind generated dust from stockpiles, exposed unconsolidated soils and roads.

An assessment of the potential effects of construction traffic movements associated with the proposed development is presented in Chapter 10 (Air Quality and Climate) of the EIAR. Maximum utilisation of on-site excavation will reduce the need to import excavated materials to the site and where excavated material, concrete and building materials are required to be brought to site, local quarries (such as Belgard Quarry, located 2.15 km southeast of the proposed development) and suppliers will be preferred to minimise the carbon footprint of construction material deliveries.

In order to minimise emission of pollutants from plant and equipment, the following measures will be implemented during the construction works:

- Regular maintenance of plant and equipment will be carried out to ensure that the equipment is operated efficiently and generating minimal air emissions; and
- Plant or equipment will not be left running unnecessarily and low emission fuels will be used.

The greatest potential impact on air quality during the construction stage will be from dust emissions associated with the construction works. The proactive control of fugitive dust, rather than an inefficient attempt to control dust once released will ensure the prevention of significant emissions.

The following measures will be implemented to minimise the potential for dust generation:

- Minimisation of extent of working areas;
- Stockpiling of excavated materials will be limited to the volumes required to practically meet the construction schedule;
- Drop heights of excavated materials into haulage vehicles will be minimised to a practicable level; and
- Daily inspections by site personnel to identify potential sources of dust generation along with implementation measures to remove causes where found.

A Dust Management Plan (DMP) has been prepared which sets out the measures that will be implemented by the Contractor to minimise and control dust emissions (see Section 5.2.1) This DMP will be updated by the Contractor in the final CEMP to account for any additional measures identified in Planning Conditions.

5.2.1 Dust Management Plan

The potential for dust to be emitted depends on the type of construction activity being carried out in conjunction with environmental factors including levels of rainfall, wind speeds and wind direction. The potential for impact from dust depends on the distance to potentially sensitive locations and whether the wind can carry the dust to these locations. The majority of any dust produced will be deposited close to the potential source and any impacts from dust deposition will typically be within 200m of the construction area. It is noted that the vast majority of construction works are located at distances greater than 200m from residential properties.

In order to ensure mitigation of the effects of dust nuisance, a series of measures will be implemented. Site access roads shall be regularly cleaned and maintained as appropriate; dry sweeping of large areas shall be avoided. Hard surface access roads shall be swept to remove mud and aggregate materials from their surface while any un-surfaced access roads shall be restricted to essential site traffic only. Furthermore, any road that has the potential to give rise to fugitive dust must be regularly watered, as appropriate, during dry and/or windy conditions.

Vehicles using site access shall have their speeds restricted where there is a potential for dust generation. Vehicles delivering material with dust potential to an off-site location shall be enclosed or covered with tarpaulin at all times to restrict the escape of dust. Access gates to site are located at least 450m from receptors which will prevent significant dust effects on residents.

Vehicles exiting the site will make use of a wheel wash facility prior to entering onto public roads to ensure mud and other wastes are not tracked onto public roads. Public roads outside the site shall be regularly inspected for cleanliness on a daily basis and cleaned using a street sweeper, as necessary (see Figure 5-1). Before entrance onto public roads, trucks shall be adequately inspected to ensure no potential for dust emissions. On-site haul routes shall be inspected for integrity and necessary repairs to the surface instigated as soon as reasonably practicable. Records shall be kept of all inspections of the haul routes and any subsequent action(s) in a site logbook.

Figure 5-1 Typical road sweeper (Source: CMP Road Planning)

The following measures will be implemented to prevent significant dust emissions from material stockpiles. Material handling systems and site stockpiling of materials will be designed and laid out to minimise exposure to wind as per Section 3.4.6 and Section 5.5. Sand and other aggregates will be stored in bunded areas and not allowed to dry out unless this is required for

a particular process, in which case appropriate additional control measures will be put in place. Water misting or sprays will be used as required if particularly dusty activities are necessary during dry or windy periods. At all times, the procedures put in place shall be strictly monitored and assessed by the SHEQ Officer. In the event of dust nuisance occurring outside the site boundary, appropriate procedures shall be implemented to rectify the problem.

This DMP shall be reviewed at regular intervals during the construction phase to ensure the effectiveness of the procedures in place and to maintain the goal of minimisation of dust through the use of best practices and procedures. As per Section 4.8, the name and contact details of a person to contact regarding air quality and dust issues shall be displayed on a notice board at the site entrance. All dust and air quality complaints shall be recorded, and causes identified, along with the measures taken to reduce emissions. Daily on and off-site inspections shall occur for nuisance dust and compliance with this DMP. This shall include regular dust soiling checks of surfaces within 100m of the construction works. Cleaning shall be provided if necessary.

5.2.2 Climate

There is the potential for a number of embodied greenhouse gases (GHGs) and GHG emissions during the construction phase of the development. Construction vehicles, generators etc., may give rise to CO_2 and N_2O emissions as well as the large quantities of material such as stone, concrete and steel that will be required for the proposed development. The Institute of Air Quality Management (IAQM) document *Guidance on the Assessment of Dust from Demolition and Construction* (2014) states that site traffic and plant is unlikely to make a significant impact on climate.

To minimise climate impacts associated with delivery of construction materials to the site, the Contractor will source quarry materials as close to the site location as possible and use local builder's providers where possible. Excavation on site will be utilised as much as possible to minimise import of quarried stone material. In some cases, it will not be possible to locally source building materials due to the technical nature of parts and equipment required.

5.3 Surface Water Management

The Contractor will employ the best practice measures outlined in CIRIA C532 publication *Control of Water Pollution from Construction Sites: Guidance for Consultants and Contractors*.

The surface water drainage design concept is set out in Section 3.5.3 (Utilities and Services) of the EIAR and is designed to capture surface water run-off from the proposed power plant site, infrastructure and other adjacent hardstanding areas. It is proposed to install a swale to collect runoff from the adjacent Northeast Road. The water once permeated into the swale will be directed towards the surface water drainage infrastructure via a perforated pipe and above ground falls. The swale will also slow the surface water at source, increase the quality of water which is intercepted by the system through infiltration, biodegradation and pollutant settlement.

It is proposed to attenuate all storm water accumulated on site within an underground attenuation tank, which will be discharged to the Baldonnel stream via a Hydro brake.

The surface water drainage system will be designed to include Surface Water Pumps in Duty/Standby Arrangement, Petrol Interceptors, Down Pipes/Gullies, a Flow Control Device, Permeable Paving and an Infiltration Basin.

The permanent surface water management infrastructure will be constructed early in the project along with the construction of impermeable surfaces so that surface water run-off during construction works will be controlled and managed to prevent discharge of sediment laden water to the existing surface water network and local streams.

In addition, temporary settlement ponds (or alternatively a tank) will be established during construction works in areas of high construction activity and groundworks. The locations of temporary settlement ponds will be adjacent to significant earthworks, as close as possible to the source of sediment while maintaining a minimum 50m buffer distance from existing watercourses. These additional temporary ponds will be decommissioned and reinstated on completion of the construction works.

The design of surface water for the proposed power plant will provide the necessary attenuation to limit the rate of outflow at or below greenfield run-off rates and are classified as sustainable drainage system (SuDS) measures.

The settlement ponds/tanks will also provide containment capacity in the event of a spill or leak on the installed infrastructure and the outflow can be closed off to contain any potential pollutants within the settlement ponds.

In the event of contaminated run-off being contained in a settlement pond/tank, the incident will be reported as set out in Section 4.7, samples taken of the contaminated liquid for classification, as required, and the liquid pumped out of the pond using a suitable vacuum truck and disposed of at a licensed waste facility off-site.

The surface water management system will be visually inspected on a daily basis during construction works by the SHEQ Officer to ensure that it is working optimally. The frequency of inspection will be increased at settlement ponds adjacent to areas where earthworks are being carried out and during excavation. Where issues arise, construction works will be stopped immediately, and the source of the issue will be investigated. Records of all maintenance and monitoring activities associated with the surface water network will be retained by the Contractor on-site, including results of any discharge testing requirements.

The Contractor will implement control measures such as temporary drains and drainage diversions, from commencement of construction to limit the volume of water that requires treatment. Temporary control measures implemented during construction works may include silt fences, silt bags, temporary settlement tanks and run-off attenuation, as required. Examples of silt fences and temporary settlement tanks are shown in Figures 5-2 and 5-3.

Figure 5-2 Silt fencing measures (Source: SSI Environmental (left) and Thrace Group (right)

Figure 5-3 Temporary site settlement tanks (Source: Siltbuster)

There is potential for earthworks to lead to release of suspended solids to surface water bodies. The main factors influencing the rate of soil erosion and subsequent sediment release includes:

- Climate;
- Length and steepness of slopes;
- Characteristics of the soil/soil erosion potential;
- Soil vegetation/cover;
- Duration and extent of works; and
- Erosion and sediment control measures.

Runoff will be maintained at Greenfield (pre-development) runoff rates. The layout of the development has been designed to collect surface water runoff from hardstanding areas within the development and discharge to associated surface water attenuation adjacent to the proposed infrastructure. It will then be managed by gravity flow at Greenfield runoff rates.

Suspended solid (silt) removal features will be implemented in accordance with CIRIA C697 SuDS Manual, and CIRIA C648 Control of water pollution from linear construction projects.

<u>Pre-Emptive Site Drainage Management</u>

The works programme for the initial construction stage of the proposed development will take account of weather forecasts and predicted rainfall in particular. Large excavations and movements of subsoil or vegetation stripping will be suspended or scaled back if heavy rain is forecast. The extent to which works will be scaled back or suspended will relate directly to the amount of rainfall forecast.

The following forecasting systems are available and will be used on a daily basis at the site to direct proposed construction activities:

- General Forecasts: Available on a national, regional and county level from the Met Eireann website (www.met.ie/forecasts). These provide general information on weather

patterns including rainfall, wind speed and direction but do not provide any quantitative rainfall estimates;

- MeteoAlarm: Alerts to the possible occurrence of severe weather for the next two days. Less useful than general forecasts as only available on a provincial scale;
- 3-hour Rainfall Maps: Forecast quantitative rainfall amounts for the next 3 hours but does not account for possible heavy localised events;
- Rainfall Radar Images: Images covering the entire country are freely available from the Met Eireann website (www.met.ie/latest/rainfall_radar.asp). The images are a composite of radar data from Shannon and Dublin airports and give a picture of current rainfall extent and intensity. Images show a quantitative measure of recent rainfall. A 3-hour record is given and is updated every 15 minutes. Radar images are not predictive; and
- Consultancy Service: Met Eireann provide a 24-hour telephone consultancy service. The forecaster will provide interpretation of weather data and give the best available forecast for the area of interest. Using the safe threshold rainfall values will allow work to be safely controlled (from a water quality perspective) in the event of forecasting of an impending high rainfall intensity event.

Works will be suspended during the groundworks phase if forecasting suggests any of the following is likely to occur:

- >10 mm/hr (i.e., high intensity local rainfall events);
- >25 mm in a 24-hour period (heavy frontal rainfall lasting most of the day); or
- >half monthly average rainfall in any 7 days.

Prior to works being suspended the following control measures will be completed:

- Secure all open excavations;
- Provide temporary or emergency drainage to prevent back-up of surface runoff;
- Avoid working during heavy rainfall and for up to 24 hours after heavy events to ensure drainage systems are not overloaded; and
- Provide cover to material storage areas i.e., adequate tarpaulin over stockpile areas if material cannot be reinstated prior to suspension.

No instream works are proposed.

Run-off will be maintained at greenfield (pre-development) run-off rates. The layout of the development has been designed to collect surface water run-off from hardstanding areas within the development and discharge to associated surface water swale and attenuation tank adjacent to the proposed infrastructure. It is proposed to attenuate all storm water accumulated on site within an underground attenuation tank, which will be discharged to the Baldonnel stream via a Hydrobrake at greenfield run-off rates.

During the ground clearance of the proposed development, the Contractor will implement water control measures to limit the impact on water quality using standard measures.

All temporary and permanent drainage from the site shall be designed to have as a minimum three stages of treatment, as defined in the SuDS Manual. Management of run-off will include the following:

- Filtration of water through filter media (sand / stone check dam, silt fence);
- Detention / settlement in settlement ponds or behind check dam in swales; and
- Conveyance of shallow depths of water in vegetated swale.

5.3.1 Concrete Handling

Only ready-mixed concrete will be used during the construction phase, with all concrete being delivered from local batching plants in sealed concrete delivery trucks. The use of ready-mixed concrete deliveries will eliminate any potential environmental risks of on-site batching. When concrete is delivered to site, only the chute of the delivery truck will be cleaned, using the smallest volume of water necessary, before leaving the site. Concrete trucks will be washed out fully at the batching plant, where suitable facilities are already in place.

The small volume of water that will be generated from washing of the concrete trucks chute will be directed into a temporary lined impermeable containment area, or a concrete wash unit. This type of unit catches the solid concrete and filters and holds wash liquid for pH adjustment and further solids separation. The residual liquids and solids can be disposed of off-site as waste material. Where temporary lined impermeable containment areas are used, such containment areas will be excavated and lined with an impermeable membrane (see Figure 5-5).

Figure 5-4 Example of temporary concrete washout area

Measures to prevent surface water contamination from concrete pouring on-site will include:

- Using weather forecasting to assist in planning large concrete pours and avoiding large pours where prolonged periods of heavy rain is forecast;
- Restricting concrete pumps and machine buckets from slewing over watercourses while placing concrete;
- Ensuring that excavations are sufficiently dewatered before concreting begins and that dewatering continues while concrete sets;
- Ensuring that covers/mesh are available for freshly placed concrete to avoid the surface washing away in heavy rain;
- Disposal of surplus concrete after completion of a pour off-site; and
- Discussing arrangements for concrete deliveries with the suppliers before works commence to ensure they are aware of on-site wash-out restrictions.

5.4 Groundwater

It is not anticipated that significant quantities of groundwater will be encountered in excavations. However groundwater ingress will need to be managed should it occur. Groundwater levels will vary seasonally and with recent weather conditions. The Contractor will give due regard to groundwater levels at the time of construction and optimise excavation works to minimise groundwater ingress.

Where groundwater is encountered in excavations and dewatering is required, the pumped water will be released back into the existing surface water drainage network via the settlement ponds, silt bags or dedicated settlement tank to minimise the level of sediments entering the existing watercourses.

All concrete browsers will be washed down at a dedicated concrete washout onsite located within the construction compound or off site. Concrete washings will not be disposed of onsite to any surface or ground water feature. All washings will be removed offsite and treated at a licensed facility.

5.5 Land, Soils and Geology

The disturbance of soil, subsoil and bedrock is an unavoidable effect in the development of the proposed infrastructure at the site, however excavations for the infrastructure will be kept to a minimum to limit disturbance of the current ground conditions and to minimise costs associated with earthmoving.

Utilising material and soil from on-site excavation will increase the impact on local geology, however there will be less demand for off-site aggregate materials resulting in less traffic movements to and from the site as well as shorter travel distances.

The management of excavated materials is an important component of controlling dust as well as sediment and erosion control. Excavated topsoil, subsoils where encountered, will only be moved short distances from the point of extraction and will be used locally for landscaping and benching/battering, where possible. Excavated material will not be stored in excessive mounds on the site. Excess soils/subsoils will be stockpiled temporarily pending backfill. Placed soils will be sealed and levelled using the back of an excavator bucket to prevent erosion.

Excavation may be susceptible to collapsing depending on material encountered and depth of the excavation. Where battering back of excavations to a safe angle is not feasible, a physical barrier will be applied between the excavations and the potentially unstable material in the form of a granular berm or sheet piles. Excavations for the proposed power plant infrastructure will be backfilled to ground level following foundation installation. Temporary works designs will be carried out by a competent engineer during detailed design to account for the existing ground conditions.

Vehicular movements will be restricted to the footprint of the proposed development site. This means that machinery will not move onto areas that are not permitted for development. This will prevent disturbance of existing soils and vegetation.

As discussed in Section 4.1, temporary wastewater holding tanks will be used to store wastewater generated from the welfare facilities in the two construction compounds. This will eliminate the need for any wastewater treatment and percolation at the site. No concrete truck wash-out will be permitted at the site either so as to protect the existing ground conditions. Only concrete truck chute washing will be permitted on site in accordance with the measures outlined in Section 5.3 above. The management and handling of fuels, oils and lubricants will be in accordance with the measures set out in Section 4.5 so as to reduce the potential for spillage or contamination of soils.

Surface water management measures as set out in Section 5.3 will be put in place from start of construction works and installed to ensure that surface water run-off is controlled and does not cause erosion of exposed surfaces or generate sediment laden discharge.

5.6 Biodiversity

5.6.1 Habitats

5.6.1.1 Removal of Vegetation

In accordance with Section 40 of the Wildlife Acts, the vegetation (wet grassland) which is proposed to be removed, which may be used as nesting sites by breeding birds, will be cleared outside of the birds nesting season (1st March to 31st August inclusive). This will ensure there is no loss of nests as a result of the proposed construction works.

In the event that clearance of vegetation is required within the bird nesting season, vegetation will be first surveyed by an experienced ecologist to identify the presence of active nests. The survey will specifically target ground nesting birds including lapwing and snipe. Only vegetation confirmed to be nest free may be cleared. In the event that a nest is confirmed as present, the nest will either be removed under license obtained from NPWS or the nest will be cordoned off until the chicks have fledged or until nesting has failed.

The construction work areas will be demarcated prior to the construction works commencing. No clearance of vegetation will be undertaken outside of the demarcated areas. Disturbed areas of ground will be fully reinstated flowing completion of the works.

5.6.1.2 Maintaining Site Hydrology

The implementation of control measures will ensure that there is no potential for impact to ecological receptors in the receiving environment. However a summary of the sediment and pollution control measures which will be implemented are provided hereunder:

- All works must comply with the guidance set out in the guidance document entitled, "Control of Water Pollution from Construction Sites. Guidance for Consultants and Contractors (C532)" (CIRIA, 2001).
- Silt fences will be installed along the entire inside boundary of the Baldonnell Stream. Silt fences will also be installed around large stock piles of material. Silt fences will be constructed using a permeable filter fabric (Hy-Tex Terrastop Premium silt fence or similar). Silt fencing will be installed as per the manufacturer's guidelines and shall be maintained until vegetation on the disturbed ground has been re-established. Once installed, the silt fence shall be inspected regularly during construction and more frequently during heavy rainfall.
- Excavation activities will not be carried out during or following heavy rainfall. All stockpiled material will be stored within the site construction compound a minimum of 50m from the Baldonnell Stream.
- All concrete will be mixed off site and poured in place at site. All concrete bowsers will be washed down at a dedicated concrete washout onsite located within the construction compound or off site. Concrete washings will not be disposed of onsite to any surface or ground water feature. All washings will be removed offsite and treated at a licensed facility. No chemicals that are deleterious to aquatic organisms are to be used in cleaning works. All raw, uncured waste concrete must be cured at a designated location within the construction compound or off site.
- Re-fuelling of construction equipment and the addition of hydraulic oil or lubricants to vehicles / equipment will take place in designated hard surface, bunded areas within this

construction compound or off site only. If it is not possible to bring machinery to the refuelling point, fuel will be delivered in a double-skinned mobile fuel bowser. A drip tray will be used beneath the fill point during refuelling operations in order to contain any spillages that may occur. Refuelling will only occur within the construction compound or off site.

Further information on surface water management is provided in Section 5.3.

5.6.1.3 Flora

Wheels of machinery used in construction will be washed and free of soil before they are brought into the proposed power plant site to prevent accidental introduction of invasive plant species propagules.

Biosecurity measures will be employed during the construction works. The biosecurity measures will have regard to IFI Biosecurity Protocols including: *'IFI Biosecurity Protocol for Field Survey Work (December 2010)'.*

All machinery and equipment used will be inspected and will be completely dry prior to works commencing to prevent the risk of pathogen translocation. A 'Check, Clean, Dry' protocol will be undertaken with all equipment, machinery and vehicles entering and leaving the proposed development site. All equipment/machinery used within the drainage ditch will checked for living plants and animals. Equipment and machinery used will be washed thoroughly and then allowed to dry for at least 48 hours.

5.6.1.4 Bats

All temporary lighting associated with the construction works will be placed strategically by the Contractor following consultation with a suitably qualified ecologist. This will ensure that illumination beyond the works area is controlled. Lighting will be cowled and directional to reduce significant light splay. No lighting will be directed towards the hedgerows and treelines located around the outer boundary of the proposed development site. Only low-pressure sodium, high pressure sodium or LED luminaires will be used on site to ensure that there are no significant negative impacts on bats. In addition, the column height of the temporary lights will be carefully considered to minimise light spill.

5.6.1.5 Birds

Construction-phase mitigation measures to protect retained habitats and to protect watercourses are described in Section 5.6.5 and Section 5.3.

The following additional specific measures will be implemented to mitigate impacts to bird populations:

- Where possible, scrub clearance will not be carried out during the bird breeding season (1st March - 31st of August);
- Based on the results, of the pre-construction/construction breeding bird surveys, construction work will be timed to avoid work in close proximity to any breeding Snipe locations within the proposed power plant site during the Snipe breeding season.

In the event that any lapwing or snipe nests are identified within the ZoI during the nest survey appropriate mitigation measures in consultation with Bird Watch Ireland will be implemented.

Hoarding will be erected between the nest and the proposed development site to limit both noise and visual disturbance.

5.6.2 Pre-Clearance Surveys and Monitoring

Prior to vegetation clearance, the site will be surveyed by the ECoW or other qualified ecologist for mammal breeding or resting places, such as badger setts, and also bird nesting sites.

In accordance with Section 40 of the Wildlife Acts, the vegetation (wet grassland) which is proposed to be removed, which may be used as nesting sites by breeding birds, will be cleared outside of the birds nesting season (1st March to 31st August inclusive). This will ensure there is no loss of nests as a result of the proposed construction works. In the event that clearance of vegetation is required within the bird nesting season, vegetation will be first surveyed by an experienced ecologist to identify the presence of active nests. The survey will specifically target ground nesting birds including lapwing and snipe. Only vegetation confirmed to be nest free may be cleared. In the event that a nest is confirmed as present, the nest will either be removed under license obtained from NPWS or the nest will be cordoned off until the chicks have fledged or until nesting has failed.

The construction work areas will be demarcated prior to the construction works commencing. No clearance of vegetation will be undertaken outside of the demarcated areas. Disturbed areas of ground will be fully reinstated flowing completion of the works.

5.6.3 Fauna Protection at Excavations

At any construction site, mammals and other fauna, such as frogs, are at risk of falling into open excavations. Silt ponds pose no risk as their sides are sufficiently sloped to permit escape. During construction, open excavations must incorporate facilities for animals to escape, by means of:

- gently sloping earth or stone inclines to be left at the end of each day's operation – at each end of open trenches;
- for long excavations, timber escape planks to be left at c. 50m intervals along the trench at the end of each day's operations; these will usually be placed at right-angles to the trench;
- for long excavations, occasional earth/stone or wooden plank bridges to allow badgers to cross the trench during construction; and
- works will be limited to daylight hours where feasible to allow fauna to forage at dawn, dusk, and at night.

5.6.4 Aquatic Ecology Mitigation

Proposed drainage measures to reduce and protect the receiving waters from the potential impacts during the construction of the proposed development are set out in Section 5.3. These include measures to prevent run-off erosion from vulnerable areas and consequent sediment release into nearby watercourses to which the proposed development site discharges. Additional mitigation measures specific to aquatic ecological receptors are proposed, where appropriate, below.

Measures to prevent accidental spillage/leakage of chemicals and pollutants and uncontrolled runoff of contaminated surface water and sediment are outlined in Chapter 8 (Land, Soils and Geology) and Chapter 9 (Hydrology and Hydrogeology). The implementation of control measures will ensure that there is no potential for impact to ecological receptors in the receiving

environment. However a summary of the sediment and pollution control measures which will be implemented are provided hereunder.

All works must comply with the guidance set out in the guidance document entitled: "*Control of Water Pollution from Construction Sites. Guidance for Consultants and Contractors (C532)*" (CIRIA, 2001)[4].

Silt fences will be installed along the entire inside boundary of the Baldonnell Stream. Silt fences will also be installed around large stock piles of material. Silt fences will be constructed using a permeable filter fabric (Hy-Tex Terrastop Premium silt fence or similar). Silt fencing will be installed as per the manufacturer's guidelines and shall be maintained until vegetation on the disturbed ground has been re-established. Once installed, the silt fence shall be inspected regularly during construction and more frequently during heavy rainfall.

Excavation activities will not be carried out during or following heavy rainfall. All stockpiled material will be stored within the site construction compound a minimum of 50m from the Baldonnell Stream.

All concrete will be mixed off site and poured in place at site. All concrete browsers will be washed down at a dedicated concrete washout onsite located within the construction compound or off site. Concrete washings will not be disposed of onsite to any surface or ground water feature. All washings will be removed offsite and treated at a licensed facility. No chemicals that are deleterious to aquatic organisms are to be used in cleaning works. All raw, uncured waste concrete must be cured at a designated location within the construction compound or off site.

Re-fuelling of construction equipment and the addition of hydraulic oil or lubricants to vehicles / equipment will take place in designated hard surface, bunded areas within this construction compound or off site only. If it is not possible to bring machinery to the refuelling point, fuel will be delivered in a double-skinned mobile fuel bowser. A drip tray will be used beneath the fill point during refuelling operations in order to contain any spillages that may occur. Refuelling will only occur within the construction compound or off site.

5.7 Waste Management Plan

All waste generated from the proposed development will be managed in accordance with the provisions of the *Waste Management Act* 1996 as amended and associated Regulations.

All excavated topsoil and subsoils will be reused within the site boundary, insofar as possible, primarily for reinstatement. Any excess material which cannot be reused will be transferred off-site to a licensed waste facility. However, it is not anticipated that any excess material will not be suitable for reuse within the site.

Typical waste streams (including material-related streams such as metals, paper and cardboard, plastics, wood, rubber, textiles, bio-waste and product-related streams such as packaging, electronic waste, batteries, accumulators and construction waste) will be managed, collected, segregated and stored in separate areas at the construction compounds and removed off site by a licensed waste management contractor at regular intervals for the duration of the construction works. Skips and bins of appropriate sizes will be stored in both construction compounds and used to maximise source segregation of waste materials. This will include food

[4] https://www.ciria.org/ProductExcerpts/C532.aspx

and packaging waste from welfare facilities. Appropriate control of food waste in the compound will minimise the potential for pests and rodents to visit the area.

Any contaminated materials used for spills and equipment maintenance works will be separately stored in a suitable container for collection by an authorised hazardous waste contractor.

The Contractor will encourage all project teams to minimise waste generation and to maximise the segregation of waste at source. Material wastage will be avoided by delivering only the required quantities of material to site and utilising off-site manufacturing of steel reinforcement cages and concrete materials as much as possible. The Contractor will establish 'just-in-time' deliveries to avoid excess material storage at the site which can lead to waste generation. Delivery drivers will be encouraged to remove any excess packaging from materials delivered to site and remove unused timber pallets where possible.

Reusable formwork for concrete pouring will be used in preference of non-reusable options. Other opportunities for material reuse across the site will be sought by the Contractor.

It is not anticipated that there will be contaminated soils or materials encountered during the excavation works. No contaminated soils were identified during historical site investigation works.

The SHEQ Officer, or other appropriate person, will be appointed as the Waste Manager for the duration of the project in accordance with the general guidance set out in the *Best Practice Guidelines on the Preparation of Waste Management Plans for Construction and Demolition Projects* (Department of the Environment, Heritage and Local Government (DoEHLG, 2006).

At the pre-construction stage, the construction and demolition (C&D) Waste Manager will be in a position to require fellow designers to take full advantage of all reasonable C&D waste prevention, reuse and recycling opportunities. During construction, the practicalities of waste prevention, salvaging re-useable materials, and the need to synchronise the recycling of waste materials through the timing of their use in the new construction works will be emphasised by the Waste Manager.

The Waste Manager will be responsible for auditing waste handling and storage throughout the project and for advising construction personnel on best practices. All waste collections and records of waste movement off-site will be collated by the Waste Manager and retained in the site office.

5.8 Traffic and Transport

Mitigation measures to reduce or eliminate construction phase impacts will be implemented as part of a Construction Traffic Management Plan (CTMP). An Outline CTMP has been prepared for planning application purposes and the final Site-Specific Construction Traffic Management Plan will be produced by the appointed Contractor and PSCS in conjunction with the PSDP for the project. The final TMP will address the following issues:

- Site Access & Egress;
- Traffic Management Signage;
- Routing of Construction Traffic / Road Closures;

- Timings of Material Deliveries to Site;
- Traffic Management Speed Limits;
- Road Cleaning;
- Road Condition;
- Road Closures;
- Enforcement of Traffic Management Plan
- Details of Working Hours and Days;
- Details of Emergency plan;
- Communication;
- Construction Methodologies; and

Particular Construction Impacts.

5.8.1 Site Entrance

5.8.1.1 Junction Visibility

Adequate visibility at the site access will mitigate the potential increased likelihood for collisions between construction generated traffic and existing road network traffic.

Profile Park has been well developed to cater and entice future growth and expansion. Each of the proposed sites within the park has a pre-constructed access with a bellmouth width of approx. 20m to cater for all vehicle types. Internally Profile Park has an internal roundabout to separate traffic flows to the various sections with an approximate ICD of 45m. All traffic to Profile Park originates from the R134 New Nangor Road to the North.

An existing splitter island and central reserve is present on the arm accessing Profile Park providing lanes for East and West turning traffic. Splitter Islands are present on all arms of the internal roundabout also to separate traffic flows. Autotrack assessment have been carried out as part of the overall design for the scheme which demonstrates that large vehicles will be able to access the site comfortably.

Preferred construction phase access would be from the existing access to site off the internal roundabout within Profile Park. The delivery/haulage vehicles will be routed depending on the destination/origin of the materials being delivered.

The use of local roads will be minimised as much as possible, particularly to avoid / minimise the encountering of narrow road widths, poor visibility and unsuitable bearing capacities. As the site is located on the outskirts of Dublin City and is well serviced by major infrastructural routes, it is envisaged that the majority of delivery vehicles shall be able to access site through the M50 motorway, N4 and N7 National roads and the Regional road network immediately surrounding the site (R134, R120 and R136) which will keep them away from built-up urban centres.

The roads forming part of the haul routes will be monitored visually throughout the construction period and a truck mounted vacuum mechanical sweeper will be assigned to roads along the haul route as required. In addition, the contractor shall, in conjunction with the local authority:

Throughout the course of the construction of the proposed development, ongoing visual inspections and monitoring of the haul roads will be undertaken to ensure any damage caused by construction traffic is recorded and that the relevant local authority is notified.

5.8.2 Traffic Impact

To mitigate the impact of the construction traffic, the proposed power plant will utilise all available resources within the existing site to reduce the requirement for importation of materials to site.

5.8.3 Trench Reinstatement

To mitigate the impact of the cable laid within the public road, the reinstatement works will be backfilled and reinstated as soon as practicable. The reinstatement works will be undertaken in accordance with the "Purple Book" best guidance and practices as required by South Dublin County Council. The proposed reinstatement and construction details and phasing will be agreed with associated Local Authorities Municipal District Office in advance of the works. The Contractor will be responsible for arranging for the required road opening licenses.

The gas connection will be laid beneath the ground surface and/or public road. The area where excavations are planned will be the subject of a confirmatory survey, prior to the commencement of works. A verification condition survey will be carried out for all parts of the route within the public road. A trench will be opened using an excavator to accommodate the formation. The excavated material will be cast to the side to be reused as backfilling material where appropriate. This material will not be stored in the vicinity of any watercourse and will be smoothed with the back of an excavator bucket to minimise runoff. It will be cast on the upgradient side of the trench, so if any runoff did occur it will run into the downgradient trench. Excess material will be used on the site of the proposed development for local landscaping and reinstatement, further detail is provided in Chapter 3 (Description of Development).

The grid connection will be laid beneath the ground surface and/or private road. The area where excavations are planned will be the subject of a confirmatory survey, prior to the commencement of works. A verification condition survey will be carried out for all parts of the route within the public road. A trench will be opened using an excavator to accommodate the formation. The excavated material will be cast to the side to be reused as backfilling material where appropriate. This material will not be stored in the vicinity of any watercourse and will be smoothed with the back of an excavator bucket to minimise runoff. It will be cast on the upgradient side of the trench, so if any runoff did occur it will run into the downgradient trench. Excess material will be used on the site of the proposed development for local landscaping, further detail is provided in Chapter 3 (Description of Development).

5.8.4 Project Delays

To avoid delays to the project programme, all required road opening licenses and agreements with the Local Authorities and An Garda Síochána to facilitate movement of abnormal loads shall be sought by the appointed Contractor in a timely manner.

5.9 Cultural Heritage

The National Monuments Act, as amended requires that, in the event of the discovery of archaeological finds or remains that the relevant authorities, the National Monuments Service of the Department of Culture, Heritage and the Gaeltacht (DoCHG) and the National Museum of Ireland, should be notified immediately. Allowance will be made for full archaeological excavation, in consultation with the National Monuments Service of the DoCHG, in the event that archaeological remains are found during the construction phase.

A suitably qualified cultural heritage consultancy/consultant will be appointed to oversee the effective implementation of the archaeological mitigation measures recommended in this chapter for the construction phase of the proposed development. The consultancy/consultant will maintain continuing liaison with the National Monuments Service of the DoCHG and KCC's Executive Archaeologist throughout the construction phase of the development.

5.9.1 Architectural Heritage

There are no architectural heritage sites (RPS) located within the vicinity of the proposed power plant area.

6.0 CONCLUSION

This Construction Environmental Management Plan (CEMP) presents a summary of the overall proposed development works, the management of the site during the construction works and the mitigation measures required to ensure the proposed works do not have a significant effect on the environment. This document is prepared in accordance with Best Practice documents as set out above and in the EIAR.

Prior to commencement of construction, the appointed Contractor will be required to update this document with site specific details including the location of spill kits on the site, the layout of the construction compounds, machinery pre-start checklists and provide details on the persons responsible for environmental management for the duration of the works. The updated CEMP will also be required to include any specific construction phase environmental management procedures identified in the grant of planning for the development or subsequent to the planning submission. The final CEMP document will be agreed with the Developer prior to commencement of works and submitted to the planning authority. It will be a live document and updated accordingly throughout the project.

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3.3 OUTLINE WASTE MANAGEMENT PLAN

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BUILT ON KNOWLEDGE

Greener Ideas

PROFILE PARK POWER PLANT

OUTLINE WASTE MANAGEMENT PLAN

JUNE 2021

PROFILE PARK POWER PLANT

OUTLINE WASTE MANAGEMENT PLAN

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Table of Contents

1.0 INTRODUCTION

Greener Ideas Limited (hereafter referred to as the Developer) intend to apply for planning permission to develop a 125 MW dual fuel gas fired power plant at a site located in Profile Park, Dublin 22.

The site of the proposed power plant is located in Profile Park, Dublin 22 which is approximately 3.15km west of Clondalkin town centre. Profile Park is a 100 acre (40.5 Ha) fully enclosed, private business park. The immediate area is predominantly commercial / industrial in nature. Outside of this, Grange Castle Golf Course is located approximately 120m east of the site and Baldonnel Aerodrome 450m south of the site. The nearest residential properties are located some 400m to the south of the site and some 450 m to the northeast.

The planning application for the proposed development will be submitted to South Dublin County Council (SDCC) under Section 34 of the *Planning and Development Act 2000* (as amended). An Environmental Impact Assessment Report (EIAR) has been prepared to accompany the planning application and incorporate all elements of the proposed project works including the main power plant site, the electrical grid connection. Collectively this is referred to as the Profile Park Power Plant.

This report presents an Outline Waste Management Plan (OWMP) for the proposed development which will ensure handling and storage provisions for waste materials generated at the development are in full compliance with national waste policy, regional waste management plans and South Dublin County Council (SDCC) Waste Bye-Laws.

There are no guidelines in Ireland for the preparation of OWMPs, therefore this OWMP has been prepared in accordance with the following relevant documents:

- South Dublin County Council (Segregation, Storage and Presentation of Household and Commercial Waste) Bye-Laws 2018;
- BS5906:2005 Waste Management in Buildings – Code of Practice;
- Dublin City Development Plan 2016 – 2022 – Appendix 10 Guidelines for Waste Storage Facilities; and
- Department of Housing, Planning and Local Government (DoHPLG), Sustainable Urban Housing: Design Standards for New Apartments. Guidelines for Planning Authorities (March 2018).

The proposed power plant will be regulated by the Environmental Protection Agency under the provisions of the Industrial Emission Directive.

2.0 WASTE MANAGEMENT CONTEXT

2.1 Overview

The primary legislative instrument that governs waste management in Ireland is the *Waste Management Act (WMA) 1996*, as amended. The WMA is a key instrument which, among others, implements the EU *Waste Framework Directive (Directive 2008/98/EC)* in Ireland. The WMA provides for a general duty on everyone not to hold, transport, recover or dispose of waste in a manner that causes or is likely to cause environmental pollution. The WMA also sets out the provisions for the collection of waste and for its recovery/disposal.

Any person or contractor engaged in the collection of waste on a commercial basis is required to hold a Waste Collection Permit in accordance with the requirements of the *Waste Management (Collection Permit) Regulations 2007*, as amended. A Waste Collection Permit is issued to appropriate contractors by the National Waste Collection Permit Office (NWCPO).

Waste materials collected by a suitably permitted waste contractor must only be transported to appropriately permitted or licensed waste facilities. Authorisation for receiving waste materials are provided in accordance with the *Waste Management (Facility Permit & Registration) Regulations 2007*, as amended for waste permits and certificates of registration (COR) granted by the relevant Local Authority. Waste management authorisations granted by the Environmental Protection Agency (EPA) are issued in accordance with the *Waste Management (Licensing) Regulations 2004*, as amended and the *Environmental Protection Agency (Industrial Emissions) (Licensing) Regulations 2013*, as amended.

2.2 National Waste Statistics

The EPA reports on national waste generation statistics on a regular basis. The latest municipal waste statistics (2018) [1] provide the following key trends:

- Ireland produced 2,912,353 tonnes of municipal waste in 2018, this is a 3.5% increase on 2017;
- The rate of household waste generated per person in 2018 increased to 315kg per person annually from 305kg per person in 2016;
- In 2018, 38% of municipal waste was recycled, down from 40% in 2017 and 41% in 2016;
- 43% of waste was used in energy recovery, up significantly from 32% in 2017; and
- Waste sent to landfill was at just 14% in 2018, down from 23% in 2017.

3.0 RELEVANT POLICY

3.1 National Policy

Ireland's waste management policy is based on the EU waste hierarchy and establishes a priority order for waste handling and treatment as set out in Figure 1-1.

Figure 3-1: Waste Management Hierarchy (Source: EPA)

[1] EPA Municipal Waste Statistics for Ireland (25 September 2020)

The current government policy document on waste, which covers the period from 2020 – 2025, is entitled *A Waste Action Plan for a Circular Economy* and was published in June 2020[2]. This document is Ireland's new roadmap for waste planning and management and aims to embed climate action in all strands of public policy. The Plan shifts focus away from waste disposal and looks instead to how the country can preserve resources by creating a circular economy.

The Plan outlines the contribution of the sector to the achievement of a number of other national plans and policies including the Climate Action Plan. It also matches the level of ambition being shown across the European Union through the European Green Deal which encompasses a range of actions supporting circularity and sustainability.

The key targets under the Waste Action Plan in relation to households and businesses are:

- Recycling targets for waste collectors;
- Standardised bin colours across the State: green for recycling, brown for organic waste and black for residual;
- Environmental levies for waste recovery and single use coffee cups to encourage recycling and reuse;
- Waste oversight body to manage consumer rights; and
- Education and awareness campaign to improve waste segregation.

Most notably in respect of the proposed commercial development, the new Waste Action Plan commits to working with stakeholders to *"improve waste segregation in the commercial sector, including an awareness campaign and enforcement actions requiring segregated waste bins and incentivised charging to ensure waste minimisation and proper segregation".*

The Plan also states that *"We will develop a quality waste management assurance scheme for businesses (including apartments serviced by management companies) to sign up to. This will verify that premises are complying with best waste management practice in terms of waste prevention and recycling (including organic waste)."*

3.2 Regional Waste Management Plan

For the purposes of waste planning, Ireland has been divided into three waste regions, namely the Eastern-Midlands Waste Region, the Southern Waste Region and the Connacht-Ulster Waste Region.

The Eastern-Midlands Waste Region (EMWR) comprises 12 no. local authority areas which are:

Eastern-Midlands Waste Region	
South Dublin County Council	Laois County Council
Dublin City Council	Longford County Council
Dún Laoghaire-Rathdown County Council	Meath County Council
Fingal County Council	Offaly County Council
Kildare County Council	Westmeath County Council
Louth County Council	Wicklow County Council

[2] Department of Communications, Climate Action and Environment, *A Waste Action Plan for a Circular Economy: Ireland's National Waste Policy 2020-2025* (June 2020)

Each of the three waste management regions has developed a waste management plan to provide a framework for the prevention and management of wastes in a safe and sustainable manner. The current waste plan for the EMWR is the *Eastern-Midlands Region Waste Management Plan 2015 – 2021*.

The strategic vision of the regional waste plan is to rethink Ireland's approach to managing wastes, by viewing waste streams as valuable material resources that can lead to a healthier environment and sustainable commercial opportunities for the economy.

The regional plan sets out the following strategic targets for waste management in the region:

- A 1% reduction per annum in the quantity of household waste generated per capita over the period of the plan;
- Achieve a recycling rate of 50% of managed municipal waste by 2020; and
- Reduce to 0% the direct disposal of unprocessed residual municipal waste to landfill (from 2016 onwards) in favour of higher value pre-treatment processes and indigenous recovery practices.

The new National Waste Policy document, *A Waste Action Plan for a Circular Economy*, states that the three current regional waste management plans will be replaced by a new National Waste Management Plan for a Circular Economy by January 2022, which will contain targets for:

- Reuse;
- Repair;
- Resource consumption; and
- Reducing contamination levels.

3.3 County Development Plan

The current development plan applicable to the proposed development is the South Dublin County Development Plan 2016 – 2022. The Development Plan sets out a number of policies and objectives with regard to waste management including those set out overleaf:

INFRASTRUCTURE & ENVIRONMENTAL QUALITY (IE) Policy 5 Waste Management

It is the policy of the Council to implement European Union, National and Regional waste and related environmental policy, legislation, guidance and codes of practice to improve management of material resources and wastes.

IE5 Objective 1:

To support the implementation of the Eastern-Midlands Region Waste Management Plan 2015-2021 by adhering to overarching performance targets, policies and policy actions.

IE5 Objective 2:

To support waste prevention through behavioural change activities to de-couple economic growth and resource use.

IE5 Objective 3:

To encourage the transition from a waste management economy to a green circular economy to enhance employment and increase the value recovery and recirculation of resources.

IE5 Objective 4:

To provide, promote and facilitate high quality sustainable waste recovery and disposal infrastructure/ technology in keeping with the EU waste hierarchy and to adequately cater for a growing residential population and business sector.

IE5 Objective 5:

To provide for and maintain the network of bring infrastructure (e.g. civic amenity facilities, bring banks) in the County to facilitate the recycling and recovery of hazardous and non-hazardous municipal wastes.

IE5 Objective 6:

To seek the provision of adequately sized public recycling facilities in association with new commercial developments and in tandem with significant change of use/extensions of existing commercial developments where appropriate.

IE5 Objective 7:

To develop a countywide network of green waste centres in suitable locations to expand the collection system for compostable waste.

IE5 Objective 8:

To secure appropriate provision for the sustainable management of waste within developments, including the provision of facilities for the storage, separation and collection of such waste.

Actions

- Support and facilitate the separation of waste at source into organic and non-organic streams or other waste management systems that divert waste from landfill and maximise the potential for each waste type to be re-used and recycled or composted and divert organic waste from landfill, in accordance with the National Strategy on Biodegradable Waste (2006).
- Implement the objectives of the National Waste Prevention Programme at a local level with businesses, schools, householders, community groups and within the Council's own activities.
- Promote an increase in the amount of waste re-used and recycled consistent with the Regional Waste Management Plan and Waste Hierarchy and facilitate recycling of waste through adequate provision of facilities and good design in new developments.
- Implement the South Dublin Litter Management Plan 2015 - 2019.

3.4 South Dublin County Council Waste Bye-Laws

New Waste Bye-Laws for the functional area of SDCC entered into force in December 2018. These are referred to as *County of South Dublin (Segregation, Storage and Presentation of Household and Commercial Waste) Bye-laws, 2018.*

The main provisions of the Bye-Laws relevant to the proposed development are as follows:

- Containers used for the presentation of kerbside waste shall be maintained in such condition and state of repair that the waste placed therein will not be a source of nuisance or litter. Waste shall not be presented in a container where: (a) the wheels or lid have been removed or damaged to such an extent that it is not able to contain the waste without spillage, is otherwise unfit for the purpose for which it was designed or is not capable of being conveniently emptied;
- Other than on the day before and the designated waste collection day, containers used for the presentation of kerbside waste shall be held within the curtilage of the premises where the waste is produced. They shall not be stored on a roadway,footway, footpath or any other public place unless the location has been expressly authorised in writing by an authorised person.
- Kerbside waste presented for collection shall not be presented for collection earlier than 8.00 pm on the day immediately proceeding the designated waste collection day. All containers used for the presentation of kerbside waste and any uncollected waste shall be removed from any roadway, footway, footpath or any other public place no later than 8:00am on the day following the designated waste collection day.
- Commercial waste shall not be deposited at any bring facility provided by or on behalf of South Dublin County Council.

4.0 PROJECT DESCRIPTION

The proposed development will comprise the construction and installation of the following:

- Site Entrance;
- Engine Hall comprising up to 6 no. gas engines and 1 no. exhaust stack cluster with a flue tip height of 31.8m;
- Electrical Annex Building;
- Workshop Building;
- Security Hut;
- Radiator Coolers;
- 110 kV Electrical Transformer(s);
- Gas AGI;
- Tank Farm comprising:
    - 2 x Fuel Oil Storage Tank;
    - SCR reagent Tank;
    - Lube Oil Storage Tank;
    - Lube Oil Maintenance Tank;
    - Pilot Oil Tank;
    - Fire Water Storage Tank;
    - Cooling Water Run-Down Tank;
    - Surface Water Attenuation Tank
    - Bund wall, approximately 1.8m high;
- Perimeter Fencing, approximately 3m high;
- Car Park;
- Landscape planting around perimeter of site.

A 10-year planning permission is being sought and the power plant is expected to be operational for at least 25 years from the date of commissioning. On cessation of activities, the plant will

either be redeveloped as a power related facility, or the site will be redeveloped in an alternative form.

5.0 WASTE ARISINGS

The typical waste types which will be generated at the proposed development are:

- Waste lubricating oils;
- Oil/water separators;
- Waste fuel oil / diesel;
- Contaminated rages and wipes;
- Nominally empty hazardous containers;
- Waste acid;
- Waste alkali;
- Contaminated PPE;
- Batteries;
- Fluorescent tubes;
- Waste Electrical Electronic Equipment.
- Mixed dry recyclables (MDR) – cardboard, paper, plastic metals;
- Wood – timber pallets from incoming deliveries;
- Organic waste – food waste and biodegradable materials;

5.1 Estimated Waste Quantities

Waste quantities to be generated at the proposed development have been estimated based on Industrial Emissions Licences for similar scale power plants.

Table 5-1: Estimated operational waste quantities

Waste Type	Quantity Generated (tonnes per month)
Waste lubricating oils	<0.5
Oil/water separators	<0.5
Waste fuel oil / diesel	<0.5
Contaminated rages and wipes	<0.1
Nominally empty hazardous containers	<0.1
Waste acid	<0.1
Waste alkali	<0.1
Contaminated PPE	<0.005
Batteries	<0.001
Fluorescent tubes	<0.005
Waste Electrical Electronic Equipment	<0.01
Mixed dry recyclables (MDR) – cardboard, paper, plastic metals	<0.01
Wood – timber pallets from incoming deliveries	0.01
Organic waste – food waste and biodegradable materials	0.01

5.2 Waste Handling

In accordance with the requirements of the SDDCC Waste Bye-Laws, this operational waste strategy provides for the segregation at source of waste materials and storage within the curtilage of the proposed building. All waste storage areas and containers will be maintained in good condition by the facilities management team such that they do not become a source of nuisance, litter or odour.

5.3 Storage of Waste

A dedicated Waste Store will be provided within the Gas Engine Hall Building. The Waste Store will be designed and built to meet best practice standards for waste handling, including:

- Mechanical ventilation rated at c. 8 air changes per hour to control odour;
- Suitable lighting with water-proof fittings to allow cleaning of room surfaces;
- Water supply to allow for bin washing on-site;
- Power supply suitable for a wet environment;
- Sloped floor to a foul drain;
- Washable wall finishes; and
- Anti-slip floor coating/finish.

The Waste Stores will be secured internally and externally by means of restricted access to authorised personnel only and will be appropriately designed to permit use by persons with limited mobility. Signage will be erected in the waste stores to identify the waste container types and what waste types can be placed in each container. Signage may be provided by the appointed waste contractor or, alternatively, labels and bin poster resources provided by the Regional Waste Management Offices (RWMOs) through the mywaste initiative (www.mywaste.ie) can be used.

Fire protection measures specific to waste storage areas will also be provided for including passive ventilation to the lobby area and sprinkler protection.

Pest control measures, such as bait boxes, will also be put in place as required to control vermin.

5.4 Separation of Waste at Source

Waste will be stored in UN-approved containers, as required. Containers will be inspected regularly to ensure they have not been damaged or become degraded. All drums will be secured to pallets for uploading. All liquid waste drums will allow 10% ullage to prevent doming. Hazardous and non-hazardous waste will be segregated and clearly labelled.

All recyclable wastes will be segregated on site and collected for recycling by permitted waste contractors. General non-hazardous wastes will be compacted on site and collected for disposal by a licensed waste disposal contractor. All documentation will be retained on site in accordance with legislative requirements and the Environmental Management System for the site.

All hazardous wastes will be stored in accordance with HSG 71 Chemical Warehousing - The Storage of Packaged Dangerous Substances. All hazardous waste will be labelled appropriately, covered where necessary and stored in contained areas on site before being collected by a permitted hazardous waste contractor and brought to a licensed facility for disposal, recovery or recycling. This will include empty hazardous containers and waste oils. All documentation will

be retained on site in accordance with legislative requirements and the Environmental Management System for the site. Standard operating procedures will be developed to cover waste management activities at the site. Waste chemicals will be segregated where possible and stored in a designated chemical store in suitable, labelled containers prior to collection by a licensed waste contractor for recovery or disposal at licensed hazardous waste management facilities. As with any industrial facility, standard hazardous wastes such as fluorescent tubes, batteries, oils, etc. will arise from time to time. These wastes will be stored and managed as hazardous waste. Under licensed/permitted waste management contracts, these wastes will be sent for recovery and recycling.

The volume of waste generated by the power plant will be relatively small. Waste will be managed on site in accordance with the Waste Management Hierarchy. Where possible the generation of waste will be avoided. Where this is not possible the production of waste will be minimised and sent for recovery.

All waste will be managed by appropriately authorised contractors in accordance with relevant legislation. A baseline waste audit will take place as part of the EMS. The waste audit process will identify all waste streams generated on site and determine opportunities for waste prevention, minimisation and re-use. The audit will also include an assessment of current waste management practices and determine if additional opportunities for waste recovery exist. The findings of the waste audit will be incorporated into, and managed through, the Environmental Management System.

An annual waste minimisation report will be developed demonstrating the efforts made to reduce consumption. A material balance will be included illustrating the fate of all waste materials. Food waste will be managed in accordance with the Waste Management (Food Waste) Regulations 2009. It is noted that there is no canteen with catering facilities proposed for this facility.

5.5 Presentation of Waste for Collection

Waste will be stored in the segregated bins in the Waste Store until it is required to be collected by a waste contractor. Only contractors that are suitably permitted in accordance with the *Waste Management (Collection Permit) Regulations 2007*, as amended, will be engaged by the facilities team. There are numerous authorised waste contractors in operation in the South Dublin area.

All waste containers presented for collection will be clearly identified and will not be presented in such a way as to cause a nuisance, cause a risk to traffic, endanger health or cause environmental harm.

5.6 Waste Reduction

The Government's new *Waste Action Plan for a Circular Economy* includes a commitment to *"work to deliver sustained and visible public behavioural change campaigns under uniform branding, targeting individuals, business and the public sector to encourage waste prevention and recycling."*

Greener Ideas Limited is committed to supporting the Government's efforts in waste prevention and recycling and will engage with the appointed waste contractors to maximise opportunities for segregation of waste in the Waste Store and throughout the building in the provision of additional waste containers for specific items and/or appropriate signage. Relevant

communication material from the waste collection contractor, or from Mywaste resources, will be provided to assist with this.

6.0 SUMMARY

This Outline Waste Management Plan sets out a strategy for the handling and management of waste materials generated during the operational phase of the proposed power plant.

This strategy will ensure compliance with national policy, the *Eastern-Midlands Region Waste Management Plan 2015 – 2021, Dublin City Development Plan 2016 – 2022* and the SDCC Waste Bye-Laws. Compliance with the measures set out in this strategy will ensure a high level of waste segregation at source ensuring maximum opportunities for off-site reuse, recycling and recovery.

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3.4 SURFACE WATER DRAINAGE CALCULATIONS

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes GDSDS Manhole Sizes IW Foul

FSR Rainfall Model - Scotland and Ireland

Return Period (years)	5	PIMP (%)	100
M5-60 (mm)	16.900	Add Flow / Climate Change (%)	20
Ratio R	0.272	Minimum Backdrop Height (m)	0.200
Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m)	1.500
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	12.728	0.057	225.0	0.032	4.00	0.0	0.600	o	225	Pipe/Conduit	
1.001	77.893	0.346	225.0	0.080	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.002	11.409	0.051	225.0	0.142	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.003	61.565	0.205	300.0	0.012	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.004	17.255	0.245	70.6	0.146	0.00	0.0	0.600	o	300	Pipe/Conduit	
2.000	29.000	0.129	225.0	0.051	4.00	0.0	0.600	o	225	Pipe/Conduit	
2.001	14.142	0.063	225.0	0.012	0.00	0.0	0.600	o	225	Pipe/Conduit	
2.002	25.099	0.112	225.0	0.012	0.00	0.0	0.600	o	225	Pipe/Conduit	
2.003	14.142	0.063	225.0	0.074	0.00	0.0	0.600	o	225	Pipe/Conduit	
2.004	23.914	0.106	225.0	0.005	0.00	0.0	0.600	o	225	Pipe/Conduit	
2.005	11.873	0.072	163.9	0.045	0.00	0.0	0.600	o	225	Pipe/Conduit	
2.006	75.371	0.358	210.3	0.092	0.00	0.0	0.600	o	300	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	50.00	4.24	73.675	0.032	0.0	0.0	0.9	0.87	34.5	5.2
1.001	50.00	5.74	73.618	0.112	0.0	0.0	3.0	0.87	34.5	18.2
1.002	50.00	5.92	73.197	0.254	0.0	0.0	6.9	1.04	73.8	41.3
1.003	50.00	7.06	73.147	0.266	0.0	0.0	7.2	0.90	63.8	43.2
1.004	50.00	7.21	72.941	0.412	0.0	0.0	11.1	1.87	132.5	66.9
2.000	50.00	4.56	73.675	0.051	0.0	0.0	1.4	0.87	34.5	8.3
2.001	50.00	4.83	73.546	0.062	0.0	0.0	1.7	0.87	34.5	10.1
2.002	50.00	5.31	73.483	0.074	0.0	0.0	2.0	0.87	34.5	12.1
2.003	50.00	5.58	73.372	0.148	0.0	0.0	4.0	0.87	34.5	24.1
2.004	50.00	6.04	73.309	0.154	0.0	0.0	4.2	0.87	34.5	25.0
2.005	50.00	6.24	73.203	0.199	0.0	0.0	5.4	1.02	40.5	32.3
2.006	50.00	7.40	73.055	0.291	0.0	0.0	7.9	1.08	76.4	47.3

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Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.005	5.814	0.019	300.0	0.087	0.00	0.0	0.600	o	450	Pipe/Conduit	
1.006	40.664	0.136	300.0	0.000	0.00	0.0	0.600	o	450	Pipe/Conduit	
1.007	40.664	0.136	300.0	0.000	0.00	0.0	0.600	o	450	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.005	50.00	7.48	72.547	0.789	0.0	0.0	21.4	1.17	185.8	128.2
1.006	50.00	8.06	72.527	0.789	0.0	0.0	21.4	1.17	185.8	128.2
1.007	50.00	8.64	72.392	0.789	0.0	0.0	21.4	1.17	185.8	128.2

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Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	Pipe Out PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	Pipes In PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
1	74.800	1.125	Open Manhole	1200	1.000	73.675	225				
2	74.800	1.182	Open Manhole	1200	1.001	73.618	225	1.000	73.618	225	
3	74.800	1.603	Open Manhole	1200	1.002	73.197	300	1.001	73.272	225	
4	74.800	1.653	Open Manhole	1200	1.003	73.147	300	1.002	73.147	300	
5	74.800	1.859	Open Manhole	1200	1.004	72.941	300	1.003	72.941	300	
6	74.800	1.125	Open Manhole	1200	2.000	73.675	225				
7	74.800	1.254	Open Manhole	1200	2.001	73.546	225	2.000	73.546	225	
8	74.800	1.317	Open Manhole	1200	2.002	73.483	225	2.001	73.483	225	
9	74.800	1.428	Open Manhole	1200	2.003	73.372	225	2.002	73.372	225	
10	74.800	1.491	Open Manhole	1200	2.004	73.309	225	2.003	73.309	225	
11	74.800	1.597	Open Manhole	1200	2.005	73.203	225	2.004	73.203	225	
12	74.800	1.745	Open Manhole	1200	2.006	73.055	300	2.005	73.130	225	
13	74.800	2.253	Open Manhole	1350	1.005	72.547	450	1.004	72.697	300	
								2.006	72.697	300	
14	74.800	2.273	Open Manhole	1350	1.006	72.527	450	1.005	72.527	450	
15	74.800	2.408	Open Manhole	1350	1.007	72.392	450	1.006	72.392	450	
18	74.800	2.544	Open Manhole	0		OUTFALL		1.007	72.256	450	

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PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	o	225	1	74.800	73.675	0.900	Open Manhole	1200
1.001	o	225	2	74.800	73.618	0.957	Open Manhole	1200
1.002	o	300	3	74.800	73.197	1.303	Open Manhole	1200
1.003	o	300	4	74.800	73.147	1.353	Open Manhole	1200
1.004	o	300	5	74.800	72.941	1.559	Open Manhole	1200
2.000	o	225	6	74.800	73.675	0.900	Open Manhole	1200
2.001	o	225	7	74.800	73.546	1.029	Open Manhole	1200
2.002	o	225	8	74.800	73.483	1.092	Open Manhole	1200
2.003	o	225	9	74.800	73.372	1.203	Open Manhole	1200
2.004	o	225	10	74.800	73.309	1.266	Open Manhole	1200
2.005	o	225	11	74.800	73.203	1.372	Open Manhole	1200
2.006	o	300	12	74.800	73.055	1.445	Open Manhole	1200
1.005	o	450	13	74.800	72.547	1.803	Open Manhole	1350
1.006	o	450	14	74.800	72.527	1.823	Open Manhole	1350
1.007	o	450	15	74.800	72.392	1.958	Open Manhole	1350

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	12.728	225.0	2	74.800	73.618	0.957	Open Manhole	1200
1.001	77.893	225.0	3	74.800	73.272	1.303	Open Manhole	1200
1.002	11.409	225.0	4	74.800	73.147	1.353	Open Manhole	1200
1.003	61.565	300.0	5	74.800	72.941	1.559	Open Manhole	1200
1.004	17.255	70.6	13	74.800	72.697	1.803	Open Manhole	1350
2.000	29.000	225.0	7	74.800	73.546	1.029	Open Manhole	1200
2.001	14.142	225.0	8	74.800	73.483	1.092	Open Manhole	1200
2.002	25.099	225.0	9	74.800	73.372	1.203	Open Manhole	1200
2.003	14.142	225.0	10	74.800	73.309	1.266	Open Manhole	1200
2.004	23.914	225.0	11	74.800	73.203	1.372	Open Manhole	1200
2.005	11.873	163.9	12	74.800	73.130	1.445	Open Manhole	1200
2.006	75.371	210.3	13	74.800	72.697	1.803	Open Manhole	1350
1.005	5.814	300.0	14	74.800	72.527	1.823	Open Manhole	1350
1.006	40.664	300.0	15	74.800	72.392	1.958	Open Manhole	1350
1.007	40.664	300.0	18	74.800	72.256	2.094	Open Manhole	0

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Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	User	-	60	0.053	0.032	0.032
1.001	User	-	60	0.006	0.003	0.003
	User	-	40	0.192	0.077	0.080
1.002	User	-	100	0.022	0.022	0.022
	User	-	100	0.110	0.110	0.131
	User	-	60	0.018	0.011	0.142
1.003	User	-	100	0.012	0.012	0.012
1.004	User	-	100	0.107	0.107	0.107
	User	-	100	0.024	0.024	0.131
	User	-	60	0.025	0.015	0.146
2.000	User	-	60	0.023	0.014	0.014
	User	-	60	0.062	0.037	0.051
2.001	User	-	60	0.007	0.004	0.004
	User	-	60	0.012	0.007	0.012
2.002	User	-	60	0.020	0.012	0.012
2.003	User	-	60	0.029	0.017	0.017
	User	-	40	0.098	0.039	0.056
	User	-	60	0.029	0.017	0.074
2.004	User	-	60	0.009	0.005	0.005
2.005	User	-	60	0.022	0.013	0.013
	User	-	60	0.054	0.032	0.045
2.006	User	-	40	0.190	0.076	0.076
	User	-	100	0.016	0.016	0.092
1.005	User	-	100	0.076	0.076	0.076
	User	-	100	0.010	0.010	0.087
1.006	-	-	100	0.000	0.000	0.000
1.007	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				1.224	0.789	0.789

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.007	18	74.800	72.256	72.300	0	0

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	20.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	2.000
Hot Start (mins)	0	Inlet Coeffiecient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1

Number of Input Hydrographs 0 Number of Offline Controls 0
Number of Online Controls 1 Number of Storage Structures 1

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Simulation Criteria for Storm

Number of Time/Area Diagrams 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	5	Cv (Summer)	0.750
Region	Scotland and Ireland	Cv (Winter)	0.840
M5-60 (mm)	16.900	Storm Duration (mins)	30
Ratio R	0.272		

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Online Controls for Storm

Hydro-Brake® Optimum Manhole: 15, DS/PN: 1.007, Volume (m³): 9.7

Unit Reference	MD-SHE-0068-4000-4337-4000
Design Head (m)	4.337
Design Flow (l/s)	4.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	68
Invert Level (m)	72.392
Minimum Outlet Pipe Diameter (mm)	100
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	4.337	4.0
Flush-Flo™	0.291	2.0
Kick-Flo®	0.603	1.6
Mean Flow over Head Range	-	2.8

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	1.7	1.200	2.2	3.000	3.4	7.000	5.0
0.200	2.0	1.400	2.4	3.500	3.6	7.500	5.2
0.300	2.0	1.600	2.5	4.000	3.8	8.000	5.3
0.400	2.0	1.800	2.7	4.500	4.1	8.500	5.5
0.500	1.9	2.000	2.8	5.000	4.3	9.000	5.6
0.600	1.6	2.200	2.9	5.500	4.5	9.500	5.8
0.800	1.8	2.400	3.0	6.000	4.6		
1.000	2.0	2.600	3.1	6.500	4.8		

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Storage Structures for Storm

Tank or Pond Manhole: 15, DS/PN: 1.007

Invert Level (m) 72.392

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	490.0	1.000	490.0	1.010	0.0

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Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	20.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs	0	Number of Storage Structures	1
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.272
Region	Scotland and Ireland	Cv (Summer)	0.750
M5-60 (mm)	16.900	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0	DVD Status	OFF
Analysis Timestep	Fine	Inertia Status	OFF
DTS Status	ON		

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 0, 0

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
1.000	1	2880 Winter	100	+0%	100/15 Summer			
1.001	2	2880 Winter	100	+0%	30/15 Summer			
1.002	3	2880 Winter	100	+0%	30/15 Summer			
1.003	4	2880 Winter	100	+0%	30/15 Summer			
1.004	5	2880 Winter	100	+0%	30/15 Winter			
2.000	6	2880 Winter	100	+0%	100/15 Summer			
2.001	7	2880 Winter	100	+0%	30/15 Winter			
2.002	8	2880 Winter	100	+0%	30/15 Summer			
2.003	9	2880 Winter	100	+0%	30/15 Summer			
2.004	10	2880 Winter	100	+0%	30/15 Summer			
2.005	11	2880 Winter	100	+0%	30/15 Summer			
2.006	12	2880 Winter	100	+0%	30/15 Winter			
1.005	13	2880 Winter	100	+0%	30/15 Summer	30/1440 Summer		
1.006	14	2880 Winter	100	+0%	30/240 Winter	30/720 Summer		
1.007	15	2880 Winter	100	+0%	30/120 Winter			

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Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	1	74.556	0.656	0.000	0.02		0.5	FLOOD RISK	
1.001	2	74.555	0.712	0.000	0.05		1.8	FLOOD RISK	
1.002	3	74.555	1.058	0.000	0.07		4.1	FLOOD RISK	
1.003	4	74.555	1.108	0.000	0.07		4.3	FLOOD RISK	
1.004	5	74.553	1.312	0.000	0.06		6.6	FLOOD RISK	
2.000	6	74.557	0.657	0.000	0.03		0.8	FLOOD RISK	
2.001	7	74.557	0.786	0.000	0.03		1.0	FLOOD RISK	
2.002	8	74.557	0.849	0.000	0.04		1.2	FLOOD RISK	
2.003	9	74.556	0.960	0.000	0.08		2.4	FLOOD RISK	
2.004	10	74.556	1.022	0.000	0.08		2.5	FLOOD RISK	
2.005	11	74.555	1.127	0.000	0.09		3.2	FLOOD RISK	
2.006	12	74.554	1.198	0.000	0.06		4.7	FLOOD RISK	
1.005	13	74.552	1.555	0.000	0.11		12.2	FLOOD RISK	
1.006	14	74.551	1.574	0.000	0.07		12.1	FLOOD RISK	
1.007	15	74.550	1.708	0.000	0.02		2.9	FLOOD RISK	

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9.1 FLOOD RISK ASSESSMENT

TOBIN
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BUILT ON KNOWLEDGE

Greener Ideas

PROFILE PARK POWER PLANT

Flood Risk Assessment

Proposed Power Plant, Profile Park, West Dublin

Flood Risk Assessment

Document Control Sheet	
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Report Status	Planning Issue
Report Date	June 2021
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Client:	Greener Ideas Limited
Client Address:	C/O Centrica Business Solutions, 1 Seapoint Building, 44-45 Clontarf Road, Dublin 3, D03 F4A7
Project Number	11069

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Appendices

1.0 INTRODUCTION

TOBIN Consulting Engineers were appointed by Greener Ideas Limited to undertake a Flood Risk Assessment (FRA) for the construction of a new power plant at Profile Park in West Dublin.

Figure 1-1 shows the location of the subject site in Profile Park, 16km from Dublin City Centre. The 1.9ha greenfield site is relatively flat, with existing ground levels ranging from 72.88mOD along the northeastern site boundary bordering the adjacent roadway, to 76.11mOD at the southeastern site corner.

A topographical survey of the proposed development site is provided in Appendix 1.

Due to the proximity of the site to the Baldonnell Stream, a tributary of the Grifeen River, fluvial flooding was initially considered a potential source of flood risk to the proposed development.

The purpose of this report is to communicate any potential flood risks to people and future development at the site.

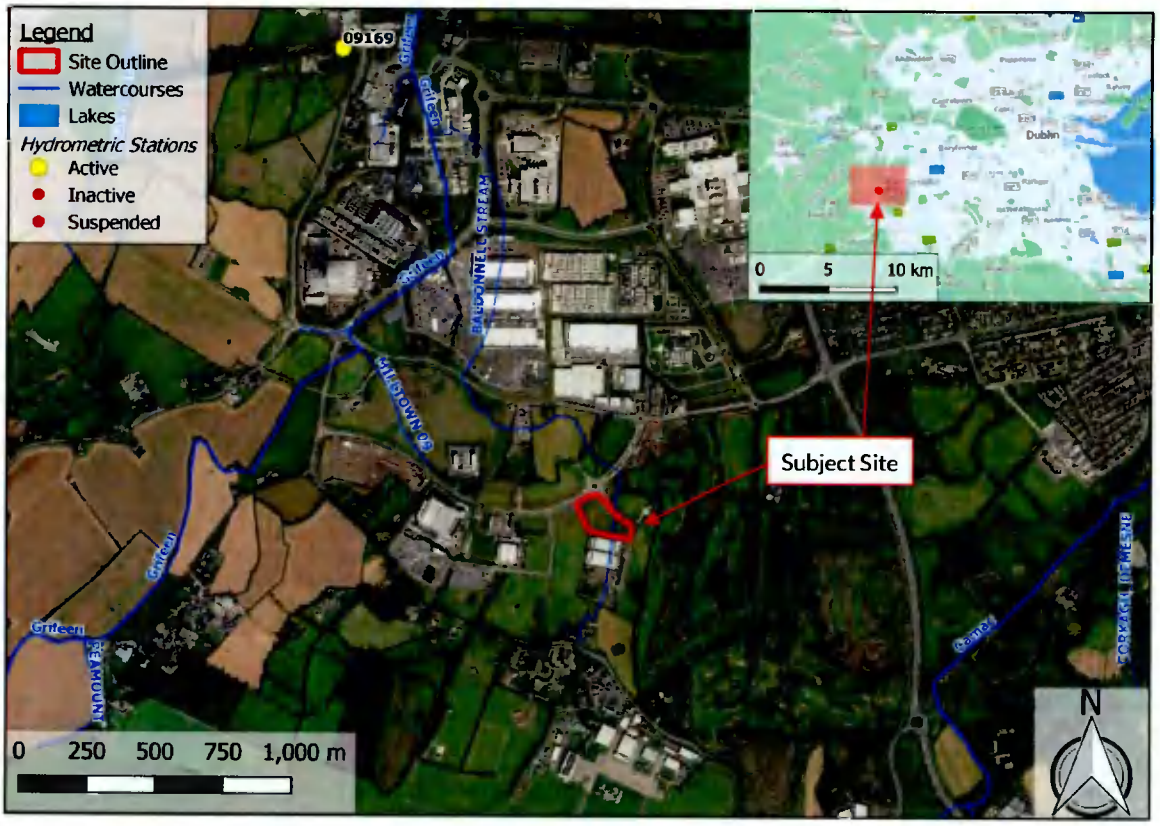

Figure 1-1 Site Location

It was noted that the Baldonnell Stream has been highly modified in the past, with much of its course upstream and downstream of the subject site being culverted. The watercourse also appears to have been rerouted to the eastern boundary; see Figure 1-2.

Figure 1-2 Baldonnell Stream

The proposed site layout (see Figure 1-3), includes grading ground elevation from existing levels (72.8mOD to 76.1mOD) to 74.0-75.0mOD, removing localised depressions.

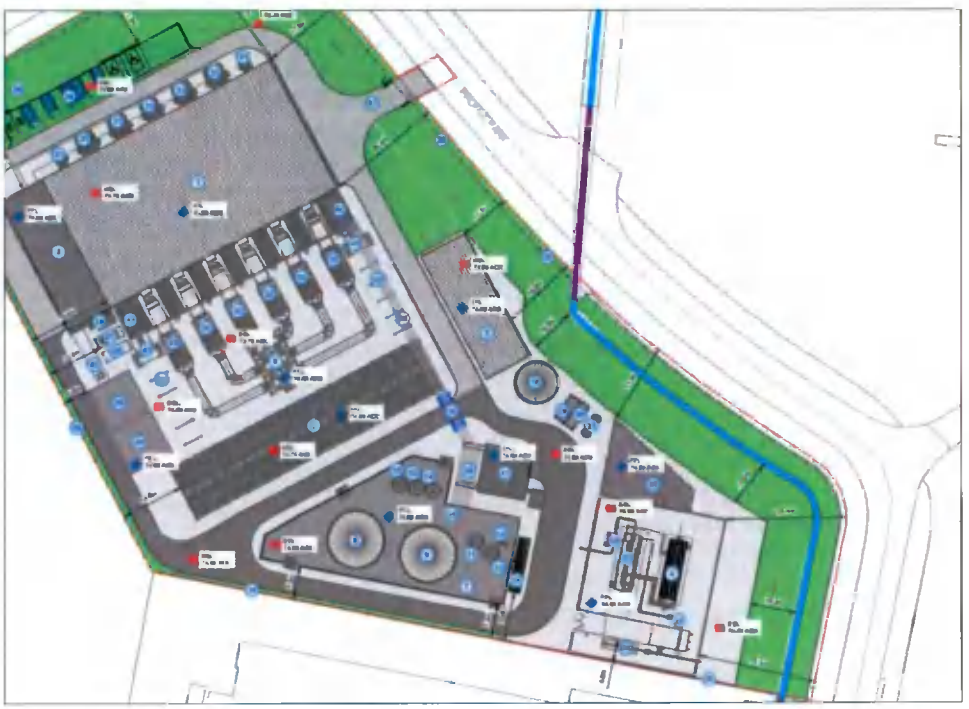

Figure 1-3 Proposed Power Plant Layout

2.0 FLOOD RISK MANAGEMENT GUIDANCE

This Strategic Flood Risk Assessment was carried out in accordance with the following flood risk management guidance documents:

- The Planning System and Flood Risk Management Guidelines for Planning Authorities
- Flood Risk Management Climate Change Sectoral Adaptation Plan
- South Dublin County Council Development Plan & Strategic Flood Risk Assessment

2.1 The Planning System and Flood Risk Management Guidelines

The Planning System and Flood Risk Management Guidelines for Planning Authorities (PSFRM Guidelines) were published in 2009 by the Office of Public Works (OPW) and Department of the Environment, Heritage and Local Government (DoEHLG). Its aim is to ensure that flood risk is considered in development proposals and the assessment of planning applications.

2.1.1 Flood Zones and Vulnerability Classes

The PSFRM Guidelines discuss flood risk in terms of flood zones A, B, and C, which correspond to areas of high, medium, or low probability of flooding, respectively. The extents of each flood zone are based on the Annual Exceedance Probability (AEP) of various flood events.

The PSFRM Guidelines also categorise different types of development into three vulnerability classes based on their sensitivity to flooding. Power plants are considered "highly vulnerable" and are required to be operational during flooding.

Table 2-1 shows a decision matrix that indicates which types of development are appropriate in each flood zone and when the Justification Test (see Section 2.1.2) must be satisfied. The annual exceedance probabilities used to define each flood zone are also provided.

Table 2-1 Decision Matrix for Determining the Appropriateness of a Development

Flood Zone (Probability)	Annual Exceedance Probability (AEP)	Development Appropriateness		
		Highly Vulnerable	Less Vulnerable	Water Compatible
A (High)	Fluvial & Pluvial Flooding More frequent than 1% AEP	Justification Test	Justification Test	Appropriate
B (Medium)	Fluvial & Pluvial Flooding 0.1% to 1% AEP	Justification Test	Appropriate	Appropriate
C (Low)	Fluvial & Pluvial Flooding Less frequent than 0.1% AEP	Appropriate	Appropriate	Appropriate
Note: Given that coastal flooding is not a potential source of risk to the proposed development, the probabilities for coastal flooding have been omitted from this table.				

2.1.2 The Justification Test

Any proposed development being considered in an inappropriate flood zone (as determined by Table 2-1) must satisfy the criteria of the Justification Test outlined in Figure 2-1 (taken from the PSFRM Guidelines).

Box 5.1 Justification Test for development management (to be submitted by the applicant)

When considering proposals for development, which may be vulnerable to flooding, and that would generally be inappropriate as set out in Table 3.2, the following criteria must be satisfied:

1. The subject lands have been zoned or otherwise designated for the particular use or form of development in an operative development plan, which has been adopted or varied taking account of these Guidelines.
2. The proposal has been subject to an appropriate flood risk assessment that demonstrates:
   - (i) The development proposed will not increase flood risk elsewhere and, if practicable, will reduce overall flood risk;
   - (ii) The development proposal includes measures to minimise flood risk to people, property, the economy and the environment as far as reasonably possible;
   - (iii) The development proposed includes measures to ensure that residual risks to the area and/or development can be managed to an acceptable level as regards the adequacy of existing flood protection measures or the design, implementation and funding of any future flood risk management measures and provisions for emergency services access; and
   - (iv) The development proposed addresses the above in a manner that is also compatible with the achievement of wider planning objectives in relation to development of good urban design and vibrant and active streetscapes.

The acceptability or otherwise of levels of residual risk should be made with consideration of the type and foreseen use of the development and the local development context.

Note: See section 5.27 in relation to major development on zoned lands where sequential approach has not been applied in the operative development plan.

Refer to section 5.28 in relation to minor and infill developments.

Figure 2-1 Criteria of the Justification Test

2.2 The Flood Risk Management Climate Change Adaptation Plan

The Flood Risk Management Climate Change Sectoral Adaptation Plan was published in 2019 under the National Adaptation Framework and Climate Action Plan. This plan outlines the OPW's approach to climate change adaptation in terms of flood risk management.

This approach is based on a current understanding of the potential impacts of climate change on flooding and flood risk. Research has shown that climate change is likely to worsen flooding through more extreme rainfall patterns, more severe river flows, and rising mean sea levels.

To account for these changes, the Adaptation Plan presents two future flood risk scenarios to consider when assessing flood risk:

- Mid-Range Future Scenario (MRFS)
- High-End Future Scenario (HEFS)

Table 2-2 indicates the allowances that should be added to estimates of extreme rainfall depths, peak flood flows, and mean sea levels for the future scenarios.

Table 2-2 Climate Change Adaptation Allowances for Future Flood Risk Scenarios

Parameter	Mid-Range Future Scenario (MRFS)	High-End Future Scenario (HEFS)
Extreme Rainfall Depths	+ 20%	+ 30%
Peak River Flood Flows	+ 20%	+ 30%
Mean Sea Level Rise	+ 0.5 m	+ 1 m

2.3 South Dublin County Council Development Plan 2016-2022

The current South Dublin County Council Development Plan provides a strategic framework for planning and sustainable development in South Dublin for 2016 to 2022. Chapter 7 outlines South Dublin County Council's strategy for the management of Infrastructure & Environmental Quality, with Section 7.3 outlining the Council's approach to Flood Risk Management, presenting four key objectives:

INFRASTRUCTURE & ENVIRONMENTAL QUALITY (IE) Policy 3 Flood Risk

It is the policy of the Council to continue to incorporate Flood Risk Management into the spatial planning of the County, to meet the requirements of the EU Floods Directive and the EU Water Framework Directive.

IE3 Objective 1:

To support and co-operate with the Office of Public Works in delivering the Catchment Based Flood Risk Assessment and Management Programme and in particular the Eastern District CFRAMS and associated Flood Risk Management Plan (FRMP), the River Dodder CFRAMS and associated Flood Risk Management Plan (FRMP). The recommendations and outputs arising from the CFRAM study for the Eastern District shall be considered in preparing plans and assessing development proposals.

IE3 Objective 2:

To support the implementation of the EU Flood Risk Directive (2007/60/EC) on the assessment and management of flood risks and the Flood Risk Regulations (SI No 122 of 2010).

IE3 Objective 3:

To manage flood risk in the County in accordance with the requirements of The Planning System and Flood Risk Management Guidelines for Planning Authorities, DECLG and OPW (2009) and Circular PL02/2014 (August 2014), in particular when preparing plans and programmes and assessing development proposals. For lands identified as being at risk of flooding in (but not limited to) the Strategic Flood Risk Assessment, a site-specific Flood Risk Assessment to an appropriate level of detail, addressing all potential sources of flood risk, is required, demonstrating compliance with the aforementioned Guidelines or any updated version of these Guidelines, paying particular attention to residual flood risks and any proposed site specific flood management measures.

IE3 Objective 4:

To support and facilitate the delivery of flood alleviation schemes in South Dublin County, including the following schemes:

- Poddle Flood Alleviation Scheme.
- Ballyculien Flood Alleviation Scheme.
- Whitechurch River Flood Alleviation Scheme (at Rathfarnham), part of the Dodder CFRAMS.

IE3 SLO 1:

To require the preparation of a site and catchment specific Flood Risk Assessment and Mitigation Strategy, prepared by a qualified person(s), to be submitted with any proposal for development on the 'EE' zoned lands and demonstration that the development satisfies all the criteria of the Development Management Justification Test as set out in Table 2.3 of the document titled 'Strategic Flood Risk Assessment for SDCC Development Plan – Detailed Report on Flood Risk in the Baldonnell Area'.

South Dublin County Council Development Plan mapping identifies the subject site within the Department of Defence Inner Zone[1], and within the area zoned under Objective E—to provide for enterprise and employment related uses[2].

[1] South Dublin County Council Development Plan, Index Map

[2] South Dublin County Council Development Plan, Map 4

2.3.1 Strategic Flood Risk Assessment for South Dublin County Council Development Plan 2016-2022

In June 2016, a Strategic Environmental Assessment (SEA) Environmental Report was published, assessing the likely effects of implementing the South Dublin County Council Development Plan on the environment. In support of this assessment, a Strategic Flood Risk Assessment (SFRA) was published in January 2016 under the requirements of The Planning System and Flood Risk Assessment Guidelines for Planning Authorities (2009) and Circular PL02/2014 (August 2014).

This SFRA includes requirements for development proposals in flood zones (Section 4.4), including the assessment of proposals for highly vulnerable developments (Section 4.4.3):

Highly vulnerable development proposals should not be considered in flood risk areas. Any applications for Highly Vulnerable Development shall be supplemented by an appropriately detailed FRA and meets the criteria of the Development Management Justification Test. The following considerations should be addressed in applications for highly vulnerable development in flood risk areas:

- *The minimum finished floor level for highly vulnerable development should be above the Flood Zone B (0.1% AEP) level plus suitable freeboard. The recommended level of freeboard is 500 mm for fluvial flood levels.*
- *Applications should outline the emergency procedures that will be applied in the event of a flood. Evacuation routes should be identified but if this is not possible then containment may be considered if is considered safe and practical to do so. If either safe evacuation or containment is not possible, then the development proposal should be refused.*
- *The site layout should follow the sequential approach to allocate land within a development based on the vulnerability class of the development i.e. more vulnerable development should be placed on higher ground while water compatible development e.g. car parking, greenfield space can placed in the flood zones.*
- *Compensatory storage for development that results in a loss of floodplain within Flood Zone A must be provided on a level for level basis, the lands should be in close proximity to the area that storage is being lost from, the land must be within the ownership of the developer and the land given to storage must be land which does not flood in the 1% AEP event. Also the compensatory storage area should be constructed before land is raised to facilitate development.*

Due to the nature of the proposed power plant as essential infrastructure, it is accordingly considered "Highly Vulnerable", whereby this assessment must be applied.

<u>Coastal Flooding</u>

Section 5.8.2 of the SFRA evaluates the risk of coastal flooding in South Dublin, referencing the landlocked nature of the county and Irish Coastal Protection Strategy Study (ICPSS) results to conclude coastal flooding is not a concern for the plan area. Further, any outstanding risk from "*a combination of high flow in rivers and a high tide [preventing] the river from discharging into the sea thus increasing water levels inland causing rivers to overtop their banks*" has been accounted for in the "*CFRAM mapping using joint probability analysis, hence any impact coastal influences may have upstream along the Dodder and the Liffey are accounted for in the mapping*".

Groundwater Flooding

Section 5.8.3 of the SFRA discusses groundwater flooding within the plan area. The report notes that "*The OPW Preliminary Flood Risk Assessments Groundwater Flooding Report concludes that ground water flooding is largely confined to the West Coast of Ireland due to the hydrogeology of the area*", concluding "*ground water flooding is not a risk for South Dublin County*".

Pluvial Flooding

The SFRA identifies pluvial and fluvial flooding as the primary concerns for the South Dublin plan area. Figure 2-2 shows OPW indicative pluvial flood mapping in the vicinity of the subject site, as presented in the SFRA. This mapping indicates a portion of the adjacent road to the northwest is liable to 0.1% AEP pluvial flooding.

The SFRA does not indicate any pluvial flooding within the bounds of the proposed development.

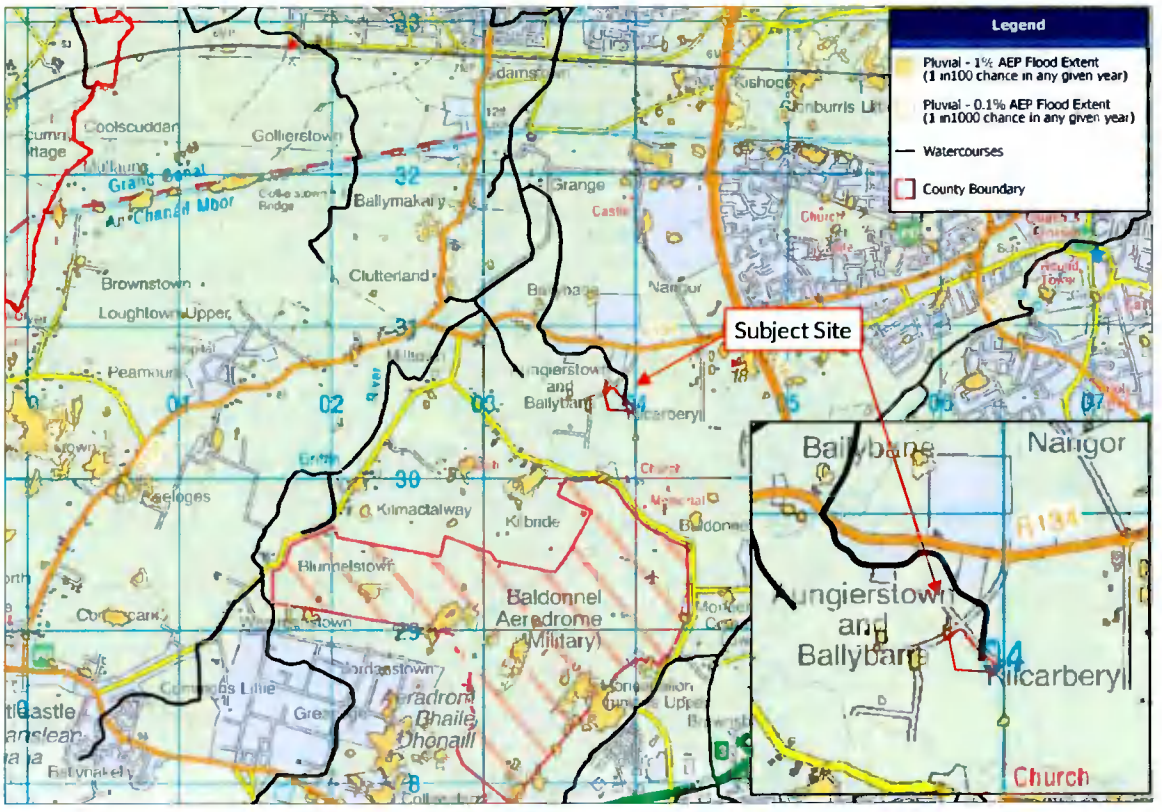

Figure 2-2 Excerpt of South Dublin County Council Strategic Flood Risk Assessment PFRA Indicative Pluvial Flood Zone Mapping, Figure MDW0657_0027 (14 January 2016)

Fluvial Flooding

SFRA fluvial flood zone mapping is based upon the Eastern Catchment Flood Risk Assessment and Management (CFRAM) Study and the River Dodder CFRAM Study fluvial flood extents, further discussed in Section 3.3. The SFRA notes all the principal watercourses and notable streams in South Dublin County are accounted for by this modelling, and historical flood risk information has been incorporated.

Figure 2-3 shows an excerpt of SFRA fluvial flood zone mapping for the area. This mapping indicates portions of the site may be liable during a 0.1% AEP fluvial or pluvial flood event, and is therefore located in Flood Zone B.

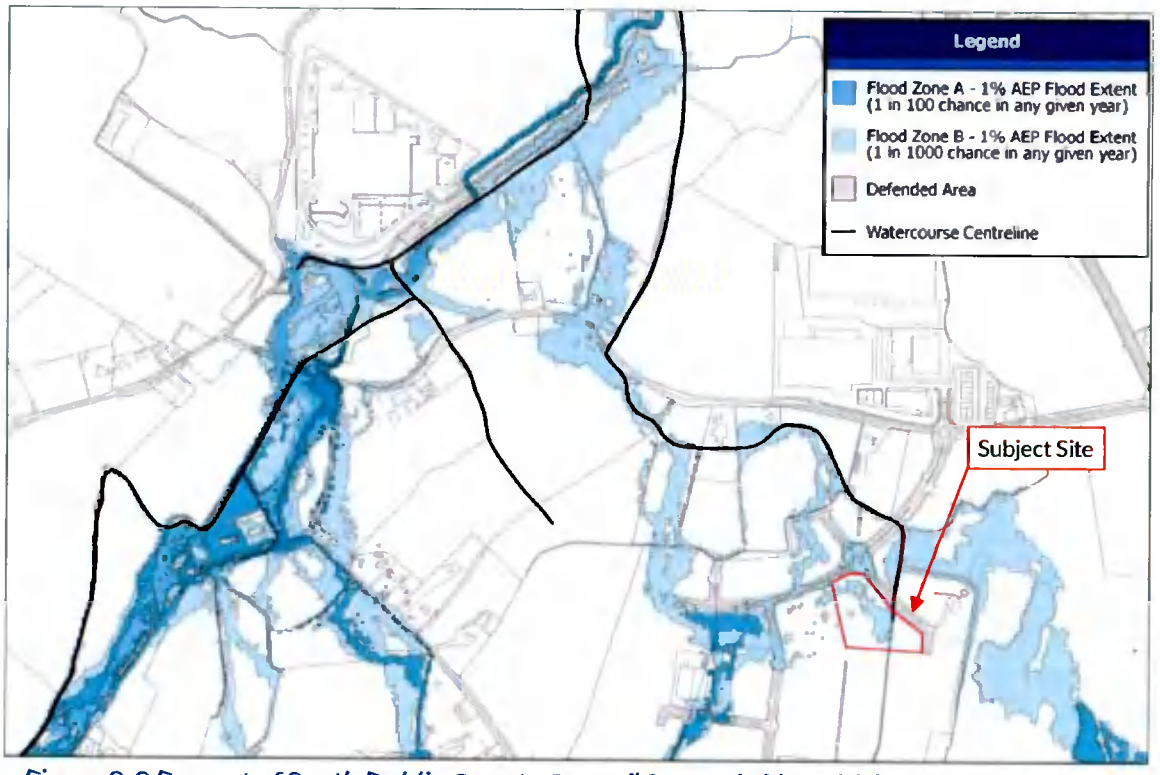

Figure 2-3 Excerpt of South Dublin County Council Strategic Flood Risk Assessment, Fluvial Flood Zone Mapping, Figure MDW657_0004 (14 January 2016)

3.0 INITIAL FLOOD RISK ASESSMENT

3.1 Past Flood Events

The OPW's National Flood Information Portal[3] provides past flood event mapping with records of flooding reports, meeting minutes, photos, and/or hydrometric data.

Based on the flood map shown in Figure 3-1, no historical flooding has been recorded within 1km of the subject site. Historic flooding was recorded approximately 1.2km northwest of the proposed development site (Flood ID: 3320—Peamount R134 R120 junction Nov 2000). A South Dublin County Council report noted significant rainfall was experienced on 5th and 6th November 2000, with serious flooding experienced in the Griffeen Catchment area[4].

No recurring flooding has been identified at the proposed development site.

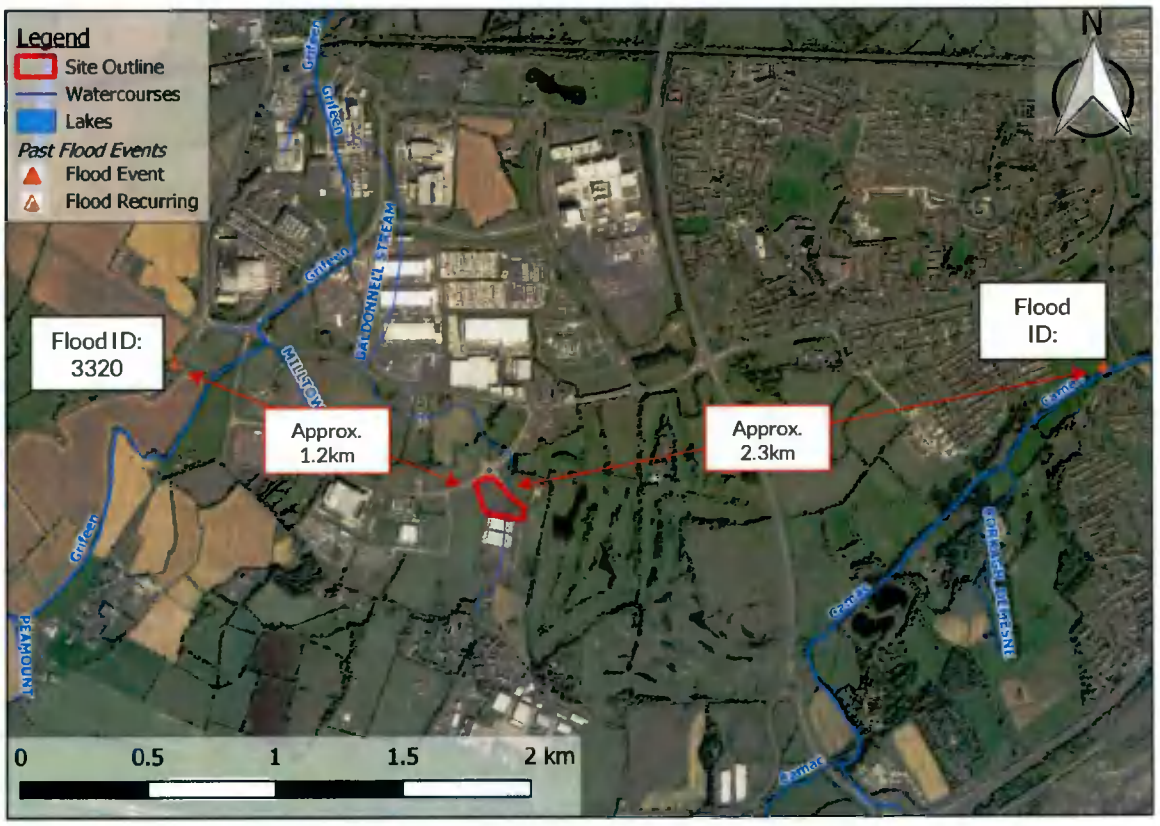

Figure 3-1 OPW Flood Map of Past Flood Events

[3] floodinfo.ie

[4] South Dublin County Council Report on Flooding 5th & 6th November, 2000

3.2 OPW Preliminary Flood Risk Assessment (PFRA) Study

In 2009, the OPW produced a series of maps to assist in the development of a broad-scale FRA throughout Ireland. These maps were produced from several sources.

The OPW's National Preliminary Flood Risk Assessment (PFRA) Overview Report from March 2012 noted that *"the flood extents shown on these maps are based on broad-scale simple analysis and may not be accurate for a specific location"*[5].

Limitations on potential sources of error associated with the PFRA maps include:

- Assumed channel capacity (due to absence of channel survey information)
- Absence of flood defences and other drainage improvements and channel structures (bridges, weirs, culverts)
- Local errors in the national Digital Terrain Model (DTM)

Figure 3-2 Indicative Flood Mapping from OPW PFRA Study

Modelling of the Baldonnell Stream does not extend to the subject site, and results indicate the site is not liable to flooding from neighbouring watercourses.

Improved hydraulic modelling was carried out through the Catchment Flood Risk Assessment and Management Study (CFRAM) in 2015 (discussed in Section 3.2) and is considered more accurate than the PFRA study as it utilised surveyed river geometry and was subject to greater model calibration.

[5] The National Preliminary Flood Risk Assessment (PFRA) Overview Report, OPW (March 2012)

3.3 Catchment Flood Risk Assessment and Management Study

In 2015, the OPW produced flood maps[1] as part of the Catchment Flood Risk Assessment and Management (CFRAM) Study. The flood extents in these maps are based on detailed modelling of Areas for Further Assessment identified by the National Preliminary Flood Risk Assessment.

As shown in Figure 3-3, the CFRAM study indicates that a portion of the site may be at risk from fluvial flooding during a 1-in-1000-year (0.1% AEP) event.

Based on a review of the CFRAM hydraulics report[6], the Camac and Grifeen Rivers were both surveyed and modelled. The Baldonnell Stream, however, does not appear to have been modelled explicitly. While the flood mapping indicates some flooding along its course, this is the result of overland spill from the Camac across the model's 2D domain (5m cell size). The additional capacity of the stream channel and culverts (not rectified in the terrain model) would likely alleviate some of this flooding.

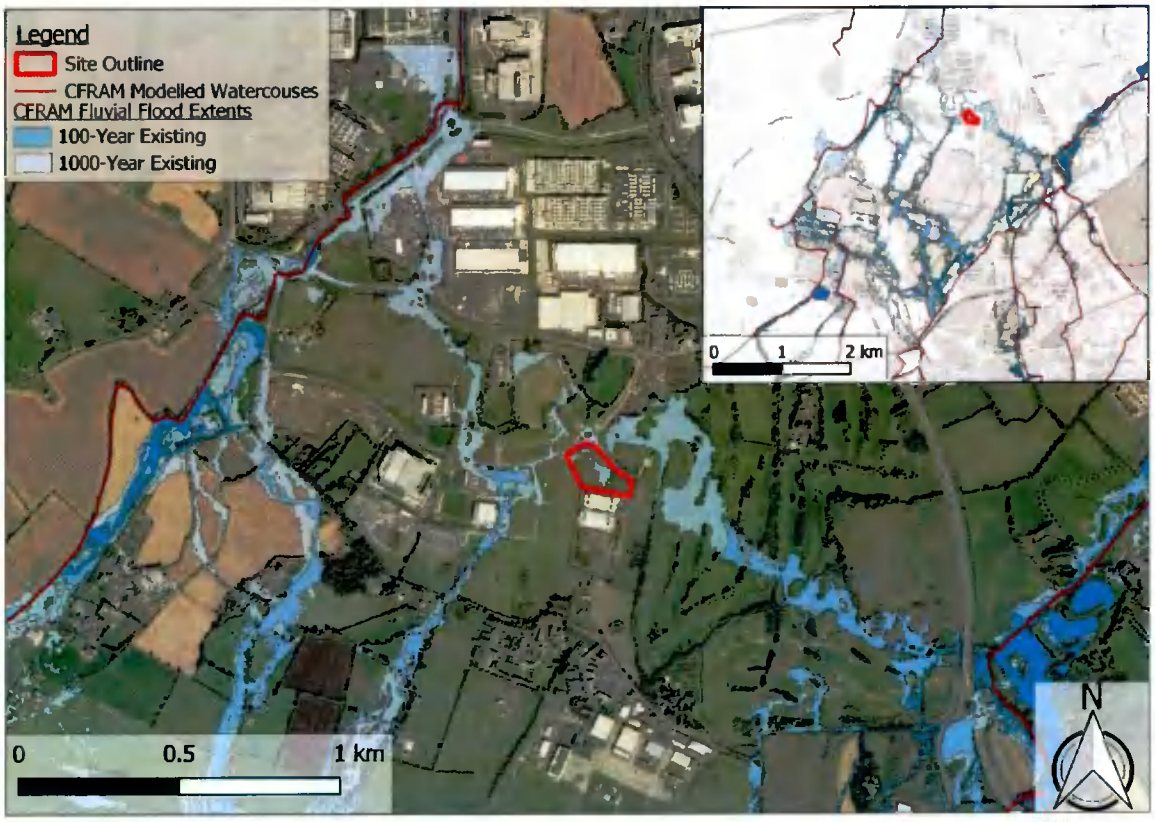

Figure 3-3 CFRAM Current Fluvial Model and Flood Extents in Vicinity of Subject Site

The Eastern CFRAM study also included an assessment of the likely impact of climate change on flood risk in the area. The flood extents for a Mid-Range Future Scenario are shown in Figure 3-4. Based on the findings of the study the proposed power plant is liable to fluvial flooding during a 0.1% AEP MRFS fluvial flood event.

[6] Eastern CFRAM UoM09 Hydraulics Report (9th August 2017)

As noted previously, some of this flooding will be alleviated by local drainage channels and culverts (including the Baldonnell Stream) which were not considered in the CFRAM study.

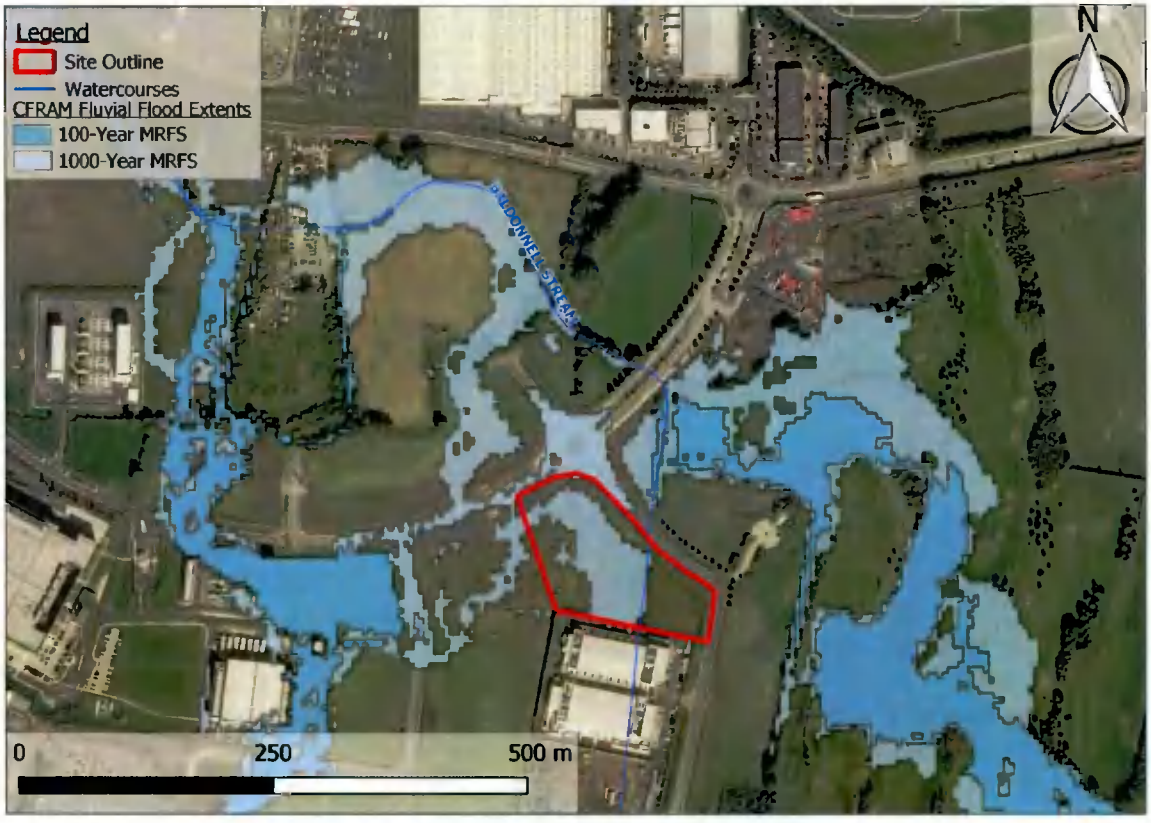

Figure 3-4 CFRAM MRFS Fluvial Flood Extents

3.4 Geological Survey Ireland Mapping

The Geological Survey Ireland (GSI) provides mapping[7] with data related to Ireland's subsurface. Based on the map shown in Figure 3-5, there are no karst features (caves, springs, turloughs, etc.) in the surrounding 1km area. The St. Columbs Well (spring) is located approximately 6.7km northwest of the subject site, and is the nearest karst feature.

Therefore, the subject site is not estimated to be at risk of groundwater flooding.

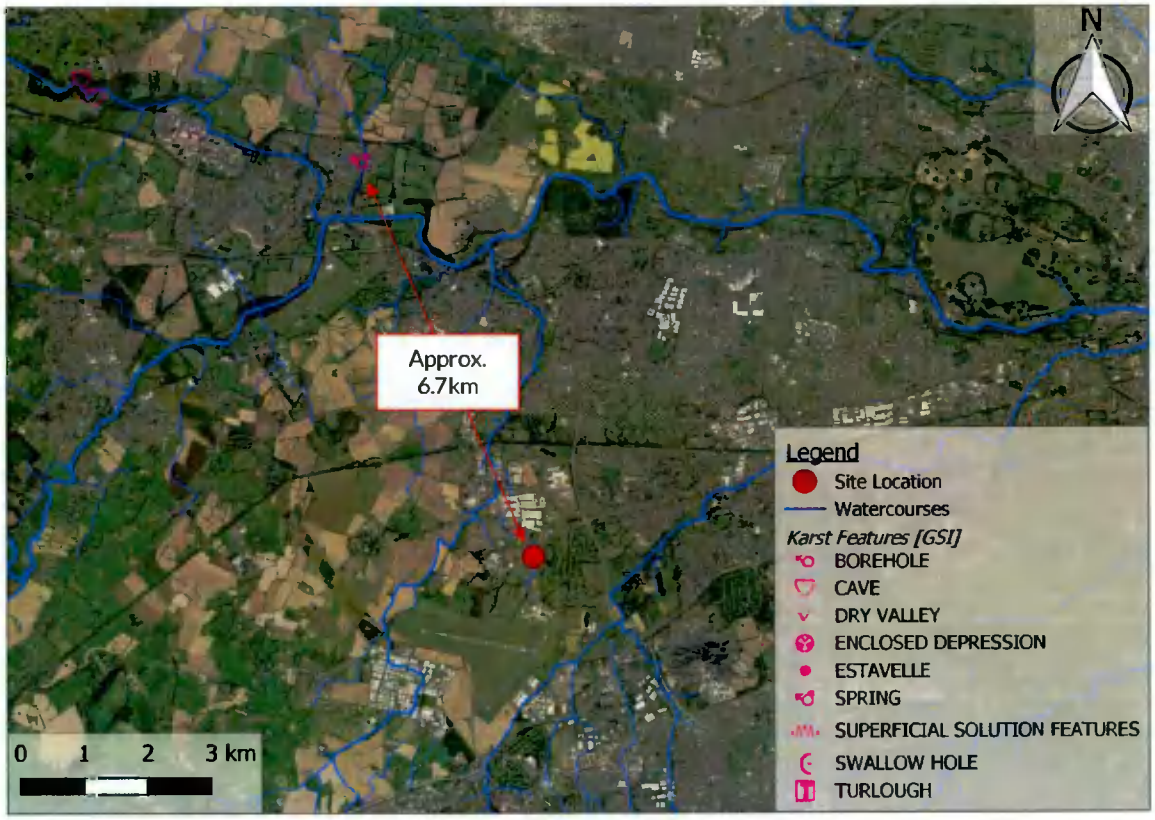

Figure 3-5 GSI Mapping of Karst Features

[7] https://www.gsi.ie/en-ie/data-and-maps/Pages/default.aspx

4.0 SITE SPECIFIC HYDRAULIC ANALYSIS

Due to the proximity of the Baldonnell Stream to the proposed development, and the potential for fluvial flood risk highlighted by the Eastern CFRAM study, a site-specific hydraulic assessment was required.

4.1 Flow Estimation

As shown in Figure 1-1, the natural course of the Baldonnell Stream passed through the subject site. This stream appears to have been rerouted to the eastern boundary of the site, likely as part of the development immediately upstream.

The catchment area for the stream at the subject site was estimated at 0.86 km^2 based on the OPW's FSU dataset and the topography of the area. See Figure 4-1.

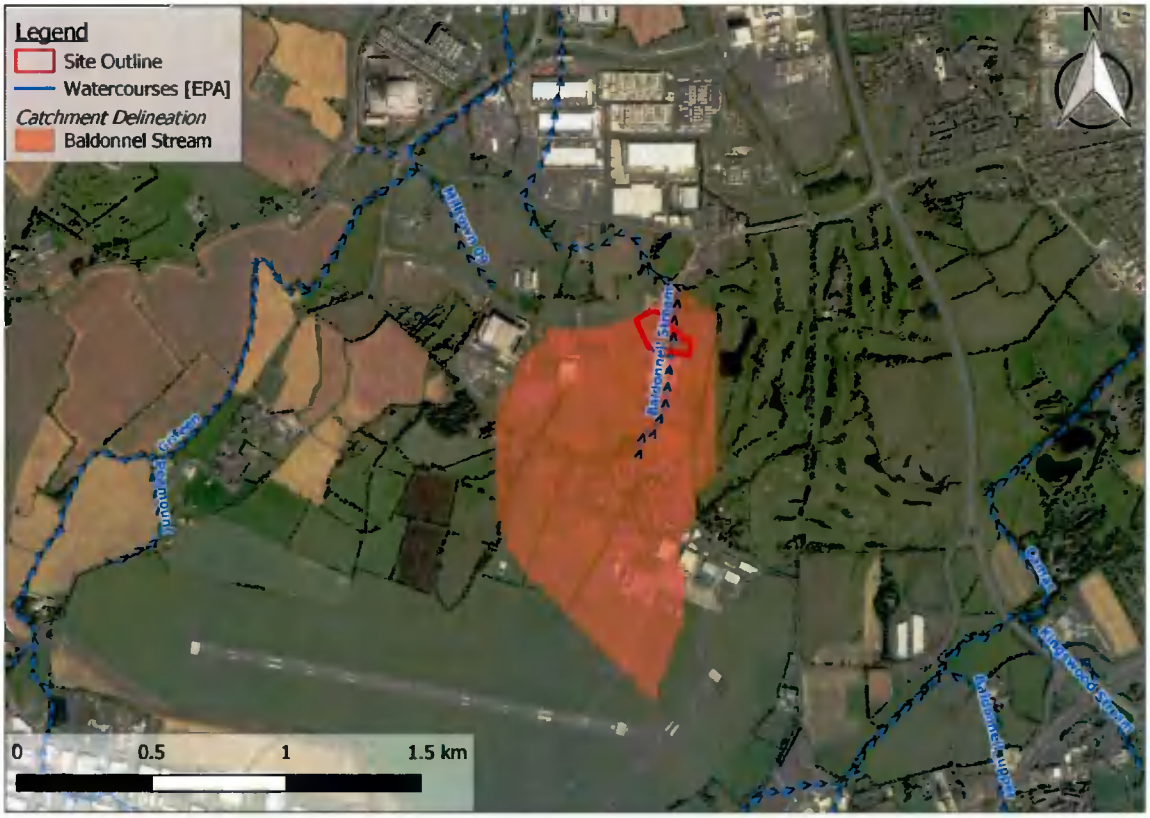

Figure 4-1 Catchment Delineation

The 100- and 1000-year flow in the watercourse was estimated based on catchment descriptors, see Table 4-1. Four different methodologies were considered:

- Flood Studies Update (FSU) method
- The Centre for Ecology and Hydrology Flood Estimation Handbook (FEH) method
- The Institute of Hydrology Report No. 124 (IH124) method
- The Modified Rational Method (MRM)

Table 4-1 Summary of Catchment Descriptors

Descriptor	Units	Baldonnell Stream	Source
Catchment	-	Liffey	EPA
Catchment Area	km^2	0.864	FSU/TOBIN
Method applicability			
FSU	-	NO	
FEH	-	YES	
IH124	-	YES	
MRM	-	YES	
Catchment Descriptors			
BFI_{SOIL}	-	0.520	FSU
SAAR	mm	714.82	FSU/MET
FARL	-	1.000	FSU
DRAIND	km/km^2	0.721	FSU
S1085	m/km	0.100	FSU/DEM
ARTDRAIN2	-	0.200	FSU
URBEXT	-	0.359	FSU
S1		0	WRAP
S2		1	WRAP
S3		0	WRAP
S4		0	WRAP
S5		0	WRAP
i_{10}	mm/hr	21.40	MET
i_{100}	mm/hr	43.20	MET
i_{1000}	mm/hr	76.60	MET
CWI	-	90.0	graph
URBAN	fraction	0.10	user
UCWI (winter)	-	133.5	graph

EV1 growth factors (1.90 and 2.41 as defined by the FSR for the East) were applied to the estimation of Q_{bar} to predict the 100- and 1000-year flows, respectively.

In accordance with the Climate Change Sectorial Adaption Plan, the proposed development was assessed against a Mid-Range-Future-Scenario (MRFS) which includes a 20% increase in flow.

The largest flows from each methodology were compared, and the largest was conservatively adopted as the design flow. See Table 4-2.

Table 4-2 Estimated Flows

Description	Units	Value
Method adopted	-	MRM
100-year Flow	m^3/s	0.74
1000-year Flow	m^3/s	1.32
100-year MRFS Flow	**m^3/s**	**0.89**
1000-year MRFS Flow	**m^3/s**	**1.58**

4.2 Hydraulic Model Construction

A site-specific hydraulic model of the site area was developed using the latest version (5.0.7) of the Hydraulic Engineering Centre's River Analysis System (HEC-RAS) software. HEC-RAS is designed to perform one-dimensional hydraulic calculations for a full network of natural and constructed channels. The three primary inputs into the HEC-RAS model are summarised below:

- Geometric Data: Cross-sectional survey of watercourse, culverts and bridges
- Inflow Data: 100 and 1,000 year existing and MRFS design flows
- Boundary Data: Normal depth downstream boundary

An overview of the hydraulic model is shown in Figure 4-2.

Figure 4-2 HEC-RAS Model Configuration

The Baldonnell Stream channel and floodplain in the vicinity of the proposed site were surveyed by TOBIN in March 2021. The hydraulic model includes two existing watercourse crossing structures: a 1.1m diameter circular culvert located directly adjacent to the subject site, and two 1.4m dia. circular culvert barrels conveying the watercourse beneath Profile Park Road to the north, approximately 150m downstream.

Conservative roughness values of 0.04 and 0.06 were applied to the channel and floodplain, respectively, based on a review of site photography and channel conditions.

The model was used to run four unsteady flow scenarios: the 100-year and 1000-year floods, with and without climate change. These events were simulated over a 3-day duration with 1-minute computational timesteps. The results of the hydraulic modelling are given in Section 4.3.

4.3 Hydraulic Model Results

Modelling of the Baldonnell Stream in the vicinity of the subject site indicates the watercourse is not predicted to burst its banks under existing flow conditions. As such, the subject site is not estimated to be liable to flooding for the current 0.1% AEP fluvial flood event, and is located in Flood Zone C.

Figure 4-3 shows the 100- and 1000-year water surface levels estimated in the Baldonnell Stream using the hydraulic model.

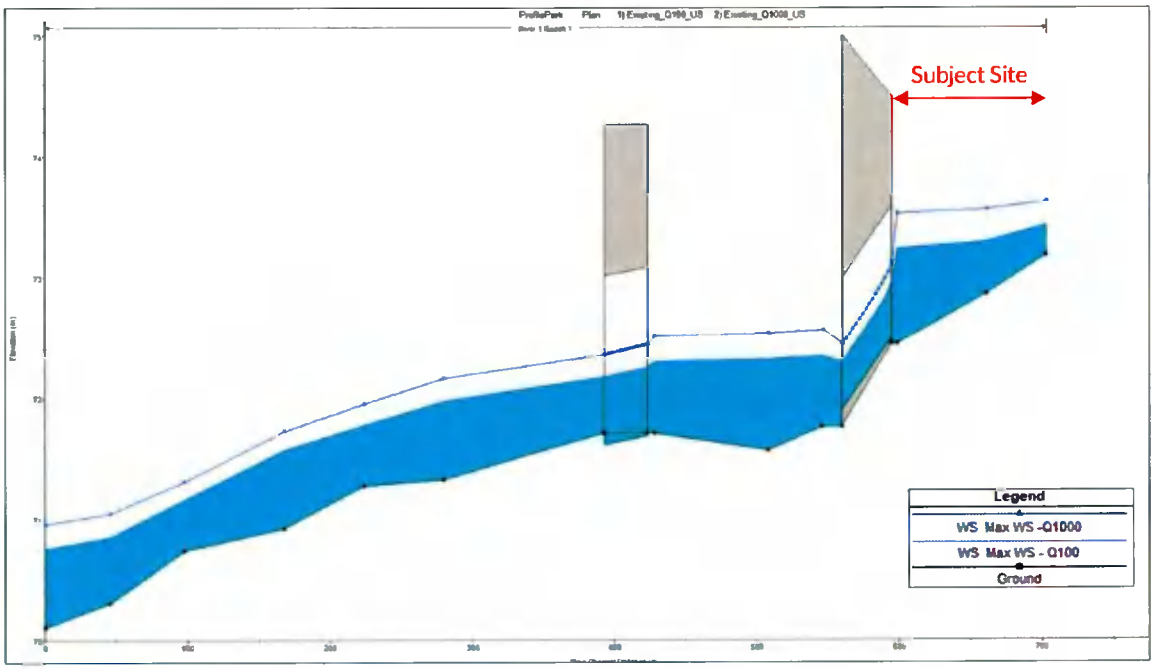

Figure 4-3 Predicted Maximum Water Surface Elevation [100- & 1000- Year without climate change]

In accordance with the Climate Change Sectorial Adaption Plan, the proposed development was also assessed against a Mid-Range-Future-Scenario (MRFS) which includes a 20% increase in flow.

The water surface level for the 0.1% AEP MRFS fluvial event is estimated at 73.66mOD, while existing ground elevations at the subject site range from approximately 72.8mOD to 76.1mOD. Figure 4-4 shows the 1000-year MRFS flood extents estimated in the vicinity of the subject site using the hydraulic model.

Based on the results of the hydraulic model, it is estimated that a part of the site (having regard to current site levels) may be liable to flooding during the 1000-year MRFS scenario due to surcharging of the adjacent culvert.

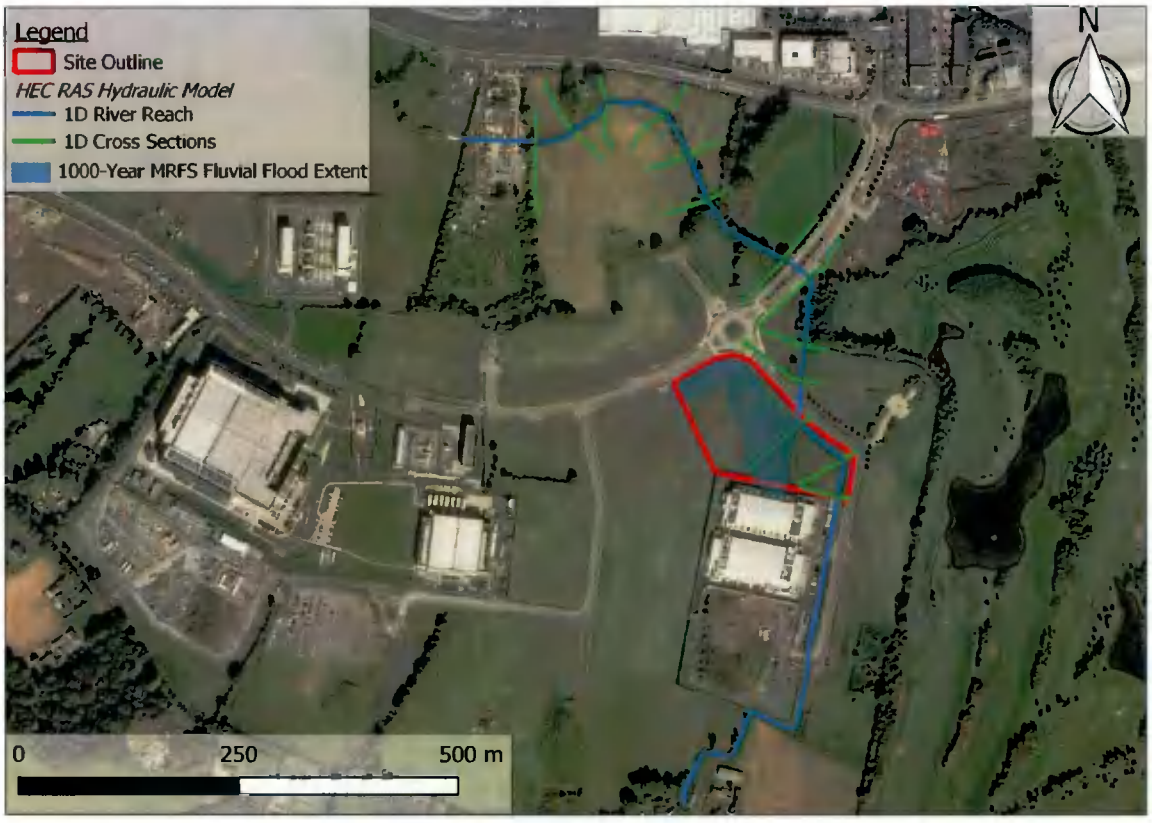

Figure 4-4 Predicted 1000- Year MRFS Fluvial Flood Extent

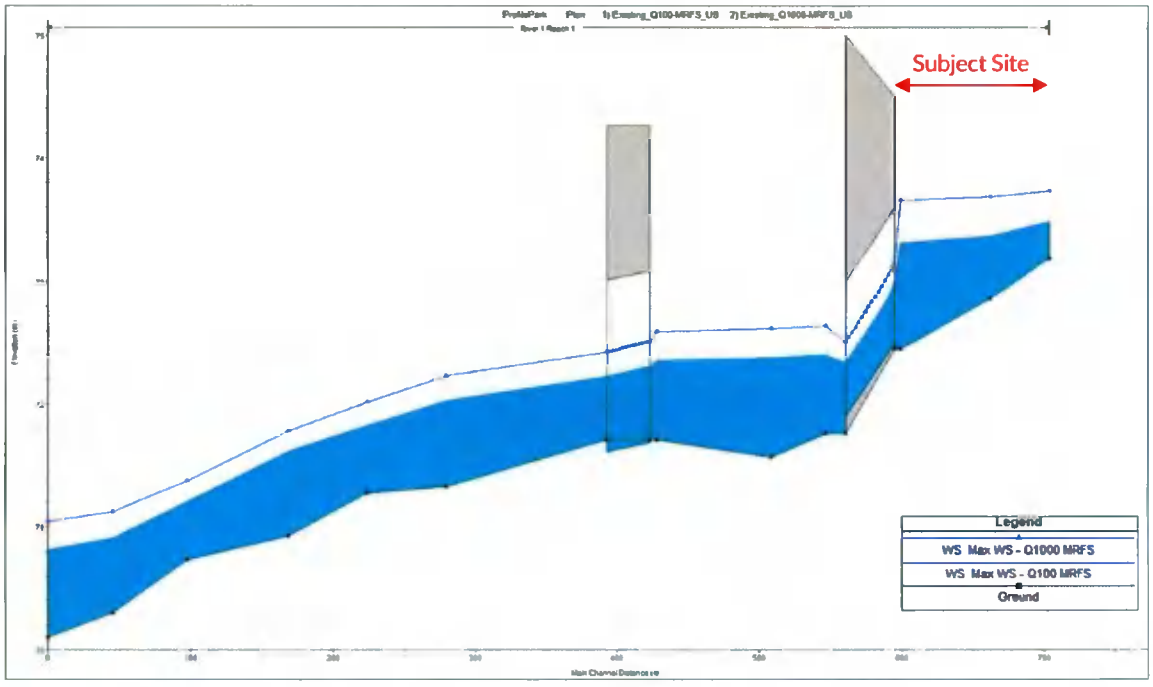

Figure 4-5 Predicted Maximum Water Surface Elevation [100- & 1000- Year MRFS]

4.3.1 Site Grading

As part of the power plant development, it is proposed to raise ground levels to 74.0mOD or higher. This provides 0.34m of freeboard above the 0.1% AEP MRFS flood levels predicted by site-specific hydraulic modelling.

The hydraulic model was updated to assess the impact of raising ground levels on floodplain storage and flood risk elsewhere.

Based on the results of the hydraulic analysis, it is predicted that increasing site elevations increase water levels up to 0.005m at the subject site during a 1000-year MRFS event, see Figure 4-6. It is estimated that the effects of this will be imperceptible elsewhere in the catchment.

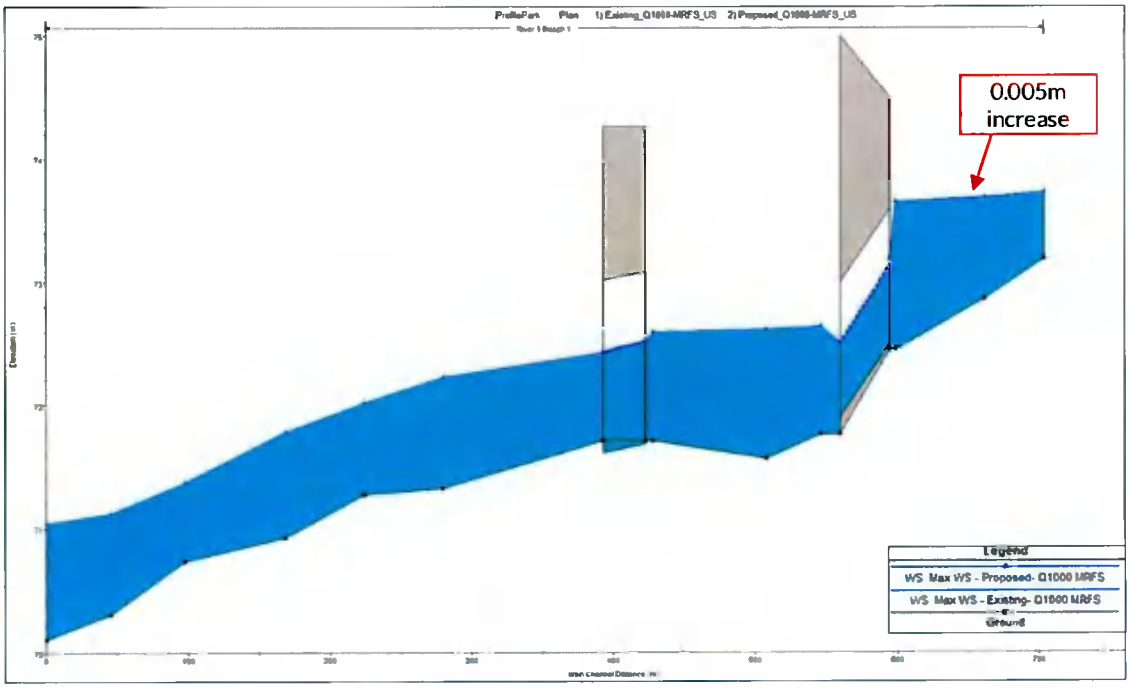

Figure 4-6 Predicted Maximum Water Surface Elevation [1000- Year MRFS Existing and Proposed]

5.0 DETAILED FLOOD RISK ASESSMENT

The PSFRM Guidelines classify power plants as "essential infrastructure", and therefore "highly vulnerable" in terms of sensitivity to flooding. Such facilities are required to be operational during a flood event. As such, the proposed development should be constructed in flood zone C—where there is less than a 0.1% Annual Exceedance Probability (AEP) of pluvial and fluvial flooding—or assessed under the PSFRM Justification Test (see Section 2.1.2).

A Mid-Range Future Scenario (MRFS) has also been considered as part of this assessment to allow for the likely effects of climate change.

5.1 Pluvial Flooding

Previous flood studies which covered the area (OPW PFRA and South Dublin SFRA) indicated that the proposed development site is not at risk of pluvial flooding (see Figure 2-2).

Existing ground elevations at the subject site vary from 72.88mOd to 76.11mOD. The topographic survey indicates that there is a depression adjacent to the culvert inlet, below predicted flood levels in which pluvial flooding/ponding may occur, as evidenced by CFRAM study (Figure 3-3 and Figure 3-4).

Minor ponding (depths <200mm) was observed in depression during site visits, see Figure 5-1.

This pluvial ponding will be managed by the proposed drainage system, in conjunction with site regrading (proposed ground elevations 74-75mOD).

Figure 5-1 Site Photo of Ponding at Localised Depression (25 January 2021)

The landscaping and topography of the developed site will provide safe exceedance flow paths and prevent surface water ponding to minimise residual risks associated with an extreme flood event or a scenario where the stormwater drainage system becomes blocked.

Surface water arising at the site will be managed by a dedicated stormwater drainage system designed in accordance with Sustainable Drainage Systems (SuDS) principles, limiting discharge from the site to greenfield runoff rates.

Therefore, the proposed development at the site is not estimated to be at risk of pluvial flooding.

5.2 Groundwater Flooding

Based on Geological Survey Ireland (GSI) subsurface mapping, there are no karst features (caves, springs, turloughs, etc.) of concern to the proposed site location (see Figure 3-5).

Further, the South Dublin County SFRA notes that "*ground water flooding is not a risk for South Dublin County*".

Therefore, the proposed development at the site is not estimated to be at risk of groundwater flooding.

5.3 Coastal Flooding

The proposed site in Profile Park is located inland, over 15km from the sea. The subject site (existing ground levels 72.8mOD or higher) is over 69m above the nearest 0.1% AEP MRFS coastal flood level estimated by the Eastern CFRAM study at Merrion (approx. 3.3mOD)[8].

Further, based on previous flood studies for the area (OPW PFRA, ICPSS, Eastern CFRAM, and South Dublin SFRA), the proposed development site is not at risk of coastal flooding.

5.4 Fluvial Flooding

The River Grifeen flows through the area of the proposed development, with several small tributaries flowing to the main watercourse, including the Baldonnell Stream which runs through the subject site. There are no historical flood reports in the vicinity of the subject site.

The Eastern CFRAM study includes models of the Camac and Grifeen Rivers; however, the Baldonnell Stream has not been explicitly modelled. CFRAM modelling notes that the site may liable to the 0.1% AEP fluvial flood event (see Figure 3-3) as a result of an overland spill from the Camac River, without accounting for the capacity of the Baldonnel Stream or other local drainage channels.

Site-specific hydraulic modelling was carried out by TOBIN to quantify the risk of flooding associated with the proposed development, and the Baldonnell Stream.

Based on the initial findings of the study, the subject site is liable to fluvial flooding in an extreme 0.1% AEP MRFS event (see Figure 4-4); however, the Baldonnell Stream is confined to its banks in an existing 0.1% AEP and 1% AEP MRFS event.

[8] Eastern CFRAM Study, Map No. E09SAN_EXCCD_F2_02 (14 November 2017)

Proposed site elevations (≥74.0mOD) provide more than 0.3m freeboard above the predicted 0.1% AEP MRFS flood level (73.66mOD), removing the proposed development from the floodplain, and has imperceptible impacts on flood risk upstream/downstream of the subject site.

Based on the findings of site-specific hydraulic modelling, it is estimated that the risk of fluvial flooding associated with the development is minimal when accounting for proposed site elevations.

Accordingly, the site has been assessed under the PSFRM Justification Test to assess suitability.

5.5 Impact of the Development Elsewhere

It is predicted that the proposed development is not at risk of flooding during a 100-year MRFS. Therefore, the development will not affect floodplain storage or obstruct the flow path of any existing watercourses. Further, hydraulic modelling demonstrates an imperceptible impact on flood levels upstream/downstream in a 1000-year MRFS fluvial event.

Surface water arising from within the site will be managed by an on-site storm water drainage system and on-site attenuation. On this basis, it is predicted that the proposed power plant will not contribute to flood risk elsewhere in the area.

5.6 The Justification Test

The PSFRM Guidelines classify power plants and essential infrastructure as "highly vulnerable", in terms of sensitivity to flooding. As such, the proposed development should be constructed in Flood Zone C—where there is less than a 0.1% Annual Exceedance Probability (AEP) of flooding, including added allowances for a Mid-Range Future Scenario (MRFS) to account for the likely effects of climate change on extreme rainfall depths and peak flood flows—or assessed for suitability through the Justification Test.

As outlined in Figure 4-4, portions of the subject site are within Flood Zone B. Accordingly, the proposed development has been assessed against the criteria of the Justification Test (see Figure 2-1):

1. The site is zoned for enterprise and employment related uses, and is therefore considered suitable for the proposed development.
2. The site has been subject to this detailed FRA, which demonstrates:
    (i) The proposed development is predicted to have an imperceptible impact on flood risk elsewhere in the locality (see Section 5.5).
    (ii) It is predicted that the proposed development will not impede the flow of surface water during extreme flood events. The layout of the development will minimise the flood risk to people, property, the economy, and the environment.
    (iii) Residual risks to the site and to the proposed development during an extreme flood event can be managed to an acceptable level through a dedicated stormwater drainage system and effective landscaping and topography.
    (iv) The proposed power plant is compatible with the wider planning objectives of the area, which promote sustainable growth and development.

The proposed development satisfies the PSFRM criteria of the Justification Test.

6.0 CONCLUSIONS

TOBIN Consulting Engineers were appointed by appointed by Greener Ideas Limited to undertake a Flood Risk Assessment (FRA) for the construction of a new power plant at Profile Park, West Dublin.

The Planning System and Flood Risk Management (PSFRM) Guidelines (OPW/DoEHLG, 2009) classify power plants as essential infrastructure, and "highly vulnerable" in terms of their sensitivity to flooding. The proposed development should therefore be built in Flood Zone C, where there is less than a 0.1% Annual Exceedance Probability (AEP) of flooding, or assessed for suitability through the PSFRM Justification Test.

Pluvial Flooding:

Minor pluvial ponding was noted on-site during site visits, where a localised depression was recorded by the topographic survey. The risk of pluvial flooding will be managed by site regrading and the proposed stormwater drainage system.

Surface water arising at the site will be managed by a dedicated stormwater drainage system designed in accordance with SuDS, limiting discharge from the site to greenfield runoff rates. On this basis, it is predicted that the development of the site will not increase the risk of flooding elsewhere in the catchment.

The landscaping and topography of the site will provide safe exceedance flow paths and prevent surface water ponding to minimise residual risks associated with extreme flooding or blockage of the stormwater drainage system.

It is therefore estimated that the risk of pluvial flooding associated with the proposed development is minimal.

Groundwater Flooding:

There is no evidence to suggest groundwater as a potential source of flood risk to the proposed development site.

Coastal/Tidal Flooding:

The site is not at risk of coastal flooding due to its elevation and distance inland.

Fluvial Flooding:

The subject site is bounded to the east by the Baldonnell Stream, a tributary of the Grifeen River.

Previous flood studies in the area (CFRAM and PFRA) modelled the Grifeen and Camac Rivers, however the Baldonnel Stream was not explicitly modelled. CFRAM modelling of the area shows the site as liable to fluvial flooding, without accounting for the conveyance capacity of the Baldonnell Stream. This modelling is therefore not compete.

To quantify the risk of fluvial flooding at the subject site, a site-specific hydraulic model of the Baldonnell Stream was developed. Based on the results of this model, it is predicted that the Baldonnel Stream will not flood under existing flow conditions; however, the subject site may be impacted due to climate change (0.1% AEP Mid-Range Future Scenario).

Proposed site regrading (proposed elevations ≥74.0mOD) provide more than 0.3m freeboard above the predicted 0.1% AEP MRFS flood level, removing the proposed development from the future floodplain. Based on the result of site-specific modelling, it is predicted that the development will have an imperceptible impact on flood risk upstream/downstream of the subject site.

Based on the findings of site-specific hydraulic modelling, it is estimated that the risk of fluvial flooding associated with the development will be minimal.

The development satisfies the criteria of the PSFRM's Justification Test.

Appendix 1 - Drawings

Topographical Survey

NOTES

1. FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING
2. ALL DRAWINGS TO BE CHECKED BY THE CONTRACTOR ON SITE
3. ENGINEER/EMPLOYERS REPRESENTATIVE AS APPROPRIATE TO BE INFORMED BY THE CONTRACTOR OF ANY DISCREPANCIES BEFORE ANY WORK COMMENCES
4. THE CONTRACTOR SHALL UNDERTAKE A THOROUGH CHECK FOR THE ACTUAL LOCATION OF ALL SERVICES/UTILITIES ABOVE AND BELOW GROUND BEFORE ANY WORK COMMENCES
5. ALL LEVELS SHOWN RELATE TO ORDNANCE SURVEY DATUM AT MALIN HEAD

Rev	Date	Description	By	Chkd
P01	16/02/2021	ISSUED FOR PLANNING	PF	McC

Client: centrica

Project: PROFILE PARK POWER PLANT

Title: EXISTING SITE TOPOGRAPHY

Scale @ A1	1:500	
Prepared by: PK	Checked: MMcC	Date: Feb' 2021
Project Director: BRIAN CARROLL		
Drawing Status: PLANNING		

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10.1 DESCRIPTION OF THE AERMOD MODEL

The AERMOD dispersion model has been recently developed in part by the U.S. Environmental Protection Agency (USEPA) (USEPA, 2019). The model is a steady-state Gaussian model used to assess pollutant concentrations associated with industrial sources. The model is an enhancement on the Industrial Source Complex-Short Term 3 (ISCST3) model which has been widely used for emissions from industrial sources.

Improvements over the ISCST3 model include the treatment of the vertical distribution of concentration within the plume. ISCST3 assumes a Gaussian distribution in both the horizontal and vertical direction under all weather conditions. AERMOD with PRIME, however, treats the vertical distribution as non-Gaussian under convective (unstable) conditions while maintaining a Gaussian distribution in both the horizontal and vertical direction during stable conditions. This treatment reflects the fact that the plume is skewed upwards under convective conditions due to the greater intensity of turbulence above the plume than below. The result is a more accurate portrayal of actual conditions using the AERMOD model. AERMOD also enhances the turbulence of night-time urban boundary layers thus simulating the influence of the urban heat island.

In contrast to ISCST3, AERMOD is widely applicable in all types of terrain. Differentiation of the simple versus complex terrain is unnecessary with AERMOD. In complex terrain, AERMOD employs the dividing-streamline concept in a simplified simulation of the effects of plume-terrain interactions. In the dividing-streamline concept, flow below this height remains horizontal, and flow above this height tends to rise up and over terrain. Extensive validation studies have found that AERMOD (precursor to AERMOD with PRIME) performs better than ISCST3 for many applications and as well or better than CTDMPLUS for several complex terrain data sets (USEPA, 1998).

Due to the proximity to surrounding buildings, the PRIME (Plume Rise Model Enhancements) building downwash algorithm has been incorporated into the model to determine the influence (wake effects) of these buildings on dispersion in each direction considered. The PRIME algorithm takes into account the position of the stack relative to the building in calculating building downwash. In the absence of the building, the plume from the stack will rise due to momentum and/or buoyancy forces. Wind streamlines act on the plume leads to the bending over of the plume as it disperses. However, due to the presence of the building, wind streamlines are disrupted leading to a lowering of the plume centreline.

When there are multiple buildings, the building tier leading to the largest cavity height is used to determine building downwash. The cavity height calculation is an empirical formula based on building height, the length scale (which is a factor of building height & width) and the cavity length (which is based on building width, length and height). As the direction of the wind will lead to the identification of differing dominant tiers, calculations are carried out in intervals of 10 degrees.

In PRIME, the nature of the wind streamline disruption as it passes over the dominant building tier is a function of the exact dimensions of the building and the angle at which the wind approaches the building. Once the streamline encounters the zone of influence of the building, two forces act on the plume. Firstly, the disruption caused by the building leads to increased turbulence and enhances horizontal and vertical dispersion. Secondly, the streamline descends in the lee of the building due to the reduced pressure and drags the plume (or part of) nearer to the ground, leading to higher ground level concentrations. The model calculates the

descent of the plume as a function of the building shape and, using a numerical plume rise model, calculates the change in the plume centreline location with distance downwind.

The immediate zone in the lee of the building is termed the cavity or near wake and is characterised by high intensity turbulence and an area of uniform low pressure. Plume mass captured by the cavity region is re-emitted to the far wake as a ground-level volume source. The volume source is located at the base of the lee wall of the building, but is only evaluated near the end of the near wake and beyond. In this region, the disruption caused by the building downwash gradually fades with distance to ambient values downwind of the building.

AERMOD has made substantial improvements in the area of plume growth rates in comparison to ISCST3 (USEPA, 2019). ISCST3 approximates turbulence using six Pasquill-Gifford-Turner Stability Classes and bases the resulting dispersion curves upon surface release experiments. This treatment, however, cannot explicitly account for turbulence in the formulation. AERMOD is based on the more realistic modern planetary boundary layer (PBL) theory which allows turbulence to vary with height. This use of turbulence-based plume growth with height leads to a substantial advancement over the ISCST3 treatment.

Improvements have also been made in relation to mixing height (USEPA, 2019). The treatment of mixing height by ISCST3 is based on a single morning upper air sounding each day. AERMOD, however, calculates mixing height on an hourly basis based on the morning upper air sounding and the surface energy balance, accounting for the solar radiation, cloud cover, reflectivity of the ground and the latent heat due to evaporation from the ground cover. This more advanced formulation provides a more realistic sequence of the diurnal mixing height changes.

AERMOD also contains improved algorithms for dealing with low wind speed (near calm) conditions. As a result, AERMOD can produce model estimates for conditions when the wind speed may be less than 1 m/s, but still greater than the instrument threshold.

10.2 METEOROLOGICAL DATA - AERMET

AERMOD incorporates a meteorological pre-processor AERMET (version 19191) (USEPA, 2018b). AERMET allows AERMOD to account for changes in the plume behaviour with height. AERMET calculates hourly boundary layer parameters for use by AERMOD, including friction velocity, Monin-Obukhov length, convective velocity scale, convective (CBL) and stable boundary layer (SBL) height and surface heat flux. AERMOD uses this information to calculate concentrations in a manner that accounts for changes in dispersion rate with height, allows for a non-Gaussian plume in convective conditions, and accounts for a dispersion rate that is a continuous function of meteorology.

The AERMET meteorological preprocessor requires the input of surface characteristics, including surface roughness (z_0), Bowen Ratio and albedo by sector and season, as well as hourly observations of wind speed, wind direction, cloud cover, and temperature. A morning sounding from a representative upper air station, latitude, longitude, time zone, and wind speed threshold are also required.

Two files are produced by AERMET for input to the AERMOD dispersion model. The surface file contains observed and calculated surface variables, one record per hour. The profile file contains the observations made at each level of a meteorological tower, if available, or the one-level observations taken from other representative data, one record level per hour.

From the surface characteristics (i.e. surface roughness, albedo and amount of moisture available (Bowen Ratio)) AERMET calculates several boundary layer parameters that are important in the evolution of the boundary layer, which, in turn, influences the dispersion of pollutants. These parameters include the surface friction velocity, which is a measure of the vertical transport of horizontal momentum; the sensible heat flux, which is the vertical transport of heat to/from the surface; the Monin-Obukhov length which is a stability parameter relating the surface friction velocity to the sensible heat flux; the daytime mixed layer height; the nocturnal surface layer height and the convective velocity scale which combines the daytime mixed layer height and the sensible heat flux. These parameters all depend on the underlying surface.

The values of albedo, Bowen Ratio and surface roughness depend on land-use type (e.g., urban, cultivated land etc) and vary with seasons and wind direction. The assessment of appropriate land-use types was carried out in line with USEPA recommendations[4] and using the detailed methodology outlined by the Alaska Department of Environmental Conservation[17]. AERMET has also been updated to allow for an adjustment of the surface friction velocity (u^*) for low wind speed stable conditions based on the work of Qian and Venkatram (BLM, 2011). Previously, the model had a tendency to over-predict concentrations produced by near-ground sources in stable conditions.

SURFACE ROUGHNESS

Surface roughness length is the height above the ground at which the wind speed goes to zero. Surface roughness length is defined by the individual elements on the landscape such as trees and buildings. In order to determine surface roughness length, the USEPA recommends that a representative length be defined for each sector, based on an upwind area-weighted average of the land use within the sector, by using the eight land use categories outlined by the USEPA. The inverse-distance weighted surface roughness length derived from the land use

classification within a radius of 1km from Shannon Airport Meteorological Station is shown in Table 1.

Table 1: Surface Roughness based on an inverse distance weighted average of the land use within a 1km radius of Casement Airport Meteorological Station

Sector	Area Weighted Land Use Classification	Spring	Summer	Autumn	Winter[Note A]
270-180	100% Grassland	0.05	0.10	0.01	0.01
180-270	100% Urban	1	1	1	1

Note A Winter defined as periods when surfaces covered permanently by snow whereas autumn is defined as periods when freezing conditions are common, deciduous trees are leafless and no snow is present (Iqbal (1983)). Thus for the current location autumn more accurately defines "winter" conditions in Ireland.

ALBEDO

Noon-time albedo is the fraction of the incoming solar radiation that is reflected from the ground when the sun is directly overhead. Albedo is used in calculating the hourly net heat balance at the surface for calculating hourly values of Monin-Obuklov length. A 10km x 10km square area is drawn around the meteorological station to determine the albedo based on a simple average for the land use types within the area independent of both distance from the station and the near-field sector. The classification within 10km from Casement Airport Meteorological Station is shown in Table 2.

Table 2: Albedo based on a simple average of the land use within a 10km × 10km grid centred on Casement Airport Meteorological Station

Area Weighted Land Use Classification	Spring	Summer	Autumn	Winter[Note A]
0.5% Water, 30% Urban, 0.5% Coniferous Forest 38% Grassland, 19% Cultivated Land	0.155	0.180	0.187	0.187

Note A For the current location autumn more accurately defines "winter" conditions in Ireland.

BOWEN RATIO

The Bowen ratio is a measure of the amount of moisture at the surface of the earth. The presence of moisture affects the heat balance resulting from evaporative cooling which, in turn, affects the Monin-Obukhov length which is used in the formulation of the boundary layer. A 10km x 10km square area is drawn around the meteorological station to determine the Bowen Ratio based on geometric mean of the land use types within the area independent of both distance from the station and the near-field sector. The classification within 10km from Casement Airport Meteorological Station is shown in Table 3.

Table 3: Bowen Ratio based on a geometric mean of the land use within a 10km × 10km grid centred on Casement Airport Meteorological Station.

Area Weighted Land Use Classification	Spring	Summer	Autumn	Winter[Note A]

Area Weighted Land Use Classification	Spring	Summer	Autumn	Winter[Note A]
0.5% Water, 30% Urban, 0.5% Coniferous Forest 38% Grassland, 19% Cultivated Land	0.549	1.06	1.202	1.202

Note A For the current location autumn more accurately defines "winter" conditions in Ireland.

10.3 AIR DISPERSION MODELLING RESULTS FOR PSEUDO STACK SCENARIO

PROCESS CONTRIBUTIONS

NO_2 Emissions

The NO_2 modelling results for the Profile Park Power Station pseudo stack scenario are detailed in Table 1. The results indicate that the ambient ground level concentrations are below the relevant air quality limit values for NO_2. Emissions from the facility including background lead to an ambient NO_2 concentration which is 41% of the maximum 1 hour limit value (measured as a 99.8th%ile) for the worst-case year modelled (2017) and 31% of the annual limit value at the worst-case off-site receptor for the worst-case year modelled (2016).

Table 1: Pseudo Stack – Modelled NO_2 ($\mu g/m^3$) Concentrations for the Profile Park Power Station

Pollutant / Year	Averaging Period	Process Contribution NO_2 ($\mu g/m^3$)	Background Concentration ($\mu g/m^3$)[Note A]	Predicted Emission Concentration - PEC NO_2 ($\mu g/Nm^3$)	Limit Values ($\mu g/Nm^3$)[Note B]	PEC as a % of Limit Value
NO_2/2016	Annual Mean	0.3	16	16.3	40	41%
	99.8th%ile of 1-hr means	31.6	30	61.6	200	31%
NO_2/2017	Annual Mean	0.4	16	16.4	40	41%
	99.8th%ile of 1-hr means	17.2	30	47.2	200	24%
NO_2/2018	Annual Mean	0.3	16	16.3	40	41%
	99.8th%ile of 1-hr means	27.2	30	57.2	200	29%
NO_2/2019	Annual Mean	0.3	16	16.3	40	41%
	99.8th%ile of 1-hr means	16.2	30	46.2	200	23%
NO_2/2020	Annual Mean	0.3	16	16.3	40	41%
	99.8th%ile of 1-hr means	12.6	30	42.6	200	21%

Note A The short-term peaks are assumed to have an ambient background concentration of twice the annual mean background concentration.

Note B Air Quality Standards 2011 (from EU Directive 2008/50/EC and S.I. 180 of 2011).

The geographical variations in ground level NO_2 concentrations beyond the facility boundary for the worst-case years modelled are illustrated as concentration contours in Figure 1 and Figure 2. The location of the maximum annual mean concentration for NO_2 are approx. 500 m north east of the site boundary, while the maximum hourly NO_2 concentration is likely to occur approx. 5 km southwest of the site boundary.

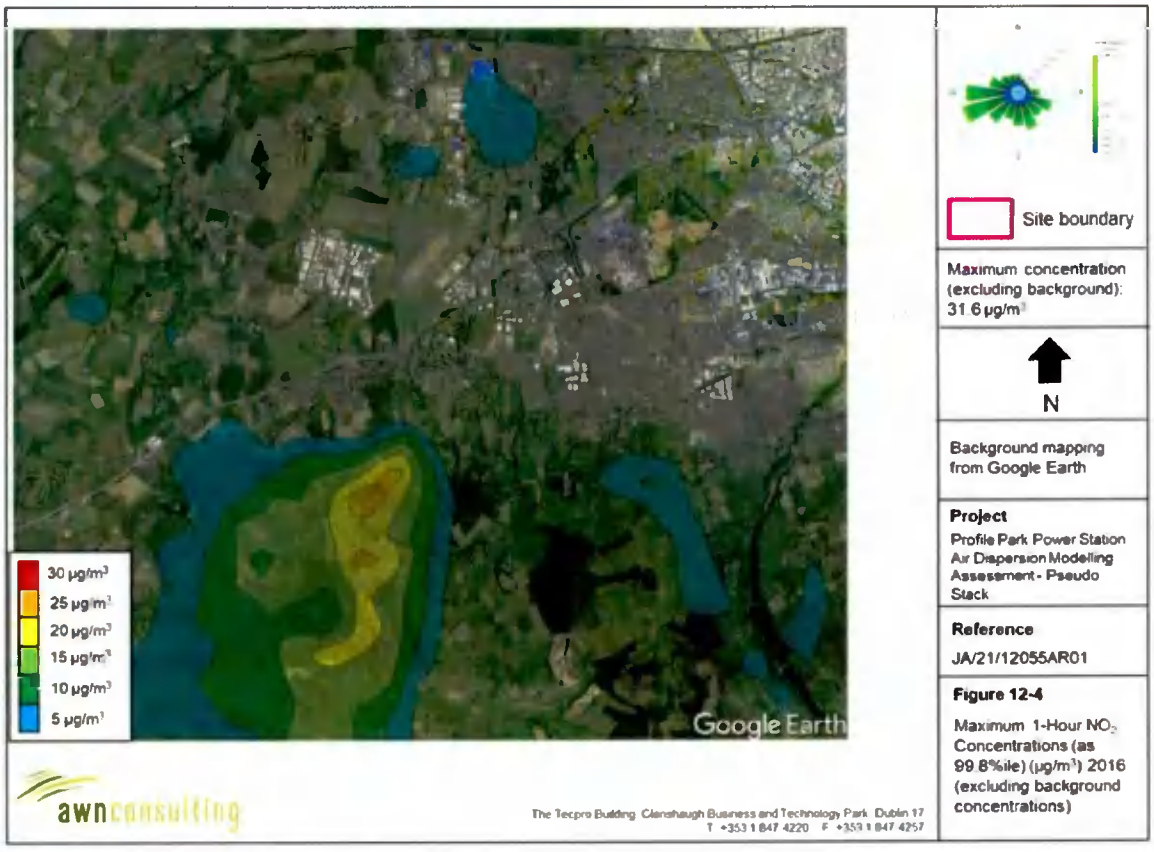

Figure 1: Profile Park Power Station Pseudo Stack Scenario: Predicted NO_2 99.8th Percentile of Hourly Concentrations (2016)

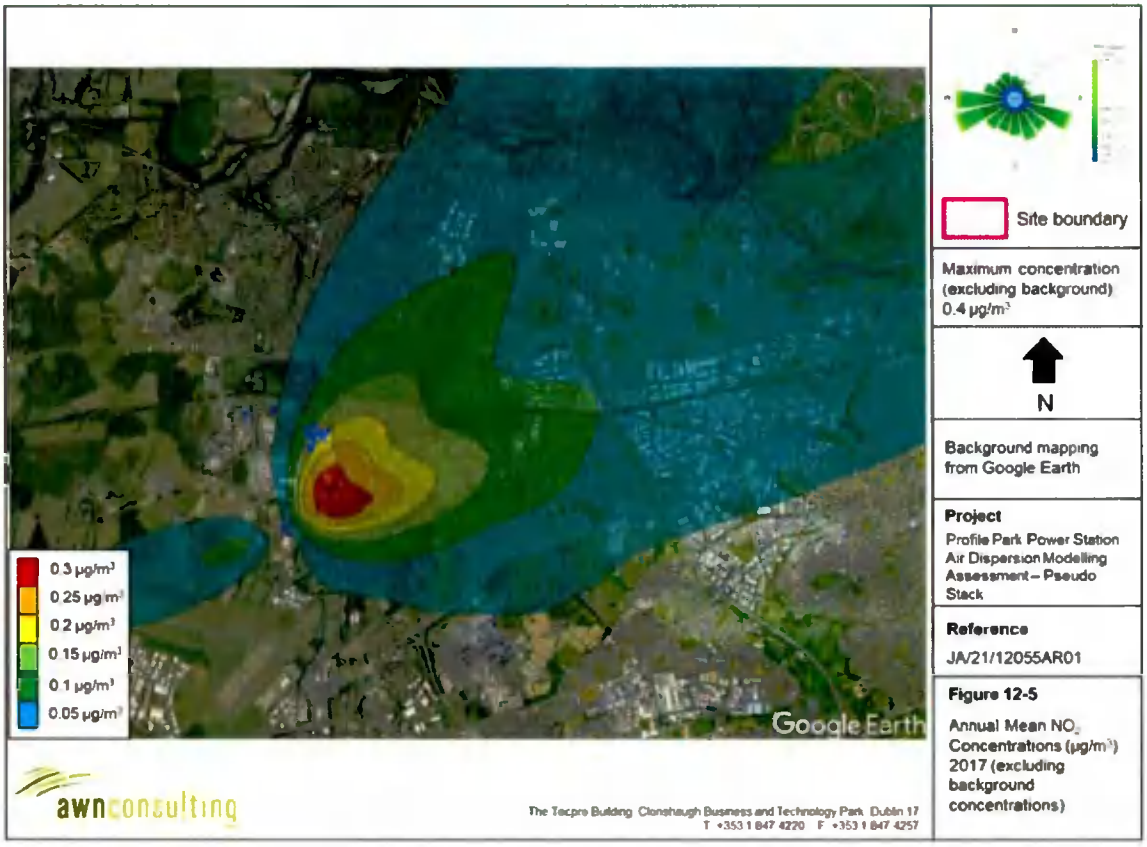

Figure 2: Profile Park Power Station Pseudo Stack Scenario: Predicted Annual Mean NO_2 Concentrations (2017)

Impact of NO_X on Sensitive Ecosystems

The Profile Park Power Station NO_X modelling results for the pseudo stack scenario are detailed in Table 2. Emissions from the facility lead to an ambient NO_X concentration (excluding background) which are approx. 1% of the annual limit value at the worst-case location within the designated sites over the five years of meteorological data modelled. In addition, modelling results based on conservative assumptions indicate that the proposed Profile Park Power Station in isolation will have an imperceptible impact on NO_X concentrations within the sensitive ecosystems contributing at most 1% of the limit value at the worst-case location in the worst-case year modelled.

Table 2: Pseudo Stack – Modelled NO_X Concentrations ($\mu g/m^3$) excluding background within the Dodder Valley pNHA, Glenasmole Valley SAC/pNHA, Grand Canal pNHA, Kilteel Wood pNHA, Liffey Valley pNHA, Lugmore Glen pNHA, Royal Canal pNHA, Rye Water Valley/Carton SAC/pNHA, Slade of Saggart and Crooksling Glen pNHA and Wicklow Mountains SPA/SAC for all Emission Points at Profile Park Power Station

Pollutant/ Year	Averaging Period	Process Contribution ($\mu g/m^3$)	Limit Value ($\mu g/Nm^3$) Note A	Process Contribution as a % of Limit Value
NO_x/2016	Annual Mean	0.19	30	1%
NO_x/2017	Annual Mean	0.20	30	1%

Pollutant/ Year	Averaging Period	Process Contribution ($\mu g/m^3$)	Limit Value ($\mu g/Nm^3$) Note A	Process Contribution as a % of Limit Value
NO_x/2018	Annual Mean	0.19	30	1%
NO_x/2019	Annual Mean	0.19	30	1%
NO_x/2020	Annual Mean	0.20	30	1%

Note A Air Quality Standards 2011 (from EU Directive 2008/50/EC and S.I. 180 of 2011).

CUMULATIVE ASSESSMENT

NO_2 Emissions

The pseudo stack scenario cumulative impact of NO_2 emissions from Profile Park Power Station and emissions from Pfizer, Takeda and the Grange Castle Power Facility are detailed in Table 3 below. The results indicate that the ambient ground level concentrations are below the relevant air quality standards for NO_2. For the worst-case year, emissions from the sites lead to an ambient NO_2 concentration (including background) which is 54% of the maximum ambient 1-hour limit value (measured as a 99.8th%ile) and 56% of the annual limit value at the worst-case off-site receptor for the worst-case years modelled.

Table 3: Pseudo Stack – Modelled NO_2 ($\mu g/m^3$) Concentrations for the Cumulative Assessment

Pollutant / Year	Averaging Period	Process Contribution NO_2 ($\mu g/m^3$)	Background Concentration ($\mu g/m^3$) Note A	Predicted Emission Concentration - PEC NO_2 ($\mu g/Nm^3$)	Limit Values ($\mu g/Nm^3$) Note B	PEC as a % of Limit Value
NO_2/2016	Annual Mean	5.7	16	21.7	40	54%
	99.8th%ile of 1-hr means	72.1	32	104.1	200	52%
NO_2/2017	Annual Mean	5.5	16	21.5	40	54%
	99.8th%ile of 1-hr means	71.6	32	103.6	200	52%
NO_2/2018	Annual Mean	5.7	16	21.7	40	54%
	99.8th%ile of 1-hr means	75.3	32	107.3	200	54%
NO_2/2019	Annual Mean	5.7	16	21.7	40	54%
	99.8th%ile of 1-hr means	71.1	32	103.1	200	52%
NO_2/2020	Annual Mean	5.3	16	21.3	40	53%
	99.8th%ile of 1-hr	79.1	32	111.1	200	56%

Pollutant / Year	Averaging Period	Process Contribution NO_2 ($\mu g/m^3$)	Background Concentration ($\mu g/m^3$)[Note A]	Predicted Emission Concentration - PEC NO_2 ($\mu g/Nm^3$)	Limit Values ($\mu g/Nm^3$)[Note B]	PEC as a % of Limit Value
	means					

Note A The short-term peaks are assumed to have an ambient background concentration of twice the annual mean background concentration.

Note B Air Quality Standards 2011 (from EU Directive 2008/50/EC and S.I. 180 of 2011).

Impact of NO_X on Sensitive Ecosystems

The NO_X modelling results for the cumulative assessment are detailed in Table 4. Emissions from the facility lead to an ambient NO_X concentration (excluding background) which ranges from 15 – 18% of the annual limit value at the worst-case location within the designated sites over the five years of meteorological data modelled. In addition, modelling results based on conservative assumptions indicate that the proposed Profile Park Power Station in isolation will have a small impact on NO_X concentrations within the sensitive ecosystems contributing at most 18% of the limit value at the worst-case location in the worst-case year modelled.

Table 4: Modelled NO_X Concentrations ($\mu g/m^3$) excluding background within the Dodder Valley pNHA, Glenasmole Valley SAC/pNHA, Grand Canal pNHA, Kilteel Wood pNHA, Liffey Valley pNHA, Lugmore Glen pNHA, Royal Canal pNHA, Rye Water Valley/Carton SAC/pNHA, Slade of Saggart and Crooksling Glen pNHA and Wicklow Mountains SPA/SAC for the Cumulative Assessment

Pollutant/ Year	Averaging Period	Process Contribution ($\mu g/m^3$)	Limit Value ($\mu g/Nm^3$) [Note A]	Process Contribution as a % of Limit Value
NO_x/2016	Annual Mean	4.44	30	15%
NO_x/2017	Annual Mean	5.27	30	18%
NO_x/2018	Annual Mean	4.55	30	15%
NO_x/2019	Annual Mean	4.86	30	16%
NO_x/2020	Annual Mean	5.36	30	18%

Note A Air Quality Standards 2011 (from EU Directive 2008/50/EC and S.I. 180 of 2011).

10.4 THERMAL PLUME MODELLING

INTRODUCTION

This appendix provides an assessment of the potential impact of the plumes associated with the operational phase of the Profile Park Power Station on aircraft, and in particular helicopters, in the region.

The issue of plume characteristics and the effect on the operation of helicopters in the region of the site has been assessed below. An assessment has been undertaken to determine the region surrounding the facility where levels of excess temperature, turbulence (vertical velocity) and reduced oxygen could potentially be encountered. Studies undertaken by the MITRE Corporation (MITRE, 2012) and outlined in the user manual for the "Exhaust-Plume-Analyzer" model detail the likely impact of an exhaust plume on aircraft based on a range of parameters / criteria including the thermal buoyancy and temperature of the plume.

The current study is based on detailed site-specific information. The site-specific study, using the Cambridge Environmental Research Consultants (CERC) AMDS-5 model for oxygen, temperature and vertical velocity, allows the actual emission data for the facility to be used as input into the model. In addition, meteorological data for the region, based on three full years of data from Casement Aerodrome (2018-2020) and building data also forms part of the inputs to the model to allow an accurate representation of the impact of the facility in the surrounding environment.

METHODOLOGY

The parameters of the plume which are most relevant to helicopters has been investigated by the Mitre Corporation as part of the development of the "Expanded Model For Determining The Effects Of Vertical Plumes On Aviation Safety" (MITRE, 2012). These parameters have been reviewed below.

Oxygen

The Mitre Corporation report confirms that oxygen levels below 12% are potentially hazardous to helicopters (MITRE, 2012) and thus the oxygen content of the plume with distance from the stack has been investigated.

In relation to the gas generator, the oxygen content of the plume at stack top will typically be 13%.

Temperature

The Mitre Corporation report confirms that temperatures in excess of 50°C are potentially hazardous to helicopters (MITRE, 2012) and thus the temperature of the plume with distance from the stack has been investigated.

In relation to the gas generator, the temperature of the plume at stack top is 592.2K (319°C).

Vertical Velocity

High vertical velocities are also a concern when considering helicopter / plume interactions as they can lead to increased turbulence in the atmosphere. The literature (CASA, 2012) suggests that the critical level for vertical velocities is 4.3 m/s. Thus, modelling has been undertaken to understand the worst-case vertical velocities of the gas generator plume with distance from the stacks.

The change in each of these parameters with distance from the stack has been reviewed below. For each of these parameters, three full years of meteorological conditions has been used in the analysis including periods of atmospheric pressure / temperature inversions. Meteorological data for the years 2018-2020 for Casement Aerodrome have been used in the analysis for all scenarios outlined, with results for the worst case year reported. The ADMS-5 model has the capability to process calm conditions by setting the wind speed to 0.3 m/s and allowing an equal probability for all wind directions. This option has been used in this assessment for both the temperature assessment and the vertical velocity assessment.

The model was also run with a high density receptor grid based on 5m horizontal spacing and 0.5m vertical spacing in the region of the stack top to determine the changes in the parameters above over very short distances. The receptor spacing of 0.5m was selected as the change with vertical distance in oxygen, temperature and vertical velocity from the stack top is rapid and would be difficult to determine with a coarser grid resolution.

PROCESS EMISSIONS

The proposed Profile Park Power Station will have six gas generator stacks at a height of 31.8m (~75m OD). The source information for the modelled emission points has been summarised in *Table* 1.

Table 1: Summary of Source Information

Scenario	Height Above Ground Level (m)	Exit Diameter (m)	Cross-Sectional Area (m^2)	Temp (K)	Max Volume Flow (Nm^3/hr)	Exit Velocity (m/sec actual)	NO_2	
							Conc. (mg/Nm^3)	Mass Emission (g/s)
Individual stacks	31.8m (75m OD)	1.704	2.28	592.2	133,862	29.54	75.0	2.79

RESULTS & DISCUSSION

Oxygen / Plume Interaction

The Mitre Corporation report (MITRE, 2012) confirms that depleted oxygen is generally of greatest concern when considering helicopter/plume interactions. The Mitre Corporation report confirms that at an oxygen content below 12% oxygen there is a risk of engine cut-out whilst above this level there is no risk to helicopter engines. Thus, modelling has been undertaken to determine the oxygen percentage of operations both on natural gas and diesel oil.

The following equation is used to model the % of oxygen in the plume with distance from the stack top. For a given emission concentration of any pollutant e (in $\mu g/m^3$), the oxygen content O (%), is related to the plume concentration c (in $\mu g/m^3$) by the following relationship (13% is the plume oxygen percentage at release for gas generators):

$$c / e = (20.95-O) / (20.95-13)$$

Thus, the calculation can be re-arranged to determine the oxygen content (%) of the plume as a function of distance from the stack top. The re-arranged equation is:

$$O (\%) = 20.95- [(c/e) * (7.65)]$$

AERMOD was thus run to calculate the pollutant concentration and identify the distance from the plume centreline where the 12% oxygen level was exceeded. Modelling was undertaken using Casement Aerodrome data for 2018-2020. Shown in

Figures 1 and 2 show the results for the full worst-case year of 2020.

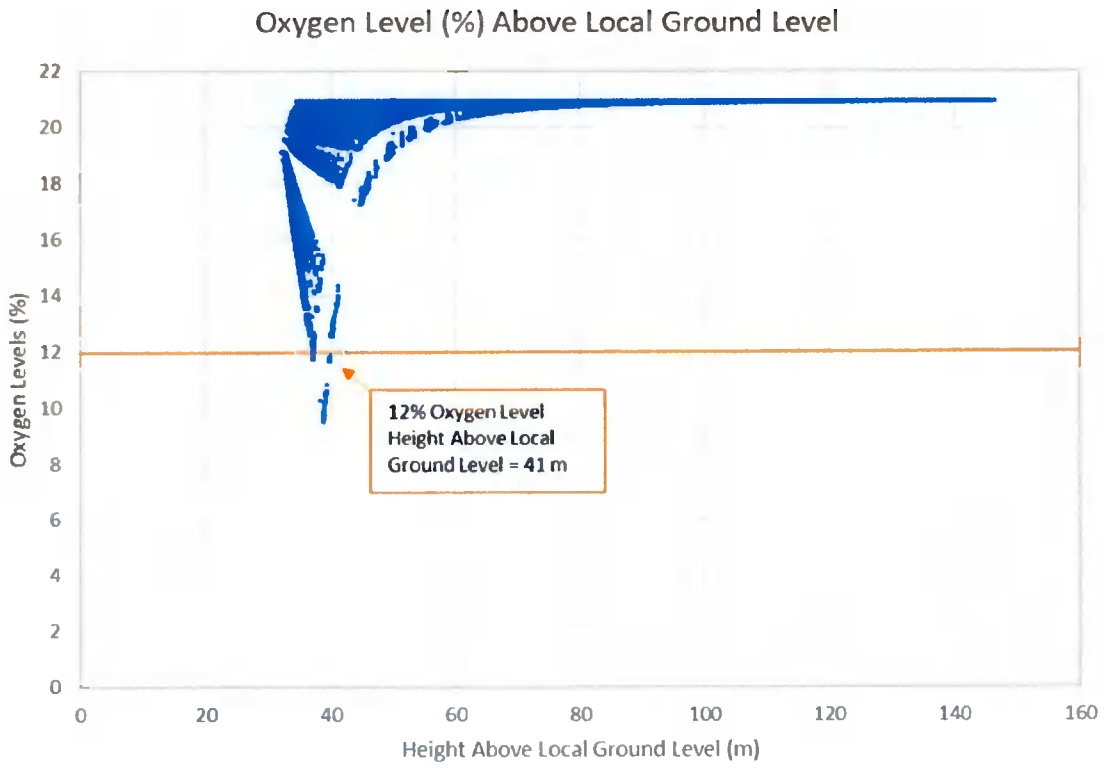

Figure 1: Oxygen Content Of The Plume (%) With Distance Above Ground Level

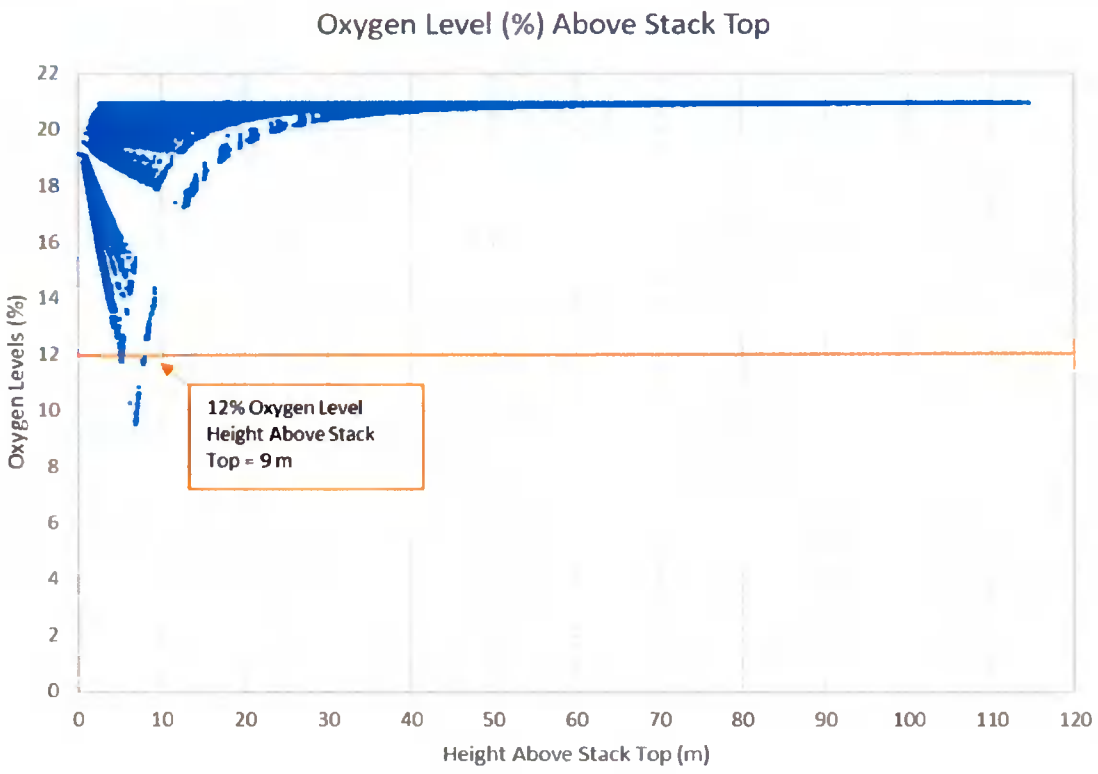

Figure 2: Oxygen Content Of The Plume (%) With Distance From Stack Top

The modelling results confirm that within a distance of 9 m from the stack top (41 m above local ground level) the oxygen content of the stacks plume will be 12% or greater. This analysis is based on every hour of the worst case year 2020 and includes all meteorological conditions including pressure / temperature inversions.

Temperature / Plume Interactions

Temperatures in excess of 50°C are potentially hazardous to helicopters and thus the decrease in the initial temperature of stack plumes (319°C) with distance from the stack has been investigated. Modelling of the temperature of the plume with distance from the stack has been undertaken using the CERC ADMS-5 model for every hour of the year based on Casement Aerodrome 2018-2020 meteorological data. The model has a specific temperature module which can, as part of the model output, give the temperature of the plume centreline with distance from the stack top.

The results are outlined below in Figure 3 and 4 for the worst case year of 2020.

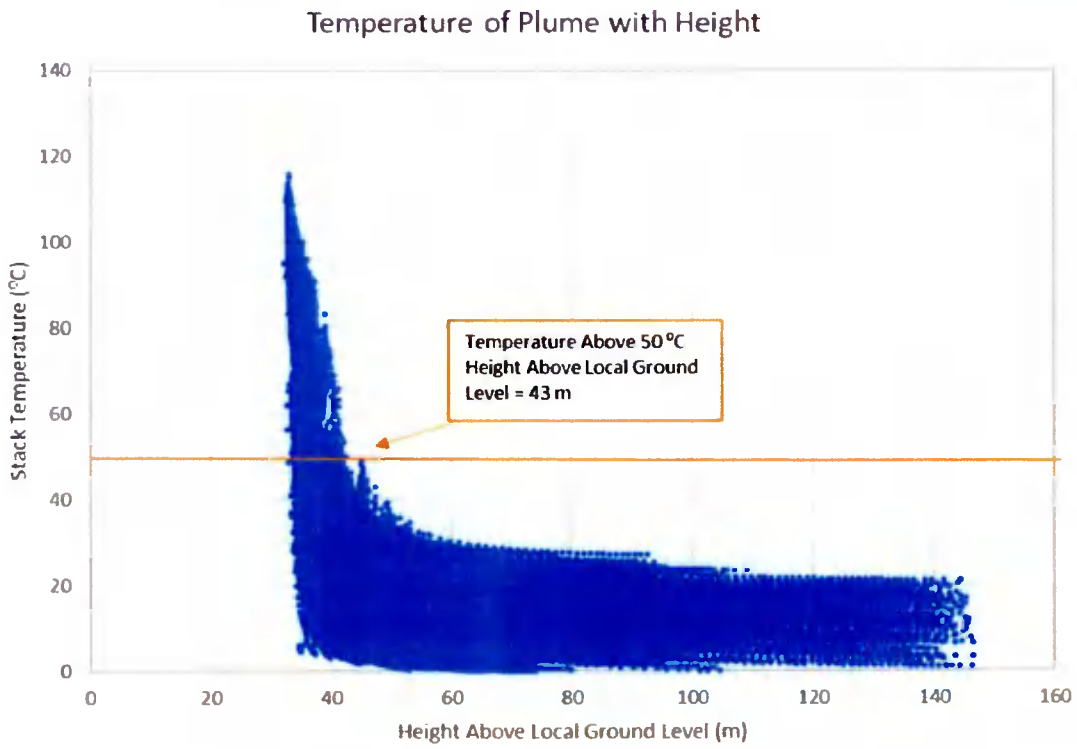

Figure 3: Temperature Of The Plume (°C) With Distance Above Ground Level

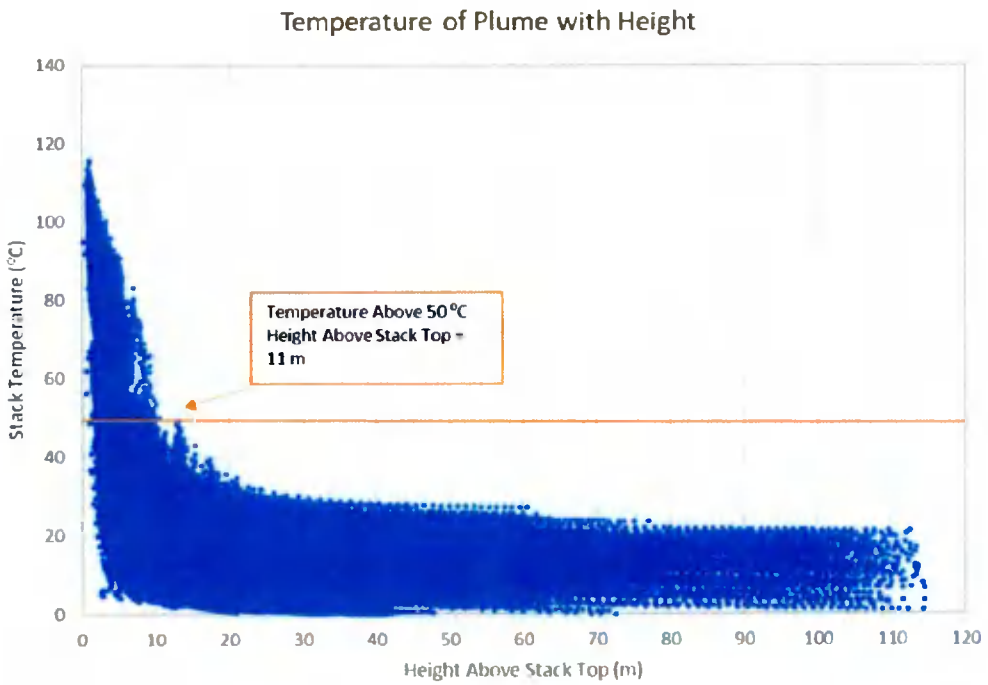

Figure 4: Temperature Of The Plume (°C) With Distance From Stack Top

The results confirm that the plume will be below 50°C within 11 m of the stack top (43 m above ground level) for every hour over the year for the stack including all meteorological conditions including pressure / temperature inversions.

Vertical Velocity / Plume Interactions

High vertical velocities are also relevant when considering helicopter/plume interactions. The Australian CASA (CASA, 2012) consider that the critical level for vertical velocity is 4.3 m/s. Thus, modelling has been undertaken to understand the vertical velocity of the plume with distance from the stack.

Cambridge Environmental Research Consultants (CERC), the developers of the EPA approved AMDS-5 model, were contacted to determine whether vertical velocity could be derived indirectly from the travel time of the plume with distance from the stack. CERC confirmed that the vertical velocity (in m/s) could be derived from an analysis of the plume centreline height (in metres) and the plume travel time (in seconds). The vertical velocity has been calculated for every hour of the year using Casement Aerodrome 2018-2020. The results are outlined below in Figures 5 and 6 for the worst case year of 2020.

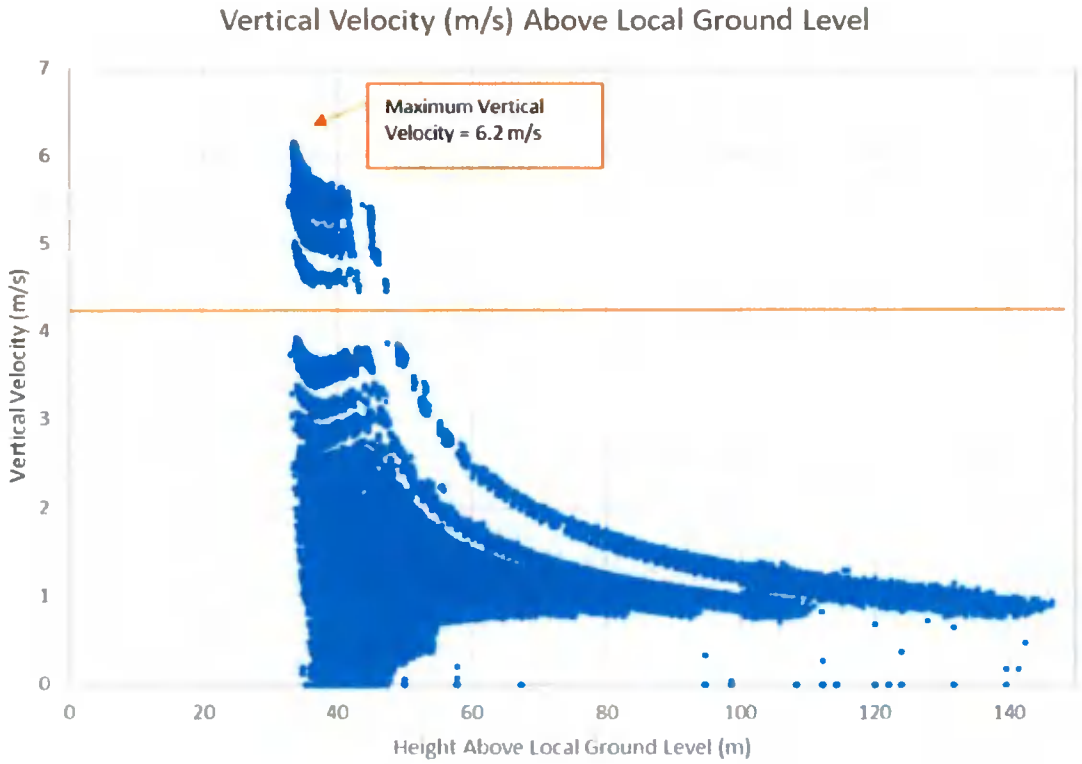

Figure 5: Vertical Velocity Of The Plume (m/s) With Distance Above Ground Level

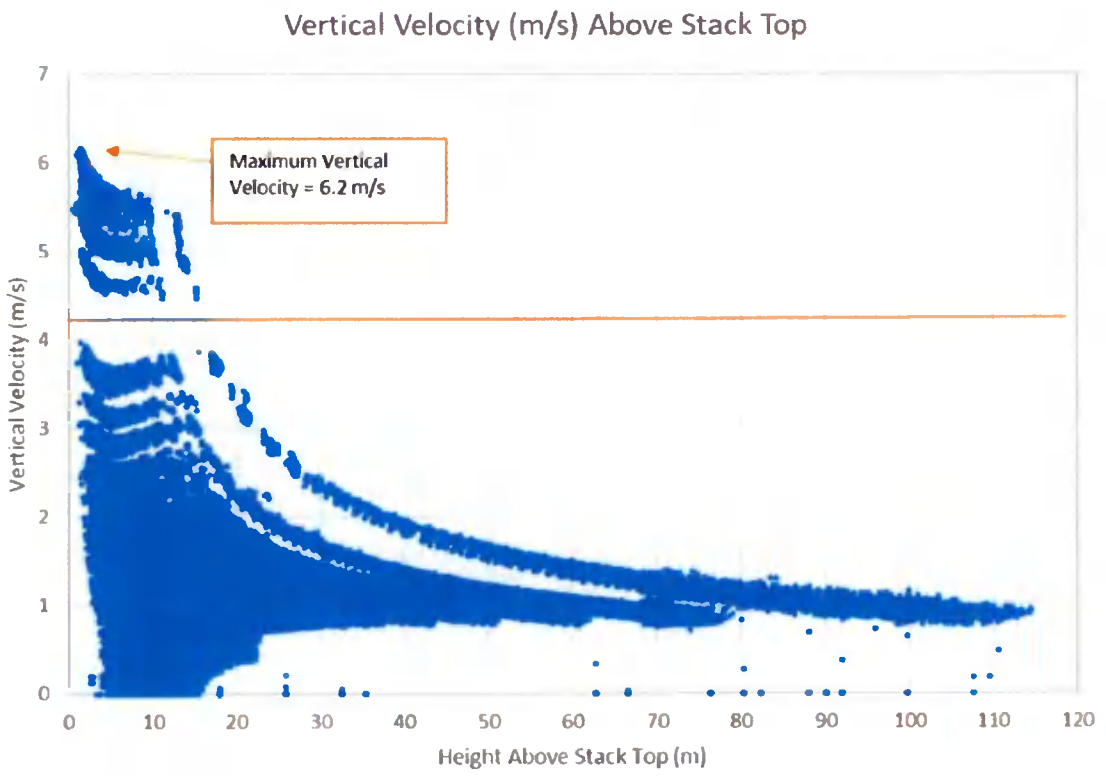

Figure 6: Vertical Velocity Of The Plume (m/s) With Distance From Stack Top

The results confirm that the velocity of the plume will be below 4.3 m/s within 15 m of the stack top (47 m above ground level) of the stack including all meteorological conditions including pressure / temperature inversions.

SUMMARY

Thus, in summary the results of the analysis are as follows.

- **Oxygen Content** – within 9 metres of the stack top the oxygen concentration will increase above the 12% risk level for oxygen.
- **Temperature** – the temperature of the plume will drop to less than 50°C within 11 metres of the stack.
- **Vertical Velocity** – the critical vertical velocity of 4.3 m/s will not be exceeded within 15 metre from the stack top.

Thus, the maximum extent of the risk zone of the plume for each parameter is shown below based on three full years of meteorological data covering all meteorological conditions including pressure / temperature inversions:

- Risk Zone for Oxygen – 9 metres
- Risk Zone for Temperature – 11 metres
- Risk Zone for Vertical Velocity – 15 metres

11.1 GLOSSARY OF ACOUSTIC TERMINOLOGY

ambient noise	The totally encompassing sound in a given situation at a given time, usually composed of sound from many sources, near and far.
background noise	The steady existing noise level present without contribution from any intermittent sources. The A-weighted sound pressure level of the residual noise at the assessment position that is exceeded for 90 per cent of a given time interval, T ($L_{AF90,T}$).
broadband	Sounds that contain energy distributed across a wide range of frequencies.
dB	Decibel - The scale in which sound pressure level is expressed. It is defined as 20 times the logarithm of the ratio between the RMS pressure of the sound field and the reference pressure of 20 micro-pascals (20 μPa).
dB L_{pA}	An 'A-weighted decibel' - a measure of the overall noise level of sound across the audible frequency range (20 Hz – 20 kHz) with A-frequency weighting (i.e. 'A'–weighting) to compensate for the varying sensitivity of the human ear to sound at different frequencies.
Hertz (Hz)	The unit of sound frequency in cycles per second.
impulsive noise	A noise that is of short duration (typically less than one second), the sound pressure level of which is significantly higher than the background.
$L_{Aeq,T}$	This is the equivalent continuous sound level. It is a type of average and is used to describe a fluctuating noise in terms of a single noise level over the sample period (T). The closer the L_{Aeq} value is to either the L_{AF10} or L_{AF90} value indicates the relative impact of the intermittent sources and their contribution. The relative spread between the values determines the impact of intermittent sources such as traffic on the background.
L_{AFN}	The A-weighted noise level exceeded for N% of the sampling interval. Measured using the "Fast" time weighting.
L_{AFmax}	is the instantaneous slow time weighted maximum sound level measured during the sample period (usually referred to in relation to construction noise levels).
$L_{Ar,T}$	The Rated Noise Level, equal to the L_{Aeq} during a specified time interval (T), plus specified adjustments for tonal character and impulsiveness of the sound.