

APPENDIX 3

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SUMMARY OF MITIGATION MEASURES

Environmental Parameter	Mitigation Measures
Human Beings	With respect to construction impact, mitigation measures will focus on expediting the works as quickly as possible within the constraints imposed by minimising emissions from the development site, minimising disruption to access and traffic flows and minimising disturbance to ecologically important species and habitats.
	The appointed contractor will prepare and implement an Environmental Management Plan, to be approved by Dublin City Council prior to the commencement of construction. A Construction Waste Management Plan will be submitted to Dublin City Council's Waste Management Services for approval as part of the Environmental Management Plan.
	Measures to minimise air/dust, noise and water emissions are dealt with under the relevant section below.
	A minimum lane width of 3.5 metres is recommended to be provided for flow of traffic. It is recommended to maintain access to the cycleway along the majority of the route.
	A traffic management plan will be submitted for approval to Dublin City Council Traffic Section by the appointed contractor prior to the commencement of any construction works.
Landscape & Visual	Construction work is to be carried out in a progressive manner (with four successive working phases/areas) along the length of the promenade so as to minimise the extent of disruption and visual impact from the work as seen from the road and nearby residences and to maintain access to at least half the promenade at all times.
	Within each working area, after the completion of approximately 100 metre long sections of earth bund, the working area will be covered with imported topsoil, which will be tilled and seeded.
	For safety and visual amenity reasons the section of the promenade being worked on will be closed to the public, with a 2.4 metre high, painted, timber panel holding wall constructed around the space. Footpath access will be maintained along Clontarf Road.
	It is recommended to protect trees that will be retained as part of the work by placing temporary fencing by the perimeter of the drip line of the canopy of the trees prior to any site clearance. Any earthworks and construction of walls in proximity to trees that are noted on the landscape plan as being retained are to be considered by an arborist in regard to potential effects of adjacent ground disturbance on the trees.

	<p>Existing tree specimens will be maintained where possible, in particular in the vicinity of the Pumping Station building, to maintain some of the established natural features and landscape structure of the promenade.</p>
	<p>The proposed floodwalls are to be in-situ uncoloured concrete cast with either stone patterned formwork or natural stone facing. A consistent and high quality finish will ensure the walls will contribute to the amenity values of the promenade becoming recognisable features that contribute to the promenade and wider area landscape character.</p>
	<p>The earth bunds are to be located, where possible, at the Clontarf Road side of the promenade, maintaining an area of flat green space adjacent to the existing seaside walkway. The existing cycleway will, for the most part, be retained in its current position.</p>
	<p>The bunds will discourage ball games in close proximity to Clontarf Road (currently a traffic hazard).</p>
	<p>Earth bunds are to be formed with gradual variations in height and width. This will help blend the new forms into the promenade in a naturalistic manner that will reduce the visual impact as seen from adjacent public areas and from within the promenade itself.</p>
	<p>The existing cycle and walkway network through the promenade will be maintained and enhanced. All path gradients are to be formed so as to be accessible to all users. Resurfacing of existing paths within the promenade is outside the scope of this project. New paths will be tarmacadam in keeping with existing paths with new white lines to direct cyclists and pedestrians.</p>
	<p>Consideration is given to opportunities to diversify use of the promenade, providing for design of spaces to encourage use of the existing features. For example, better enclosure and integration of the Alfie Byrne memorial seating into the promenade using the proposed earth bund.</p>
	<p>A greater sense of enclosure (notably at Alfie Byrne Road) enhances amenity of the promenade and reduces the impact of traffic.</p>
	<p>Intermittent view across the promenade from Clontarf Road will provide a sense discovery and encourage exploration.</p>
	<p>The quality of the promenade and amenity values associated with the space is to be enhanced with all new planting comprising tree species and ground cover rather than dense clusters of tree and large shrub species. This new planting formal will maintain spaces for refuge within the framework of predominantly open grass areas, while enabling passive surveillance across the promenade.</p>
	<p>Painting the small seating shelters structures in a variety of bright colours will make a feature of them and strengthen the character of the promenade. Installation of stainless steel or timber seating to the existing concrete plinths within the shelters will improve amenity value.</p>

	Sloping grass areas orientates spaces towards the sea and away from the road to benefit public amenity.
	The area immediately adjacent to the water's edge will not be disturbed in any way. This will ensure ecological values and habitat associated with the foreshore will not be disturbed.
Noise & Vibration	Reference will be made to BS5228: <i>noise control on construction and open sites</i> , which offers detailed guidance on the control of noise and vibration from site preparation and construction activities.
	Limiting the hours during which site activities likely to create high levels of noise or vibration are permitted.
	Establishing channel of communication between the contractor/developer, Local Authority and residents.
	Appointing a site representative responsible for matters relating to noise or vibration is permitted.
	Monitoring typical levels of noise and vibration during critical periods and at sensitive locations.
	All site access roads will be kept even so as to mitigate the potential for vibration from lorries.
	Selection of plant with low inherent potential for generation of noise and/or vibration.
	Use of hoardings or specific noise barriers, where practicable and necessary, to provide acoustic screening. These should be erected, where practicable, prior to any construction activities being undertaken in the Working Areas.
	Location of equipment, as far as is reasonably practicable, away from adjacent occupied buildings or as close as possible to noise barriers or hoardings where these are located between the equipment and the buildings.
	Provision of properly lined and sealed acoustic covers for all compressors where work is being carried out, which shall be kept closed whenever the machines are in use.
	Regular maintenance of all equipment such that it continues to meet relevant national or international standards, directives and recommendations on noise and vibration emissions.
	Operation of equipment, whatever practicable, in the mode of operation that minimise noise emissions.
Shutting down equipment, which is in intermittent use in the intervening periods between work or throttling down to a minimum.	
Prohibition of works vehicles waiting or queuing on the public highway, with engines running.	

	All audible warning system and alarms will be designed, where reasonably practicable, to minimise noise. Non-audible warning systems where practicable will be utilised in preference.		
	Recommend that vibration from construction activities be limited to the values set out below:		
	Allow Vibration (in terms of peak particle velocity) at the Closest Part of Sensitive Property to the Source of Vibration, at a Frequency of:		
	Less than 10Hz	10 to 50Hz	50 to 100Hz (and above)
	3mm/s	3 – 8 mm/s	8 – 10 mm/s
	<u>Operational</u>		
	The noise impact assessment outlined above has demonstrated that mitigation measures are not required.		
Air Quality	<u>Construction</u>		
	A Dust Minimisation Plan has been formulated for the construction phase of the project, as construction activities are likely to generate some dust emissions.		
	During very dry spells when the surface moisture content may drop, it may be prudent to implement some mitigation measures relating to dust reduction particularly on unpaved haul roads. These may include the spraying of haul roads during periods of dry weather and a stringent control of truck speeds on all unpaved roads. Such mitigation measures will typically reduce dust emissions by 80% or greater.		
	Other measures to reduce emissions include (i) ensuring stockpiles are kept moist (ii) ensuring vehicles containing dusty materials are sheeted where practicable (iii) on-site vehicles to have upward pointed exhausts wherever practicable to prevent disturbing ground lying dust and (iv) shielding of stockpiling areas.		
Flora & Fauna	<u>Winter Waterfowl</u>		
	Principal mitigation measures for wintering waterfowl is a seasonal restriction on construction activity on the watermain in the section adjoining the South Bull Lagoon, i.e. chainage 38 to 1600. Recommended that the tender and contract conditions specify that work on this section of the pipeline is carried out between mid-April and mid-August. This would ensure that work is completed during the summer months when waterfowl numbers are low, and will minimise disturbance to birds. Any variation in contract conditions will be subject to agreement with the National Parks and Wildlife Service of the Department of Environment, Heritage and Local Government, and would require provision of visual screening and monitoring of bird response.		

	It is recommended that visual screening (green mesh type) is applied to the side of the construction compound which faces towards the Tolka Basin, to minimise the potential for disturbance impacts from human activity within the compound. Visual screening is also recommended along the sea wall for each section of Clontarf Promenade when under construction.
	Displacement impacts on Brent geese feeding on grassland at Alfie Byrne Road will be mitigated by the provision of an alternative grassland area at the Causeway. Grassland on either side of Causeway Road will be mown by agreement with Dublin City Council Parks Department, to prepare a short grass sward suitable for use by geese as a replacement feeding area. It is recommended that a mowing regime be introduced six months in advance of the anticipated commencement date.
	When grassland at Clontarf Promenade is being reinstated, it is recommended that red fescue grass <i>Festuca rubra</i> is included in the seed mix at a rate of at least 30%. This species is relatively salt tolerant and will withstand short periods of inundation with salt water.
	The route of the pathway and cycle lane near Alfie Byrne Road has been designed to minimise severance of grassland between the sea wall and the flood defence bund, to facilitate continued use of this grassland by Brent geese.
	Recommended that an ecologist be retained during the construction phase, to liaise with and advise the contractor of potential impacts and mitigating practices, to carry out some monitoring of waterfowl responses to construction work, and to assess the effectiveness of mitigation measures.
	Recommended that the flood defence bund at Alfie Byrne Road is left grassed but unplanted with trees or shrubs, to encourage geese to resume feeding use of this area after construction. If geese remain displaced from the area because of altered topography and reduced field of view, mowing of the Causeway Road Grassland could continue during the operational phase.
	<p>Terrestrial Habitats <u>Construction</u></p> <p>Existing tree and shrub cover will be retained where possible during construction. Street trees on Kilbarrack Road will be protected during construction and excavation will be kept outside the canopy spread of the trees where possible to minimise root severance.</p>

	<p><u>Operational</u></p> <p>New tree planting may be carried out by Dublin City Council during the operational phase, to replace early mature tree cover, which will be lost along Alfie Byrne Road and Clontarf Promenade during construction. A number of native species are recommended for inclusion. Birch, rowan and hawthorn grown, as standards would provide relatively light screening. Native trees, which provide more dense screening, are alder, ash, whitebeam, white poplar and oak. Thorny shrubs include blackthorn, hawthorn, wild rose and rose cultivars.</p>
<p>Water</p>	<p><u>Construction</u></p> <p>To minimise any impact on the underlying subsurface strata from material spillages, all oils, solvents and paints used during construction will be stored within temporary bunded areas or dedicated bunded containers such as those supplied by Chemstore or similar.</p>
	<p>Where possible refuelling of construction vehicles and the addition of hydraulic oils or lubricants to vehicles, will take place in a designated area of the route which will be away from surface water gullies, drains and waterbodies.</p>
	<p>In the event of a machine requiring refuelling outside of this area, fuel will be transported in a mobile double skinned tank.</p>
	<p>Where soil/made ground and subsoil stripping occurs the resulting excavated soil fractions will be segregated into inert, non-hazardous and/or hazardous fractions (in accordance with Council Decision 2003/33/EC and the EPA waste classification criteria for PAH).</p>
	<p>All associated hazardous construction waste will be stored within temporary bunded storage areas prior to removal by an appropriate EOA or Local Authority approved waste management contractor for off-site treatment/recycling/disposal.</p>
	<p>Any other building waste will be disposed of to on-site skips for removal by a duly approved waste management contractor.</p>
	<p>Stripped topsoil will be temporarily stored in bunds in predefined locations on site.</p>
	<p>The guidelines provided by the Department of the Marine and Natural Resources, with respect to concrete wash waters CIRIA, the UK Environment Agency and Environment and Heritage Service, the UK Department of the Environment and the Eastern Regional Fisheries Board will be adhered to, in order to ensure that there is a neutral impact on the water environment during the construction phase of the proposed development.</p>

	<p>The risk of groundwater ingress to excavations, or surface water collecting in excavation, is deemed low. As the design progresses, should it be found necessary to extend the trench into the quaternary aquifer, discussions will be held with Dublin City Council Drainage Department and Environment Department, to determine the most appropriate disposal route for water generated during dewatering operations.</p>
	<p><u>Operation</u></p> <p>In order to prevent the risk of a spill or leak of materials to the groundwater environment during maintenance, refuelling of construction vehicles and the addition of hydraulic oils or lubricants to vehicles used for maintenance will take place off site.</p>
<p>Soil & Geology</p>	<p><u>Construction</u></p> <p>Contractors shall be required to submit and adhere to a Construction Method Statement indicating the extent of areas likely to be affected and demonstrating that this is the minimum disturbance necessary to achieve the required works.</p> <p>Where soil/made ground and subsoil stripping occurs the resulting excavated soil fractions will be segregated into inert, non-hazardous and/or hazardous fractions (in accordance with Council Decision 2003/33/EC and the EPA waste classification criteria for PAH).</p> <p>Temporary storage of inert spoil will be carefully managed in such a way as to prevent any potential negative impact on the receiving environment.</p> <p>In the areas classed as inert for the purposes of disposal (based on the site investigations), all excavated materials will be visually assessed for signs of possible contamination such as staining or strong odours, which may have occurred from leaks or spills from construction machinery. Should any unusual staining or odour be noticed, samples of this soil will be analysed for the presence of possible contaminants in order to ensure that pollution of the soil has not occurred. Should it be determined that any of the inert spoil excavated is contaminated, this will be dealt with appropriately as per the Waste Management Act of 196.</p> <p>Excess inert fill and unsuitable excavated material will be deposited in appropriate and approved infill sites, in compliance with the Waste Management Acts of 1996 – 2003 and Section 5 of the Waste Management (Collection Permit) Regulations of 2001.</p> <p>For the importation of topsoil and backfill material, the material will be brought from as near a site as possible, in order to reduce transport distances. The vehicles will be covered, where necessary, during transport of materials, to prevent uncontrolled release of material.</p>

	<p>To minimise any impact on the underlying subsurface strata from material spillages, all fuels oils, solvents and paints used during construction will be stored within specially constructed dedicated temporary bunded areas or within bunded containers such as those supplied by Chemstore or similar, or in double skinned tanks.</p>
	<p>Refuelling of construction vehicles and the addition of hydraulic oils and lubricants to vehicles, will take place away from surface water gulleys or drains. Spill kits and hydrocarbon adsorbent packs will be stored in the site compound and operators will be fully trained in the use of this equipment.</p>
	<p>Fuel for vehicles will be stored in a mobile double skinned tank.</p>
	<p>All associated hazardous waste residuals will also be stored within temporary bunded storage areas prior to removal by an appropriate EPA approved waste management contractor for off-site treatment/recycling/disposal. Any other building waste will be disposed of to on-site skips for removal by a licensed waste management contractor.</p>
	<p>When working in Fairview Park and Alfie Byrne Road, machine operatives will have an intrinsically safe methane, carbon dioxide and hydrogen sulphide detector in the machine cab, of the type supplied by companies such as Crowcon, which will be set to give a high pitched alarm signal, should the limits of 1% vol/vol for methane (20% of the lower explosion limit) and 1.5% carbon dioxide (the concentration which exists in atmospheric air for 95% of the time).</p>
	<p>Workers entering the trench will only do so after the trench has been checked for landfill gas by a suitably qualified person, and workers shall wear personal monitors or a monitor shall be available, at all times when a worker is working in the trench.</p>
	<p>If an alarm is triggered, the machine operative will be instructed to immediately stop excavation work and drive the machine away from the excavation, and allow investigation by the supervisory personnel at the site.</p>
	<p>The excavation will be only 1 – 3 metres deep, and will be well ventilated to the open air, so the risk of landfill gas build-up is low.</p>
	<p>It is recommended that the Health and Safety Plan for the construction works include a detailed assessment of landfill gas risks and a detailed series of measures to protect works.</p>
	<p><u>Operation</u></p> <p>If material excavated during the maintenance of the watermain is not used as backfill material, the excavated material will be deposited in appropriate and approved infill sites, in compliance with the Waste Management Acts of 1996 – 2004 and the Waste Management (Collection Permit) Regulations of 2001.</p>

	<p>If importation of material is required to reinstate the trench on completion of the maintenance works, the material will be brought from as near a site as possible, in order to reduce transport distances. The vehicles will be covered, where necessary, during transport of materials, to prevent uncontrolled release of material.</p> <p>Refuelling of construction vehicles and the addition of hydraulic oils or lubricants to vehicles used for the maintenance will take place off site.</p> <p>If maintenance of the watermain is required in Fairview Park and Alfie Byrne Road, gas detectors, of the type described above, will be placed at suitable intervals across the area of the excavation, to protect operatives working within the excavation.</p> <p>There will be a number of valve chambers on the route, at least to no. will be located in areas where a risk of landfill gas ingress exists (these are in Fairview Park and beside Alfie Byrne Road after the pipe crosses under the rail line). In order to minimise the risk of grass ingress the following measures will be taken:</p> <p>The point at which the pipe enters and exits the chamber will be sealed on the external face of the chamber using a proprietary landfill gas impermeable “top hat” membrane or similar, fitted and certified by a suitably qualified specialist contractor.</p> <ul style="list-style-type: none"> • The guidance provided in BRE 212 (Construction of new buildings on gas contaminated land, BRE 212, 1991) CIRIA Report 152 (risk assessment for methane and other gasses from the ground) and CIRIA Report 149 (Protecting Development from Methane, CIRIA, 1995), will be followed during the design of the chamber to ensure the risk of gas ingress and gas build-up, is minimised. • Prior to entry to a chamber suitably qualified persons shall test the chamber atmosphere to determine the quality of the atmosphere with respect to landfill gas, this testing shall be done from a point external to the chamber. • All equipment within the chamber will be ATEX (explosive atmosphere) compliant, that is the equipment will comply with the Safety, Health and Welfare at Work (Explosives Atmospheres) Regulations 2003.
<p>Waste Management</p>	<p><u>Construction and Demolition Phase</u></p> <p>A site specific C&D Waste Management Strategy has been produced following the NCDWC Guidelines and will be adhered to during the construction and demolition phase of the development.</p> <p>All C&D waste will be segregated on site, and the materials will be stored in a specifically designated area of the site. Waste contractors, that have recovery facilities for different materials, will be sourced in order to achieve a high level of recovery and recycling.</p>

	<p>All waste taken from the site will only be removed by a waste contractor permitted by Dublin City Council, under the Waste Management (Collection Permit) Regulations of 2001.</p>
	<p>All waste that is collected from the site will be only taken to a site permitted by the Council or licensed by the EPA.</p>
	<p><u>Operational Phase</u></p> <p>All waste that may be generated during maintenance work will be dealt with in compliance with the provisions of the Waste Management Acts of 1996 and 2003, and associated Regulations, the Litter Act of 1997 and the Dublin Waste Management Plan (1999 – 2004) and optimum levels of waste reduction, re-use and recycling will be achieved.</p>
Material Assets	<p>The contractor will be required to protect and minimise the disturbance to existing material assets with Clontarf Promenade and along the route of the NCAM.</p>
	<p>The working area will be restricted to a width of 16 metres with respect to the NCAM.</p>
	<p>All roads, paths and street furniture will be reinstated prior to the contractor moving off site.</p>
	<p>Restriction on construction activities in the vicinity of the Clontarf Yacht and Boat Club during April to October will be included in the Contract Document to ensure access for the Yacht and Boat Club to their slipway. Access will be maintained to the proposed Tea-Rooms west of the slipway at all times during the construction period.</p>
	<p>The contractor will be required to prepare a traffic management that must meet the approval of the Dublin City Council’s Traffic Management Division which will be designed to minimise the impact of the construction phase on traffic flows along existing roads.</p>
Cultural Heritage	<p>Recommendation based on Archaeological Potential: Low Potential: These pipelines stretches are considered unlikely to impact on any unknown archaeology generally due to recent ground disturbance or because the ground level has been artificially built up in the last 150 years. No archaeological monitoring is recommended in these areas. However, it is important that close contact be maintained between the site engineer/foreman and a suitably qualified archaeologist in case the route for any reason deviate from disturbed ground into undisturbed deposits.</p>
	<p>Medium Potential: In these areas no archaeological features are recorded on the Register of Monuments and Places or suspected for any other reasons, for example from map evidence. There is nevertheless a background potential for the chance discovery of previously unknown features or artefacts and monitoring is recommended. However, because many of these areas are roads previously disturbed by services, it would be the decision of a suitably</p>

	qualified archaeologist and National Monuments Service to decide whether a continuous presence is necessary depending on the deposits as seen in the construction trench.
	High Potential: In these areas either a known archaeological feature or monument is recorded either along the pipeline route or in close proximity or construction is within a Greenfield area. Archaeological monitoring is recommended along these stretches. The route of the Howth tramline should be avoided if possible. If it is uncovered, the line should be recorded. A representative section, including the rectangular cut stone blocks which made up the former road surface, should be retained for future display in a relevant location.