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EIAR Chapter 17 Schedule of Mitigation Measures and Monitoring Suir Island Infrastructure Links



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17 Schedule of Mitigation and Monitoring Measures

17.1 Introduction

The purpose of this Chapter is to collate the mitigation and monitoring measures identified in the Environmental Impact Assessment Report (EIAR) that are considered necessary to protect the environment, prior to the commencement of, and throughout the duration of the Construction and / or Operational Phases of the proposed development.

The design of the proposed development has evolved through comprehensive design iteration, with particular emphasis on minimising the potential for environmental impacts, where practicable, whilst ensuring the objectives of the proposed development are attained. In addition, feedback received from the comprehensive consultation programme undertaken throughout the option selection and design development process has been incorporated, where appropriate. As described throughout this EIAR, the design of the Proposed Scheme has been progressed taking account of environmental constraints and considerations that have been identified in assessments. This has enabled the avoidance of potential environmental impacts, wherever possible.

This chapter has been produced following the guidance as set out in Chapter 1 of this EIAR. The monitoring and mitigation measures are set out in the following chapters in the EIAR

- Population and Human Health
- Biodiversity, Species and Habitats
- Land, Soils, Geology and Hydrogeology
- Hydrology
- Air Quality
- Climate
- Noise and Vibration
- Material Assets Built Services
- Material Assets Traffic and Transportation
- Material Assets Resource and Waste
- Material Assets Archaeology and Cultural Heritage
- Landscape

An Ecological Clerk of Works (ECoW) as well as a Project Landscape Architect will be appointed prior to the commencement of construction. The ECoW will be an ecologist with experience of baseline ecological surveys, pre-construction surveys and construction phase supervision. The ECoW will be required to have

experience in monitoring construction phase surface water drainage infrastructure and water quality. The ECoW will be responsible for completing pre-construction surveys and supervising construction works during the construction phase. A detailed description of the ECoW responsibilities are described in Appendix A of the OCEMP.

17.2 Mitigation Measures

Table 17-1 and 17-2 below sets out a summary the mitigation measures for the proposed development during the construction and operation phases of the project where applicable. Please refer to the relevant sections of the NIS, EIAR Chapters and OCEMP for further details.

17.2.1 Mitigation Outlined in NIS

Table 17-1: Mitigation Measures as set out in the NIS

Project Phase	Mitigated By	Justification	Mitigation Measures
Pre-construction	Ecological Clerk of Works (ECoW)	Environmental Protection	<p>Protected Species Licencing</p> <p>In the preparation of this NIS, no requirement for protected species derogation licences have been identified for biodiversity receptors that may require such licences to permit disturbance to breeding or resting sites.</p> <p>The ECoW will be required to complete pre-construction surveys in advance of the commencement of construction works and based upon the results of these surveys the ECoW will establish whether or not there is a need, at that stage, for protected species licences.</p>
Construction	Contractor and ECoW	Environmental Protection	<p>Earthworks</p> <p>Site preparation, excavations and levelling works are required to facilitate the construction of the two pedestrian bridges, construction of path/ promenade, bike cycle path, road improvements, landscape works and associated works. Excavated soils will be disposed off-site to a licenced facility by a licenced contractor. Contractors shall be</p>

			<p>required to submit and adhere to a 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>According to onsite investigations, the bedrock vulnerability is 'Moderate' to 'High' across the proposed development site. The deposition of infill soil would increase the overburden thickness and thus may even decrease the groundwater vulnerability. Furthermore, the proposed development will be covered by concrete and other impermeable material which will act as a protective layer to the underlying geology and bedrock.</p> <p>Temporary storage of soil will be carefully managed in such a way as to prevent any potential negative impact on the receiving environment and the material will be stored within the temporary site compound on Suir Island, away from any open surface water drains and a minimum distance of 50m away from the River Suir. Movement of material will be minimised in order to reduce degradation of soil structure and generation of dust. All excavated material will be temporarily stored adjacent to the trench prior to disposal off-site.</p> <p>Although there is no evidence of historical contamination in the proposed development area, all excavated materials will be visually assessed for signs of possible contamination such as staining or strong odours. Site investigations classified the subsoils as 'inert'. 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 historical pollution of the soil has not occurred. Should it be determined that any of the soil excavated is contaminated, this will be disposed of by a licensed waste disposal contractor.</p> <p>Stockpiles have the potential to cause negative impacts on air and water quality. The effects of soil stripping and stockpiling will be</p>
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			<p>mitigated against through the implementation of a earthworks handling protocol during construction. Any stockpiles will be formed within the boundary of the site and there will be no direct link or pathway from this area to any surface water body. Overburden material will be protected from exposure to wind by storing the material in sheltered parts of the site, where possible.</p>
<p>Construction</p>	<p>Contractor and ECoW</p>	<p>Environmental Protection</p>	<p>Release Of Hydrocarbons</p> <p>To control and contain any potential hydrocarbon and other harmful substances spillage by vehicles during construction, it is proposed to refuel plant equipment off the development site, thus mitigating this potential impact by avoidance. If fuelling must occur on site, then a discrete “fuel station” will be designated for the purpose of safe fuel storage and fuel transfer to vehicles. This fuel station will be bunded to 110% volume capacity of fuels stored at the site. The bunded area will be drained by an oil interceptor and drainage of same will be controlled by a pent stock valve that will be opened to discharge storm water from the bund. A suitably qualified management company will take responsibility for management and maintenance of the oil interceptor and associated drainage on a regular basis, including decommissioning following construction.</p> <p>The plant equipment used on site will require regular mechanical checks and audits to prevent spillage of hydrocarbons on the exposed ground (during construction).</p> <p>Soils contaminated with hydrocarbons will be removed and stored in a temporary bund before being disposed of off-site in an appropriate manner. Oily or impacted runoff will be contained and pumped through a treatment tanks / settlement tank with in line GAC filters before treated water is discharged.</p>

			<p>In the event of an accidental spill during the construction or operational phase of the Development, contamination occurrences will be addressed immediately, including the cessation of works in the area of the spillage until the issue is resolved. Spill kits will be kept in each vehicle associated with the Development i.e. spill kits will be readily available to all operators. Spill kits will contain a minimum of; oil absorbent granules, oil absorbent pads, oil absorbent booms, and heavy-duty refuse bags (for collection and appropriate disposal of contaminated matter). No materials contaminated or otherwise will be left on the Site. Spill kits will also be established at proposed construction areas, for example; a spill kit will be established and mobilised as part of the sheet piled area materials and equipment. Suitable receptacles for hydrocarbon contaminated materials will also be at hand.</p> <p>Both precautionary measures and emergency response protocols as specified in the OCEMP will be implemented on site.</p>
Construction	Contractor and ECoW	Environmental Protection	<p>Control Of Water During Construction</p> <p>All exposed soil surfaces will be within the main excavation site which limits the potential for any offsite impacts. Soil material excavated on site will be transferred directly to a dumper truck. The excavated material will be stored temporarily on site with the main temporary site compound on Suir Island. The storage of excavated material will be positioned within the temporary site compound a minimum of 50m from the River Suir. Excavated made ground will be stored separately from soil material.</p> <p>During construction works there will be potential for the pooling of surface water or groundwater within excavations or with sheet piled working areas. On The Quay at the north side of the proposed development any surface water pooling within excavations or sheet</p>

			<p>piled areas will be pumped from these areas and discharged to the existing foul sewer system. The surface water will be pre-treated by passing the surface water through a mobile settlement and clarification treatment tank (e.g. a silt buster). The treated surface water will then be conveyed from the mobile silt tank via a lay flat that will be connected to the foul sewer system. This approach will eliminate the potential for discharge of surface water generated within excavation and sheet piled areas on The Quay to the River Suir.</p> <p>On Suir Island any surface water pooling within excavations or sheet piled areas will be pumped from these areas, via a lay flat to a mobile settlement and clarification treatment tank. The treated water will then be conveyed from the treatment tank, via a lay flat and discharged over level vegetated ground on Suir Island to the east of the flood berm. This will provide for the dispersal and attenuation of surface water over vegetated ground cover and will avoid the discharge of surface water from these working areas on Suir Island to the River Suir.</p> <p>On the south side of the proposed development site, adjacent to Raheen Road any surface water pooling within excavations or sheet piled areas will be pumped from these areas and discharged to the existing foul sewer system. The surface water will be pre-treated by passing the surface water through a mobile settlement and clarification treatment tank (e.g. a silt buster). The treated surface water will then be conveyed from the mobile silt tank via a lay flat that will be connected to the foul sewer system. This approach will eliminate the potential for discharge of surface water generated within excavation and sheet piled areas on The Quay to the River Suir.</p> <p>Any minor ingress of groundwater and collected rainfall in the excavation will be pumped out during construction in accordance with</p>
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			<p>the approach described in the above paragraphs. It is estimated that the inflow rate of groundwater will be moderate to fast according to the available field data logs. Extensive monitoring will be adopted to ensure that the water is of sufficient quality to discharge to the foul sewer network and vegetated ground on Suir Island. The use of additional settlement and silt traps and an oil interceptor (if required) will be adopted if the monitoring indicates the requirements for the same with no excess silt or contaminated water permitted to discharge to the sewer. Due to the very low permeability of the glacial subsoils and the relative shallow nature for excavations, infiltration to the underlying aquifer is not anticipated.</p>
Construction	Contractor and ECoW	Environmental Protection	<p>Release Of Sewage</p> <p>A self-contained port-a-loo system with an integrated waste holding tank will be used on site for toilet facilities. This will be maintained by the service contractor as required and will be removed from the site on completion of the construction phase.</p> <p>No wastewater will be generated as a result of the project during the operation phase.</p>
Construction	Contractor and ECoW	Environmental Protection	<p>Release Of Cementitious Pollutants</p> <p>The Contractor is obliged to implement the following control measures to avoid the release of cement-based pollutants</p> <ul style="list-style-type: none"> • No batching of wet-cement products will occur on site. Ready-mixed supply of wet concrete products and where possible, emplacement of pre-cast elements, will take place; • Where possible, pre-cast elements for culverts and concrete works will be used;

			<ul style="list-style-type: none"> • No washing out of any plant used in concrete transport or concreting operations will be allowed on-site; • Where concrete is delivered on site, only the chute need be cleaned, using the smallest volume of water possible. No discharge of cement contaminated waters to the construction phase drainage system or directly to any artificial drain or watercourse will be allowed. Chute cleaning water is to be tanked and removed from the site to a suitable, non-polluting, discharge location; • Use weather forecasting to plan dry days for pouring concrete; • Ensure pour site is free of standing water, and plastic covers will be ready in case of sudden rainfall event. • Disposal of raw or uncured waste concrete will be controlled to ensure that watercourses or other sensitive areas will not be impacted • No cement will be required for works associated with horizontal directional drilling under watercourses and no cement will be stored in the vicinity of watercourses during such works.
Construction	Contractor and ECoW	Environmental Protection	<p>Release of Other Pollutants</p> <p>The following measures are proposed to prevent contamination of watercourses:</p> <ul style="list-style-type: none"> • No refuelling of construction vehicles or plant will take place within the 50m surface water buffer zone. • Refuelling of plant, equipment and vehicles will only be undertaken on impermeable surfaces. • No maintenance of construction vehicles or plan will take place along the proposed route, except in a case of emergency.

			<ul style="list-style-type: none">• All potentially hazardous chemicals, fuel, hydraulic oils and lubricants will be stored in bunded areas (in accordance with established best practice guidelines) at the Contractor's Temporary Compound.• In order to reduce the risk of contamination arising as a result of spills or leakages, all fuels, chemicals, liquid and solid waste will be stored on impermeable surfaces.• If there is a requirement to store hazardous chemicals on site, they will be stored within a bunded, locked COSHH container, with upkeep and security ensured by the contractor.• All tanks and drums are to be bunded in accordance with established best practice guidelines.• Re-fuelling of construction equipment and the addition of hydraulic oil or lubricants to vehicles / equipment will take place in designated bunded areas within the main construction compound and not on-site where reasonably practicable. If it is not possible to bring machinery to the refuelling point, fuel will be brought to site by a 4x4 in a double skinned bowser with drip trays. The bowser/4x4 will be fully stocked with spill kits and absorbent material, with delivery personnel being fully trained to deal with any accidental spills. The bowser will be bunded appropriately for the fuel usage volume for the time period of the construction.• plant and machinery used will be regularly inspected for leaks and fitness for purpose.• Spill kits will be readily available to deal with accidental spillage at all times.
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			<ul style="list-style-type: none"> • A segregated waste storage will be available at the substation construction site. • All existing road drains/culverts will be temporarily blocked during the drilling works to ensure that sediment or accidental spills do not reach any local watercourses. • An inventory of all chemicals on site will be kept. It will include: <ul style="list-style-type: none"> - Procedures for storage of all materials listed - Location details of all materials listed - Volume and description of all substances stored on-site - Waste disposal records, including copies of all Waste Transfer Notes (WTN) detailing disposal routes and waste carriers used. Where waste is being shipped abroad, a copy of the Trans Frontier Shipping (TFS) document must be obtained from Dublin City Council and kept on site along with details of the final destination and any relevant permits, licences or other relevant documentation. • Chemical storage details will be part of routine site audits. • Only where absolutely necessary should any hazardous waste be stored on site. If so, Hazardous Waste should be stored in a COSHH store. Only trained operatives should handle hazardous substances. Please note that COSHH data sheets are NOT risk assessments and all risk assessment should be carried out separately. All stored hazardous waste will be clearly labelled. All of these will be regularly inspected for visual signs of leaks or something that would impact on their capacity – e.g. where a drip tray is full of rainwater.
Construction	Contractor and ECoW	Environmental Protection	Prevention of Adverse Impacts During Piling Works

			<p>In order to avoid the potential for adverse impacts to instream habitats, spawning locations of sea lamprey, river lamprey, Atlantic salmon and other fish species and white-clawed crayfish during the operation phase the method of piling to be implemented will be based on rotary piling techniques. This approach to piling will eliminate the potential for high impact (noise and vibration inducing) strikes or hammering. This coupled with the set-back distances of the pile locations from the river at all pier and abutment locations, as well as the presence of the bedrock and overburden between the river and the pile locations at piers and abutments, will ensure that no noise or vibration associated with the piling will have the potential to cause injury to fish (i.e. will not exceed the low guide value of the 183 dB within adjacent waters) within the river channel adjacent to the piling locations.</p> <p>All piling works will be timed to occur outside the most sensitive time of the year when Atlantic salmon and lamprey species spawn along the section of the River Suir at Suir Island. River lamprey spawn along this section of the River Suir during spring time, between March and April (Gallagher et al., 2022); sea lamprey usually spawns in late May or June, when the water temperature reaches at least 15°C (Maitland, 2003) and surveys of sea lamprey spawning along this section of the River Suir coincides with this timeframe (Gallagher et al., 2019, 2020, 2022). Atlantic salmon spawn along this section of the River Suir during the winter and spring between November and March. In view of these spawning timeframes and taking into account the time of year when river flows are typically low, all piling works will be timed to be undertaken between mid-July and September.</p> <p>In addition to the above the approach to the rotary piling will include a slow start-revving up procedure. This will involve slowly starting rotary piling and revving up the piling over a 30-minute period. This slow start</p>
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			<p>period will allow noise-sensitive species to move away from the piling area and avoid injury.</p> <p>The use of rotary bored piling will also ensure that vibration levels associated with this piling will be low and will not present a risk of undermining the integrity of adjacent river banks and their collapse.</p> <p>In order to eliminate the potential for sheet piling installation works to result in river bank instability and collapse, the sheet piling to be used will consist of interlocking steel panels, which will be driven through the overbank materials prior to any excavations occurring near the riverbanks. The interlocking/retaining nature of the sheetpiling will protect the riverbanks from destabilising during the piling operations and subsequent works within the sheet piled working area.</p> <p>With the implementation of the above measures and as imposed in any Conditions and/o Restrictions in any Approval by the Competent Authority, the piling works during the construction phase will not result in adverse effects to Annex 2 fish species, white-clawed crayfish or otter supported by the stretch of the River Suir surrounding Suir Island.</p>
<p>Construction</p>	<p>Contractor and ECoW</p>	<p>Environmental Protection</p>	<p>Prevent Adverse Impacts of Artificial Lighting During the Construction Phase</p> <p>All working hours will occur within daylight hours between the months of April to October. From late October to mid-March working hours will hours of darkness between 7am and 8am and between 5pm and 7pm. Outside of working hours all artificial lighting that as the potential to cast light on the river will be turned off. In addition, during the months of late Mid-October to mid-March artificial lighting that casts light onto the river channel will not be used and will be turned off. In effect this will require any works in the vicinity of the river during these months to be completed during daylight hours. It is further noted that works near the river associated with the installation of piers and abutments</p>

			and the landing of the bridge superstructures will be completed between the months of April to October, during the time of year when the risk of flooding is minimised.
Operational	Contractor and ECoW	Environmental Protection	<p>Prevent Adverse Impacts of Artificial Lighting During the Operational Phase</p> <p>The following measures will be implemented to minimise the impact of artificial night lighting to light sensitive species which include Annex 2 fish species and aquatic fauna:</p> <p>The final lighting design will avoid light spill to the River Suir and the design will be required to demonstrate no change in light conditions on the river.</p> <p>The lighting for the bridge sections has been designed in accordance with the best practice guidelines for bats and lighting prepared by the Institute of Lighting Professionals and Bat Conservation Trust. The design of the lighting in line with these measures will also ensure that a sensitive approach to lighting has been adopted for all other light sensitive species, including Annex 2 fish species and white-clawed crayfish.</p> <p>The following key requirements will be incorporated into the lighting design:</p> <p>Lighting will be controlled via movement sensors which will be triggered by human activity as people walk or cycle by at night. This lighting regime will reduce the overall time that the lighting is in use which will in turn reduce impacts on light sensitive fauna including Annex 2 fish species. In addition to this a Central Monitoring System will be installed allowing lights to be monitored remotely and individually controlled. Bespoke dimming regimes can be installed or</p>

			<p>particular lighting units switched off or dimmed during periods of low-level use.</p> <p>All luminaires will lack UV elements and only LED luminaires will be used.</p> <p>Metal halide fluorescent have not been used in the design.</p> <p>A warm white spectrum light will be used to reduce blue light component</p> <p>The luminaires should feature peak wavelengths higher than 550nm to avoid the component of light most disturbing to bats.</p> <p>Other features that have been incorporated into the public lighting design include the following:</p> <p>Lighting will be based on movement sensors and so will not be on all the time.</p> <p>The spacing between light columns has been maximised in order to avoid excessive illumination along the greenway.</p> <p>The height of lighting columns has been minimised to a height of 5m to reduce lighting within a great heights where foraging bats will be active.</p> <p>The lights have been designed to minimise light spill and no light will spill onto the river channel, ensuring the potential impacts of lighting to aquatic fauna are avoided. Only luminaires with an upward light ratio of 0% and with good optical control have been included in the lighting design</p> <p>All luminaires should always be mounted on the horizontal – no upward tilt.</p>
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Construction	Contractor and ECoW	Environmental Protection	<p>Prevent the spread of non-native invasive species</p> <p>An Invasive Species Management Plan has been prepared for the project and is provided as Appendix 4 to this Natura Impact Statement. The following sub-sections summarise elements of this Invasive Species Management Plan.</p>
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Table 17-2: Mitigation Measures as set out in the EIAR and OCEMP

Project Phase	Mitigated By	Justification	Mitigation Measures
Construction	Management	Environmental Protection	A project-specific Construction Environmental Management Plan (OCEMP) will be prepared and maintained during the construction phase of the project. The OCEMP will include but not be limited to controls for dust, noise and vibration, waste management, protection of soils and groundwaters, protection of flora and fauna, site housekeeping, emergency response planning, site environmental policy, environmental regulatory requirements and project roles and responsibilities. The OCEMP will also address extreme of weather (drought, wind, precipitation, temperature extremes) and the possible impacts on receptors and mitigation of same. The OCEMP will be treated as a live document and communicated to all site personnel.
Construction and Operation	Management	Environmental Protection	The applicant will, during both construction and operational stages, maintain a Complaints Register to record any complaints regarding but not limited to noise, odour, dust, traffic or any other environmental nuisance. The Complaint Register will include details of the complaint and measures taken to address the complaint and prevent repetition of the complaint.
Construction	Site Operator	Water Protection	Contractors for the proposed development will be contractually required to operate in compliance with the OCEMP which includes the mitigation measures outlined in this EIA report. All personnel working on the site will be suitably trained in the implementation of the procedures.
Construction	Management	Soil and Water Protection	Any material required to be removed from site will be stockpiled separately and subsequently sampled to ensure appropriate disposal. The surplus of

			<p>excavated material from the excavations will be disposed off-site to licenced facility by a licenced contractor.</p> <p>Aggregate materials such as sands and gravels will be stored in clearly marked receptacles within a compound area to prevent contamination.</p> <p>Temporary storage of spoil will be managed to prevent accidental release of dust and uncontrolled surface water run-off which may contain sediment and solid matter. Materials will be sent off site for recycling where possible and, if not suitable for recycling, materials will be disposed of to an appropriate permitted/licensed waste disposal facility.</p> <p>Liquid materials i.e., fuel storage will be located within temporary bunded areas, doubled skinned tanks or bunded containers (all bunds will conform to standard bunding specifications - BS8007-1987) to prevent spillage.</p> <p>The removal of waste from the site will be carried out in accordance with Waste Regulations, Regional Waste Plan (Eastern Midland Region) and Waste Hierarchy/Circular Economy Principals.</p> <p>Cased piles will be used to prevent the use of bentonite and will be cast using ready-mix concrete trucks transported to site and pumped into the casings due to restricted access for concrete trucks. No batching plants will be allowed on site.</p>
Construction	Management	Soil and Water Protection	<p>All excavated materials will be visually assessed for signs of possible contamination such as staining or strong odours.</p> <p>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 historical pollution of the soil has not occurred. Should it be determined that any of the soil excavated is contaminated, this will be disposed of by a licensed waste disposal contractor.</p> <p>The effects of soil stripping and stockpiling will be mitigated against through the implementation of appropriate earthworks handling protocol during construction. It is anticipated that any stockpiles will be formed within the boundary of the site and the direct link or pathway from this area to any surface water will be minimised through the use of silt fencing etc as appropriate. Overburden material will be protected from exposure to wind by storing the material in sheltered parts of the site, where possible.</p>
Construction	Management	Soil and Water Protection	<p>All fill and aggregate for the proposed development will be sourced from reputable suppliers. All suppliers will be vetted for:</p>

			<ul style="list-style-type: none"> - Aggregate compliance certificates/declarations of conformity for the classes of material specified for the proposed development; - Environmental Management status; and - Regulatory and Legal Compliance status of the Company.
Construction	Prevention	Soil and Water Protection	<p>The following mitigation measures will be taken at the construction stage in order to prevent any spillages to ground of fuels and prevent any resulting soil and/or groundwater quality impacts:</p> <ul style="list-style-type: none"> - Oil and fuel storage tanks will be stored in designated areas; - Designation of a bunded refuelling areas on the site, these areas will be bunded to a volume of 110% of the capacity of the largest tank/container within the bunded area(s) (plus an allowance of 30 mm for rainwater ingress); - Drainage from the bunded area(s) will be diverted for collection and safe disposal; - Refuelling of construction vehicles and the addition of hydraulic oils or lubricants to vehicles will take place in a designated area – contractors’ compound - (or where possible off the site) which will be away from surface water gullies or drains; - Provision of spill kit facilities across the site; - All relevant personnel will be fully trained in the use of this equipment; - All ready-mixed concrete will be brought to site by truck. A suitable risk assessment for wet concreting will be completed prior to works being carried out which will include measures to prevent discharge of alkaline wastewaters or contaminated storm water to the underlying subsoil. Wash down and washout of concrete transporting vehicles will take place at an appropriate facility offsite; - Containers shall be stored in a dedicated internally bunded chemical storage cabinet and labelled clearly to allow appropriate remedial action in the event of a spillage.
Construction	Management	Soil and Water Protection	<p>Care will be taken to ensure that exposed soil surfaces are stable to minimise erosion. Measures will include managing slope gradients, covering of soil stockpiles where necessary etc. All exposed soil surfaces will be within the main excavation site which limits the potential for any offsite impacts.</p>

			<p>Should any discharge of construction water be required during the construction phase, Pre-treatment and silt reduction measures on site will include a combination of silt fencing, settlement measures (silt or sediment traps, buffer zone between machinery and watercourses, refuelling of machinery off site) and hydrocarbon interceptors. All water runoff from car park areas will be channelled to an oil interceptor or an alternative treatment system prior to discharge.</p> <p>Any minor ingress of groundwater and collected rainfall in the excavation will be pumped out during construction.</p>
Construction	Management	Soil and Water Protection	<p>During construction phase the following monitoring measures will be adopted:</p> <ul style="list-style-type: none"> - Regular inspection of surface water run-off and sediments controls e.g.; silt traps will be utilised during the construction phase. - Soil sampling to confirm disposal options for excavated soils. - Regular inspection of construction/mitigation measures will be undertaken e.g., concrete pouring, refuelling etc.
Construction	Management	Surface Water Run-off	<p>Cognisance will have to be taken from the referenced guidance documents for construction near watercourse/bodies:</p>
Construction	Management	Surface Water Protection	<p>The duration and extent of in-stream works will be kept to a minimum to avoid disruptions to aquatic life and short-term changes to river morphology;</p> <p>Discharge of surface water from sumps, excavations and exposed soil surfaces will include the use of silt traps or settlement ponds;</p> <p>Silt traps, settlement ponds, hydrocarbon interceptors will be constructed in the early stages of the construction programme;</p> <p>Bare soil surfaces will be protected from erosion by placing granular material on the surfaces to prevent sediment transport to watercourses;</p> <p>Storage areas of fuel, oil and chemicals will be on impermeable surfaces and located away from drains and watercourses. Fuel storage areas will be bunded to provide adequate retention capacity in the event of a leak or spillage occurring;</p> <p>Refuelling of construction vehicles will take place on impermeable surfaces and located away from nearby drains and watercourses;</p> <p>Spill kits to be provided near all works areas on the North Plaza, Suir Island and Raheen Road.</p>

Construction	Site Operator / Management	Surface and ground Water Protection	<p>During the pouring of concrete for permanent structures (piles, piers and abutments), the operation and management of these activities will be carefully controlled to avoid spillage.</p> <p>As the use of use of concrete cannot be avoided the following control measures will be employed:</p> <ul style="list-style-type: none"> - Quick-setting or rapid hardener add-mixtures will be used to promote early setting of concrete to ensure cementitious compounds are not absorbed by surface or groundwater; - Where concrete works are required in or near water sources, the used of biodegradable products will be used; - Any plant operating close to water sources will require special consideration and monitoring when on site; - Placing of concrete in or near watercourses will be carried out only under the supervision of the Ecological Clerk of Works (ECoW); - No cleaning or hosing of any concrete surfaces, plant or equipment will be permitted near surface water sources or drains. Designated impermeable areas to be prepared with sufficient settlement capacity and accidental spillage containment volume; - On-site concrete batching will not be allowed near the site.
Construction	Management	Surface and ground Water Protection	<p>Construction of structures in the river floodplain requires temporary works such as localised sheet piling and excavation works which will be phased to minimise the reduction of flow area.</p> <p>The reduction of flow area increases scour potential of the river therefore the works should be phased to negate or minimise any increase in flow velocities arising from restricting the river flow area.</p>
Construction	Management	Surface and ground Water Protection	<p>River water levels and weather forecasts will be monitored for potential flood events during construction and temporary flood defences will be provided during construction where the existing flood defence wall will be altered.</p>
Construction	Protection	Ecological Protection	<p>The ECoW will be responsible for completing pre-construction surveys and supervising construction works during the construction phase.</p>
Construction and Operation	Protection	Habitat Protection	<p>Pre-construction surveys required in advance of the construction phase will include as a minimum:</p>

			<ul style="list-style-type: none"> - Otter surveys along the River Suir and Suir Island. Surveys to be completed will pay particular attention to identifying the presence/absence of otter holts/couches within 150m of piling locations. -Non-native invasive plant species surveys: An up-to-date non-native invasive plant species survey of the project site and adjacent areas will be completed during the growing season immediately prior to the commencement of construction works. -Surveys for the presence of plant species of local conservation interest. These surveys will be completed during the growing season immediately prior to the commencement of the construction phase. The surveys will be completed to identify the stands of <i>Symphytum officinale</i>, <i>Orobanche hederæ</i> and <i>Aquilegia vulgaris</i> occurring within the works area of the project site. The survey will also aim to confirm the presence/absence of <i>Centaurea cyanus</i> within the works area during the growing season immediately prior to the commencement of construction works.
<p>Construction and Operation</p>	<p>Protection</p>	<p>Habitat Protection</p>	<p>The ECoW will ensure that best practice construction methods and mitigation measures detailed in this EIAR and accompanying planning documentation including the Construction Environmental Management Plan (OCEMP) and Natura Impact Statement are implemented in full.</p> <p>The ECoW will be responsible for ensuring that the construction phase contractor is aware of key biodiversity receptors, such as the Lower River Suir SAC, the presence of populations of white-clawed crayfish, spawning habitat for Atlantic salmon and lamprey, the presence of otters and high value bat foraging and breeding bird habitat. The ECoW will inspect the construction works throughout the construction phase and will pay particular attention to the implementation of all biodiversity related mitigation measures.</p> <p>The ECoW will provide monitoring inspection reports during the construction phase and will also provide a close-out report following the completion of the contract construction works.</p> <p>Where necessary the ECoW will liaise with relevant authorities such as Tipperary County Council, the IFI and the NPWS with respect to construction phase activities that relate to biodiversity.</p> <p>As part of the ECoW terms of appointment, the ECoW will be vested with the authority to stop works where activities have been identified on site</p>

			that are not in accordance with the mitigation measures outlined in this EIAR, the Natura Impact Statement and/or the OCEMP prepared for the planning application for the proposed development.
Construction and Operation	Protection	Habitat Protection	The ECoW will be required to complete pre-construction surveys in advance of the commencement of construction works and based upon the results of these surveys the ECoW will establish whether or not there is a need at that stage for protected species licences.
Construction	Protection	Habitat Protection	Construction machinery will be restricted to site roads and the footprint of the proposed development and associated construction works area.
Construction	Protection	Habitat Protection	Plants of local conservation interest that are identified as occurring within the footprint of the construction works will be removed and translocated to an alternative suitable location on Suir Island outside the footprint of the project site. During the baseline surveys these plant species have been identified as <i>Orobanche hederaceae</i> , <i>Aquilegia vulgaris</i> and <i>Symphytum officinale</i> . The translocation of these plants will be undertaken under the supervision of the project ECoW. The project ECoW will direct the contractor to excavate the plants as turves that will be a minimum of 0.5m x 0.5m to a depth of 0.3m. The plants will be translocated to a suitable receptor location on the island with conditions similar to those occurring at the original site.
Construction	Protection	Habitat protection	Where possible vegetation to be cleared onsite will be completed outside the nesting bird season between March and August inclusive. Where it is not possible to time such works outside these months then a survey of hedgerow/treeline/grassland vegetation and habitats for the presence of nesting birds will be required. Noise mitigation measures will be implemented during the construction phase to minimise the potential for noise disturbance to bird species and fauna.
Construction	Protection	Habitat Protection	All working hours will occur within daylight hours between the months of April to October. Outside of working hours all artificial lighting that has the potential to cast light on the river will be turned off.
Construction	Protection	Habitat Protection	The management of surface water during the construction phase will adhere to the recommendations of the CIRIA guides Control of Water

			<p>Pollution from Construction Sites (2001) and Control of Water Pollution from Linear Construction Projects (2006). During construction key requirements for control of chemical pollution risk will include:</p> <ul style="list-style-type: none"> - Storage – all equipment, materials and chemicals will be stored away from any watercourse. Chemical, fuel and oil stores will be sited on impervious bases and within a secured bund of 110% of the storage capacity, within the lay down area; - The integrity and water tightness of all the bunding structures and their resistance to penetration by water or other materials stored therein will also be tested and demonstrated. - All fuel oil fill areas will have an appropriate spill apron. - Vehicles and refuelling – standing machinery will have drip trays placed underneath to prevent oil and fuel leaks causing pollution. Where practicable, refuelling of vehicles and machinery will be carried out on an impermeable surface in designated areas, well away from any surface watercourse; - Maintenance – maintenance to construction plant will not be permitted on site unless vehicles have broken down necessitating maintenance at the point of breakdown. All necessary pollution prevention measures will be put in place prior to commencement of maintenance in this instance; - Concrete - Wet concrete operations would not be carried out within watercourses or adjacent to watercourses. Runoff from wastewaters or contaminated storm water will be directed to drains installed as part of the surface water management plan - Mess, sanitation and welfare facilities will be required during construction and will be located at the construction compound. Foul effluent will make use of chemical facilities with periodic removal for offsite disposal.
<p>Construction and Operation</p>	<p>Protection</p>	<p>Habitat Protection</p>	<p>The following measures will be implemented to minimise the impact of artificial night lighting to bats, other nocturnal species and aquatic fauna:</p> <ul style="list-style-type: none"> - The final lighting design will avoid light spill to the River Suir and the design will be required to demonstrate no change in light conditions on the river.

			<ul style="list-style-type: none"> - The lighting design for the bridge sections will be based upon the best practice guidelines for bats and lighting prepared by the Institute of Lighting Professionals and Bat Conservation Trust. The following key requirements will be incorporated into the lighting design: - Lighting will be controlled via movement sensors which will be triggered by human activity as people walk or cycle by at night. - This lighting regime will reduce the overall time that the lighting is in use which could in turn reduce impacts on bats and insects. A Central Monitoring System will be installed allowing lights to be monitored remotely and individually controlled. Bespoke dimming regimes can be installed or particular lighting units switched off or dimmed during periods of low-level use. - All luminaires will lack UV elements and only LED luminaires will be used. - Metal halide fluorescent have not been used in the design. - A warm white spectrum light will be used to reduce blue light component. - The luminaires should feature peak wavelengths higher than 550nm to avoid the component of light most disturbing to bats. Other features that have been incorporated into the public lighting design include the following: - Lighting will be based on movement sensors and so will not be on all the time. - The spacing between light columns has been maximised in order to avoid excessive illumination along the greenway. - The height of lighting columns has been minimised to a height of 5m to reduce lighting within a great heights where foraging bats will be active. - The lights have been designed to minimise light spill and no light will spill onto the river channel, ensuring the potential impacts of lighting to aquatic fauna are avoided. Only luminaires with an upward light ratio of 0% and with good optical control have been included in the lighting design - All luminaires should always be mounted on the horizontal – no upward tilt.
Operation	Protection	Habitat Protection	Ongoing monitoring of habitat reinstatement areas will be completed during the operation phase of the project.

Construction	Protection	Habitat Enhancement	<p>In order to enhance the quality of habitat occurring within the project site and the adjacent Suir Island the following habitat enhancement measures are recommended:</p> <ul style="list-style-type: none"> - Bird nest boxes will be erected on appropriately trees occurring within or adjacent to the project site. The trees that will support nest boxes will be selected by the construction phase ECoW. - Bat boxes will be erected on appropriately trees occurring within or adjacent to the project site. The trees that will support nest boxes will be selected by the construction phase ECoW
Construction	Management	Dust Management	<p>The siting of activities and storage piles will take note of the location of sensitive receptors and prevailing wind directions in order to minimise the potential for significant dust nuisance. As prevailing wind is predominantly westerly to south-westerly, locating construction compounds and storage piles downwind (to the east or north-east) of sensitive receptors will minimise the potential for dust nuisance to occur at sensitive receptors.</p>
Construction	Management	Air Quality	<p>Hard surface roads will be swept to remove mud and aggregate materials from their surface while any un-surfaced roads will be restricted to essential site traffic.</p> <p>Any road that has the potential to give rise to fugitive dust must be regularly watered, as appropriate, during dry and/or windy conditions.</p> <p>Vehicles using site roads will have their speed restricted, and this speed restriction must be enforced rigidly. On any un-surfaced site road, this will be 20 kph.</p> <p>Public roads outside the site will be regularly inspected for cleanliness and cleaned as necessary.</p> <p>Material handling systems and site stockpiling of materials will be designed and laid out to minimise exposure to wind. Water misting or sprays will be used as required if particularly dusty activities are necessary during dry or windy periods.</p> <p>During movement of materials both on and off-site, trucks will be stringently covered with tarpaulin at all times. Before entrance onto public roads, trucks will be adequately inspected to ensure no potential for dust emissions.</p>

Construction	Management	Dust Management	<p>Adverse weather conditions will be responded to by either restricting operations on-site or quickly implementing effective control measures before the nuisance occurs.</p> <p>During periods of very high winds (gales), activities likely to generate significant dust emissions will be postponed until the gale has subsided.</p> <p>The following measures will be taken in order to avoid dust nuisance occurring under unfavourable meteorological conditions:</p> <ul style="list-style-type: none"> - The principal contractor or equivalent must monitor the contractor's performance to ensure that mitigation measures are implemented; - Name and contact details of a person and head/regional office to contact regarding air quality and dust issues will be displayed on site boundary; - community engagement will be undertaken before works commence on site explaining the nature and duration of the works to local residents and businesses; - The development of a complaints register and effective measures to deal with any complaints received. - It is the responsibility of the contractor at all times to demonstrate full compliance with the dust control conditions herein; - At all times, the procedures put in place will be strictly monitored and assessed.
Construction	Management	Dust Management	<p>Plan site layout so that machinery and dust causing activities are located away from receptors.</p> <p>Erect solid screens or barriers around dusty activities or the site boundary that are least as high as any stockpiles on site.</p> <p>Specific operations where there is high potential for dust production and site is active for an extensive period will be fully enclosed.</p> <p>Avoidance site run off of water or mud.</p> <p>Site fencing, barriers and scaffolding will be kept clean using wet methods.</p> <p>Materials that have a potential to produce dust will be removed from site as soon as possible.</p> <p>Stockpiles will be covered, seeded or fenced to prevent wind whipping.</p>
Operations	Management	Dust Management	<p>Only cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g. suitable local exhaust ventilation systems will be used.</p>

			<p>An adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water is to be supplied. Unclosed chutes and conveyors and covered skips are to be used. Minimisation of drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and usage of fine water sprays on such equipment is to be implemented. Equipment will be readily available on site to clean any dry spillages and clean up spillages as soon as reasonably practicable after using wet cleaning methods.</p>
Construction	Management	Dust Management	<p>Scabbling (roughening of concrete surfaces) will not take place. Sand and other aggregates will be stored in bunded areas and not allowed to dry out. Bulk cement and other fine powder materials will be delivered in enclosed tankers and stored in silos with suitable emission control systems to prevent escape of material and overfilling during delivery. For smaller supplies of fine powder materials bags will be sealed after use and stored appropriately to prevent dust.</p>
Construction	Management	Dust Management	<p>Site roads (particularly unpaved) can be significant source of fugitive dust from construction sites; A speed restriction of 20 km/hr will be applied as an effective control measure for dust for on-site vehicles. Water-assisted dust sweeper(s) will be used on the access and local roads, to remove any material tracked out of the site. Dry sweeping of large areas will not take place. Vehicles entering and leaving sites are to be covered to prevent escape of materials during transport. On-site haul routes will be inspected for integrity and necessary repairs carried out to the surface as soon as reasonably practicable. All inspections of haul routes and any subsequent action will be recorded in a site log book. Install hard surfaced haul routes, which are regularly damped down with fixed or mobile sprinkler systems, or mobile water bowsers and regularly cleaned.</p>

			<p>Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable).</p> <p>Ensure there is an adequate area of hard surfaced road between the wheel wash facility and the site exit, wherever site size and layout permits. Access gates to be located at least 10 m from receptors where possible.</p>
Construction	Management	Noise Pollution	<p>The least noisy item in relation to static plant such as compressors and generators should be selected wherever possible.</p> <p>It is required that these units be supplied with manufacturers' propriety acoustic enclosers.</p> <p>Should a particular item of plant already on the site be found to generate high noise levels, the first action should be to identify whether or not said item can be replaced with a quieter alternative.</p>
Construction	Management	Noise Pollution	<p>Referring to the potential noise generating sources for the works under consideration, the following best practice migration measures should be considered;</p> <p>Use of machinery for lifting bulky items, dropping, and loading of materials within work areas should be restricted to normal working hours.</p> <p>Mobile plant items such as dump trucks, excavators and loaders, the installation of an acoustic exhaust and/or maintaining enclosure panels closed during operation can reduce noise levels by up to 1 0dB. Mobile plant should be switched off when not in use and not left idling.</p> <p>For compressors, generators, and pumps, these can be surrounded by acoustic lagging or enclosed within acoustic enclosures providing air ventilation.</p> <p>Demountable enclosures will be used to screen operatives using hand tools and will be moved around site, as necessary.</p> <p>All items of plant will be subject to regular maintenance. Such maintenance can prevent unnecessary increases in plant noise and can serve to prolong the effectiveness of noise control measures.</p> <p>Care will be taken when cleaning augers of piling rigs. Shaking and banging of the auger to loosen earth will be avoided.</p> <p>Use of pneumatic hand tools will be avoided at night-time and fixings should be manually tightened where possible.</p>

			Site compounds will be located in excess of 30m from noise sensitive locations within on-the-ground constraints.
Construction	Management	Noise Pollution	Where required, the use of temporary hoarding or mobile screens will be used to aid in reducing noise levels from potential high levels of construction activity.
Construction	Management	Noise Pollution	A designated environmental liaison officer will be appointed to site during construction works. Noise complaints should be logged and promptly followed up by liaison officer. Where noisy construction is expected to operate outside of normal working hours, the liaison officer will inform nearest noise sensitive locations of the time and expected duration.
Construction	Management	Noise Pollution	Monitoring typical levels of noise and vibration during critical periods and at sensitive locations Construction noise monitoring will be undertaken at critical periods at the nearest noise sensitive locations to the development works to check compliance with the construction noise criterion.
Construction	Management	Noise Pollution	The phasing programme will be arranged to control the amount of disturbance in noise and vibration sensitive areas at times that are considered of greatest sensitivity.
Construction and Operation	Management	Landscape Protection	Where applicable a landscape drawing with notes indicating planting to be used as visual screening; retention of existing hedges/ trees; reconnection to severed hedges or foraging corridors as identified in Chapter 5; required maintenance access; boundary treatment; and architectural features, and signage compatible with the existing environment and the proposed development. Including avoiding or reducing inappropriate lighting. Specification document -includes planting, post planting /maintenance
Construction and Operation	Management	Landscape Protection	Other aspects to be considered as mitigation measures in order to reflect the landscape character for the site and for each sub-area and consider human activity, the built and natural features and/ or processes are as follows; <ul style="list-style-type: none"> - Reducing the impact of hard features within the existing landscape - Orientation of receptor's circulation - Improving access with ramps and steps - Framing views or reinforce through formal planting a gateway

			<ul style="list-style-type: none"> - Creating a sense of place using planting - Considering existing landforms where appropriate, regrading to improve access such as appropriate slopes for ramps - Use of specimen plants as focal points and/or as landmarks. - Use plants as buffers or as screening and/or integrate the harder features proposed - Adjusting site levels and the layout to meet the design requirements while still mitigating impact
Construction and Operation	Management	Landscape Protection	<p>The selection of appropriate hard finishes (i.e., paving, and stone finishes selected to match the palette of materials already in use throughout the historic town centre of Clonmel) and soft materials such as the proposed wildflower planting at the flood barrier berm and new trees at the Northern Bridge plaza will be used as specific visual design solution to reduce the existing hardscape area.</p> <p>Native tree species tolerant to temporary tolerant flooding, the urban environment and compatible with the Floodplain landscape character of this area;(i.e., <i>Alnus glutinosa</i>-Common Alder; <i>Betula pubescens</i> -Down Birch; <i>Salix</i>-Willow spp.); and some non-native species will be included for their low maintenance characteristics, tolerance to flooding and pollinating/birdlife value, and seasonal aesthetic appeal.</p>
Construction and Operation	Management	Landscape Protection	<p>Landscape mitigation measure will include mitigating any impact on the existing trees to be retained as per standard practices during construction to prevent damage to existing trees identified for retention.</p>
Construction and Operation	Management	Landscape Protection	<p>The tree retention drawing indicates Root Protection Area, (RPA), this area around each tree cannot be disturbed or impacted upon during construction.</p> <p>This protection will be achieved by installing a temporary fence that will remain in place for the duration of construction activities, and any traffic (pass between the tree protection areas as indicated by arborist's Drawing No. 072921_TP_02. For further clarity refer to original drawings regarding the location of the trees with protective fencing.</p>
Construction	Management	Landscape Protection	<p>Additional mitigation measures that are not specifically addressing the existing vegetation and/or landscape to protect and/or consider are the following:</p>

			<ul style="list-style-type: none"> - Site lighting will be kept low with Lux levels to meet the minimum requirement to protect the flora and fauna as well as to minimise visual impacts of the site's presence from the town centre outside of working hours, but still provide security for at night-time access and circulation. - Construction of the proposed development will be progressed as a single construction contract with the construction phase potentially lasting approximately 18 months. As much as possible of the bridge elements will be constructed off-site with the site area being used for assembly prior to lifting into position. It is proposed that the construction period start in early summer (May), to ensure that foundations are constructed when the Suir River water-level is at its lowest, which will ensure safe access and minimise flood risk when constructing temporary sheet piling. The visual impacts of these works, including the presence of cranes, will be temporary, and will end with the completion of the works. - Storage areas will be confined to the eastern portion of the existing carpark area on the Island, from where the haul roads will provide access to the northern and southern Island bank locations of the bridge foundations. It is also likely that an area on the northern bank around the proposed plaza location, as well as a strip along the Raheen Road and the southern landing point will be required for site access during the construction period.
Operation	Management	Landscape Protection	<p>Any trees identified as retained that are lost during construction will be replaced with same species in the original location to compensate for loss of existing vegetation.</p> <p>All landscape works will be established in accordance with the detailed plans and specifications provided by the landscape architects, and any breaches or defects in tree protection measures or site hoarding that might occur will be reinstated immediately.</p>
Construction	Protection	Protection of Local Heritage	<p>Archaeological monitoring will take place for any works requiring ground disturbance / excavation, including site preparation works and any ground disturbance works well in advance of development.</p> <p>The archaeologist will have provision to inspect all excavation to natural soil level and to temporarily halt the excavation work, if and as necessary. They will be given provision to ensure the temporary protection of any features of archaeological importance identified. The archaeologist will be</p>

			afforded sufficient time and resources to record and remove any such features identified.
Construction	Protection	Protection of Local Heritage	Archaeological monitoring will be carried out under licence to the Department of Housing Local Government and Heritage (DHLGH) and the National Museum of Ireland (NMI), and will ensure the full recognition of, and the proper excavation and recording of, all archaeological soils, features, finds and deposits which may be disturbed below the ground surface. All archaeological issues will have to be resolved to the satisfaction of the DHLGH and the NMI.
Construction	Protection	Protection of Local Heritage	The enabling works for the piers in the floodplain be archaeologically monitored, as the riverine silts may have deeply buried deposits of archaeological potential.
Construction	Protection	Protection of Local Heritage	Should archaeological material be identified during the monitoring works, the remains will be preserved by record through archaeological excavation and/ or preservation of in-situ. If features associated with the town wall or medieval structural remains survive there may be a requirement for redesign and public display and works to be carried out under Ministerial Consent.
Construction	Protection	Protection of Local Heritage	Archaeological excavation ensures that the removal of any archaeological soils, features, finds and deposits is systematically and accurately recorded, drawn and photographed, providing a paper and digital archive and adding to the archaeological knowledge of a specified area (i.e. preservation by record).
Construction	Management	Continuation of Services	A Traffic Management Plan (TMP) will be compiled by contractor before construction activities commence and will be a stand-alone document forming part of the project Environmental Operating Plan. The TMP will address temporary disruption to traffic lanes, footpath access and the management of pedestrian crossing points. The contractor will provide an appropriate information campaign for the duration of the construction works.
Construction	Management	Continuation of Services	The following mitigation measures will be implemented during the construction phase of the proposed development: - - The Contractor will implement the OC and DWMP throughout the duration of the proposed excavation and construction phases

Construction	Management	Environmental Pollution	<p>The following mitigation measures will be implemented:</p> <ul style="list-style-type: none"> - Building materials will be chosen to ‘design out waste’; - On-site segregation of waste materials will be carried out to increase opportunities for off-site reuse, recycling and recovery. The following waste types, at a minimum, will be segregated: <ul style="list-style-type: none"> - Concrete rubble (including ceramics, tiles and bricks); - Plasterboard; - Metals; - Glass; and - Timber. - Left over materials (e.g. timber off-cuts, broken concrete blocks / bricks) and any suitable construction materials will be re-used on-site, where possible; - All waste materials will be stored in skips or other suitable receptacles in designated areas of the site; - Any hazardous wastes generated (such as chemicals, solvents, glues, fuels, oils) will also be segregated and will be stored in appropriate receptacles (in suitably bunded areas, where required); - A Resource Manager will be appointed by the main Contractor(s) to ensure effective management of waste during the excavation and construction works; - All construction staff will be provided with training regarding the waste management procedures; - All waste leaving site will be reused, recycled or recovered, where possible, to avoid material designated for disposal; - All waste leaving the site will be transported by suitably permitted contractors and taken to suitably registered, permitted or licenced facilities; and <p>All waste leaving the site will be recorded and copies of relevant documentation maintained.</p>
Construction	Management Control		<p>Pre-construction surveys required in advance of the construction phase will include as a minimum:</p> <ul style="list-style-type: none"> • Otter surveys along the River Suir and Suir Island. Surveys to be completed will pay particular attention to identifying the

			<p>presence/absence of otter holts/couches within 150m of piling locations.</p> <ul style="list-style-type: none"> Non-native invasive plant species surveys: An up-to-date non-native invasive plant species survey of the project site and adjacent areas will be completed during the growing season immediately prior to the commencement of construction works. <p>An Invasive Species Management Plan has been prepared for the proposed development and is provided as Appendix 4 to this Natura Impact Statement. During the pre-construction and construction phase the ECoW will be required to supervise the implementation of all measures set out in the Invasive Species Management Plan</p>
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17.3 Monitoring Measures

Table 17-2 and Table 17-3 below sets out a summary the recommended monitoring measures for the proposed development during the construction and operation phases of the project where applicable. Please refer to the relevant sections of the OCEMP and the relevant chapters of the EIAR for further details.

17.3.1 Pre-construction Surveys Outlined in NIS

Table 17-3: Pre-construction Surveys for Monitoring outlined in NIS

Section	Monitoring Measures	Frequency
7.0 A Description & Evaluation of Mitigation Measures for the Project	<p>Pre-construction surveys required in advance of the construction phase will include as a minimum:</p> <ul style="list-style-type: none"> Otter surveys along the River Suir and Suir Island; Non-native invasive plant species surveys 	<ul style="list-style-type: none"> Surveys to be completed will pay particular attention to identifying the presence/absence of otter holts/couches within 150m of piling locations. An up-to-date non-native invasive plant species survey of the project site and adjacent areas will be completed during the growing season immediately prior to the commencement of construction works.

17.3.2 Monitoring Measures Outlined in the NIS

Table 17-4: Monitoring Measures as set out in the NIS

Section	Monitoring Measures	Frequency
5.5.1 Construction Control of Water During Construction	Any minor ingress of groundwater and collected rainfall in the excavation will be pumped out during construction. Extensive monitoring will be adopted to ensure that the water is of sufficient quality to discharge to the foul sewer network and vegetated ground on Suir Island. The use of additional settlement and silt traps and an oil interceptor (if required) will be adopted if the monitoring indicates the requirements for the same with no excess silt or contaminated water permitted to discharge to the sewer	Throughout Construction Phase
5.5.1 Construction	The ECoW will provide monitoring inspection reports during the construction phase and will also provide a close-out report following the completion of the contract construction works.	Throughout Construction Phase and at completion
5.5.2 Operation Lighting	A Central Monitoring System will be installed allowing lights to be monitored remotely and individually controlled.	Throughout the Operation Phase
5.5.2 Operation Habitat Rehabilitation	The monitoring of the four areas of habitat reinstatement in the broad-leaved woodland, riparian woodland, dry meadows and grassy verges and reed and large sedge swamp will be completed by an experience ecologist appointed by Tipperary County Council. The ecologist will assess the reinstatement of the habitats and where growth failure of desired species is identified the ecologist will set out remedial actions with the aim of establishing growth of desired species and habitat enhancement	Ongoing -The monitoring will be undertaken during the growing season, between the months of June and August during years 1, 2, 3, 5 and 7 of

		the operation phase.
5.5.2 Operation Riparian Woodland Habitat Enhancement	As part of the overall management of Suir Island Tipperary County Council will undertake habitat management of the riparian woodland on the island. The overall aim of the woodland habitat enhancement will be the achievement of targets set out for Alluvial woodland habitat attributes outlined in the Lower River Suir SAC site-specific conservation objectives (NPWS, 2017).	Monitoring of the success of the woodland habitat enhancement measures set out above will be undertaken every 5 years.

17.3.3 Monitoring Measures Outlined in the EIAR

Table 17-5: Monitoring Measures as set out in the EIAR

Chapter	Phase	Monitoring Measures	Frequency
5 -Biodiversity	Construction	An Ecological Clerk of Works (ECoW) as well as a Project Landscape Architect will be appointed prior to the commencement of construction. The ECoW will be an ecologist with experience of baseline ecological surveys, pre-construction surveys and construction phase supervision. The ECoW will be responsible for completing pre-construction surveys and supervising construction works.	Throughout Construction Phase
5 -Biodiversity	Construction	The ECoW will provide monitoring inspection reports during the construction phase and will also provide a close-out report following the completion of the contract construction works.	upon completion of development

5 -Biodiversity	Construction	In the event that the contractor requires works to be undertaken outside of the direct land-take of the proposed development footprint they will be done so only following review and approval by the project ECoW and Tipperary County Council.	Case by case basis
5 -Biodiversity	Construction	Should excavation works be required during the nesting bird season and an in-use nest is found in the zone of works the nest will be monitored and works postponed until the nest is no longer in use. If not possible to postpone works an exclusion zone will be implemented.	Case by case basis
5 -Biodiversity	Operation	Ongoing monitoring of habitat reinstatement areas will be completed during the operation phase of the project. The monitoring of the four areas of habitat reinstatement in the broad-leaved woodland, riparian woodland, dry meadows and grassy verges and reed and large sedge swamp will be completed by an experience ecologist appointed by Tipperary County Council.	June-August of years 1,2,3,5 and 7 of the operational phases.
6 - Land, Soils, Geology and Hydrogeology	Construction	Regular inspection of surface water run-off and sediments controls e.g., silt traps will be utilised during the construction phase. Soil sampling to confirm disposal options for excavated soils. Regular inspection of construction/mitigation measures will be undertaken e.g., concrete pouring, refuelling etc.	Regular basis

6 - Land, Soils, Geology and Hydrogeology	Operation	There will be no requirement for groundwater monitoring as there is no discharge to ground or storage of bulk fuels or chemicals	N/A
7 - Hydrology	Construction	The construction of the proposed bridge structures requires the pouring of concrete for permanent structures (piles, piers and abutments) located in the direct vicinity of the Suir River. The operation and management of these activities will be carefully controlled to avoid spillage which will adversely affect the chemical water composition and aquatic habitats of species. As the use of concrete cannot be avoided the (ECoW) will monitor these activities during this phase of work.	Throughout the course of any plant operating close to water sources
8 - Air	Construction	The following measures will be taken in order to avoid dust nuisance occurring under unfavourable meteorological conditions: <ul style="list-style-type: none"> - The principal contractor or equivalent must monitor the contractor's performance to ensure that mitigation measures are implemented; - Name and contact details of a person and head/regional office to contact regarding air quality and dust issues will be displayed on site boundary; - community engagement be undertaken before works commence on site explaining the nature and duration of the works to local residents and businesses; - The development of a complaints register and effective measures to deal with any complaints received. - It is the responsibility of the contractor at all times to demonstrate full compliance with the dust control conditions herein; 	Continuous basis
8 - Air	Construction	Construction phase dust monitoring should be put in place along the site boundary to sensitive receptors to ensure dust mitigation measures are controlling emissions. Dust monitoring should be conducted using the Bergerhoff method in accordance with the requirements of the German Standard VDI 2119. The Bergerhoff Gauge consists of a collecting vessel and a stand with a protecting gauge. The collecting vessel is secured to the stand with the opening of the collecting vessel located approximately 2m above ground level. Results are assessed against the TA Luft limit value of 350 mg/m ² /day during the monitoring period between 28-32 days	Continuous basis
9- Climate	Construction	Prevention of on-site or delivery vehicles from leaving engines idling	Continuous basis

9- Climate	Construction	Ensure all plant and machinery are well maintained and inspected regularly	Continuous basis
9- Climate	Construction	Minimising waste of materials due to poor timing or over ordering on site will aid to minimise the embodied carbon footprint of the site.	Continuous basis
10 - Noise	Construction	Baseline noise monitoring was undertaken at four locations to determine the range of noise levels at locations and noise environments in proximity to the proposed development.	Prior to construction
10 - Noise	Construction	Construction noise monitoring will be undertaken at periodic sample periods at the nearest noise sensitive locations to the development works to check compliance with the construction noise criterion. Noise monitoring should be conducted in accordance with the International Standard ISO 1996: 2017: Acoustics – Description, measurement and assessment of environmental noise.	Periodic intervals
10 - Noise	Construction	where a particularly noisy construction activity is planned or other works with the potential to generate high levels of noise are expected to operate outside of normal working hours etc., the liaison officer will inform the nearest noise sensitive locations of the time and expected duration of the noisy works.	Case by case basis
13 - Material Assets: Resources and Waste Management	Construction	A Resource Manager will be appointed by the main Contractor(s) to ensure effective management of waste during the excavation and construction works	Throughout construction phase
13 - Material Assets: Resources and Waste Management	Construction	All waste leaving the site will be recorded and copies of relevant documentation maintained.	Throughout construction phase
13 - Material Assets: Resources and Waste Management	Operation	All waste materials will be segregated into appropriate categories and will be temporarily stored in appropriate bins, skips or other suitable receptacles in a designated, easily accessible areas of the site.	Throughout operational phase

13 - Material Assets: Resources and Waste Management	Operation	TCC / the operator during the operational phase will be responsible for ensuring – allocating personnel and resources, as needed – the ongoing implementation of waste management of this site in line with the TCC waste management strategy, ensuring a high level of recycling, reuse, and recovery at the site where possible.	Throughout operational phase
13 - Material Assets: Resources and Waste Management	Operation	TCC / the operator will ensure on-site segregation of all waste materials into appropriate categories where possible	Throughout operational phase
13 - Material Assets: Resources and Waste Management	Operation	TCC / the operator will ensure that all waste materials will be stored in colour coded bins or other suitable receptacles in designated, easily accessible locations. Bins will be clearly identified with the approved waste type to ensure there is no cross contamination of waste materials	Throughout operational phase
13 - Material Assets: Resources and Waste Management	Operation	TCC / the operator will ensure that all waste collected from the site of the proposed development will be reused, recycled, or recovered, where possible, with the exception of those waste streams where appropriate facilities are currently not available	Throughout operational phase
13 - Material Assets: Resources and Waste Management	Operation	TCC / the operator will ensure that all waste leaving the Site will be transported by suitable permitted contractors and taken to suitably registered, permitted, or licensed facilities	Throughout operational phase

14 Archaeology	- Construction	Archaeological monitoring will take place of any works requiring ground disturbance / excavation, including site preparation works and any ground disturbance works well in advance of development. The archaeologist will have provision to inspect all excavation to natural soil level and to temporarily halt the excavation work, if and as necessary. They will be given provision to ensure the temporary protection of any features of archaeological importance identified. The archaeologist will be afforded sufficient time and resources to record and remove any such features identified.	Prior to construction of development
14 Archaeology	- Construction	Archaeological monitoring will be carried out under licence to the Department of Housing Local Government and Heritage (DHLGH) and the National Museum of Ireland (NMI), and will ensure the full recognition of, and the proper excavation and recording of, all archaeological soils, features, finds and deposits which may be disturbed below the ground surface. All archaeological issues will have to be resolved to the satisfaction of the DHLGH and the NMI.	Prior to construction of development
14 Archaeology	- Construction	It is recommended that the enabling works for the piers in the floodplain be archaeologically monitored	Prior to construction of development
14 Archaeology	- Construction	Should archaeological material be identified during the monitoring works, the remains will be preserved by record through archaeological excavation and/ or preservation of in-situ	Prior to construction of development
14 Archaeology	- Construction	The Local Authority will make provision to allow for, and to fund, the necessary archaeological monitoring, inspection and excavation works that will be needed on the site during and prior to construction	Prior to construction of development

17.3.4 Monitoring Measures Outlined in the OCEMP

Table 17-6: Monitoring Measures as Set out in the OCEMP

Section	Phase	Monitoring Measures	Frequency
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3.4.3 - Employer's Ecological Clerk of Works	Construction	The Employer's Ecological Clerk of Works (ECoW) appointed by Tipperary County Council will be responsible for monitoring compliance with the OCEMP and other relevant regulations	Throughout construction period
3.4.5 - Site Environmental Manager	Construction	The main duties and responsibilities of the SEM include and is not limited Responsible for reviewing all environmental monitoring data and ensuring that they all comply with stated guidelines and requirements and any Approval	Throughout construction period
4.3.1 - Monitoring	Construction	Mitigation and monitoring will be carried out in accordance with the requirements of the EIAR and NIS and in any Approval .	Prior to and during construction
4.3.1 - Monitoring	Construction	Suitable monitoring programmes will need to be developed, implemented, documented, and assessed (with potential follow up) in accordance with the specification outlined in the detailed OCEMP(s) and any Approval	Prior to and during construction
4.3.1 - Monitoring	Construction	The results of all environmental monitoring activities would be reviewed by the Environmental Manager on an ongoing basis to enable trends or exceedance of criteria to be identified and corrective actions to be implemented as necessary. The contractor will be required to inform the Employer's Representative of any continuous exceedances of criteria.	Prior to and during construction

4.3.2 - Inspections	Construction	Each month one of the weekly inspections will include a review of environmental documentation and records. The monthly inspection will be recorded on a standard form and reported to the Employers Representative within five days of the inspection taking place. This standard form will address Results of the monitoring programme	Throughout construction period
4.4.2 - Corrective Action Reports	Construction	A Corrective Actions Report is prepared on foot of any non-conformances identified during environmental monitoring	Throughout construction period
4.6 - Environmental Records	Construction	The Contractor will maintain records of all environmental documentation including monitoring, test results, method statements	Throughout construction period
6.4- Noise and vibration	Construction	During construction, regular inspections will be undertaken to ensure that the noise and vibration minimising methods, plant and mitigation identified in the specimen design stage are adopted on site and are working effectively. If applicable, it is proposed that construction method inspections be integrated into any health and safety or quality surveillance regime.	Throughout construction period
6.4- Noise and vibration	Construction	Noise monitoring should be undertaken at the start of each new activity to determine the compliance with limit values. This may involve monitoring on a daily basis initially (for the first three weeks), but subject to satisfactory results, this could be relaxed to once a week/twice-weekly depending upon the site activities. The frequency will be increased again if particularly noisy activities (piling) are undertaken	Throughout construction period
6.4- Noise and vibration	Construction	Continuous noise and vibration monitoring will take place at three of the nearest sensitive receptors Environmental noise monitoring will be undertaken only by suitably-trained and experienced staff	Throughout construction period
6.6 - 6.6 Archaeology, Architecture and Cultural Heritage	Construction	The contractor will monitor excavation continuously throughout the construction duration in the interests of Archaeology, Architecture and Cultural Heritage.	Throughout construction period
6.7 - Hydrology and Water Quality	Construction	To avoid excessive silt runoff weather forecasts will be monitored to ensure site clearance is not to undertaken during wet conditions	Throughout construction period
6.7 - Hydrology and Water Quality	Construction	All vehicles will be regularly checked for oil leaks and ruptured hose pipes.	Throughout construction period

6.8 - Land and Soils	Construction	Soil sampling will be carried out to ensure historic contamination of the soil has not occurred.	Prior construction period to
6.9 - Resource and Waste Management	Construction	Record keeping procedures	Throughout construction period
6.9 - Resource and Waste Management	Construction	Waste collectors, recycling and disposal sites including copies of relevant permits or licences; and Waste auditing protocols.	Throughout construction period
6.9 - Resource and Waste Management	Construction	Waste Auditing: The contractor will record the quantity in tonnes and types of waste and materials leaving site during the construction phase	Throughout construction period
6.10 - Population and Human Health	Construction	Maintain regular proactive consultation with local residents and businesses	Throughout construction period

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