

Chapter 11:

Material Assets

11 MATERIAL ASSETS

Material assets are generally considered to be the physical resources in the environment, which may be of human or natural origin. This chapter details the impact of the proposed Lower Lee (Cork City) Drainage Scheme on these resources, namely transport infrastructure, subterranean infrastructure, management of waste, access to river/land and land use.

This impact assessment is based on a desk study, with details of major utilities taken from information supplied by Cork City Council, Cork County Council, Arup (Scheme Designers) and the service providers. The road network was identified using Ordnance Survey Ireland (OSi) discovery series mapping along with an examination of aerial photography.

A number of documents were consulted in the preparation of this assessment, as follows;

- (i) Cork City Development Plan, 2015 – 2021
- (ii) Cork County Development Plan, 2014
- (iii) Cork City Waste Management Plan, 2004
- (iv) Cork County Council, Waste Management Plan, 2004
- (v) EPA, Guidelines on the information to be contained in Environmental Impact Statements

11.1 RECEIVING ENVIRONMENT

The Lower Lee (Cork City) Drainage Scheme, described in Chapter 3, comprises mainly of works to and in the vicinity of the River Lee from the Inniscarra Dam extending along the main channel of the river. As such, potential impacts to material assets are restricted to these areas. The proposed scheme will have potential to impact on the following:

- Transport Infrastructure;
- Drainage Network;
- Water Distribution Network;
- Bord Gáis Distribution Network;
- Electricity Network;
- Broadband Network;
- Telecommunications Network;
- Access to lands;
- Land Use.

11.2 TRANSPORT INFRASTRUCTURE

Road Infrastructure

Road and transportation infrastructure in the Lower Lee (Cork City) Flood Relief Scheme study area comprises extensive road and rail infrastructure, as detailed below.

The primary access routes to the Study Area and the urban centres of Ballincollig and Cork City are:

- the N8/M8 National Primary Route from Dublin,
- the N20 National Primary Route from Limerick, which crosses the Bride (north) River just before it meets a tributary, the Glennamought River. The road runs parallel to the Bride (north) to Blackpool, where the river is culverted down to the Lee.
- the N22 National Primary Route from West Cork/Killarney, crosses the Bride (west) River to the west of Ballincollig, then runs south of Ballincollig (Ballincollig bypass). The N22 meets the N40 National Primary Route (Cork South Ring Road), runs north to the south banks of the Lee, then east into Cork City.
- the N25 National Primary Route from Waterford,
- the N27 National Primary Route from Cork Airport,
- the N28 National Primary Route from Ringaskiddy, and,
- the N71 National Secondary Route from Clonakilty/Bandon.

Regional roads within the study area include the following:

- R579 Regional Road which follows the route of the Shournagh River north of the Lee from the Muskerry Golf Club to Carrigrohane, east of Ballincollig. From this point the R579 joins the R618 Regional Road which crosses over the Lee River, and subsequently joins the N22 National Primary Route, south of the Lee.
- R635 (Cork North Ring Road) which follows the route of and crosses over the Glen River, a tributary of the Bride (north) River, south of Ballyvolane. The R635 also crosses over the Ballincolly River south of Ballyvolane.

All roads in the Study Area are maintained by Cork City and County Council; however, any modifications to National Primary and Secondary Roads will require consultation with the Transport Infrastructure Ireland (TII). Available Traffic Counts for the N22, N27 and N28 National Primary Routes around Cork City were assessed in Chapter 12. This chapter examines the impacts to road infrastructure as a material asset.

Railway Infrastructure

The main Dublin-Cork rail line runs through the Lower Lee (Cork City) Flood Relief Scheme study area from where it crosses the River Bride (North) at a high level via a stone arch viaduct at Murphy's Rock on the Old Mallow Road. After approximately 800m the rail line enters a tunnel at the North Ring Road (Regional Road R635) and exits under the Lower Glanmire Road (National Primary Route N8), just before the main train station for Cork City (Kent Station).

The Cork-Cobh train line also runs through a portion of the study area. The line runs in an easterly direction from Kent Station, crossing over and running parallel to the Lower Glanmire Road (National Primary Route N8).

Bridges

Within Cork City Centre there are twelve bridges on the northern channel of the River Lee including six pedestrian bridges (including the proposed footbridge adjacent to penstock) and 18 bridges on the southern channel including six pedestrian bridges. These form part of the transport infrastructure through the city. Table 11.1 shows bridges crossing the River Lee within the study area, proposed impacts and regional or national routes impacted.

Table 11.1 Bridges, proposed impacts and impacted road infrastructure – North Channel/Main channel

Bridge	Chainage	Impact	Regional or National Road Impacted
North Channel			
Michael Collins Bridge	C01 1900	Bridge decking raised at south bank.	N27
Brian Boru Bridge	C01 2050	Bridge to be modified to incorporate upstand along bridge footpath (demountable flood gates to be deployed during flood events).	N8
St Patrick's Bridge	C01 2375	None	N8
Christy Ring Bridge	C01 2525	Parapet to be modified.	N20
Shandon Bridge - Pedestrian	C01 2775	None	
Griffith Bridge	C01 3025	Parapet to be modified.	R846-R847
St Vincent's Bridge - Pedestrian	C01 3330	Ground levels to be raised at and south bank (demountable flood gates to be deployed during flood events).	
Alderman Reilly's Bridge - Pedestrian	C01 3350	Penstock to be placed upstream. Upgrade masonry arch for potential uplift if required.	
Mardyke Bridge - Pedestrian	C01 3990	None	
Unnamed – Pedestrian (Mill Race)	C01 3990	Proposed RC footbridge to provide access to proposed penstock.	
Daly's Bridge - Pedestrian	C01 4600	None	
Thomas Davis Bridge	C01 5025	None	R846
Main Channel			
Bannow Bridge	C01 9800	None	

Table 11.2 Bridges, proposed impacts and impacted road infrastructure – South Channel

Bridge	Chainage	Impact	Regional or National Road Impacted
Eamon de Valera Bridge	C02 125	Bridge decking raised at north bank.	N27
Clontarf Bridge	C02 250	Bridge to be modified to incorporate upstand along bridge footpath (demountable flood gates to be deployed during flood events).	R610
Parnell Bridge	C02 375	None	R610
Trinity Bridge - Pedestrian	C02 700	Ground levels to be raised at north and south banks (demountable flood gates to be deployed during flood events).	
Parliament Bridge	C02 950	None	R610
Nano Nagle Bridge - Pedestrian	C02 1100	None	
South Gate Bridge	C02 1200	None	R608
Clarke's Bridge	C02 1500	None	R608
St Finbarre's Bridge	C02 1725	Parapet modifications at north bank.	R608
Lancaster Bridge	C02 1800	Parapet modifications at north bank.	
The River Lee Hotel Bridge	C02 1920	Parapet modifications at north bank.	
Donovan's Bridge	C02 2250	None	
Bridge UCC - Pedestrian	C02 2300	None	
Gaol Bridge	C02 2725	None	
Unnamed - Pedestrian	C02 2875	None	
Unnamed - Pedestrian	C02 2925	None	
O'Neill Crowley Bridge	C02 3325	None	N22
Unnamed- Pedestrian	C02 3540	Existing modern footbridge to be replaced with a vehicular bridge.	

Potential Temporary Significant Impact

The majority of the proposed works for the Lower Lee (Cork City) Drainage Scheme are contained within the city centre. The proposed works are located in the vicinity of the river and comprise the following as detailed in Chapter 3:

- Installation of sheet piles;
- Construction of new culverts,
- Replacement of an existing pedestrian bridge and construction of flow control structure in South Channel,
- Construction of new flood walls/ earthen embankments,
- Constructing/modifying bridge parapets/steel reinforcement on four bridges,

- Modifications to the existing foul and surface water collection networks in the vicinity of the proposed works in order to prevent flooding,
- Localised regrading of ground levels to facilitate pedestrian/ vehicular access around flood defences,
- Regular maintenance of the river channel and pumping stations.

Detailed site investigation will also be required at the location of all proposed works. These proposed works are detailed in the scheme drawings in Appendix 3A.

The Lower Lee (Cork City) Drainage Scheme, as described above and detailed in Chapter 3, is mainly concerned with works to and in the vicinity of the River Lee. The potential impacts of the Lower Lee (Cork City) Drainage Scheme on the road network are as follows:

- Temporary impact during construction due to the replacement of parapets at four bridges (three on north channel and one on the south channel);
- Temporary impact during construction due to the regrading of road and pedestrian pavements to achieve crest at flood defence level at the following locations: Wood Road, Desmond Villa, Lee Road, East of Kingsley Hotel, Grenville Place to Bachelors Walk, North Mall, Horgan's Quay, Custom House Street, Victoria Road, Lapps Quay, Terence MacSweeney Quay, Father Mathew Quay, Morrison's Quay and to the south of proposed replacement bridge on South Channel.
- Temporary impact during construction due to the resealing and grouting, installation of new steel railings, and reinforcing flood defences of surcharged culverts at North City Link Road, Proby's Quay and Wandersford Quay.
- Temporary impact during construction due to the slight realignment River Lee adjacent to Mercy Hospital.

The proposed replacement of the parapets will result in a temporary negative impact during the construction phase of the drainage scheme as it will be necessary to limit vehicular and pedestrian access across the river. Access will be fully restored on construction of the works and will result in a permanent slightly positive impact following the construction phase of the drainage scheme. Chapter 12 details further the impact of construction on access.

The proposed sealing and grouting of the existing culvert north of Christy Ring Bridge will have a temporary negative impact due to temporary restriction of access to Christy Ring Bridge. Access will be reinstated over the culvert following completion of the works.

Mitigation Measures

The construction of the pedestrian bridge and parapet replacement will be carried out by a suitably qualified and experienced contractor who will be supervised to ensure that the works are carried out correctly. This will ensure that the bridge will be constructed safely and ensure the structural integrity of the structure.

Sealing and grouting of the surcharged culverts at North City Link Road, Proby's Quay and Wandersford Quay will be carried out in consultation with the Local Authority, and will also follow the Department of Transport, Tourism and Sport published document entitled 'Guidelines for Managing Openings in Public

Roads'. These works will be designed and supervised by a suitably qualified and experience professional to ensure they are carried out correctly.

Residual Impacts - Imperceptible Impact

Taking into account the abovementioned mitigation measures, the residual impact of the proposed scheme on the transport infrastructure will be imperceptible.

11.3 POTENTIAL IMPACTS ON SERVICES AND PROPOSED MITIGATION MEASURES

The majority of proposed works pertaining to the Lower Lee (Cork City) Drainage Scheme, described in detail in Chapter 3, are located in or in the vicinity of the River Lee. This section will explore the potential impact the scheme could have on existing services, and propose necessary mitigation measures.

Detailed Site Investigation will also be carried out in the vicinity of all proposed works. These works have the potential to impact existing services however standard industry methodologies will mitigate this impact. As such, the detailed site investigation has not been assessed in the individual sections below.

11.3.1 Potential Impacts on Drainage Network

Potential Temporary Significant Impact

Waste Water infrastructure in the Study Area consists of Waste Water Treatment Plant, Sewerage Collection Networks (including pumping stations) and varied domestic treatment systems. Ballincollig is the only sewerage scheme, which incorporates a Waste Water Treatment Plant (WWTPs) within the Study Area; there are a further two sewerage schemes immediately upstream of the study area, at Killumney (A0435-01) and upstream of Inniscarra Reservoir at Coachford (D0427-01). Cork City sewerage scheme discharges to the Carrigrenan WWTP (D0033-01) at Little Island, outside of the study area. Carrigrenan WWTP discharges to Lough Mahon to the east of the study area.

The proposed scheme has potential to have a significant impact on the crossings of the River Lee. In the absence of mitigation measures, these pipes may be exposed or damaged during excavation works. This would lead to pollution of the River Lee and disruption of the wastewater collection system. In addition, there is an existing pumping station at chainage C01 4800 which must provide continued service.

A large storm culvert located at Patricks Street will likely be encountered during works near the top of Patrick's Quay. There is also a large drainage main along Albert Quay East which be encountered during construction works. The design of appropriate mitigation measures will form part of the detailed design.

Mitigation Measures

Prior to tendering the Contract, the Employer's Representative (Consultant Engineer) will assess the drainage network drawings and the detailed site investigation reports in order to determine the approximate location of the drainage network within the works area. The locations of the drainage network pipework relative to the proposed works will be confirmed as part of the Design Phase. Should it be anticipated that the excavation for the proposed works will impact on this pipework, this will be taken into consideration at detailed design stage and any necessary or unavoidable diversions will be designed, planned and agreed with Irish Water and Cork City and County Councils in advance of the construction phase. Planned diversions will be included in the works requirements or carried out in advance as appropriate.

Prior to excavation, the Contractor will assess record drawings and the results of the Site Investigation Contract. The Contractor will carry out additional site investigation to confirm the location of the existing pipework. This will further reduce the risk of striking the drainage network and causing interruption to the system during the construction phase.

Residual Impact – Neutral Impact

Taking into account the abovementioned mitigation measures the residual impact of the proposed scheme on the wastewater collection network and treatment process will be imperceptible.

11.3.2 Potential Impact to the Water Distribution Network

Potential Temporary Moderate Impact

The proposed scheme will potentially impact the water distribution network in the locations adjacent to work areas. Watermains may be encountered during excavation works for the proposed flood defence walls, pumping stations, embankments and culverts. It is possible that watermains could be damaged during the construction phase, resulting in distribution to the potable water supply in the area. The impacts are predicted to be moderate and temporary.

Mitigation Measures

The Employer's Representative (Consultant Engineer) will assess the water distribution drawing and detailed site investigation in order to determine the approximate location of watermains relative to the proposed works as part of the Design Phase. Any anticipated clashes between the water distribution network and the proposed works will be identified during the design phase and any necessary or unavoidable diversions will be designed, planned and agreed with Irish Water in advance of the construction phase of the Scheme.

The Contractor will be supplied with record service drawings and the results of the Site Investigation prior to excavation in order to determine the location of existing watermains within the works area. The Contractor will carry out additional site investigation in order to confirm the location of the watermains. This will further reduce the risk of striking the watermains and causing unscheduled interruption to the potable water supply in the area.

Residual Impact - Neutral Impact

Taking into account the abovementioned mitigation measures, no residual impact to the watermains following the construction phase is predicted.

11.3.3 Potential Impact to the Gas Network

Potential Temporary Moderate Impact

There is an extensive gas distribution network throughout Cork City which intersects or lies in close proximity to the proposed scheme. It is possible that this gas main could be damaged during the construction phase, affecting the supply to properties in the area and potentially causing a fire or explosion. Bord Gáis were consulted as part of preparing this EIS chapter and based on preliminary information provided there are no high pressure transmission mains (7 to 85bar) in the study area. There

are low and medium pressure distribution pipelines (up to 7bar) present, however, the risks associated with working in close proximity to these pipelines are significantly lower.

The impacts described above are predicted to be temporary and significant.

Mitigation Measures

The locations of the gas pipelines relative to the proposed works will be confirmed as part of the Design Phase. The Employer's Representative (Consultant Engineer) will assess the gas network drawings and result of the detailed site investigation in order to determine the approximate location of the existing gas pipelines within the works area. Should it be anticipated that the excavation for the proposed works will impact on this pipework, this will be taken into consideration at detailed design stage and any necessary or unavoidable diversions will be designed, planned and agreed with Bord Gáis in advance of the construction phase. Planned diversions will be included in the works requirements or carried out in advance as appropriate. The Contractor will be supplied with the site investigation report and record drawings of the gas distribution network. Prior to excavation the Contractor will carry out additional site investigation, including slit trenches, in order to determine the exact location of the gas pipelines in close proximity to the works area. This will ensure that the gas distribution network will not be damaged during the construction phase.

Residual Impact - Neutral Impact

Taking into account the abovementioned mitigation measures, there will be no residual impact to the gas mains following the construction phase.

11.3.4 Potential Impact to Electricity Network

Potential Temporary Moderate Impact

Electricity cable laid in close proximity to the location of the proposed culverts and flood defence walls and embankments has the potential to be damaged during excavation works. This would result in a loss of power in the area. The striking of an underground electricity cable during construction operations could potentially result in serious injury or death of site staff.

The potential impact to the electricity infrastructure as a result of the construction of the proposed works is predicted to be temporary and significant. There are major high voltage ESB lines running through Union Quay and Fr Matthew Quay. There will be an issue during Morrison Island works and will require careful coordination between contractors and the ESB to avoid impacts. These lines cannot be decommissioned or temporarily shut down.

Mitigation Measures

The locations of the electricity network relative to the proposed works will be confirmed as part of the Design Phase. The Employer's Representative (Consultant Engineer) will assess the service drawings and results of the detailed site investigation in order to determine the approximate location of the existing electricity cables within the works area. Should it be anticipated that the excavation for the proposed works will impact on the electricity network, this will be taken into consideration at detailed design stage and any necessary or unavoidable diversions will be designed, planned and agreed with the ESB in advance of the construction phase. Planned diversions will be include in the works requirements or carried out in advance as appropriate.

The Contractor will be supplied with the site investigation report and record drawings of the electricity network. Prior to excavation the Contractor will carry out additional site investigation, including slit trenches, in order to determine the exact location of the electricity network in close proximity to the works area. This will ensure that the underground electricity network will not be damaged during the construction phase.

The Contractor will be supplied with the information obtained in the slit trenches and the electrical cable locations will be marked prior to excavation in the area. The Contractor will carry out additional site investigation to determine the exact location of the electrical cables in the vicinity of the proposed works. This will further reduce the risk of striking the cables and causing damage during the construction phase.

It is considered that any likely impacts to or from the overhead cables will be mitigated by applying standard construction practices. The Contractor must adhere to the ESB Code of Practice for Avoiding Danger from Overhead Electricity Lines, 2008 and the HSA Code of Practice for Avoiding Danger from Underground Services, 2010.

Residual Impact - Neutral Impact

Taking into account the abovementioned mitigation measures there will be no residual impact to the electrical infrastructure following the construction phase.

11.3.5 Potential Impact to Broadband Network

Potential Temporary Slight Impact

Broadband cables laid in close proximity to the location of the proposed culverts and flood defence walls and embankments has the potential to be damaged during excavation works. This would result in the loss of service in the area. The potential impacts are considered to be slight and temporary.

Mitigation Measures

Prior to tendering Contract, the Employer's Representative (Consultant Engineer) will assess the broadband network drawings and the detailed site investigation reports in order to determine the approximate location of the broadband network within the works area. The locations of the drainage network pipework relative to the proposed works will be confirmed as part of the Design Phase. Should it be anticipated that the excavation for the proposed works will impact on this pipework, this will be taken into consideration at detailed design stage and any necessary or unavoidable diversions will be designed, planned and agreed with the service provider in advance of the construction phase. Planned diversions will be included in the works requirements or carried out in advance as appropriate.

The Contractor will be supplied with the information obtained in the slit trenches and the electrical cable locations will be marked prior to excavation in the area. The Contractor will carry out additional site investigation to determine the exact location of the broadband cables in the vicinity of the proposed works. This will further reduce the risk of striking the cables and causing damage during the construction phase.

Residual Impact - Neutral Impact

Taking into account the abovementioned mitigation measures there will be no residual impact to the broadband infrastructure following the construction phase.

11.3.6 Potential Impact to Telecommunications Network

Potential Temporary Slight Impact

Works are proposed at the locations where telecommunication cables are present both above and below ground. Should these cables clash with the works they could become damaged during construction phase.

The potential impacts are considered to be temporary and moderate.

Mitigation Measures

Prior to tendering Contract, the Employer's Representative (Consultant Engineer) will assess the telecommunications network drawings and the detailed site investigation reports in order to determine the approximate location of the existing network within the works area. The locations of the telecommunications cable locations relative to the proposed works will be confirmed as part of the Design Phase. Should it be anticipated that the excavation for the proposed works will impact on this cabling, this will be taken into consideration at detailed design stage and any necessary or unavoidable diversions will be made, planned and agreed with the service provider in advance of the construction phase. In the case of the proposed flood defence walls where the cables potentially run along the proposed wall route, these cables will have to be taken into consideration at detailed design stage. Planned diversions will be included in the works requirements or carried out in advance as appropriate.

The Contractor will be supplied with the information obtained in the slit trenches and the telecommunication cable locations. Prior to excavation the Contractor will carry out additional site investigation in order to determine the exact location of any underground telecommunications cables. This will further reduce the risk of striking the cables and causing damage during the construction phase.

It is considered that any likely impacts to the overhead cables will be mitigated by applying standard construction practices.

Residual Impact - Neutral Impact

Taking into account the abovementioned mitigation measures there will be no residual impact to the telecommunications infrastructure following the construction phase.

11.4 WASTE MANAGEMENT DURING CONSTRUCTION

It is anticipated that the Lower Lee (Cork City) Drainage Scheme will produce a significant volume of waste material during the construction phase. Through an extensive document review combined with information received from the scheme designers this section will examine the potential impacts associated with this waste and any mitigation measures required.

11.4.1 Background Information

'Best Practice Guidelines for the Preparation of Waste Management Plans for Construction and Demolition Projects (2006)' were published by the DoEHLG. These Guidelines outline the issues that need to be addressed at the pre-planning stage of a development all the way through to its completion.

Best Practice Guidelines sets thresholds to ascertain which projects require the preparation of C&D plans. The proposed development, exceeds the following threshold and therefore requires a C&D Waste Management Plan;

- Civil Engineering projects producing in excess of 500m³ of waste, excluding waste materials used for development works on the site.

As outlined in Chapter 6, excavated material will be reused on site as much as practicable. Where this is not possible, the recycling rates for the C&D waste produced throughout the construction of the Lower Lee (Cork City) Drainage Scheme should be maintained at or above 85%, if possible, as outlined in the Waste Management (Planning) Regulations 1997.

11.4.2 Classification Of Waste

Excavation for flood defence foundations, pipe trenches and culverts will give rise to a volume of material during the construction phase of the proposed scheme. The excavated material will be reused where possible, however as much as 77,700 m³ will have to be exported from the site.

The European Waste Codes (EWC) for typical waste materials that may possibly be generated during the construction phase are outlined in Table 11.3.

Table 11.3 Applicable European Waste Codes

Waste Material	EWC
Soil, stones and dredged spoil	17 05
Bituminous mixtures, coal tar and tarred products	17 03
Concrete, Bricks, Tiles and Ceramics	17 01
Metals (including their alloys)	17 04
Waste Hydraulic Oils*	13 01
Wastes of Liquid Fuels*	13 07
* Denotes Hazardous Materials	

A breakdown of the estimated volumes of waste, origin of waste, and European Waste Codes are shown on Table 11.4.

Table 11.4 Estimated C&D Waste resulting from the proposed scheme

Origin of Waste	EWC	Estimated Volume of Waste
Wall Foundations	17 05/17 03	25,000m ³
Culverts	17 05/17 03	1,000m ³
Embankment Foundations	17 05/17 03	30,000m ³
Pipe Trenches	17 05/17 03	20,000m ³
Miscellaneous	17 05/ 17 04/17 03/17 01/ 13 01/ 13 07	1,500m ³
Total		77,500m³

11.4.3 Potential Impact during Construction Phase

Potential Temporary Moderate Impact

Poor management of excavated waste could lead to the disposal of waste deemed unsuitable for reuse or recycling in facilities that do not carry the appropriate licenses.

In addition, if waste is not managed and stored correctly on site, it has the potential to cause nuisance and environmental impact. Litter may be generated from packaging taken from materials, mixed waste produced by the construction workers (lunches, cigarette waste etc.), or from debris from leftover/damaged construction materials. Poor management of waste may also result in water and ground pollution on the site or adjacent to the site.

Fuels and hydraulic oils/lubricants that will be used during the construction phase are classed as hazardous. There will be fuels stored on site for machinery and construction vehicles along with oils and lubricants. Should any spillages, waste or surplus liquids be disposed of incorrectly it could cause serious harm to the surrounding environment.

The potential impacts of construction and demolition waste on the environment are predicted to be short term and moderate.

Mitigation Measures

All current and applicable waste management legislation will be applied and adhered to. Contractors that are engaged in the transport of waste off-site will comply with the provisions of the Waste Management Act (1996) (as amended), associated Regulations and the Waste Management Plan prepared in accordance with 'Best Practice Guidelines for the Preparation of Waste Management Plans for Construction and Demolition Projects (2006)'. As such, the Contractor must handle, transport and dispose of waste in a manner that ensures that no adverse environmental impacts occur as a result of any of these activities. A collection permit to transport waste must be held by the relevant contractor which has been issued by the Local Authority where the waste has been generated i.e Cork City Council and Cork County Council.

Waste receiving facilities must also be appropriately licensed or permitted for the waste being received. Operators of such facilities cannot receive any waste, unless in possession of a waste permit granted by the Local Authority under the 'Waste Management (Facility Permit & Registration) Regulations 2007' (as amended) or a waste license granted by the EPA. The permit/license held will specify the type and quantity of waste able to be received, stored, sorted, recycled and/or disposed of at the specific site. It has been confirmed that there are appropriate facilities in the area available to receive and process waste material.

The construction compound for the proposed scheme should have a dedicated Waste Storage Area (WSA) for any construction waste generated. Receptacles/skips or bays will be provided for each recyclable material. Dedicated waste bins should also be provided on any water going vessel/platform to prevent litter from contaminating the River.

Bedrock, Block and Concrete

It is reasonable to assume that gravels and bedrock may be encountered during the excavation of foundations, culverts and pipe trenches. Any material which is not reused will be separated out and sent to the appropriate recycling facility or waste facility if deemed unsuitable for recycling.

During construction of flood defence walls and works to bridges and culverts it is reasonable to assume that there will be some waste concrete and blocks generated. This waste will be adequately contained and stored within the WSA of the construction compound. It will then be disposed of to a permitted or licensed facility.

Soil/Subsoil

Soils generated from excavations carried out throughout the scheme will be stored separately from the gravels and bedrock and will be transported to an appropriately licensed facility by permitted contractors. It is not considered likely that these materials will be hazardous, but should a portion of it be deemed to be contaminated they will be stored separately to the inert material. Samples will be taken and tested in order to appropriately classify the material as non-hazardous or hazardous to establish the criteria for the acceptance of waste at landfills. They will then be transported to an appropriately licensed facility by permitted contractors.

Scrap Metal

Reinforced concrete is likely to be used as part of the construction of the flood defence walls, bridge and flow control structure. As such it is reasonable to assume that a small amount of scrap metal will be generated.

Scrap metal is highly recyclable and as such it will be segregated from other waste and recycled accordingly.

Timber

A small amount of timber waste may also be generated as a result of hoarding around works areas, or from shuttering for in-situ concrete pours. It is likely that this timber can be reused for a number of different functions throughout the construction phase however a small amount of waste will be generated, and the timber as a whole could be disposed of as the construction phase comes to a close.

Timber that is uncontaminated, i.e. free from paints, preservatives, glues etc, will all be recycled. Should any timber be deemed to be contaminated it will be collected by an appropriately permitted specialist contractor and disposed of in an appropriately licensed facility.

Hazardous Materials

If hazardous materials are used/encountered on site, i.e. timber with paint, asbestos concrete pipes, a specialist contractor will be employed to carry out an environmental clean-up to remove all traces of contaminated material from the site. The specialist contractor will be licensed under the 'Waste Management (Collection Permit) Regulations, 2007' (as amended). This will be disposed of at an appropriately licensed facility.

In order to avoid any hazardous materials infiltrating the ground water during construction and operation phase there will be a bunded area constructed within the site compound with sufficient volume to contain any spills. All plant refuelling, maintenance or washing will be carried out within the bunded area. Spill kits will also be available at this area to facilitate the quick and effective cleaning of any substances.

Documentation

Waste will be weighed, either by weighing mechanism on the truck or at the receiving facility, and these records will be kept by the contractor (both hard and soft copies). A copy of all waste collection permits, for all waste contractors will be kept by the Waste Manager, working on behalf of the Contractor, on site.

If the waste is being transported to another site, a copy of the waste permit or EPA Waste License for that site must be provided and kept by the Waste Manager. If the waste is being shipped abroad, a copy of the Transfrontier Shipping (TFS) document must be obtained from Dublin City Council (as the relevant authority on behalf of all local authorities in Ireland) and kept on site along with details of the final destination (permits, licenses etc). A receipt from the final destination of the material will be kept as part of the on-site waste management records.

All information will be entered into the waste management system to be maintained on site.

Residual Impacts – Neutral Impact

Taking into account the abovementioned mitigation measures the residual impact of the construction phase will be imperceptible.

11.4.4 Potential impact during the Operational Phase

Potential Temporary Slight Impact

The operational phase of the proposed scheme is unlikely to produce any waste of significant volume. Periodic maintenance of flood defences, pumping stations and trash screen will be carried out which could generate very small volumes of litter, packaging, concrete, scrap metal, bitumen products or soils that if not disposed of correctly could adversely affect the local environment.

Mitigation Measures

For maintenance and repair work, all maintenance teams involved will take all waste generated on site back to their compounds to be placed in appropriate waste streams designated for recycling, reuse or disposal. No waste will be left at the site of the repair or maintenance.

Residual Impacts – Neutral Impact

Taking into account the abovementioned mitigation measures the residual impact of the operational phase will be imperceptible.

11.5 ACCESS TO LAND

Potential Moderate Impact

As the majority of flood defences are adjacent to the River Lee or existing roads there is minimum land severance occurring as a result of the Lower Lee (Cork City) Drainage Scheme.

Within Cork City there are a number of locations where access to Quays have be extinguished. In addition there are several instances where flood embankments have resulted in impeded access to the River Lee:

- Western entrance to Lee Fields and the slipway at the eastern entrance to Lee Fields
- Ferry Park
- Fitzgerald's Park

Mitigation Measures

An iterative process was undertaken whereby the designers selected accesses which they considered may be extinguished. The City Council then reviewed these and confirmed or commented on any areas with which they disagreed. In general, these access points were those which were already fenced and where there was more than one access point per quay.

Residual Impacts – Neutral Impact

Taking into account the abovementioned mitigation measures the residual impact of the operational phase will be slight permanent.

11.6 LAND USE

11.6.1 Residential and Commercial land Use

Potential Temporary Impacts

As the majority of flood defences are adjacent to the river there is minimum impact on land owners occurring as a result of the Lower Lee (Cork City) Drainage Scheme.

There are a number of areas along the scheme where there will be a predicted impact on material assets due to construction activities. The majority of this will consist of installation of sheetpiles and construction of reinforced flood walls/embankments. The residents will experience some disturbance during construction phase but this is anticipated to be a temporary impact and as the contractor is obliged to work within a stringent set of construction limits and guidelines it is predicted that the overall impact will not be significant. Where works impede natural drainage temporary measures will be taken to allow waters to drain to less critical areas and so minimise the impact.

The proposed drainage scheme will result in a reduced risk of flooding which will have a positive impact on protected residential and commercial properties.

Mitigation Measures

Good communication between the contractor and the landowners in advance of and during the construction phase will prevent undue disturbance due to noise, dust and to minimise difficulties caused by the restriction of access to properties.

Residual Impact – Significant Positive Impact

Taking into account the abovementioned mitigation measures and the benefit of the scheme to the commercial heart of the Cork City, the residual impact will be significant permanent positive.

11.6.2 Agricultural land Use

Potential Moderate Impact

The main impacts on agricultural activity during the construction phase of the scheme will consist of:

- Construction noise;
- Dust;
- Restricted access to severed land parcels;

- Disturbance of field drainage works;
- Disturbance of services.

It is expected that impacts during the construction phase will be slight impacts as the proposed embankments are generally adjacent to field boundaries.

The main impacts on agricultural lands during the operation phase of the scheme will consist of reduced use of land due to increased frequency of flooding in washlands. The lands affected lie within the existing floodplains of the River Lee along the river bank between the Inishcarra Dam and the western outskirts of Cork City, as shown on the Washlands Drawings in Appendix 3A.

As noted in Chapter 3, these lands will be designated as washlands. In creating washlands by pre-emptive advance spilling of water from the reservoirs at higher rates, 'artificial' or 'early' flooding of existing floodplains will occur. This will predominantly affect agricultural land to the west of the city. These lands will benefit from the scheme in terms of a reduction in the peak flows and thus magnitude of flooding from extreme events. However, as a result of the pre-emptive spilling of higher flows from the dams, these lands will be subject to a greater frequency of lower or medium flooding events. In addition, the proposed scheme will result in peak flows extending for a longer duration during a given flood event. The works will therefore impact on the use of these lands.

Mitigation Measures

Good communication between the contractor and the landowners during the construction phase will prevent undue disturbance due to noise, dust and to minimise difficulties caused by the restriction of access to severed land parcels. In cases where impeded drainage during construction will cause obvious difficulty to a particular landowner, temporary measures will be taken to allow waters to drain to less critical areas and so minimise the impact. Any existing service connections severed as a result of construction of the proposed embankments will be reinstated.

Mitigation measures detailed in this section relate to engineering accommodation works alone. Further measures to compensate farmers due to land acquisition, drainage works and loss of facilities will be agreed by the valuer at a later stage. The extent and complexity of such access provisions vary with each farm depending on the nature of the impact and the type of enterprise being carried out. In most cases simple gateways will suffice, while in other cases new accommodation roads may have to be constructed.

Residual Impact - Imperceptible Impact

Nationally there are approximately 3,936,567 hectares of agricultural land (excluding rough grazing) of which 3,535,443 ha are in grassland based enterprises and 401,124 ha of cereal and non-cereal crop production. Approximately 7 ha of land will be lost to agricultural production as a result of the construction of embankments. In addition, there will be changes in frequency and duration for which livestock will need to be removed from agricultural land. This loss, while significant to individual farmers, is not significant on a county or national level.

Taking into account the abovementioned mitigation measures the residual impact will be imperceptible.