

15 Resource and Waste Management

15.1 Introduction

This chapter describes the likely significant effects of the proposed scheme in relation to resource and waste management. **Chapter 4**, *Description of the Proposed Scheme*, provides a description of the proposed scheme while **Chapter 5**, *Construction Strategy*, describes the Construction Strategy. The following aspects of the scheme are particularly relevant to the resource and waste assessment:

Design:

- Throughout the design development for the proposed scheme, consideration has been given to the minimisation of resource usage and to the generation of waste through retention of material on site and material use & reuse.

Construction:

- During the construction of the proposed scheme, material usage will be minimised and material will be reused where possible. Waste will be generated from site clearance, demolition and excavation. General construction waste is also likely to be generated during construction of the proposed scheme.

Operation:

- During operation, maintenance waste is likely to be generated from maintenance works associated with the proposed scheme.

The use of resources and the potential for waste and surplus materials to be generated during the site clearance and demolition, excavation, construction and operation phases of the proposed scheme, are assessed. The potential environmental effects of the use of resources and the generation and management of solid waste arising, are examined in the context of the existing local and national resource and waste management environment. Mitigation measures are identified where necessary to reduce the impact of the use of resources and generation of waste by the proposed scheme in the construction and operational phases.

This Chapter describes by-products and wastes of relevance to the proposed scheme. Where excavated natural resources are being reused on site and are not wastes or by-products, these are considered in further detail in **Chapter 13**, *Land and Soil*. Construction materials imported to site are discussed in **Chapter 5**, *Construction Strategy* and also considered in terms of embodied carbon in **Section 19.4.2 of Chapter 19** *Climate*.

15.2 Assessment Methodology

The principal objective of sustainable resource and waste management is to use material resources more efficiently, where the value of products, materials and

resources is maintained in the economy for as long as possible and the generation of waste is minimised. To achieve resource efficiency there is a need to move from a traditional linear economy to a circular economy (refer to **Figure 15.1**, which illustrates the concept of a circular economy).

However, where residual waste is generated, it should be dealt with in a way that follows the waste hierarchy set out in the European Communities (Waste Directive) Regulations 2011 (S.I. No. 126/2011) (see **Figure 15.2**, which illustrates the waste pyramid) and actively contributes to the economic, social and environmental goals of sustainable development.



Figure 15.1: Circular Economy¹

¹ European Environment Agency (2019). Circular Economy – A simplified model of the circular economy for materials and energy. Available from: <https://www.eea.europa.eu/media/infographics/circular-economy/view> [Accessed: 13 April 2021]

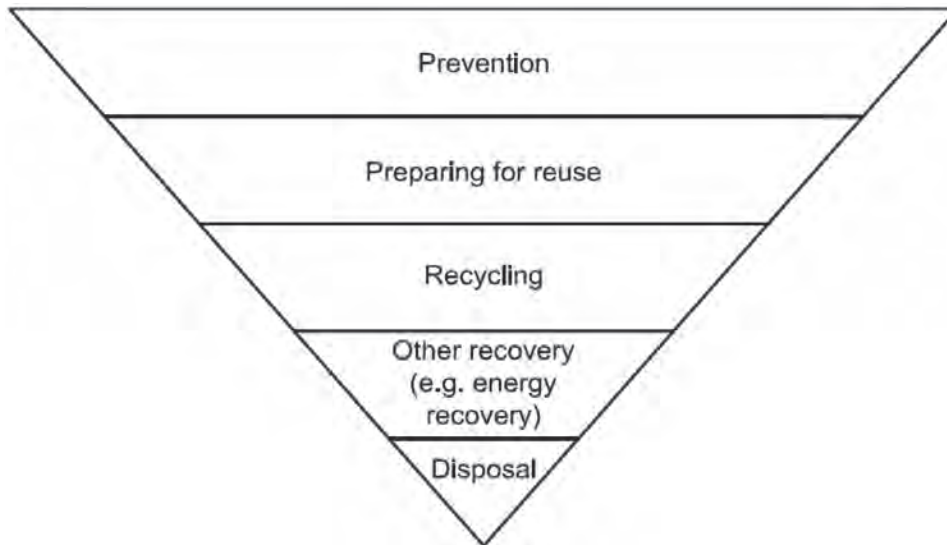


Figure 15.2: Waste Hierarchy²

15.2.1 General

This resource and waste management assessment considers the following aspects:

- The legislative context;
- The construction of the proposed scheme, including site clearance, demolition, excavation and excavation from the riverbed ; and
- The operation and maintenance of the proposed scheme.

A literature review was carried out of relevant legislation, policy and best practice guidance (refer to **Appendix 15.1**). A desk study was undertaken which included the following tasks:

- Review of relevant policy and legislation which creates the legal framework for resource and waste management in Ireland (refer to **Appendix 15.1**);
- Description of estimated waste generation during the construction and operational phases; and
- Review of the proposed scheme, using the waste hierarchy as a framework, to identify mitigation (refer to **Figure 15.1** and **Appendix 15.1**).

Mitigation measures are proposed to minimise the effect of the proposed scheme on the environment, reduce the quantity of waste sent for final disposal in so far as feasible and to promote sustainable waste management practices. These are described in **Section 15.5**.

² European Communities (Waste Directive) Regulations 2011 (S.I. No. 126/2011)

15.2.2 Guidance and Legislation

Resource and waste management takes place in a policy and legislative framework. A review of relevant legislation, policy and best practice guidance was undertaken to inform the impact assessment and recommended mitigation.

The key components of EU, national and local policy, legislation and guidance relevant to the proposed scheme (refer to **Appendix 15.1**) are summarised as follows:

- Prevention of waste is the preferred option such that the value of products, materials and resources are maintained in the economy for as long as possible, the generation of waste is minimised and the principles of circular economy are implemented;
- Where construction waste is generated it should be source separated to facilitate reuse, recycling and maximise diversion of waste from landfill;
- Where operational waste is generated it should be source separated to facilitate reuse, recycling and maximise diversion, from landfill;
- Where waste cannot be prevented or reused on site it should be transported and recycled or disposed of in accordance with the Waste Management Act 1996, as amended; and
- Waste may only be transferred from site by a waste collection permit holder and delivered to an authorised waste facility (i.e. a facility which holds a Certificate of Registration, Waste Facility Permit or Waste Licence).

15.2.3 Study Area

Waste management planning in Ireland takes place on a regional basis and the proposed scheme is located in County Wicklow, which is in the Eastern-Midlands Region for the purpose of waste planning. However, Arklow is adjacent to County Wexford which is located in the Southern Region for the purpose of waste management planning. Waste statistics are published in Ireland on a national basis, as well as on a regional basis. Therefore, the study area in relation to the consideration of baseline waste generation and treatment is regional and national whilst the study area in relation to effects is local, regional and national.

15.2.4 Impact Assessment Methodology

The methodology followed in carrying out this resource and waste impact assessment aligns with the overarching EIA guidance as described in **Chapter 1, Introduction**.

The description of effects used in this Chapter are as presented in **Section 1.3.5 of Chapter 1, Introduction** and as published in the EPA Guidelines³.

³ Draft Guidelines on the information to be contained in Environmental Impact Assessment Reports (EPA, 2017)

15.3 Baseline Conditions

Surplus construction materials and wastes, including site clearance and demolition material, excavation material and general surplus construction material will be generated as a result of the proposed scheme. In order to establish a baseline and review capacity in relation to construction waste, a review of published data and statistics was undertaken.

An indicative breakdown of the composition of construction and demolition (C&D) waste in Ireland in 2018, as reported by the EPA, is set out in **Table 15.1**.

Soil, stones and dredged material accounted for 77% of the 6.2Mt (million tonnes), which was the total quantity of C&D waste collected in Ireland in the year 2018, as reported by the EPA.

Table 15.1: Material categories of C&D waste collected in Ireland, 2018 (Source: EPA⁴)

Material from construction and demolition sources	Quantity (tonnes)	% of material stream in reference to total
Soils, stones & dredging spoil	4,786,162	77.0%
Concrete, bricks, tile and gypsum	755,525	12.1%
Mixed C&D waste	414,983	6.7%
Metal	179,043	2.9%
Bituminous mixtures	60,759	1.0%
Segregated wood, glass and plastic	23,068	0.4%
Total	6,219,540	100.0%

High level data published in 2020 indicates that 7,563,000 tonnes of soil and stone material was collected in Ireland in 2019⁵. This accounted for 85% of the total quantity of 8,813,000 tonnes of C&D waste collected in Ireland in the year 2019.

Figure 15.3 shows the final treatment routes for C&D waste material classes in 2018.

Final treatment operations (recycling, backfilling, energy recovery, disposal) varied greatly between material streams. By far the biggest amount of C&D waste was used for backfilling (a recovery operation), which mainly reflects the dominance of waste soil, stones, concrete, bricks and tiles in the overall composition mix. Recycling was the dominant treatment activity for the smaller metal, plastic, glass and wood fractions of C&D waste, while disposal was mainly used for C&D waste treatment residues.

⁴ EPA (2020a) Construction and Demolition Waste Statistics for Ireland [Online] Available from: <http://www.epa.ie/nationalwastestatistics/constructiondemolition/> [Accessed 13 April 2021]

⁵ RPS (2020) Construction and Demolition Waste Soil and Stone Recovery / Disposal Capacity. Eastern Midlands Region / Connacht Ulster Region / Southern Region. Waste Management Plans 2015 – 2021.

Under the Waste Framework Directive (2008/98/EC), as amended, there is a target for Member States to achieve 70% material recovery of non-hazardous, non-soil and stone C&D wastes by 2020. Ireland achieved 77% material recovery of non-hazardous, non-soil and stone C&D waste in 2018, surpassing the 2020 EU target.

The construction sector also generates hazardous waste such as hazardous soils, lead-acid batteries, waste electrical and electronic equipment, asbestos, solvent-based paints and varnishes, pesticides and waste oils. The EPA reports that in 2019, 46,191 tonnes of hazardous soil were exported from Ireland for treatment⁶.

⁶ EPA (2020b) Hazardous Waste Statistics for Ireland [Online] Available from: <http://www.epa.ie/nationalwastestatistics/hazardous/> [Accessed 13 April 2021]

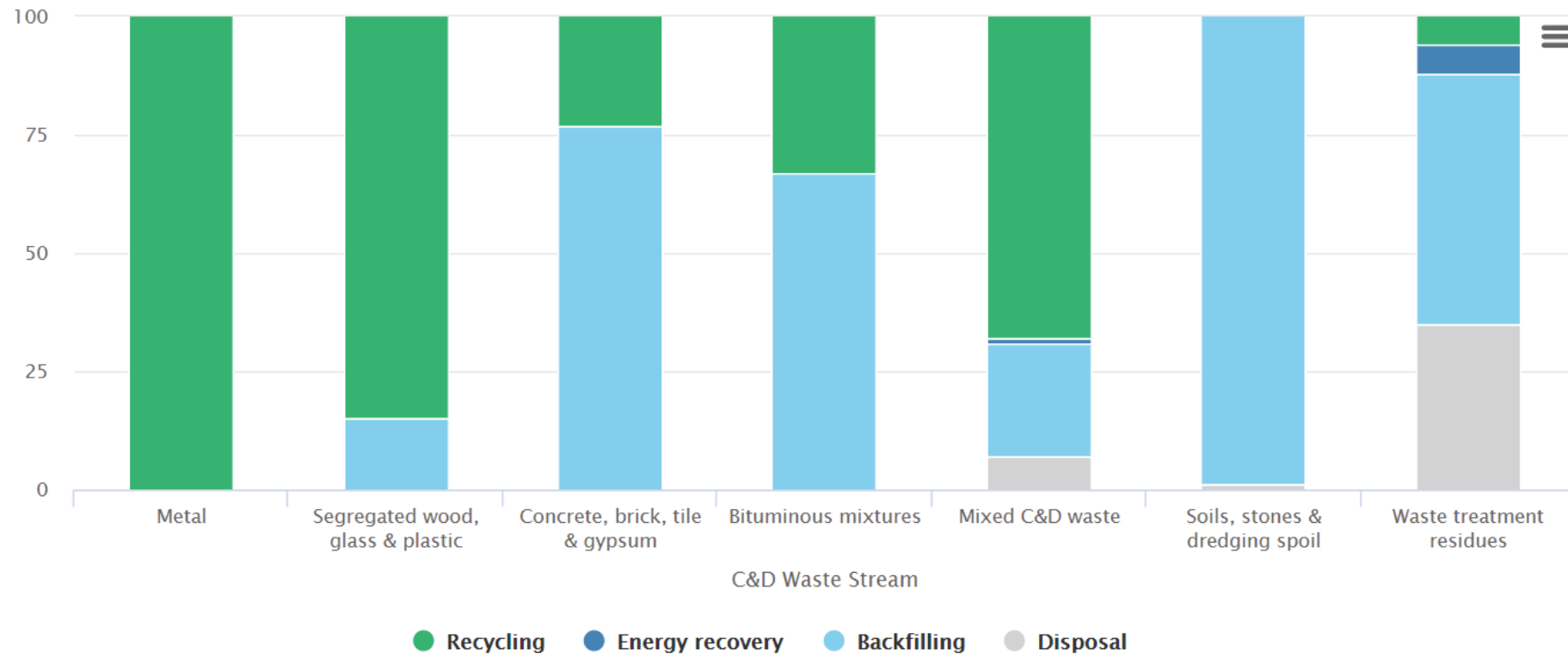


Figure 15.3: Final Treatment for C&D waste Material Classes in 2018 (Source: EPA⁴)

15.4 Likely Significant Effects

15.4.1 Do-Nothing Scenario

In the scenario where the proposed scheme does not proceed as planned, the resource and waste management effects described in this chapter would not arise. However, the periodic flooding in the town of Arklow, which would continue in the absence of the scheme, would give rise to significant quantities of municipal solid waste from households and commercial premises in the form of furniture, fittings and household effects destroyed by the flood waters.

15.4.2 Assessment of Effects during Construction

15.4.2.1 Site Clearance and Demolition

Prior to commencing work, the contractor will need to undertake vegetation removal and stripping of topsoil as required in the relevant working areas. It is proposed to remove the vegetation growing on Arklow Bridge as part of the works.

Minor demolition will be undertaken as part of the enabling works for the proposed scheme. The demolition works will include the following:

- At Arklow Bridge, demolition of the existing concrete scour protection slab;
- Upstream of Arklow Bridge on the river's southern bank along River Walk, demolition of the existing tarmac road surface, footpaths, kerbs and concrete quay wall will be undertaken to accommodate the construction of the flood defence walls;
- Along South Quay, from Arklow Bridge to the existing slipway, demolition of the Coal Quay slipway, and demolition of the existing concrete quay wall along two short lengths will be undertaken to accommodate the construction of the new flood defence walls;
- In the Dock area, extending along the western and southern sides of the dock, demolition of the existing tarmac road surface and the fence around the Dock will be undertaken to accommodate the construction of the flood defence wall; and
- Along River Walk, South Quay and the Dock area, demolition of the existing tarmac road surfaces in these areas will be undertaken to accommodate the construction of a surface water drainage network and pumping stations.

Approximately 5,978 tonnes of surplus materials will be generated as a result of the demolition works to facilitate the proposed scheme. This material will be predominantly comprised of concrete and tarmac.

The effect of site clearance and demolition waste on the capacity of waste management facilities and waste industry trends in Ireland prior to mitigation measures being implemented is expected to be slight, negative and short-term.

Management of Site Clearance and Demolition Waste

Where naturally occurring material is generated this will be reused within the construction works as required, provided it is suitable for its proposed use.

Surplus materials or by-products generated as a result of the proposed scheme which are not naturally occurring and which will be reused within the scheme will be notified to the EPA in accordance with Article 27 of the European Communities (Waste Directive) Regulations, 2011 as a by-product, provided it meets the requirements of that clause.

Where surplus materials or by-products which are generated as a result of the proposed scheme and which will be reused within other schemes, will be notified to the EPA in accordance with Article 27 of the European Communities (Waste Directive) Regulations, 2011 as a by-product, provided it meets the requirements of that Article.

Where surplus materials are generated, which cannot be reused within the scheme or other construction works, these will be waste and will be delivered to facilities authorised in accordance with the Waste Management Act, 1996 as amended, and which hold a Certificate of Registration, Waste Facility Permit or EPA Licence.

15.4.2.2 Land Based Excavation

Land based excavated material as part of the construction works will generally consist of:

- Topsoil;
- Subsoil; and
- Made ground.

The following activities will result in the generation of land based excavation material during the construction phase of the proposed scheme:

- Works at river access and site compound access locations;
- Works at Ferrybank – removal of pipelines;
- Construction of flood defence walls and drainage infrastructure along South Quay; and
- Construction of flood defence wall and earth embankment at Arklow Marsh.

The total quantity of land based excavated materials from the proposed scheme is estimated to be approximately 34,733 tonnes. This represents a conservative worst-case estimate which includes an additional miscellaneous allowance of 10% on the overall total figure.

A breakdown of the quantity of this material that will be generated from the different elements of the scheme works is presented in **Table 15.2**.

Table 15.2: Land Based Excavation Quantities

Scheme Works	Tonnes <i>Note 1</i>
Flood Defence Walls (Sheet Piles)	900
Flood Defence Walls (River Channel)	4,876
Flood Defence Walls (North Bank)	496
Flood Earth Embankment	19,360
Vehicle Ramp (Riverwalk)	86
Vehicle Ramp 1 (Docks)	28
Vehicle Ramp 2 (Docks)	38
Drainage (Riverwalk)	776
Drainage (South Quay)	2,288
Drainage (Docks)	2,658
Pump Station 1 – Riverwalk	12
Pump Station 2 – South Quay	32
Pump Station 3 – Dock	26
Miscellaneous Allowance (10%)	3,157
Total	34,733

Note 1: A conversion factor of 2.0 was used to convert from m³ to tonnes.

The effect of land-based excavation waste on the capacity of waste management facilities and waste industry trends in Ireland prior to mitigation measures being implemented is expected to be moderate, negative and short-term.

Management of Land Based Excavation Waste

The most environmentally sustainable means of managing excavated material is its prevention and minimisation. Prevention and minimisation are inherent in the design of the proposed scheme.

Prevention and Reuse

Topsoil, soil, rock and naturally occurring material excavated in the course of construction activities will be reused within the proposed scheme where feasible, subject to further testing to determine if materials meet the specific engineering standards for their proposed end-use. This is not deemed to be a waste in accordance with Article 2 of the Waste Directive 2008/98/EC, the European Communities (Waste Directive) Regulations, 2011 and Section 3 of the Waste Management Acts, 1996-2011 as amended.

Surplus materials or by-products generated as a result of the proposed scheme, which are not naturally occurring, and which will be reused within the scheme will be notified to the EPA in accordance with Article 27 of the European Communities (Waste Directive) Regulations, 2011 as a by-product, provided it meets the requirements of that Article.

Waste Recovery (including Recycling) and Disposal

Where surplus materials are generated which cannot be reused within the scheme or other construction works, these will be considered waste and will be delivered to recovery and disposal facilities authorised in accordance with the Waste Management Act, 1996, as amended, and which hold a Certificate of Registration, Waste Facility Permit or EPA Licence.

15.4.2.3 Excavation from the Riverbed

Channel dredging works are proposed to lower the level of the riverbed in the Avoca river for 320m upstream and 520m downstream of Arklow Bridge. In general, the riverbed will be 1.0m lower at Arklow Bridge and taper to existing bed levels at the upstream and downstream extents. The dredging will extend to within 2m of the existing riverbanks or proposed river walls, as applicable.

A total of approximately 168,826 tonnes of sediment is required to be dredged upstream and downstream of Arklow Bridge. Approximately 25,600 tonnes of excavated material from the riverbed will be reused on site. The remaining approximately 143,226 tonnes of excavated material from the riverbed will be removed from site. The design team has undertaken material testing. Please refer to details included in the report attached in **Appendix 15.2, Dredge Material Management Study**. The approximate breakdown of the classification of the excavated material from the riverbed is shown in **Table 15.3**.

Table 15.3: Material Classification

Material classification	Percentage of total material excavated from the riverbed	Approximate quantity (tonnes)
Natural sands and gravels	70	118,626
Natural sands and gravels with slightly elevated chloride concentrations	20	33,400
Non-hazardous waste	7	11,800
Hazardous waste	3	5,000
Total	100	168,826

The effect of excavated material from the riverbed on the capacity of waste management facilities and waste industry trends in Ireland prior to mitigation measures being implemented is expected to be moderate, negative and short-term.

Management of Excavated Waste from the Riverbed – Natural Soil and Stone

Prevention

Approximately 25,600 tonnes of excavated material from the riverbed will be reused on site. This naturally occurring material will primarily be reused to construct a flood embankment along the edge of Arklow Town Marsh. Further smaller volume options include as fill material for regrading works, backfill behind new flood walls and around new buried utility installations. This

material is not considered a waste in accordance with Article 2 of the Waste Directive 2008/98/EC, the European Communities (Waste Directive) Regulations, 2011 and Section 3 of the Waste Management Acts, 1996-2011 as amended.

It will be the responsibility of the contractor to ensure all material which is reused on site as a by-product complies with the relevant legislation including Article 27 of the European Communities (Waste Directive) Regulations, 2011.

Where onsite reuse of by-product material requires a notification to the EPA, it will be the responsibility of the contractor to ensure compliance with Article 27 of the European Communities (Waste Directive) Regulations, 2011.

Following excavation, the material may be required to be stored within the site boundary pending reuse. Details of storage locations are set out in **Chapter 5, Construction Strategy**.

The remaining approximately 143,226 tonnes of excavated material from the riverbed will be removed from site. Material that meets the TII Specification for Road Works, Series 600, Table 6/1 and complies with condition (d) of Article 27 and the EPA guidelines will be suitable for beneficial reuse off site as a construction material.

Off-site construction reuse options include quarry infilling, site restoration, coastal protection schemes and flood relief schemes or offshore for reclamation or coastal protection schemes with works below the high-water mark. Offshore works below the high-water mark would require additional foreshore licensing. The destination site which will use the material will have granted planning permission for the proposed use and offshore works below the high-water mark will have the required foreshore licence in place. It will be the responsibility of the contractor to ensure all material reused off site as a by-product complies with the relevant legislation including Article 27 of the European Communities (Waste Directive) Regulations, 2011, and planning and foreshore licence legislation. In 2018, the EPA determined that 907,000 tonnes of the soil and stone notified were by-products, as notified, under Article 27 (EPA, 2020a).

The contractor will be responsible for identification of suitable sites for reuse of the material in accordance with Article 27 of the European Communities (Waste Directive) Regulations, 2011.

Recycling/Recovery

For excavated material from the riverbed which is not a by-product, this will be considered a waste, and testing will be undertaken to determine if it is suitable for delivery to recovery facilities authorised in accordance with the Waste Management Act, 1996 as amended, for recycling/soil recovery.

There are 20 soil recovery sites currently operating in Wicklow and Wexford with

583,974⁷ tonnes/annum capacity to accept dredged material or soil and stones.

Therefore, it is reasonable to anticipate there will be sufficient available capacity to accept any suitable material from the proposed scheme. Further details on these facilities are provided in **Appendix 15.3**.

Disposal

Where excavated material from the riverbed is not a by-product and does not meet the test criteria for recycling or reuse it will be delivered to authorised disposal facilities. Inert landfill options include the following:

- IMS Ltd., Hollywood, the Naul, Co. Dublin;
- Murphy Concrete Manufacturing, Gormanstown, Co. Meath; and
- Walshestown Restoration Ltd., Walshestown, Co. Kildare.

The hazardous and non-hazardous material identified at the proposed river dredging site can only be disposed of at hazardous and non-hazardous facilities respectively. Approximately 11,800 tonnes of material identified upstream of Arklow bridge is categorised as non-hazardous in accordance with the EPA ‘Guidance on waste acceptance criteria at authorised soil recovery facilities’ (EPA, 2020d) and the EPA ‘Guidance on Soil and Stone By-products’ (EPA, 2019). This material will be disposed of at a licenced landfill for non-hazardous waste. Non-hazardous options include the following:

- Drehid Waste Management Facility (Bord Na Mona), Co. Kildare;
- Knockharley Landfill, Co. Meath; and
- Ballynagran Residual Landfill (Greenstar), Co. Wicklow.

Approximately 5,000 tonnes of material identified upstream of Arklow bridge is considered hazardous in accordance with the Waste Acceptance Criteria (WAC)⁸ and must be disposed of at an authorised hazardous waste management facility.

There is currently limited capacity for hazardous excavated soils in Ireland, and this may continue into the future. If required, this material may be exported to authorised facilities which have capacity. Transportation of this material abroad will take place in accordance with relevant legislation including the provisions of the Waste Management (Shipments of Waste) Regulations, S.I. 419 of 2007. In 2019, Ireland produced 90,595 tonnes of contaminated soils, 29,063 tonnes of which was treated in Ireland, with the remainder exported.⁵

⁷ Note - the capacity of soil recovery sites in Wicklow and Wexford was calculated in April 2021 and is, as such, a more up-to-date estimate than that provided in Appendix 15.3 - Dredge Material Management Study.

⁸ European Council (2003). *Council Decision 2003/33/EC of 19th December 2002 establishing criteria and procedures for the acceptance of waste at landfills pursuant to Article 16 of and Annex II to Directive 1999/31/EC.*

15.4.2.4 General Construction Waste

Construction works, site offices and temporary works facilities are also likely to generate waste. General construction waste can vary significantly from site to site but typically may include the following non-hazardous fractions:

- Soil and stone;
- Concrete, brick, tiles and ceramics;
- Asphalt/tar;
- Metals;
- Wood; and
- Other.

General construction waste will also include surplus and damaged products and materials arising in the course of construction work or used temporarily during the course of on-site activities.

In the case of the proposed scheme, the most likely type of general construction waste will be surplus concrete and unusable or damaged pipe segments which may arise on site. Quantities of the above materials are estimated to be small.

The effect of general construction waste on the capacity of waste management facilities and waste industry trends in Ireland prior to mitigation measures being implemented is expected to be slight, negative and short-term.

Management of General Construction Waste

Surplus construction materials will be reused within the proposed scheme or at other construction sites. The feasibility of reuse as a by-product will be investigated by the contractor and undertaken where feasible in accordance with Article 27 of the European Communities (Waste Directive) Regulations, 2011.

The contractor will ensure that the appropriate waste authorisation is in place for all facilities that the material is delivered to (i.e. EPA Licence, Waste Facility Permit or Certificate of Registration).

15.4.3 Assessment of Effects during Operation

Minor quantities of maintenance waste will be generated during the operational phase.

Both the debris trap and the gravel trap will require routine maintenance from time to time. This will be done on an 'as needs' basis as quantities of gravel and floating debris will be determined by flows in the river. The quantity of material to be removed at any one time is not expected to exceed approximately 700 tonnes.

It is expected that there will be some level of sediment settling along the channel related to the flood scheme during the operational phase. As such, some excavation of the channel will be required from time to time.

The location of this excavation will be dependent on where deposition occurs. The excavation is estimated to be required every ten years but will be based on periodic surveys of the riverbed levels.

There is the potential that clean, inert material that collects on the river could become contaminated over time through third-party activities (e.g. wash down of heavy metals from historical mines located outside of the scheme area, higher up in the river catchment). Accordingly, material removed from the debris and gravel traps, and from the periodic dredging of the channel, will need to be classified to determine its fate in line with national legislation.

Removal of branches and vegetation impacting on flood flows in the river will also be carried out on an annual basis to improve the conveyance capacity of the river channel. This will be carried out over the stretch of river upstream of Arklow Bridge as far as the gravel and debris traps. The quantity of branches and vegetation to be removed will be minor.

The effect of operational waste on the capacity of waste management facilities and waste industry trends in Ireland prior to mitigation measures being implemented is expected to be imperceptible and long term.

Management of Operational Waste

Where a reuse opportunity is identified for operational waste material and following testing to ensure it is suitable for its proposed end use it will be transported offsite for reuse as a by-product on other sites in accordance with Article 27 of the European Communities (Waste Directive) Regulations, 2011.

All operational wastes will be delivered from site to an authorised waste facility. The operator will ensure that the appropriate waste authorisation is in place for all facilities that the material is delivered to (i.e. EPA Licence, Waste Facility Permit or Certificate of Registration).

15.5 Mitigation Measures and Monitoring

15.5.1 Mitigation During Construction

15.5.1.1 Construction and By-Products Waste Management Plan

A Construction and By-Products Waste Management Plan (CBWMP) has been prepared (refer to **Appendix 15.4**). This CBWMP plan will be required to be updated by the contractor(s) following appointment and prior to commencing works on site. The CBWMP addresses waste generation and arrangements made for prevention, reuse, recycling, disposal and collection of recyclables and wastes.

The CBWMP has been prepared in line with the guidance⁹. The CBWMP addresses the following:

⁹ DoEHLG (2006) Best Practice Guidelines on the Preparation of Waste Management Plans for Construction & Demolition Projects.

- Description of the project (refer to **Chapter 4**, *Description of the Proposed Scheme* and **Chapter 5**, *Construction Strategy*);
- Wastes arising including procedures for minimisation/segregated storage/reuse/recycling;
- Estimated cost of waste management;
- Roles and responsibilities for implementing the CBWMP;
- Procedures for training of workforce and plan dissemination programme;
- Record keeping procedures;
- Waste collectors, and recycling and disposal sites including copies of relevant permits or licences; and
- Waste auditing protocols.

Using the information identified in this section, the contractor(s) will be required to update the CBWMP, with its/their detailed procedures and the names of staff with assigned roles in the plan prior to commencement of construction, and as required during the construction of the proposed scheme.

15.5.1.2 Construction Mitigation Measures

In addition to the inherent design measures which will be implemented during construction, the following mitigation measures will be implemented:

- A pre-demolition audit will be undertaken in order to facilitate selective demolition. Selective demolition will be undertaken in order to enable removal and safe handling of hazardous substances and to facilitate re-use and high-quality recycling. The pre-demolition audit will be undertaken in accordance with the EU *Guidelines for the waste audits before demolition and renovation works of buildings* (European Commission, 2018), or similar guidance. The aim of the guidance is to facilitate and maximize recovery of materials and components from demolition or renovation of buildings and infrastructure for beneficial reuse and recycling, without compromising the safety measures and practices outlined in the EU *Construction and Demolition Waste Management Protocol* (European Commission, 2016). The above guidelines provide guidance on best practices for undertaking a ‘waste audit’, i.e. the assessment of construction and demolition waste streams prior to demolition or renovation of buildings and infrastructures.
- The contractor will minimise waste disposal so far as is reasonably practicable. Opportunities for reuse of materials, by-products and wastes will be sought throughout the construction stage of the proposed scheme.
- Possibilities for re-use of clean non-hazardous excavation material as fill on the site or in landscaping works will be considered following appropriate testing to ensure material is suitable for its proposed end use. Where excavated material may not be re-used within the proposed works the contractor will endeavour to send material for reuse on another site, recovery or recycling so far as is reasonably practicable.

- Waste from the proposed scheme will be transported by authorised waste collectors in accordance with the Waste Management (Collection Permit) Regulations, 2007 as amended.
- Waste from the proposed scheme will be delivered to authorised waste facilities in accordance with the Waste Management Acts 1996, as amended.
- Source segregation: Where possible metal, timber, glass and other recyclable material will be segregated and stored separately, during construction and removed off site to a permitted/licensed facility for recycling. Waste stream colour coding will be used to facilitate segregation and each container will have photographs of wastes to be placed in that container, as required. Where waste generation cannot be avoided source segregation will maximise the quantity and quality of waste delivered for recycling and facilitate its movement up the waste hierarchy away from landfill disposal and reduce its environmental impact.
- Material management: ‘Just-in-time’ delivery will be used so far as is reasonably practicable to minimise material wastage.
- Materials will be stored in appropriate conditions, and if outdoors, will be raised above the ground and covered, as required, to prevent deterioration and spoiling due the effects of the weather.
- Supply chain partners: The contractor will engage with the supply chain to supply products and materials that use minimal packaging, and segregate packaging for reuse.
- Waste Auditing: The contractor will record the quantity in tonnes and types of waste and materials leaving site during the construction phase.
- Waste fuels/oils may be generated from equipment used on-site during construction and may be classified as hazardous waste. Such wastes will be stored in a secure, bunded area on-site prior to collection by a contractor who holds the appropriate waste collection permit.
- The name, address and authorisation details of all facilities and locations to which waste and materials are delivered will be recorded along with the quantity of waste in tonnes delivered to each facility. Records will show which material is recovered and which is disposed of.
- The contractor(s) will ensure that any off-site interim storage or waste management facilities for excavated material have the appropriate waste licences or waste facility permits in place.

Export of hazardous waste from the proposed scheme out of the State is subject to a Europe-wide control system founded on EU Regulation 1013/2006 on the Shipments of Waste (known as the Transfrontier Shipment Regulations), as amended. A Trans Frontier Shipment (TFS) licence is a licence which must be approved by the origin/destination/transit authorities consenting to the movement/transit and acceptance of wastes between EU member states.

This licence tracks waste from origin to destination and ensures that each authority is aware of the status of the waste until final recovery when the individual TFS notification annex consigned with each shipment is signed off as having been received and treated by the receiver. This completed licence is then circulated back to the producer as well as all relevant authorities

EU Regulation 1013/2006 is supplemented by the Waste Management (Shipments of Waste) Regulations 2007, as amended, which makes Dublin City Council responsible for the enforcement of this regulatory system throughout Ireland. Export of hazardous waste from the site out of the State will comply with the procedures set out in this legislation.

The above procedures will be applied to any hazardous waste generated during the construction phase.

15.5.2 Mitigation during Operation

The mitigation measures described above will be implemented, where relevant, during the operation and maintenance of the proposed development.

15.5.3 Monitoring

15.5.3.1 Monitoring during Construction

The monitoring, as specified in the CBWMP and CEMP as set out in **Section 15.5.1** and **Appendix 5.1** in relation to wastes, will be undertaken and recorded by the contractor(s).

15.5.3.2 Monitoring during Operation

Monitoring of the maintenance waste generated during the operational phase will be carried out to determine its appropriate suitability for re-use, recovery or disposal off site.

15.6 Cumulative Effects

This section presents an assessment of the potential for likely significant direct and indirect cumulative effects of projects listed in **Table 20.1** in **Chapter 20**, *Cumulative Impacts and Interaction of Effects* in combination with the proposed scheme. It also includes an assessment of the potential for likely significant direct and indirect cumulative effects of all projects listed in **Table 20.1** in **Chapter 20**, *Cumulative Impacts and Interaction of Effects* taken together in combination with the proposed scheme.

Action Health Enterprises GP Limited The Former Boland's Builders Providers, Castle Park (181170)

This project relates to the development of a primary care facility at Castle Park. Due to the nature of this development, there is potential for a cumulative resource and waste management effect during the construction of the proposed scheme.

Should the construction of this project proceed in parallel or overlap with the construction of the proposed scheme, this could give rise to short term, slight resource and waste management effects on the capacity of waste management facilities and waste industry trends in Ireland due to an increased demand on waste recovery and/or disposal sites.

Having regard to the imperceptible resource and waste management effect of the proposed scheme during operation, no negative likely significant cumulative resource and waste management effects on the capacity of waste management facilities and waste industry trends in Ireland are identified during the operational phase of the proposed scheme.

Circle K Safeway Service Station (20426)

This project relates to the demolition of the existing, and construction of a new, fuel forecourt at the existing Circle K service station, which is located immediately adjacent to Arklow Town Marsh and SC1 of the proposed scheme. Due to the nature of this development, there is potential for a cumulative resource and waste management effect on the capacity of waste management facilities and waste industry trends in Ireland during the construction of the proposed scheme. Should the construction of this project proceed in parallel or overlap with the construction of the proposed scheme, this could give rise to short term, slight resource and waste management effects on the capacity of waste management facilities and waste industry trends in Ireland due to an increased demand on waste recovery and/or disposal sites.

Having regard to the imperceptible resource and waste management effect of the proposed scheme during operation, no negative likely significant cumulative resource and waste management effects on the capacity of waste management facilities and waste industry trends in Ireland are identified during the operational phase of the proposed scheme.

Frank & Sandra Duffy No 7 and 8 Bridge Street &, No 34 Main Street (19750)

The project relates to the demolition of 2 existing buildings and the construction of a new retail and commercial building on Main Street. Due to the nature of this development, there is potential for a cumulative resource and waste management effect on the capacity of waste management facilities and waste industry trends in Ireland during the construction of the proposed scheme. Should the construction of this project proceed in parallel or overlap with the construction of the proposed scheme, this could give rise to short term, slight resource and waste management effects on the capacity of waste management facilities and waste industry trends in Ireland due to an increased demand on waste recovery and/or disposal sites.

Having regard to the imperceptible resource and waste management effect of the proposed scheme during operation, no negative likely significant cumulative resource and waste management effects on the capacity of waste management facilities and waste industry trends in Ireland are identified during the operational phase of the proposed scheme.

Gaines Europe Ltd Unit 1A Lower Tinahisk, South Quay (16248)

This project relates to the development of a new warehouse and distribution facility at Arklow Harbour. Due to the nature of this development, there is potential for a cumulative resource and waste management effect on the capacity of waste management facilities and waste industry trends in Ireland during the construction of the proposed scheme. Should the construction of this project proceed in parallel or overlap with the construction of the proposed scheme, this could give rise to short term, slight resource and waste management effects on the capacity of waste management facilities and waste industry trends in Ireland due to an increased demand on waste recovery and/or disposal sites.

Having regard to the imperceptible resource and waste management effect of the proposed scheme on the capacity of waste management facilities and waste industry trends in Ireland during operation, no negative likely significant cumulative resource and waste management effects on the capacity of waste management facilities and waste industry trends in Ireland are identified during the operational phase of the proposed scheme.

Gaines Europe Ltd Tinahisk Lower, South Quay (16414)

This project relates to the demolition of an existing industrial building at Arklow Harbour. Due to the nature of this development, there is potential for a cumulative resource and waste management effect on the capacity of waste management facilities and waste industry trends in Ireland during the construction of the proposed scheme. Should the construction of this project proceed in parallel or overlap with the construction of the proposed scheme, this could give rise to short term, slight resource and waste management effects on the capacity of waste management facilities and waste industry trends in Ireland due to an increased demand on waste recovery and/or disposal sites.

Having regard to the imperceptible resource and waste management effect of the proposed scheme during operation, no negative likely significant cumulative resource and waste management effects on the capacity of waste management facilities and waste industry trends in Ireland are identified during the operational phase of the proposed scheme.

Irish Water Arklow, Co. Wicklow (SI201801) and Foreshore Licence (FS006862)

This project relates to the development of a new Wastewater Treatment Plant at Ferrybank, Arklow. Due to the nature of this development, there is potential for a cumulative resource and waste management effect on the capacity of waste management facilities and waste industry trends in Ireland during the construction of the proposed scheme. According to the EIAR for the Wastewater Treatment Plant project, the residual resource and waste management effects of this project during its construction are expected to be short term and imperceptible to slight. Should the construction of this project proceed in parallel or overlap with the construction of the proposed scheme, this could give rise to short term, slight resource and waste management effects on the capacity of waste management facilities and waste industry trends in Ireland due to an increased demand on waste recovery and/or disposal sites.

Having regard to the imperceptible resource and waste management effect of the proposed scheme on the capacity of waste management facilities and waste industry trends in Ireland during operation, no negative likely significant cumulative resource and waste management effects on the capacity of waste management facilities and waste industry trends in Ireland are identified during the operational phase of the proposed scheme.

Joby Developments North Quay, Arklow (15857)

This project relates to the demolition of existing structures and construction of retail and residential units at North Quay. Due to the nature of this development, there is potential for a cumulative resource and waste management effect on the capacity of waste management facilities and waste industry trends in Ireland during the construction of the proposed scheme. Should the construction of this project proceed in parallel or overlap with the construction of the proposed scheme, this could give rise to short term, slight resource and waste management effects on the capacity of waste management facilities and waste industry trends in Ireland due to an increased demand on waste recovery and/or disposal sites.

Having regard to the imperceptible resource and waste management effect of the proposed scheme on the capacity of waste management facilities and waste industry trends in Ireland during operation, no negative likely significant cumulative resource and waste management effects on the capacity of waste management facilities and waste industry trends in Ireland are identified during the operational phase of the proposed scheme.

Mill Sea Ltd North Quay, Arklow (18316)

This project relates to the demolition of existing structures at Arklow Harbour. Due to the nature of this development, there is potential for a cumulative resource and waste management effect on the capacity of waste management facilities and waste industry trends in Ireland during the construction of the proposed scheme. Should the construction of this project proceed in parallel or overlap with the construction of the proposed scheme, this could give rise to short term, slight resource and waste management effects on the capacity of waste management facilities and waste industry trends in Ireland due to an increased demand on waste recovery and/or disposal sites.

Having regard to the imperceptible resource and waste management effect of the proposed scheme on the capacity of waste management facilities and waste industry trends in Ireland during operation, no negative likely significant cumulative resource and waste management effects on the capacity of waste management facilities and waste industry trends in Ireland are identified during the operational phase of the proposed scheme.

Wicklow County Council Inner Harbour / Dock, Off South Quay (20469)

This project relates to the development of storage units at Arklow Harbour. Due to the nature of this development, there is potential for a cumulative resource and waste management effect on the capacity of waste management facilities and waste industry trends in Ireland during the construction of the proposed scheme. Should the construction of this project proceed in parallel or overlap with the

construction of the proposed scheme, this could give rise to short term, slight resource and waste management effects on the capacity of waste management facilities and waste industry trends in Ireland due to an increased demand on waste recovery and/or disposal sites.

Having regard to the imperceptible resource and waste management effect of the proposed scheme on the capacity of waste management facilities and waste industry trends in Ireland during operation, no negative likely significant cumulative resource and waste management effects on the capacity of waste management facilities and waste industry trends in Ireland are identified during the operational phase of the proposed scheme.

Crag Digital Avoca Limited (18940/201285)

This project relates to the demolition of existing industrial buildings and the construction of data centre buildings at Avoca River Business Park. Due to the nature of this development, there is potential for a cumulative resource and waste management effect on the capacity of waste management facilities and waste industry trends in Ireland during the construction of the proposed scheme. Should the construction of this project proceed in parallel or overlap with the construction of the proposed scheme, this could give rise to short term, slight resource and waste management effects on the capacity of waste management facilities and waste industry trends in Ireland due to an increased demand on waste recovery and/or disposal sites.

Having regard to the imperceptible resource and waste management effect of the proposed scheme on the capacity of waste management facilities and waste industry trends in Ireland during operation, no negative likely significant cumulative resource and waste management effects on the capacity of waste management facilities and waste industry trends in Ireland are identified during the operational of the proposed scheme.

Arklow Bank Wind Park Phase 2 Onshore Grid Infrastructure Arklow, Co. Wicklow - Pre-Application (306662)

This project relates to the development of onshore transmission connection infrastructure related to the Arklow Bank Wind Park offshore wind energy project. Due to the nature of this development, there is potential for a cumulative resource and waste management effect on the capacity of waste management facilities and waste industry trends in Ireland during the construction of the proposed scheme. Should the construction of this project proceed in parallel or overlap with the construction of the proposed scheme, this could give rise to short term, slight resource and waste management effects on the capacity of waste management facilities and waste industry trends in Ireland due to an increased demand on waste recovery and/or disposal sites.

Having regard to the imperceptible resource and waste management effect of the proposed scheme on the capacity of waste management facilities and waste industry trends in Ireland during operation, no negative likely significant cumulative resource and waste management effects on the capacity of waste management facilities and waste industry trends in Ireland are identified during the operational phase of the proposed scheme.

Parade Ground - WCC Part 8

This project relates to public realm improvement works at Parade Ground, Arklow. Due to the nature of this development, there is potential for a cumulative resource and waste management effect on the capacity of waste management facilities and waste industry trends in Ireland during the construction of the proposed scheme. Should the construction of this project proceed in parallel or overlap with the construction of the proposed scheme, this could give rise to short term, slight resource and waste management effects on the capacity of waste management facilities and waste industry trends in Ireland due to an increased demand on waste recovery and/or disposal sites.

Having regard to the imperceptible resource and waste management effect of the proposed scheme on the capacity of waste management facilities and waste industry trends in Ireland during operation, no negative likely significant cumulative resource and waste management effects on the capacity of waste management facilities and waste industry trends in Ireland are identified during the operational phase of the proposed scheme.

FORESHORE

FS007049 Sure Partners Site Investigations at Arklow Bank

This project relates to site investigations to inform the engineering and design of an offshore wind farm at the site at Arklow Bank. Due to the offshore location and nature of this development, no negative likely significant cumulative resource and waste management effects on the capacity of waste management facilities and waste industry trends in Ireland are identified during the construction, operational phase of the proposed scheme.

All projects taken together in combination with the proposed scheme

Overall, taking all of the projects together in-combination with the proposed scheme, it is considered that these projects could give rise to short term, slight resource and waste management effects on the capacity of waste management facilities and waste industry trends in Ireland during the construction phase of the proposed scheme due to an increased demand on waste recovery and/or disposal sites. It is considered that these projects will not give rise to any negative likely significant cumulative resource and waste management effects on the capacity of waste management facilities and waste industry trends in Ireland during the operational phase of the proposed scheme

15.7 Residual Effects

Following implementation of the mitigation described in **Section 15.5** the residual effects are as follows:

15.7.1 Residual Effects during Construction

The residual effect of site clearance and demolition waste on the capacity of waste management facilities and waste industry trends in Ireland is expected to be slight, negative and short-term.

The residual effect of land based excavation waste on the capacity of waste management facilities and waste industry trends in Ireland is expected to be slight, negative and short-term.

The residual effect of excavation waste from the riverbed on the capacity of waste management facilities and waste industry trends in Ireland is expected to be slight, negative and short-term.

The residual effect of general construction waste on the capacity of waste management facilities and waste industry trends in Ireland is expected to be imperceptible and short term.

15.7.2 Residual Effects during Operation

The residual effect of operational waste on the capacity of waste management facilities and waste industry trends in Ireland is expected to be imperceptible and long term.

15.8 References

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