Appendix 15.4

Construction and By-Products Waste Management Plan (CBWMP)

1 Introduction

This Construction and By-Products Waste Management Plan (CBWMP) has been prepared as part of the Environmental Impact Assessment Report (EIAR) for the proposed Arklow Flood Relief Scheme, Arklow, Co. Wicklow.

This document has been prepared in accordance with the Department of the Environment, Heritage and Local Government *Best Practice Guidelines for the Preparation of Waste Management Plans for Construction and Demolition Projects, 2006*[1].

Following appointment, the Contractor will be responsible for detailing and maintaining this report and updating it as appropriate.

Following each update, a copy of the updated report shall be provided to Wicklow County Council and the Office of Public Works by the Contractor.

2 Waste Management Objectives for the Project

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 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 2**, which illustrates the waste pyramid) and actively contributes to the economic, social and environmental goals of sustainable development.

[1] Department of the Environment, Heritage and Local Government (DoEHLG), 2006. *Best Practice Guidelines on the Preparation of Waste Management Plans for Construction & Demolition Projects.*

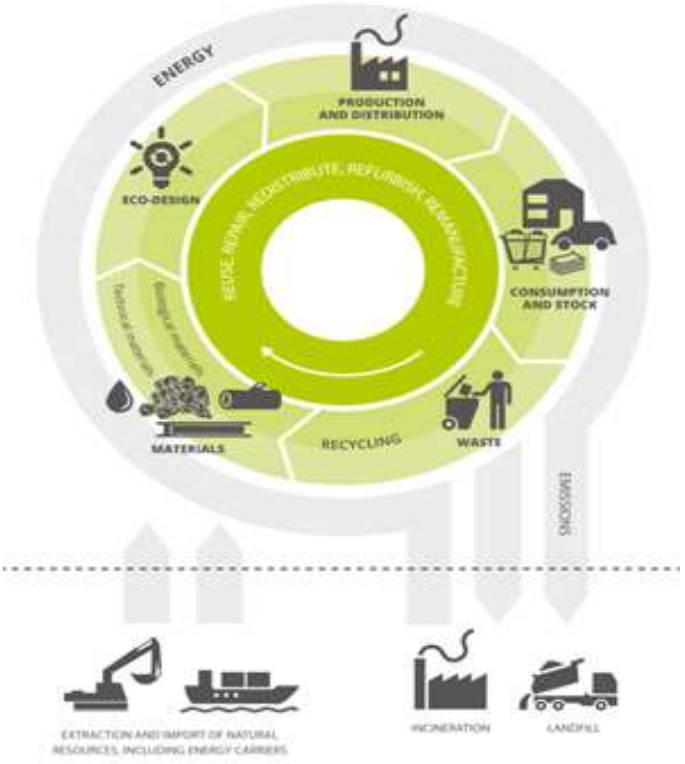

Figure 1: Circular Economy[2]

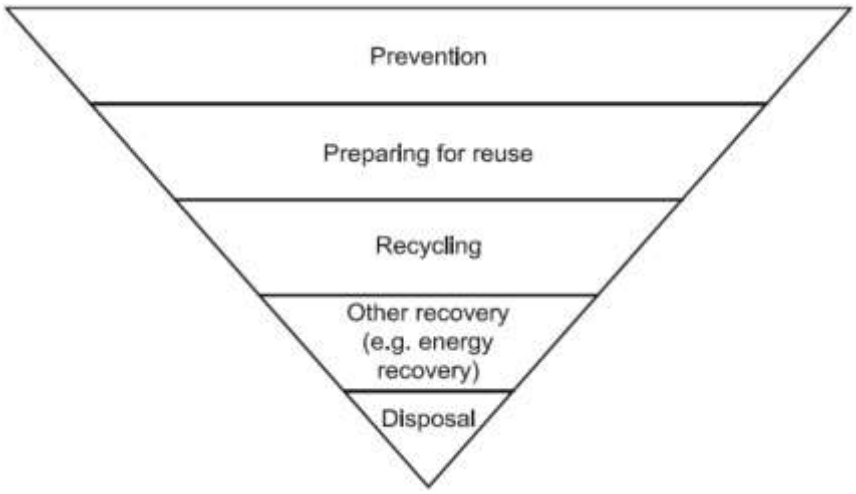

Figure 2: Waste Hierarchy[3]

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

3 Roles, Responsibilities and Training

The nominated waste manager responsible for implementation of this Plan will be identified prior to the commencement of works.

Copies of the Plan will be made available to all relevant personnel on site.

All site personnel and sub-Contractors will be provided with a copy of the Plan and will be informed of the objectives of the Plan and their responsibilities in relation to compliance with the Plan.

The waste manager shall ensure that, where training is required regarding the handling and management of wastes on site, this is provided to staff as required.

The waste manager will be responsible for informing Contractor staff and sub-Contractors of content of the Plan and for maintaining and keeping the Records set out below.

In the event of the waste manager leaving the project team the Contractor will nominate a suitable replacement.

4 Wastes Arising

4.1 Introduction

Construction and Demolition (C&D) waste is defined as waste which arises from construction, renovation and demolition activities.

Also included within the definition are surplus and damaged products and materials arising in the course of construction work or used temporarily during the course of on-site activities.

Typical construction and demolition waste types which are likely to arise during the proposed site clearance and demolition, excavation and construction works are set out below.

The Contractor will ensure that waste generation on site is minimised and that waste removed from site for recovery or disposal is reduced where feasible.

4.2 Site Clearance and Demolition

4.2.1 Wastes Arisings

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, river access, 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.

4.2.2 Waste Management

Where naturally occurring material is excavated 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.

4.2.3 Demolition Audit

In addition to the general measures outlined above, a waste audit in accordance with the EU *Guidelines for the waste audits before demolition and renovation works of buildings*[4], or similar guidance will be considered at detailed design stage.

The above guidelines provide guidance on best practices for the assessment of construction and demolition waste streams prior to demolition or renovation of buildings and infrastructure, called a "waste audit". The aim of the guidance is to facilitate and maximize recovery of materials and components from demolition or renovation of buildings and infrastructures for beneficial reuse and recycling, without compromising the safety measures and practices outlined in the EU *Construction and Demolition Waste Management Protocol*[5].

4.3 Land Based Excavation

4.3.1 Waste Arisings

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 Arklow Bridge;
- Works at Ferrybank – removal of pipelines;
- Construction of flood defence walls and drainage infrastructure along South Quay; and
- Construction of flood defence walls and earth embankment at Arklow Marsh.

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

[4] European Commission, 2018. *Guidelines for the waste audits before demolition and renovation works of buildings.*

[5] *European Commission, 2016. Construction and Demolition Waste Management Protocol.*

A breakdown of the quantity of this material that will be generated from the different elements of the scheme works is presented in **Table 1**.

Table 1: Land Based Excavation Quantities

Scheme Works	**Tonnes** *Note 1*
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 m^3 to tonnes.

4.3.2 Waste Management

As noted in Section 1 above, following appointment, the Contractor will be responsible for detailing this Plan and providing it to Wicklow County Council and the Office of Public Works for approval. The detailed Plan will include a description of how land-based excavation material from the proposed development will be managed. A full list of all facilities to which uncontaminated excavation material will be sent will be provided in the detailed Plan.

It will be at the discretion of the Contractor to determine how land-based excavation material from the proposed development will be managed. It is assumed, as a worst-case scenario, that all excavated soil will be treated or disposed of at an authorised facility, either in Ireland or abroad. However, all of the below options may also be used.

4.3.2.1 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.

4.3.2.2 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 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.

4.4 Excavation from the Riverbed

4.4.1 Waste Arisings

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. The approximate breakdown of the classification of the excavated material from the riverbed is shown is shown in **Table 2**.

Table 2: 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**

4.4.2 Waste Management

4.4.2.1 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.

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[6].

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.

[6] EPA (2020). *Construction & Demolition Waste Statistics for Ireland. Latest Reference Year: 2018 [Online].* Available from: http://www.epa.ie/nationalwastestatistics/constructiondemolition/ [Accessed: 15 April 2021].

4.4.2.2 Recycling / Recovery

For excavated material from the riverbed which is not a by-product, this will be 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 approximately 583,974[7] 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.

4.4.2.3 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 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'[8] and the EPA 'Guidance on Soil and Stone By-products'[9]. 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.

[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] EPA (2020). *Guidance on Waste Acceptance Criteria at Authorised Soil Recovery Facilities. EPA, Johnstown Castle, Wexford, Ireland.*

[9] EPA (2019). *Guidance on Soil and Stone By-products in the context of article 27 of the European Communities (Waste Directive) Regulations 2011*. Version 3. EPA, Johnstown Castle Estate, Wexford, Ireland.

Approximately 5,000 tonnes of material identified upstream of Arklow bridge is considered hazardous in accordance with the Waste Acceptance Criteria (WAC)[10] and must be disposed of at an authorised hazardous waste management facility.

There is currently limited capacity for hazardous excavated and dredged 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]

4.5 Construction

4.5.1 Waste Arisings

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.

4.5.2 Waste Management

The Contractor shall take the following measures to prevent waste, facilitate recycling and minimise waste disposal during the construction phase:

- Source Segregation: Where possible, metal, timber, glass and other recyclable material will be segregated and removed off site to a permitted/licensed facility for recycling. Waste stream colour coding and photographs will be used to facilitate segregation.

[10] 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*.

- Office and food waste arising on site will be source separated at least into dry mixed recyclables, biodegradable residual wastes.
- Waste bins, containers, skip containers and storage areas will be clearly labelled with waste types which they should contain, including photographs as appropriate.
- The site will be maintained to prevent litter and regular litter picking will take place throughout the site.
- Material Management: 'Just in time' delivery will be used so far as is reasonably practicable to minimise material wastage.
- Waste Auditing: The Contractor will record the quantity in tonnes and types of waste and materials leaving the site during the demolition works. 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 material which is recovered and disposed of.
- Paints, sealants and hazardous chemicals etc. will be stored in secure, bunded locations.
- All hazardous waste will be separately stored in appropriate lockable containers prior to removal from site by an appropriate waste collection holder.
- Waste generated on site will be removed as soon as practicable following generation for delivery to an authorised waste facility.
- The contractor will ensure that any off site interim storage facilities for excavated material have the appropriate waste licences or waste facility permits in place.

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 Management) 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).

5 Waste Collection

Waste from site clearance, demolition, excavation and construction will be transported by authorised waste collectors in accordance with the *Waste Management (Collection Permit) Regulations, 2007 as amended*.

An up to date list of all waste collectors used to transport waste from site during the proposed scheme works will be maintained on site and updated by the Contractor. A sample summary table template is included as **Table 3.**

Copies of valid appropriate waste collection permits will be held on site by the contractor.

Table 3: Waste Collection Permits – Sample Table

Waste Collector	Address	Waste Collection Permit Number	Waste Types Collected – List of Waste Code	Waste Types Collected – Text Description

6 Waste Recovery and Disposal Offsite

Waste from demolition and construction will be delivered to authorised waste facilities in accordance with the *Waste Management Acts 1996 to 2011, as amended.*

An up to date list of all waste facilities to which waste from the site will be delivered will be maintained on site and updated by the Contractor. A summary table template is included as **Table 4**.

Copies of valid facility Certificates of Registration, Waste Facility Permits and Waste Licences will be held on site by the Contractor.

Table 4: Waste Facilities – Sample Table

Waste Facility Name	Address	Waste Licence/Waste Permit/Certificate of Registration Number	Regulatory Authority	Waste Types to be Delivered – List of Waste Code	Waste Types to be Delivered – Text Description

7 Costs of Waste Management

As required by the *Department of the Environment, Heritage and Local Government Best Practice Guidelines on the Preparation of Waste Management Plans for Construction & Demolition Projects* this section addresses costs of waste management.

While landfill disposal has been the most commonly used method for waste management in Ireland in the past, waste to energy incinerators are also now in operation at Poolbeg, Dublin 4 and in Carranstown, County Meath.

Typically, the current cost of disposal of waste to landfill in Ireland exceeds €170 per tonne. From 1st July 2013 in accordance with the Waste Management (Landfill Levy) (Amendment) Regulations 2013 the 'landfill levy' increased to €75 per tonne for waste disposed to landfill.

In addition to landfill operator fees and landfill levies there are additional costs included in the 'true cost of waste management' including:

- The purchase cost of waste materials (including imported soil);
- Handling costs;
- Storage and transportation costs; and
- Revenue generated from sales.

Therefore, in order to reduce costs associated with waste management, surplus materials should be reused and recycled where possible and materials should be carefully stored and handled to minimise risk of damage.

8 Record Keeping and Auditing

The Contractor will record the quantity in tonnes and types of waste and materials leaving the development site during the site clearance and demolition, excavation and construction phases.

The name, address and authorisation details of all facilities and locations to which waste and materials from the proposed development are delivered will be recorded along with the quantity of waste in tonnes delivered to each facility and the date of the waste movement. Records will show material which is recovered and disposed of.

The waste manager will arrange for a waste audit of the project once demolition has fully commenced on site and of any facilities to which demolition waste from the project is delivered as required. The waste manager will also arrange for a waste audit of the project once construction has fully commenced on site and of any facilities to which construction waste from the project is delivered as required.