

Attachment-4-3-4-R and D Activity Capacity Calculations

1. Waste Recovery Capacity

Class R 5 (P). Recycling/reclamation of other inorganic materials, which includes soil cleaning resulting in recovery of the soil and recycling of inorganic construction materials.

The volume of material to be extracted from the proposed extension to the quarry has been calculated by AGECE Consulting Engineers based on 3-D modelling. The modelling indicates that there are c. 846,000 cubic metres (c. 1,354,400 tonnes) of material to be extracted within the proposed extension area. The quarry is proposed to be fully restored to the original landform therefore the restoration volumes will equate that of the extraction. Restoration shall be undertaken via the recovery of waste (inert soil - LoW Code 17 05 04) to the facility which shall be used as backfill within the quarry void. The density of the extracted sand and gravel have been assumed to be similar to that of the imported fill (inert waste) estimated at 1.6 tonnes/m³. Accordingly, the total capacity for recovery of inert soil at the facility is estimated as c. 846,000 cubic metres (c. 1,354,400 tonnes).

The above quantity calculations exclude the upper 3.3m of soil at the site comprising of topsoil (0.3m thick) and sandy subsoil (3m thick). These shall be retained on-site for use in restoration works as detailed in Section 3 (Non-Waste Storage below).

The initial 3 years of the proposed quarry operations will comprise extraction activities only which is not a licensable activity and does not form part of the waste licence application. The waste licence application relates to the recovery of inert soil for use as fill in the quarry void which will commence in about year 4 of the facility operations. The staged commencement of extraction and restoration allows time for a sufficient area of the quarry floor to be made available for filling, and which will allow working area for extraction and filling operations to be carried out with minimal interference from either operation.

The maximum proposed extraction output rate from the quarry has been estimated as 100,000 tonnes per annum. Based on consultations and projection of market requirements from developers, the predicted annual rate of inert soil available for the proposed quarry void filling is estimated as 80,000 tonnes.

Based on the above annual extraction and filling rates, the operation of the proposed quarry is estimated at about 20 years. The latter 5-years of operations will be filling only as the remaining proposed quarry void is filled with inert soil. Table 1 below indicates Predicted Annual Extraction and Filling Quantities and timeframes for both quarry and waste recovery (filling) activities.

Table 1: Predicted Annual Extraction and Filling Quantities

Year	Extraction Quantity (tonnes)	Extraction Volume (m ³)	Recovery/ Filling Quantity (tonnes)	Recovery/ Filling Volume (m ³)
1	100,000	62,500	No filling	No filling
2	100,000	62,500	No filling	No filling
3	100,000	62,500	No filling	No filling
4	100,000	62,500	80,000	50,000
5	100,000	62,500	80,000	50,000
6	100,000	62,500	80,000	50,000
7	100,000	62,500	80,000	50,000
8	100,000	62,500	80,000	50,000
9	100,000	62,500	80,000	50,000
10	100,000	62,500	80,000	50,000
11	100,000	62,500	80,000	50,000
12	100,000	62,500	80,000	50,000
13	100,000	62,500	80,000	50,000
14	54,400	34,000	80,000	50,000
15	Extraction ended	Extraction ended	80,000	50,000
16	Extraction ended	Extraction ended	80,000	50,000
17	Extraction ended	Extraction ended	80,000	50,000
18	Extraction ended	Extraction ended	80,000	50,000
19	Extraction ended	Extraction ended	80,000	50,000
20	Extraction ended	Extraction ended	74,400	46,500
Total	1,354,400	846,500	1,354,400	846,500

Notes:

- (1) Density of sand and fill (inert waste) assumed at 1.6 tonnes/m³
- (2) The predicted extraction and filling rates will vary depending on market demands.

2. Waste Storage Capacity

Class R 13. Storage of waste pending any of the operations numbered R 1 to R 12 (excluding temporary storage (being preliminary storage according to the definition of 'collection' in section 5(1)), pending collection, on the site where the waste is produced).

There shall be two types of waste storage onsite including storage of imported fill and storage of quarantined imported filled. The maximum amount waste that may be stored on site is as follows:

- 5,600 tonnes of imported soil may be temporarily stored within the existing quarry void; and,
- 720 m³/ 1,152 tonnes of quarantined waste (non-inert soil and stone).

It is expected that there will be minimal stockpiling and storage of imported soil. It is proposed that under normal circumstances that imported soil shall be unloaded at the filling area and used immediately in restoration works. The filling area will be the current location where active restoration works are taking place at the time.

Where stockpiling of imported soil is required due to unexpected circumstances, a maximum quantity of 5,600 tonnes of imported soil may be temporarily stored within the existing quarry void, if required. This figure has been calculated based on 2D modelling of the available space within the existing quarry void. Soil will be stored in stockpiles on the North section of the existing quarry floor as indicated in the *Attachment-3-1-Site Plan*. As soon as practicable, soil temporarily stored within the existing quarry void shall be moved to the active restoration and used as fill.

2D modelling was undertaken to assess the available space remaining within the existing quarry floor for storage of imported. It is estimated that an approximate area of 1000m² is available for temporary storage of imported fill, where required. Based on a proposed storage height of 4 m proposed for this material it is estimated that approximately 3,500m³ (5,600 tonnes) may be stored in this area.

Where imported inert soil is found to contain extraneous, non-hazardous or hazardous material then it will be segregated and removed to the quarantine area for closer inspection and classification. The quarantine area will be located on the North section of the site as indicated on *Attachment-3-1-Site Plan*. The quarantine area comprises a concrete hard standing, separated into 4 no. bays by walls approximately 3m in height. Each bay is 6m in length and 10m wide, giving a total area for storage of approximately 240 square meters (720 cubic meters)/ 1,152 tonnes). It is estimated however that due to the stringent pre-acceptance and waste acceptance procedures that less than two loads of material (<40 tonnes) will be quarantined.

3. Storage Capacity-Non-Waste

Both the topsoil and sandy subsoil stripped for the quarry surface will be stored on site and used for progressive restoration following placement of imported inert soil. Similarly, extracted material deemed unsuitable for export from site shall be used in the restoration of the quarry void. There is a specified purpose for these materials as per planning conditions for the facility which require the restoration of the site to its original landform following extraction activities. Therefore, the temporary storage of these materials is instrumental in the restoration of the site and as such these materials are not considered to be waste as per the *Waste Management Act 1996*, as amended and *the Waste Management (Management of Waste from the Extractive Industries) Regulations 2009*. There shall be no extractive waste generate as a result of extraction activities and as such the above Regulations are not considered applicable to the facility.

Topsoil and overburden (sandy subsoil) stripped from the extraction area over the initial 4-year period of the quarrying activity will be stored on site. Topsoil and overburden (sandy subsoil) stripped from the extraction area over the initial 4-year period of the quarrying activity will be stored on site. The sandy subsoil will be stored within the floor of the existing quarry, with topsoil stored in bunds along the southern boundary of the proposed quarry extension site. These materials shall be used for the final restoration of the quarry void during years 15 to 20 of the facility operations. Topsoil and overburden stripped during years 5 to 14 shall be used directly within the restoration area avoiding the requirement to store these materials onsite and to minimise earthworks.

By year 4, filling and part restoration will be underway and at that time it is estimated that about 30% of the extraction area would have been stripped prior to restoration. The maximum required overburden (topsoil and subsoil) storage is based on 30% of the extraction area being stripped, taking into account any re-use of material in restoration. Table 1 below details the calculated volumes of topsoil and subsoil requiring storage.

Table 2: Overburden volumes for restoration and storage location

Overburden	Total Volume	Maximum Stored Volume (30% of total)	Storage Location
Topsoil	17,490m ³	5,250m ³	Bund on southern boundary
Sandy subsoil	174,900m ³	52,500m ³	Floor of existing quarry to northeast and floor of proposed quarry, as required

The topsoil storage bund proposed along the southern boundary of the site will be approximately 15m wide at its base with a maximum height of about 2m, with a flat/even 2m-wide central section running down its centre. This gives a storage of 17m³ per metre of bund. With a total bund length of about 360m. The available storage volume in bund is therefore 6,120m³ which shall be sufficient to store the stripped topsoil (5,250 m³) from years 1 to 4 of the facility operations. The plan area of the existing quarry is over 10,000m² with a potential to fill up to about 10m or more, if required. An area of 6000m² has been designated allowing 10m height storage (total area 60,000m³) within the northwest section of existing quarry void to provide for the storage of stripped overburden (year 1 to 4).

Based on existing quarry activities, the quantity of extracted material deemed unsuitable for export from site will be less than 1% of overall extraction materials. It is estimated that approximately 400,000 tonnes (250,000m³) of material shall be extracted within the initial 4-year period of extraction. It can therefore be estimated that a maximum quantity of 4,000 tonnes (2,500m³) will require storage prior to the commencement of filling operations. Based on 2D modelling of the available space within the existing quarry void, with a proposed maximum storage height of 4m proposed for this material, an area of 1000m² has been designated for storage of this material. Allowing for banked sides to the stockpile due to likely un-cohesive nature of this material, this gives a minimum of 3000 m³ storage.

It is deemed that there is sufficient space within the exiting quarry floor for temporary storage of stripped overburden (year 1 to 4), extracted material deemed unsuitable for export (year 1 to 4) and approximately 3,500m³ of imported fill.

4. National targets for the recycling and recovery of waste

The most recent waste management data available for Ireland is presented in the *National Waste Report (2012)* which was published by the EPA in August 2014 and states that Ireland achieved all its EU obligations across a broad range of waste legislation in relation to recycling, recovery and diversion targets. The Waste Framework Directive (2008/98/EC) has a target for Dec 2020 of *preparing for reuse, recycling and other material recovery (incl. beneficial backfilling operations using waste as a substitute) of 70% by weight of C&D non-hazardous waste*; However, this target excludes natural soils & stone. The EPA website (<https://www.epa.ie/nationalwastestatistics/constructiondemolition/>) states:

- *In 2014, 3,314 ktonnes of construction & demolition waste were finally treated (recovered or disposed). Soil & stones accounted for 74 per cent of the total quantity. Mineral waste (concrete, bricks, gypsum) accounted for 12 per cent of the total quantity.*
- *Under the Waste Framework Directive (2008/98/EC) there is a target for Member States to achieve 70 per cent material recovery of non-hazardous, non-soil & stones C&D wastes by 2020. Ireland achieved 68 per cent recovery in 2014. The Waste Framework Directive target only applies to a portion of all C&D wastes generated, as hazardous wastes and soil & stones wastes are excluded from the calculation.*
- *Final treatment operations (recycling, backfilling, use as a fuel, 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 soil & stones. Recycling was the dominant treatment activity for materials separated for that purpose (e.g. C&D waste glass). Residues from sorting (e.g. fines) were used as landfill cover (backfilling) and difficult wastes that could not be recovered were disposed (e.g. residues from sorting of waste, C&D waste containing asbestos or PCBs).*
- *Having adequate authorised treatment capacity for C&D waste is vital to avoid unauthorised C&D waste disposal. The Waste Management Planning Regions have highlighted a lack of treatment capacity for soil & stones. Soil & stones accounted for 75 per cent of the total quantity of C&D waste finally treated in 2014 and is a significant waste stream in terms of quantity arising.*
- *C&D produces the largest volume of waste in the EU. In November 2017, the European Commission published non-binding guidelines for the construction industry as part of the Circular Economy Package – the EU C&D Waste Management Protocol. The aim of any C&D project should be to prevent waste arising but where waste does arise that it must be appropriately segregated, collected and transferred to an authorised waste management facility. Many C&D wastes are suitable for recycling, once they are properly segregated at source.*

While there are no national or EU targets specified for the recovery of soil and stone, as per the above, the Waste Management Planning Regions have highlighted a lack of treatment capacity for soil & stones. The proposed development shall provide much need capacity for soil and stone recovery in the South-East region and promotes appropriate segregation and recovery of inert waste in the construction and demolition industry.

5. Food Waste

Waste generation from the site office and weighbridge are considered to be minor and shall be disposed of within dedicated recycling of refuse bins. The *Waste Management (Food Waste) Regulations 2009* are not applicable to the facility

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