Appendix A.9.3

MDA Baseline Report

A.9.3 MDA Baseline Report

Galway County Council

N6 Galway City Ring Road

Material Deposition Areas - Baseline Report

GCRR-4.04.03.9

Issue 2 | 28 March 2025

This report takes into account the particular instructions and requirements of our client.

It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party.

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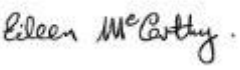
		Signature			
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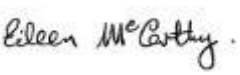
		Signature			
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Contents

1 Introduction

This report has been prepared to document the requirements for the Material Deposition Areas (MDAs) required as part of the N6 proposed N6 Galway City Ring Road (GCRR). It has been reviewed and updated to take account of of points raised from the Brief of Evidence presented and submissions made by Galway County Council to An Bord Pleanála (ABP) at the oral hearing in 2020 and from the ABP Inspector's Report dated June 2021 and the findings of assessments undertaken in 2024 to inform the updated EIAR to reflect recent source material and information where this is available.

MDAs are required to satisfy the necessary engineering, environmental and safety requirements for the proposed N6 GCRR in the following locations:

- Construction within the grade separated junctions, where the ground level of the junction is much higher than the surrounding landscape
- Landscaping and attenuation pond construction
- Slope stabilisation at Lackagh Quarry in areas where the exposed quarry has significant blast damage
- To facilitate the creation of ecological habitat creation

While supporting the requirements highlighted above, MDAs also allow for the placement of surplus (to the fill requirement of the proposed N6 GCRR) earthworks material generated during construction. The reuse of this surplus material will ensure this natural resource will remain in productive use for longer and reduce / avoid the need for removal of the material as a waste. This approach is in line with circular economy principles outlined in the National Waste Policy 2020-2025, National Waste Regulations and European Union Waste Directives. This was outlined in the 'Responses to Queries raised in Module 2 of the N6 Galway City Ring Road in respect of Lackagh Quarry Material Deposition Areas[1]' at the Oral Hearing in 2020.

The locations of the MDAs are shown on Figures 7.301 and 7.302 of the updated EIAR. Material not suitable for placement within the MDAs, for example hazardous material, will be removed off site[2].

These MDA locations were assessed by the various environmental specialists including ecological, landscape & visual, geotechnical, hydrogeological and hydrological specialists to complete an environmental assessment of the deposition of material.

The objective of this report is to present:

- an overview of the MDAs including the:

[1] https://www.n6galwaycityringroad.ie/sites/default/files/media/GCRR_4-03.34.13.004_Lackagh%20Quarry%20Response_I1.pdf
[2] Refer to Chapter 7, Construction Activities and Chapter 20, Resources & Management of the updated EIAR and the Construction Environment Management Plan (CEMP) in Appendix A.7.5 of the updated EIAR for waste management of material to be removed off site.

  - volume and composition of the material suitable for placement
  - location and area footprint
  - permitted placement material at each location
  - capacity
- the design criteria to be adhered to by the Contractor including the:
  - engineering design requirements
  - environmental design requirements
  - site-specific design requirements
- a summary of the MDA requirements

Please note that the terminology in this document has been updated since the 2020 Oral Hearing to reference the new terminology provided in the TII Earthworks Specification for National Roads published in September 2024, namely:

- Acceptable material is now referred to as Compliant material
- Unacceptable U1 material is now referred to as Non-Compliant material
- Unacceptable U2 (hazardous) material is now referred to as Unacceptable material.

However, all of the MDA locations, material volumes and associated content as presented at the 2020 Oral Hearing remains unchanged.

Text in purple represents changes which were noted in Appendix A Corrigenda in 'Responses to Queries raised in Module 2 of the N6 Galway City Ring Road in respect of Lackagh Quarry Material Deposition Areas[3]' which was submitted at the Oral Hearing.

[3] https://www.n6galwaycityringroad.ie/sites/default/files/media/GCRR_4-03.34.13.004_Lackagh%20Quarry%20Response_I1.pdf

2 Material Volumes and Composition

2.1 Material Volumes

All excavated material, excluding a small potential volume of unacceptable (hazardous) material, will be re-used as construction fill and material deposition minimising the loss of solid geology.

Material that will be generated during excavation was firstly quantified and classified. Then this material was assessed for its compliance for re-use as part of construction. Following this, the volume of material surplus to the fill requirements of the proposed N6 GCRR was determined.

This analysis determined that approximately **366,000m^3** of material will be generated for placement in MDAs. The materials comprise:

- **33,700m^{3*} of Topsoil** a Class 5 material as outlined in TII Series 600 Table 6/1
- **76,000m^{3*} of Peat** in line with TII Series 600, non-hazardous peat shall be categorised as non-compliant material
- **65,000m^{3*} of Marginal Material** which is overburden material that requires treatment such as addition of lime or air drying in order to meet compliance requirements of TII Series 600 and used within the construction
- **147,500m^{3*} of Non-Compliant Soil:** Non-hazardous soil which does not comply with the requirements outlined in TII Series 600 Section 1.1, shall be categorised as non-compliant material
- **43,800m^{3*} of Non-Compliant Rock:** Non-hazardous rock which does not comply with the requirements outlined in TII Series 600 Section 1.1, shall be categorised as non-compliant material

*estimated volumes

2.1.1 Material Bulking

No account for material bulking from *in situ* to placed volume is included in the generated material volume of **366,000m^3** (presented above). Bulking occurs when soil or rock is excavated, for example 1m^3 of soil or rock *in situ* in the ground does not translate to 1m^3 in a lorry or placed and compacted on site.

Given the nature of non-compliant material, which is unsuitable for road construction, compaction may be challenging. Typically, bulking factors depend on material type and size and can range from 10-15% for granular material, 20-40% for cohesive material, 25-45% for peat and 30-80% for rock depending on the size (gravel to boulders). Assuming a general bulking factor of 30% the deposition volumes equate to:

- 33, 700m^3 of **Topsoil** bulked = **43,800m^3**
- 76, 000m^3 of **Peat** bulked = **98,800m^3**
- 65, 000m^3 of **Marginal Material** bulked = **84,500m^3**

- 147, 500m^3 of **Non-Compliant Soil** bulked =**191,750m^3**
- 43, 800m^3* of **Non-Compliant Rock** bulked = **56,950 m^3**

2.1.2 Volume Limitations

Material volumes are based on the difference between the existing and proposed vertical and horizontal road alignment which identifies areas of cut and fill (embankments). The excavated material has been classified based on ground investigation information available for the area and assessed for compliance and reusability, based on the requirements of TII SRW Series 600 Earthworks, for re-use as part of construction.

It should be noted that the ground investigation data provided valuable information on the soils and geology at point locations. Between each point the data has been interpolated using a conservative interpretation to defined material boundaries. While ground conditions can vary between locations the exploratory locations were selected following the completion of the comprehensive baseline data collection.

2.2 Material Composition

For the purpose of defining the material suitable for placement in MDAs, the materials are grouped into two material type categories. This natural split is influenced by the engineering properties. These are:

1. **Peat** is typically present over the granite bedrock on the western extents of the proposed N6 GCRR. The thickness of peat is typically between 0.5 – 1.0m. According to the requirements outlined in Section 1.1 of TII SRW Series 600, peat is a non-compliant material from an earthworks perspective.
2. **Non-compliant material**, consisting of non-hazardous material and which may consist of materials from swamps, marshes and bogs, made ground comprised of man-made materials, argillaceous rock and calcite, logs, stumps and perishable material, materials in a frozen condition, clay having a liquid limit determined in accordance with BS 1377 : Part 2, exceeding 80 or plasticity index determined in accordance with BS 1377 : Part 2, exceeding 55, material susceptible to spontaneous combustion and non-hazardous materials other than those classified as compliant in accordance with TII SRW Series 600.

2.3 Volume and Composition Summary

Based on the two material groups presented in Section 2.2, the estimated bulked volume of material available for MDAs is:

- 76,000m^3 of peat bulked = **98,800m^3**
- 290,000m^3 of in-situ non-compliant material bulked = **377,000m^3**
- **Total volume: 475,800m^3**

As part of the MDA assessment the various environmental specialists including ecological, landscape & visual, geotechnical, hydrogeological and hydrological

specialists completed an environmental assessment of the material group type suitable for deposition in a particular location to ensure there are no environmental constraints preventing placement of a particular material in these locations. Subsequently each area was designated as a non-compliant material receptor only or as a peat and non-compliant material receptor.

3 Material Deposition Areas

Material Deposition Areas are located east and west of the River Corrib within the Assessment Boundary. These locations were selected to satisfy the necessary engineering, environmental and safety requirements for the proposed N6 GCRR.

Care was also taken to adopt sustainability principles by endeavouring to plan for the deposition of excess material arising as close as possible to the point of extraction, thereby optimising material haulage and reducing excessive or lengthy transportation of material during construction. In the case of peat, the majority of peat generated as part of the proposed N6 GCRR is west of the River Corrib. The design process aimed to maximise placement of peat within MDAs west of the River Corrib. However, not all MDAs west of the River Corrib could facilitate the placement of peat with consideration of the criteria outlined below in Section 4. Therefore, the next nearest MDAs east of the River Corrib were reviewed to optimise placement of peat (namely, DA24, DA25 and DA28 in Lackagh Quarry).

A total of 32 site areas have been identified as MDAs along the route of the proposed N6 GCRR and their locations are shown on Figures 7.301 and 7.302 of the updated EIAR. Table 3.1 below details the placement footprint area and material type at each location. The material type stated in Table 3.1 does not state the material required as part of stabilisation and drainage layers within the MDA. These are outlined in Section 4 of this report. The ecological requirements detailed in the Habitat Compensation Management Plan in Appendix A.8.27 of the updated EIAR must also be adhered to where the MDAs are provided to facilitate the ecological habitat compensation.

Peat can only be used in areas stated in the table below and not in other MDAs, however in areas where peat is permitted it is not mandatory that peat is placed at each of these locations. Alternative materials can be placed at these locations if the material volume capacity is not exceeded.

Table 3.1: Material Deposition Area locations, area footprint and material type

Number	Location	Approximate Chainage	Area (ha)	Material Type
DA01	R336 Coast Road	0+050	0.089	Peat with non-compliant material (excl. peat) bunds
DA03	Cnoc na Gréine	0+350	0.112	Peat with non-compliant material (excl. peat) bunds
DA04	Na Foraí Maola Thiar	1+050	0.098	Peat with non-compliant material (excl. peat) bunds
DA05	Na Foraí Maola Thoir	1+450	1.051	Non-compliant material (excl. peat)
DA06	Troscaigh Thiar	1+800	0.483	Peat with non-compliant material (excl. peat) bunds

Number	Location	Approximate Chainage	Area (ha)	Material Type
DA07	Bearna to Moycullen Road	2+900	0.065	Peat with non-compliant material (excl. peat) bunds
DA08	Bearna to Moycullen Road	2+950	0.602	Peat with non-compliant material (excl. peat) bunds
DA09	An Chloch Scoilte	3+250	0.239	Peat with non-compliant material (excl. peat) bunds
DA11	An Chloch Scoilte	3+950	0.314	Peat with non-compliant material (excl. peat) bunds
DA12	An Chloch Scoilte	4+050	0.18	Peat with non-compliant material (excl. peat) bunds
DA13	Cappagh	4+850	0.121	Peat with non-compliant material (excl. peat) bunds
DA14	Ballymoneen	5+250	0.811	Peat with non-compliant material (excl. peat) bunds
DA15	Keeraun	5+950	0.484	Peat with non-compliant material (excl. peat) bunds
DA17	Bushypark	0+050	0.079	Non-compliant material (excl. peat)
DA18	Bushypark	0+075	0.393	Non-compliant material (excl. peat)
DA19	Bushypark	0+200	0.353	Peat with non-compliant material (excl. peat) bunds
DA20	Dangan	8+100	0.149	Non-compliant material (excl. peat)
DA21	Dangan	8+200	0.069	Non-compliant material (excl. peat)
DA24	Lackagh Quarry	11+350	2.52	Non-compliant material with contained peat placement in flat areas
DA25	Lackagh Quarry	11+550	0.48	Non-compliant material with contained peat placement in flat areas
DA27	Lackagh Quarry	11+550	0.4	Non-compliant material (excl. peat)
DA28	Lackagh Quarry	11+650	2.8	Non-compliant material with contained

Number	Location	Approximate Chainage	Area (ha)	Material Type
				peat placement in flat areas
DA29	Ballinfoile	12+200	0.208	Peat with non-compliant material (excl. peat) bunds
DA31	Twomileditch	13+650	0.234	Peat with non-compliant material (excl. peat) bunds
DA32	Twomileditch	14+000	1.368	Non-compliant material (excl. peat)
DA33	Parkmore	13+950	0.315	Non-compliant material (excl. peat)
DA34	Parkmore	13+950	0.195	Non-compliant material (excl. peat)
DA35	Coolagh	16+000	0.395	Peat with non-compliant material (excl. peat) bunds
DA37	Coolagh	16+550	1.15	Non-compliant material (excl. peat)
DA38	Coolagh	16+350	1.797	Non-compliant material (excl. peat)
DA39	Coolagh	16+450	0.44	Non-compliant material (excl. peat)
DA40	Coolagh	16+500	0.782	Non-compliant material (excl. peat)

4 Design Criteria

A number of factors influence the MDA plan area, geometry and composition. These include the requirements for MDA slope stability, blast damaged slope stability, ecological habitat compensation (including their maintenance) and landscaping requirements. The constraints of the existing location also influence the MDA, for example slope stability of existing blast damaged rock faces in Lackagh Quarry. As outlined in the updated EIAR there is scope to refine the MDAs. The allowable capacity of the MDAs is presented in Section 5 of this report.

This section of the report presents the Material Deposition Area criteria that the Contractor shall adhere to at the construction stage. These include:

- Engineering Design Requirements
- Environmental Design Requirements
- Site Specific Design Requirements

4.1 Engineering Design Requirements

The engineering design requirement include:

- Stability design
- Height of material placement area
- Drainage requirements

4.1.1 Stability Design

The MDA design will be governed by the available area, the placement material, the proposed placement volume, construction sequence (including timeline) and the site-specific location constraints.

4.1.1.1 Deposition area slopes

Bund slopes will be constructed from non-compliant material (not including peat). Bund slope gradients are permitted to range from 1 vertical (V) in 2 horizontal (H), 1 (V) in 3 (H) or 1 (V) in 4 (H).

The slope is governed by the available material, i.e. the steeper the slope the superior the material quality. A free draining granular layer may be incorporated into the slope and/or slope surface to achieve slope and surface stability. A slope stability assessment will be undertaken at construction stage using the parameters of the proposed placement material for each MDA complying with Eurocode 7, BS8081 slope stability requirements to ensure stable MDAs.

In general, a 1 (V) in 3 (H) slope has been assumed for each proposed MDA.

4.1.1.2 Low strength material

Low strength material will generally be placed in the central section of the MDAs as it is not suitable for placement on bund side slopes for stability reasons. This is particularly relevant to peat. Where low strength material is proposed, stability layers may be introduced into the fill to control slope stability.

Some of the low strength non-compliant material encountered along the proposed N6 GCRR will likely increase in strength with reworking such as drying. This is evident from the material encountered during the ground investigation.

The peat encountered along the proposed N6 GCRR during the ground investigation ranged in natural moisture content from 90 to 970%. Careful handling is essential to retain any existing structure and integrity of the excavated materials, where minimising agitation of the acrotelm[4] will safeguard important processes such as carbon sequestration. The following principles will be employed when handling peat at the construction phase of the proposed N6 GCRR:

- Minimise plant movements and haul distances in relation to any peat earthworks activities
- Appropriate temporary storage areas for excavated peat close to the excavation will be developed
- Peat placement will occur as soon as possible after excavation where practicable

A number of peat reinstatement options at the MDAs are available to the Contractor including:

- Peat placement in the upper central portion of the MDA only (non-compliant material, excluding peat, placed in the bund slopes and base)
- Peat blending with a more consolidated peat, granular material or cement
- Drying of peat to reduce the natural moisture content
- Containment, separating the placement area into a series of cells, with the cell structure constructed from impermeable material
- Covering of the peat with subsoils or topsoils to prevent dust generation and to allow for appropriate ecological/landscape finish to surface
- The surface of the MDAs is finished with an ecological/landscape treatment. The treatment should have regard to the local environment and may provide for seeding to meadow grass, for heath development, with or without shrub planting

Where MDAs are used to facilitate ecological habitat compensation (see **Table 4.3**) a number of the above principles will not apply. The more site-specific requirements for these areas in terms of peat removal, handling, storage, placement and treatment are outlined in Appendix A.8.27 of the updated EIAR. For MDAs where peat is proposed to be placed and which have been designated as areas for

[4] In accordance with TII Series 600 Earthworks Specification, 'acrotelm' is defined as the upper layer of in situ peat consisting of living mosses and poorly decomposed plant debris.

compensation of calcareous grassland, particular measures are required and outlined in Section 4.2.

4.1.2 Material placement height

Material placement is generally limited to 2m above existing ground level with the deposition height locally varying depending on the local topography where local depressions occur. Exceptions for placement greater than 2m are discussed below and presented in Table 4.1.

Material placement greater than 2m is proposed at locations for where the deposition material is contained within embankments for health and safety requirements and in Lackagh Quarry where material placement is required for health and safety for slope stability purposes. Lackagh Quarry design requirements are discussed in Section 4.3.2.

In areas where material placement is greater than 2m granular layers (class 1 type material) may be introduced into the fill to control slope stability.

The embankment height for MDAs that are contained within embankments will be governed by the lowest embankment height, refer to Figure 4.1 below.

Figure 4.1: Contained Material Deposition Area

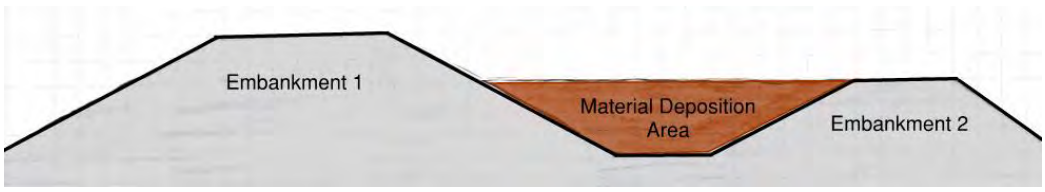

Table 4.1: Locations where the material placement height may exceed 2m

Number	Approximate Chainage	Placed material type	Rational for permitting material placement greater than 2m
DA25	11+550	Peat with bunds of non-compliant material (other than peat)	Located within Lackagh Quarry site
DA27	11+550	Non-compliant material (other than peat) with granular drainage layers	Located within Lackagh Quarry site and required for slope stabilisation of existing blast damage to quarry walls
DA28	11+650	Peat, non-compliant material (other than peat) with granular drainage layers	Located within Lackagh Quarry site and required for slope stabilisation of existing blast damage to quarry walls and protection of Lough Corrib SAC Annex I habitat
DA29	12+200	Peat with bunds of non-compliant material (other than peat)	Contained within embankments

Number	Approximate Chainage	Placed material type	Rational for permitting material placement greater than 2m
DA39	16+450	Non-compliant material (other than peat)	Contained within embankments
DA40	16+500	Non-compliant material (other than peat)	Contained within embankments

4.1.3 Drainage

The drainage arrangement for each MDA shall comply with TII publications standards and the requirements outlined in the Construction Environmental Management Plan (CEMP) (appendix A.7.5 of the updated EIAR)_for sediment, erosion and pollution control.

In areas prone to ponding of water a drainage layer is required at the base of the MDA. A number of areas specifically identified by the hydrogeologist in Lackagh Quarry also require a drainage layer at the base of the MDA and at the interface between the existing rock face and the deposition material. Refer to Section 4.3.2 for the drainage requirements in Lackagh Quarry.

The drainage layer will comprise of a free draining granular material (low percentage fines) overlain with a filter separator (e.g. geotextile) to prevent the migration of fines material from the material placed in the deposition area.

Where an area of habitat planting has a requirement for a free draining layer beneath the surface and it corresponds with a proposed MDA where peat may be placed, the free draining layer will be placed between the peat placement layer and the habitat to be created layer. The free drainage material will be contained within a filter separator layer (e.g. geotextile), above and below to prevent the migration of fines sediment therefore ensuring the functionality of the layer.

MDAs shall be isolated from overland contribution with the only contribution to drainage flows from such sites being the direct rainfall on to the site.

Table 4.2: Deposition areas requiring drainage layers

Number	Location	Requirement
DA01	R336 Coast Road	Drainage requirements for proposed MDA in accordance with the requirements set out in the updated EIAR
DA03	Cnoc na Gréine	Drainage requirements for proposed MDA in accordance with the requirements set out in the updated EIAR
DA04	Na Foraí Maola Thiar	Drainage requirements for proposed MDA in accordance with the requirements set out in the updated EIAR
DA05	Na Foraí Maola Thoir	The site has saturated ground with a drainage channel with poor conveyance. Drainage requirements for proposed MDA in accordance with the requirements set out in the updated EIAR to address this issue.

Number	Location	Requirement
DA06	Troscaigh Thiar	Drainage requirements for proposed MDA in accordance with the requirements set out in the updated EIAR
DA07	Bearna to Moycullen Road	Drainage requirements for proposed MDA in accordance with the requirements set out in the updated EIAR
DA08	Bearna to Moycullen Road	Drainage requirements for proposed MDA in accordance with the requirements set out in the updated EIAR
DA09	An Chloch Scoilte	Drainage requirements for proposed MDA in accordance with the requirements set out in the updated EIAR
DA11	An Chloch Scoilte	This area is divided by the Bearna Stream which is a Salmonid system. Drainage requirements for proposed MDA in accordance with the requirements set out in the updated EIAR which will address this issue.
DA12	An Chloch Scoilte	
DA13	Cappagh	Drainage requirements for proposed MDA in accordance with the requirements set out in the updated EIAR
DA14	Ballymoneen	Drainage requirements for proposed MDA in accordance with the requirements set out in the updated EIAR
DA15	Keeraun	Drainage requirements for proposed MDA in accordance with the requirements set out in the updated EIAR
DA17	Bushypark	Drainage requirements for proposed MDA in accordance with the requirements set out in the updated EIAR
DA18	Bushypark	Drainage requirements for proposed MDA in accordance with the requirements set out in the updated EIAR
DA19	Bushypark	Drainage requirements for proposed MDA in accordance with the requirements set out in the updated EIAR
DA20	Dangan	Drainage requirements for proposed MDA in accordance with the requirements set out in the updated EIAR
DA21	Dangan	Drainage requirements for proposed MDA in accordance with the requirements set out in the updated EIAR
DA24	Lackagh Quarry	Refer to Section 4.3.2
DA25	Lackagh Quarry	Refer to Section 4.3.2
DA27	Lackagh Quarry	Refer to Section 4.3.2
DA28	Lackagh Quarry	Refer to Section 4.3.2
DA29	Ballinfoile	Drainage requirements for proposed MDA in accordance with the requirements set out in the updated EIAR Contractor

Number	Location	Requirement
DA32	Twomileditch	Drainage requirements for proposed MDA in accordance with the requirements set out in the updated EIAR Contractor
DA33	Parkmore	Drainage requirements for proposed MDA in accordance with the requirements set out in the updated EIAR
DA34	Parkmore	Drainage requirements for proposed MDA in accordance with the requirements set out in the updated EIAR
DA35	Coolagh	Drainage requirements for proposed MDA in accordance with the requirements set out in the updated EIAR
DA37	Coolagh	Drainage requirements for proposed MDA in accordance with the requirements set out in the updated EIAR
DA38	Coolagh	Drainage requirements for proposed MDA in accordance with the requirements set out in the updated EIAR
DA39	Coolagh	Drainage requirements for proposed MDA in accordance with the requirements set out in the updated EIAR
DA40	Coolagh	Drainage requirements for proposed MDA in accordance with the requirements set out in the updated EIAR

4.2 Environmental Requirements

The MDAs listed in Table 4.3 below also facilitate the ecological habitat compensation measures. Therefore, specific requirements which are set out in the Habitat Compensation Management Plan in Appendix A.8.27 of the updated EIAR apply at these sites.

Table 4.3: Deposition areas and habitat compensation

Deposition area	Requirement
DA01	Requirements relating to habitat/peat removal, handling, storage, placement and treatment (see Appendix A.8.27 of the updated EIAR)
DA03	Requirements relating to habitat/peat removal, handling, storage, placement and treatment (see Appendix A.8.27 of the updated EIAR)
DA05	Requirements relating to habitat/peat removal, handling, storage, placement and treatment (see Appendix A.8.27 of the updated EIAR)
DA06	Requirements relating to habitat/peat removal, handling, storage, placement and treatment (see Appendix A.8.27 of the updated EIAR)
DA08	Requirements relating to habitat/peat removal, handling, storage, placement and treatment (see Appendix A.8.27 of the updated EIAR)
DA09	Requirements relating to habitat/peat removal, handling, storage, placement and treatment (see Appendix A.8.27 of the updated EIAR)

Deposition area	Requirement
DA11	Requirements relating to habitat/peat removal, handling, storage, placement and treatment (see Appendix A.8.27 of the updated EIAR)
DA12	Requirements relating to habitat/peat removal, handling, storage, placement and treatment (see Appendix A.8.27 of the updated EIAR)
DA15	Requirements relating to habitat/peat removal, handling, storage, placement and treatment (see Appendix A.8.27 of the updated EIAR)
DA24	Requirements relating to habitat/peat removal, handling, storage, placement and treatment (see Appendix A.8.27 of the updated EIAR)
DA25	Requirements relating to habitat/peat removal, handling, storage, placement and treatment (see Appendix A.8.27 of the updated EIAR)
DA28	Requirements relating to habitat/peat removal, handling, storage, placement and treatment (see Appendix A.8.27 of the updated EIAR)

4.2.1 Peat in MDAs with Habitat Compensation

This sub-section is in accordance with the information provided in Section 3 of 'Responses to Queries raised in Module 1 of the N6 Galway City Ring Road[5]' at the Oral Hearing in 2020.

In accordance with the Habitat Compensation Management Plan (Appendix A.8.27 of the updated EIAR) a drainage layer is necessary to maintain surface drainage at ecological habitat compensation sites, in particular for the creation and maintenance of calcareous grassland (6210).

Where peat is to be placed in MDAs requiring a drainage layer for ecological habitat compensation, mixed peat shall be used in the upper areas of the MDA, with the final surface shaped to drain towards and shed surface water runoff to the perimeter of the swale and shallow surface drains which will be installed to accommodate surface drainage, as per the requirements of the CEMP in Appendix A.7.5 of the updated EIAR and Appendix C of the updated NIS.

The drainage layer will consist of a 350mm layer of free drainage material contained within a filter separator layer (e.g. geotextile), above and below to prevent the migration of fines sediment therefore ensuring the functionality of the layer. This drainage layer will also provide a separation between the calcareous grassland and the mixed peat zone. The drainage material must meet particular properties (including permeability) which may be potentially acquired on site as non-compliant material (other than peat) or may require import.

The composition of the mixed peat shall also be developed to ensure that the magnitude of immediate, primary and secondary consolidation will not exceed 250mm. The composition of the mixed peat to achieve this performance can be achieved by a combination of the following:

[5] https://www.n6galwaycityringroad.ie/sites/default/files/media/GCRR_4-03.34.13.004_Lackagh%20Quarry%20Response_I1.pdf

- Peat will be stripped and excavated in a controlled manner from its source location, excluding the material required from the sixty six dry heath donor sites. This agitation process can be used to allow excess water to dissipate, thereby reducing the water content and void ratio and in turn improving the workability of the peat.
- While at source, the peat can be mixed with other materials, including non-hazardous material classified as non-compliant material (in accordance with TII Series 600 Earthworks Specification[6]).
- At the point of deposition, further mixing is permitted in order to meet long term performance requirements. The mixed material will be spread in layers up to full thickness. The thickness of the individual layers will be determined based on the workability of the material. Each layer will be spread with appropriate plant (e.g. dozer), resulting in some compaction of the material.

The combination of the drainage layer and the sloped mixed peaty surface will facilitate free surface drainage from Point A to Point B, as shown in Figure 4.2 and Figure 4.3.

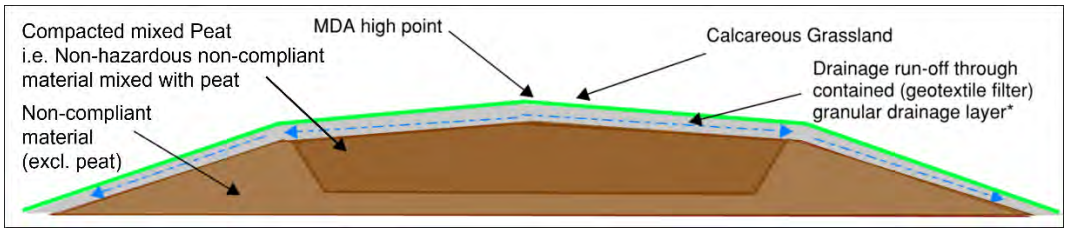

Figure 4.2 Typical Cross Section of MDA with Calcareous Grassland

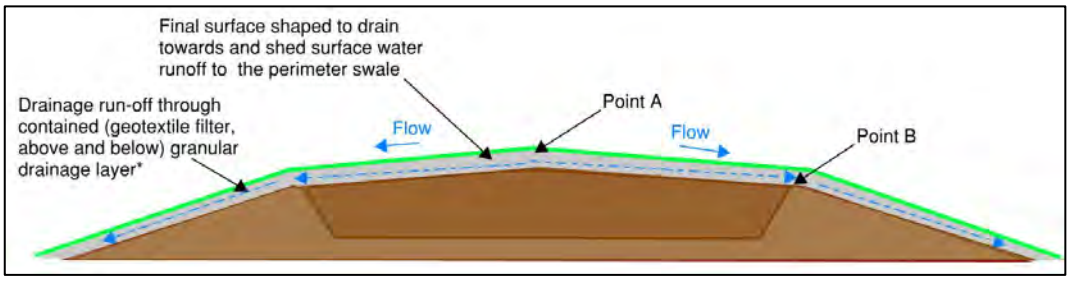

Figure 4.3 Drainage Flow Direction following Implementation of Requirements above

4.3 Site Specific Requirements

This section of the report outlines specific requirements that the Contactor shall adhere to for the relevant MDA. These are discussed below under the following headings:

- Slope Surface
- Lackagh Quarry
- Placement of Material derived from a different Lithology

[6] https://www.tiipublications.ie/library/CC-SPW-00600-04.pdf

- Streams
- ESB Network
- Demolition
- Landscape and Visual

4.3.1 Slope Surface

Depending on the location, the outer slopes of MDAs may be covered in topsoil and seeded to grass, or alternatively it may be appropriate to use lower quality topsoil and seed to locally appropriate mix of meadow grasses. A proportion of the outer slopes may also be planted with shrubs appropriate to the location and soil type, e.g. blackthorn, hawthorn, hazel, holly, willow, etc. The final surface shall reflect the surrounding environment of the MDA location.

For sediment control a rapid formation of a surface crust and vegetation cover is required to permit surface water run-off and prevent these sites becoming sediment laden.

Where MDAs are required to facilitate ecological habitat compensation there are specific requirements that must be adhered to as stated above in Section 4.2 of this report.

4.3.2 Lackagh Quarry

Within Lackagh Quarry, four Material Deposition Areas have been identified, namely DA24, DA25, DA27 and DA28. A detailed description of the MDAs in Lackagh Quarry and the particular design requirements are provided in Annex A of this report. These design requirements include:

- Where habitat compensation is specified and maintenance is required of the finished surfaces in accordance with the Habitat Compensation Management Plan in Appendix A.8.27 of the updated EIAR
- Implementation of slope stability / health and safety solutions for the exposed rock face. This solution includes rock bolt, rock dowel, steel mesh and sprayed concrete combination. The designer shall undertake a permanent composite rock support system designed to the relevant design standards (Eurocode 7, BS8081) and best practice guidance documents
- Drainage systems in accordance with the requirements set out in the updated EIAR
- Drainage layers as necessary to maintain surface drainage in accordance with the Habitat Compensation Management Plan in Appendix A.8.27 of the updated EIAR.
- A free draining granular material between the existing cliff face (including existing quarry bench faces) and material deposition material to allow the cliff face to maintain its drainage system must 1m wide. This will be a vertical layer.

- A free draining granular material between the existing quarry base and material deposition material (horizontal layers) to maintain its drainage system. The design of the drainage layer is to accommodate peak flood levels in the quarry floor which occur during the winter. This is required:
  - Where the existing quarry level at an MDA is below +17.7mOD, free draining granular material is required up to +17.7mOD
  - Above this level (+17.7mOD) a minimum of 0.5m free drainage material is required at the interface between the exiting quarry floor level and the MDA
- A filter separator (e.g. geotextile) is required between all drainage layers (vertical and horizontal) and general fill to prevent migration of fines sediment
- Maintain north east cliff heights

4.3.3 Introduction of Material derived from a different Lithology

The overburden across the proposed N6 GCRR consists of glacial till derived from the underlying bedrock. The bedrock changes approximately at the N59 Moycullen Road, from a granite in the west to a limestone bedrock in the east which have different chemical compositions.

To prevent impact to the local peatland habitats in granite bedrock areas, the following fill limitations will be incorporated at the locations identified below in Table 4.4.

- Only pavement and capping layers protected from surface water runoff and groundwater movements are permitted to be derived from non-native material
- All other compliant fill material will be derived from native material or other pH compatible material

There are no limitations for the placement of granite derived material in limestone bedrock areas as there are no potential environmental impacts.

Table 4.4: Fill Limitation Areas in MDAs in granite bedrock areas

Fill Limitation Area Location*	Fill Limitation Chainage area	
	From	To
1	0+620	0+775
2	1+150	1+475
3	1+830	2+050
4	2+200	2+325
5	2+875	3+175
6	3+450	3+550
7	3+595	3+890
8	4+650	5+150
9	7+750	7+900

*Refer to Chapter 11, Hydrology of the updated EIAR for details

4.3.4 Watercourses

Natural watercourses that are located near, or in close proximity to MDAs are presented in Table 4.5 below. The requirements outlined in the Construction Environmental Management Plan (CEMP) in Appendix A.7.5 of the updated EIAR will be implemented at these locations. These requirements include, but are not limited to:

- A setback of at least 5m from the drain/watercourse to the excavated material will be maintained for material deposition and a bund constructed to contain the excavated material. A silt fence shall be installed at least 3m from the drain/watercourse before the excavated material is deposited and shall be maintained in place until vegetation has re-established
- Where appropriate, the MDAs will be provided with a runoff collection and treatment system. This will consist of a shallow swale around the perimeter. This will be located just behind the bund or where the placed material meets the existing ground contour (approx. 2m wide by 0.25m deep). Check dams may be required to manage velocities and potential erosion within the swales
- The final surface of the MDAs will be shaped to drain towards the perimeter swale and shallow surface drains will be installed to accommodate this. The perimeter swale will discharge via a settlement pond prior to discharge at a suitably controlled rate to the watercourse or groundwater body
- In general the MDAs will be confined by the boundaries of impervious material and therefore the final surface will be shaped to shed surface water runoff to the road surface water collection/ conveyance and treatment system. Such areas will be landscaped immediately upon completion
- Interceptor drains will be installed where necessary to prevent additional drainage contribution to the MDA by diverting local drainage around these areas.

Table 4.5: MDAs and natural streams

Deposition area	Stream	Requirement
DA07	Stream	5m clearance required
DA11	Bearna Stream	5m clearance required
DA14	Tonabrocky stream	5m Buffer required between site and stream

4.3.5 Underground and Overhead Services

Each MDA shall be surveyed for underground and overhead services prior to placement. Electrical powerlines operated by ESB Networks are present within one MDA, these locations are presented in ***Table 4.6***. It should be noted that unknown services may also be present and the Contractor will carry out their own inspection for services in advance of any works.

Where services are present the following requirements are applicable:

- Relevant service providers to be contacted prior to the commencement of works to agree placement and site-specific requirements with respect to the relevant services
- 5m horizontal clear distance from existing and proposed exterior powerlines
- Existing ground level to be maintained directly beneath overhead powerlines
- No planting shall be established on MDAs under overhead powerlines and over underground services

Table 4.6: MDAs with overhead services*

Deposition area	ESB lines	Site requirement
DA37	Yes	Maintain existing ground levels directly beneath the existing and proposed 110kV diversion and 5m horizontal clear distance from the exterior powerline.

*Additional services may be present following Contractor's survey and all will adhere to the above requirements

4.3.6 Demolition Required

Structures that are present on an MDA site will be removed. Table 4.7 identifies the buildings within the MDAs that will be demolished.

Table 4.7: MDAs with structures

Deposition area	Building
DA24	Derelict building within disused quarry

4.3.7 Landscape and Visual Requirements

The landscape requirements are presented in Table 4.8 and generally relate to maintaining trees and vegetation and the setback of the MDAs requirements from property boundaries.

Table 4.8: MDAs additional requirements

Deposition area	Requirement
DA11	Maintain streamside vegetation and trees
DA15	Setback from property boundary for security and privacy
DA17	Existing ground level is sloped, placement height governed by topography and slope stability. Maintain mature trees on boundaries and setback from church grounds
DA18	Existing ground level is sloped, placement height governed by topography and slope stability. Maintain mature trees on boundaries
DA19	Existing ground level is sloped, placement height governed by topography and slope stability. Maintain mature trees on boundaries and setback from graveyard boundary
DA20	Existing ground level is sloped, placement height governed by topography and slope stability. Maintain mature trees on adjoining residential boundaries and setback from property boundaries
DA21	Existing ground level is sloped, placement height governed by topography and slope stability. Maintain mature trees on adjoining residential boundaries and setback from property boundaries
DA32	Setback from hedgerow and mature copse of trees on adjoining property boundary
DA34	Setback from boundary hedgerow and trees
DA35	Setback from eastern boundary to maintain trees and vegetation
DA38	Maintain existing mature planting along N6

5 Material Deposition Area Capacity

Table 5.1 presents the allowable capacity for each area. The allowable capacity is the volume of material that can be placed in an area taking into consideration the relevant design requirements set out in Section 4 above.

The total allowable capacity of the 32 MDAs exceeds the volume of material surplus to the construction of proposed N6 GCRR. This allows for:

- an increase / decrease in volume of a material type during construction
- volume changes based on the available material (stability assessment)
- construction programme flexibility, placing material in an efficient manner

Table 5.1: MDA allowable placement material, estimated placement volume and material type

Number	Location	Allowable Capacity (m^3)	Material Type
DA01	R336 Coast Road	1,200	Peat with non-compliant material (excl. peat) bunds
DA03	Cnoc na Gréine	2,700	Peat with non-compliant material (excl. peat) bunds
DA04	Na Foraí Maola Thiar	1,300	Peat with non-compliant material (excl. peat) bunds
DA05	Na Foraí Maola Thoir	24,000	Non-compliant material (excl. peat)
DA06	Troscaigh Thiar	7,800	Peat with non-compliant material (excl. peat) bunds
DA07	Bearna to Moycullen Road	500	Peat with non-compliant material (excl. peat) bunds
DA08	Bearna to Moycullen Road	11,500	Peat with non-compliant material (excl. peat) bunds
DA09	An Chloch Scoilte	3,800	Peat with non-compliant material (excl. peat) bunds
DA11	An Chloch Scoilte	3,700	Peat with non-compliant material (excl. peat) bunds
DA12	An Chloch Scoilte	2,000	Peat with non-compliant material (excl. peat) bunds
DA13	Cappagh	2,100	Peat with non-compliant material (excl. peat) bunds
DA14	Ballymoneen	10,700	Peat with non-compliant material (excl. peat) bunds
DA15	Keeraun	4,000	Peat with non-compliant material (excl. peat) bunds
DA17	Bushypark	800	Non-compliant material (excl. peat)

Number	Location	Allowable Capacity (m^3)	Material Type
DA18	Bushypark	2,200	Non-compliant material (excl. peat)
DA19	Bushypark	6,300	Peat with non-compliant material (excl. peat) bunds
DA20	Dangan	1,500	Non-compliant material (excl. peat)
DA21	Dangan	900	Non-compliant material (excl. peat)
DA24	Lackagh Quarry	104,000	Non-compliant material with contained peat placement in flat areas
DA25	Lackagh Quarry	6,500	Non-compliant material with contained peat placement in flat areas
DA27	Lackagh Quarry	16,700*	Non-compliant material (excl. peat)
DA28	Lackagh Quarry	231,000*	Non-compliant material with contained peat placement in flat areas
DA29	Ballinfoile	5,700	Peat with non-compliant material (excl. peat) bunds
DA31	Twomileditch	4,400	Peat with non-compliant material (excl. peat) bunds
DA32	Twomileditch	23,000	Non-compliant material (excl. peat)
DA33	Parkmore	5,200	Non-compliant material (excl. peat)
DA34	Parkmore	1,900	Non-compliant material (excl. peat)
DA35	Coolagh	6,600	Peat with non-compliant material (excl. peat) bunds
DA37	Coolagh	10,800	Non-compliant material (excl. peat)
DA38	Coolagh	41,800	Non-compliant material (excl. peat)
DA39	Coolagh	17,600	Non-compliant material (excl. peat)
DA40	Coolagh	35,000	Non-compliant material (excl. peat)
	Total	597,200	

* Excluding vertical and base drainage material which must meet particular properties (including permeability) which may be potentially acquired on site as non-compliant material (excluding peat) or may require import.

5.1 Volumetric Comparison

As outlined in Section 2.3, the estimated bulked volume of material available for MDAs is:

- 76,000m^3 of Peat bulked = **98,800m^3**
- 290,000m^3 of in-situ non-compliant material (excluding peat) bulked = **377,000m^3**
- **Total volume: 475,800m^3**

As per the MDAs outlined in Table 5.1, the allowable/available capacity within MDAs is:

- Peat = **101,000m^3**
- Non-compliant (excluding peat) = **496,200m^3**
- **Total volume = 597,200m^3**

As outlined in 'Responses to Queries raised in Module 2 of the N6 Galway City Ring Road in respect of Lackagh Quarry Material Deposition Areas[7]' at the Oral Hearing in 2020, the total allowable capacity for peat in MDAs outside of Lackagh Quarry (where peat is permissible) equates to approximately 47,000m^3. Given the total estimated bulked volume of peat (98,800m^3), the MDAs in Lackagh Quarry which can facilitate the placement of peat are critically important to meet the objectives outlined in this report to cater for the remaining 51,800m^3 of peat.

As outlined in 'Responses to Queries raised in Module 2 of the N6 Galway City Ring Road in respect of Lackagh Quarry Material Deposition Areas[7]' at the Oral Hearing in 2020 and based on the summary volumes presented above, there is approximately 26% additional/spare capacity based on the total volumes. However, there is only approximately 2% spare capacity for peat. The overall spare capacity is likely to reduce further when considering the variable ground conditions across the proposed N6 GCRR, bulking arising from the direct reuse of over 2.6 million cubic meters of material across the full extent of the proposed N6 GCRR (see Chapter 7 of the updated EIAR for further details), and general construction related factors (for example variable weather conditions impacting material reusability, temporary excavations).

[7] https://www.n6galwaycityringroad.ie/sites/default/files/media/GCRR_4-03.34.13.004_Lackagh%20Quarry%20Response_I1.pdf

6 Summary

A portion of the necessary engineering, environmental, landscape and safety requirements for the proposed N6 GCRR are met by the implementation of Material Deposition Areas.

The volume of material that is available and suitable for placement in MDAs is presented in Section 2 of this report.

Their locations were selected to satisfy the necessary engineering, environmental, landscape and safety requirements for the proposed N6 GCRR. The allowable material type of each MDA was also assessed by the environmental specialists. The locations and allowable placement material are tabulated in Section 3 and the locations are presented on Figures 7.301 and 7.302 of the updated EIAR.

Section 4 of the report details the requirements of the MDAs and the criteria that the Contractor shall adhere to during construction.

In Section 5, the allowable capacity for each Material Deposition Area is specified.

Annex A

Lackagh Quarry: Material Deposition Area Report

Galway County Council

N6 Galway City Ring Road

Lackagh Quarry: Material Deposition Assessment

GCRR-4.04-03-4.23

Issue 2 | 28 March 2025

This report takes into account the particular instructions and requirements of our client.

It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party.

Job number 233985

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Document verification

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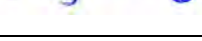
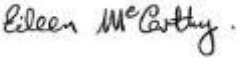
		Signature			
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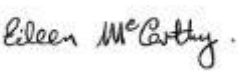
		Signature			
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Contents

Annexes

1 Introduction

This report has been developed to provide a detailed description of Material Deposition Areas (MDAs) in Lackagh Quarry. As outlined in the Material Deposition Area Baseline Report, MDAs are required to satisfy the necessary engineering, environmental and safety requirements for the proposed N6 GCRR. This report has been reviewed and updated to take account of points raised from the Brief of Evidence presented and submissions made by Galway County Council to An Bord Pleanála (ABP) at the oral hearing in 2020 and from the ABP Inspector's Report dated June 2021 and the findings of assessments undertaken in 2024 to inform the updated EIAR to reflect recent source material and information where this is available.

A total of 32 site areas have been identified as MDAs along the route of the proposed N6 GCRR and their locations are shown on Figures 7.301 and 7.302 of the updated EIAR. Of the 32 MDA locations, four are located within Lackagh Quarry.

The MDAs at Lackagh Quarry are designed, combining material placement with direct and indirect rock slope stability solutions, to provide stability to the existing blast damaged rock face and thereby prevent encroachment on the Lough Corrib SAC, including Annex I habitat, and to facilitate the creation of compensatory ecological habitat. The creation of MDAs to the north of the alignment within Lackagh Quarry is limited to the north western area, as the north eastern area is used to mitigate potential impacts on Peregrine Falcon.

The objective of this report is:

- to present an overview of the deposition assessment for Lackagh Quarry including:
  - Overview of material deposition areas within Lackagh Quarry
  - Description of the capacity and purpose of each material deposition area
  - Description of the additional solutions required, in combination with material deposition area, to stabilise the blast damaged quarry walls
  - Description of the ecological habitat compensation facilitated by the material deposition areas
- to summarise findings and make recommendations, including particular commitments

This report was originally submitted as Appendix A.1.11 in the 2019 RFI Response. As part of the original report, a remodelling exercise was completed of the MDAs in Lackagh Quarry which resulted in the removal of DA23, the addition of DA25 and the modification of DA24, DA27 and DA28. This report provides a detailed breakdown of the current arrangement of the MDAs in Lackagh Quarry following the original remodelling exercise, where the arrangement presented in this report remains unchanged from the evidence presented at the 2020 Oral Hearing.

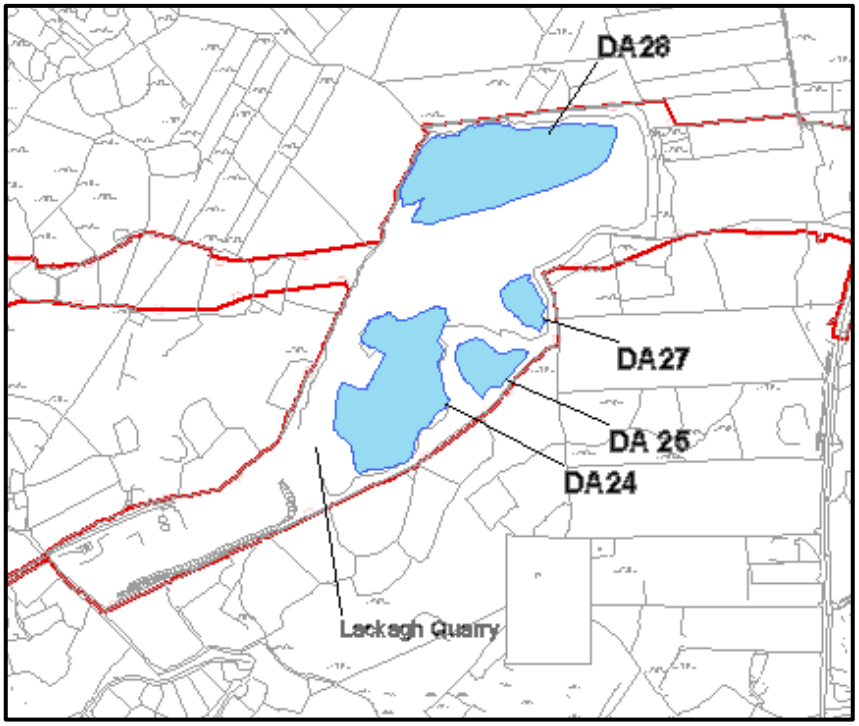
Text in purple represents changes which were noted in Appendix A Corrigenda in 'Responses to Queries raised in Module 2 of the N6 Galway City Ring Road in

respect of Lackagh Quarry Material Deposition Areas[1]' which was submitted at the Oral Hearing.

2 Lackagh Quarry Deposition Assessment

There are four Material Deposition Areas (MDAs) within Lackagh Quarry as presented in Figure 7.302 of the updated EIAR, namely DA24, DA25, DA27 and DA28. The location of these areas is presented in Figure 2.1 below (which is extracted from Figures 7.302 of the updated EIAR) and details of each are presented in Table 2.1.

Figure 2.1: Lackagh Quarry Material Deposition Areas



The MDAs in Lackagh Quarry were identified for the following reasons:

- DA24: To provide stability to the existing blast damaged rock face and to facilitate habitat compensation
- DA25: To facilitate the creation of ecological habitat compensation
- DA27: To provide stability to the existing blast damaged rock face
- DA28: To provide stability to the existing blast damaged rock face and thereby prevent encroachment on the Lough Corrib SAC including areas of Annex I habitat. The north eastern portion of this area is used to mitigate potential impacts on Peregrine Falcon.

The following sections provide a detailed summary of the assessment completed for each MDA in Lackagh Quarry.

[1] https://www.n6galwaycityringroad.ie/sites/default/files/media/GCRR_4-03.34.13.004_Lackagh%20Quarry%20Response_I1.pdf

Table 2.1: Summary of assessment of material deposition area details and requirements

Number	Approx. Chainage	Area (ha)	Approx. Capacity (m^3)	Material designation	Construction / Design Specific Requirement
DA24	11+350	2.52	104,000	Non-compliant material (excluding peat) in bunds to contain peat at higher levels	Contractor to update drainage design to include for their proposed Material Deposition Area in accordance with the requirements set out in the updated EIAR
DA25	11+550	0.48	6,500	Non-compliant material (excluding peat) in bunds to contain peat and granular drainage layers	Contractor to update drainage design to include for their proposed Material Deposition Area in accordance with the requirements set out in the updated EIAR
DA27	11+550	0.4	16,700	Non-compliant material (excluding peat) with granular drainage layers	Drainage layer to +17.7mOD required, a filter separator (e.g. geotextile is required between the horizontal interface between the drainage layer and general fill to prevent migration of fines sediment). Contractor to update drainage design to include for their proposed Material Deposition Area in accordance with the requirements set out in the updated EIAR
DA28	11+650	2.8	231,000	Non-compliant material (excluding peat) with peat placement on the flat areas and granular drainage layers (vertical and horizontal) and stability layers throughout.	Drainage layer to +17.7mOD required, a filter separator (e.g. geotextile is required between the horizontal interface between the drainage layer and general fill to prevent migration of fines sediment. Vertical and horizontal drainage layers are required between the existing rock face and material placement. Contractor to update drainage design to include for their proposed Material Deposition Area in accordance with the requirements set out in the updated EIAR

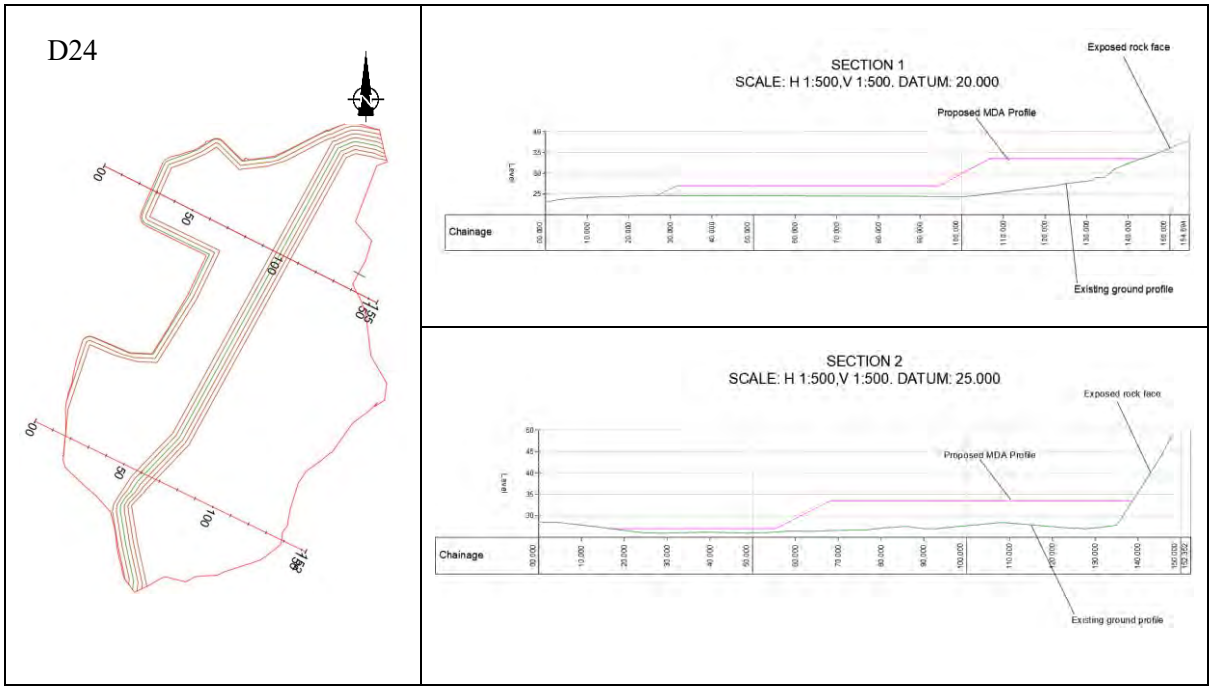
2.1 DA24

This location is proposed to facilitate ecological habitat compensation and for engineering requirements to stabilise blast damaged slope stability. The arrangement allows for peat placement in flat areas and ecological habitat compensation on the surfaces. Plan and cross section of the proposed solution is presented in the Figure 2.2 below.

An earthworks assessment concluded that 104,000m^3 of material can be placed in this area, of which 37,000m^3 can be peat.

Similar to the other deposition areas with an exposed rock face above the placed material in DA24, additional slope stability/health and safety solutions may be required for the exposed rock face. The recommended solution is the direct solution and includes, rock bolt, rock dowel, steel mesh and sprayed concrete combination.

Figure 2.2: DA24 Plan and Cross Sections



2.2 DA25

This location is proposed to facilitate the creation of ecological habitat compensation. This area is proposed to contain peat placement in flat areas, non-compliant material (excluding peat) on the base and surrounding bunds and compensatory ecological habitat on the flat surfaces. Plan and cross section of the proposed solution is presented in the Figure 2.3 below.

The earthworks assessment concluded that 6,500m^3 of material can be placed in this area, of which 3,000m^3 can be peat.

Figure 2.3: DA25 Plan and Cross Sections

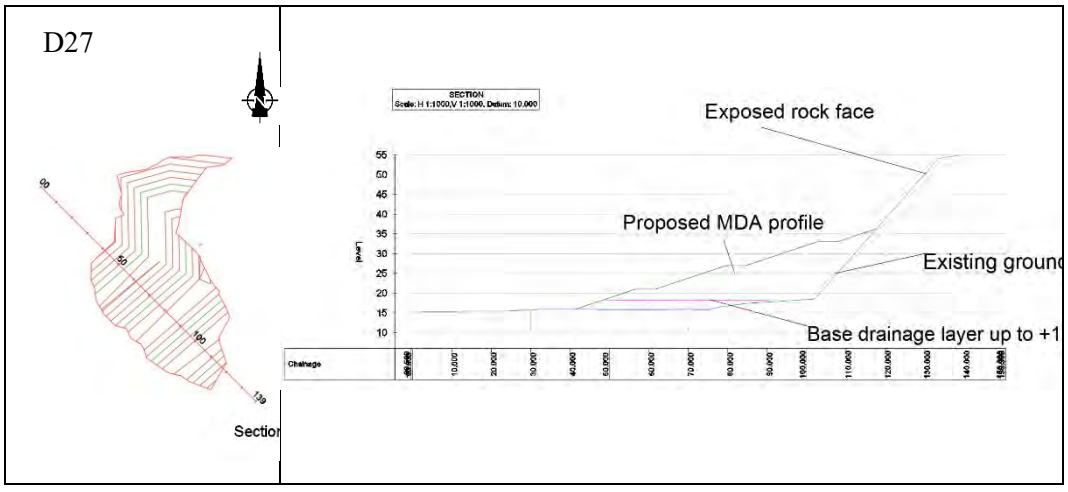
2.3 DA27

This location is proposed to stabilise existing blast damaged rock face within Lackagh Quarry. The arrangement takes into consideration the drainage pond located to the north west of DA27. Given access is limited in the long-term scenario, this area has not been identified as an area suitable for creation of ecological habitat compensation. Plan and cross section of the proposed solution is presented in the Figure 2.4 below.

The earthworks assessment concluded that 16,700m^3 of material can be placed in this area. An additional 2,800m^3 is required as a drainage layer up to **+17.7mOD**. The drainage layer material has potential to be acquired on site as non-compliant material (excluding peat) but this is not guaranteed as this material has particular characteristic requirements to permit free drainage.

Any exposed rock face above the placed material, may require additional slope stability/health and safety solutions as outlined in Section 3.

Figure 2.4: DA27 Plan and Cross Sections



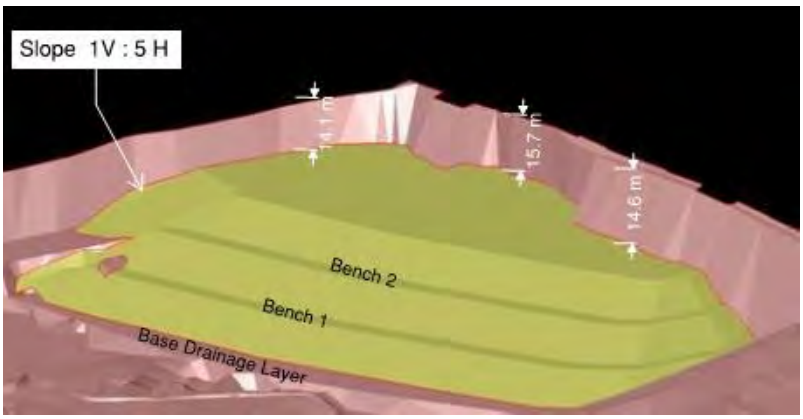
2.4 DA28

Material Deposition Area DA28 is the largest placement area with respect to material placement volume.

This area is proposed to facilitate ecological habitat compensation, provide stability to the existing blast damaged rock face and prevent encroachment on the Lough Corrib SAC including Annex I habitat. Refer to Figure 2.5 and Table 2.2 for plan, profile, surface area details and material volumes of DA28.

Given the complexity of the placement area, there are requirements for DA28 which are summarised in Table 2.3.

Figure 2.5: Plan and Profile section for DA28



Location	Area Surface (m^2)
Top surface	8,797
Bench 2 (middle)	1,301
Bench 1 (lower)	1,573
Total flat area	*11,671*
Total slopes surface	*17,561*

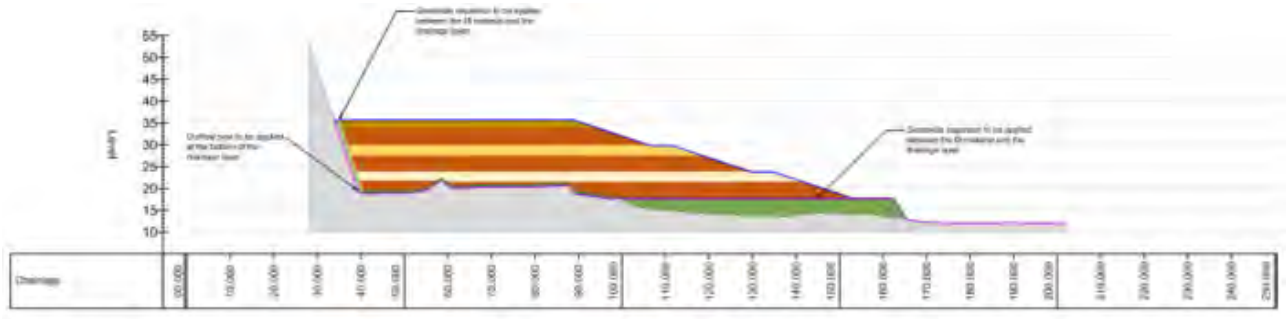


Table 2.2: Break down of material in DA28

Layer ID	Description	Volume m^3
	Vertical and Quarry Base Interface Drainage Layer (This material has potential to be acquired on site as non-compliant material (excluding peat) but this is not guaranteed as this material has particular characteristic requirements)	10,000
	Base Drainage Layer (quarry base to +17.7mOD): Possibly Imported material (Potentially obtained as non-compliant material, excluding peat)	67,000
	Granular Stability Layers (Non-compliant material excluding peat)	49,000

Layer ID	Description	Volume m^3
	Cohesive Material (Non-compliant material excluding peat)	168,000
	Peat	14,000
	Total (**14,000 peat** / **217,000 non-compliant (excl. peat)** / **77,000 possible non-compliant material, excl. peat**)	308,000

Table 2.3: Conditions and requirements for DA28

Rational	Conditions & Requirements
Geometry	Upper level is 35.7mOD
Stability	The external side slope gradient must be 1V in 3H
	Two granular stability layers are assumed. Detailed design to be completed based on the placement material characteristics
	The granular stability layers are assumed to be 2m deep (detailed design will confirm the depth of the stability layer)
	Granular stability layers can be obtained from non-compliant granular material.
	Intermediate benches are required. These shall be a minimum of 5m wide
	The intermediate benches are to be located 6m apart vertically. With a 1V in 3H slope the benches are 18m horizontally apart.
Drainage	A free draining granular material between the existing cliff face (including bench faces) and material deposition material to allow the cliff face to maintain its drainage system shall be 1m wide A filter separator (e.g. geotextile is required between the horizontal interface between the drainage layer and general fill to prevent migration of fines sediment)
	A free draining granular material between the existing quarry base and material deposition material to maintain its drainage system. This is required: • Where the exiting quarry level at a material deposition area is below +17.7mOD. In these areas free draining granular material is required up to +17.7mOD; and • Above this level a minimum of 0.5m free drainage material is required at this interface
	A filter separator (e.g. geotextile) is required between all drainage layers (vertical and horizontal) and general fill to prevent migration of fines sediment
Rock Face stability	The exposed rock face exposed above the material deposition is approximately 15m high, therefore additional measures for stability are required, refer to Section 3 of this note The additional slope stability/health and safety solutions include the direct solution of rock bolt, rock dowel, steel mesh and sprayed concrete combination
Environmental	An access track for maintenance shall be no steeper than 1V in 5H slope to the upper bench

Rational	Conditions & Requirements
	Maintenance is required of the finished surfaces in accordance with the Habitat Compensation Management Plan outlined in Appendix A.8.27 of the updated EIAR
Environmental	Peat will be included with in the placement

2.5 Volumetric Summary

The vast majority of the material placement capacity (relative to all material deposition areas on the Project) is located in Lackagh Quarry. A summary of the proposed placement in Lackagh Quarry is provided in Table 2.4.

Table 2.4: Lackagh Quarry Capacity Summary

Material Deposition Areas	Estimated Capacity of Non-Compliant (excl. Peat) m^3	Estimated Capacity of Peat m^3
DA24	67,000	37,000
DA25	3,500	3,000
DA27 volume above the base drainage layer (volume of potential non-compliant material [excl. peat] for drainage layers)	16,700 (19,500 / Potential 2,800)	0
DA28 volume above the base drainage layer (volume of potential non-compliant material [excl. peat] for drainage layers)	217,000 (294,000 / Potential 77,000)	14,000
Total (drainage layer volume excluded)	**304,200**	**54,000**

3 Additional blast damaged slope stability solutions

Material deposition in DA24, DA27 and DA28 provides stability to the existing blast damaged rock face. Additional solutions are required for the remaining blast damaged rock faces above the surface of the MDA (and elsewhere where required).

For Lackagh Quarry, two slope stability / health and safety solutions for the exposed rock face are considered:

1. Direct solution – rock bolt, rock dowel, steel mesh and sprayed concrete combination
2. Indirect solution – rock trap, fence and exclusion zone combination

These solutions are discussed in more detail in the following sub-sections.

It should be noted however that removing or reducing the placement profile of the MDAs in these areas will require application of these additional slope stability solutions for the entire exposed blast damaged rock face.

3.1 Direct Solution

Where rock stability and/or health and safety is required for exposed rock faces, a direct solution can be provided through a permanent composite rock support system designed to the relevant design standards (Eurocode 7, BS8081) and best practice guidance documents. The design solution will include a combination of the following:

i. Rock bolts
ii. Rock dowels
iii. Steel mesh
iv. Sprayed concrete

This solution is expensive and is best suited in areas where an indirect solution is not viable. For instance, in DA28 it would be employed above the top of the material placement level to ensure no encroachment on the Lough Corrib SAC.

3.2 Indirect Solution

Indirect solutions can be provided through a rock trap, fence and exclusion zone solution designed to the relevant design standards with reference to Transport Research Laboratory (TRL) report PPR555 “Rock engineering guides to good practice rock slope remedial and maintenance works”. An example of this indirect solution is presented in Figure 3.1 below.

Figure 3.1: Extracts from (TRL) report PPR555, Rock Trap and Fence

Figure 6.10 Effective Rock Trap Barrier (A77, Ballantrae)

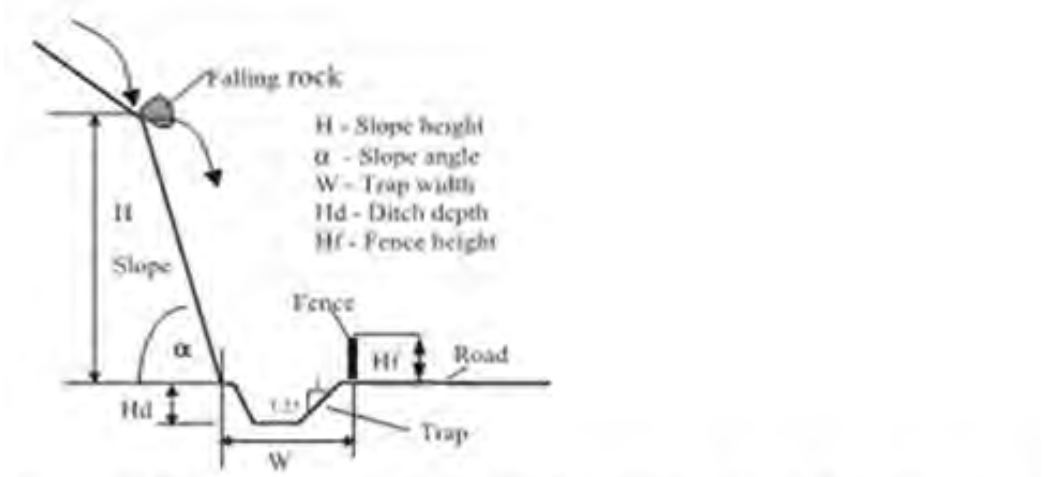


Figure 6.12 The Shaped Ditch for Catching Falling Rock (after Franklin and Dusseault, 1989)

Rock trap and fence requirements vary depending on the exposed slope height and angle as outlined in Figure 6.12, Table 6.2 in TRL report PPR555. TRL recommend that Ritchie's chart (presented below in Figure 4.2) can be used for irregular and bulk blasted slopes which is the case in Lackagh Quarry.

Figure 4.2: Extract from (TRL) report PPR555, Comparison of rock Trap Design Chart Recommendations*

Table 6.2 Comparison of Rock Trap Design Chart Recommendations*

Rock slope details		Rock trap design chart recommendations					
		Ritchie (1963)		Mak & Blomfield (1986)		Fookes & Weltman (1989)	
Height (m)	Angle (deg.)	W (m)	H_d (m)	W (m)	H_f (m)	W (m)	H_d+H_f (m)
5	60	3	1.2	1.5	0.9	1.5	1.25
5	80	3	0.9	1.5	0.6	1.5	2.25
10	60	4.6	1.6	1.5	1.6	2.5	1.25
10	80	4.6	1.2	1.5	0.9	2.5	2.25
12	60	4.9	1.9	1.5	1.6	3	1.25
12	80	4.9	1.3	1.5	0.9	3	2.3
20	60	6.2	2.1	NA	NA	5.3	1.5
20	80	6.2	1.5	NA	NA	5.3	3

*** For notation of W, H_d and H_f, see Figure 6.12**

The exposed slopes on site vary considerably, up to **70** degrees. The exclusion zone at the base of the slope will accommodate excavation of the rock trap and maintenance access. Generally, where required the exclusion zone will be up to 15m from the base of the exposed slope with a rock barrier fence height of approximately 1.5 to 2m.

3.3 Summary

The direct solution is the more expensive method of stabilisation and should only be considered in areas where protection of Limestone pavement is required or where maintenance is an issue.

The indirect solution including a rock trap, fence and exclusion zone solution is viable in all areas, however it requires maintenance and may require up-keep.

4 Ecological Habitat Compensation

There will be a permanent loss of c0.25ha of the Annex I habitat Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*) (* important orchid sites) [6210] (hereafter referred to as 6210) as a result of the proposed N6 GCRR. There will also be a permanent loss of c1.54ha of the Annex I habitat Limestone pavements [*8240] (hereafter referred to as *8240), and *c.* 0.03ha of Limestone pavement/Calcareous grassland mosaic [*8240/6210]. The loss of these habitats is outside a European site. To compensate[2] for the loss of 6210, it is proposed to recreate c7.98ha of 6210. Although the significant residual effects associated with the loss of *8240 habitat cannot be directly compensated for[3], the areas of 6210, (which is a related habitat) that will be created provides a biodiversity gain for limestone associated habitats locally. The area of 6210 habitat being provided is c.7.98ha which is greater than the combined losses of *8240 and 6210 habitat (*c.*1.82ha).

As set out in the Compensatory Habitat Management Plans in Appendix A.8.27 of the updated EIAR there are seven receptor sites for 6210, with an area of2.22ha[4] located outside Lackagh Quarry and an area of c.5.75ha located within Lackagh Quarry. These are listed below in Table 4.1.

Table 4.1: Ecological Habitat Compensation Areas

Reference	Area (ha)	Comment
6210.R1	*c.* 0.83[5]	Located outside Lackagh Quarry
6210.R2	*c.* 0.98	Located outside Lackagh Quarry
6210.R5	*c.* **2.44**	**Located inside Lackagh Quarry**
6210.R6	*c.* **0.48**	**Located inside Lackagh Quarry**
6210.R8	*c.* **2.83**	**Located inside Lackagh Quarry**
6210.R7*	*c.* 0.49	Located outside Lackagh Quarry
6210.nR9	*c.* 0.44[5]	Located outside Lackagh Quarry

Note: * This site whilst on Lackagh Quarry lands is considered outside Lackagh quarry for this assessment.

[2] The compensatory habitat areas are not compensatory measures in the context of the requirements of Article 6(4) of the Habitats Directive as they are not compensating for an impact that would adversely affect the integrity of any European site. As concluded in the updated NIS, it is the professional opinion of Scott Cawley that the proposed N6 GCRR will not result in such an impact on any European site.

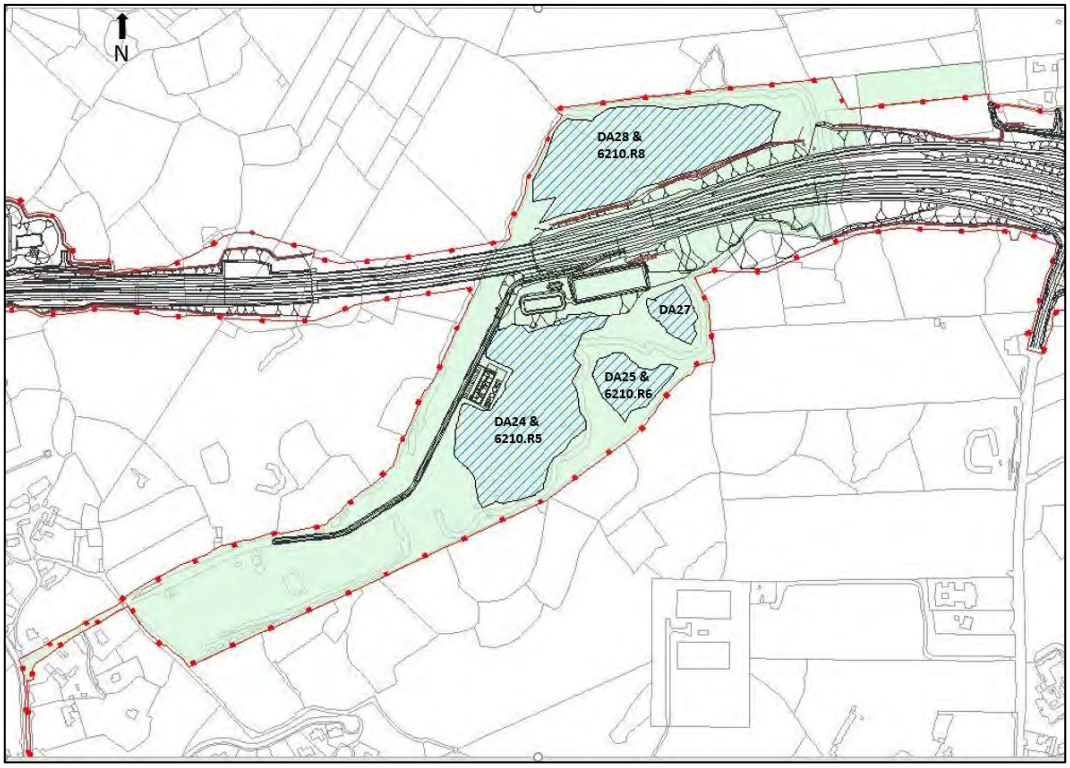
[3] Limestone pavement cannot be directly compensated for as it cannot be recreated

[4] This area excludes *c.* 0.52 ha of the receptor sites 6210.R1 and 6210.nR9 which lie within the air quality Zone of Influence (ZoI) for nitrogen deposition. It may not be possible to achieve the creation of a 6210 habitat that is of Annex I quality within the air quality ZoI for nitrogen deposition because the critical level associated with 6210 habitat is exceeded.

[5] A portion of this receptor site consisting of *c.* 9.4% of the total area (*i.e. c.* 0.83ha) lies within the air quality Zone of Influence (ZoI) for nitrogen deposition. Therefore, it may not be possible to achieve the creation of a 6210 habitat that is of Annex I quality within the ZoI. This area has been excluded from the total calculated area of 6210 habitat to be created. Receptor site 6210.nR9 (consisting of *c.* 0.44ha) has been excluded from this table as its entire area lies within the air quality Zone of Influence (ZoI) for nitrogen deposition.

The full loss of 6210 can be compensated in receptor sites outside of Lackagh Quarry (i.e. providing an area of 0.25ha) with an excess of 1.97ha in the receptor sites outside the quarry. This 1.97ha plus the remaining 5.57ha of 6210 to be created is proposed to provide an overall biodiversity gain for limestone associated habitats locally. The receptor sites for Lackagh Quarry are shown on Figure 4.1.

Figure 4.1: Ecological Habitat Compensation Areas within Lackagh Quarry



5 Conclusions and Recommendations

Within Lackagh Quarry there are 4 placement areas DA24, DA25, DA27 and DA28. These locations were identified for the creation of ecological habitat compensation, to provide stability to the existing blast damaged rock face and to prevent encroachment on the Lough Corrib SAC including areas of Annex I habitat. North of the proposed N6 GCRR within Lackagh Quarry, placement of material is limited to the north western area of the quarry, as the north eastern area is used to mitigate potential impacts on Peregrine Falcon.

The total volume of material required for the four MDAs within Lackagh Quarry is 358,200m^3 of which 54,000m^3 is peat and 304,200m^3 is non-compliant, excluding peat, material (excluding material required for drainage layers as documented in Table 2.4).

Where material placement is not available to provide stability to exposed blast damages rock faces, and for exposed rock faces requiring stability solutions above material placement, there are two support solutions (described in Section 4) proposed namely:

1. Direct solution – rock bolt, rock dowel, steel mesh and sprayed concrete combination
2. Indirect solution – rock trap, fence and exclusion zone combination

Figure 5.1 and Table 5.1 summarise the proposed deposition areas and requirements in Lackagh Quarry. Table 5.2 outlines the particular commitments for each MDA in Lackagh Quarry.

Figure 5.1: Lackagh Quarry Material Deposition Areas

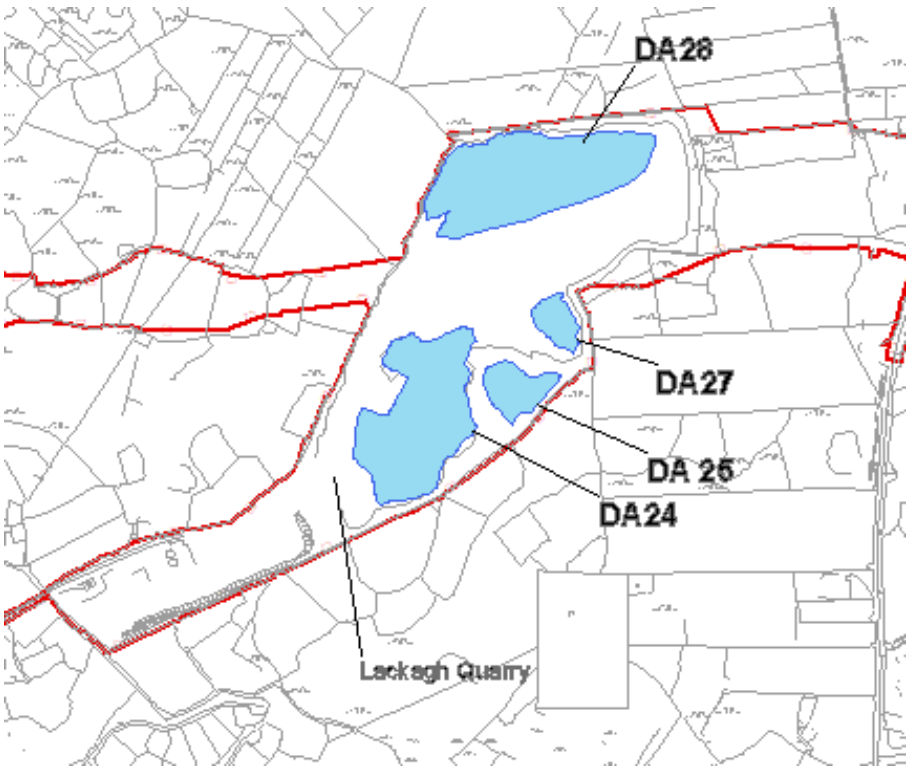


Table 5.1: Summary of proposed Lackagh Quarry material deposition area details and requirements

Number	Approx. Chainage	Area (ha)	Approx. Capacity (m^3)	Material designation	Construction / Design Specific Requirement
DA24	11+350	2.52	104,000	Non-compliant material (excl. peat) in bunds with peat placed at higher levels	Contractor to update drainage design to include for their proposed Material Deposition Area in accordance with the requirements set out in the updated EIAR
DA25	11+550	0.48	6,500	Non-compliant material (excl. peat) in bunds with peat placed in flat areas and granular drainage layers	Contractor to update drainage design to include for their proposed Material Deposition Area in accordance with the requirements set out in the updated EIAR
DA27	11+550	0.4	16,700	Non-compliant material (excl. peat) with granular drainage layers	Drainage layer to +17.7mOD required, a filter separator (e.g. geotextile is required between the horizontal interface between the drainage layer and general fill to prevent migration of fines sediment). Contractor to update drainage design to include for their proposed Material Deposition Area in accordance with the requirements set out in the updated EIAR
DA28	11+650	2.8	231,000	Non-compliant material (excl. peat) in bunds with peat placement on the flat areas and granular drainage layers (vertical and horizontal) and stability layers throughout.	Drainage layer to +17.7mOD required, a filter separator (e.g. geotextile is required between the horizontal interface between the drainage layer and general fill to prevent migration of fines sediment. Vertical and horizontal drainage layers are required between the existing rock face and material placement.

Number	Approx. Chainage	Area (ha)	Approx. Capacity (m^3)	Material designation	Construction / Design Specific Requirement
					Contractor to update drainage design to include for their proposed Material Deposition Area in accordance with the requirements set out in the updated EIAR

5.1 Particular Commitments

The particular commitments for each MDA within Lackagh Quarry are summarised below.

Table 5.2: Particular Commitments and Requirements for each MDA in Lackagh Quarry

Number	Particular Requirement
DA24	Design: 1. MDA: The designer shall complete a detailed stability design based on the placement material characteristics 2. Exposed rock face: The designer shall undertake a permanent composite rock support system designed to the relevant design standards (Eurocode 7, BS8081) and best practice guidance documents Estimated Capacity: 1. Non-compliant material (excluding peat): 67,000m^3 2. Peat: 37,000m^3 Geometry: 1. Volumetric capacity as per Table 5.1 2. Non-compliant material (excluding peat) in bunds with peat placement in flat areas 3. Area comprises of two platforms and a sloped transition zone 4. The external side slope gradient is 1V in 3H Stability: 1. Non-compliant material (excluding peat) used to stabilise and contain peat Rock Face Stability: 1. Implementation of slope stability / health and safety solutions for the exposed rock face. This solution includes rock bolt, rock dowel steel mesh and sprayed concrete combination – Direct solution Drainage: 1. Contractor to update drainage design to include for their proposed MDA in accordance with the requirements set out in the updated EIAR 2. Contractor to include a drainage layer if required to maintain surface drainage in accordance with the Habitat Compensation Management Plan outlined in Appendix A.8.27 of the updated EIAR 3. A free draining granular material between the existing cliff face (including existing quarry bench faces) and material deposition material to allow the cliff face to maintain its drainage system must be 1m wide (vertical layer).

Number	Particular Requirement
	4. A free draining granular material between the existing quarry base and MDA (horizontal layers) to maintain its drainage system. This is required: a. Where the exiting quarry level at an MDA is below +17.7mOD. In these areas free draining granular material is required up to +17.7mOD b. Above this level (+17.7mOD) a minimum of 0.5m free drainage material is required at the interface between the exiting quarry floor level and the MDA 5. A filter separator (e.g. geotextile) is required between all drainage layers (vertical and horizontal) and general fill to prevent migration of fines sediment Environmental: 1. Placement of ecological compensatory habitat [6210] in accordance with Appendix A.8.27 of the updated EIAR 2. Maintenance is required of the finished surfaces in accordance with the Habitat Compensation Management Plan outlined in Appendix A.8.27 of the updated EIAR
DA25	Design: 1. MDA: The designer shall complete a detailed stability design based on the placement material characteristics Estimated Capacity: 2. Non-compliant material (excluding peat): 3,500m^3 3. Peat: 3,000m^3 Geometry: 4. Volumetric capacity as per Table 5.1 5. Non-compliant material (excluding peat) in bunds with peat placement in flat areas 6. Area comprises of a series of benches and slopes 7. The external side slope gradient is 1V in 3H Stability: 8. Non-compliant material (excluding peat) used to stabilise and contain peat 9. Non-compliant material (excluding peat) will be used to stabilise the slopes or an alternative as per design Cliff Edge Stability: 10. The MDA shall be a minimum of 5m from the cliff edge Drainage: 11. Contractor to update drainage design to include for their proposed MDA in accordance with the requirements set out in the updated EIAR 12. Contractor to include a drainage layer if required to maintain surface drainage in accordance with the Habitat Compensation Management Plan outlined in Appendix A.8.27 of the updated EIAR 13. A free draining granular material between the existing cliff face (including existing quarry bench faces) and MDA to allow the cliff face to maintain its drainage system must be 1m wide (vertical layer). 14. A free draining granular material between the existing quarry base and material deposition material (horizontal layers) to maintain its drainage system. A minimum of 0.5m free drainage material is required at the interface between the exiting rock surface at the base of the MDA and the material deposition 15. A filter separator (e.g. geotextile) is required between all drainage layers (vertical and horizontal) and general fill to prevent migration of fines sediment

Number	Particular Requirement
	Environmental: 16. Placement of ecological compensatory habitat [6210] in accordance with Appendix A.8.27 of the updated EIAR 17. Maintenance is required of the finished surfaces in accordance with the Habitat Compensation Management Plan outlined in Appendix A.8.27 of the updated EIAR
DA27	Design: 1. MDA: The designer shall complete a detailed stability design based on the placement material characteristics 2. Exposed rock face: The designer shall undertake a permanent composite rock support system designed to the relevant design standards (Eurocode 7, BS8081) and best practice guidance documents Estimated Capacity: 3. Non-compliant material (excluding peat): 16,700m^3 4. Peat: Not permitted (0m^3) Geometry: 5. Volumetric capacity as per Table 5.1 6. Non-compliant material (excluding peat) 7. Area comprises of a series of benches and slopes 8. The external side slope gradient is 1V in 3H Stability: 9. Non-compliant material (excluding peat) will be used to stabilise the slopes or an alternative as per design Rock Face Stability: 10. Implementation of slope stability / health and safety solutions for the exposed rock face. This solution includes rock bolt, rock dowel, steel mesh and sprayed concrete combination - Direct solution Drainage: 11. Contractor to update drainage design to include for their proposed MDA in accordance with the requirements set out in the updated EIAR 12. A free draining granular material between the existing cliff face (including existing quarry bench faces) and MDA to allow the cliff face to maintain its drainage system must be 1m wide (vertical layer). 13. A free draining granular material between the existing quarry base and material deposition material (horizontal layers) to maintain its drainage system. This is required: a. Where the exiting quarry level at a MDA is below +17.7mOD. In these areas free draining granular material is required up to +17.7mOD b. Above this level (+17.7mOD) a minimum of 0.5m free drainage material is required at the interface between the exiting quarry floor level and the MDA 14. A filter separator (e.g. geotextile) is required between all drainage layers (vertical and horizontal) and general fill to prevent migration of fines sediment
DA28	Design: 1. MDA: The designer shall complete a detailed stability design based on the placement material characteristics 2. Exposed rock face: The designer shall undertake a permanent composite rock support system designed to the relevant design standards (Eurocode 7, BS8081) and best practice guidance documents Estimated Capacity:

Number	Particular Requirement
	3. Non-compliant material (excluding peat): 217,000m^3 4. Peat: 14,000m^3 Geometry: 5. Volumetric capacity as per Table 5.1 6. Non-compliant material (excluding peat) in bunds with peat placement in flat areas at higher levels 7. Area comprises an upper main platform at 35.7mOD and a series of slopes and transition zones 8. The external side slope gradient is 1V in 3H with an access track slope of 1V in 5H Stability: 9. Non-compliant material (excluding peat) in the bunds with peat placement on the upper bench. The upper level is 35.7mOD 10. A minimum of two granular stability layers are required. Where available this material may be sourced from the non-compliant material (excluding peat) or imported 11. The intermediate benches are to be located 6m apart vertically. With a 1V in 3H slope the benches are 18m horizontally apart Rock Face Stability: 12. Implementation of slope stability / health and safety solutions for the exposed rock face. This solution includes rock bolt, rock dowel, steel mesh and sprayed concrete combination - Direct solution Drainage: 13. Contractor to update drainage design to include for their proposed MDA in accordance with the requirements set out in the updated EIAR 14. Contractor to include a drainage layer if required to maintain surface drainage in accordance with the Habitat Compensation Management Plan outlined in Appendix A.8.27 of the updated EIAR 15. A free draining granular material between the existing cliff face (including existing quarry bench faces) and MDA to allow the cliff face to maintain its drainage system must be 1m wide (vertical layer). 16. A free draining granular material between the existing quarry base and MDA (horizontal layers) to maintain its drainage system. This is required: 17. Where the exiting quarry level at an MDA is below +17.7mOD. In these areas free draining granular material is required up to +17.7mOD 18. Above +17.7mOD a minimum of 0.5m free drainage material is required at the interface between the exiting quarry floor level and the MDA 19. A filter separator (e.g. geotextile) is required between all drainage layers (vertical and horizontal) and general fill to prevent migration of fines sediment Environmental: 20. Placement of ecological compensatory habitat [6210] in accordance with Appendix A.8.27 of the EIAR 21. Maintenance is required of the finished surfaces in accordance with the Habitat Compensation Management Plan outlined in Appendix A.8.27 of the updated EIAR

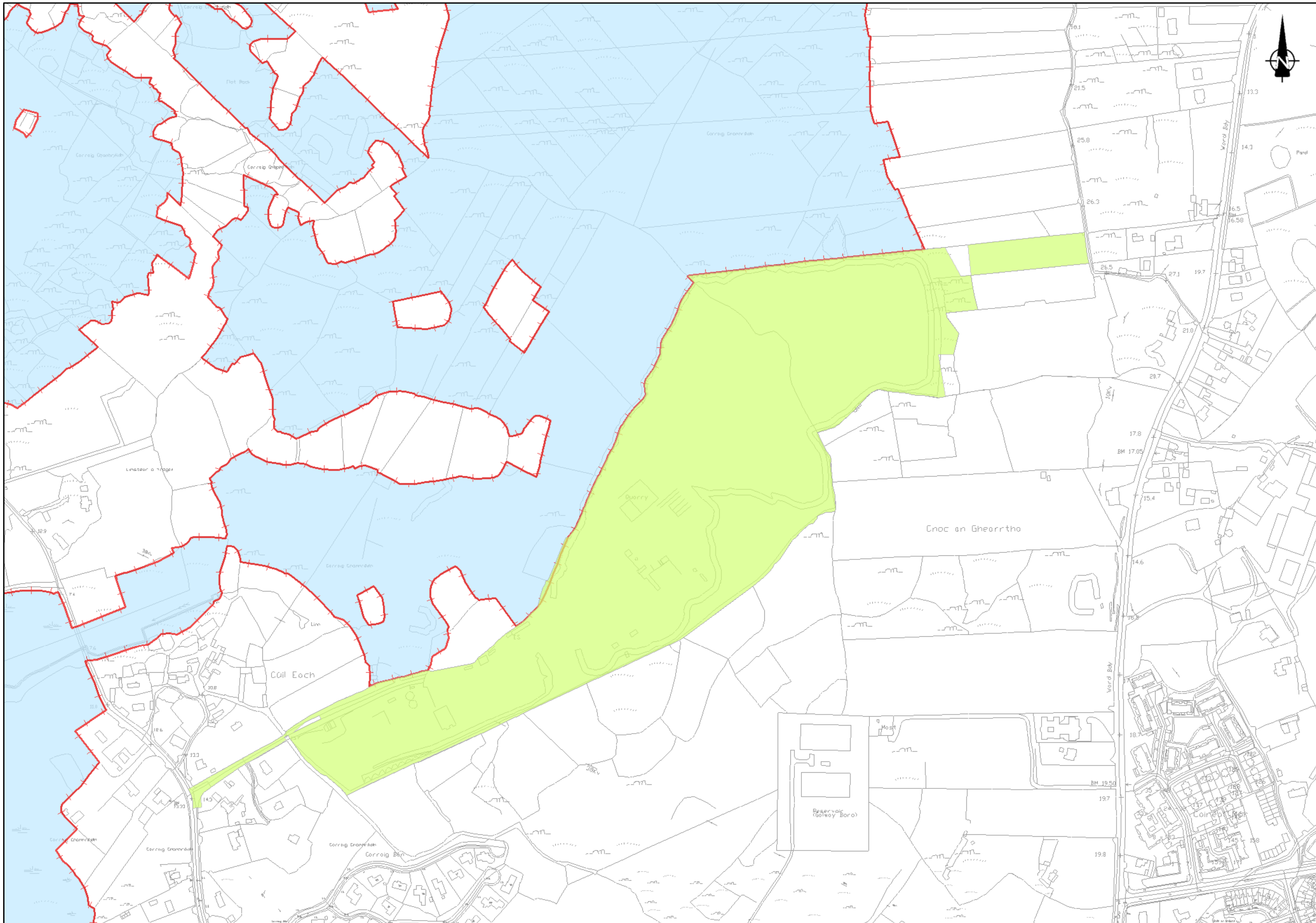
6 References

i. *GCOB - 4 03 - 4 16_Lackagh Tunnel Geo and Hydro Appraisal*
ii. *Transport Research Laboratory (TRL) report PPR555 Rock engineering guides to good practice rock slope remedial and maintenance works by P McMillian, AJ Harber and I M Nettleton. June 2000*
iii. *Earthworks: a guide, N. A. Trenter and Thomas Telford Limited 2001*

Annex 1

Lackagh Quarry Layout - Drawings

A3



FOR INFORMATION

Legend

- Extents of Lackagh Quarry
- Lough Corrib SAC

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Job Title

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Scale: **1:5,000**

Date: **March 2025**

Issue	Date	By	Chkd	Appd
I1	31/03/2025	KJ	CMtS	MH
I1	30/08/2019	KD	JC	MH

Drawing Title

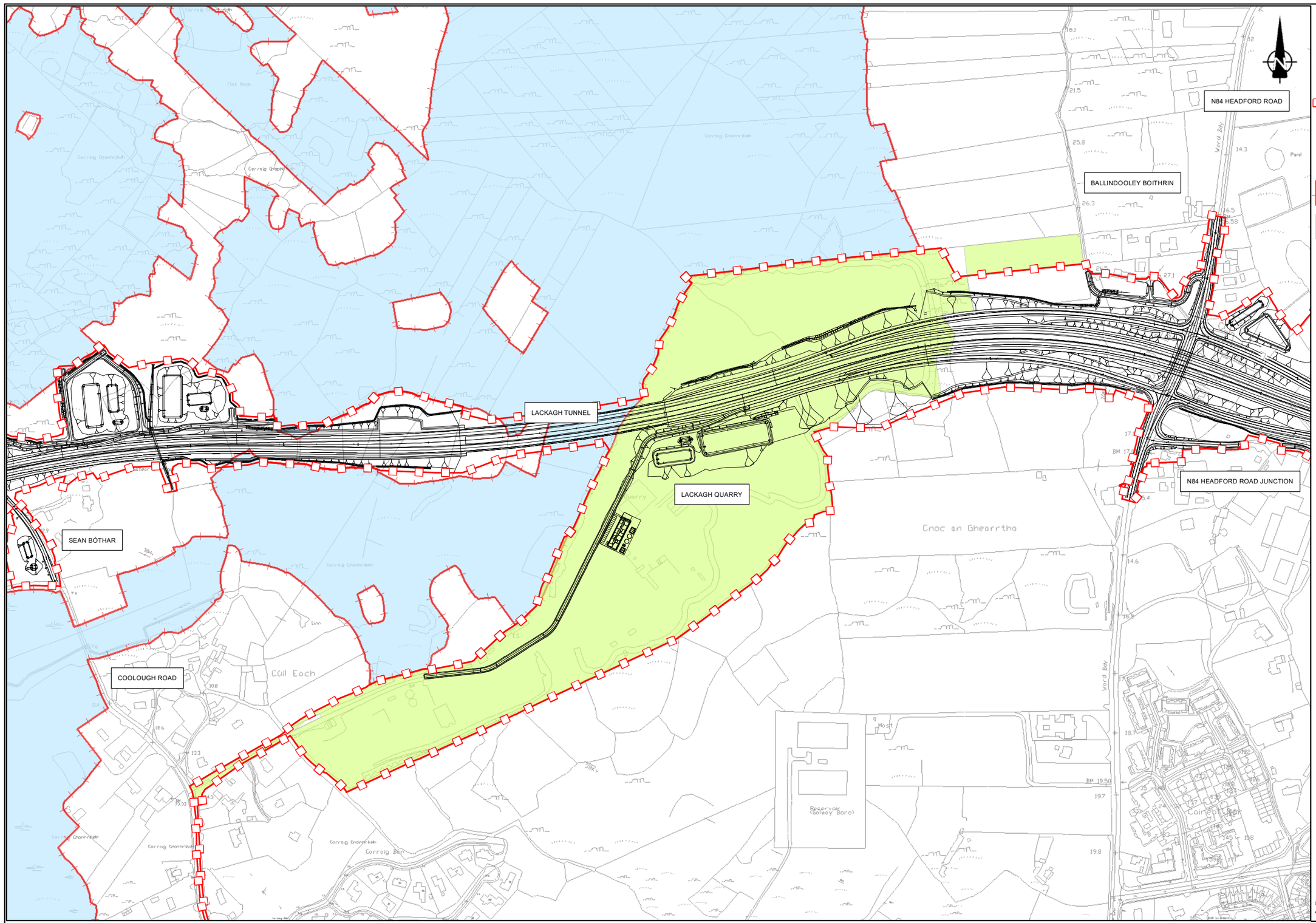
Plan Layout of Lackagh Quarry Pre-Construction Excluding Mitigation Measures

Drawing Status

For Information

Job No	Drawing No	Issue
233985-00	**Figure 1.8.1**	**I2**

A3



FOR INFORMATION

Legend

- Assessment Boundary
- N6 GCRR Road Design
- Lough Corrib SAC
- Extents of Lackagh Quarry

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Scale: **1:5,000**

Date: **March 2025**

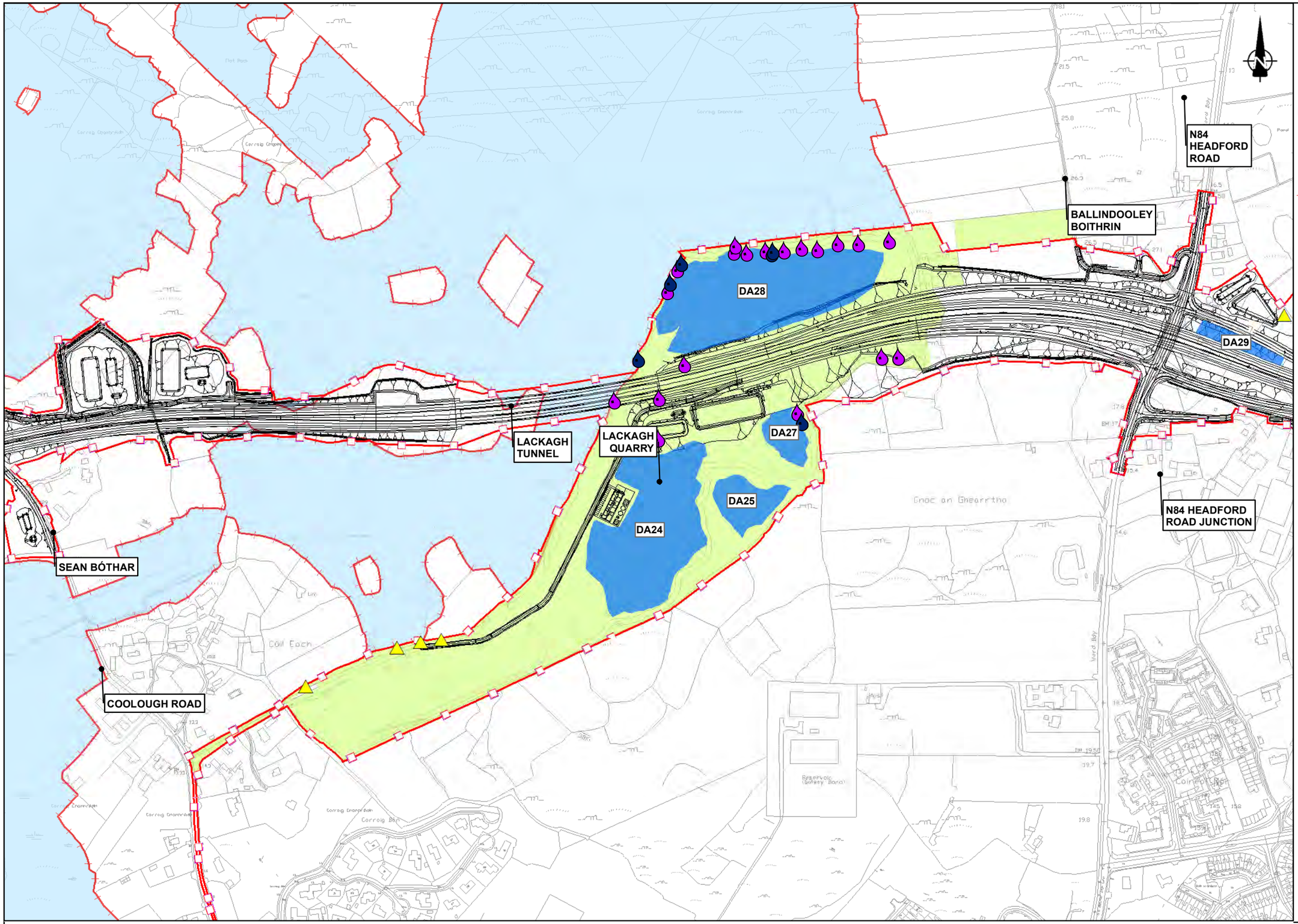
Issue	Date	By	Chkd	Appd
I2	31/03/2025	KJ	CMtS	MH
I1	30/08/2019	KD	JC	MH

Drawing Title: **Plan Layout of Lackagh Quarry Post-Construction Excluding Mitigation Measures**

Drawing Status: **For Information**

Job No	Drawing No	Issue
233985-00	Figure 1.8.2	I2

A3



FOR INFORMATION

Legend

- Assessment Boundary
- Proposed N6 GCRR
- Lough Corrib SAC
- Extents of Lackagh Quarry
- MDAs
- Petrifying Springs
- Groundwater Seepage Points
- Proposed Artificial Bat Roosts

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Clients: An Roinn Iompair Department of Transport; Tionscadal Éireann Project Ireland 2040; N6 Galway City Transport Project; Comhairle Chontae na Gaillimhe Galway County Council; TII

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Job Title: **N6 Galway City Ring Road**

Scale: **1:5,000**
Date: **March 2025**

Issue	Date	By	Chkd	Appd
I2	28/03/2025	KJ	CMtS	MH
I1	30/08/2019	KD	JC	MH

Drawing Title: **Plan Layout of Lackagh Quarry Post-Construction Including Mitigation Measures**

Drawing Status: **For Information**

Job No	Drawing No	Issue
233985-00	Figure 1.8.3	I2

A3

FOR INFORMATION

Clients

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Scale N.T.S.

Date: August 2025

Issue	Date	By	Chkd	Appd
I2	31/03/2025	KJ	CMtS	MH
I1	30/08/2019	SN	JC	MH

Drawing Title
Aerial View of Lackagh Quarry
- Post Construction Excluding Mitigation Measures
Sheet 1 of 3

Drawing Status
For Information

Job No	Drawing No	Issue
233985	**Figure 1.8.4**	**I2**

Do not scale

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A3

FOR INFORMATION

Note:

For Inflows and Bat Roosts details refer to Figure 1.8.3.

Clients

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Scale N.T.S.

Date: August 2025

Issue	Date	By	Chkd	Appd
I2	31/03/2025	KJ	CMtS	MH
I1	30/08/2019	SN	JC	MH

Drawing Title
Aerial View of Lackagh Quarry
- Post Construction Including Mitigation Measures
Sheet 2 of 3

Drawing Status
For Information

Job No	Drawing No	Issue
233985	Figure 1.8.5	I2

Do not scale

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