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INTRODUCTION

Background

- 6.1 This Chapter of the Environmental Impact Assessment Report (EIAR) presents an assessment of the potential effects on land, soil and geology of the proposed increase in the permitted soil and stone intake capacity and extended operational life of the existing soil recovery facility operated by Kilsaran Concrete Unlimited Company ('Kilsaran') at Halverstown, Kilcullen, Co. Kildare.
- 6.2 It provides a description of the existing geological setting at the application site at a regional and local scale, an assessment of geological aspects of the proposed development and its impact on land-use and geological character / features of the area.
- 6.3 Sand and gravel extraction began at Halverstown in the early 1940s, predating the 1964 Planning and Development Act. Although the extraction area was fully depleted of reserves by the late 1980s, the area at the northern end has been in continuous use since that time for concrete block manufacturing.
- 6.4 The application site, the adjoining concrete block plant to the north and a restored sand and gravel pit previously operated by Kilsaran to the north-west are identified on a plan of the area in EIAR Figure 1.4.
- 6.5 As noted above, this planning application is being made to extend the life and capacity of the existing soil recovery facility at Halverstown. These activities provide for the backfilling and restoration of the former sand and gravel pit up to / close to surrounding ground level and for the raising and improvement of lands to the north-east, refer to Chapter 1 of this EIAR.
- 6.6 The existing development and ongoing activities undertaken at the facility are described in detail in Chapter 2 of this EIAR. A detailed description of proposed further development at the facility is also provided in Chapter 2. The key aspects of the proposed development which relate to Land, Soils and Geology are:
- (i) an increase in the permitted total intake of soil and stone to the existing soil recovery facility, from 1.2 million tonnes to 2.06 million tonnes. The additional intake to the facility will comprise a mix of soil and stone managed as waste (as heretofore) and as (non-waste) by-product;
 - (ii) an extension to the permitted life of the existing facility of 3 years (to December 2029) in order to accommodate the additional soil and stone intake;
 - (iii) continued shared use of existing, co-located site facilities, structures and infrastructure (including the site office, staff welfare facilities, weighbridge (with dedicated office), wheelwash, hardstand areas, fuel storage tanks and site access road);
 - (iv) continued soil and stone intake at a rate of up to 300,000 tonnes per annum, of which no more than 95,000 tonnes (per annum) will be managed as waste;
 - (v) continued environmental monitoring of noise, dust and groundwater for the duration of the site recovery and restoration activities and for a short period thereafter (and in accordance with EPA waste licence requirements);
 - (vi) continued temporary stockpiling of topsoil pending its re-use as cover material for final restoration of the site; and
 - (vii) ultimate restoration of the modified final landform (entailing harrowing, topsoiling and seeding) to establish a native woodland habitat on the northern side of the access road and grassland habitat on the southern side.

- 6.7 Ongoing (and continued) backfilling of the lands at Halverstown will progress using only excess soil and stone sourced from pre-approved external construction and development sites. The facility does not, and will not, accept peat, contaminated soils or any non-hazardous waste. The current site layout can be seen in EIAR Figure 2.1.
- 6.8 At the present time, the facility accepts the soil / particulate waste types identified below (with their corresponding European Waste Code (EWC)):
- 17 05 04: Soil and stones not included in 17 05 03;
 - 17 05 06: Dredging spoil not covered by 17 05 05; and
 - 20 02 02: Soil and stone from municipal facilities.
- 6.9 The soil recovery facility currently operates under a Waste Licence (Ref. No. W0300-01) issued by the Environmental Protection Agency (EPA) in July 2020. Following (and subject to) approval for the additional soil waste intake, as provided for in this planning application, Kilsaran will apply to the Agency for a review of its waste licence to facilitate the intake of additional waste, over and above that already sanctioned by the current licence.

Scope of Work / EIA Scoping

- 6.10 The scope of this EIAR Chapter is based on a desk study of the application site and surrounding area using
- published geological data;
 - a site inspection of existing site operations,
 - review of ground investigation data (principally trial pit records and borehole data) included in the 2017 EIAR in respect of existing approved development; and
 - information provided to Kildare County Council (KCC) in respect of planning compliance at the site / facility.

Consultations / Consultees

- 6.11 No consultations were undertaken specifically for the purposes of preparing this Chapter of the EIA. An initial virtual (online) meeting took place between Kilsaran, SLR and officials from Kildare County Council on 23 June 2023. A further follow-up online consultation meeting was held on 15 January 2024 (Ref. No. PP5660).
- 6.12 A number of sources of information were consulted in the preparation of this EIAR Chapter for Land, Soils and Geology. The sources of information consulted are outlined below in this EIAR.
- 6.13 No additional specialist external consultation was undertaken in the preparation of this Chapter of the EIAR. Consultation was however undertaken with other specialist contributors to the EIAR.

Author

- 6.14 This EIAR chapter relating to Land, Soils and Geology was prepared by:
- Peter Glanville BA, MSc, EurGeol, PGeo; and
 - Nikolina Bozinovic BSc, MSc.

Limitations / Difficulties Encountered

- 6.15 This EIAR has been prepared based on available desktop information and information in respect of the application site which pre-dates the current backfilling / recovery activities, much of it previously presented in the 2017 EIAR.
- 6.16 No specific limitations or difficulties were encountered in the preparation of this EIAR.

REGULATORY BACKGROUND

EU Directives

- 6.17 The following European Union (EU) Directive relating to Land, Soils and Geology are relevant to preparation of this EIAR Chapter:
- Environmental Impact Assessment Directive (2011/92/EU);
 - Environmental Impact Assessment Directive (2014/52/EU);
 - The Waste Framework Directive (2008/98/EC)
 - The Management of Waste from Extractive Industries (2006/21/EC); and
 - Environmental Liability Directive (2004/35/EC).
- 6.18 The EU EIA Directive regulates the information impact assessment process and the information to be presented in an EIAR. The Waste Framework Directive, Extractive Waste Directive and the Environmental Liability Directive regulate the backfilling and recovery activities at the application site.

Irish Legislation

- 6.19 The following legislation sets out the information which must be presented in respect of Land, Soils and Geology in an EIAR for consideration at planning stage:
- The Planning and Development Acts, 2000 as amended;
 - The Planning and Development Regulations (S.I. 600 of 2001) and subsequent amendments thereto, including, S.I. No. 364 of 2005, S.I. 685 of 2006.
 - The European Communities (Environmental Impact Assessment) Regulations, S.I. No. 349 of 1989, and subsequent amendments (including S.I. No. 84 of 1994, S.I. No. 352 of 1998, S.I. No. 93 of 1999, S.I. No. 450 of 2000 and S.I. No. 538 of 2001);
 - The European Union (Planning and Development) (Environmental Impact Assessment) Regulations (S.I. No. 543 of 2014) and European Union (Planning and Development) (Environmental Impact Assessment) Regulations (S.I. No. 296 of 2018)
 - European Union (Environmental Impact Assessment and Habitats) Regulations S.I. No. 473 of 2011, and European Union (Environmental Impact Assessment and Habitats) (No.2) Regulations S.I. No. 584 of 2011;
 - European Union (Environmental Impact Assessment) (Minerals Development Act 1940) (Amendment) Regulations, S.I. No. 384 of 2018, and subsequent amendment (including S.I. No. 164 of 2019)

Planning Policy and Development Control

- 6.20 Planning Policy and Development Control relating to Land, Soils and Geology at the site in this EIAR is set out in the Kildare County Development Plan (CDP) 2023-2029. The current CDP sets out a number conservation objectives in relation to soils, geology, geomorphology and geological heritage in Kildare.
- 6.21 The current CDP recognises that the extractive industry is generally located in a rural area and can only be developed where the resources occur, that it is effectively a tied land use.
- 6.22 The CDP sets out policy and objectives which recognise land-use and resource requirements of extractive industries within the County as outlined below;

Policy RD P8 states that it is the policy of the Council to:

Support and manage the appropriate future development of Kildare's natural aggregate resources in appropriate locations to ensure adequate supplies are available to meet the

future needs of the county and the region in line with the principles of sustainable development and environmental management and to require operators to appropriately manage extraction sites when extraction has ceased.

- 6.23 The objectives set by the CDP in respect of extractive industry and associated land-use are outlined below:

Objective RD O47 states that it is an objective of the Council to:

Protect and safeguard the county's natural aggregate resources from inappropriate development.

Objective RD O48 states that it is an objective of the Council to:

Manage the finite aggregate resources being mined by the extractive industries in the county to supply the future needs of our region while working to reach our climate change targets.

Objective RD O50 states that it is an objective of the Council to:

Ensure the satisfactory and sensitive re-instatement and/or re-use of disused quarries and extraction facilities, where active extraction use has ceased. Future uses should include amenity, recreation and biodiversity areas shall be informed by an assessment of the specific site / lands and shall be subject to an ecological impact assessment or other environmental assessments as appropriate. Where it is proposed to reclaim, regenerate, or rehabilitate old quarries by filling or re-grading with inert soil or similar material, or to use worked-out quarries as disposal locations for inert materials, the acceptability of the proposal shall be evaluated against the criteria set out in Section 15.9.6 of this Plan. The Council will resist development that would significantly or unnecessarily alter the natural landscape and topography, including land infilling / reclamation projects or projects involving significant landscape remodelling, unless it can be demonstrated that the development would enhance the landscape and / or not give rise to adverse impacts.

Objective RD O51 states that it is an objective of the Council to:

Require that quarry remediation plans provide for environmental benefit, biodiversity and re-wilding in all instances. The 80% requirement for environmental/biodiversity may be waived at sites closer to urban areas where a significant portion of the site is being provided for sports, recreation, and amenity.

- 6.24 The current Kildare CDP sets out a number of policies relating to the geological heritage of the County;

Policy RD O43 states that the Council will:

'Consult with the Geological Survey of Ireland (GSI), with regard to any developments likely to have an impact on Sites of Geological Importance listed in Chapter 12 of this Plan.'

Policy BI P10 states that it is the policy of the Council to:

Maintain and protect the conservation value of geological sites of national or local importance and seek the sustainable management of the county's geological heritage resource as listed in Table 12.7.

- 6.25 The CDP also sets out a number of geological heritage objectives of the Council including;

BI O60 *Consult with the Geological Survey of Ireland regarding any development proposals within or likely to have an impact on Sites of Geological Importance set out in Table 12.7.*

BI O61 *Contribute towards the protection from inappropriate development of Geological Natural Heritage Areas that become designated during the lifetime of this Plan.*

BI O62 *Promote, encourage, and support the provision of access to geological and geomorphological features of interest in cooperation/consultation with landowners (where appropriate/practicable).*

BI 063 *Where appropriate support the restoration of Sites of Geological Importance (identified in Table 12.7).*

Guidelines

- 6.26 The following guidelines relating to Land, Soils and Geology and have been considered in the preparation of this EIAR Chapter:
- Environmental Protection Agency, 2003. Advice Notes on current practice (in the preparation of Environmental Impact Statements);
 - Environmental Protection Agency Guidelines on the Information to be contained in Environmental Impact Assessment Reports (2022);
 - Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (2018);
 - Geological Survey of Ireland, Irish Concrete Federation, 2008. Geological Heritage Guidelines for the Extractive Industry;
 - Institute of Geologists of Ireland, 2002. Geology in Environmental Impact Statements, A Guide;
 - Institute of Geologists of Ireland, 2007. Recommended collection, presentation and interpretation of geological and hydrogeological information for quarry developments;
 - Institute of Geologists of Ireland, 2013. Guidelines for the preparation of Soils, Geology and Hydrogeology Chapters of Environmental Impact Statements;
 - National Roads Authority, 2008. Environmental Impact Assessment of National Road Schemes - A Practical Guide; and
 - National Roads Authority, 2008. Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes.

Technical Standards

- 6.27 The following Technical Standard relating to Land, Soils and Geology is applied in drafting this EIAR Chapter:
- British Standards (2020) : Code of Practice for Site Investigations BS5930:2015 + A1 2020.
- 6.28 The BS Code of Practice was used in the description of the subsoils encountered in trial pits and boreholes excavated at the application site and in the course of on-site drilling programmes.

RECEIVING ENVIRONMENT

Study Area

- 6.29 The study area for this Land, Soils and Geology section of the EIAR comprises the following principal geographic areas:
- the existing soil recovery facility / application site;
 - the immediate surrounding area within approximately 2km of the Applicant's site boundary.
- 6.30 The 2013 guidelines published by the Institute of Geologists of Ireland's (IGI) recommend a minimum study area extending 2km from an application site. The guidelines recommend that this minimum distance should be reviewed in the context of the geological / hydrogeological environment as well as the scale of development and, if necessary, should be increased to reflect the sensitivity of the subsurface.

- 6.31 For the purposes of this assessment, given that the proposed development is already extant with no adverse impact on the geological environment, the study area is taken to comprise the application site and the surrounding area within a radius of up to 2 km, in line with IGI guidance.
- 6.32 The baseline information in respect of Land Soil and Geology, presented at a scale of 1:25,000 in enclosed figures, represent the surrounding geological environment extending for a distance of approximately 3.5 km from the Halverstown property boundary.

Baseline Study Methodology

- 6.33 The baseline study undertaken in respect of Land, Soils and Geology involves a review of published literature and information, a review of available information in relation to the application site and the findings from a walkover survey of the site and an assessment of the site context within the surrounding area.
- 6.34 This Chapter describes the receiving environment at and in the immediate vicinity of the application site using the available baseline information gathered, specifically the:
- **Context of the receiving environment** - location/ magnitude/ spatial extent and trends of the environmental factors;
 - **Character of the receiving environment** - distinguishing aspects of the environment being considered here;
 - **Significance of the receiving environment** - the quality, value or designation is assigned to the existing environment; and
 - **Sensitivity of the receiving environment** - how sensitive is the aspect of the environment to change.
- 6.35 The baseline study is a qualitative assessment of the available information based on professional experience.

Sources of Information

- 6.36 Table 6-1 below summarises all sources of information consulted in the preparation of the receiving environment baseline study for Land, Soils and Geology:

**Table 6-1:
Regional Data Consultation**

Data	Dataset
Soils	• Irish Soils Information System - Teagasc
Subsoil Geology	• Teagasc/GSI/EPA Subsoil Mapping
Bedrock Geology	• GSI Data Viewer - Bedrock Geology
Protected Areas, Environmental Pressures	• Environmental Protection Agency, • Irish Geological Heritage Programme (www.gsi.ie); • National Parks and Wildlife Service
Soil Waste	• Environmental Impact Statement in respect of (existing) Inert Waste Recovery Facility (Planning Ref. 18/453)

Field Survey / Site Inspection

- 6.37 Site walkover surveys and trial pit surveys were previously undertaken and recorded by SLR personnel on two occasions (prior to commencement of backfilling and recovery activities) in 2015 and 2017.

- 6.38 Prior to commencement of current development, the application site comprised a worked-out sand and gravel pit with a former settlement pond at its southern end. The site has since been gradually backfilled with imported excess uncontaminated (inert) soil and stone material from construction and development sites, starting in 2018 under a waste permit and continuing under EPA waste licence after July 2020.
- 6.39 Details of the previous trial pit and borehole surveys undertaken at the site are presented in Appendix 6-A and Appendix 6-B. The ground profiles identified in these logs has subsequently been overlaid by the soil and stone materials imported and placed in accordance with the existing planning permission and waste licence.

Land Baseline

- 6.40 Land refers to the 'land take' required for the proposed development. Land can be considered to be a resource with a beneficial use to society, for example agricultural land use, extractive industry land use or urban residential land use.
- 6.41 The land use at the application site comprises backfilling of a former worked-out sand and gravel pit with excess soil and stone generated by construction works / projects in the surrounding region. Prior to the commencement of backfilling, the site comprised a disused pit and settlement pond and an adjoining concrete block plant with ancillary infrastructure.
- 6.42 The historical extraction activities at the site were a tied land-use activity, being dependant on the availability of aggregate reserves at that specific location. The former agricultural activities on the lands to the north-west (seasonal grazing) were influenced by the nutrient and drainage characteristics of the soils present at the site.
- 6.43 The proposed development provides for continuation of backfilling activities and extension of the operational life of the existing recovery facility. The previous extraction activity and ongoing (and proposed additional) backfilling are interrelated and tied land uses at this location.
- 6.44 As noted previously, policies and objectives in relation to the extractive industry in the county recognise the regional importance of aggregates and that the material is tied or resource-based land use. It also sets out policies and objectives in respect of post-closure remediation and/or restoration of former extractive sites.
- 6.45 Uncontaminated (inert) soil and stone material has been, and continues to be, imported to restore much of the application site up to / close to surrounding ground level as part of the existing permitted development. The additional capacity provided by the proposed development is achieved by.
- increasing the overall height of backfilling by 1m on the southern side of the access road and steepening of side slopes to approximately 1v:6h (9.5°);
 - creating a 3m high, 20m wide screening berm along the northern side of the access road and steepening side slopes to the site boundary to 1v:4v (14°) (which will provide screening and noise attenuation of traffic movements along the access road leading to the concrete manufacturing plant); and
 - allowing for the fact that the density of imported soil placed in-situ is approximately 20% greater than was assumed at the time the planning application was submitted. Site records indicate the soil density achieved in-situ is 1.8t/m³ as against 1.5t/m³ (which was initially assumed at the outset) and as a result, there is a shortfall of approximately 240,000 tonnes in the soil intake required to complete the currently approved landform.

- 6.46 In terms of land take, given that backfilling and recovery operations are already established and ongoing at the application site, the proposed development will not result in any sterilisation of sand and gravel resource (much of it already extracted in any event) or any reduction in agricultural land-use at this location.
- 6.47 Following completion of backfilling and recovery operations and ground levels being raised close to permitted final levels, some pre-stockpiled topsoil materials will be used to return the site to native woodland and grassland, with resultant benefits for local biodiversity, refer to Chapter 2 of this EIAR.

Soils Baseline

- 6.48 Soil is the top layer of the earth's crust and is formed by mineral particles, organic matter, water, air and living organisms. Soil is an extremely complex, variable and living medium and its characteristics are a function of parent subsoil or bedrock materials, climate, relief and the actions of living organisms over time.
- 6.49 Soil formation is an extremely slow process and can take thousands of years to evolve; soil can be considered essentially as a non-renewable resource.
- 6.50 As the interface between the earth, the air and the water, soil performs many vital functions; it supports food and other biomass production (forestry, biofuels etc.) by providing anchorage for vegetation and storing water and nutrients long enough for plants to absorb them. Soil also stores, filters and transforms other substances including carbon and nitrogen, and has a role supporting habitats serving as a platform for human activity.

National Soils

- 6.51 The Irish Soil Information System (ISIS) project was undertaken by the EPA and Teagasc and has gathered together existing information and data from soil survey work in Ireland, which has been augmented with new field data, leading to the production of a new national soil map at a scale of 1:250,000 (www.teagasc.ie/soils).
- 6.52 The ISIS project has identified a number of Soil Associations across Ireland, which are each comprised of a range of soil types (or 'Series'), each of them different in properties, with different environmental and agronomic responses. For each soil type, the properties have been recorded in a database maintained by Teagasc.
- 6.53 The soil association of near-surface soils which occur(ed) at and around the application site is the Elton Soil Association (1000c), as indicated in Figure 6-1. This soil association is characterised as 'fine loamy drift with limestone'. The Elton Soil Association is described as comprising '*Luvisols associated to histic and humic Groundwater Gleys and Calcareous Brown Earths, on drift with Limestones*'.
- 6.54 The Elton Soil Association is comprised of a total of 10 separate Soil Series which include soil series which have developed on limestone glacial drift. It is one of the most extensive soil associations found across the limestone lowlands of Ireland and it is generally considered to be naturally moderately draining.
- 6.55 The Elton Soil Association is considered to have good agricultural potential, being friable deep soils with plentiful, well-developed roots, a high base saturation with good nutrient retention (Creamer *et. al.*, 2018).
- 6.56 The Soils of County Kildare (An Foras Talúntais, 1970) notes that the Elton Series soils have a wide use-range and are suitable for a wide range of farm and vegetable crops but are mainly used for grassland. The series are identified as first-class grassland soils as they are free draining but have a good moisture holding capacity.

Subsoils Baseline

Regional Subsoils

- 6.57 The Quaternary (Subsoil) deposits were deposited during the last 2 million years, and essentially comprise the unconsolidated materials overlying the bedrock. The two main types of quaternary subsoils in Ireland are glacial till, deposited at the base of ice sheets, and sand and gravel deposits associated with the melting of the ice sheets which are generally termed glaciofluvial outwash sands and gravels.
- 6.58 Other extensive quaternary subsoils in Ireland include peat, river alluvium and coastal process deposits. Most Quaternary subsoils in Ireland were deposited since the maximum of the last glaciation, the Midlandian, which occurred approximately 17,000 years ago.
- 6.59 The underlying, natural subsoils at the application site have been mapped by Teagasc as glaciofluvial carboniferous limestone derived sands and gravels, refer to Figure 6-2.
- 6.60 The published mapping indicates that there is a minor area of basic esker sand and gravels deposits and landforms located approximately 900m to the south of the site. The subsoils on surrounding lands comprise areas of limestone derived till to the north-east and north-west, with some alluvium deposits located along watercourses to the east of the site, as also indicated in Figure 6-2.

Site Subsoils – Sands and Gravels

- 6.61 Much of the original subsoil deposits at the site have been removed for use as aggregate and no significant extractable reserves of material remain at the site. The southern part of the site comprises a former (dried-out) settlement pond which held more silty particulate soils derived from former aggregate processing (washing) activities.
- 6.62 Trial pits conducted at the site in December 2015 encountered Made Ground which included intermixed aggregates and silt around the settlement pond area. The Made Ground at that area overlies clayey gravels and sandy gravels, refer to Appendix 6-1.
- 6.63 The subsoils at the application site have been identified and described in borehole records of four wells installed in April 2017 for groundwater monitoring purposes. The borehole / monitoring well locations are shown in Figure 6-3 and a copy of the logs is provided in Appendix 6-B. Summary details of the borehole logs prepared at that time are presented in Table 6-2 below.

T Table 6-2
Summary Borehole Details (2017 Wells)

Borehole ID	Borehole Depth	Description
GW01	19m	Glacial Till material
GW02	19m	Made Ground and Sand / Gravel material
GW03	16m	Made Ground and Glacial Till Material
GW04	9m	Sand / Gravel Material and Glacial Till Material

- 6.64 At the present time, the original subsoils at the application site are overlaid by soil and stone materials which has been imported for backfilling and recovery purposes, in line with the existing planning permission and waste licence.

Bedrock Geology Baseline

- 6.65 The GSI 1:100,000 Geology Map Sheet 16 (1994) indicates that the application site is underlain by the Carrighill Formation which is part of the Kilcullen Group and is of Silurian age, refer to Figure 6-4.
- 6.66 The Carrighill Formation is described as fine-grained greywacke siltstones and shale. The greywackes in this formation are distinctive as they have a calcareous matrix. The GSI online map viewer indicates that the overturned bedding of this formation displays a strike and dip of 20 degrees in a south-eastern direction. The application site is situated on the north-west limb, around 1.5 kilometres to the north of the synclinal axis.
- 6.67 No bedrock is exposed at the application site and the proposed development does not necessitate excavation or exposure of any of the underlying bedrock. Some minor bedrock outcrops are recorded approximately 700m to the south-east of the site.
- 6.68 The GSI karst database indicates that there are no karst features within the application site or locally in the area surrounding it.

Geological Heritage Baseline

- 6.69 An audit of County Geological Sites in County Kildare was completed by the Geological Survey of Ireland's (GSI) Irish Geological Heritage (IGH) Programme in September 2005. The report and GSI Geological Heritage map viewer¹ were reviewed to establish if any geological heritage sites or features were present at the application site or in the immediate vicinity thereof.
- 6.70 The review established that there are no designated County Geological Sites within, or in the immediate of the existing soil recovery facility in Halverstown. Separately, there are no sites of geological heritage interest or value identified sites by the current Kildare County Development Plan (2023-2029) in the surrounding local area.
- 6.71 The closest Geological Heritage Audited Site is located at Ballysax (Ref. Code KE005), approximately 2.5 kilometres north-west of the property boundary at Halverstown (at ITM Co-ordinates 681212 E, 708582 N). The site reportedly demonstrates a "*number of interesting sedimentary structures, which are an insight into how the landscape of this area, including the Curragh to the north, were formed.*"

Sensitive Receptors

- 6.72 In terms of land, soils and geology baseline considered herein, the sensitive receptors for the impact assessment purposes are taken to be land and soils. Subsoils and geology are not considered to be sensitive receptors at the site as they have already been covered by imported materials, in line with the existing planning permission and waste licence.

IMPACT ASSESSMENT

Evaluation Methodology

- 6.73 The evaluation of impacts of the proposed development is based on a methodology similar to that outlined in the:
- National Roads Authority (2009) 'Guidelines for the Assessment of Geology, Hydrology and Hydrogeology for National Road Schemes'; and
 - IGI (2013) 'Guidelines for the Preparation of Soils, Geology and Hydrogeology Chapters of Environmental Impact Statements'.

¹ <https://dcenr.maps.arcgis.com/apps/webappviewer/index.html?id=b245c2bd11a64162a1632ad6bccf8e34&scale=0>

Evaluation of Impacts

- 6.74 The proposed development is for the continued importation of inert soil and stone material for backfilling and recovery on the existing licenced site. There will therefore be no construction impacts associated with the proposed development. This assessment therefore will focus on the potential impact of the uncontaminated (inert) import materials on the land and soils at the site.
- 6.75 The importance of existing land, soil and geology attributes identified at the application site is assessed in Table 6-3 below.

Table 6-3:
Importance of Land, Soil and Geology Attributes

Attribute	Status / Occurrence	Importance
Land	Land-use at the site is already established with soil and stone backfilling / recovery activities are ongoing at present.	The lands used for backfilling / recovery are not considered to be particularly important at a local, regional or national scale.
Soils	There are no soils across the existing waste recovery facility. Some soil has been stockpiled pending use at a late stage in the final restoration of the site.	Agricultural soils are considered important at a local scale.
	Restored lands at the site will facilitate establishment of native woodland and grassland habitat which will promote greater local biodiversity.	Agricultural soils are considered important at a local scale.
Subsoils	Sand and gravel subsoils at the site have previously been excavated and supplied as aggregate for construction projects. There is no further extractable resource at the site.	-
Geology	No bedrock is exposed at the site and no bedrock has been extracted at the site in the past.	-
Geological Heritage	There is no geological heritage site present at the site.	-

- 6.76 The magnitude of the potential impacts proposed development on the Land, Soils and Geology attributes is assessed in Table 6-4 below.

Table 6-4:
Significance of Impacts on Land, Soil and Geology with no Mitigation

Attribute	Impact of Proposal on Land, Soil and Geology	Magnitude of Potential Impact
Land	Temporary loss of small area of agricultural land (ongoing) as result of backfill / recovery operations at the site.	Short to medium term and negative impact over extended lifetime of project. Minor impact at local scale

Attribute	Impact of Proposal on Land, Soil and Geology	Magnitude of Potential Impact
	Lands will be reinstated following cessation of backfilling / recovery activities. Part of application site to be restored to grassland. Remainder to be restored to native woodland.	Long term positive impact following cessation of site backfilling / recovery activities. Minor impact at local scale
Soils	Loss of small area of agricultural soils (ongoing). Soils temporarily stockpiled on site during backfilling / recovery activities.	Short to medium-term and negative over extended lifetime of project. Minor impact at local scale
	Soils will be re-used in restoration of lands to grassland and native woodland following cessation of backfilling / recovery activities.	Long term and positive with restoration and re-use of soils in site restoration works. Minor impact at local scale
Subsoils	No impact.	None.
Geology	No impact	None
Geological Heritage	No impact	None

6.77 It is considered that there will be no indirect impacts on Land, Soils or Geology as a result of the extended soil and stone backfilling / recovery activities at the application site.

Unplanned Events

- 6.78 Unplanned events in relation to the proposed development could potentially arise from instability caused by over-steep placement or stockpiling of imported soil and stone at the application site. Any short-term instability in the imported materials, were it ever to arise, is likely to be localised at small areas within the application site.
- 6.79 The risk of such instability will be minimised by site management procedures which limit the height and gradient of slopes developed in them, by adhering to the Health and Safety Authority (HSA) Safe Quarry Guidelines and implementing the Safety Health and Welfare at Work (Quarries) Regulations 2008. Specifically, risks arising from potential instability will be mitigated by ongoing geotechnical stability appraisal as operations progress.
- 6.80 In the longer-term, once filling and restoration works are complete, there will be no risk of instability, as the final ground surface will be graded to a relatively shallow slope. In light of the above, it is considered unlikely that material / soil instability will have any adverse impact on land, soils and geology at the application site.
- 6.81 From a land, soils and geology perspective, any potential impacts on human health from continued backfilling and recovery activities at the application site would not be via soil / geology pathways but via other pathways such as air (principally dust) and water (principally groundwater). These are addressed in detail in relevant Chapters of this EIAR.

Cumulative Impacts

- 6.82 Cumulative impacts are those which result from incremental changes caused by other past, present or reasonably foreseeable actions, together with those generated by the proposed development. Therefore, the potential impacts of the proposed development cannot be considered in isolation but must be considered in addition to impacts already arising from existing or planned development.
- 6.83 A review of Kildare County Council online planning search facilities indicates that no other major developments are planned or have been granted planning permission in the last five years in surrounding townlands or within 2km of the application site. In light of the above, it is considered that there is no potential for other planned development to create significant adverse cumulative impacts for land, soils or geology in the local area.

Interaction with Other Impacts

- 6.84 The risks associated with the inadvertent or unintended importation and placement of potentially contaminated (non-inert) soil and stone when backfilling the former pit could have implications for groundwater quality, were infiltrating rainfall to leach contamination from imported soils to the underlying groundwater aquifer. This aspect is discussed in more detail in Chapter 7 of this EIAR (Water).
- 6.85 When successfully completed, the extended backfilling and recovery operations across the plan footprint of the former pit will provide an increased thickness of soil and subsoil cover above the groundwater table, thereby reducing the potential risk of any groundwater contamination from any future activities on the (raised) ground surface.
- 6.86 During the backfilling and recovery activities, the presence of wider areas of exposed, unvegetated soil surfaces could give rise to dust blows during dry windy weather. The impacts from these activities will however be mitigated as part of the environmental management programme. This aspect is discussed in more detail in Chapter 8 of this EIAR (Air Quality).
- 6.87 No interactions with other impacts have been identified for the Land, Soils or Geology attributes associated with the proposed development.

'Do-nothing Scenario'

- 6.88 In a 'do-nothing scenario', it would not be possible to complete the approved backfilling of the worked-out pit or the restoration of the site to the approved landform and surrounding ground levels (in view of the in-situ density of soil placed at the site being 20% higher than initially assumed at the time the previous planning application was submitted).
- 6.89 The opportunity would also be lost to optimise intake / backfilling / recovery capacity at the existing facility and require capacity to be provided at alternative sites and locations, which may be less strategically located or result in more significant environmental impact.

MITIGATION MEASURES

- 6.90 A number of mitigation measures outlined below will continue to be implemented over the extended operation of the soil waste recovery facility at Halverstown.
- 6.91 As all the site preparation works and installation / commissioning of infrastructure required to facilitate the proposed development has been completed previously, it does not require a separate construction phase impact assessment. The operational stage for impact assessment purposes is the extended period for importation and placement of additional uncontaminated (inert) soil and stone materials at the application site.

Operational Stage Impacts - Ongoing Site Restoration

- 6.92 The mitigation measures, outlined below, have been implemented at the existing backfilling / recovery facility (operating under Planning Ref 18/453) in order to mitigate against any potential adverse impacts which could potentially impact the receiving soil and subsoil environment. These will continue to be implemented over the expended period of site operations.
- 6.93 The existing mitigation measures in place to deal with potential fuel / oil spills at the site are as follows:
- Fuel is stored at a designated diesel fuel storage tank at the site infrastructure area. The tank is constructed over a sealed concrete pavement and with a perimeter bund sized to provide a storage / retention capacity of 110% of tank storage volume;
 - Oils, greases and hydraulic fluids are stored under cover, over fuel spill trays / bunded containers within the existing shed or dedicated storage container;
 - Plant refuelling will generally take place around the existing bunded fuel storage tanks at the adjoining concrete manufacturing plant. On occasion some refuelling from mobile, double skin fuel bowsers will take place at hardstanding areas (Clause 804 sub-base materials) with drip trays used to contain any leaks or spills as required;
 - Maintenance of plant and machinery is routinely undertaken over paved / sealed surfaces at the existing covered workshop / maintenance shed.
 - Good site management practices are implemented at the site to reduce risks of spills, including the regular monitoring and inspection of storage vessels and regular maintenance and servicing of plant and equipment;
 - Such plant and resources as are necessary are deployed on site to ensure that activities are managed and executed in accordance with best management practice and to ensure compliance with environmental management systems, planning consents and existing waste licence conditions; and
 - Contingency plans / procedures are in place to deal with potential leaks and spills. An emergency spill response kit is held on site.
- 6.94 Only uncontaminated (inert) soil and stone materials are imported to the backfilling / recovery facility at the application site. In order to minimise the risk of importing and placing contaminated soil / subsoil, management systems have been introduced to establish the source of imported materials in advance and to confirm that the imported material is uncontaminated (inert).
- 6.95 A multiple level soil testing and inspection regime confirms that the material is compliant, in line with established EPA methodologies for soil recovery facilities, as outlined below;
- The source of each consignment of inert soil and stone to be imported for backfilling and recovery purposes is identified in advance and subject to basic characterisation testing to confirm that soils at the source site can be accepted at the Halverstown facility. Characterisation testing is typically undertaken in advance by customers / clients / contractors intending to forward excess soil and stone to the site;
 - Operating procedures at the site require that soil and stone imported forwarded for backfilling / recovery purposes is pre-sorted at source, uncontaminated and free of construction or demolition waste or any non-hazardous / hazardous domestic, commercial or industrial wastes;

- Any waste materials that are deemed to be unacceptable for restoration / recovery based on a visual inspection at the weighbridge are, and will continue to be, rejected and directed to an alternative authorised waste facility;
- All soil and stone imported to the facility is unloaded (end-tipped) from HGVs / trucks at the designated active backfill area. All consignments are visually inspected by site personnel at that point to confirm that there is no intermixed construction or demolition, non-hazardous or hazardous waste within it;
- If, following acceptance of the inert soil and stone, there is any subsequent grounds for concern about the nature of the materials imported, it will be segregated and transferred to the waste inspection and quarantine shed for closer inspection and classification. Detailed records will be kept of all such inspections; and
- For waste materials, representative samples will continue to be taken for every 2,000 tonnes accepted at the facility and subject to compliance testing to confirm that it complies with site intake criteria.

6.96 Any suspect non-hazardous or hazardous wastes or other waste streams which do not comply with the permitted waste acceptance criteria for backfilling and recovery identified during spreading, placement and compaction operations, will be segregated and transferred to the waste inspection and quarantine facility for closer inspection and testing to determine if it can remain on site or required removal off-site to an appropriately authorised waste facility.

Post-Operational Stage Impacts

6.97 Following completion of backfilling and recovery activities, any previously stripped or stockpiled soils will be used to reinstate soil cover across the application site prior to subsequent establishment of native woodland and grassland.

6.98 As near-surface soils and subsoils may be compacted by site plant, the following measures will ensure that the ground surface is prepared and suitable for planting of native woodland and grassland;

- Tilling - shallow tilling to aerate the upper c. 25cm of soil; and / or
- Soil ripping – use of a subsoiler or aerator to break up deeper compacted soil, improving aeration and deeper drainage, which will also allow for deeper root penetration.

6.99 These activities will prevent surface water sitting on the near-surface soils and will also reduce over-ground storm flow (run-off) which has the potential to result in soil erosion over the final, completed / restored landform.

RESIDUAL IMPACT ASSESSMENT

6.100 The residual impacts on land, soil and geology are those impacts which remain following the implementation of mitigation measures and these are assessed below.

Operational Stage

6.101 The backfilling and recovery of uncontaminated (inert) soil and stone will continue to be undertaken in line with the Health and Safety Authority Safe Quarry Guidelines in relation to the Safety Health and Welfare at Work (Quarries) Regulations 2008 and will limit the potential for unplanned events such as instability of any faces and materials, or instability on adjacent lands. Therefore, it is considered that any residual impact at the site in terms of ground instability will be low to imperceptible.

6.102 The backfilling and recovery of soil and stone and the reinstatement of the former land form to its original level will facilitate long-term land-use benefits, principally establishment

of native woodland and grassland habitats. The residual impact in terms of land-use will therefore be both positive and beneficial.

- 6.103 The implementation of mitigation measures to ensure that imported soil and stone materials are uncontaminated (inert) will ensure that any long-term impact on soils at the application site will be low to imperceptible.

Post-Operational Stage

- 6.104 With the restoration of the site to a combination of native woodland and grassland, and consequent benefits for local biodiversity, it is considered that the residual long-term impact on land-use will be both positive and beneficial.
- 6.105 The implementation of mitigation measures to ensure that imported soil and stone is uncontaminated and that restoration soil cover is appropriately placed and prepared for planting post-closure, will ensure that any long-term impact on soils at the application site (including erosion) will be low to imperceptible.

MONITORING

- 6.106 Following completion of backfilling, recovery and restoration / planting works at the application site, establishment maintenance / aftercare will be carried out for up to 3 years to ensure that planting become established within the upper soil layer and that there is no erosion or loss of soil cover.
- 6.107 During the operational stage, groundwater levels and quality will continue to be monitored in order to assess what (if any) impact the imported soil and stone and development activities have on groundwater beneath the application site.
- 6.108 Following the final restoration of the site and three years of aftercare monitoring, there will be no requirement for any long-term or on-going monitoring at the site.

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National Roads Authority (2006) A Guide to Landscape Treatments for National Road Schemes in Ireland

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The Soils of Co. Kildare (1970), An Foras Talúntais.

The Soils of Ireland (2018), World Soils Book Series, Creamer, R. and O'Sullivan, L. Eds.

RECEIVED: 28/03/2024

FIGURES

**Figure 6-1:
Soil Association Map**

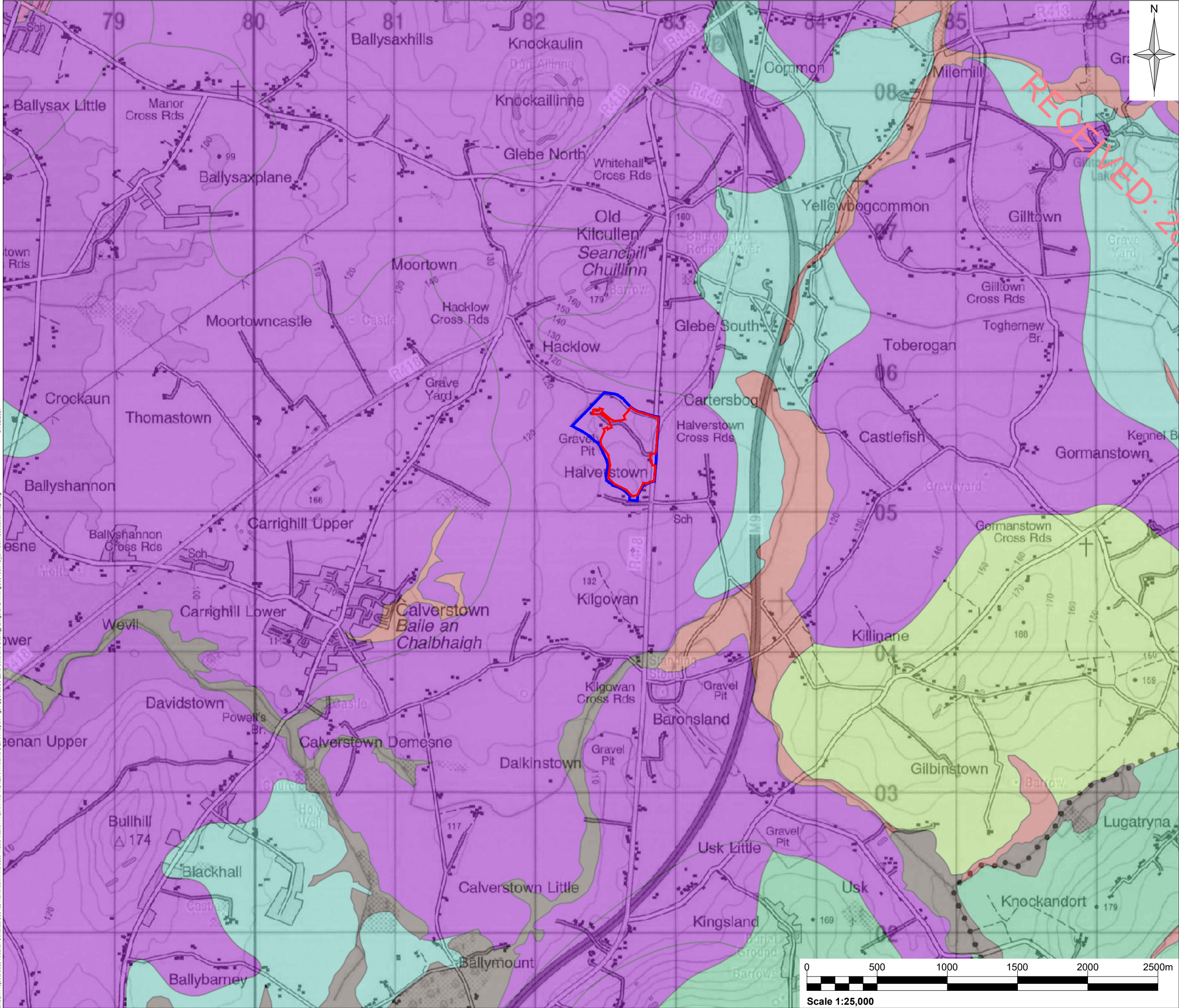
**Figure 6-2:
National Subsoils Map**

**Figure 6-3:
Trial Pit and Borehole Locations**

**Figure 6-4:
Bedrock Geology Map**

21/02/2024

S:\SLR Projects\0038 Kilsaran Concrete\Volume-2 EIAR\NIS WLA\EIAR\Volume-2 EIAR Report Figs\Appendix06 Land Soils and Geology\Draws\CAD\Wiring\065 58_FIG_6-1 Soil Association Map.dwg



Notes:

1. Extract from Ordnance Survey Discovery Series Map No. 55 and from SIS Soil Data Mapping © EPA.

Legend:

- KILSARAN CONCRETE LAND INTEREST (c.26.3 Ha)
- SITE BOUDARY
- ELTON SOIL ASSOCIATION
- MYLERSTOWN SOIL ASSOCIATION
- RIVER ALLUVIUM
- KENNYCOURT SOIL ASSOCIATION
- PEAT

Rev	Amendments	Date	By	Chk	Auth
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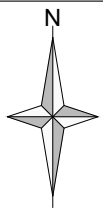
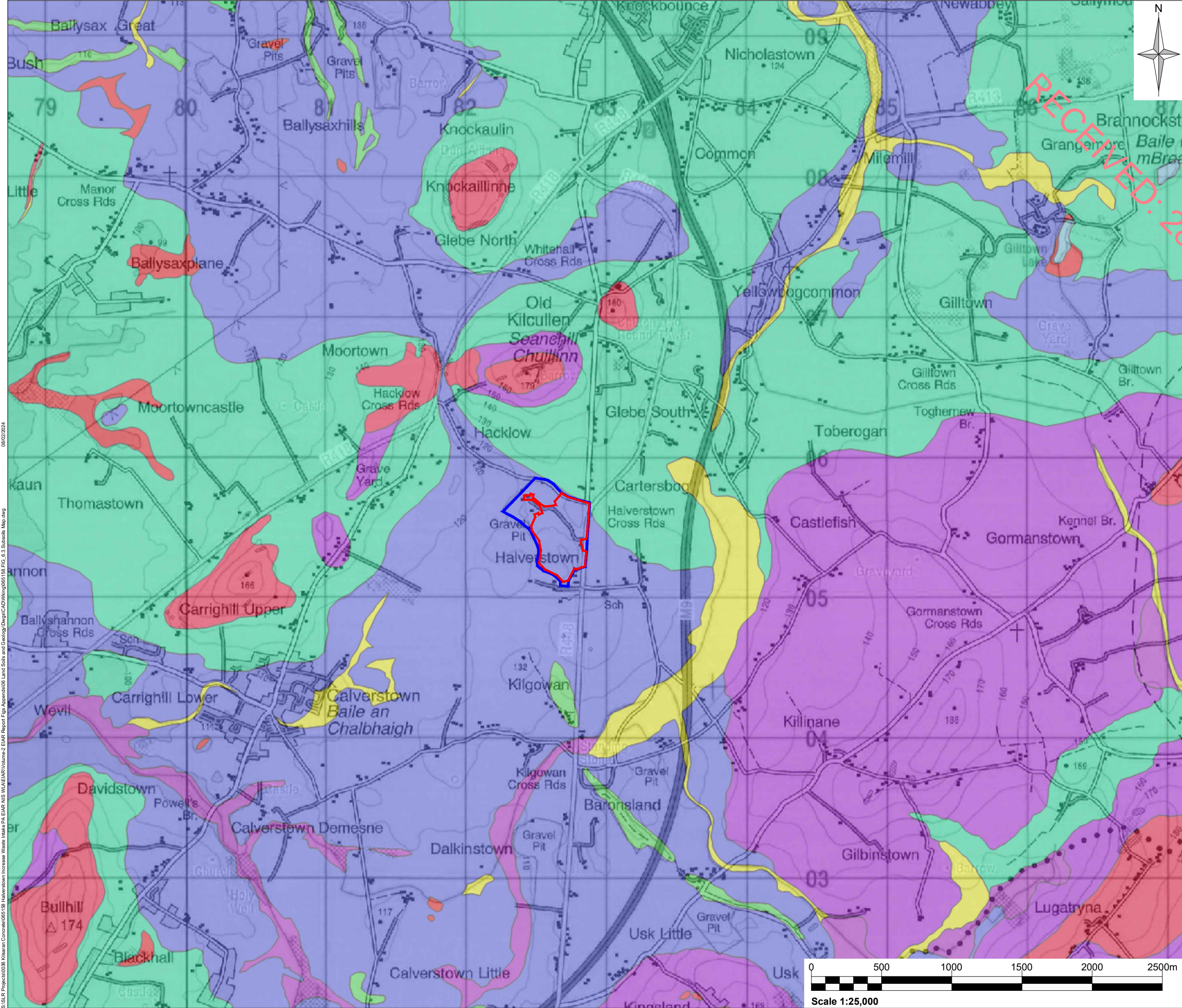
www.slrconsulting.com

Client
KILSARAN CONCRETE

Project
INCREASED INTAKE TO EXISTING
SOIL RECOVERY FACILITY
HALVERSTOWN, KILCULLEN, CO. KILDARE

Figure Title
SOIL ASSOCIATION MAP

Scale 1:25000		@ A3	SLR Project No. 065158.00001	
Designed NB	Drawn NB	Checked DL	Authorised DL	
Date 08/23	Date 08/23	Date 02/24	Date 02/24	
Figure Number FIGURE 6-1			Rev. 0	




Notes:

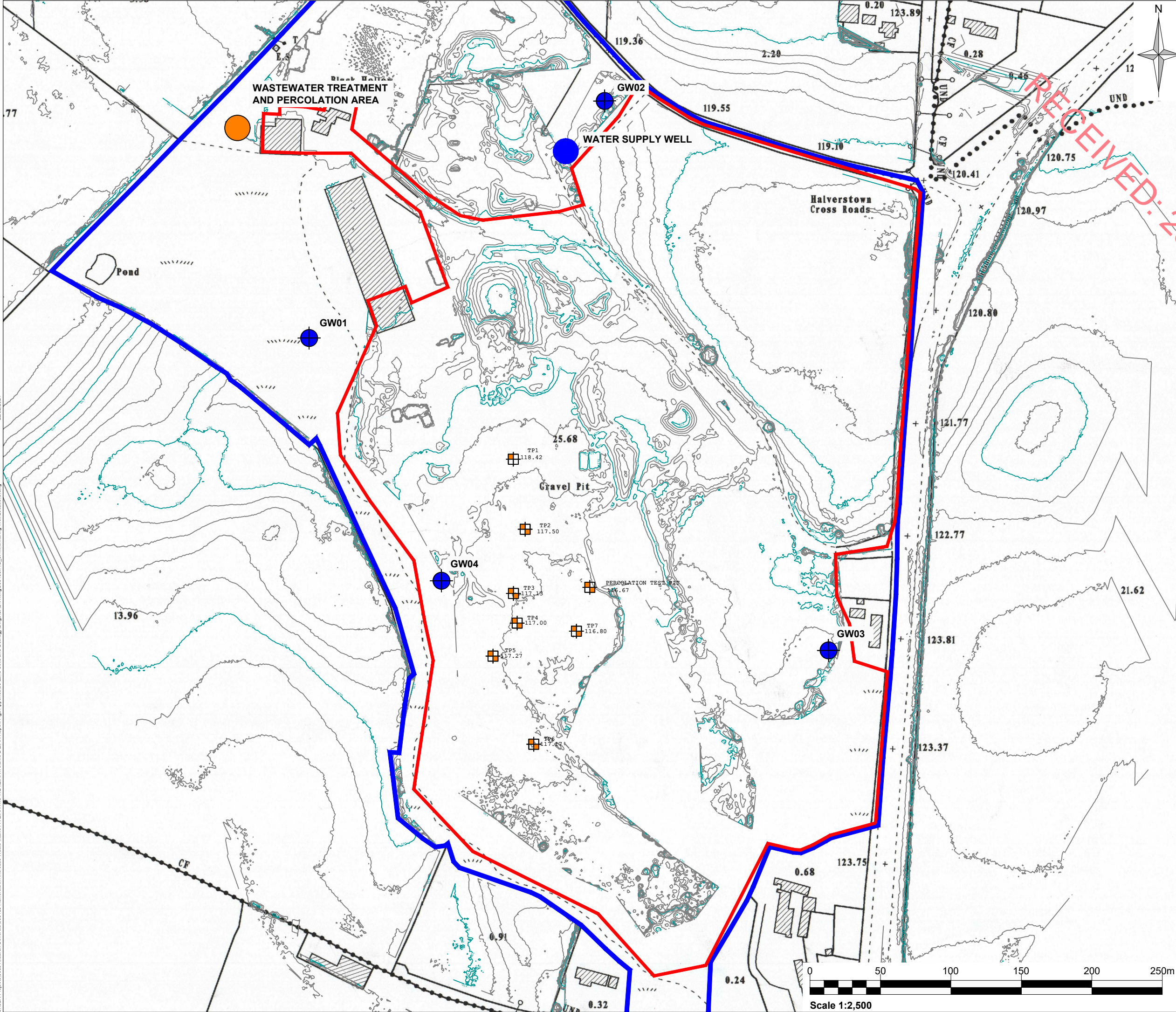
- Ordnance Survey Ireland Licence No. CYAL5016488
(c) Ordnance Survey Ireland and Government of Ireland
- Extract from Ordnance Survey Discovery Series Map No. 55
- Extract from Teagasc/EPA Subsoil Data Mapping © EPA

Legend:

- KILSARAN CONCRETE LAND INTEREST (c.26.3 Ha)
- SITE BOUDARY
- GLs, LIMESTONE SANDS AND GRAVELS
- TLs, LIMESTONE TILL
- A, ALLODIUM
- TLPSSs, SANDSTONE AND SHALE TILL
- Rck, BEDROCK AT SURFACE
- BasEsk, BASIC ESKER SANDS AND GRAVELS

Rev	Amendments	Date	By	Chk	Auth
<div> www.slrconsulting.com</div>					
Client KILSARAN CONCRETE					
Project INCREASED INTAKE TO EXISTING SOIL RECOVERY FACILITY HALVERSTOWN, KILCULLEN, CO. KILDARE					
Figure Title NATIONAL SUBSOILS MAP					
Scale 1:25000 @ A3		SLR Project No. 065158.00001			
Designed NB	Drawn NB	Checked DL	Authorised DL		
Date 08/23	Date 08/23	Date 02/24	Date 02/24		
Figure Number FIGURE 6-2					Rev. 0

S:\SLR Projects\0038 Kilsaran Concrete\065158 Halverstown Increase Waste Intake PA EIA\NIS WLA\EIA\Volume-2 EIA\Report Figs\Appendix06 Land Soils and Geology\Draws\CAD\Wiring\065158_FIG_6.3 Subsoils Map.dwg
08/02/2024



Notes:
1. BASED ON ORDNANCE SURVEY MAPPING :

KE028-15 (25 Inch);
3778-C; 3778-D and 3836-B (1:2,500).

Legend:

KILSARAN CONCRETE LAND INTEREST (c.26.3 Ha)

PLANNING APPLICATION AREA (c.18.0 Ha)

EXISTING CONTOURS

TRIAL PIT LOCATIONS

SEPTIC TANK LOCATION

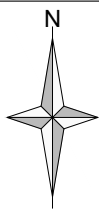
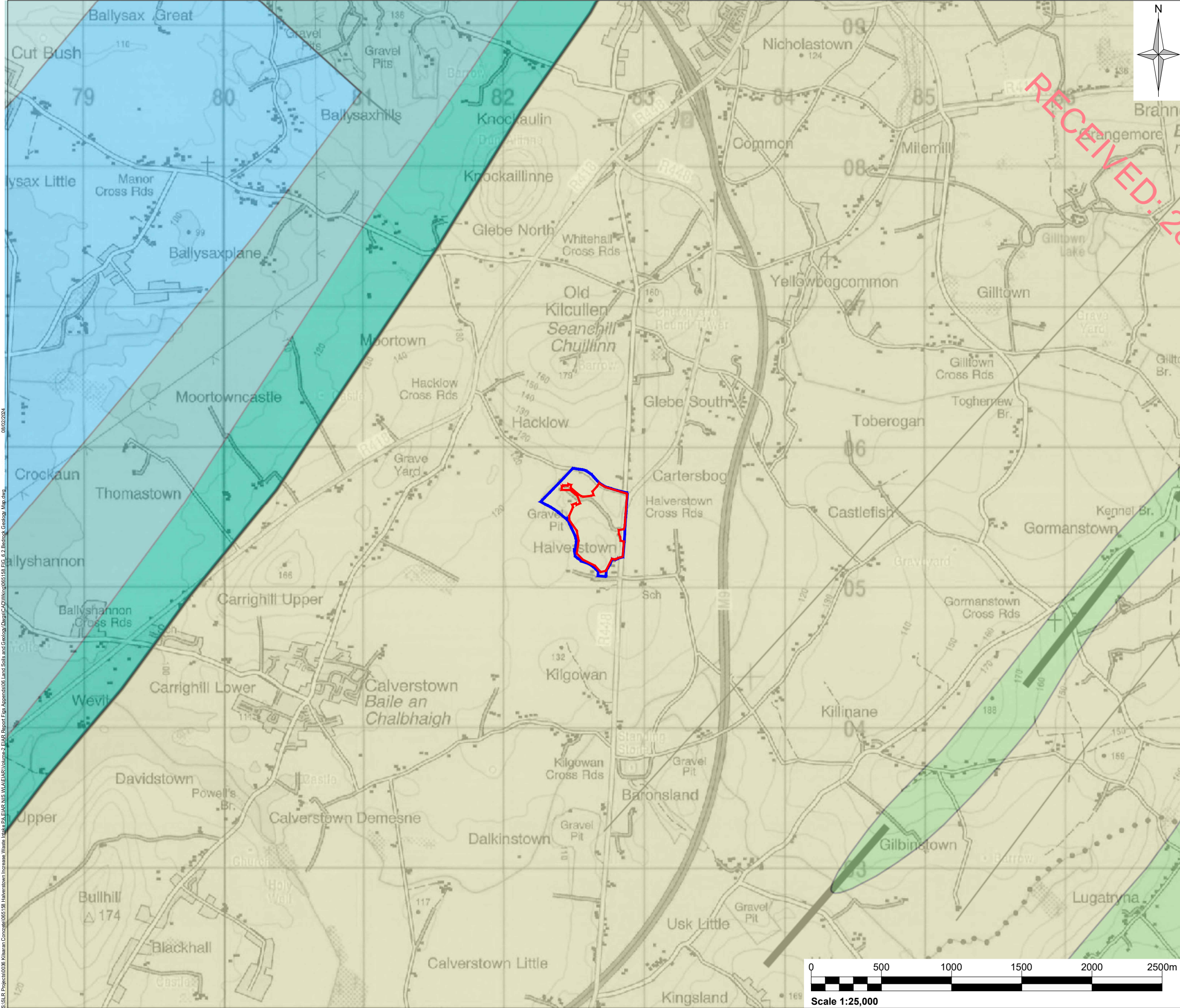
WATER SUPPLY WELL

WASTE WATER TREATMENT & PERCOLATION AREA

Rev	Amendments	Date	By	Chk	Auth
<div> SLR</div> <div>www.slrconsulting.com</div>					
Client KILSARAN CONCRETE					
Project INCREASED INTAKE TO EXISTING SOIL RECOVERY FACILITY HALVERSTOWN, KILCULLEN, CO. KILDARE					
Figure Title TRIAL PIT & MONITORING WELL LOCATIONS					
Scale 1:2,500 @ A3		SLR Project No. 065158.00001			
Designed EW	Drawn EW	Checked DL	Authorised DL		
Date 08/23	Date 08/23	Date 02/24	Date 02/24		
Figure Number FIGURE 6-3					Rev. 0

Scale 1:2,500

0 50 100 150 200 250m



Notes:

- Ordnance Survey Ireland Licence No. CYAL5016488
(c) Ordnance Survey Ireland and Government of Ireland
- Extract from Ordnance Survey Discovery Series Map No. 55
- Extract from GSI Bedrock Geology Data Mapping © EPA

Legend:

- KILSARAN CONCRETE LAND INTEREST (c.26.3 Ha)
- SITE BOUDARY
- CARRIGHILL FORMATION
- TIPPERKEVIN FORMATION
- QUINACH FORMATION
- FEIGHOULLEN FORMATION
- BALLYSTEEN FORMATION

Rev	Amendments	Date	By	Chk	Auth
<div> SLR</div> <div>www.slrconsulting.com</div>					
Client KILSARAN CONCRETE					
Project INCREASED INTAKE TO EXISTING SOIL RECOVERY FACILITY HALVERSTOWN, KILCULLEN, CO. KILDARE					
Figure Title BEDROCK GEOLOGY MAP					
Scale 1:25000 @ A3		SLR Project No. 065158.00001			
Designed NB	Drawn NB	Checked DL	Authorised DL		
Date 08/23	Date 08/23	Date 02/24	Date 02/24		
Figure Number FIGURE 6-4					Rev. 0

S:\SLR Projects\0038 Kilsaran Concrete\065158 Halverstown Increase Waste Input\DA EIA\NIS\WATER\Volume 2 EIA\Report Figs\Appendix 06 Land Soils and Geology\Draws\CAD\Wing\065158_FIG_6-2_Bedrock_Geology_Map.dwg 08/02/2024

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APPENDICES

RECEIVED: 28/03/2024

APPENDIX 6-A: Trial Pit Logs (2015)



Trial Pit Log

TP1

Sheet 1 of 1

Date
08/12/2015

Depth
5.20

Logged
PG

[illegible]

Remarks: Levels in mOD Dimensions Approximately 1.5m x 1.5m

Stability:



Trial Pit Log

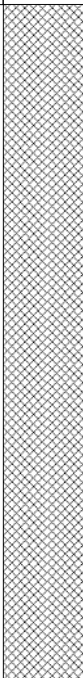

TP2

Sheet 1 of 1

Date
08/12/2015

Depth
4.80

Logged
PG

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description		
	Depth	Type	Results						
<div>▼</div>							MADE GROUND	1	
									2
									3
									4
				4.50	113.00		clayey GRAVELS		
				4.80	112.70				
							End of pit at 4.80 m	5	
								6	
								7	
								8	
								9	
								10	

Remarks: Levels in mOD Dimensions Approximately 1.5m x 1.5m

Stability:

<div><div>SLR</div><div><div>SLR Consulting Ireland</div><div>7 Dundrum Business Park</div><div>Windy Arbour</div><div>Dublin 14</div></div></div>				<div>Trial Pit Log</div>				<div>Trialpit No</div> <div>TP3</div> <div>Sheet 1 of 1</div>	
<div>Project Name: Halverstown Waste Licence</div>				<div>Project No. 501.0036.0029</div>		<div>Co-ords: 682570.00 -705382.00</div> <div>Level: 117.13</div>		<div>Date 08/12/2015</div>	
<div>Location: Halverstown, Co. Kildare</div>						<div>Dimensions (m):</div> <div>Depth 4.90</div> <div></div>		<div>Scale 1:50</div> <div>Logged PG</div>	
<div>Client: Kilsaran</div>		<div>Samples and In Situ Testing</div>		<div>Depth (m)</div>	<div>Level (m)</div>	<div>Legend</div>	<div>Stratum Description</div>		
<div>Water Strike</div>	<div>Depth</div>	<div>Type</div>	<div>Results</div>						
							MADE GROUND		
				3.00	114.13		MADE GROUND - sand GRAVELS with some small cobbles		
				4.90	112.23		End of pit at 4.90 m		
<div>Remarks: Levels in mOD Dimensions Approximately 1.5m x 1.5m</div>									
<div>Stability:</div>									



Trial Pit Log

TP4

Sheet 1 of 1

Co-ords: 682556.00 - 705334.00
Level: 117.20

Date
08/12/2015

Dimensions
(m):

Scale
1:50

Client: Kilsaran

Depth
5.20

Logged
PG

[illegible]

Remarks: Levels in mOD Dimensions Approximately 1.5m x 1.5m

Stability:

<div><div>SLR</div><div><div>SLR Consulting Ireland</div><div>7 Dundrum Business Park</div><div>Windy Arbour</div><div>Dublin 14</div></div></div>				<div>Trial Pit Log</div>				<div>Trialpit No</div> <div>TP5</div> <div>Sheet 1 of 1</div>	
Project Name: Halverstown Waste Licence				Project No. 501.0036.0029		Co-ords: 682588.00 -705269.00		Date 08/12/2015	
Location: Halverstown, Co. Kildare				Dimensions (m):		<div></div>		Scale 1:50	
Client: Kilsaran				Depth 1.50				Logged PG	
Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description		
	Depth	Type	Results						
				1.50	115.77	<div></div>	MADE GROUND - SILT		
							End of pit at 1.50 m		
							1		
							2		
							3		
							4		
							5		
							6		
							7		
							8		
							9		
							10		
Remarks: Levels in mOD Dimensions Approximately 1.5m x 1.5m									
Stability:									



Trial Pit Log

TP6

Sheet 1 of 1

Co-ords: 682610.00 - 705255.00
Level: 117.17

Date
08/12/2015

Dimensions
(m):

Scale
1:50

Client: Kilsaran

Depth
1.50

Logged
PG

[illegible]

Remarks: Levels in mOD Dimensions Approximately 1.5m x 1.5m

Stability:



Trial Pit Log

TP7

Sheet 1 of 1

Co-ords: 682619.00 - 705362.00
Level: 116.80

Date
08/12/2015

Dimensions
(m):

Scale
1:50

Client: Kilsaran

Depth
5.00

Logged

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
							MADE GROUND - slightly silty sand GRAVEL with few cobbles
				4.50	112.30		sandy GRAVELS
				5.00	111.80		End of pit at 5.00 m

Remarks: Levels in mOD Dimensions Approximately 1.5m x 1.5m

Stability:

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APPENDIX 6-B: Borehole Logs (2017)

Ellis Water Well Drilling

MINVAUDE, HACKETSTOWN, CO. CARLOW.

Tel: 059 - 6471355 Mobile: 086 - 8211955

email: info@elliswelldrilling.ie www.elliswelldrilling.ie



Site: KILCULLEN, CO. KILDARE

Log No: 1071 - BH.1

Total Well Depth: 19 m

Estimated Water Yield: _____

Depth to Bedrock: _____

Steel Casing Required: _____

P.V.C. Liner Required: _____

Other Requirements: _____

Comments: _____

Canned:

Ellis Water Well Drilling

email: info@elliswelldrilling.ie www.elliswelldrilling.ie



Log No: 1072 - BH2

Site: Kilcullen, Co. Kildare

[illegible]

Comments:

Sinned

Ellis Water Well Drilling

email: info@elliswelldrilling.ie www.elliswelldrilling.ie



o: 1073 - BH3

Log No: 1073 - BH3

Client: G.I.I

Site: Kilcullen, Co. Kildare

[illegible]

Total Well Depth: 16 m

Estimated Water Yield:

Depth to Bedrock:

Steel Casing Required:

P.V.C. Liner Required:

Other Requirements:

Comments:

Signed:

Ellis Water Well Drilling

email: info@elliswelldrilling.ie www.elliswelldrilling.ie



Client: G.I.I

Site: Kilcullen, Co. Kildare

Log No: 1074 - BH4

[illegible]

Total Well Depth: 9 m

Estimated Water Yield:

Depth to Bedrock:

Steel Casing Required:

P.V.C. Liner Required: _____

Other Requirements:

Comments:

Signed: