4 ENVIRONMENTAL FACTORS

All projects and developments that require EIA *by virtue of their nature, size and location*, have the potential to have an impact on the environment. The following sub-sections are intended to assess and describe specific areas of the existing baseline environment, to identify potentially significant impacts of the proposed development in respect of these areas, and to detail any proposed mitigation measures and on-going monitoring programmes, where appropriate.

4.1 POPULATION & HUMAN HEALTH

4.1.1 INTRODUCTION

The impact of proposed developments on human's beings forms one of the most important aspects to be considered in an EIAR. Any likely significant impact on human beings, including their community and activities, must therefore be comprehensively addressed. The principal concern in respect to this proposed development is that human beings should experience no significant unacceptable diminution in an aspect, or aspects of 'quality of life' as a consequence of the construction and operation of the proposed development.

This section of the EIAR has been prepared in order to establish the human environment in the vicinity, and to assess the potential impact, if any, of the proposed Soil Recovery Facility (SRF) on the existing environment in respect of human beings. Matters related to water, air quality, noise, landscape and other such environmental impacts are not considered here, as these are more appropriately dealt with in their respective sections. Thus, the impacts of the proposed development on human beings in relation to particular issues are addressed in the following sections:

- Land, Soils & Geology – Section 4.3
- Water – Section 4.4
- Air – Section 4.6
- Noise & Vibration – Section 4.7
- The Landscape – Section 4.8
- Cultural Heritage – Section 4.9
- Material Assets – Sections 4.10
- Roads & Traffic – 4.11

The issues considered here include, land use, population, economy & employment, social infrastructure, amenity, tourism and recreation and health and safety. The potential impact on human beings resulting from the proposed development is assessed, and possible mitigation measures proposed to reduce any significant impacts.

4.1.2 METHODOLOGY

The human environment was assessed by undertaking a desktop study and conducting visits to the site and the area. The desktop study was undertaken to compile, review and interpret available information and data pertaining to the human environment of the site and area.

The desktop study involved the assessment of all relevant demographic and socio-economic data for the area, much of which was sourced from the Central Statistics Office (CSO). The Cork County Development Plan (2015–2022) was also reviewed, whilst there are no plans for towns, villages or local areas relevant to the proposed development site. Prior EIS's on the Garryhesta and Donovan Quarries (Golders 2006a, 2006b) provided much of the site-specific information. In addition, the desktop study used: (a) maps and site layout plans of the existing quarry development; (b) a copy of the current planning permission for the quarry (Ref. QR19 06/11798 & PL04.225332); (c) Regional Planning Guidelines for the South West Region (RPGs) 2010-2022; (d) the National Spatial Strategy 2000-2020; and (e) Infrastructure and Capital Investment 2016-2021 (DoPER 2015), which replaced the the National Development Plan 2007-2013. The National Spatial Strategy was revoked in 2013, as it had failed to meet its objectives, and no alternative national spatial plan has been adopted, but its legacy persists having been incorporated into the current RPGs, CPDs and LAPs.

In early, 2018, the government published "Project Ireland 2040", the new overarching public policy initiative, which consists of the National Planning Framework to 2040 and the National Development Plan 2018-2027 (DoHPLG, 2018), which will replace the revoked NSS and the Infrastructure and Capital Investment Plan 2016-2021, respectively. This represents an alignment of the investment strategy with the strategic planning policy, to create a unified and coherent plan, which will drive the long-term economic, environmental and social progress across all parts of the country over the next ten years. This will ultimately feed into the new Regional Spatial and Economic Strategies (RSES) that will replace the Regional Planning Guidelines in early 2019 (refer to Appendix 5.1 for details).

In preparing this section, regard was given to the relevant guidelines and recommendations set out in the 'Draft Guidelines on the Information to be contained in Environmental Impact Statements', Draft, (EPA 2017) and 'Advice Notes on Current Practice in the preparation of Environmental Impact Statements', Draft (EPA 2015).

It is considered that there is a wealth of available data and information, which is sufficient to adequately assess the local environment with respect to human beings.

The assessment of impacts on the human environment were considered using criteria such as: (a) location of nearest sensitive receptors; (b) disturbance to the general amenity of the local environment; and (c) pre-existing use of the land and area. The construction and operational phases of the proposal were both considered. In carrying out the assessment both positive and negative impacts were considered, and the

significance of the impacts are rated as being either: imperceptible; not significant; slight; moderate; significant; very significant or profound (See Appendix 5.4).

4.1.3 BASELINE DESCRIPTION OF RECEIVING ENVIRONMENT

In this section, land use, recent demographic trends, economic activity, social consideration, amenity and tourism, and health are examined.

4.1.3.1 Land Use

Cork is home to scenic coastal and upland landscapes of international importance, particularly along the peninsulas in the southwest, which constitute invaluable elements of its natural resource base, and which need to be protected from inappropriate development. Sensitive development and conservation of this resource is essential to the underpinning of strengthened rural economies, the economy and quality of life.

Garryhesta Pit is located in the townland of Knockanemore between Ovens, Ballincollig and Cork City (1km, 5.5km and 13.5km, respectively to the east) and Macroom (19 km to the west). The site is located in the valley of the Bride River, which is a prominent, long, narrow, geomorphic feature running roughly east-northeast to west-southwest in a geological structure known as the Cork Syncline. This area is characterised by a mixed land use pattern, albeit dominated by pasture and lesser non-irrigated land for tillage, with considerable area given over to mineral extraction. The nearest watercourse to the site is the Bride River, which flows roughly W-E approximately 1km south of the site.

Agricultural activity in the wider area consists of livestock and tillage farming. The field pattern consists of generally large intensively managed agricultural fields bordered by variably managed hedgerows. There is only minor broad-leaved forest, which is restricted to fringes in river valleys, ravines and hedgerows.

The Applicant, Roadstone, has operated sand and gravel pits at Garryhesta Pit, Classis Pit, Donovan's Pit and since the 1940's, as well as Dineen's Pit, Classis West and South in Ovens, County Cork more recently. The existing Classis Pit and Production Facility is currently being supplied with aggregate (sand and gravel) from the adjacent and linked pits at Classis West and South via an existing conveyor belt.

The proposed soil recovery facility including site infrastructure will comprise a c. 7.9 ha section of the existing quarry workings at Garhyhesta, as shown by the Application Area Map Figure 1.2. The total landholding extends to c. 77.2 ha and is shown highlighted in blue. Thus, the proposed application site area (for infilling) will be confined to a relatively small section of the sand and gravel pit, much of which has already been worked out.

The proposed Soil Recovery Facility (SRF) will also continue to use the established quarry infrastructure located north centrally in the quarry site, including internal roads, site office, welfare facilities and other ancillaries (Refer to EIAR Figure 1.3).

Land-use in the surrounding area is largely agriculture and quarrying with scattered rural pattern of residential dwellings along the N22 which runs immediately to the north of the site and along other local roads to the south and east of the site. The site is well screened from outside views along the N22 by well-established planting (Refer to EIAR Figures 1.1 and 1.2).

4.1.3.2 Population

The complete list of reports from Census 2016 has now been published, such that the data presented below are based on the 2016 census data published by the Central Statistics Office (CSO). As the 2011-2016 inter-censal period records the changes since the depths of the recent economic crisis, commonly called the "Great Recession", which bottomed-out in the middle of 2011, it is more perceptive to examine a longer period, such as the 2002-2016 period, in order to discern more meaningful long-term trends in the censal population data. Thus, trends in the population will be discussed here typically by reference to censal data spanning the 15-year period 2002-2016.

Analysis of the 2002-2016 Census indicated that in the periods 2002-2006, 2006–2011, and 2011-2016, Cork experienced a significant increase, with the population passing the half million mark. A population of 447,829 was recorded in 2002, 481,295 in 2006, 519,032 in 2011, and 542,868 in 2016, representing increases of 7.5%, 7.8%, and 4.6%, respectively, in the three inter-censal periods. The average annual rate of population growth in the period was 1.4%, which was higher than the rate of increase experienced during the 1996-2002 period (1.1%). The increase in the population of Cork between 2011 and 2016 (i.e., 23,836) is comprised of unequal components due to natural increase (births over deaths) of 21,645, and to a much lesser extent net migration of 2,191.

Since 2011, the population of Munster increased by 2.7%, while the population of the State increased by 3.8%. This is consistent with the long-term trends in the population growth of the State outpacing Cork County, in that the population of Munster increased by 16.3% since 2002, while the population of the State increased by 21.6% in the same period. Nonetheless, Cork had the highest rate of population growth in Munster, resulting in its share of the provincial population (i.e., 1,280,020) continuing to increase from 41.0% in 2006, 41.7% in 2011, to 42.4% in 2016.

There are twelve major towns (pop. > 5,000) and cities with legally defined boundaries in Co. Cork., namely Cork City (pop. 125,675), Ballincollig (pop. 18,872), Carrigaline (pop. 15,770), Cobh (pop. 12,800), Midleton (pop. 12,496), Mallow (pop. 12,459), Youghal (pop. 7,963), Bandon (pop. 6,957), Fermoy (pop. 6,585), Passage West (pop. 5,843), Kinsale (pop. 5,281), and Carrigtwohill (pop. 5,080). Of these, Carrigtwohill experienced the most growth between the period 2011-2016 at 11.6%, followed by Ballincolllig at 8.7%, while Cork City having experienced a decline of -3.2% and -0.2% in the two previous inter-censal periods of 2002-2006 and 2006-2011, showed modest rebound with growth of 5.4% in 2011-2016. Thus, the 2002, 2006 and 2011 Census data indicate that the population of the only recognised Gateway in the South West Region had been declining, while satellite towns showed strong growth.

Development around the Cork Gateway over the decade has clearly experienced a "doughnut effect", whereby higher population growth has occurred in villages and rural areas instead of within the main urban areas. This trend of significant population growth in areas classified as Rural Areas Under Strong Urban Influence, while the centre of the Gateway experiences population loss is an unsustainable pattern of development. It results in higher commuting patterns and greater demands on infrastructure development and the need for other services outside of main urban areas. However, the only recognised Hub in Cork County, namely Mallow, and many of the Key Towns, such as Youghal, Kinsale, Skibereen, Clonakilty, and Macroom, are increasing in size, which is a positive outcome for building the critical mass essential to facilitate balanced regional development.

In 2016, there were 26 towns (pop. > 1,500) and cities with legal defined boundaries and which are classified for the purpose of the census as urban settlements. The total urban population was 340,681, while the rural population was 202,187, giving a rural/urban divide of 62.8%.

The proposed development is located in the Electoral District of Ovens (Refer to Figure 4.1.1), which includes the following townlands: Barnagore, Carrigane, Castleinch, Clashanure, Classes, Curraghbeg, Knockanemore, Lackenareague, Lisheens, Mullaghroe, Walshestown. As stated earlier, the Garryhesta pit is located in the townland of Knockanemore.

The surrounding Electoral Districts include Carrigrohane, Dripsey, Aglish, Ballygroman and Ballincollig, whilst in the broader context, Knockanemore is located in the Greater Cork Rural Area, a relatively densely populated area surrounding Cork City. The townland falls within the Electoral Division of Ovens, which has an area of 15.99 km^2, and a population of 2,342 persons, which translates into a moderately high population density of 146.5 persons per km^2. This compares to the population densities of 72.4 and 67.8 persons per km^2 for County Cork and the State, respectively, which themselves constitute low population densities relative to those in the UK and Europe (i.e., 255 and 112 persons per km^2, respectively).

The Electoral District has a sex ratio (i.e., 1,045 males versus 1,097 females), with the higher number of females, who in general preferentially migrate to the towns, resulting in a characteristic pattern more reflective of urban areas in Ireland.

The average age of the population in Cork County (i.e., 37.1), which is marginally above the national average (i.e., 37.4), and is exceeded conspicuously by Cork City, with an average age of 39.1. The average age in the Ovens Electoral District in 2011 was very young at 33.0 and fell further to 32.4 in 2016. The proportion of the population aged 65 years and older in the Ovens ED was very low at 6.5% in 2016. The proportion of the population aged 65 years and older in Cork was 12.0% in 2011, which compared favourably with 11.0% nationally, although it dropped to 11.8% in 2016. The 'Old Dependency' ratio, the ratio of persons aged +65 to working persons, in County Cork was 20.2% in 2016, and was close to the average of 20.4% for the State. In contrast, the 'Young Dependency' ratio, the ratio of persons aged 0-14 to working persons, in County Cork was 35.7% in 2016, which is higher than the average of 34% for the State.

Thus, the 'Total Age Dependency' ratio in County Cork was 56.1% in 2016 compared to 52.7% in the State, due largely to the younger population.

Table 4.1-1 gives population data for the electoral districts in the vicinity of Garryhesta, as well as for County Cork, the South West Region, and the State from 2002-2016 (CSO 2017). Notably, the population of the six electoral districts that together comprise the local area show a strong growth of 23.5% (1.56% annually), while Cork, the South West Region and the State show lower, but still double-digit population growth in the same period. Indeed, the strong population growth of the local area can be largely attributed to that of the urban centre of Ballincollig and its environs (+ 2,956), and the redrawing of the boundaries of the Ovens ED, which resulted in an anomalous jump in population between the census years of 2002 and 2006. The more rural electoral districts exhibit populations that are growing modestly (i.e., Aglish and Dripsey) to declining (i.e., Carrigrohane). The trend of increasing population in all but the most rural parts of the local area is consistent with the doughnut pattern of development experienced by Cork City, whereby higher population growth has occurred in villages and rural areas instead of within the main urban area.

There are no large residential settlements close to the site, with nearest large population centre being the town of Ballincollig c. 5.5 km to the east. The village of Farran is situated 2km to the west along the N22, while the village of Killumney is 2km to the southeast. Residential development consists of isolated farm dwellings and of owner occupied bungalow/houses along public roads (Refer to EIAR Figures 1.2 and 1.3).

Table 4.1-1 Population in the Local Area 2002-2016

District	2002	2006	2011	2016	%Change 2002-2016
Ovens	1,047	1,703	2,090	2,342	+123.7
Carrigrohane,	1,691	1,563	1,425	1,499	+11.4
Dripsey,	1,323	1,377	1,466	1,495	+13.0
Aglish,	1,339	1,333	1,366	1,453	+8.5
Ballygroman	977	1,321	1,572	1,673	+71.2
Ballincollig	15,119	16,308	17,965	18,075	+19.6
Total Local Area	21,496	23,605	25,884	26,537	+23.5
County Cork	447,829	481,295	519,032	542,868	+21.2
South West Region	580,356	621,130	664,534	690,575	+19.0
State	3,917,203	4,239,848	4,588,252	4,761,865	+21.6

Note: Data from CSO (2017).

4.1.3.3 Economy & Employment

Cork is a large, populous county with the largest urban centre and Gateway outside of Dublin. With a population of a third of a million, combined with its airport and sea port, Cork City has the critical mass to be the linchpin in a proposed Atlantic Economic

Corridor connecting Waterford City, Limerick/Shannon and Galway City. It thus comprises the only serious counterweight to Dublin in terms of attracting investment and balancing regional development and has the most immediate potential to be developed to the national level scale required to complement Dublin. The Greater Cork Area (GCA) comprising the Cork Metropolitan Area or Gateway and the Ring Towns and Rural Area in the Cork Area Strategic Plan (CASP) area forms one of the four main planning areas in the South West Region (SWRA 2010). The Ring Towns in the CASP include Youghal, Fermoy, Mallow, Macroom, Bandon and Kinsale. The Metropolitan area includes Cork City proper, Carrigaline, Cobh, Middleton, Carrigtwohill, Ballyvolane & Glanmire, Monard/Rathpeacon, Blarney and Ballincollig. This Metropolitan area is envisaged as a unified entity having a single jobs and property market, an integrated transport system, and the social, cultural and educational facilities of a modern European city (Cork 2001). Ovens is situated on the western periphery of the CASP area.

The economy of County Cork is broad based and diverse. Agriculture and fishing have always been significant sectors, but the 19th Century brought growth in shipping, transport and commerce, while in the mid-20th Century general manufacturing activities (steel, vehicles and components, fertilizer & chemicals, etc.) became prominent. There has been substantial growth in modern technology-based manufacturing in sectors such as electronics, pharmaceuticals and medical devices. The service sector has also grown significantly as modern ICT developments have enabled Cork to serve global markets.

The CASP has a number of employment locations that have underpinned Cork's economic success. These include the port related, pharmaceutical and associated industries at Ringaskiddy; the manufacturing, storage and logistics related activities at Little Island; high levels of mixed-use employment at settlement locations such as Ballincollig, Carrigtwohill and Midleton; as well as the central employment role played by Cork City (Cork 2014).

The rural/urban divide in Cork was 62.8% in 2016, indicating that the rural areas of Cork are home and workplace to a significant proportion of the people of Cork. The urban population increased at over twice the rate of the rural population in 2011-2016 (i.e., 16,890 and 6,946, respectively). Agriculture is the primary land-use in the county, but the economy is only moderately reliant on this sector, with 6.64% employed in agriculture, forestry and fishing in 2016. The rural and coastal areas are also the location of major natural resources as well as our major recreational, amenity, tourist and archaeological resources.

Of the 248,372 workers recorded in 2011, 207,503 were at work, giving a nominal, non-seasonally adjusted unemployment rate of 16.5% at the height of the recession. In 2016, of the 254,857 workers recorded, 230,373 were at work, giving a nominal, non-seasonally adjusted unemployment rate of 9.6%, indicating significant economic recovery.

Examination of the Central Statistics Office (CSO) Live Register figures for County Cork during the recession shows that unemployment levels rose dramatically from

the end of 2007 to 2010 and remained a factor of about 2.5 times the pre-recession levels at c. 45,000 until November 2011 (See Figure 4.1-3).

The dramatic increase in unemployment had been largely associated with the collapse of the construction industry and the associated service industries. The level of employment has steadily improved since 2011, reflecting a broad economic recovery, with only 21,169 and 8,560 on the live register in Cork County and Cork City, respectively, in December 2017. Nationally, there were 236,268 on the live register in December 2017, indicating the unemployment rate in the Cork County and City is significantly lower than in the State.

From Table 4.1.2, it is apparent that the dominant employment sectors in County Cork are professional services (23.3%) followed closely by commerce and trade (22.1%), manufacturing (16.3%), transport and communications (7.42%), etc.

Professional services and commerce and trade are the largest employers, accounting for 48.5% of the employment in in the Electoral Division of Ovens. These are followed by manufacturing (16.2%), other activities (12.8%) and transport and communication (11.0%). As stated above, the main employment consists of professional services and commerce and trade, which is mainly located in Ovens, Ballincollig, Cork City, Little Island, Ringaskiddy, and the nearby Cork Airport and business park. The mean travel time to work for residents of the Ovens ED in 2016 was 14.5 minutes, suggesting that Ballincollig and Cork City are the dominant destinations for employment.

Table 4.1-2 Employment by industry in County Cork and Ovens ED in 2016

Industry	County Cork		Cork City		Ovens	
	Pop.	%	Pop.	%	Pop.	%
Agriculture, forestry and fishing	11,946	6.64	120	0.24	18	1.48
Building and construction	10,035	5.58	1,815	3.60	59	4.86
Manufacturing	29,307	16.29	7,012	13.89	197	16.21
Commerce and trade	39,716	22.08	11,326	22.44	302	24.86
Transport and communications	13,343	7.42	4,784	9.48	134	11.03
Public administration	8,409	4.67	2,073	4.11	62	5.10
Professional services	41,819	23.25	12,670	25.10	287	23.62
Other	25,315	14.07	10,683	21.16	156	12.84
Total	179,890	100.00	50,483	100.00	1,042	100.00

Note: Data from CSO (2017).

One of the largest employer in Ovens is Dell EMC, who operate a 650,000 square-foot EMC International Operations Campus, which supports 1,900 employees, 90% of which hold 3rd level qualifications. The campus is located on the N22, c. 2km east of the site (c. 0.5km east of Ovens), and provides a wide range in business functions from software development, product support, international finance, manufacturing, R&D, logistics, etc.

The Applicant, Roadstone, has operated numerous sand and gravel pits in the Ovens area since the 1940s to present. Roadstone also manufactures a range of concrete products at its Classis facilities c. 4km from the site and employs a total of c. 100 people directly and indirectly in the area.

There are several medium-sized employers in the nearby village of Killumney (c. 2km to the southeast of the site), including Classic Building Solutions, which employs 35 people, Cronin Buckley Steel, Munster Blinds, CO-OP Superstore, the Killumney Inn, and a few minor retail outlets. There are a number of other small settlements in the locality, such as Ovens, Srelane Cross, Farran, Kilcrea, within which all commerce can be described as small (shops, pubs, etc.). There are a number of bed and breakfast (B&Bs) in the area primarily along the N22 and the Lee valley Golf and County Club at Clashanure, Ovens.

The SRF will require one person to operate a bulldozer/excavator and one general foreman to monitor and inspect the quality and suitability, of imported materials being brought to the site for recovery and two other general site operatives. It is expected that the existing staff will take on these roles.

4.1.3.4 Social Consideration

There are numerous established individual residences, clusters of residences, hamlets or graigs within a 1 km radius of the quarry site. Six residences abut the northern boundary of the quarry site along the N22, one abuts the western boundary, and two abut the southern border, where it extends to local secondary road LS6226, known as Garryhesta Road, as shown on EIAR Figures 1.2 and 1.3. Residential development consists of isolated farm dwellings and of owner occupied bungalow/houses along public roads. There are no large residential settlements close to the site, with the village of Ovens situated c. 1.5km to the east along the N22, the village of Farran situated c. 2km to the west along the N22, while the village of Killumney is c. 2km to the southeast. The nearest large population centres are the town of Ballincollig and Cork City c. 5.5km and 13.5km, respectively, to the east along the N22, followed by Blarney c. 10km to the northeast, Bandon c. 14.5km to the south, Macroom c. 18.5km to the west (along the N22), Carrigaline c. 21km to the southeast, and Kinsale c. 22km to the south, all of which are within 25 km. With exception of the N22 Primary National Road, the roads in the area (< 5km) are of a local character and typical of a rural location.

The nearest Post Office is in the town of Ballincollig, where a large range of shops and retail outlets are also available. The nearest bank is also available in Ballincollig,

The nearest national school is Ovens National School, which is situated 1.5km to the southeast and had an enrollment of 427 boys and girls in the 2015/16 school year, whilst Scoil Naomh Muire is located nearby at Farran. The nearest secondary school is Coláiste Choilm in Ballincollig, which had an enrollment of 700 boys and 690 girls in the 2015/16 school year. The nearest third level Institutions are located in Cork City, namely Cork Institute of Technology (CIT) and University College Cork (UCC).

The nearest church is St. John the Baptist Church, Ovens, which is situated c. 1.5km southeast of the site. Other catholic churches in the region include Farrran Church, the Church of St. Mary & St. John, Ballincollig, Church of the Real Presence, Cork City, St. Joseph's Church (SMA Wilton), Cork City, and Church of the Descent of the Holy Ghost, Cork City. The nearest Protestant churches are St. Mark's, Aherla, St. Senan's Church, Inniscarra, and St. Peter's Church, Carrigrohane. Places of worship of other denominations include the Bible Baptist Church, Ballincollig, the Lee Valley Bible Church, Ballincollig, Trinity Presbyterian Church, Montenotte, Cork City, Cork Methodist Church, Ardfallen, Cork City, and Cork Mosque, Ballyphehane, Cork City.

There is a primary health centre in Ballincollig, namely the Ballincollig Health Centre, while the nearest hospital is Cork University Hospital, a general/acute, tertiary hospital on the west side of Cork City. There is a fire station located in Ballincollig, where the Southern Division and County Headquarters are also co-located there. The nearest Garda Station to Garryhesta is located in Ballincollig, which falls within the Cork City Garda Division.

The main local GAA clubs in the area are the Eire Og GAA at Knockanemore, Dripsey GAA, Ballincollig GAA, Gleann na Laoi GAA club at Carrigrohane, and Inniscarra GAA. Additional sports facilities are scattered around the region, including Ballincollig Camogie Club, Ballincollig Rugby Football Club, Le Valley Golf and Country Club, Clashanure, the National Rowing Centre at Farran Wood, the Cork Powerboat and Waterski Club, Agharinagh, and the Lakewood Sports and Social Club, Ballincollig, which offers tennis, soccer, pitch and put, etc. Other facilities in the region include community centres and halls, some of which are stand-alone or are associated with local GAA grounds.

Power to local residences is provided by over-head lines. The mains water supply for the area runs along the N22 roadway. There are also houses in the area served by bored wells. Most houses are serviced by septic tank systems and proprietary effluent treatment systems.

4.1.3.5 Tourism & Amenity

Garryhesta is located c. 5.5km west of Ballincollig, c. 13.5km from both Cork City and Cork Airport. The site is located along the N22, which serves visitors travelling from Cork to Macroom, Killarney and on to Tralee. Both Cork with Killarney are major tourist destinations, while the historic port of Kinsale lies c. 22.5km south on the coast, and offers golfing, yachting, sea angling, and dolphin and whale watching.

There are community facilities c. 1.5km the southeast at Ovens (i.e., Ovens Church, Ovens National School and Eire Og GAA Club). Sports are actively pursued in the local area, and include football, soccer, tennis, sailing, waterskiing, rowing, swimming, hillwalking, fishing, golfing and pitch and put.

Major tourist attractions in south Cork, include:

Cork City English Market –food market with spectacular vaulted ceiling.

Cork City Gaol – imposing former Victorian prison

Elizabeth Fort – a restored star-shaped 17th C fort

St. Fin Barre's Cathedral - mixture of French gothic and medieval whimsy

Blackrock Castle and Observatory

Crawford Art Gallery

University College Cork Campus

South Cork: Blarney Castle and 'much talked about' Blarney Stone

Midleton Distillery – history of Uisce Beatha at Jameson Heritage Centre

Fota Island Wildlife Park - just 20 minutes east of Cork City

Charles Fort, Kinsale - one of Europe's best-preserved star-shaped forts

Bantry House – 18th-century house with air of faded gentility

Mizen Head Signal Station - perched on a small island connected to the mainland by a spectacular 45m-high bridge

There are numerous walking and cycling trails in south Cork, including Farran Forest Park Loop, Farran Wood, Gunpowder Trail – Heron Trail, Ballincollig, Slí na Sláinte, Blarney, Slí na Sláinte, Kinsale, and the Carrigaline to Crosshaven Greenway. Other activities are available at the National Rowing Centre, Farran Wood, the Cork Powerboat and Waterski Club, Agharinagh, Aquaventures Dive Centre, Baltimore, Swell Surf School, Kilgraney, Kartmania, Little Island, and ActionPak Paintball, Kinsale. There are numerous yacht and kayak clubs, inland fishing for brown trout, salmon, bream and pike, sea fishing for bass, seatrout and pollack, as well as sandy public beaches and small seaside resorts.

Golf enthusiasts visiting the area can enjoy a choice of excellent golf courses within short driving distance, including Blarney Golf Club, Muskerry Golf Club, Cork Golf Club, Douglas Golf Club, the nearby (< 1km) Lee Valley Golf and Country Club, Clashanure, and the nearby (c. 2.5km) Lakewood Sports and Social Club, Ballincollig for pitch and put.

There are a host of festival and events held throughout the year in the Cork City area, which include the following notables:

- Cork Spring Poetry Festival - February
- St. Patrick's Day Festival - 17th March

- Cork World Book Festival – April
- Cork International Choral Festival – April
- Cork Midsummer Festival - Late June
- Irish Examiner Cork City Marathon – June
- Irish Performing Arts Festival - Late June
- Cork Puppetry Festival – August
- Cork International Short Story Festival – September
- Cork Folk Festival - Early October
- Oktoberfest Beag - early-Mid October
- Cork Jazz Festival - October Bank Holiday Weekend
- Cork Film Festival - October/November
- Cork Science Festival – November
- Glow: A Cork Christmas Celebration - December

Ovens and its environs are steeped in history and have a wealth of historical and archaeological sites. There are a number of protected structures within 5km of the site, and these include:

- Imposing ruins of Kilcrea Friary, which was founded in 1465 by the Franciscan Friars, stand on the southern bank of the River Bride, and lie c. 2km southwest of the site.
- Ruins of Kilcrea Castle lie c. 2.25km southwest of the site.
- Derelict former St. Mary's Church (Athnowen Church) lies c. 2.5km from the site at Carrgane.
- Farran House, Farran, lies c. 2.5km west of the site, is the former home of the Clarke family, who made their fortune in the tobacco business.
- Desertmore House lies c. 2.5km south of the site.
- Lodge House, Aherla, lies c. 4km southwest of the site.
- Ruins of Inniscarra Church, Inniscarra, lies c. 4km east of the site.
- Inniscarra Bridge and Weir, Inniscarra, lie c. 4.5km east of the site.
- Clashanure Cornmills, Clashanure, lies c. 3km north of the site.
- Dovecote Pigeon House, lies c. 3km north of the site, just across the Inniscarra Reservoir on the Lee River.

There are a several heritage centres located east and west of the site along the N22. These include the Bealick Mill Heritage Centre and Prince August Toy Soldier Facility c. 14km to the west, and Ballincollig Gunpowder Mills and Dunkathel House c. 7km to the east.

There are two scenic routes running essentially E-W within c. 5km north of the application site. These routes lie in a high value landscape defined as Hilly River and Reservoir Valleys (Cork 2014). These are:

- S37 (R618), which runs E-W from Carrigohane, Cork City to Macroom, north of the Inniscarra Reservoir, largely within the Lee River Valley.

- S38 (L2202), which runs E-W from Classis to Coachford via Currabeg, south of the Inniscarra Reservoir, on upland partly overlooking the Bride River Valley.

4.1.3.6 Human Health

This section describes the existing human environment in terms of the health and safety of the receiving population, as well as that of the workforce of the application site, which are protected by employment legislation, including principally the provisions of the "Safety, Health and Welfare at Work Act, 2005", and amendments and regulations made thereunder.

The constitution of the World Health Organization (WHO) defines health as 'a state of complete physical, mental and social wellbeing and not merely the absence of disease or infirmity' (WHO, 2018). Thus, any assessment of a proposed development should consider the potential impacts on physical, mental, and social health (IPH, 2009). Public health pertains to the promotion and protection of health and well-being, prevention of ill-health, and prolongation of life, and emphasises a collective responsibility for the health of the population.

Health is determined by access to quality healthcare services, lifestyle choices, and the socioeconomic conditions in which people live (IPH, 2009). The latter include many factors that lie outside the healthcare sector, such as housing, education, employment, transport, drinking water and sanitation, and access to high quality food. Thus, policies in ostensibly non-healthcare sectors can have a significant impact on the health and well-being of a population. There may also be significant health inequalities within a population, in that there are arbitrary disparities in health outcomes depending on socio-economic status. Individuals in higher socioeconomic groups are more likely to live longer and to experience good health longer than those in lower socioeconomic groups, while men and women experience notable differences in health outcomes. From a public policy perspective, addressing the social determinants of health can have positive impacts on health inequalities, and thus should inform the planning and development process.

Common concerns in terms of human health, particularly to vulnerable sections of the receiving population, with respect to developments such as the proposed project, are generally associated with noise, air quality, water contamination, traffic safety, and accidents and disasters. Consequently, human health impacts are assessed through these environmental factors, such that the human health of the receiving environment is primarily addressed here under the individual chapters dedicated to each of the relevant factors. Thus, in respect of human health, the baseline conditions associated with soil and land are described in Section 4.3, with groundwater in Section 4.4, with dust and air quality in Section 4.6, with noise and vibration in Section 4.7, and with roads & traffic in Section 4.11.

The European Communities (Control of Major Accident Hazards involving Dangerous substances) Regulations, 2000 (S.I. No. 476 of 2000) do not apply as the proposed development will only accept inert material for recovery. Details with respect accident

and emergency response are addressed in EIAR Section 3.3.3.3.2.2 and mitigation measures are proposed (Refer to EIAR Section 4.1.5 below).

The primary residential and commercial receptors have been outlined in preceding sections. The immediate receptors were identified to determine the number of residential and commercial addresses within the vicinity of the proposed development. Although there are numerous established individual residences abutting the larger quarry site, there are no residences abutting the boundaries of the site of the proposed SRF co-located within the quarry. There are 10 residences within c. 250m and 19 within c. 500m, of the proposed SRF site, as shown on EIAR Figures 1.2 and 1.3. There are also c. 10-20 commercial addresses within 1km, including a pub, restaurant, numerous farms, not to mention several of the playing fields of the Eire Og GAA club. The local farms are significant environmental receptors, not simply by way of being local residents, but also as land uses/economic enterprises.

Table 4.1-3 Socioeconomic Group of Reference Person in Household

Socio-Economic Group	Ovens ED	%	Cork County	%	Cork City	%
Employers and managers	488	20.8	65,406	15.8	13,525	11.2
Higher professional	342	14.5	31,807	7.7	9,829	8.1
Lower professional	393	16.7	48,991	11.8	13,461	11.1
Non-manual	378	16.1	67,639	16.3	23,435	19.4
Manual Skilled	177	7.5	41,687	10.1	10,520	8.7
Semi-skilled	182	7.7	40,775	9.8	11,834	9.8
Unskilled	33	1.4	11,787	2.8	5,925	4.9
Own account workers	111	4.7	23,124	5.6	4,157	3.4
Farmers	39	1.7	31,168	7.5	122	0.1
Agricultural workers	11	0.5	2,310	0.6	106	0.1
All others gainfully occupied and unknown	197	8.4	49,368	11.9	28,066	23.2
Total	2,351	100.0	414,062	100.0	120,980	100.0

In order to ascertain the socio-economic and health status of the population in the local area around Garryhesta, relevant statistics from the 2016 census have been compiled in Tables 4.1.3 and 4.1.4. The socioeconomic group of the reference person per household in the Ovens ED, Cork County, and Cork City have been compiled in Table 4.1.3. It is apparent that the employer, managerial and professional classes represent

52.0% of the population in the Ovens ED, which compares very favourably with 35.3% and 30.4% in Cork County and Cork City, respectively. The population of the Ovens ED are predominantly from socioeconomic classes which are typically advantaged in terms of education, housing, diet, lifestyle and access to healthcare services. In view of the well-established correlation between socioeconomic status and good health, it would be expected that the population of the Ovens ED would have very good health.

From Table 4.1.4, it is apparent that persons with either good or very good health comprise 92.0% of the population in the Ovens ED, which compares favourably with 89.5% and 83.6% in Cork County and Cork City, respectively. In addition, the age dependency ratio of 34.1 and average age of 34.3 (national average is 37.4) indicate a very young population. Indeed, the population of the Ovens ED has more than doubled from 1,047 to 2,342 since 2002 to 2016. Thus, the population of Ovens ED is very young, healthy and therefore likely to be more resilient by comparison with Cork County, Cork City, and the national populations.

Table 4.1-4 Populations by General Health and Age Dependency

Health	Ovens ED	(%)	Cork County	(%)	Cork City	(%)
Very Good	1,602	68.4	263,057	63.1	67,953	54.1
Good	552	23.6	110,351	26.4	37,054	29.5
Fair	107	4.6	28,786	6.9	12,567	10.0
Bad	15	0.6	4,276	1.0	2,231	1.8
Very Bad	2	0.1	967	0.2	555	0.4
Not Stated	64	2.7	9,774	2.3	5,297	4.2
Total	2,342	100.0	417,211	100.0	125,657	100.0
Average Age	34.3		37.1		39.1	
Young Dependency	34.1		35.7		20.4	
Old Dependency	11.7		20.2		22.4	
Total Age Dependency	45.8		55.9		42.8	

The receiving environment of the proposed development is therefore characterised by a rapidly growing population with a higher proportion of younger age cohorts than the city, county and national averages, and who are also in better health. It can be assumed that this population is both active and resilient, has a high demand for active

outdoor recreational amenities, and would be sensitive to any diminution in both the visual or recreational amenity of the local area.

4.1.4 ASSESSMENT OF IMPACTS

The following Impact Assessment matrix provides an indication of the significance of potential effects arising during the life cycle of the development not accounting for any mitigation measures.

Table 4.1-5 Population & Human Health - Impact Matrix

'Do Nothing' Impacts	●		
Factors	**Construction**	**Operation**	**Decommissioning**
Direct Impacts	●	●	X
Indirect Impacts	●	●	X
Cumulative Impacts	●	●	X
Residual Impacts	X	X	X
'Worst Case' Impacts	X	●	X

None/imperceptible: X; Slight: ●; Moderate: ●; Significant/Very significant: ●.
Refer to Appendix 5.2 for definition of Significance

The proposed development of an SRF arises from the continued demand of human beings to have their buildings, roads and structures, modified and improved, resulting in the generation of large volumes of excavated soil and stone. In addition, large amounts of spoil are generated during the dredging of rivers and streams to mitigate flood risk and improve their navigation. The recovery of this inert waste is essential to reduce resource utilisation and divert reusable inert waste from landfill.

The strategic location of Garryhesta on the N22 in south central Cork, c. 15km west of Cork City, renders the proposed SRF well positioned to deliver recovery of inert waste from a large catchment area, diverting greater volumes of waste from disposal in landfill, as required under the Waste Framework Directive 2008 (2008/98/EC), and the European Communities (Waste Directive) Regulations, 2011 (S.I. 126 of 2011). There is also a preference for the deposition of soil and stone to be underpinned by a beneficial use in order to be considered waste recovery. Consequently, co-location of a waste recovery facility at Garryhesta Pit has significant positive impacts and is thus environmentally preferred.

The impact on human beings resulting from the proposed development is assessed here, and possible mitigation measures proposed to reduce any significant impacts. The table describing significance of effects in Appendix 5.4 were used here to evaluate

the significance of potential impacts resulting from the proposed development. These impact ratings are in accordance with impact assessment criteria provided in EPA's "Advice Notes for preparing Environmental Impact Statements" (2015).

It is expected that the potential negative impacts on human beings and amenity of the area arising from the SRF, above those already arising from the quarry, will relate mainly to nuisance from noise, dust and traffic.

There are a number of potential environmental impacts associated with the proposed development that may directly, or indirectly, affect the local "human" environment. These potential impacts and the mitigation measures proposed are described in the following sections of this report under the headings detailed below:

- Biodiversity – Section 4.2
- Land, Soils & Geology – Section 4.3
- Water – Section 4.4
- Air Quality – Section 4.6
- Noise– Section 4.7
- Landscape – Section 4.8
- Cultural Heritage – Section 4.9
- Material Assets – Sections 4.10
- Traffic & Roads – 4.11

4.1.4.1 'Do-Nothing' Impacts

If the proposed development did not proceed, recovery of inert waste at the SRF would not occur and result in the failure to divert these volumes from disposal in landfill, as required under the Waste Framework Directive 2008. The Garryhesta site would remain as an unrestored quarry site, without the backfilling generated by the proposed SRF. As the quarry area to be restored is currently inactive and well screened, the absence of the proposed SRF would have no significant impact on the local human environment.

4.1.4.2 Direct Impacts

4.1.4.2.1 Construction

Potential impacts on human beings will arise out of the construction and operation phases of the proposed SRF, and these include noise, dust, visual impact, traffic and safety.

The proposed development consists of restoration of part (c. 6.7 ha) of existing quarry (QR19 06/11798 & PL04.225332) by importation of up to 300,000 tonnes per annum of inert soil and stones and river dredging spoil (EWC 17-05-04 and 17-05-06).

The proposed Soil Recovery Facility (SRF) will utilise the permitted quarry infrastructure including internal roads, site office, welfare facilities and other ancillaries to complete the works (Refer to Figure 1.3 - Existing Site Survey Plan). A wheel wash and weighbridge will be provided as part of the proposed development and the existing workshop will be utilised as a quarantine area. A hard-stand with drainage to oil interceptor will also be provided as a designated refueling area. The total application area including the site infrastructure covers 7.9 ha of lands.

The proposed site layout is shown on the attached Site Layout Figures 3.1 to 3-3. The proposed site area being within the quarry is screened from outside views and nearest residences by perimeter hedgerows screening berms constructed as part of the quarry development (Refer to Figure 3-4). The existing quarry site access will be utilised by the proposed SRF.

It Is considered that as the proposed development is within an existing quarry that there will be an imperceptible impact on the human environment associated with construction activities. Such impacts are assessed within the relevant sections of this EIAR.

4.1.4.2.2 Land Use

Land-use in the surrounding area is largely agriculture and quarrying with scattered rural pattern of residential dwellings along the N22 which runs immediately to the north of the site and along other local roads to the south and east of the site.

The quarry has put in place a number of mitigation measures with respect to environmental management and monitoring to ensure that operations, including those of the proposed SRF, do not result in significant impacts on the surroundings, including the human environment.

The area has an established history of sand and gravel working, and these activities have co-existed with other land uses in the area, particularly intensive agriculture. On completion of site activities, the site of the quarry and SRF will be decommissioned and left safe and secure. Furthermore, the site will be reinstated in accordance with the approved quarry restoration scheme, and thus integrated back into the surrounding landscape with the attendant improvement to the visual amenity of the area.

The restoration of the site will result in a moderate positive effect in the medium term.

4.1.4.2.3 Population

It is not anticipated that the proposed development will result in any change in population. However, by supporting and maintaining the workforce living in the area, it is considered that the proposed SRF will have a slight positive impact on sustaining the population.

4.1.4.2.4 Economy & Employment

The quarry has contributed indirectly to sustaining and developing the local and regional economy through the supply of building products, and has provided employment for local people, both directly and indirectly.

The SRF will require one person to operate a bulldozer/excavator and one general foreman to monitor and inspect the quality and suitability, of imported materials being brought to the site for recovery and two other general site operatives. It is expected that the existing staff will take on these roles.

The continuance of employment of the existing workforce in the locality is considered a slight positive short-term effect.

4.1.4.2.5 Social Consideration

The proposed development would provide a valuable and necessary resource to the county, providing a facility for recovery of inert waste through the beneficial use of backfilling and restoration of lands. These wastes would otherwise be landfilled with no attendant environmental benefit. The proposed SRF will involve capital inflow into the Ovens area, which will contribute to balanced regional development, and have a slight positive impact on the local human environment.

Although there are residences abutting the larger quarry site, there are no residences abutting the boundaries of the site of the proposed SRF co-located within the quarry. There are 10 residences within c. 250m and 19 within c. 500m of the proposed SRF site.

There are no community facilities within close proximity of the proposed development. The church, national school and Eire Og GAA club at Ovens are c. 1.5km from the site, which constitutes a substantial standoff distance. Thus, it is expected that there will be an imperceptible impact on local community facilities as a result of the development of an SRF at Garryhesta.

4.1.4.2.6 Tourism & Amenity

There are no tourism attractions in the immediate vicinity of the proposed development, such that local tourism will not be significantly impacted upon. A number of such attractions exist in south central County Cork; however, all of these are remote to the proposed development and therefore will be not be impacted upon.

Tourists who travel the N22 and pass the site location will notice some site activity at the existing entrance, but this will be limited. Existing landscaping to the front of the

site already acts as a buffer, such that the impact of proposed SRF on the landscape will be imperceptible. It is considered that adequate screening is provided by the existing hedgerows and berms, and that the SRF will have no significant impact on the journeys of tourists, and hence tourism.

Traffic entering and leaving the site will use the existing established quarry site access. The N22 road servicing the site is generally in good condition. The site entrance has been adequately set-back and splayed in accordance with P. Ref. QR19 06/11798 & PL04.225332 to the satisfaction of the Planning Authority. Further details with respect to the impact and mitigation of traffic are contained within this report (Refer to Section 4.11).

As the proposed SRF will be co-located within the existing quarry, negligible additional visual intrusion is expected. Nonetheless, there are no protected views and prospects that are affected by the development. The visual impact of the development is discussed in more detail in Section 4.8 - Landscape. Upon decommissioning, the site will be restored in accordance with the approved final restoration scheme for the quarry. Therefore, in the long term, the site will be assimilated back into the landscape in a planned manner.

4.1.4.2.7 Human Health

Common concerns in terms of human health, particularly to vulnerable sections of the receiving population, with respect to developments such as the proposed project, are generally associated with noise, air quality, water contamination, traffic safety, and accidents and disasters. Any impacts arising with respect to these environmental factors are addressed under the relevant chapters where relevant. i.e.

- Land, Soils & Geology – Section 4.3
- Water – Section 4.4
- Air – Section 4.6
- Noise & Vibration – Section 4.7
- The Landscape – Section 4.8
- Cultural Heritage – Section 4.9
- Material Assets – Sections 4.10
- Roads & Traffic – 4.11

The receiving environment of the proposed development is characterised by a rapidly growing population with a higher proportion of younger age cohorts than the city, county and national averages, and who are also in better health. It can be assumed that this population is both active and resilient, has a high demand for active outdoor recreational amenities, and would be sensitive to any diminution in both the visual or recreational amenity of the local area.

The European Communities (Control of Major Accident Hazards involving Dangerous substances) Regulations, 2000 (S.I. No. 476 of 2000) do not apply as the proposed development will only accept inert material for recovery. Details with respect accident and emergency response are addressed in EIAR Section 3.3.3.3.2.2 and mitigation measures are proposed (Refer to EIAR Section 4.1.5 below).

The policy of the operator is to ensure the health and welfare of its employees by maintaining a safe, clean and tidy working environment, and employing safe working procedures. The policy will be extended to include the proposed SRF, which will be co-located within the Garryhesta Pit, and will accord with the requirements of employment legislation, regulations, and best work practices for the industry.

The design, construction and operation of the proposed development, will be carried out in accordance all relevant Irish and European legislation/regulations governing safety in the work place. In particular, specific regard will be given to the regulations implemented under the Safety, Health & Welfare at Work Act 2005 and amendments and regulations made thereunder, including the Safety, Health & Welfare at Work Construction) Regulations 2013 (S.I. No. 291 of 2013), as amended. A 'Health & Safety Plan' will be implemented for the development in accordance with the regulations.

On completion of site activities, the site of the quarry and SRF will be decommissioned and left safe and secure. Furthermore, the site will be reinstated in accordance with the approved quarry restoration scheme, and thus integrated back into the surrounding landscape with the attendant improvement to the visual amenity of the area.

It is considered that following restoration and the mitigation measures incorporated in the design that there will be no significant effects in terms of Human Health. The restoration of the site to beneficial after-use will result in a moderate positive effect in the medium term.

4.1.4.2.8 Other

There are no recorded archaeological, architectural or cultural heritage features within the area of land take, although there are a number in the surrounding environment within c. 1km standoff. These include:

- Ringfort – Clashanure (Reg No. CO072-113001)
- Fulacht Fia – Knockanemore (Reg No. CO073-093)
- Earthwork – Knockanemore (Reg No. CO073-052)
- Ringfort - Knockanemore (Reg No. CO073-053)
- House, 1890-1930 – Lackenareague (Reg No. 20907224)
- House, 1880-1920 – Knockanemore (Reg No. 20907226)
- Elm Park House, 1800-1840 – Garryhesty (Reg No. 20907227)
- Srelane House, 1900-1920 – Knockanemore (Reg No. 20907308)

As there will be imperceptible impacts on these recorded archaeological, architectural or cultural heritage features, it is considered mitigation measures are unnecessary.

The recovery of soils and river dredging spoil on this site will result in a local impact on ecology but will not result in any loss of heritage values in the locality. The changes will be both negative (loss of open habitats) and positive (gain of woodland/scrub over time).

There will be no run-off from the active restoration area and will thus prevent any impact on any the nearby watercourses, including the Bride River. Existing mitigation measures will continue to be maintained and improved as necessary to achieve imperceptible impact.

4.1.4.3 Indirect Impacts

The main indirect impact during the construction and operation stage will be an increase in traffic locally. This has been studied in detail in Section 4.11. Given that the site has the benefit of direct access to the N22, which is the National Primary Route connecting Cork with Tralee, via Ballincollig, Macroom and Killarney it is considered that the proposed development will result in a slight effect with respect to Roads and Traffic.

4.1.4.4 Cumulative Impacts

The proposed soil recovery facility including site infrastructure will comprise a c. 7.9 ha section of the existing quarry workings at Garhyhesta, as shown by the Application Area Map Figure 1.2. The total landholding extends to c. 77.2 ha and is shown highlighted in blue. Thus, the proposed application site area (for infilling) will be confined to a relatively small section of the sand and gravel pit, much of which has already been worked out.

There is already an EMS in place which addresses monitoring of water, noise and dust. The cumulative impact of emissions at the quarry is assessed through the existing environmental monitoring programme that has been established in compliance with the planning permission associated with the quarry.

Mitigation measures are already in place at the site and included in the existing site Environmental Management System. Continual monitoring and measurement will ensure the effective application of these mitigation measures an ensure that activity at the quarry including the SRF will not result in any significant environmental impact.

4.1.4.5 Residual Impacts

It is considered that following restoration and the mitigation measures incorporated in the design that there will be no significant effects in terms of Population and Human Health.

4.1.4.6 'Worst Case' Impact

There are no large residential settlements close to the site, with nearest large population centre being the town of Ballincollig c. 5.5 km to the east. The village of Farran is situated 2km to the west along the N22, while the village of Killumney is 2km to the southeast. Residential development consists of isolated farm dwellings and of owner occupied bungalow/houses along public roads (Refer to EIAR Figures 1.2 and 2.1).

Although there are residences abutting the larger quarry site, there are no residences abutting the boundaries of the site of the proposed SRF co-located within the quarry. There are 10 residences within c. 250m and 19 within c. 500m of the proposed SRF site. It should also be noted that the predominant impact on the residences is the due noise associated with passing traffic on the N22 Primary Road.

The site is well screened from outside views along the N22 by well-established planting (Refer to EIAR Figures 1.1 and 1.2).

It is expected that in the absence of mitigation measures (primarily noise and dust) that there will be slight negative effects with respect to local amenity and residential receptors as a result of the development of an SRF at Garryhesta.

4.1.5 MITIGATION & MONITORING

With regard to human beings, there are no mitigations proposed beyond normal site management and screening, particularly along the N22. Proposed mitigation measures with regard to environmental issues such as air quality, noise, traffic and visual impacts are provided for and are described in detail under the relevant sections (See above list). Any impact on the natural environment will be mitigated against to the greatest degree practical, thereby minimising any associated impact on the "human" environment.

The operator has in place an Environmental Management System (EMS) which addresses such matters as Emergency Preparedness & Response in dealing with accident and emergency situations resulting in effects on the environment (Refer to EIAR Section 3.3.3.3.2.1.

Roadstone Ltd has established an on-going environmental monitoring programme for the quarry site, which will be modified to take account of the proposed SRF. The programme will allow on-going monitoring of environmental emissions (e.g., noise, dust, water) from the site, thereby assisting in ensuring compliance with any future requirements or regulations. The results of this monitoring will be made available to the Local Authority/EPA on a regular basis, where members of the public may examine it.

The future monitoring programme will be revised accordingly, subject to compliance with any planning conditions attached to any decision to grant planning permission and/or waste licence.

Operations at the proposed SRF site, which will be co-located within the Garryhesta Pit, will be carried out in accordance with all relevant legislation / regulations and with the best work practices for the industry. The policy of the operator is to ensure the health and welfare of its employees by maintaining a safe, clean and tidy working environment, and employing safe working procedures. The policy will be extended to include the proposed SRF, and will accord with the requirements of employment legislation, regulations, and best work practices for the industry.

Access to the site will be restricted at all times and all visitors and contractors will undergo a site induction before entering the site. The wearing of protective clothing such as footwear, helmets and high visibility clothing is mandatory in operational areas. Careful attention is paid to safe practices when carrying out machinery maintenance and ensuring appropriate guarding of moving parts.

This quarry is in an area of low population density. The boundaries of the quarry are enclosed by a combination of bunds, hedgerows and fencing, which is designed to blend into the surrounding landscape. There is ongoing monitoring to ensure that site boundaries are maintained in a proper manner, and these include thickening of hedgerows, fencing of the landholding, provision and maintenance of quarry signage, routine cleaning/housekeeping and the removal of unsightly features. Appropriate warning signs to the public have been provided on the approaches to the site, and the access gate is kept padlocked shut outside of the normal working hours. It is also proposed to install CCTV subject to grant of any planning permission for an SRF to monitor and document incoming loads.

The development can be controlled and regularised in accordance with the scheme as outlined in this document, through continued environmental monitoring and by conditions imposed by the relevant regulatory authority. The proposal will have no significant and/or long-term effect on the human environment.

4.1.6 REFERENCES

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4.1.7 FIGURES

Figure 4.1-1 Map of the Ovens Electoral Division

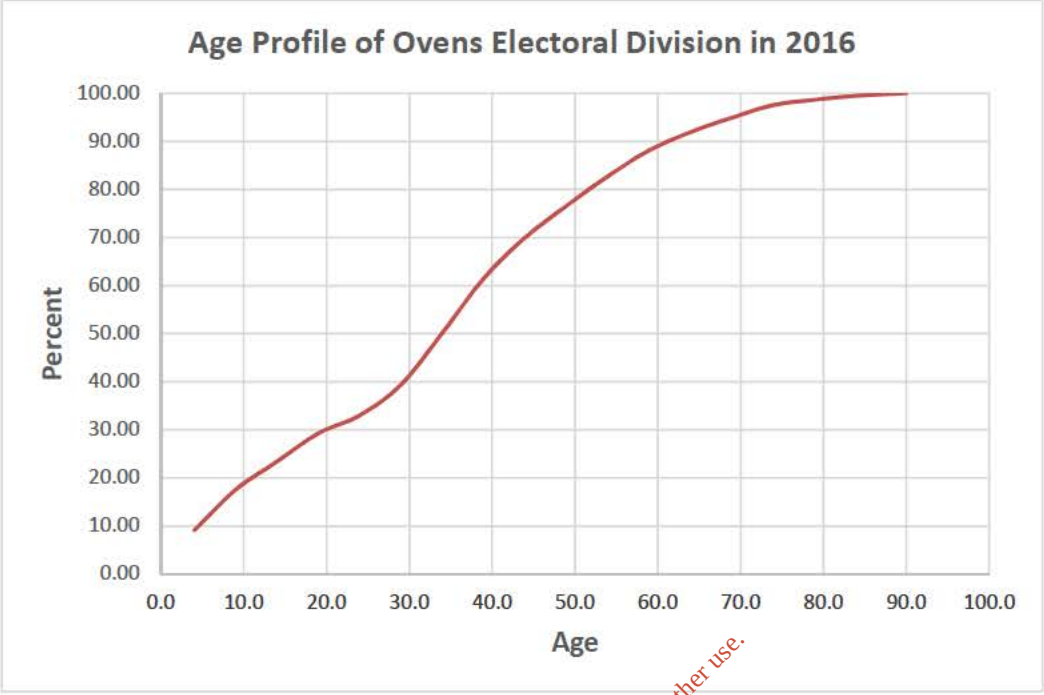

Figure 4.1-2 Age Profile of Ovens Electoral Division in 2016.

Note average age of 34.3 at the 50 percentile.

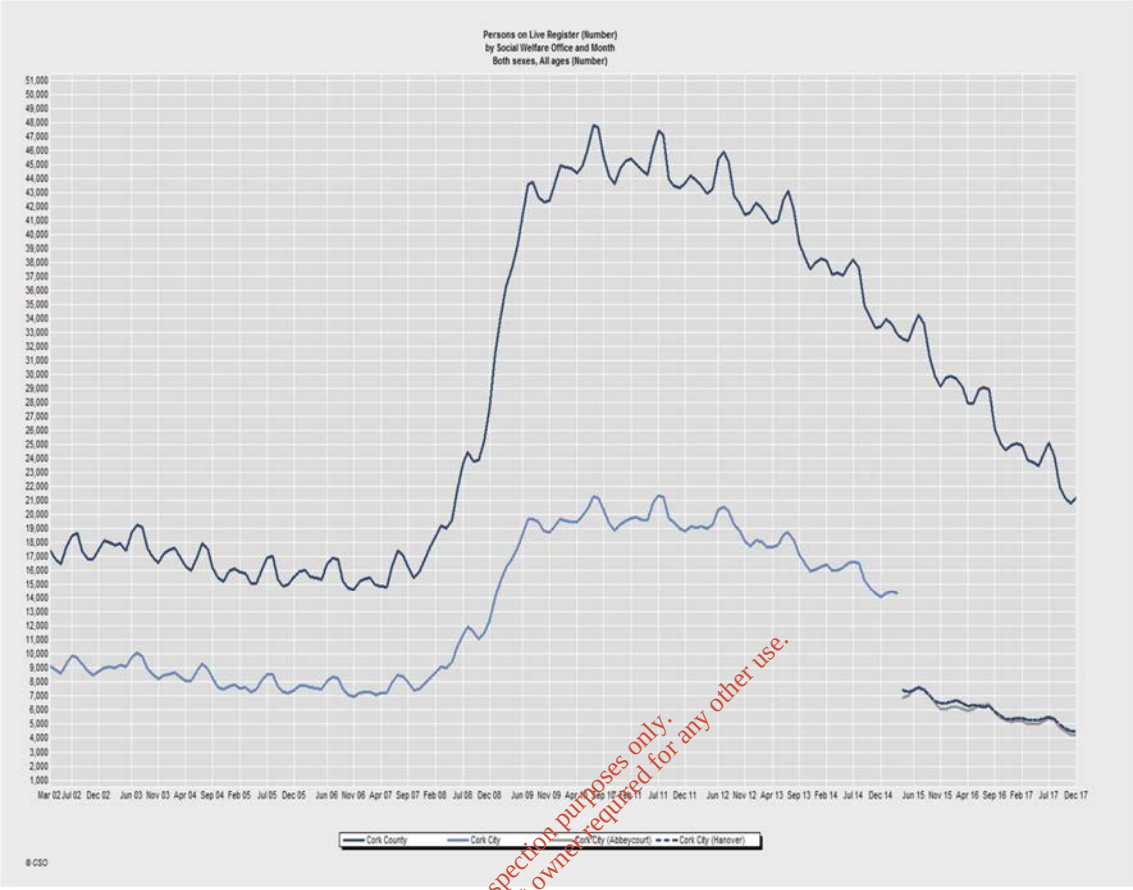

Figure 4.1-3 Chart Showing profile of Live Register

County Cork and Cork City from March 2002 to December 2017.

Data for Cork City is split between two different offices after February 2015, and hence line graph is dislocated, and corresponding two segments from March 2015 onwards are displaced to lower values.

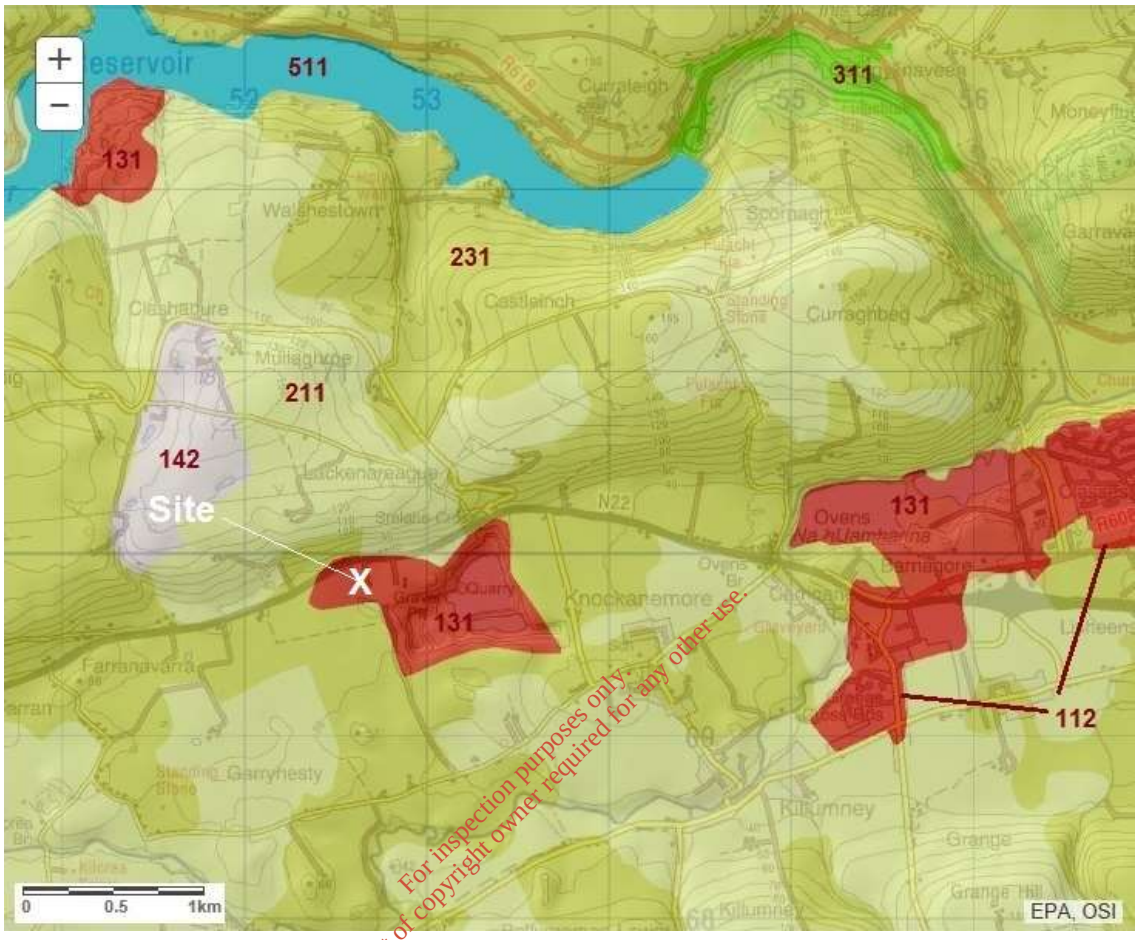

Figure 4.1-4 Corine Land Use Map of the Ovens Electoral Division in 2012.

Note. Discontinuous urban fabric (112); Mineral extraction sites (131); Sport and leisure facilities (142); Non-irrigated land (211); Pastures (231); Broad-leaved forest (311); and Stream courses (511). Scale bar at lower left. Modified from EPA (2017).

4.2 BIODIVERSITY

4.2.1 INTRODUCTION

The purpose of this report is to assess the ecological value of the site and the effects of the development that will be undertaken.

4.2.2 METHODOLOGY

A preliminary desk-top study was undertaken of all data in the NPWS files relating to this area and the nearest Natura 2000 sites, including rare plant records. In addition, the local flora (O'Mahony 2009) was consulted as well as national atlases of flora, mammals, birds, dragonflies and butterflies.

After a study of existing aerial photographs, fieldwork was carried out on a site visit in January 2017 with company personnel. These investigations followed the methodology of the Heritage Council guidelines (Smith *et al* 2011) though mapping was not digitised in the field. Habitats are classified as in Fossitt (2000). Signs of mammals and birds were searched for at all times.

Once the habitat had been assessed, on-line sources of biodiversity data were consulted for additional relevant insects and other species.

4.2.2.1 Policy & Legislation

The Southern Regional Waste Management Plan 2015-2021 (Refer to Appendix 5.1.1.2.2) sets out criteria (Refer to SWRP Chapter 16.5) that must be applied in order to ensure that the impact on communities, human health, ecology and the wider environment can be avoided where possible and minimised, managed and mitigated where necessary.

The County Development Plan (CDP) sets out Cork County Council's overall strategy for the proper planning and sustainable development of Cork County and the associated planning policies looking towards the horizon year of 2022 (Refer to EIAR Section 3.2.2.8.1).

The following section details relevant CDP objectives and measures proposed to address same with respect to the proposed development of a Soils Recovery Facility (SRF) at Garryhesta quarry:

It is an objective (HE 2-1) of the CDP to provide protection to all natural heritage sites designated or proposed for designation under National and European legislation and International Agreements, and to maintain or develop linkages between these. This includes Special Areas of Conservation, Special Protection Areas, Natural Heritage Areas, Statutory Nature Reserves, Refuges for Fauna and Ramsar Sites.

It is an objective (HE 2-2) of the CDP to provide protection to species listed in the Flora Protection Order 1990, on Annexes of the Habitats and Birds Directives, and to animal

species protected under the Wildlife Acts in accordance with relevant legal requirements.

It is an objective (HE 2-3) of the CDP to retain areas of local biodiversity value, ecological corridors and habitats that are features of the County's ecological network, and to protect these from inappropriate development. This includes rivers, lakes, streams and ponds, peatland and other wetland habitats, woodlands, hedgerows, tree lines, veteran trees, natural and semi-natural grasslands as well as coastal and marine habitats. It particularly includes habitats of special conservation significance in Cork as listed in Volume 2 Chapter 3 Nature Conservation Areas of the plan.

It is an objective (HE 2-7) of the CDP to control the spread of invasive plant and animal species within the county.

4.2.2.2 Designations

The proposed development site is not located in any designated site (*i.e.* SAC, NHA, SPA etc). Cork Harbour SPA (Site Code 4030) is approximately 20km downstream to the east whereas the Gearagh SAC (0108) and the Gearagh SPA (4109) are situated 20km to the west (upstream).

4.2.3 BASELINE DESCRIPTION OF RECEIVING ENVIRONMENT

4.2.3.1 Habitats

The site is a narrow arm of the existing quarry that runs E-W, immediately south of the N22 road. It covers about 6.7 ha altogether and is 25-30m deep with steep sides. It lies at or above the seasonal watertable but the groundwater level can temporarily rise above the level of the pit floor during very wet periods over winter, notably in early 2016 when 3.5m of water was present for some weeks. The only substrate visible is the unconsolidated sands and gravels that have been extracted. The habitat is generally recolonising bare ground (ED3 in Fossitt 2000) with willow or gorse scrub (WS1) but there is some exposed sand, gravel or till (ED1) at the eastern end, with vehicle tracks.

4.2.3.2 Flora

The pit slopes have been partially covered by an open scrub of common gorse *Ulex europaeus*, as well as self-sown downy birch *Betula pubescens*, butterfly bush *Buddleja davidii*, bramble *Rubus fruticosus* and black pine *Pinus nigra*. There are several prominent herbs and mosses, the species depending on the stability of the substrate. They include:

Teucrium scorodonia	wood sage
Lotus corniculatus	bird's-foot trefoil
Hypochaeris radicata	catsear
Hypericum pulchrum	shining St John's wort

Asplenium scolopendrium	hartstongue
Scrophularia nodosa	figwort
Bellis perennis	daisy
Veronica serpyllifolia	thyme-leaved speedwell
Epilobium brunnescens	New Zealand willowherb
Pseudoscleropodium purum	a moss
Pogonatum urnigerum	a moss

The older pit slopes, especially on the southern side, support young sycamores *Acer pseudoplatanus* and hawthorn *Crataegus monogyna* growing with brambles *Rubus fruticosus*, foxglove *Digitalis purpurea* and heath speedwell *Veronica officinalis*.

A more defined scrub of willows covers the base below each side (photo overleaf). It is formed of grey willow *Salix cinerea* with a few osiers *S.viminalis* and white willow *S.alba* also. The young trees grow in a cover of the moss *Calliergonella cuspidata* (which is abundant) and grass. The canopy is still quite open, so the associated species include some plants that extend to the treeless ground in the centre of the site. The following are frequent

Agrostis stolonifera	creeping bent
Rumex crispus	curled dock
Holcus lanatus	Yorkshire fog
Tripleurospermum inodorum	scentless mayweed
Juncus effusus	soft rush
J.articulatus	jointed rush
Gnaphalium uliginosum	cudweed
Ranunculus flammula	lesser spearwort
Myosotis cf *laxa*	water forget-me-not
Epilobium parviflorum	hoary willowherb
Veronica anagallis-aquatica	water speedwell

Species restricted to the open grassland are yellow trefoil *Trifolium dubium*, sticky mouse-ear *Cerastium glomeratum*, oval sedge *Carex ovalis* and small hawkbit *Leontodon saxatilis*.

A remnant pond (now dry) occurs at the lowest point and supports a few shoots of bulrush *Typha latifolia* along with marsh bedstraw *Galium palustre* and tufted vetch *Vicia cracca*.

Plate 4.2-1 View of site from west end (*through Buddleja*) showing scrub at each side

4.2.3.3 Fauna

There were no signs of mammals other than rabbits in the area though the fox is very probably present. Bats are not likely to occur regularly but could make feeding trips from tree belts along the northern margin at times.

The sediment is too coarse-grained for sand martins to burrow in and there are no cliffs for peregrines to breed. The only birds likely to occur are those associated with the scrub at the base or on the pit slopes, such as willow warbler, robin, wren, blackbird, stonechat, blue tit etc. A few snipe would occur in winter (one was flushed on the site visit) but otherwise the species seen were jackdaw, rook and woodpigeon.

The vegetation is not diverse enough to support a good range of insects.

4.2.3.4 Other Considerations

4.2.3.4.1 Relationship with Appropriate Assessment

The proposed development area is not located within any designated site (*i.e.* SAC, NHA, SPA etc). The only relevant site is Cork Harbour SPA (Site Code 4030) which is located approximately 20km to the east. Screening for Appropriate Assessment for the proposed development is included (Refer to Appendix 5.2). It has been assessed that there is no likelihood of significant ecological effects from this development on any of the sites in the Natura 2000 network or on their conservation objectives. Thus, the further, more detailed, stages of appropriate assessment are not required.

4.2.3.4.2 Relationship with Other Consent Procedures Relevant to Biodiversity

There are no species on site that would require special consent procedures prior to development.

4.2.3.5 Significance (Evaluation)

The site does not contain items of particular ecological interest as far as is known but the successional stage of open scrub that occurs within the worked-out areas of the quarry has local biodiversity value, particularly in such agricultural surroundings.

In addition the line of trees/scrub at the northern edge of the quarry, along the N22, contributes to habitat connectivity as it provides a pathway for organisms to the rest of the quarry area. The south-facing slopes of the pit are likely to be used by solitary bees for nesting (e.g. *Andraena* & *Nomada* species) but extensive exposures of the requisite dry soil habitat occur throughout the Ballincollig area in the various quarries.

No rare species of plant are reported from the quarry and none are likely (cf. O'Mahony 2009).

No invasive, alien plants such as Japanese knotweed were seen on site though *Buddleja* (which is abundant) is itself an introduced species.

4.2.4 ASESSMENT OF IMPACTS

The proposed development consists of restoration of part (c. 6.7 ha) of the existing quarry by importation of up to 300,000 tonnes per annum of inert soil and stones and river dredging spoil.

The proposed Soil Recovery Facility (SRF) will utilise the permitted quarry infrastructure including internal roads, site office, welfare facilities and other ancillaries to complete the works (Refer to Figure 1.3 - Existing Site Survey Plan). A wheel wash and weighbridge will be provided as part of the proposed development and the existing workshop will be utilised as a quarantine area. A hard-stand with drainage to oil interceptor will also be provided as a designated refueling area. The total application area including the site infrastructure covers 7.9 ha of lands.

Following inspection and acceptance the soil and stone material will be placed within the restoration area (placement by bulldozer). The applicant is an experienced earthmoving contractor. Soils will be handled in accordance with accepted guidelines and good practice.

The restoration plan involves the progressive backfilling of the quarry void on a phased basis, with natural inert soil and stone and dredging spoil sourced externally and imported. Topsoil will be seeded, and the area returned to grassland. It is proposed that that the void space will be filled over a period of c.8 to 10 years.

Roadstone propose to carry out the reclamation works in accordance with the principles of the Green, Low Carbon, Agri-environment Scheme (GLAS). i.e. Consideration will be given during the land reclamation scheme to conservation of arable grass margins and solitary bees, coppicing and planting of native trees and hedgerows.

The proposed development will be subject to an EPA Waste Management Licence. As such a Closure and Restoration/After Care Management Plan (CRAMP) may be required as a condition of the Waste Licence

The following Impact Assessment matrix provides an indication of the significance of potential effects arising during the life cycle of the development not accounting for any mitigation measures.

Table 4.2-1 Biodiversity - Impact Matrix

'Do Nothing' Impacts	●		
Factors	**Construction**	**Operation**	**Decommissioning**
Direct Impacts	●	●	X
Indirect Impacts	X	X	X
Cumulative Impacts	X	X	X
Residual Impacts	X	X	X
'Worst Case' Impacts	X	●	●

None: X; Slight: ●; Moderate: ●; Significant: ● (Negative) ●.(Positive)

4.2.4.1 'Do Nothing' Impacts

The Garryhesta site would remain as an unrestored quarry without the backfilling generated by the proposed SRF. Habitat development would occur slowly and lead to a general increase in biodiversity as the plant cover became more varied. The final stage would stabilise at a woodland/scrubland community with periodic tree falls on the steeper slopes.

As mentioned the site does not contain items of particular ecological interest at present but the successional stage of open scrub that occurs within the worked-out areas of the quarry has a positive biodiversity value in such agricultural surroundings.

4.2.4.2 Direct Impacts

The impact of infilling part of this site with inert material will be significant in ecological terms since it will result in a change of habitat in this part of the site and initially reduce the level of biodiversity. However, all the habitats and species involved are common and are established in other parts of the quarry, particularly in the main quarry area to the east.

The activity will not result in a significant loss of heritage values in the locality. The changes will be both negative (loss of open habitats) and positive as Roadstone propose to carry out the reclamation works in accordance with Tier 3 of the Green, Low Carbon, Agri-environment Scheme (GLAS). This means that during reclamation efforts will be directed to conservation of arable grass margins and banks, conservation of solitary bees, coppicing and planting of native trees and hedgerows and species rich hay meadow.

The area has an established history of sand and gravel working, and these activities have co-existed with other land uses in the area, particularly intensive agriculture. On completion of site activities, the site of the quarry and SRF will be decommissioned and left safe and secure. Furthermore, the site will be reinstated in accordance with the approved quarry restoration scheme, and thus integrated back into the surrounding landscape with the attendant improvement to the visual amenity of the area.

4.2.4.3 Indirect Impacts

The Cork Harbour SPA is located approximately 20km downstream of the proposed development site and therefore only indirect impacts are possible. However, as there are no surface water outlets from the site, the indirect pathway is firstly via groundwater to the River Bride, and then via surface water to the downstream designated site. Due to the distances involved and the nature of the infill proposal no significant impacts are anticipated.

Therefore, the potential impact to the Cork Harbour SPA due to the deposition of inert infill material is considered to be indirect and imperceptible.

Dust pollution, if any, is unlikely to cause ecological change in the surroundings.

4.2.4.4 Cumulative Impacts

The proposed soil recovery facility including site infrastructure will comprise a c. 7.9 ha section of the existing quarry workings at Garhyhesta, as shown by the Application Area Map Figure 1.2. Thus, the proposed application site area (for infilling) will be confined to a relatively small section of the sand and gravel pit, much of which has already been worked out.

The only other land use activities visible in the area are quarries, existing farming operations and single dwelling houses. There will be no significant 'in combination' impacts on biodiversity resulting from this project, and other local existing developments, quarries, projects and plans.

Mitigation measures are already in place at the site and included in the existing site Environmental Management System. Continual monitoring and measurement will ensure the effective application of these mitigation measures an ensure that activity at the quarry including the SRF will not result in any significant environmental impact.

4.2.4.5 Residual Impacts

It is considered that following restoration and the mitigation measures incorporated in the design that there will be no significant effects in terms of biodiversity.

As a result of the proposed mitigation and enhancement measures, no residual significant adverse impacts are predicted for the ecological receptors in the long-term following implementation of mitigation measures.

4.2.4.6 'Worst Case' Impact

The worst-case impact would result if the site was restored to intensive agricultural use with no consideration given during the land reclamation scheme to conservation and creation of new habitat and species as is proposed by Roadstone.

4.2.5 MITIGATION & MONITORING

Roadstone propose to carry out the reclamation works in accordance with the measures in the Green, Low Carbon, Agri-environment Scheme (GLAS). These will include the creation and/or retention of 10-metre-long x 1 to 2 m high South-facing banks along the boundary with the N22 road and the establishment of native plant species in hedges and field margins. Parts of the area will be left without a new cover of topsoil to ensure the maximum species content in vegetation. The aim will be to create or retain habitat heterogeneity and thereby maintain the maximum level of biodiversity consistent with the new land use.

Ecological monitoring will be carried out during the course of development when areas have reached their final height.

The proposed development will be subject to an EPA Waste Management Licence. As such a Closure and Restoration/After Care Management Plan (CRAMP) may be required as a condition of the Waste Licence.

4.2.5.1 Dust

Dust emissions and their management will be addressed in a revised Environmental Management System for the entire Garryhesta site.

- During dry weather the haul roads and tipping area will be sprayed with water to dampen any likely dust blows.
- A mobile water browser is provided in periods of dry or windy weather to cover locations where it is impractical or inappropriate to use a fixed water spray system.
- The main haulage routes in the site will be maintained with a good temporary surface and will be adequately drained, to prevent ponding.
- A wheel wash facility will be installed on site and all vehicles required to pass through it on exiting the site.
- A road sweeper is available for use on site and adjacent sections of the N22 at least on a weekly basis and/or if a spillage occurs onto the public roadway.
- Suitable vegetation will be provided on restored areas at the earliest opportunity to prevent soil movement and erosion.

4.2.5.2 Emissions to Water

There is no surface water connection from the development site to the River Bride or the River Lee and the only possible impact would be through the groundwater. However certain measures will be taken to minimize risks, i.e.

- Infilling will only be undertaken when the groundwater level is at or below the base of the pit
- Prior to pit floor backfilling the existing residual sand and gravel in the floor of the pit will be levelled to ensure there is no potential for ponding or exposed groundwater during the backfilling operations;
- Runoff collected in the pit will be routed in a temporary sump and released to ground via a percolation area
- The infilled area will be seeded as grassland at the earliest opportunity to avoid erosion.
- An emergency response procedure for hydrocarbon spills and appropriate training of site staff in its implementation, are in place. An emergency spill kit with will be kept on site for use in the event of an accidental spill.
- A hard-stand with drainage to oil interceptor will be provided as a designated refueling area.

- All plant and machinery will be serviced before being moved to the site, and regular leak inspections will be completed during the backfilling works;
- All waste oils will be removed from the site for authorised disposal by licensed waste contractors. A record of all waste removal will be kept in the site office.

Monitoring of groundwater and aerial emissions will be installed so that compliance with standards can be maintained.

4.2.5.3 Control of Invasive Species

The categories of waste material to be used are unlikely to be contaminated by Japanese knotweed or other invasive species. In addition, the supplier of the fill is responsible for the control of the plant on his site. Roadstone as part of their Site Pre-Approval Procedure (Refer to Appendix 5.3.4) will only accept material from pre-approved sites where an appropriate invasive species risk assessment has been carried out by a qualified person.

4.2.6 REFERENCES

Fossitt, J.A. (2000). *A guide to habitats in Ireland*. Heritage Council, Dublin, Ireland.

O'Mahony, T. (2009). *Wildflowers of Cork City and County*. Collins, Cork, Ireland.

4.3 LAND, SOILS & GEOLOGY

4.3.1 INTRODUCTION

This section of the EIAR has been compiled in order to establish both the regional and local geological setting of the proposed Soil Recovery Facility (SRF) with respect to the land, soil, subsoil and geological bedrock environment. The potential impact on the geological environment resulting from the proposed development is assessed and possible mitigation measures proposed to reduce any significant impacts. An assessment of the hydrological and hydrogeological impacts relating to the proposed development is detailed in Section 4.4 of the EIAR.

4.3.2 METHODOLOGY

4.3.2.1 Desk Study

The desk study was undertaken to compile, review and interpret available information, data and literature pertaining to the natural environment of the site, its immediate environs and regional setting.

In the preparation of this geological assessment, all available regional and site-specific information was compiled, assessed and interpreted. The geological maps and literature provide the regional geological context of the site, whilst prior Resource, Planning and Environmental Reports provide site-specific information. The geological assessment of the site is considered sufficiently detailed to adequately characterise the geological setting of the site.

The section was prepared following a desk study, which included research of relevant maps and data on the Geological Survey of Ireland (GSI) online mapping website (GSI 2017), and on the Environmental Protection Agency (EPA) Envision geoportal website (EPA 2017). Additional documents that were researched comprised geological maps and bulletins published by the GSI (Sleeman & Pracht 1994), the Geology of Ireland monograph edited by Holland & Sanders (2009), prior EIS on Garryhesta Pit, as well as other miscellaneous publications.

4.3.2.1.1 Sources of Information

The following relevant sources of information were referenced in undertaking the study.

- Examination of physiographic and other maps, and aerial photography (e.g., Google Images (Google 2017), and EPA Ortho Photos 1995-2005: (EPA 2017));
- Examination of the GSI datasets and maps pertaining to geological bedrock, soil and subsoil maps (GSI 2017);
- Examination of EPA soil and subsoil maps (EPA 2017);
- Observations made during the site walkover.

- GSI/ICF (2008). Geological Heritage Guidelines for the Extractive Industry. Geological Survey of Ireland (GSI) and Irish Concrete Federation (ICF), Dublin.
- IGI (2007). Recommended Collection, Presentation and Interpretation of Geological and Hydrogeological Information for Quarry Development. Institute of Geologists of Ireland (IGI), UCD, Dublin.
- IGI (2013). Updated IGI Guidelines for the Preparation of Soils, Geology and Hydrogeology Chapters of Environmental Impact Statements. Institute of Geologists of Ireland (IGI), UCD, Dublin.
- Environmental Protection Agency (August 2017): Draft – Guidelines on the Information to be Contained in Environmental Impact Assessment Reports;
- Environmental Protection Agency (September 2015): Draft - Advice Notes on Current Practice (in the preparation on Environmental Impact Statements);
- Environmental Protection Agency (September 2015): Draft – Revised Guidelines on the Information to be Contained in Environmental Impact Statements;

Also, data was sourced online from the following websites:

- http://gis.epa.ie/Envision Envision Geoportal, Environmental Protection Agency (EPA).
- https://dcenr.maps.arcgis.com/apps/MapSeries/index.html?appid=a30af518e87a4c0ab2fbde2aaac3c228 Public Map Viewer, Geological Survey of Ireland (GSI).

Refer also to References (EIAR Section 4.3.6 below).

4.3.2.1.2 Policy & Legislation

The Southern Regional Waste Management Plan 2015-2021 (SRWMP 16.4.4) recognise that Backfilling activities (of inert waste) which meet the recovery definition and are in compliance with Articles 4 and 13 of the WFD, sit on the other recovery tier of the waste hierarchy. It is acknowledged that EPA authorisations cover more substantial operations with a longer lifetime capacity (Refer to Appendix 5.1.1.2.2 further details).

4.3.2.1.3 Designations

The proposed site is not within a European Site, including Special Protection Area (SAC) and Special Protection Areas (SPA). Appropriate Assessment Screening has been carried out with respect to the proposed development. There is no likelihood of significant ecological effects from this development on any of the sites in the Natura 2000 network or on their conservation objectives.

It is an objective (GI 9-1) of the County Development Plan (CDP) to ensure the protection and conservation of the soils in County Cork by encouraging sustainable management practices and the reuse of brownfield lands (Refer to EIAR Section 3.2.2.8.1 above).

The Council will encourage the reuse of brownfield land where possible in preference to developing green field sites in order to reduce the loss of the county's more agriculturally productive soils.

The existing site comprises a worked-out sand and gravel pit. Importation of inert soil and stones and river dredged material will allow the existing disturbed ground to be restored to beneficial agricultural lands.

It is an objective (HE 2-6) of the CDP to maintain the conservation value of those features or areas of geological interest that are listed in Volume 2, Chapter 3 Nature Conservation Areas, of the plan, and to protect them from inappropriate development. A search of the GSI Geological Heritage Database indicates that there are no sites of geological heritage within or near the site of the quarry and proposed co-located SRF at Garryhesta (Refer to EIAR Section 4.3.3.4 below).

4.3.2.2 Field Study

A UAV survey was conducted by ASM Ireland in March 2016. Multiple aerial photographs taken with the on-board 16 mp camera are digitally stitched together, from which very accurate maps are created using the principle of photogrammetry (ASM 2013). The site and immediate environs were surveyed with high horizontal and vertical spatial resolution (*i.e.*, 3cm per pixel), and produced a topographic survey with accuracy of up to 10cm (Refer to EIAR Figure 1.3).

The desktop study was followed by a site walkover and geological mapping of the pit faces. The geological fieldwork component of the investigation was conducted on the 22nd and 23rd September 2016, and included a site walkover and more detailed geological examination/mapping of the pit faces, where accessible. (Refer to EIAR Section 4.3.3 below).

As part of the Hydrogeological Assessment (Refer to EIAR Section 4.4) groundwater monitoring wells (4 no. in total) were drilled up-gradient and down-gradient of the proposed site. A description of the geology encountered during the drilling is provided below. (Refer to EIAR Sections 4.3.3.2.2 & 4.4.3.8.1).

4.3.3 BASELINE DESCRIPTION OF RECEIVING ENVIRONMENT

4.3.3.1 Land

4.3.3.1.1 Site Location

The site is located within the Townland of Knockanemore c. 2km west of Ovens, in a rural, peri-urban area of south central County Cork. The application site lies on the south side of the N22 National Primary Road, which is a major arterial connection between Cork City c. 15.5km to the east, to Tralee, County Kerry in the west, via Ballincollig, Macroom and Killarney (Refer to EIAR Figure 1.1). The N22 runs through the valley of the Bride River, which is a long narrow geomorphic feature running roughly east-northeast to west-southwest in a geological structure known as the Cork Syncline. The walls of the valley are composed of Old Red Sandstone rock, while the valley floor is composed of a deep fill of Quaternary-age, unconsolidated sands and gravels overlying Carboniferous rocks, which are mostly limestones. The roughly east-northeast to west-southwest oriented valley is enclosed by steep valley walls (ridges) and uplands to the north and south.

4.3.3.1.2 Topography

The site is situated in the valley floor with gently undulating ground at *c*. 45-65m AOD. Within *c*. 1-2 km, the uplands to the north of the valley reach *c*. 150-165 m AOD, whilst those to the south reach *c*. 110-140 m AOD. The surrounding landscape consists of gently undulating to hummocky valley floor, in which the Bride River meanders in a roughly easterly direction, mostly on the southern side of the valley in the vicinity of the site. Garryhesta lies within c. 1.5km of the Bride River, the waters of which ultimately drain into the Lee River c. 3.5km east of the site at Classis and is thus within the Lee River Catchment.

Both the soils and bedrock geology have an important role in determining the environmental characteristics of an area. The underlying bedrock has a major influence on the landform that develops, and the constituent rocks provide the parent material from which the soils are derived. The natural characteristics of the rock help determine the nature of the derived soil, as well as the rate at which it forms, whilst the soil strongly affects both the natural vegetation that emerges, and the type of agriculture that can be sustained.

The topography of the area is a reflection of the underlying geology, which is described in the succeeding subsections. The site is at a relatively low elevation of c. 45-60m AOD in an area dominated by limestone bedrock. The rocks have been folded with an E-W axis into alternating anticlines and synclines, such that the indurate sandstones form the E-W oriented ridges and uplands, while the limestones, which are more prone to weathering, form the floor of the intervening E-W oriented valleys.

The topography of the site and much of surroundings to the southwest and east, incorporating Dineens and Donovans Pits, as well as several pits in the Classis area, is disturbed or modified due to quarrying operations. This differs from the topography of the wider area within c. 5km, particularly further west and south, where the landform is relatively flat to undulating, and seems to reflect the natural landform of the valley proper. The unrestored sections of the quarry have a typically irregular, but concave topographic profile reflecting the quarry void (min. elev. ≥ 23m AOD). The existing topographical contours are shown in EIAR Figure 1.3.

4.3.3.1.3 Land Use & Land Cover

The landscape in the area is characterised by well managed and mature hedgerows with many hedgerow trees, whilst the land is held equally in pasture, used mostly for stock rearing, and tillage. Areas of deciduous forest are largely restricted to fringes in river and stream valleys, as well as gullies and ravines, whilst coniferous forest are largely absent from this landscape area. Mature hedgerows with many trees tend to create enclosed rural road corridors with restricted views. The workings are effectively screened from views on the N22 and nearby local roads by intervening mature and heavily wooded hedgerows.

Land use in the area is dominated by agriculture, sand and gravel quarrying, and residential development. The agricultural land is given over in roughly equal measure to pastoral and tillage agriculture. The local landscape is characterised by undulating hummocky terrain with a pattern of small to large fields that are generally bounded by deciduous hedgerows containing mature trees.

The Applicant, Roadstone, has operated sand and gravel pits at Garryhesta Pit, Classis Pit, Donovan's Pit and since the 1940's, as well as Dineen's Pit, Classis West and South in Ovens, County Cork more recently. The existing Classis Pit and Production Facility is currently being supplied with aggregate (sand and gravel) from the adjacent and linked pits at Classis West and South via an existing conveyor belt.

The settlement pattern is concentrated along the road network in the area, with residential properties typically comprising one-off single residences and farmsteads along public roads or along and at the end of lanes off the public roads. Although there are numerous established individual residences abutting the larger quarry site, there are no residences abutting the boundaries of the site of the proposed SRF co-located within the quarry. There are 10 residences within c. 250m and 19 within c. 500m, of the proposed SRF site, as shown on EIAR Figures 1.2 and 1.3.

The nearest large population centre is the town of Ballincollig, approximately 7km to the east, whilst there are no significant population centres within a 1km radius of the site. The nearest small settlements to the site are Farran Village c. 1km to the west, and Killumney village c. 2km to the south.

Typically, workings in the area have been shown to comprise *c*. 1.5-2m of till 'overburden' overlying up to *c*. 30m of quality sand and gravel, all above the water table. Sand and gravel deposits are also being worked below the water table in the locality. The sand and gravel deposits appear to be shallowing to the west and becoming more heterogeneous. The proposed SRF will be located within the western section of the workings at Garryhesta Pit.

4.3.3.1.4 Land Take

The proposed development consists of restoration of part (c. 6.7 ha) of existing quarry. The site is part of an existing sand and gravel pit with a total landholding area of 77.2ha, a lot of which has already been worked out. The proposed site for backfilling using imported inert soil and stone is located on the north-western corner of the landholding. The pit proposed for infilling is approximately 380m in length and 100m in width with a depth of up to ~31m below the local natural ground level. The pit is isolated from a second larger pit which exists on the east of the landholding. Extraction below the groundwater table has been undertaken at the larger pit on the east of the site. The floor of the larger pit is permanently under water.

4.3.3.2 Soils

Soil is an essential natural resource and is intrinsically valuable to the environment, and all life within it. Soil is the surface layer of the Earth's surface that is capable of supporting life, and encompasses topsoil and the upper, weathered portion of the subsoil. Soil varies from place to place, and may be mineral or organic, acid or alkaline, deep or shallow, and well drained or poorly drained. Soil generally derives from parent geological material and includes organic matter under the influence of numerous processes, unlike subsoil which has no organic matter within.

Soil provides for several important functions, including:

- Contributes to the hydrological cycle in the filtration/recharge, storage and discharge of rainwater;
- Supports all terrestrial ecology, including all flora and fauna;
- Protects and enhances biodiversity;

Topsoil and subsoil may derive from parent geological material and organic matter under the influence of numerous processes, including weathering and erosion. In terms of subsoil, the profound influence of glaciation in Ireland is seen in the glacial till, which blankets much of the underlying rocks.

Visual assessment of the soils within the quarry site suggests that the soils are shallow, naturally well drained, with no indication of waterlogged soils.

4.3.3.2.1 Topsoil

Teagasc and the EPA initiated a nationwide Soil and Subsoil Mapping Project, the final report for which was published by Fealy & Green (2009). The soil map of every county in Ireland were compiled by a remote sensing and GIS-based methodology. The distribution of the soil types at Ovens is assessed by reference to this Teagasc/EPA Soil/Subsoil Map, with supplementary interpretation based on the General Soil Map of Ireland (Gardiner & Radford 1980). Three soil maps of the area, including those of the site, are shown in Figures 4.3.1 to 4.3.3. Figure 4.3.1 is the soil map of South Cork extracted from Gardiner & Radford (1981), while Figures 4.3.2 and 4.3.3 are the Teagasc/EPA topsoil and subsoils maps, respectively, of the Ovens area (Fealy & Green, 2009; EPA 2016).

The General Soil Map of Ireland by Gardiner & Radford (1980) shows that the predominant topsoil or soil type across the area is Acid Brown Earths with associated Grey Brown Podzolics and Gleys developed on mixed sandstone, limestone glacial till (Refer Fig. 4.3.1). Other major soil types in the immediate area are similar soil types formed on mixed sandstone, limestone glacial till. However, these latter soils are developed off the floor of the valley on the valley walls and upland areas.

The soil types occurring at the site and in the wider area were also assessed by reference to the Teagasc/EPA soil map (EPA 2016; Refer Fig. 4.3.2). The dominant soil occurring at the Ovens site is identified as Lithosols and Regosols (AminSW) and covers the entire site. Mineral alluvium (AlluvMIN) is developed as a wide ribbon along the course of the Bride River. Acid Brown Earths / Brown Podzolics (AminDW) are developed on the surrounding valley walls and upland areas. All of these soil types are well drained, suggesting that drainage impedance is not an issue in the localities of the sand and gravel pits, and corroborating the presence of historical extraction in the locality.

Lithosols and Regosols are azonal soils that are developed mostly from shallow stony deposits, and from the alluvial deposits of rivers, respectively (Gardiner & Radford, 1980). Lithosols are skeletal stony soils that are predominantly shallow, well-drained soils derived from non-calcareous materials, and tend to be stony mineral soils. The profiles of Regosols show no distinct horizon development, and usually have a light-coloured A1 horizon directly overlying the C horizon. The texture of regosols varies between sands and clays, depending

on the parent material. It is considered that the identification of Lithosols and Regosols in the Teasgasc/EPA maps is consistent with underlying non-calcareous parent material (See Subsoil).

4.3.3.2.2 Subsoil – Quaternary Geology

In terms of subsoil, the profound influence of glaciation in Ireland is seen in the deposits of glacial till and glaciofluvial sand and gravel which blankets much of the underlying rocks of the country. Geologically recent Quaternary sediments cover the rocks in the valleys of Cork, and many are of glacial or glaciofluvial origin that were deposited within the last 2.6 million years (2.6Ma).

The Quaternary Period itself spans from 2.6Ma to present, and the sediments and features formed during glaciation, which is characteristic of the Period, are commonly treated under the general term Quaternary Geology. The last Ice Age, known as the Late Midlandian or Devensian, peaked at approximately 20-25,000 years before present (BP) in Ireland, with total deglaciation of Ireland by around 13,000 years BP. The soils mentioned in the previous section would have begun to develop after deglaciation, around the beginning of Holocene epoch at 12,000 years BP.

Thus, the origin of the subsoil is associated with deposition related to ice movement during glaciation and later glacial retreat and melting during deglaciation. Ice sheets grind and pulverise the underlying bedrock, reducing it to fragments ranging in size from boulders to clay particles. The powerful erosive force of the ice sheet is considered to have sculpted the landscape in the region of Cork, as evidenced by many well-preserved glacial features. The two main types of Quaternary subsoils in Ireland are; (1) glacial till, largely deposited at the base of ice sheets; and (2) sand and gravel deposits associated with the melting of the ice sheets, and generally termed 'glaciofluvial sands and gravels'.

As the ice sheets melted across Cork, the meltwaters sorted and deposited sands and gravels in the form of characteristic deglacial features such as outwash plains (sandar) and kames, fans and deltas. The sands and gravels of the site probably represent glacial and glaciofluvial deposits that originated from the ice sheet on the upland and mountainous terrain to the west.

The subsoil types occurring at the site and in the wider area were determined initially, pre-fieldwork, by reference to the Teagasc/EPA subsoil map (EPA 2016; Refer Fig. 4.3.3 and 4.3.4). The dominant subsoil type at the site and surrounding area is Sands and Gravels derived from Devonian sandstone parent material (i.e., GDSs), with minor undifferentiated gravelly alluvium (A), which is developed as a wide ribbon along the course of the Bride River. Other notable subsoil types in the wider area are till derived from Devonian sandstones (TDSs), and exposed bedrock at surface (Rck).

In the valleys of Cork, the thicker glacial sediments are largely glaciofluvial in origin (deposited by meltwater released by melting ice), while the thinner sediments on the flanking ridges are often tills. Where bedrock has been intersected in the boreholes drilled along the valley east of Ballincollig, cross-sections can give an indication of the shape of the bedrock under the valley floor (Davis *et al*., 2006). The cross-sections drawn indicate that the buried valley is not a typical, glacially excavated U-shaped valley with steep sides. Instead, the sides of the valleys

may be stepped, and pinnacles of bedrock also rise from the valley floor, beneath the sand and gravel subsoils.

In the Ovens area itself, the parent material for the glacial deposits is largely derived from Devonian and Carboniferous Sandstones and Shales, with smaller amounts of Carboniferous Limestone in places, particularly at depth. Within the Ovens locality, glacial till deposits occur on the ridges and uplands and are generally between 1-3m thick. The thicker glaciofluvial sediments occur on the valley floor, and can be up to 30m in thickness, forming relatively flat to gently undulating to hummocky topography. The GSI (2016) identifies the Quaternary sand and gravel deposits at Ovens as 'Hummocky Sand and Gravel'.

The Quaternary deposits on the floor of the Bride River Valley are therefore characterised by thick sequences of bedded and sorted, glaciofluvial, outwash sands and gravels. Pits up to 40m deep are seen at Garryhesta, with up to 30m depth of clean sediments exposed in the proposed area of the pit to be backfilled. The profile is dominated by alternating units of planar crossbedded sands and rounded to subrounded, pebble to cobble gravels. Sand beds are up to 0.35m thick, and some silt beds of up to 80mm thick are present.

Four (4 no.) groundwater monitoring wells were drilled at the site between depths of approximately 36 and 40mbgl. The sand and gravel encountered during the drilling could typically be described as brown, dense, silty, sandy GRAVEL. The gravel was fine to medium in size while the sand was mainly course. The sand and gravel was typically found to be a mixture of mainly sandstone and siltstone. Bedrock (presumed) was only encountered at 1 no. monitoring well location (MW3), where rock was met at 35mbgl.

A layer of till like material comprising dark brown, slightly gravelly, sandy SILT/CLAY was found to overlie the sands and gravels in the area of the proposed infill pit (i.e. MW1 and MW2 locations only). The depth of the till like material was approximately 16m at both locations. This till like material was absent at monitoring well locations MW3 and MW4 which are located further to the southwest/south of the proposed infill pit. Details with respect to the monitoring wells are provided in EIAR Section 4.4.

4.3.3.3 Bedrock Geology

The study area at Ovens occurs within Map Sheet 25 (South Cork), which is covered by the report titled Geology of South Cork that accompanies Geological Map of Sheet 25 (Sleeman & Pracht 1994). Thus, this subsection is based largely on Sleeman & Pracht (1994), with supplemental information from Graham (2009) and Sevastopulo & Wyse Jackson (2009), and online geological mapping (GSI 2016), but without explicit references in the text. The data indicates that all of the units within *c*. 7km of the site are Devonian or Mississippian (or Lower Carboniferous) in age, while the site is underlain only by Lower Carboniferous rocks. The lithological units in the wider area are presented in chronological order in Table 4.3.1, whilst the geological map of the area is shown in Figure 4.3.5.

Table 4.3-1 Bedrock Units of the Ovens Area

Bedrock Unit	Thickness (m)	Period/Stage/Substage
Kinsale Formation, Cuskinny Member (KNcu)	240m	Courceyan
Little Island Formation (LI)	500m	Chadian-Asbian
Waulsortian Limestones (WA)	600m	Courceyan
Old Head Sandstone Formation (OH)	<850m	Upper Devonian (Strunian)
Gyleen Formation (GY)	na.	Upper Devonian
Ballytrasna Formation (BS - ORS)	<1500m	Upper Devonian

During the Devonian Period (*c.* 417-354 Ma) Ireland was part of the Laurussia super continent (Laurentia, Avalonia and Baltica) also known as the Old Red Sandstone (ORS) continent. The latter underwent extensive subaerial erosion, whilst laying in arid southern subtropical latitudes, giving rise to the characteristic red coloured, continental facies sandstones of the ORS. During the early Carboniferous (*c.* 354-327 Ma) a marine transgression advanced northward across the eroded and flat-lying continent (*i.e.*, peneplain), and deposited a sequence of carbonate rocks that cover much of the Irish Midlands, including the study area.

At the end of the Carboniferous *c.* 300 Ma, there was a major mountain-building event, known as the Variscan (also known as the Hercynian) orogeny, caused by the continental collision of the Old Red Sandstone continent of Laurussia with Gondwana to form the supercontinent of Pangaea. This event caused the development of a fold-belt with a strong E-W orientation in southwest Ireland. The Bride River valley formed along the axis of one the E-W oriented Variscan synclines, known as the Cork Syncline. It is apparent from Sleeman & Pracht (1994) that the ORS generally forms the high ground in the core of anticlines, while Carboniferous rocks generally form the core of the synclines. Consequently, the anticlines correspond to topographic highs or uplands, while the synclines correspond to the valleys.

4.3.3.3.1 Ballytrasna Formation

The Ballytrasna Formation (BS) is mapped to the north and south of the site and forms the base of the local stratigraphy. The formation is Upper Devonian in age, and corresponds to the characteristic red coloured, continental facies mudstones and sandstones of the ORS. The thickness of the formation varies from 360m up to 1,500m. It consists mainly of dusky-red mudstone and lesser pale-red, fine-to medium-grained sandstones.

4.3.3.3.2 Gyleen Formation

The Gyleen Formation (GY) conformably overlies the Ballytrasna Fm., and lies north and south of the site, essentially comprising the walls of the valley. The formation is characterised by alternating mudstones and sandstones. The colour varies from green to grey and purple but

is generally less purple than the underlying units of the ORS. The formation underlies the northern limit of the Garryhesta property, adjacent to the N22.

4.3.3.3.3 Old Head Sandstone Formation

The Old Head Sandstone Formation (OH) overlies the Gyleen Fm. and has been mapped to the north and south of the site, underlying the northern limits of the Garryhesta property. The formation is a thick succession of grey sandstones and interbedded sandstones and mudstones. Exposure in the Cork Syncline is poor with a 10m thick exposure (90m outcrop thickness) at Sunday's Well in Cork City, while outcrop thicknesses of 150m indicate true thickness of c. 15m in the Ovens area.

4.3.3.3.4 Waulsortian Limestones

The Waulsortian (WA) is mapped as underlying most of the valley, except for a central axial band occupied by the Little Island Fm. (See below). The Waulsortian is up to 600m thick in the Cork Syncline and has a maximum outcrop width of c. 800m in the Ovens area, specifically on the eastern side of the Garryhesta property. The Waulsortian consists of pale grey, massive, almost unbedded, pure, fine-grained limestone with thin shale interbeds locally.

GSI (2016) shows that karst features are developed in the Waulsortian, specifically two swallow holes south of the Garryhesta property in the Townland of Ballygroman Lower, and Coleman Cave in the Townland of Carrigane, near Ovens village.

4.3.3.3.5 Little Island Formation

The Little Island Formation (LI) consists of Lower Carboniferous limestones of Chadian-Asbian age. The formation occurs in the axis of the syncline and runs essentially down the centre of the valley. The formation forms a 500m thick succession. It consists mainly fine mudbank limestones, with massive crinoidal wackestone appearing towards the top of the formation. No karst features are known to occur in the formation in the Ovens area (GSI 2016).

4.3.3.4 Geological Heritage

The Irish Geological Heritage (IGH) programme identifies and selects a complete range of sites that represent Ireland's geological heritage. The programme is operated by the GSI and the National Parks and Wildlife Service (NPWS), and sites identified as important for conservation are designated as Natural Heritage Areas (NHA).

A search of the GSI Geological Heritage Database indicates that there are no sites of geological heritage within or near the site of the quarry and proposed co-located SRF at Garryhesta. In its 2015-2022 County Development Plan (CPD), Cork County Council recognises areas of conservation value, which include a number of geological and geomorphological sites (Cork 2014). However, there is only one such site of geological interest near the Garryhesta site, which is centered c. 2km south of the site:

Site Name:	Killumney Moraine
IGH Theme	IGH 7 Quaternary
Location:	ITM Coordinates 154000, 67930

Critical Features:	Moraine
Summary Description:	Major moraine and fluvioglacial terraces associated with local ice-cap expansion from the Cork/Kerry mountains. It may represent a retreat position rather than a discrete ice maximum limit.

4.3.4 ASSESSMENT OF IMPACTS

The following Impact Assessment matrix provides an indication of the significance of potential effects arising during the life cycle of the development not accounting for any mitigation measures.

Table 4.3-2 Land, Soils & Geology - Impact Matrix

'Do Nothing' Impacts			
Factors	**Construction**	**Operation**	**Decommissioning**
Direct Impacts	X	●	X
Indirect Impacts	X	X	X
Cumulative Impacts	X	X	X
Residual Impacts	X	X	X
`Worst Case' Impacts	X	●	X

None/imperceptible: X; Slight: ●; Moderate: ●; Significant/Very significant: ●.
Refer to Appendix 5.2 for definition of Significance

4.3.4.1 'Do Nothing' Impacts

The strategic location of Garryhesta Pit on the N22 in central south Cork, renders the proposed SRF well positioned to deliver recovery of inert soil, stone and river dredge spoil from a large catchment area. If the SRF is not licensed to commence recovery operations, recovery of inert waste at the SRF would not occur and possibly result in the failure to divert these volumes from disposal in landfill, as required under the Waste Framework Directive 2008 (2008/98/EC). Alternatively, the inert soils and stone waste materials may have to be transported further afield with a consequential impact in terms of increased exhaust emissions for transport of materials to more removed SRF facilities.

If the proposed development did not proceed, the Garryhesta site would remain as an unrestored quarry site, without the backfilling generated by the proposed SRF, thus rendering the groundwater vulnerable to potential contamination by infiltration. Thus, it is considered that the proposed development of an SRF will have a positive impact.

4.3.4.2 Direct Impacts

The nature of the proposed SRF involves the importation and recovery of inert soil, stone and river dredge spoil, with placement of these wastes as backfill in the quarry.

The site of the SRF including the site infrastructure will be situated within the existing quarry extraction area and as such will have no impact on virgin soils, sands and gravels, which have already been stripped, disturbed or extracted. As a result of backfilling using the inert soil, stone and dredge spoil the proposed SRF will contribute to the reinstatement of the quarry site, and thus will have a permanent significant positive effect.

It is considered that as the proposed development is within an existing quarry that there will be an imperceptible impact on Land, Soils and Geology associated with construction activities.

In terms of impacting on the groundwater vulnerability of the site, the importing of the inert fill will have a positive effect on the site in that the groundwater vulnerability rating will be lower.

Human health risks will be managed by preventing public access to the site and having appropriate health and safety measures in place for staff working on the site.

On completion of site activities, the site of the quarry and SRF will be decommissioned and left safe and secure. Furthermore, the site will be reinstated in accordance with the approved quarry restoration scheme, and thus integrated back into the surrounding landscape with the attendant improvement to the visual amenity of the area.

It is considered that following restoration and the mitigation measures incorporated in the design that there will be no significant effects in terms of Land, Soils and Geology. The restoration of the site to beneficial after-use will result in a permanent significant positive effect in the medium term.

4.3.4.3 Indirect Impacts

The proposed SRF will have no indirect impact on the local or regional geology, as recovery of the inert soil, stone and river dredge spoil will not release contaminants onto the lands, whilst dust from the SRF will be tightly controlled (Refer to EIAR Section 4.6).

4.3.4.4 Cumulative Impacts

The interaction of the quarry and proposed SRF is seen as 'symbiotic' and positive, with no negative cumulative impacts on the geological environment identified.

4.3.4.5 Residual Impacts

It is considered that following restoration and the mitigation measures incorporated in the design that there will be no significant effects in terms of Land, Soils and Geology.

4.3.4.6 'Worst Case' Impact

Th worst case scenario would be an impact on groundwater quality resulting from importation of contaminated soil and stones were waste acceptance procedures not to be followed. Worst case impacts are only likely to be a slightly alteration of the groundwater quality locally. These minor local effects are not expected to compromise groundwater quality with respect to groundwater or drinking water regulations. Impact on groundwater is addressed in EIAR Section 4.4. Mitigation measures with respect to waste acceptance, emergency response procedures and soils management are provided below.

4.3.5 MITIGATION & MONITORING

There is no bedrock exposed within the quarry or the site of the proposed SRF, and as such no impact on bedrock geology as a result of the SRF is expected. The SRF is also not expected to have any significant negative impact on the surficial geology of the site or surrounding area, and thus no mitigation measures are proposed. Ultimately, after final land reclamation of the enclosing quarry site, with the land restored to agricultural or possibly recreational use, there will be no residual impact on the surrounding environment from the SRF.

Standard Operating Procedures (SOP's) will be put in place to ensure that all inert waste imported to site for recovery will be subject to comprehensive waste acceptance, inspection and sampling procedures (Refer to Appendix 5.3 for typical examples of SOP's).

All waste accepted for recovery will undergo a site pre-approval procedure (Refer to Appendix 5.3.4).

Each consignment of material arriving at the facility will be inspected at the point of entry by trained personnel to ensure it complies with what was agreed in the pre-approval stage. Basic characterisation of the material will be carried out in accordance with the Waste Inspection Procedure (Refer to Appendix 5.3.2).

Only suitable material will be permitted to be accepted in the facility (i.e. inert soil and stones and river dredging spoil (EWC 17-05-04 and 17-05-06)).

Material not suitable for recovery at the facility will be rejected either at the pre-approval stage, the onsite verification stage, or before recovery stage at the customers expense. If reloading cannot occur immediately, it will be separated and moved to the quarantine area. The existing workshop will be utilised as a quarantine area (Refer to Figure 3.1). The recycling manger will be informed immediately. A waste acceptance/rejection procedure will be put in place (Refer to Appendix 5.3.3).

Any non-natural materials in the consignment will be manually removed where possible and transferred to the appropriate waste skip for disposal at an appropriate facility (Refer to Figure 3.1).

Material accepted at the facility will undergo routine testing as detailed in the Roadstone Waste Intake Sampling Procedure (Refer to Appendix 5.3.1).

Basic characterisation will be undertaken a second time, upon tipping. Only after this second inspection will the waste be accepted. Following the second inspection the material will be accepted and placed within the infill area (placement by bulldozer/excavator).

Good quality indigenous or imported soil will be conserved wherever possible to provide the subsoil/top-soil capping.

To ensure that damage to these materials is kept to a minimum, movement and placement of topsoil and subsoil for final restoration will only take place during appropriate weather conditions and when the soils are in the optimum condition. This optimum soil condition may be described as moist but friable. No soils will be moved when they are too dry or when there are unusually windy weather conditions. This will help to prevent erosion and any consequential creation of dust. Conversely, soils will not be handled in wet conditions or when

the moisture content of the soils is too high. This will ensure that smearing of the soils does not take place and that the soil retains its structure.

Progressive restoration involving grass seeding of restored area's will be carried out on a staged basis to reduce the effects of soil erosion and windblown dust, to aid ground stabilisation, and as an effective means of weed control. Final restoration is dependent on the availability of good topsoil/subsoil and subject to suitable weather conditions. The final contours and topography for the site is shown by the Reclamation Scheme Figure 3-3 and Figure 3.4 (Cross Sections).

Once the topsoil is re-instated it will be seeded with a suitable mix of grasses suitable for pasture in order to quickly stabilise the topsoil. Once the grass sward has become established the restored farmland can be kept either as pasture or hay meadow.

Environmental monitoring, including local groundwater and surface water monitoring will be implement during the construction, operational, closure ad decommissioning phases of the development.

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4.3.7 FIGURES

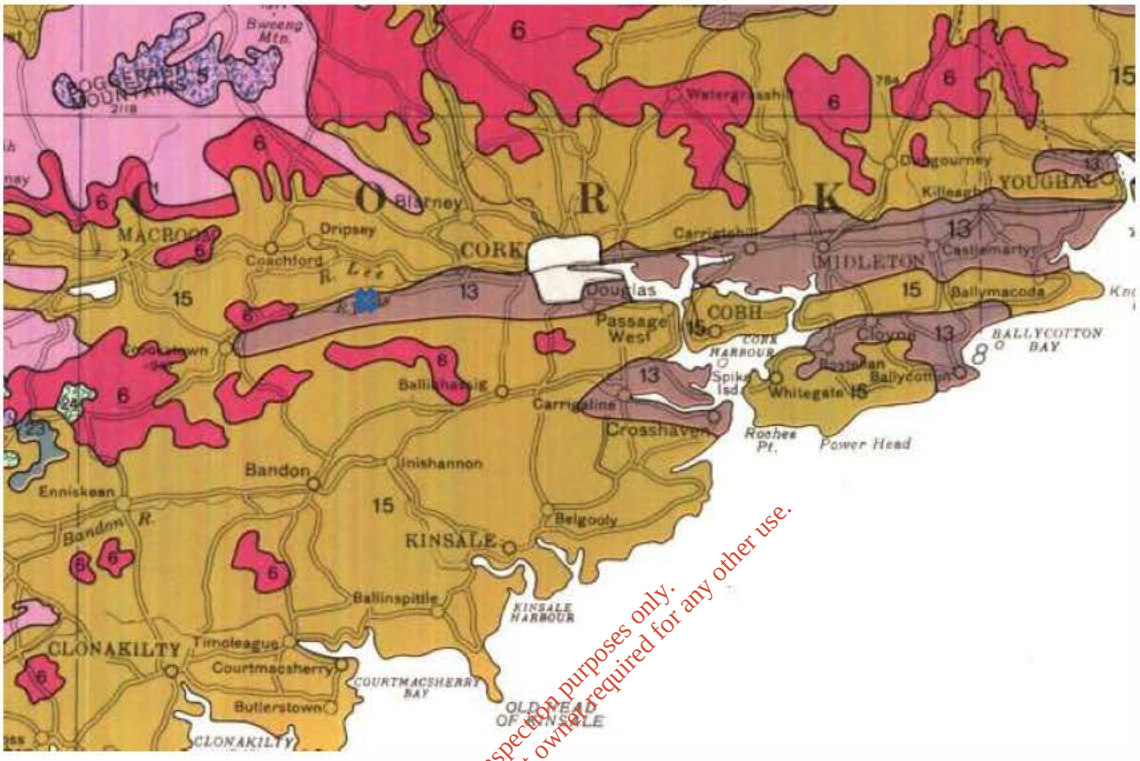


Figure 4.3-1 Soil Map of Ovens Area

Redrawn extract from Gardiner & Radford (1980)
Scale: Width of Field = c. 80 km.

Legend for major units in the vicinity of site:

1: Pink – Peaty Podzols and associated Lithosols and Blanket Peat developed mostly on granite and sandstone.

6: Red - Brown Podzolics and associated Gleys and Podzols developed mostly on sandstone.

13: Brown – Acid Brown Earths and associated Grey Brown Podzolics and Gleys developed on mixed sandstone, limestone glacial till.

15: Light Brown - Brown Podzolics and associated Acid Brown Earths and Gleys developed mostly on sandstone, Lower Avonian shale glacial till.

23: Blue Grey – Lithosols and associated Rock Outcrop and Peat developed on granite and sandstone and shallow glacial till (quartzite in places).

24: Stippled – Blanket Peat

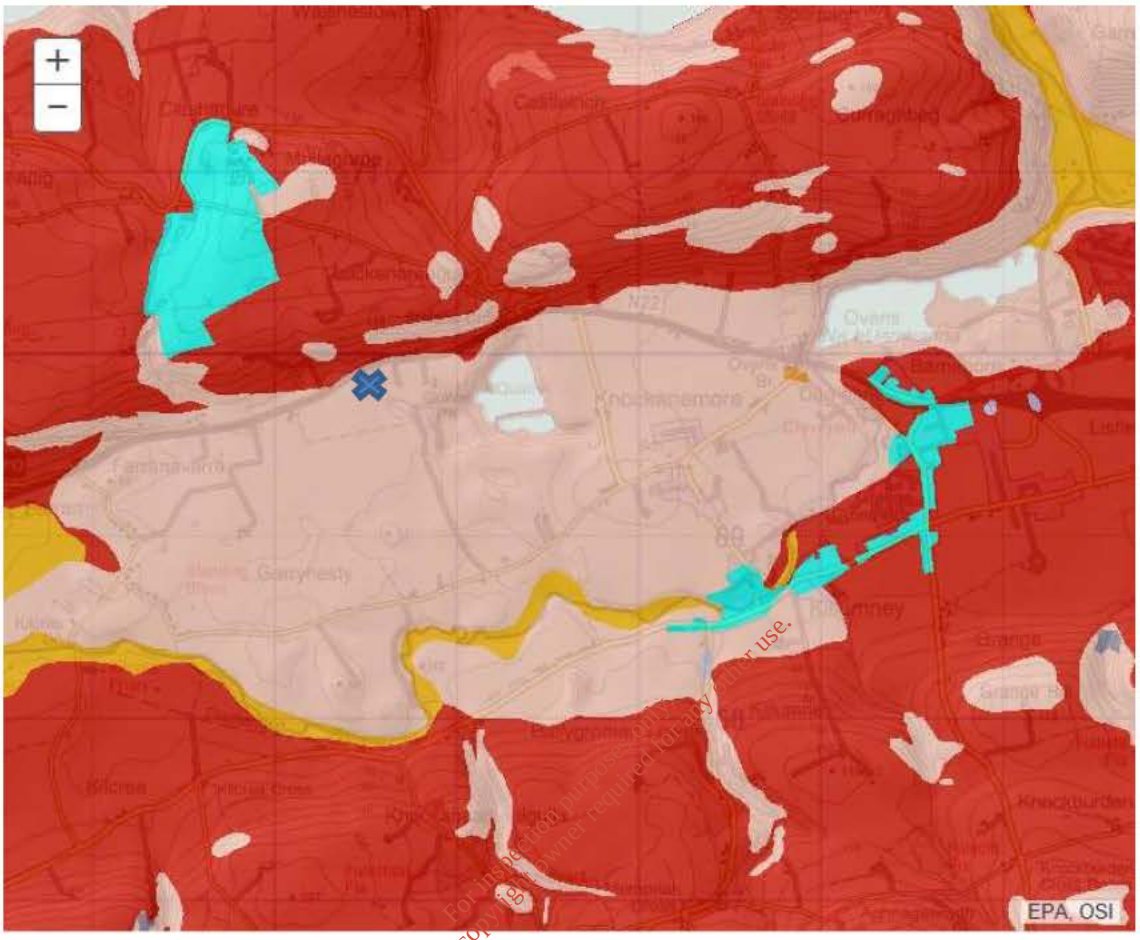


Figure 4.3-2 Soil Map of Ovens Area (EPA)

Redrawn extract from EPA Envision online mapping website at http://gis.epa.ie/Envision.

Scale: Grid Spacing = 1 km.

Legend:

AlluvMIN: Yellow - Mineral Alluvium.

AminDW: Red – Acid Brown Earths/ Brown Podzolics.

AminSW: Pink – Lithosols and Regosols

AminSRPT: Grey Blue – Podzols Peaty.

Made: Blue.

Water: Light Blue.

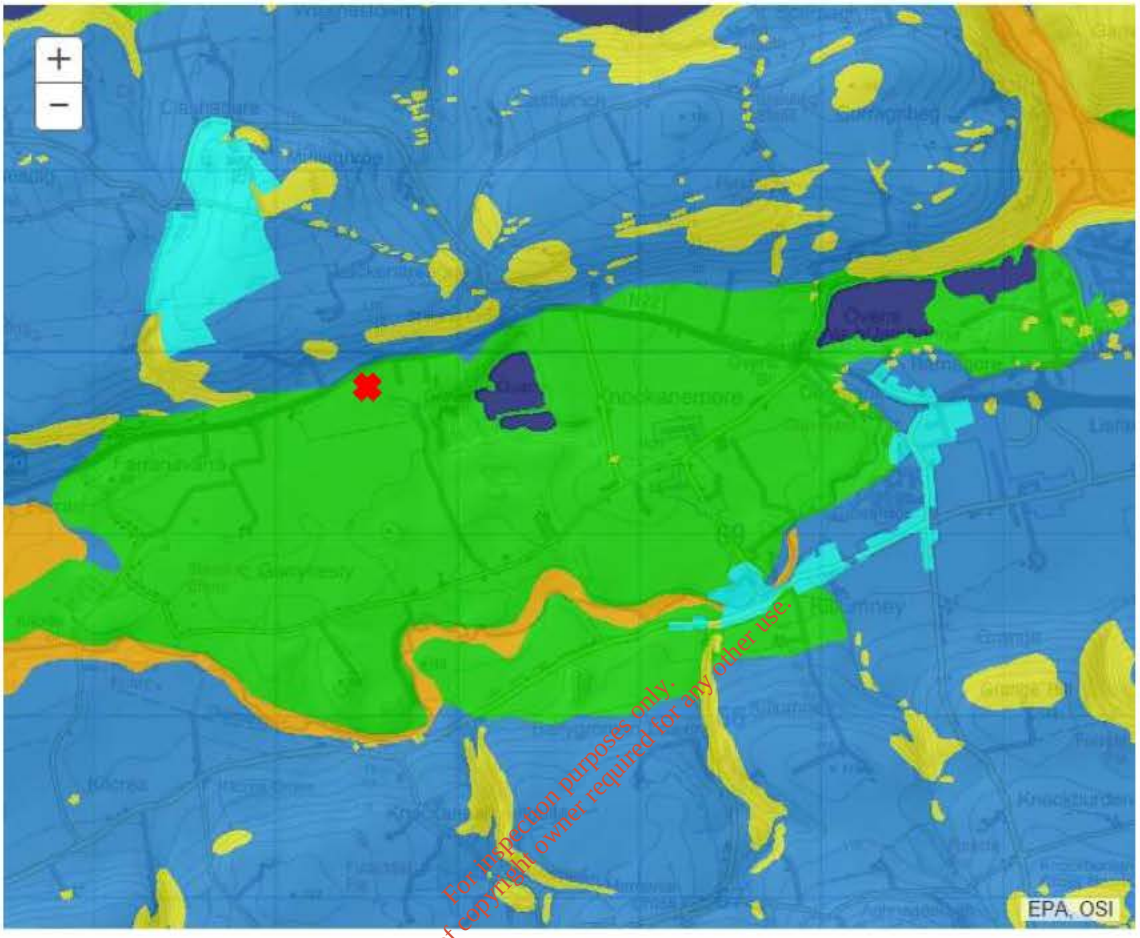


Figure 4.3-3 Subsoil Map of Queens Area (EPA)

Redrawn extract from EPA Envision online mapping website at http://gis.epa.ie/Envision.

Scale: Grid Spacing = 1 km.

Legend:
Green: GDSs - Sandstone sands and gravels, Devonian
Orange: A - Alluvium, undifferentiated gravelly
Medium Blue: TDSs – Sandstone till, Devonian
Dark Blue: Water.
Light Blue: Made ground.
Yellow: Rck – Bedrock at surface.

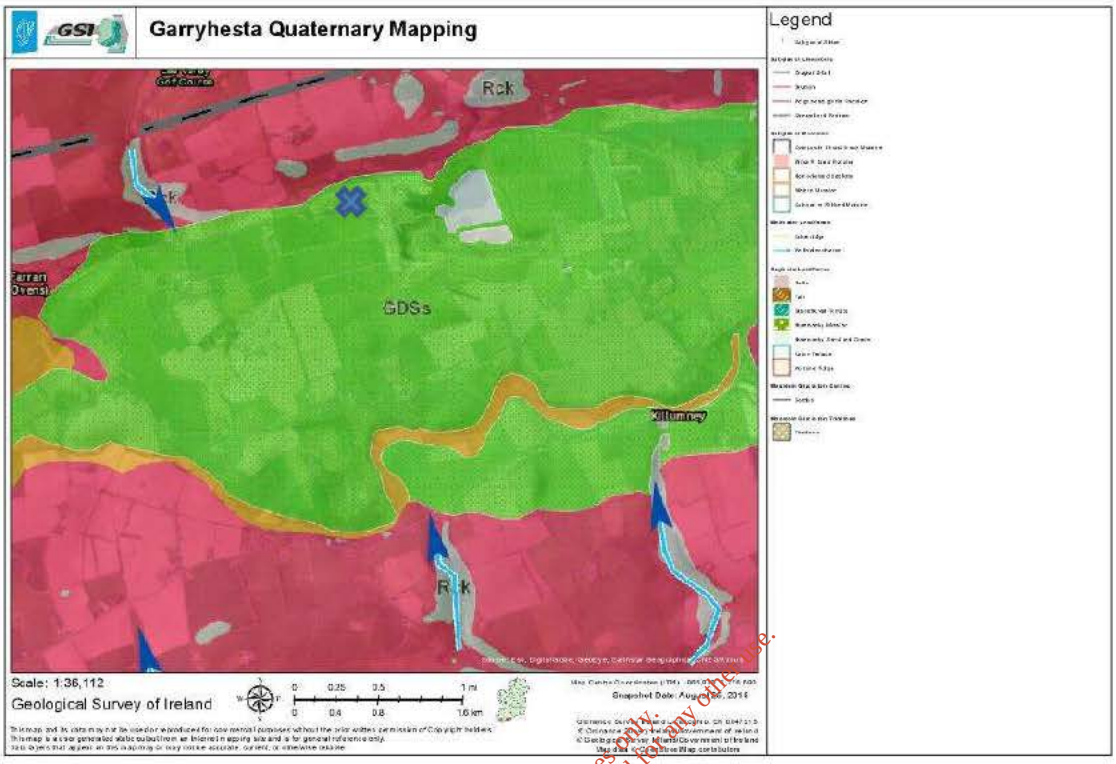


Figure 4.3-4 Quaternary Geology Map of the Gvedis Area

Redrawn extract from GSI Public Viewer online mapping website at http://dcenr.maps.arcgis.com/apps/webappviewer/index.html?id=de7012a99d2748ea9106e7ee1b6ab8d5.

See Scale Bar.

Legend:

Green: GDSs – Gravels derived from Devonian sandstone.

Red: TDSs – Till derived from Devonian sandstone.

Orange: A – Alluvium.

Light Grey: Rck – Bedrock at surface.

Dark Blue: Water.

Blue Arrows: Meltwater channels.

Dark Grey Dashed Lines: Streamlined Bedrock.

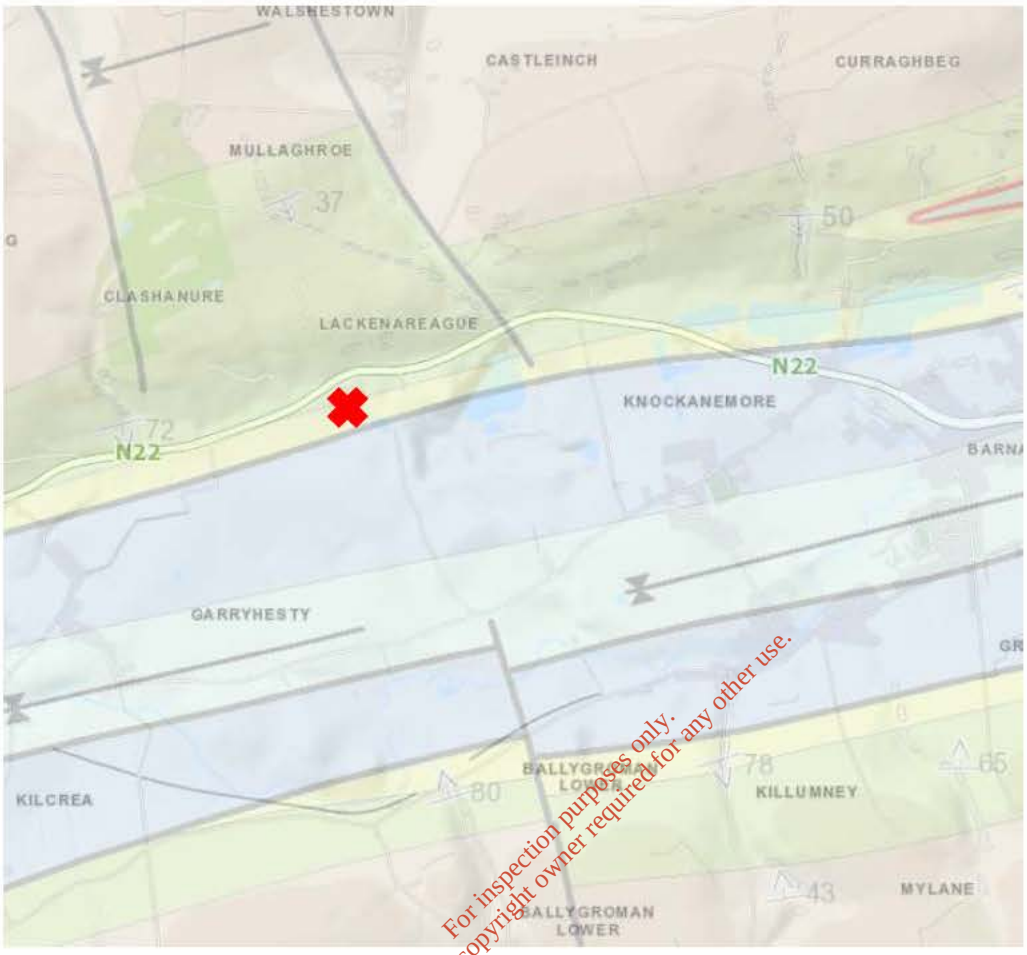


Figure 4.3-5 Geological Bedrock Map of the Ovens Area

The gravel pits are principally located on Waulsortian Limestones (WA) and Little Island Formation (LI), and lesser Old Head Sandstone Formation (OH) and Gyleen Formation (GY). Note the axis of the Cork Syncline runs axially through the valley.

Redrawn extract from GSI Public Viewer online mapping website at https://dcenr.maps.arcgis.com/apps/webappviewer/index.html?id=ebaf90ff2d554522b438ff313b0c197a&scale=0.

Width of Field = c. 5 km.

Legend

Light Blue: Little Island Formation (LI).

Medium Blue: Waulsortian Limestone (WA).

Yellow: Old Head Sandstone Formation (OH).

Green: Gyleen Formation (GY).

Brown: Ballytrasna Formation (BS).

Bright Yellow: Outcrop.

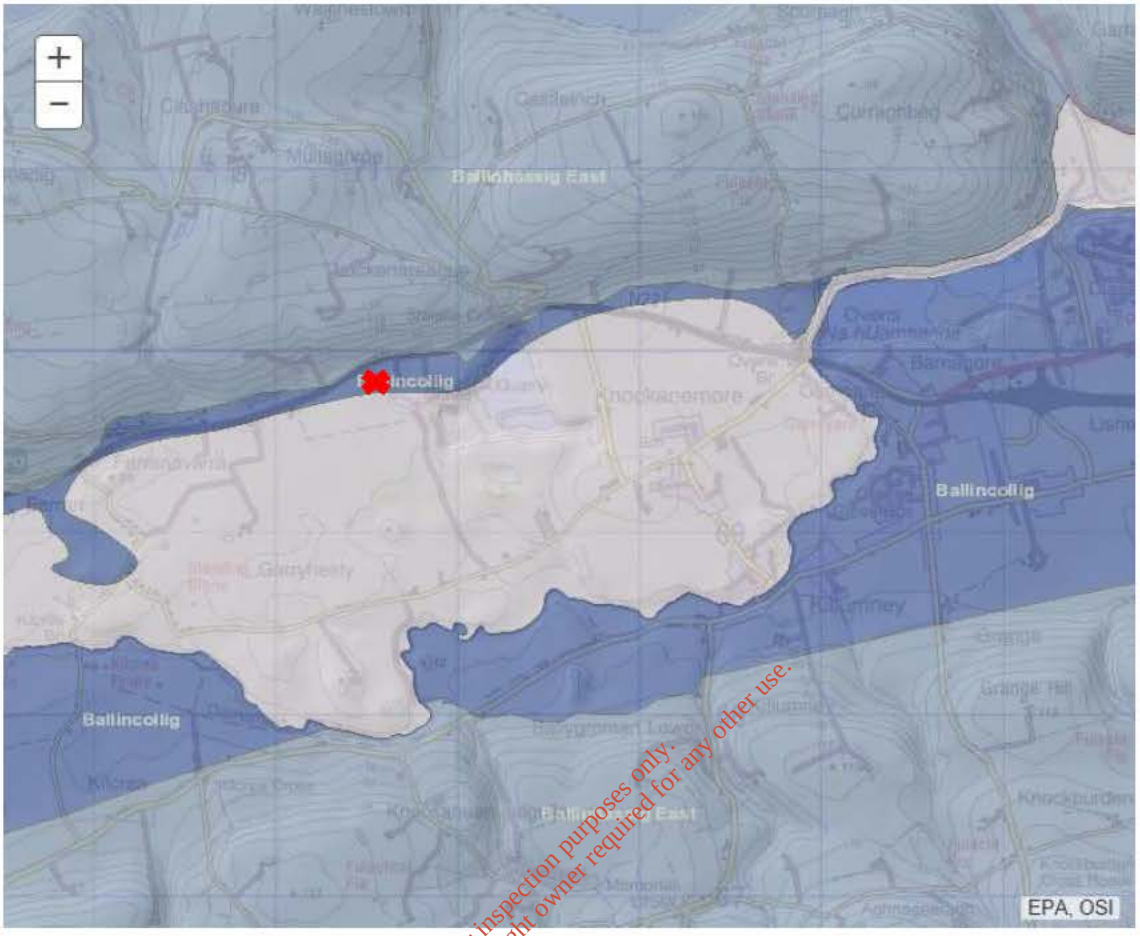


Figure 4.3-6 Aquifer Map of Ovens Area

Redrawn extracts from EPA Envision online mapping website at http://gis.epa.ie/Envision.

Scale: Grid Spacing = 1 km.

Legend.

Grey Blue – Poorly productive bedrock, Ballinhassig East. Poor aquifer, which is generally unproductive.

Dark Blue – Karstic, Ballincollig. Locally important aquifer – karstified.

Light Beige – Gravel, Lee Valley Gravels. Locally important gravel aquifer.

4.4 WATER

4.4.1 INTRODUCTION

Hydro-Environmental Services (HES) were commissioned by Mr. John Sheils of J Sheils Planning & Environmental Ltd to undertake an assessment of the potential impacts of the proposed infilling of an existing sand and gravel pit at Garryhesta, Ovens Co. Cork on water aspects (hydrology and hydrogeology) of the receiving environment. It is proposed to backfill part of the existing pit with inert fill.

4.4.1.1 Objectives

The objectives of the assessment are:

- Produce a baseline study of the existing water environment (surface water and groundwater) in the area of the proposed infilling site;
- Identify likely negative impacts of the proposed development on surface water and groundwater;
- Identify mitigation measures to avoid, remediate or reduce significant negative impacts (if any); and,
- Assess hydrological cumulative impacts of the proposed development along with other activities and developments in the local area.

4.4.2 METHODOLOGY

4.4.2.1 Desk Study

A desk study of the proposed development site and surrounding area was largely completed prior to the undertaking of the site survey and walkover assessments.

4.4.2.1.1 Sources of Information

The desk study involved collecting all relevant geological, hydrological, hydrogeological and meteorological data for the area. This included consultation with the following:

- Environmental Protection Agency database (www.epa.ie);
- Geological Survey of Ireland - National Draft Bedrock Aquifer map;
- Geological Survey of Ireland - Groundwater Database (www.gsi.ie);
- Met Eireann Meteorological Databases (www.met.ie);
- National Parks & Wildlife Services Public Map Viewer (www.npws.ie);
- Water Framework Directive "WaterMaps" Map Viewer (www.wfdireland.ie);

- Bedrock Geology 1:100,000 Scale Map Series, Sheet 21 (Geology of Kerry - Cork). Geological Survey of Ireland (GSI, 1997);
- Geological Survey of Ireland - Groundwater Body Characterisation Reports;
- OPW Indicative Flood Maps (www.floodmaps.ie);
- Environmental Protection Agency – "Hydrotool" Map Viewer (www.epa.ie);
- CFRAM Preliminary Flood Risk Assessment (PFRA) maps (www.cfram.ie); and,
- Department of Environment, Community and Local Government on-line mapping viewer (www.myplan.ie).

4.4.2.1.2 Policy & Legislation

The EIAR is carried out in accordance with the follow Irish legislation:

- S.I. No. 349 of 1989: European Communities (Environmental Impact Assessment) Regulations, and subsequent Amendments (S.I. No. 84 of 1995, 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), S.I. No. 30 of 2000, the Planning and Development Act, and S.I. 600 of 2001 Planning and Development Regulations and subsequent Amendments. These instruments implement EU Directive 85/337/EEC (EIA Directive) and subsequent amendments, on the assessment of the effects of certain public and private projects on the environment;
- Planning and Development Acts 2000-2015;
- Planning and Development Regulations, 2001-2015;
- S.I. No. 94 of 1997: European Communities (Natural Habitats) Regulations, resulting from EU Directives 92/43/EEC on the conservation of natural habitats and of wild fauna and flora (the Habitats Directive) and 79/409/EEC on the conservation of wild birds (the Birds Directive);
- S.I. No. 293 of 1988: Quality of Salmon Water Regulations, resulting from EU Directive 78/659/EEC on the Quality of Fresh Waters Needing Protection or Improvement in order to Support Fish Life;
- S.I. No. 272 of 2009: European Communities Environmental Objectives (Surface Waters) Regulations 2009 and S.I. No. 722 of 2003 European Communities (Water Policy) Regulations which implement EU Water Framework Directive (2000/60/EC) and provide for implementation of 'daughter' Groundwater Directive (2006/118/EC). Since 2000 water management in the EU has been directed by the Water Framework Directive (WFD). The key objectives of the WFD are that all water bodies in member states achieve (or retain) at least 'good' status by 2015. Water bodies comprise both surface and groundwater bodies, and the achievement of 'Good' status for these depends also on the achievement of 'good' status by dependent ecosystems. Phases of characterisation, risk assessment, monitoring and the design of programmes of measures to achieve the objectives of the WFD have

either been completed or are ongoing. In 2015 it will fully replace a number of existing water related directives, which are successively being repealed, while implementation of other Directives (such as the Habitats Directive 92/43/EEC) will form part of the achievement of implementation of the objectives of the WFD;

- S.I. No. 41 of 1999: Protection of Groundwater Regulations, resulting from EU Directive 80/68/EEC on the protection of groundwater against pollution caused by certain dangerous substances (the Groundwater Directive);
- S.I. No. 249 of 1989: Quality of Surface Water Intended for Abstraction (Drinking Water), resulting from EU Directive 75/440/EEC concerning the quality required of surface water intended for the abstraction of drinking water in the Member States (repealed by 2000/60/EC in 2007);
- S.I. No. 439 of 2000: Quality of Water intended for Human Consumption Regulations and S.I. No. 278 of 2007 European Communities (Drinking Water No. 2) Regulations, arising from EU Directive 98/83/EC on the quality of water intended for human consumption (the Drinking Water Directive) and WFD 2000/60/EC (the Water Framework Directive);
- S.I. No. 272 of 2009: European Communities Environmental Objectives (Surface Waters) Regulations 2009;
- S.I. No. 9 of 2010: European Communities Environmental Objectives (Groundwater) Regulations 2010; and;
- S.I. No. 296 of 2009: European Communities Environmental Objectives (Freshwater Pearl Mussel) Regulations 2009.

4.4.2.1.3 Designations

The proposed development site is not located within any designated site (*i.e.* SAC, NHA, SPA etc). Cork Harbour SPA is located approximately 20km to the east of the proposed development site.

4.4.2.2 Field Survey

A hydrological walkover survey, including drainage mapping and baseline monitoring, was initially undertaken by HES at the site on 27th January 2017. Monitoring well drilling and groundwater sampling was completed during October/November 2017. The field assessments included the following:

- A detailed site walkover survey, water features survey, geological mapping of exposures of subsoils, including inspection and mapping of all relevant hydrological features, such as existing drainage ditches and streams;
- A topographic survey (dGPS) was undertaken whereby hydrological / hydrogeological features of interest within the site were surveyed;
- A door to door well survey of local dwellings within 300m of the proposed development site was undertaken;

- A preliminary flood risk assessment for the proposed development site and surrounding area was also completed;
- Drilling of groundwater monitoring wells (4 no. in total) up-gradient and down-gradient of the proposed site;
- Groundwater sampling from the on-site monitoring wells and also from 1 no. off-site farm/domestic well;
- Surface water sampling (3 rounds) was undertaken at the main surface water features in the vicinity of the site; and,
- Field hydrochemistry measurements (electrical conductivity, pH and temperature) were for baseline characterisation of groundwater and surface water flows.

4.4.2.3 Impact Assessment Methodology

The Water Section of the EIAR is carried out in accordance with guidance contained in the following:

- Environmental Protection Agency (August 2017): Draft – Guidelines on the Information to be Contained in Environmental Impact Assessment Reports;
- Environmental Protection Agency (September 2015): Draft - Advice Notes on Current Practice (in the preparation on Environmental Impact Statements);
- Environmental Protection Agency (September 2015): Draft – Revised Guidelines on the Information to be Contained in Environmental Impact Statements;
- Environmental Protection Agency (2003): Advice Notes on Current Practice (in the preparation on Environmental Impact Statements);
- Environmental Protection Agency (2002): Guidelines on the Information to be Contained in Environmental Impact Statements;
- Institute of Geologists Ireland (2013): Guidelines for Preparation of Soils, Geology & Hydrogeology Chapters in Environmental Impact Statements;
- National Roads Authority (2008): Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes;
- Environmental Protection Agency (2017): Draft Waste Acceptance Criteria and Development of Soil Trigger Values for EPA - Licensed Soil Recovery Facilities.
- Environmental Protection Agency (2011): BAT Guidance Note on Best Available Techniques for the Waste Sector: Landfill Activities; and,
- Control of Water Pollution from Construction Sites - Guidance for Consultants and Contractors. CIRIA C532. London, 2001.

4.4.3 BASELINE DESCRIPTION OF RECEIVING ENVIRONMENT

4.4.3.1 Site Location

The proposed site is located at ITM E552400, N569850. It is situated ~2km west of Ovens in Co. Cork. The surrounding landscape consists of gently undulating to hummocky valley floor, in which the Bride River meanders, within the regional River Lee Catchment.

The proposed soil recovery facility including site infrastructure will comprise a c. 7.9 ha section of the existing quarry workings at Garhyhesta, as shown by the Application Area Map Figure 1.2. The total landholding extends to c. 77.2 ha and is shown highlighted in blue. Thus, the proposed application site area (for infilling) will be confined to a relatively small section of the sand and gravel pit, much of which has already been worked out.

The proposed site for backfilling using imported inert soil and stone is located on the north-western corner of the landholding. The pit proposed for infilling is approximately 380m in length and 100m in width with a depth of up to ~31m below the local natural ground level. The pit is isolated from a second larger pit which exists on the east of the landholding. Extraction below the groundwater table has been undertaken at the larger pit on the east of the site. The floor of the larger pit is permanently under water.

Land use in the surrounding area is largely agricultural with scattered rural pattern of residential dwellings along the N22 which runs immediately to the north of the site and along other local roads to the south and east of the site.

4.4.3.2 Topography

The topography in the area of the site is gently undulating with an elevation range of between approximately 45 – 65m OD (Ordnance Datum).

Current pit floor levels at the application site vary between approximately 23m and 26m OD. Natural ground levels in the fields immediately to the west and south of the site are at approximately 54 and 52m OD respectively. The ground to the north of the site rises steadily to an elevation of over 120m OD. A site survey plan is shown as Figure 1.3 of this EIAR.

4.4.3.3 Existing Activities on the Proposed Site

As described above, the site is part of an existing sand and gravel pit which has been previously worked out to a large degree. Extraction below the water table has been undertaken at the larger pit on the east of the site. Processing of the aggregate also takes place on-site.

4.4.3.4 Meteorology & Water Balance

Long term rainfall and evaporation data was sourced from Met Éireann. The 30 year annual average rainfall (AAR) recorded at Inishcarra (Gen. stn), 2.5km northeast of the site, are presented in Table 4.4.1 below.

Table 4.4-1 Local Average Long-Term Rainfall Data (MM)

Station		X-Coord		Y-Coord		Ht (MAOD)		Opened		Closed		
Inishcarra		154,500		72,700		24		1954		N/A		
Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sept	Oct	Nov	Dec	
127	95.3	89.1	71.1	73.9	71.1	67.2	81.6	83.3	129.1	114	120.5	
Total												1,123

The closest synoptic station where the average potential evapotranspiration (PE) is recorded is at Cork Airport, approximately 15km east of the site. The long term average PE for this station is 540mm/yr. This value is used as a best estimate of the site PE. Actual Evaporation (AE) at the site is estimated as 513mm/yr (which is 0.95 x PE).

The effective rainfall (ER) represents the water available for runoff and groundwater recharge. The ER for the site is calculated as follows:

Effective rainfall (ER) = AAR – AE

= 1,123mm/yr – 513mm/yr

ER = 610mm/yr

4.4.3.5 Recharge

Due to the fact that the proposed site is a sand and gravel pit (underlain by high permeability deposits) it is expected that the majority of the rainfall landing on the site will percolate into the underlying sand and gravel deposits. Assuming a conservative recharge coefficient of 90% annual recharge and runoff rates for the site are estimated to be 549mm/yr and 61mm/yr respectively.

4.4.3.6 Hydrology

The site is located in the catchment of the River Bride which is a sub-catchment of the River Lee within Hydrometric Area 19 (South Western River Basin District). The River Bride flows in an easterly direction approximately 1.5km to the south of the site. The River Bride then flows into the River Lee approximately 3km to the east of the site. A local hydrology map is shown as Figure 4.4.1 below.

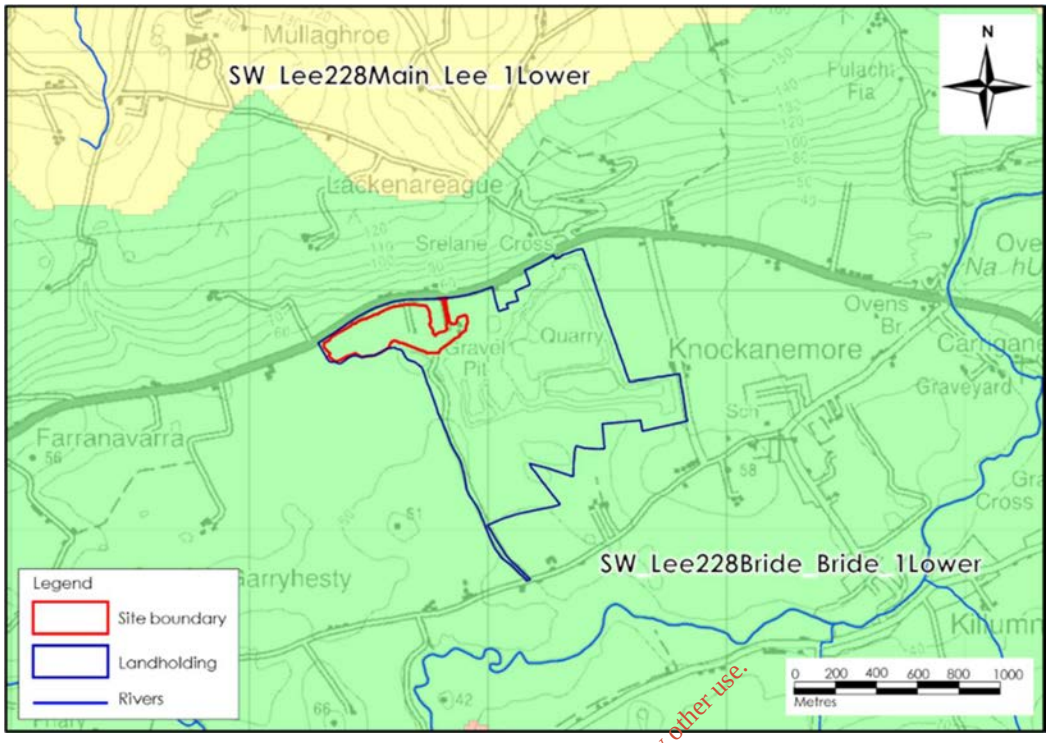


Figure 4.4-1 Local Hydrology Map

Surface water features in the vicinity of the site include a stream and small man-made pond. The stream rises on high ground to the northwest of the site and then flows along the western and southern boundary of the application site (i.e. proposed infill area) prior to flowing into a small man-made pond which exists immediately to the southeast of the application site. A local drainage map is shown as Figure 4.4.2 below.

There is no visible surface water outfall from the pond and therefore all inflows to the pond via the stream appear to percolate down through the base of the pond into the underlying sand and gravels. The stream and pond appear to be perched on a layer of low permeability overburden (silts/clays) which overlies the sand and gravel deposits in this area. There are no pathways for runoff from the application site towards the stream or pond as there is an embankment present along the southern and western boundaries of the application site. The embankment separates the application site from the stream and pond. As stated above the pit itself is up to 31m in depth and any rainfall that falls in the pit just percolates through the floor into the underlying sand and gravels.

The surface water level in the pond was measured at 49m OD (using dGPS) on 27th January 2017 which is approximately 26m above the pit floor of the application site. The discharge in stream was estimated to be approximately 0.004m^3/s.

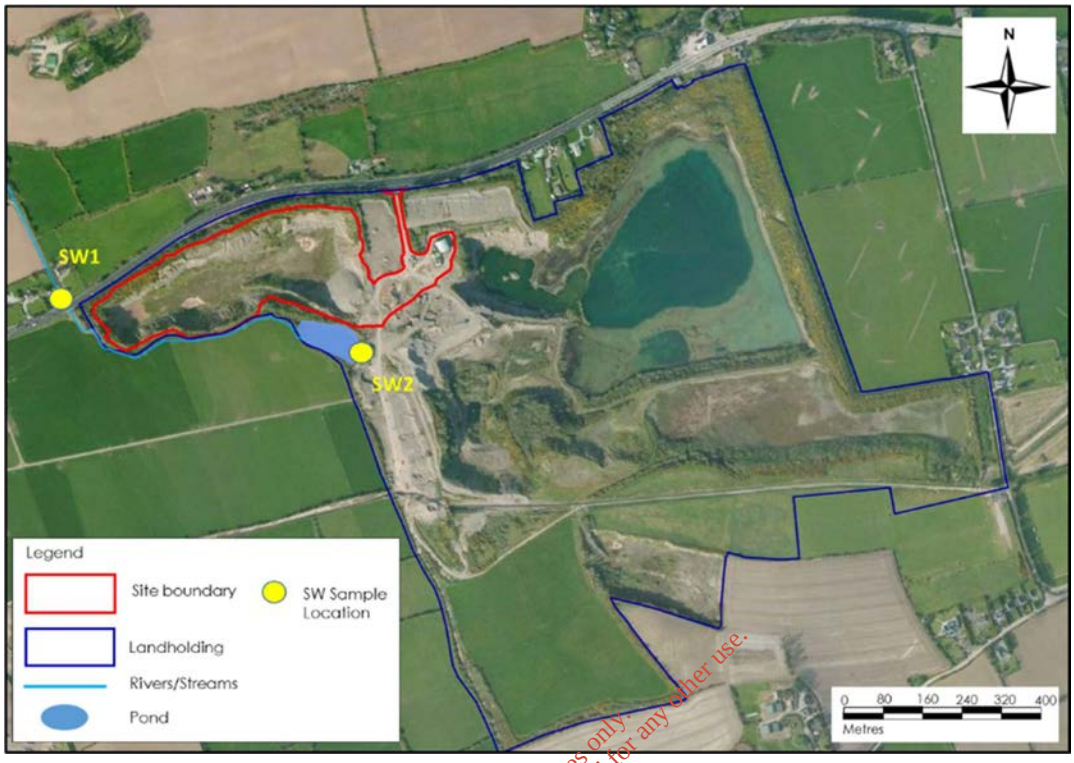


Figure 4.4-2 Local Drainage Map

4.4.3.7 Flood Risk Assessment

To identify those areas as being at risk of flooding, OPW's indicative river and coastal flood map (www.floodmaps.ie), CFRAM Preliminary Flood Risk Assessment (PFRA) maps (www.cfram.ie), and historical mapping (i.e. 6" and 25" base maps) were consulted.

No recurring flood incidents in the area of the proposed site were identified from OPW's indicative river and coastal flood map which is shown as on Figure 4.4.3 below.

Recurring flood incidents are mapped along the River Bride to the southeast (~1.8km) and east of the proposed site (~2km). As discussed above there is no surface water connection between the proposed site and the River Bride and therefore the proposed development can have no influence on downstream flooding in the Bride River.

Where complete the CFRAMS OPW Flood Risk Assessment Maps are now the primary reference for flood risk planning in Ireland and supersede the PFRAM maps. CFRAM mapping has been completed for the area of the proposed site (Refer to Figure 4.4.4). The CFRAM mapping shows that the proposed development site is not located within any fluvial flood zone. There is no risk of pluvial flooding (*i.e.* rainfall ponding) at the site as all rainfall landing in the pit percolates through the pit floor into the underlying sands and gravels.

There is no text on local available historical 6" or 25" mapping for the proposed site that identify areas that are "prone to flooding" within the site boundary, or downstream of the site.

A detailed walkover survey of the site and the surrounding area was initially undertaken by HES on 27th January 2017. The purpose of the site survey was to determine the topographic layout of the site, to investigate the hydrological regime of the area and also to assess flood risk (if any).

The stream which flows along the western and southern boundaries of the proposed site is small and no significant flood flows are anticipated. There is also an embankment in place that separates the proposed infilling site from the stream and pond. The flood risk posed to the proposed development site in respect of stream flooding is low. Also, there is no runoff or surface water outfall from the proposed infilling area to this local stream and therefore the proposed development will not have any influence on flows or flood risk in the local stream.

Any local pluvial ponding resulting from heavy rainfall infiltrates into the underlying sand and gravel deposits.

Figure 4.4-3 OPW's Indicative River and Coastal Flood Map

Figure 4.4-4 CFRAM Flood Risk Assessment Map

4.4.3.8 Hydrogeological Setting

4.4.3.8.1 Geological Setting

A brief review of the local geology is provided in this section in order to put the description of the local hydrogeological regime into perspective. Please refer to Section 4.3 (Land, Soils and Geology Section) for a detailed review of the site geology and the site extraction history.

Monitoring well drilling at the site was completed by Southern Pumps Drilling between 11th and 25th October 2017 when 4 no. monitoring wells were installed in the area of the proposed infill site (MW1 – MW4). A description of the geology encountered during the drilling is also provided below. Drilling logs for the monitoring wells are included in Appendix 5.5.1. The locations of the on-site monitoring wells are shown on Figure 4.4.5.

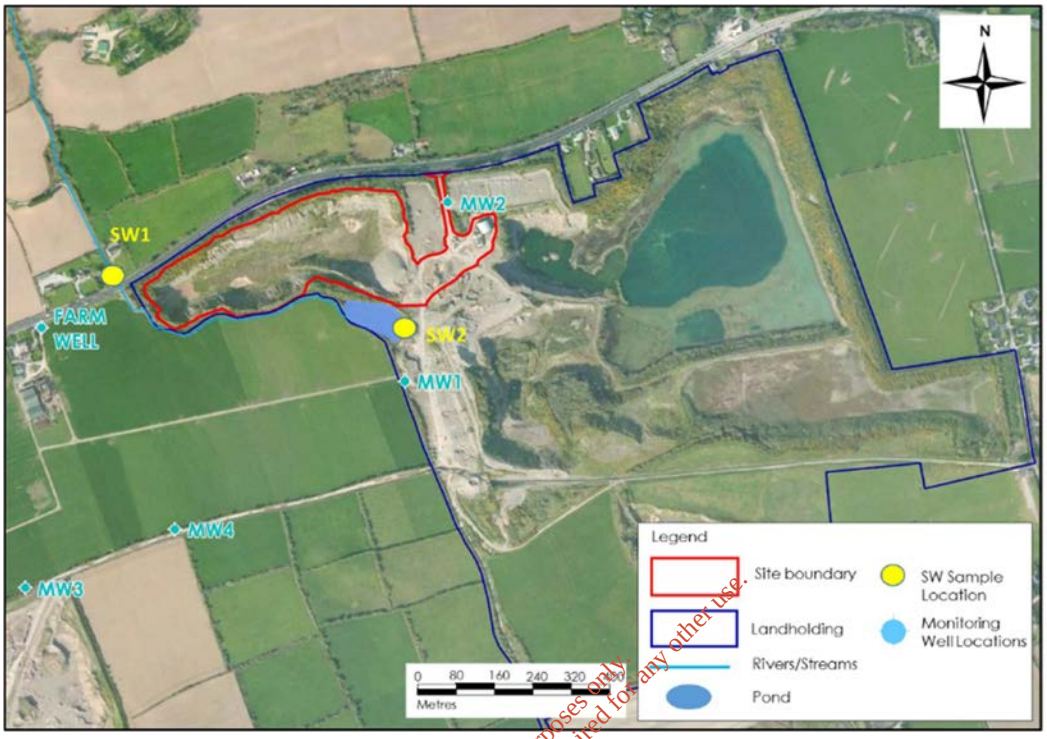


Figure 4.4-5 Monitoring Well Locations

4.4.3.8.1.1 Bedrock Geology

Based on the GSI bedrock map of the area the application site is underlain by two separate bedrock formations. The southern half of the site is mapped to be underlain by Dinantian mudstones and sandstones while the northern half is mapped to be underlain by Devonian Old Red Sandstones (ORS). The remaining area of the overall landholding to the south of the site is mapped to be underlain by Dinantian pure unbedded limestones. During drilling of the on-site monitoring wells, bedrock (presumed) was only encountered in MW3, when rock was met at 35mbgl. There was no bedrock returns and therefore the bedrock type was unconfirmed.

A local bedrock geology map is shown below as Figure 4.4.6 below.

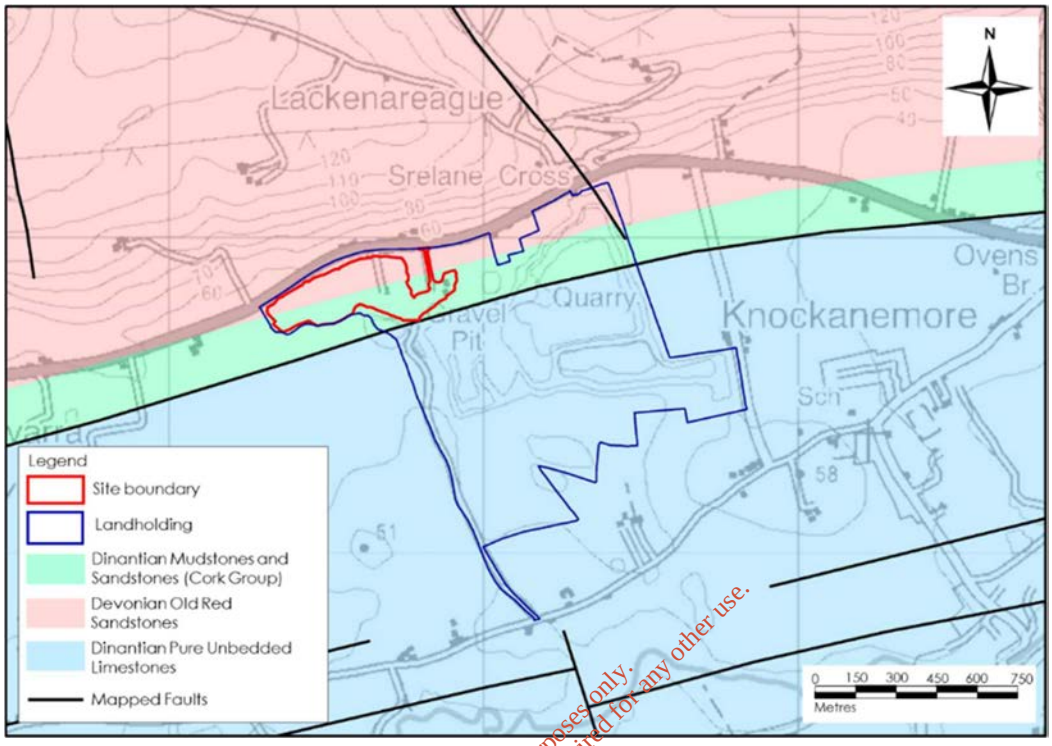


Figure 4.4-6 Local Bedrock Geology Map

4.4.3.8.1.2 Soils & Subsoils

The published soils map (www.epa.ie) for the area shows that shallow well drained soils (AminSW) are mapped in the area of the site. The majority of soils within the site and the overall landholding have been removed to facilitate sand and gravel extraction.

The GSI subsoils map (www.gsi.ie) for the area shows that sands and gravels (Devonian) are mapped at the site and over much of the surrounding area. A local subsoils map is shown below as Figure 4.4.7.

Typically, past workings in the area have been shown to comprise up to 1.8m of till 'overburden' overlying good quality sand and gravel above the groundwater table.

Up to 30m depth of clean sand and gravels are exposed in the pit faces. The profile is dominated by alternating units of cross-bedded sands and rounded to sub-rounded, pebble to cobble sized gravels. Sand beds are up to 0.35m thick, and some silt beds of up to 80mm thick are also present.

Four (4 no.) monitoring wells were drilled at the site between depths of approximately 36 and 40mbgl. The sand and gravel encountered during the drilling could typically be described as brown, dense, silty, sandy GRAVEL. The gravel was fine to medium in size while the sand was mainly course. The sand and gravel was typically found to be

a mixture of mainly sandstone and siltstone. Bedrock (presumed) was only encountered at 1 no. monitoring well location (MW3), where rock was met at 35mbgl.

A layer of till like material comprising dark brown, slightly gravelly, sandy SILT/CLAY was found to overlie the sands and gravels in the area of the proposed infill pit (i.e. MW1 and MW2 locations only). The depth of the till like material was approximately 16m at both locations. This till like material was absent at monitoring well locations MW3 and MW4 which are located further to the southwest/south of the proposed infill pit.

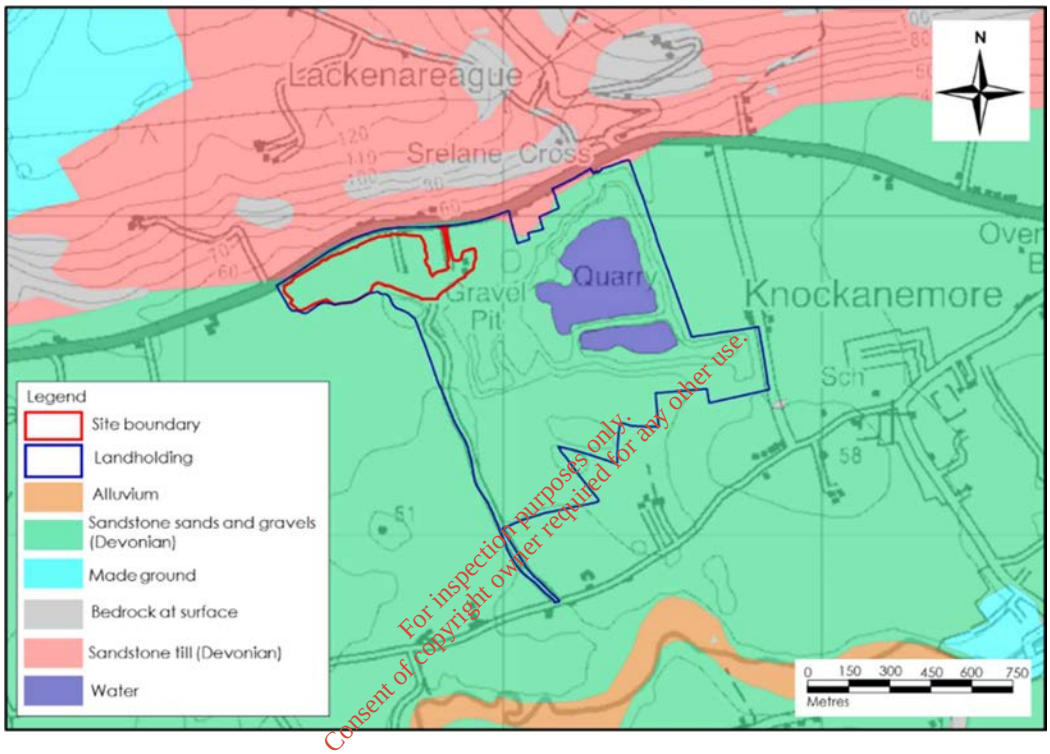


Figure 4.4-7 Local Subsoils Map

4.4.3.8.2 Aquifer Classification

The Groundwater Body (GWB) in which the site is located is called the Ballincollig GWB. In the vicinity of the site the GWB comprises the following bedrock aquifer types:

- The Geological Survey of Ireland (GSI) has classified the pure unbedded limestones which are mapped to the south of the site, as a Regionally Important Karstified Aquifer (RKd). Faults and joints were enlarged by karstification as groundwater moved through the limestones (GSI, 2004)
- The mudstones and sandstones and Devonian Old Red Sandstones, which are mapped to underlie the application site itself, are mapped as a Locally Important Aquifer - LI (bedrock which is moderately productive only in local zones)

The sand and gravel deposits which overlie the bedrock in this area are classified by the GSI as a Locally Important Gravel Aquifer (Lg). The total area of the gravel aquifer

is a mapped at approximately ~10.3km^2. The gravel aquifer extends approximately 11km to the west of Ballincollig and has a width of up to 2km. The GSI sand and gravel aquifer map for the area is shown as Figure 4.4.8 below.

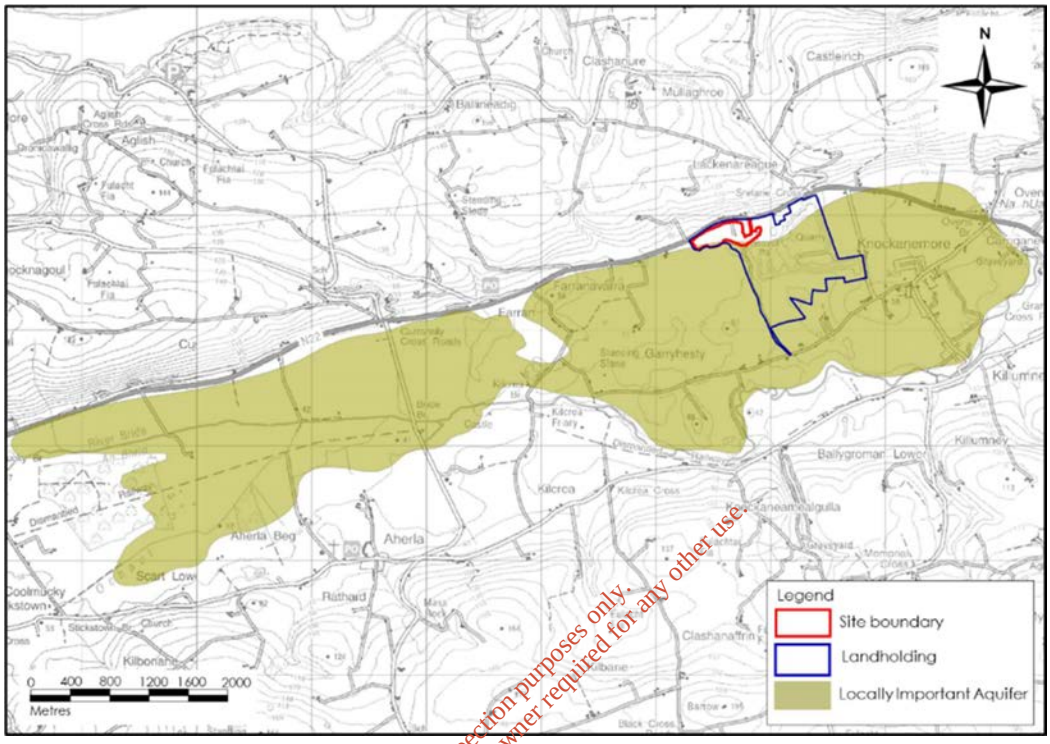


Figure 4.4-8 GSI Sand and Gravel Aquifer Map

4.4.3.8.3 Groundwater Levels & Flow Direction

On the day of the initial site survey (27/01/2017) there were several small ponded water areas noted on the pit floor of the proposed application site and these were measured at approximately 22.8m OD (using dGPS) which is just below the floor level of the deepest area of the pit. This is expected to be the groundwater level in the local sand and gravel aquifer below the pit.

However, there are water level erosion marks visible on the pit sides that indicate that the groundwater level can be as high as 26.3m OD. This is approximately 3.5m above the deepest floor level of the pit. The quarry operator stated that the groundwater level can temporarily rise above the level of the pit floor during very wet periods over winter. The water level marks currently visible on the pits sides reflect the maximum groundwater level that was present during the heavy rainfall events that occurred during late December 2015 and early January 2016. The groundwater level of 26.3m OD is therefore likely to be representative of an extreme storm event while the groundwater level of 22.8m OD measured in January 2017 is likely to be more representative of a typical winter groundwater level.

The groundwater level in the larger pit on the east / southeast of the landholding was measured at 21.7m OD on 27^h January 2017. This is slightly lower than groundwater

level in the area of the application site (22.8m OD) and this would suggest that the local groundwater gradient is in an easterly direction towards the River Bride/River Lee. Further interpretation of groundwater levels and flow direction in the area of the site was possible by the installed groundwater monitoring wells which is described below.

Groundwater level monitoring data for the on-site monitoring wells measured on 27th October 2017 are shown in Table 4.4.2 below. Groundwater levels at the site on that day varied between 21.286 and 24.004mOD. Based on the groundwater level elevations (mOD), the groundwater flow direction is down the valley in an easterly / north-easterly direction towards the River Lee as shown in Figure 4.4.9 below.

Table 4.4-2 Monitoring Well Groundwater Levels and Elevations

Location	Depth of Well (mbgl)	WL (mbgl)	WL (m OD)
MW1	40.25	28.372	22.709
MW2	38.4	31.161	21.286
MW3	38.6	27.622	24.004
MW4	36.0	28.505	23.587

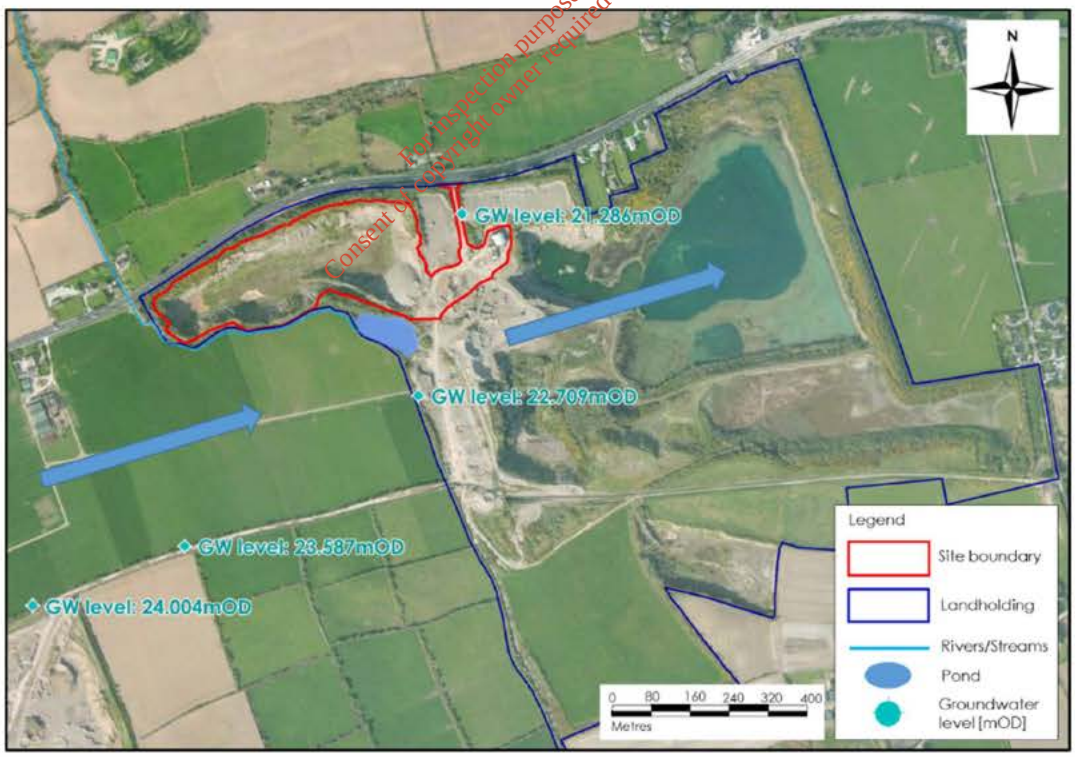


Figure 4.4-9 Groundwater Levels and Flow Direction

(See Figure 4.4.5 for Well Location Numbering)

4.4.3.8.4 Groundwater Vulnerability

Based on the GSI mapping, the site has a High groundwater vulnerability rating.

The vulnerability rating for the site has not changed with the previous extraction (of sand and gravel) that has been completed, as there is still expected to be >3m of high permeability subsoil over bedrock based on extraction records from the larger pit on the east of the landholding which was operated up to 7m below the groundwater table. See Table 4.4.3 below.

The presence of exposed groundwater/or ponding on the floor of the quarry should not be a major concern if appropriate backfilling is completed. While there is an exposure of the high winter groundwater table in the gravels above bedrock, this water has to travel down through the subsoil to enter the underlying bedrock aquifer, and the intermediate sand and gravel is a very efficient filter.

Backfilling the site with inert material could be viewed as a good approach to lowering the vulnerability rating, i.e. provide better aquifer protection in the long term, and proper landscaping and closure of the site will prevent dereliction and possible fly tipping.

Table 4.4-3 GSI Groundwater Vulnerability (GSI, 1999)

Vulnerability Rating	Hydrogeological Conditions				
	Subsoil Permeability (Type) and Thickness			Unsaturated Zone	Karst Features
	High permeability (sand/gravel)	Moderate permeability (e.g. Sandy subsoil)	Low permeability (e.g. Clayey subsoil, clay, peat)	(Sand/gravel aquifers only)	(<30 m radius)
Extreme (E)	0 - 3.0m	0 - 3.0m	0 - 3.0m	0 - 3.0m	-
High (H)	>3.0m	3.0 - 10.0m	3.0 - 5.0m	>3.0m	N/A
Moderate (M)	N/A	>10.0m	5.0 - 10.0m	N/A	N/A
Low (L)	N/A	N/A	>10.0m	N/A	N/A

Notes: (1) N/A = not applicable.
(2) Precise permeability values cannot be given at present.
(3) Release point of contaminants is assumed to be 1-2 m below ground surface.

4.4.3.8.5 Water Framework Directive

Local Groundwater Body and Surface water Body status and risk result are available from (www.catchments.ie).

The proposed development site is located in the Bride River Waterbody (Bride_050) within the WFD South Western River Basin District. The river water quality status (2010 – 2015) for the Bride River at the location of the proposed development is High. The waterbody is reported to have a risk result of “Not at Risk”.

In terms of groundwater bodies (GWB), the proposed site is located within the Ballincollig GWB and this groundwater body has been assigned a Good Status. This groundwater body is reported to be “Not at Risk”.

4.4.3.8.6 Local Groundwater Water Supplies

Based on the GSI mapping there are no groundwater protection zones for existing public water or group water schemes mapped within 7km of the proposed development site. The closest public supply to the site is the Coachford PWS (Public Water Supply) which exists approximately 7.5km to the northwest of the site. The site is not located within the Zone of Contribution (ZOC) of this source.

According to the GSI well database there is only 1 no. registered well within 500m of the proposed site and this well is located to the northeast of the site. GSI mapped wells with an accuracy of <50m are shown on Figure 4.4.10 below. This well is located on the valley side and therefore its groundwater catchment is likely to be elevated ground to the north of the well. There is likely to be no groundwater flow from the proposed side towards this source.

As the GSI well database is not exhaustive in terms of the locations of all wells in the area (as the database relies on the submission of data by drillers and the public, etc) a door to door well survey of dwellings in close proximity (300m of site boundary) was carried out on 27th January 2017. A 300m set back distance was considered a large enough distance for the private well survey, because due to the sand and gravel's ability to effectively filter groundwater as it flows through the deposits, no impacts on groundwater quality (i.e. namely turbidity) would be expected at distances more than 50 – 100m from the proposed infilling site. Only 1 no. private well was identified during the well survey and this is a farm which is located approximately 280m to the west of the site (refer to Figure 4.4.5 above for the well location). This farm well is located up-gradient of the site. Sampling of this well was completed as part of the baseline groundwater quality monitoring which is described further below.

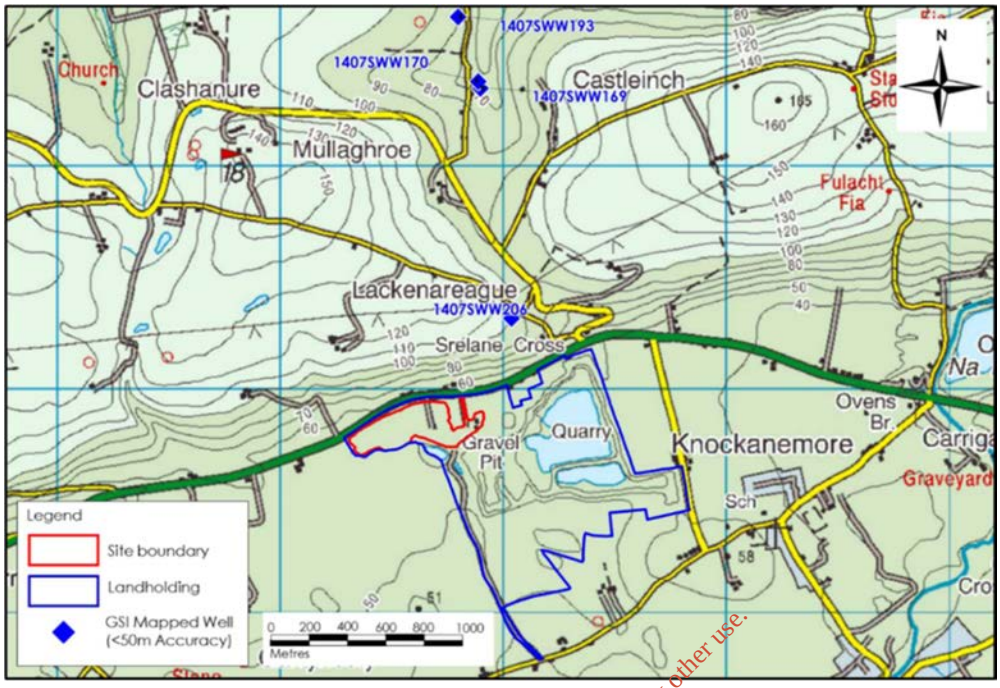


Figure 4.4-10 GSI Mapped Groundwater Well

4.4.3.8.7 Water Supply Schemes

Based on the GSI mapping, the Farran group water scheme is located approximately 4.1km west-northwest of Garryhesta Quarry. The site is not located within the ZOC of this source.

4.4.3.9 Water Quality

4.4.3.9.1 Surface Water Quality

Surface water quality monitoring results for the local stream (SW1) and the pond (SW2) are presented below. The locations of the sampling points are shown on Figure 4.4.2 above. SW1 is located upstream of the proposed site and SW2 is located downstream of the site.

Results of the laboratory analysis for surface water sampling carried out in February 2017 (Round 1) and March 2017 (Round 2) are shown alongside relevant water quality regulations in Table 4.4.4 and Table 4.4.5 below. In addition, Environmental Objectives Surface Water Regulations (S.I. 272 of 2009) are shown in Table 4.4.6. Original laboratory reports are attached as Appendix 5.5.2.

A third round of surface water sampling was completed at the same time as the groundwater monitoring well sampling (discussed further below) and the results for the Round 3 surface water sampling are shown in Table 1 which is attached as Appendix 5.5.3. Original laboratory reports are attached as Appendix 5.5.2.

Table 4.4-4 Local Stream Surface Water Quality Results (SW1)

Location	Units	Date			2006 /44/ EC	
		Jan 2017	Feb 2017	Mar 2017	Salmonid	Cyprinid
pH	pH Units	7.9	7.9	8	-	-
BOD	mg/L	<1.0	1.3	<1.0	≤3	≤6
Total Ammonia	mg/L	0.03	0.05	<0.02	≤0.04	≤0.02
Suspended Solids	mg/L	<2	6	<2	≤25	≤25
Total Nitrogen	mg/L	6.5	5.8	6	-	-
Total Phosphorus	mg/L	<0.04	0.04	<0.04	-	-
DRO	µg/L	<10	<10	<10	-	-

Table 4.4-5 Pond Surface Water Quality Results (SW2)

Location	Units	Date			2006 /44/ EC	
		Jan 2017	Feb 2017	Mar 2017	Salmonid	Cyprinid
pH	pH Units	8.1	7.8	8.1	-	-
BOD	mg/L	<1.0	1.3	<1.0	≤3	≤6
Total Ammonia	mg/L	0.06	0.05	<0.02	≤0.04	≤0.02
Suspended Solids	mg/L	<2	16	9	≤25	≤25
Total Nitrogen	mg/L	5.3	5.4	4.8	-	-
Total Phosphorus	mg/L	0.04	0.10	0.05	-	-
DRO	µg/L	<10	<10	<10	-	-

Round 1 and Round 2 Surface Water Sampling

Total suspended solids were between <2 and 6mg/L in the stream samples, which is below the Freshwater Fish Directive (2006/44/EC) for both Salmonid and Cyprinid waters. The suspended solid range in the pond samples were slightly higher (<2 – 16mg/L) but were still below the directive values.

Ammonia N in the January and February stream samples exceeded the Freshwater Fish Directive (2006/44/EC) for Cyprinid waters. The stream sample in February exceeded the Freshwater Fish Directive (2006/44/EC) for both Salmonid and Cyprinid waters. There was no exceedance of the ammonia in the March stream sample. Ammonia N in the January and February pond samples exceeded the Freshwater Fish Directive (2006/44/EC) for both salmonid and Cyprinid waters and there was no exceedance in the March pond sample. The source of ammonia is likely to be agricultural related.

BOD was between <1.0 and 1.3mg/L in both the stream and pond samples, which is below the Freshwater Fish Directive (2006/44/EC) for both Salmonid and Cyprinid waters.

Total nitrogen was between 4.8 and 6.5mg/L in all samples (stream and pond) with the overall range been slight higher in the stream samples.

Total phosphorus was below or at the laboratory detection limit (0.04mg/L) in the stream samples and they were slightly more elevated in the pond samples (range 0.04

– 0.1mg/L). The pond is bounded by agricultural land to the south and the variation in phosphorus is likely to be agricultural related.

There was no detection of diesel range organics (DROs) in any of the pond or stream samples.

Table 4.4-6 Surface Water Regulation Threshold Values

Parameter	Threshold Values (mg/L)
BOD	High status ≤ 1.3 (mean)
	Good status ≤ 1.5 mean
Ammonia-N	High status ≤ 0.04 (mean)
	Good status ≤0.065 (mean)
Ortho-phosphate	High status ≤0.025 (mean)
	Good status ≤0.035 (mean)

In comparison to the Environmental Objectives Surface Water Regulations (S.I. 272 of 2009) values as shown in Table 4.4.6 above, all results for ammonia N were below the "Good Status" threshold with 50% of the samples (3 no.) also been below the "High Status". All results for BOD were within the "High Status" range.

Round 3 Surface Water Sampling

Total suspended solids were <5mg/L in both samples, which is below the Freshwater Fish Directive (2006/44/EC) for both Salmonid and Cyprinid waters.

BOD was reported to be between 1.1 (SW1) and 1.5mg/L (SW2) which is below the High Status and Good Status surface water regulations threshold value respectively.

Ortho-phosphate was reported to be between 0.008 (SW1) and <0.005mg/L (SW2) which is below the High-Status surface water regulations threshold value.

4.4.3.9.2 Groundwater Quality

Groundwater quality monitoring was completed at the on-site monitoring wells (MW1 & MW2) and also at the farm well to the west of the site. The groundwater flow direction at the site is to the east / northeast and therefore the farm well is directly up-gradient of the site, while MW2 is directly down-gradient of it. MW1 and MW3 are to the south and are across gradient to the site.

Purging (pumping), field hydrochemistry monitoring and sampling of the on-site monitoring wells and the local farm well was completed on 27th October 2017.

Field hydrochemistry parameters [temperature, Electrical Conductivity (EC), Total Dissolved Solids (TDS), Dissolved Oxygen (DO), and pH were recorded prior to sampling. Data from this monitoring is presented in Table 4.4.7 below.

The groundwater hydrochemistry is typical of a sand and gravel aquifer comprising Devonian sand and gravels (the sands and gravels are mapped to be underlain limestone and this bedrock is also likely to influence hydrochemistry in the sand and gravel aquifer).

However, the EC, TDS and pH are notably lower in MW2 and the Farm Well and this is likely due to their location at the base of the valley side which rises steadily just north of the site. Surface water runoff from the slopes of the valley side is likely to drain into the sand and gravels at the base of the valley and mix with the groundwater flowing down the valley towards the River Lee (surface water will have a lower TDS and pH than groundwater). The hydrochemistry in MW1, MW3 and MW4 is likely to be more representative of the sand and gravel aquifer itself as they are further south within the main body of the sand and gravel aquifer and less likely to be influenced by surface water runoff from the valley sides.

Table 4.4-7 Groundwater Field Hydrochemistry

Location	Temp (ºC)	EC (µs/cm)	TDS (mg/L)	DO (%)	pH
MW1	12.25	671	576	53	7.3
MW2	13.2	494	414	79	6.7
MW3	12.3	724	622	13	7.3
MW4	12.8	689	572	96	7.2
Farm Well	12.6	490	416	93	6.8

Groundwater samples[1] from MW1, MW2 and the Farm Well were delivered to ELS Laboratories in Cork on the same day as sampling. The results are shown in Table 2 which is included as Appendix 5.5.3 where the results are compared with relevant groundwater regulation and drinking water values. Original laboratory reports are attached as Appendix 5.5.2.

All metals (dissolved) were below the relevant groundwater threshold values with the exception of manganese in MW2 and this likely due to a variation in local geology or groundwater flow from the bedrock on the valley side to the north of the well location. Manganese is a naturally occurring groundwater mineral and dissolves readily in groundwater where DO levels are low.

Nitrate is relatively elevated in MW2 and the Farm Well and this is likely due agricultural practices such as fertiliser / slurry spreading on the lands surrounding the site. Ammonia is also slightly elevated in MW2 compared to the other wells and the only obvious local source is possibly private septic tanks / wastewater treatment units at houses to the north of the site (upslope).

[1] Sampling of MW3 was not possible due to the high volumes of fine sediment in the sample.

All water samples recorded a BOD of less than 1mg/L which indicates an acceptable level of water quality.

4.4.3.10 Conceptual Model of the Aquifer

The proposed infill site is underlain by a Locally Important Sand and Gravel Aquifer. Based on surveys and groundwater level monitoring undertaken at the site to date, the groundwater level in the area of the proposed infill site vary between approximately 21.286m OD (MW2 on 27/10/2017) and 26.3m OD (based on high level water marks on the pit sides). The lowest part of the pit floor is at approximately 23m OD. The groundwater levels recorded in October 2017 are normally representative of seasonally low levels, while the level of 26.3m OD is likely to be a peak winter groundwater levels.

Based on groundwater levels measured on 27th October 2017, the groundwater flow direction in the area of the proposed site follows the alignment of the valley which is to the east / northeast. The regional groundwater flow direction appears to be towards the River Lee.

Groundwater quality / hydrochemistry in the area of the proposed infill pit appear also to be influenced by surface water runoff from the valley sides to the north of the proposed site. This was indicated by a slight variation in the groundwater hydrochemistry in MW2 and the Farm Well.

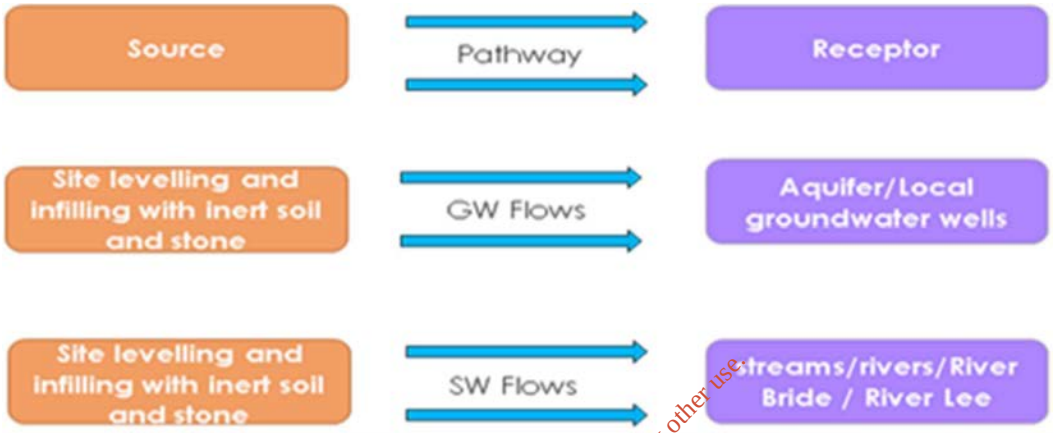
4.4.3.11 Site Water Management

There is no requirement for surface water management at the existing Garyhesta Quarry site as all rainfall percolates into the underlying sand and gravels. Also, there is no discharge of wastewater at the site as the existing welfare facilities are now serviced by a holding tank which is emptied on a routine basis by a certified waste collection contractor to an approved waste facility.

4.4.4 RISK ASSESSMENT

4.4.4.1 Introduction

The conventional source-pathway-receptor model (see graphic below) for groundwater / surface water protection was applied to assess impacts on groundwater and surface water specifically on downstream sensitive ecological receptors and local groundwater supplies.



4.4.4.2 Sources

In the case of the subject site the primary sources of impact is the infilling of the void with inert soil and stone and river dredging spoil whereby the primary potential hazards are suspended solids, leaching and spillages, and accidental discharges of potential pollutants to the local surface waters and groundwater causing a deterioration in water quality. It should be noted that the proposed infill material is to be inert soil and stone and therefore no harmful/toxic contaminants are expected to be present.

4.4.4.3 Pathway

The pathway in terms of groundwater flowpaths is via the underlying permeable sand and gravel deposits, and for surface water this will be via potential surface water runoff (if any) that ultimately enter the River Bride.

4.4.4.4 Receptors

The primary local targets of concern are the underlying sand and gravel aquifer, local wells and local surface water receptors.

4.4.4.5 Source-Pathway-Receptor Model

Where potential impacts are identified, the classification of impacts in the assessment follows the descriptors provided in the Glossary of Impacts contained in the following guidance documents produced by the Environmental Protection Agency (EPA):

- Advice Notes on Current Practice in the Preparation of Environmental Impact Statements (EPA, 2003);
- Guidelines on the Information to be contained in Environmental Impact Statements (EPA, 2002);
- Environmental Protection Agency (September 2015): Draft - Advice Notes on Current Practice (in the preparation on Environmental Impact Statements);
- Environmental Protection Agency (September 2015): Draft – Revised Guidelines on the Information to be Contained in Environmental Impact Statements; and
- Environmental Protection Agency (August 2017): Draft – Guidelines on the Information to be Contained in Environmental Impact Assessment Reports.

The description process clearly and consistently identifies the key aspects of any potential impact source, namely its character, magnitude, duration, likelihood and whether it is of a direct or indirect nature.

The description process clearly and consistently identifies the key aspects of any potential impact source, namely its character, magnitude, duration, likelihood and whether it is of a direct or indirect nature. In order to provide an understanding of the stepwise impact assessment process applied below, we have firstly presented below a summary guide that defines the steps (1 to 7) taken in each element of the impact assessment process in Table 4.4.8 below. The guide also provides definitions and descriptions of the assessment process and shows how the source-pathway-target model and the EPA impact descriptors are combined.

Using this defined approach, this impact assessment process is then applied to all levelling and infilling activities which have the potential to generate a source of significant adverse impact on the geological and hydrological/hydrogeological (including wells, streams and water quality) environments.

Table 4.4-8 Impact Assessment Step-Wise Process

Step 1	**Identification and Description of Potential Impact Source** This section presents and describes the activity that brings about the potential impact or the potential source of pollution. The significance of effects is briefly described.	
Step 2	**Pathway / Mechanism:**	The route by which a potential source of impact can transfer or migrate to an identified receptor. In terms of land infilling developments, surface water and groundwater flows are the primary pathways.
Step 3	**Receptor:**	A receptor is a part of the natural environment which could potentially be impacted upon, *e.g.* human health, plant / animal species, aquatic habitats, soils/geology, water resources, water sources. The potential impact can only arise as a result of a source and pathway being present.
Step 4	**Pre-mitigation Impact:**	Impact descriptors which describe the magnitude, likelihood, duration and direct or indirect nature of the potential impact before mitigation is put in place.
Step 5	**Proposed Mitigation Measures:**	Control measures that will be put in place to prevent or reduce all identified significant adverse impacts. These measures are generally provided in two types: (1) mitigation by avoidance, and (2) mitigation by best practice engineering design.
Step 6	**Post Mitigation Residual Impact:**	Impact descriptors which describe the magnitude, likelihood, duration and direct or indirect nature of the potential impacts after mitigation is put in place.
Step 7	**Significance of Effects:**	Describes the likely significant post mitigation effects of the identified potential impact source on the receiving environment.

4.4.5 ASSESSMENT OF IMPACTS

The following Impact Assessment matrix provides an indication of the significance of potential water environment effects arising during the life cycle of the development not accounting for any mitigation measures.

Table 4.4-9 Water - - Impact Matrix

'Do Nothing' Impacts	X		
Factors	**Construction**	**Operation**	**Decommissioning**
Direct Impacts	●	●	●
Indirect Impacts	X	X	X
Cumulative Impacts	X	X	X
Residual Impacts	X	X	X
'Worst Case' Impacts	●	●	●

None/imperceptible: X; Slight: ●; Moderate: ●; Significant/Very significant: ●.

4.4.5.1 'Do Nothing' Impacts

Current extractive practices will continue in accordance with the planning and environmental approvals previously granted for the Garryhesta quarry site. The possible benefits to groundwater vulnerability from the deposition of inert infill material would not be realised under a 'do nothing' scenario.

4.4.5.2 Direct Impacts

4.4.5.2.1 Groundwater

4.4.5.2.1.1 Impacts on groundwater vulnerability rating due to change of subsoil thickness

The proposed development consists of restoration of part (c. 6.7 ha) of existing quarry (QR19 06/11798 & PL04.225332) by importation of up to 300,000 tonnes per annum of inert soil and stones and river dredging spoil (EWC 17-05-04 and 17-05-06). The total application area including the site infrastructure covers 7.9 ha of lands. The development will be subject to the requirements of a waste management licence.

The total infill is in the order of 2.3 million tonnes over a period of c.8 to 10 years. The groundwater vulnerability rating after the fill will be improved as the additional fill will provide additional aquifer protection at the site.

In relation to additional subsoil thickness the potential impact to groundwater vulnerability is considered to be **Direct, positive, slight, permanent, high probability impact** before appropriate mitigation measures are considered.

4.4.5.2.2 Waste Water

The proposed infilling works does not include any waste water related activities and as such there are no environmental impacts, or related mitigation measures, related to waste water as part of this EIAR.

4.4.5.3 Indirect Impacts

4.4.5.3.1 Surface Water

4.4.5.3.1.1 Impacts on surface water quality due to site runoff

During infilling there will no pathway for surface water to leave the site other than by recharging into groundwater. The infilling works will require significant ground works and site levelling, and despite the lack of pathway certain measures can be implemented to ensure no indirect issue with groundwater quality. Indirect surface water quality impacts via groundwater pathways are anticipated to be **indirect, negative, imperceptible, temporary and low probability.**

4.4.5.3.1.1.1 Impacts on Water Quality of Cork Harbour SPA

The Cork Harbour SPA is located approximately 20km downstream of the proposed development site and therefore only indirect impacts are possible. However, as there are no surface water outlets from the site, the indirect pathway is firstly via groundwater to the River Bride, and then via surface water to the downstream designated site. Due to the distances involved and the nature of the infill proposal no significant impacts are anticipated.

Therefore, the potential impact to the Cork Harbour SPA due to the deposition of inert infill material is considered to be an **indirect, negative, imperceptible, temporary, low probability impact** before appropriate mitigation measures are considered.

4.4.5.3.2 Groundwater

4.4.5.3.2.1 Impacts on groundwater quality due to inert infill material

The proposed development consists of restoration of part (c. 6.7 ha) of existing quarry (QR19 06/11798 & PL04.225332) by importation of up to 300,000 tonnes per annum of inert soil and stones and river dredging spoil (EWC 17-05-04 and 17-05-06). The total infill is in the order of 2.3 million tonnes over a period of c.8 to 10 years.

Infilling of the site with inert soil and river dredging spoil should pose a low risk to groundwater quality regardless of the vulnerability rating as no harmful contaminants will be present. In addition, inert soil and stone and river dredging spoil will not contain either organic matter or liquids that will form a source of organic contaminants of microbial pathogens, nor provide a substrate to feed microbial pathogens.

Therefore, the potential impact to groundwater quality due to the deposition of inert infill material is considered to be **indirect, negative, imperceptible, long term, low probability impact** before appropriate mitigation measures are considered.

4.4.5.3.2.2 Impacts on local groundwater levels

As stated the above the proposed infilling site/pit is dry for the majority of the time, but potentially can become flooded with up to 3.5m of water when the groundwater level rises during very wet periods in winter.

Once the pit is backfilled above the high groundwater level, groundwater will no longer be able to flood the pit and will have to be stored within the sand and gravel aquifer itself. This potentially could cause a minor rise in groundwater levels locally.

Therefore, the potential impact to groundwater levels due to the deposition of inert infill material is considered to be **indirect, negative, imperceptible, temporary, high probability impact** before appropriate mitigation measures are considered.

4.4.5.3.2.3 Impacts on local well supplies

As assessed in Section 4.4.3.8.6 above, there was only 1 no. private well found within 300m of the site boundary during a door to door well search of local dwellings. This farm well is located to the west and up-gradient of the proposed site and therefore cannot be impacted on.

Based the GSI well database there is only 1 no. recorded well within 500m of the proposed site and this well is located to the northeast of the site. This well is located on high ground to the northeast of the site and therefore cannot be impacted on.

Therefore, the potential impact to local well supplies due to the deposition of inert infill material is considered to be an **indirect, negative, imperceptible, long term, low probability impact** before appropriate mitigation measures are considered**.**

4.4.5.3.2.4 Oil and fuel spillages

Accidental spillage during refueling of construction/excavation plant with petroleum hydrocarbons is a significant contamination risk to soils, groundwater, and associated ecosystems, and to terrestrial ecology. The accumulation of small spills of fuels and lubricants during routine plant use can also be a contamination risk. Hydrocarbon has a high toxicity to humans, and all flora and fauna, including fish, and is persistent in the environment. It is also a nutrient supply for adapted micro-organisms, which can rapidly deplete dissolved oxygen in waters, resulting in death of aquatic organisms.

Therefore, the potential impact to groundwater due to accidental spillage of oils and fuels is considered to be an **indirect, imperceptible, short term, low probability impact** before appropriate mitigation measures are considered.

4.4.5.4 Cumulative Impacts

The only other land use activities visible in the area are quarries, existing farming operations and single dwelling houses. There will be no significant in combination hydrological and hydrogeological impacts resulting from this project, and other local existing developments, quarries, projects and plans.

4.4.5.5 'Worst Case' Impacts

Worst case impacts are only likely to be a slightly alteration of the groundwater quality locally. These minor local effects are not expected to compromise groundwater quality with respect to groundwater or drinking water regulations.

4.4.6 MITIGATION & MONITORING MEASURES

4.4.6.1 Mitigation Measures for Construction and Operational Phase

4.4.6.1.1 Groundwater

In terms of impacting on the groundwater vulnerability of the site, the importing of the inert fill will have a positive effect on the site in that the groundwater vulnerability rating will be lower.

In terms of mitigation for groundwater quality protection it is proposed that infilling will only be undertaken when the groundwater level is at or below the base of the pit (i.e. infilling will not be completed during very wet periods when the pit floor becomes submerged in groundwater).

Infilling of the site with inert soil and dredging spoil will pose a low risk to groundwater quality as no harmful contaminants should be present. As stated above, infilling will only be completed when the groundwater level is at or below the base of the pit. Mitigation measures relating to hydrocarbon/chemical spills and leaks are dealt with further below.

Regarding local groundwater levels, when the pit is flooded up to the high-water level, there is approximately 105,000m^3 of water stored in the pit (3ha x 3.5m deep). If this water was displaced into the local sand and gravel aquifer (which has a plan area of 10.3km^2) as a result of the infill there would potentially only be a 0.04m rise in the groundwater level over the entire area of the sand and gravel aquifer assuming an aquifer porosity of 25% (105,000m^3/10,300,000m^2 x 4 = 0.04m). This is a negligible increase in groundwater levels and as such no impacts on the local hydrogeological regime are anticipated as a result of the proposed backfilling. As such no mitigation is required in relation to potential temporary groundwater level rise.

Regarding local well supplies, infilling of the site with inert soil and dredging will pose a low risk as no harmful contaminants should be present. No impacts on groundwater quality (i.e. namely turbidity) would be expected at distances more than 50 – 100m from the proposed infilling site due to the sand and gravel's ability to effectively filter groundwater as it flows through the deposits. Mitigation measures relating hydrocarbon/chemical spills and leaks are dealt with further below.

To minimise any impact on the underlying subsurface strata from oil and fuel spillages, the following mitigation measures are proposed:

- A hard-stand with drainage to oil interceptor will be provided as a designated refueling area.
- All plant and machinery will be serviced before being mobilised to site, and regular leak inspections will be completed during the backfilling works;
- No plant maintenance will be completed on site, any broken-down plant will be removed from site to be fixed; and,
- An emergency spill kit with oil boom, absorbers etc. will be kept on site for use in the event of an accidental spill.

4.4.6.1.2 Surface Water

Management of surface water runoff and mitigation of surface water runoff impacts will be undertaken as follows:

- Infilling will only be undertaken when the groundwater level is at or below the base of the pit (i.e. infilling will not be completed during very wet periods when the pit floor can become submerged with groundwater);
- Prior to pit floor backfilling the existing residual sand and gravel in the floor of the pit will be levelled to ensure there is no potential for ponding or exposed groundwater during the backfilling operations;
- Runoff collected within the pit will be routed in a temporary sump and allowed to recharge into the ground via a percolation area; and,
- The infilled area will be seeded for establishment of grassland at the soonest opportunity to avoid erosion.

These mitigation measures will ensure no significant impacts on local surface waters will occur.

In addition to the above measures, the following pertinent points are relevant to impacts on the surface water quality in Cork Harbour SPA:

- The proposed development site is 23km upstream from Cork Harbour SPA and has no direct surface water connection to the River Bride / River Lee.
- There will be no direct discharges to surface water from the site.
- Local groundwater flow on site is towards the River Bride.
- The proposed Waste Facility Management Licence will address the following:

- Pre-agreed sites for inert material ensuring; no pollutants, unauthorised material, invasive species.
- Will be operated under an Environmental Management System.
- Will implement pollution prevention measures.
- Will prepare an Emergency response procedure.
- Will complete environmental monitoring, including local groundwater and surface water monitoring.
- Will implement a phased restoration of the site, and end with the closure of site.
- Will have a documented waste recording procedure for all material entering the site.
- Will not allow unauthorised dumping of waste.

- The construction of a proposed wheel-wash and weighbridge, will be located near the entrance and not on the pit floor. The facility will utilise the existing administration and welfare facilities at the site entrance being removed from the pit floor area.

Therefore, for the above reasons and these additional on-site controls no impacts on the downstream Cork Harbour SPA are anticipated.

4.4.7 RESIDUAL IMPACTS

No significant residual impacts on the water environment are anticipated.

4.4.8 MONITORING

Groundwater and surface water quality monitoring will be completed on a regular basis in accordance with the Waste Management Licence which is being sought. Groundwater sampling will be completed at the on-site monitoring wells (MW1 – MW4) including the third-party farm well. Surface water sampling will be completed at locations SW1 and SW2 which are location upstream and downstream of the site respectively.

4.4.9 REFERENCES

Environmental Protection Agency (September 2015): Draft – Revised Guidelines on the Information to be Contained in Environmental Impact Statements. Environmental Protection Agency, Johnstown Castle, Wexford, Ireland.

Environmental Protection Agency (August 2017): Draft – Guidelines on the Information to be Contained in Environmental Impact Assessment Reports, Johnstown Castle, Wexford, Ireland.

Environmental Protection Agency (2011): BAT Guidance Note on Best Available Techniques for the Waste Sector: Landfill Activities, Johnstown Castle, Wexford, Ireland.

Environmental Protection Agency (2017): Draft Waste Acceptance Criteria and Development of Soil Trigger Values for EPA - Licensed Soil Recovery Facilities, Johnstown Castle, Wexford, Ireland.

4.5 CLIMATE

Climate was an environmental factor under Directive 2011/92/EU, whilst Directive 2014/52/EU requires the vulnerability of a project to climate change to be addressed, particularly the risk of major accidents and/or disasters that are relevant to the project, including those caused by climate change.

The Intergovernmental Panel on Climate Change (IPCC 2013) define "Climate, in a narrow sense, ….. is the statistical description in terms of the mean and variability of relevant quantities over a period of time ranging from months to thousands or millions of years. The relevant quantities are most often surface variables such as temperature, precipitation and wind. Classically the period for averaging these variables is 30 years, as defined by the World Meteorological Organization". In the context of an EIAR, climate may refer to local climatological conditions (long-term weather patterns, e.g., local wind flow, temperature, rainfall or solar radiation) and particular "microclimate" effects of the project location (e.g., due to localised heat island effects, the effects of buildings / shade or coastal effects).

4.5.1 INTRODUCTION

"Sustainable development is the kind of development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (Brundtland Commission 1987), and is the principle underpinning all current planning legislation. There is no greater challenge to meeting the latter obligation than the issue of human-induced global climate change. Developments can have implications on a national or global scale, where for example, it may represent a significant proportion of the national contribution of greenhouse gases. In the context of most Environmental Impact Statements however, climate is restricted in scope to the local climatological conditions or "microclimate" of an area, such as local wind flow, temperature, rainfall or solar radiation patterns.

For the purposes of Environmental Impact Assessment, a development may be seen to have potential climatic implications if its emissions are likely to alter meteorological conditions with possible weather effects.

This section of the EIAR addresses the issues related to climate for the proposed development of a Soil Recovery Facility (SRF) at Garryhesta Quarry, and its impact on the climate of the application site and its environs as a result of the activities been undertaken.

The prevailing weather systems are described with emphasis on the long-term patterns and trends. It involves an assessment of the prevailing climatic conditions and assesses the potential impact of the development on the latter.

4.5.2 METHODOLOGY

The objective of this study was to:

- Assess the prevailing climatic conditions of the development area on a local and regional level.
- Determine the impact, if any, of the development on the local microclimate and regional macroclimate.
- Determine any interaction between other aspects of the development and the climate of the area.

4.5.2.1 Desk Study

The study of climate in respect of the proposed development was entirely a desktop study, involving the compilation of data and information on weather, climate, climate change, and impact of and vulnerability to climate change.

The principal sources of information include:

1. Met Eireann, Glasnevin, Dublin, Ireland.
2. Environmental Protection Agency (EPA), Johnstown Castle, Wexford, Ireland.
3. Sustainable Energy Authority of Ireland SEAI), Dublin, Ireland.
4. Intergovernmental Panel on Climate Change (IPCC), New York, USA.
5. European Union, Brussels, Belgium.

4.5.3 BASELINE DESCRIPTION OF RECEIVING ENVIRONMENT

4.5.3.1 Climate

The site of the sand and gravel pit at Garryhesta is located within the Townland of Knockanemore, 7km west of Ballincollig, in south central County Cork, and approximately 25km inland from the southern coastline of the island of Ireland. The site is located in a largely rural, pre-urban area of Cork City, in low-lying lands at approximately 45-65m AOD in the Bride River Valley. The valley is a long narrow geomorphic feature running roughly east-northeast to west-southwest in a geological structure known as the Cork Syncline. The walls of the valley are composed of Old Red Sandstone rock, while the valley floor is composed of a deep fill of Quaternary-age, unconsolidated sands and gravels overlying Carboniferous rocks, mostly limestones.

The dominant influence on Ireland's climate is the Atlantic Ocean, such that Ireland does not suffer from the extremes of temperature experienced by many other countries at similar latitude. The warm North Atlantic Drift or Current has a marked influence on sea temperatures, the influence of which is strongest near the Atlantic coasts and decreases with distance inland.

The Atlantic circulation, which includes ocean currents such as the North Atlantic Current, moves heat northwards, which is then carried by the prevailing winds towards Ireland. The prevailing winds are westerly to south-westerly, and break on the hills and mountains of the west coast, which provide shelter from both the strong winds and from the direct oceanic influence. Rainfall is therefore a particularly prominent aspect of the climate in the west, with annual average precipitation highest on the west coast and in inland areas of high relief. Rainfall is much less prominent in the eastern half of the island.

The climate of Ireland is described as a typical “Temperate Maritime Climate”, which is modified by the North Atlantic Current, and is overcast about half the time with consistently high average humidity. Winters tend to be cool, moist and windy, while summers are mostly mild, cloudy and less windy, when the depression track is further north and depressions less deep. For the greater part of the year, warm maritime air associated with the Gulf Stream helps to moderate the climate from the extremes of temperature experienced by many other countries at similar latitude.

A prominent feature of the atmospheric circulation in the North Atlantic, the polar front, plays an important role in the Irish climate (Met Eireann 2017). It's a zone of transition between warm, moist air (often of tropical origin) moving northwards and colder, denser, drier air (typically of polar origin) moving southwards. In winter, the polar front usually extends north eastwards from the east coast of the United States, whereas in summer it is less well-defined. Disturbances on the front sometimes amplify and deepen to form the large-scale depressions of the middle latitudes. These depressions often move north eastwards across the North Atlantic and pass to the northwest of Ireland. Ahead of the depression centres, warm moist air is swept northwards, while behind them colder, drier air is swept southwards. This gives the sequence of cloudy, humid weather with rain, followed by brighter, colder weather with showers so typical of the Irish climate.

Ireland experiences a range of air masses with different sources and tracks, giving us our variable weather. Air masses of polar origin are most common, but they usually have a long track over the Atlantic before reaching Ireland. Even southerly or south-westerly winds can bring us returning polar air, albeit highly modified by its excursion into the warm waters of the mid Atlantic. Air masses of direct tropical or polar origin are uncommon.

The World Meteorological Organization (WMO) recommends that climate averages are computed over a 30-year period of consecutive records. The period of 30 years is considered long enough to smooth out year to year variations. By collecting weather data from around the country every hour and by analysing these records over a long period of time, 30-year average values are calculated. Met Éireann now reference 1981 to 2010 as the baseline period for day-to-day weather and climate comparisons. The closest synoptic station to the Garryhesta site with 30-year averages for the 1981 to 2010 period is at Cork Airport, c. 13.5km to the southeast.

Ireland has a typical temperate maritime climate, with relatively mild, moist winters and cool, cloudy summers. The prevailing winds are westerly to south-westerly. For the greater part of the year, warm maritime air associated with the Gulf Stream helps to

moderate the climate from the extremes of temperature experienced by many other countries at similar latitude. The average humidity is high. Annual average precipitation is highest on the west coast and in inland areas of high relief.

4.5.3.1.1 Rainfall

Rainfall in Ireland normally arises from Atlantic frontal systems, which travel in a north-easterly direction delivering cloud and rain. Highest rainfall occurs in the Western half of the country and on high ground; rainfall generally decreases towards the Northeast (See Figure 4.5.1). Averaged over all Ireland, the average annual rainfall is approximately 1,230mm. The driest seasons are spring and summer, with an all-Ireland average of approximately 260 mm, autumn and winter have all Ireland averages of approximately 350mm. The driest months are April, May, June and July, with an all-Ireland average of approximately 80mm each month. February, March, August and September have average rainfall totals of approximately 100mm, while October, November, December and January have all Ireland averages of approximately 130mm.

On an annual basis, averaged over the country, there has been an increase of approximately 5% in rainfall totals between the two normal periods (1961-1990 and 1981-2010), with the higher increases in the Western half of the country. All seasons show an overall increase in rainfall but there are regional differences. There are decreases of up to 10% in rainfall in the South and East in winter, with corresponding increases in the West and Northwest. Spring and summer show increases of 5-10%. While most months show an increase in rainfall of 5-10%, January and February had decreases of 5-10% in the South and East, while September had a general decrease of up to 10%. In July, the average increase in rainfall was in the order of 15%.

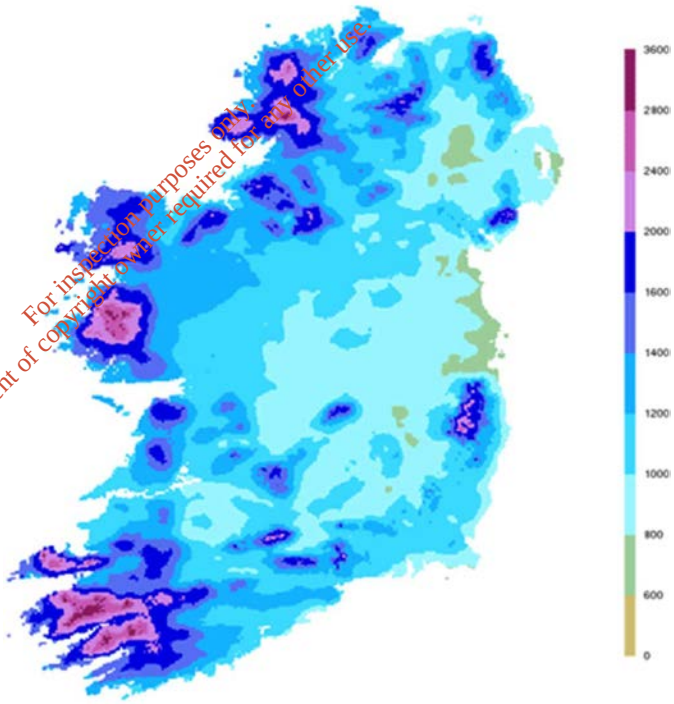


Figure 4.5-1 1981-2010 Mean Annual Rainfall (mm). Redrawn from Met Eireann (2014).

Long term rainfall and evaporation data was sourced from Met Éireann. The 30-year annual average rainfall (AAR) recorded at Inishcarra (Gen. stn), 2.5km northeast of the site is given as 1,123 mm/yr.

The closest synoptic station where the average potential evapotranspiration (PE) is recorded is at Cork Airport, approximately 15km east of the site. The long-term average PE for this station is 540mm/yr. This value is used as a best estimate of the site PE. Actual Evaporation (AE) at the site is estimated as 513mm/yr (which is 0.95 x PE). The effective rainfall (ER) represents the water available for runoff and groundwater recharge. The ER for the site is calculated as 610mm/year.

Further details with respect to the water balance for the site are included in EIAR Section 4.4 Water.

4.5.3.1.2 Temperature

The temperature regime in Ireland is greatly affected by the moderating effect of the sea, and height above sea level. Mean annual temperatures generally range between 9°C and 10°C with the higher values in coastal regions. Summer is the warmest season, followed by autumn, spring and winter. Highest temperatures occur inland during the summer, with mean seasonal maxima between 18°C and 20°C, while highest values during the winter occur in coastal regions. July is the warmest month, followed by August and June; the coldest month is January followed closely by February and then December.

Generally, there has been an increase of approximately +0.5°C in mean temperature between the 1961-1990 and the 1981-2010 periods, with the highest increases in the Southeast. Maximum and minimum temperatures have also increased by approximately +0.5°C. All seasons show a rise in mean temperature with the spring and summer seasons displaying the largest differences between the two periods of approximately +0.7°C. Almost all mean monthly temperatures show an increase, except October and December, which show small decreases of up to -0.2°C in the West and Northwest.

The average daily air temperatures at Cork Airport (1981-2010) range from 6.9ºC to 12.9ºC. These values can be considered comparable to those expected at the application site.

4.5.3.1.3 Wind

The prevailing wind direction over Ireland is between south and west. Average annual wind speeds range from 3m/s in parts of south Leinster to over 8m/s in the extreme north. On average there are less than 2 days with gales each year at some inland places like Carlow, but more than 50 a year at northern coastal locations such as Malin Head.

During the course of a typical day, the range (difference between the highest and lowest) of mean hourly wind speed is considerable. At Belmullet, a western coastal station, the mean diurnal range is 11.5m/s in January and is still as high as 8.4m/s in July. At Clones, a typical inland station the mean diurnal range is 8.4m/s in January

and 6.2m/s in July. The diurnal variation is much more pronounced in summer than in winter.

Wind blows most frequently from the south and west for open sites, while winds from the northeast or north occur least often. In January the southerly and south-easterly winds are more prominent than in July, which has a high frequency of westerly winds. Easterly winds occur most often between February and May and are commonly accompanied by dry weather.

The prevailing winds in this area are from southwest and west as illustrated by the Wind Rose for the synoptic weather station at Cork Airport, approximately 13.5km southeast of the site (See Figure 4.5.2). Notable also is the exceedingly low percent calm value of 0.2%.

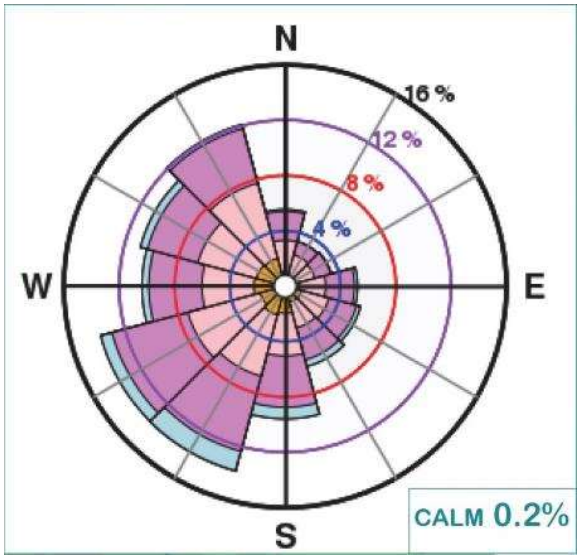


Figure 4.5-2 Cork Airport Wind Rose based on 1981-2010 Averages. Redrawn from Met Eireann (2012).

4.5.3.2 Climate Change

Climate change will continue to cause damage to the environment and compromise economic development. In this regard, it is appropriate to assess the impact of projects on climate (for example greenhouse gas emissions). The Directive also requires the vulnerability of a project to climate change to be addressed, particularly 'the risk of major accidents and/or disasters which are relevant to the project concerned, including those caused by climate change.

The EPA define Climate Change as a significant change in the measures of climate, such as temperature, rainfall, or wind, lasting for an extended period of decades or longer. The IPCC (2013) define Climate Change as "a change in the state of the climate that can be identified (e.g., by using statistical tests) by changes in the mean and/or the variability of its properties, and that persists for an extended period, typically decades or longer".

Natural factors that can give rise to climate change include: (a) changes in the sun's intensity, (b) volcanic eruptions; (c) slow changes in the Earth's orbit around the sun; and (d) variations within the climate system, such as changes in ocean current circulation. However, climate change has been attributed more recently to human activities through our emissions of greenhouse gases that are changing the composition of the earth's atmosphere. The main human activities that contribute to climate change include: (a) carbon dioxide emissions through burning fossil fuels, such as coal, oil and gas and peat; (b) methane and nitrous oxide emissions from agriculture; and (c) emissions through land use changes, such as deforestation,

reforestation, urbanization, and desertification. Since the beginning of the industrial revolution, the increased burning of fossil fuels and deforestation have caused the concentrations of heat-trapping greenhouse gases to increase significantly in the atmosphere, which prevents heat from escaping to space.

The Fifth Assessment Report of the Inter-Governmental Panel on Climate Change (IPCC) published in 2013, states that "Human influence has been detected in warming of the atmosphere and the ocean, in changes in the global water cycle, in reductions in snow and ice, in global mean sea level rise, and in changes in some climate extremes. It is extremely likely that human influence has been the dominant cause of the observed warming since the mid-20th century. Cumulative emissions of CO_2 largely determine global mean surface warming by the late 21st century and beyond. Most aspects of climate change will persist for many centuries even if emissions of CO_2 are stopped. This represents a substantial multi-century climate change commitment created by past, present and future emissions of CO_2".

4.5.3.2.1 Kyoto Protocol 1997

Member countries, including Ireland, ratified the United Nations Framework Convention on Climate Change (UNFCCC) in April 1994. It was soon augmented by an international agreement linked to the existing treaty, known as the Kyoto Protocol, with stricter demands for reducing greenhouse-gas emissions. The protocol was adopted in 1997 and entered into force on 16 February 2005. The Protocol's major feature is that it has mandatory targets on greenhouse-gas emissions for the world's leading economies. These targets range from -8 per cent to +10 per cent of the countries' individual 1990 emissions levels, with a view to reducing their overall emissions of such gases by at least 5 per cent below existing 1990 levels in the commitment period 2008 to 2012. In almost all cases, the limits call for significant reductions in currently projected emissions. A mechanism to set future more stringent mandatory targets for subsequent "commitment periods" after 2012 was established.

As a signatory nation to the Kyoto Protocol, and for the purposes of the EU burden sharing agreement under Article 4 of the protocol, Ireland agreed to limit the net anthropogenic growth of the six Greenhouse gases (GHGs; principally CO_2 emissions) under the protocol to 13% above the 1990 level over the period 2008 to 2012 (ERM, 1998). There have been substantial reductions in Ireland's GHG emissions in recent years, due in significant part to the impact of the economic downturn. Under the Kyoto Protocol, Ireland's total emissions are limited to an average of 62.8 Mt CO_{2eq} per annum for the first commitment period 2008-2012. By 2012, Ireland was 5.68 Mt CO_{2eq} below the Kyoto commitment for the period, and thus broadly on track to meet its commitment under the Kyoto Protocol first commitment period. However, when the impact of the EU Emissions Trading Scheme and forest sinks are taken into account, Ireland exceeded the Kyoto limit by 2.1 Mt CO_{2eq} (EPA 2014a).

Although Ireland is currently on track to meet its Kyoto second commitment period 2013-2030 targets, there remains significant risk that these will not be met, even under the most ambitious emission reduction scenario. Total national GHG emissions are projected to decrease by an average of 0.4% per annum out to 2020, if all national

policies are implemented and delivered. Emissions are projected to increase in 2020-2030 (12% in total), with strong growth in emissions from transport and agriculture, indicating that Ireland is not on a pathway to a low-carbon economy (EPA 2014b). Thus, rather than rely on economic recession, Ireland needs to develop as a low carbon economy in order to meet future targets.

4.5.3.2.2 Paris Agreement 2015

The UNFCCC has continued on-going, detailed negotiations in relation to GHGs reductions and in relation to technical issues such as Emission Trading and burden sharing. The Conference of the Parties (COP21) was convened in Paris in 2015 and was an important milestone in terms of international climate change agreements. The so-called "Paris Agreement" builds upon the convention, and for the first time, brings all nations into a common cause to undertake ambitious efforts to combat climate change and adapt to its effects, with enhanced support to assist developing countries to do so. As such, it charts a new course in the global climate effort.

The Paris Agreement was signed by over 200 nations (166 parties have ratified the agreement at the time of writing). The central aim of the agreement is to strengthen the global response to the threat of climate change by keeping a global temperature rise this century below 2°C above pre-industrial levels, and to pursue efforts to limit the temperature increase even further to 1.5°C. The objective is to limit global GHG emissions to 40 gigatonnes as soon as possible, while acknowledging that peaking of GHG emissions will take longer for developing countries. Significant progress was also made on elevating adaption onto the same level as action to cut and curb emissions. The agreement requires all parties to put forward their best efforts through based on intended nationally determined contributions (INDCs), which will form the foundation for climate action post 2020.

The agreement also aims to strengthen the ability of countries to deal with the impacts of climate change. To reach these ambitious goals, appropriate financial flows, a new technology framework and an enhanced capacity building framework will be put in place, thus supporting action by developing countries and the most vulnerable countries, in line with their own national objectives.

The EU agreed the "2030 Climate and Energy Policy Framework" on the 23/24th of October 2014 (EU, 2014). The European Council endorsed a binding EU target of at least a 40% domestic reduction in greenhouse gas emissions by 2030 compared to 1990. The target will be delivered collectively by the EU in the most cost-effective manner possible, with the reductions in the emissions trading system (ETS) and non-ETS sectors, amounting to 43% and 30% by 2030 compared to 2005, respectively. Secondly, it was agreed that all member states will participate in this effort, balancing considerations of fairness and solidarity. The policy also outlines, under "Renewables and Energy Efficiency", an EU binding target of at least 27% for the share of renewable energy consumed in the EU in 2030.

In August 2017, the Trump Administration notified the UN that the USA was formally withdrawing from the Paris Agreement, although no country was supposed to be able

to give notice of its departure until November 4, 2019. Notwithstanding the former notification, many US states and cities (e.g., California and Philadelphia) have pledged to meet their commitments under the agreement irrespective of the Federal government's position on climate change.

4.5.3.2.3 Impact of Climate Change on Ireland

Much of the discussion on Climate Change revolves around the issue of rising global temperatures. The EPA notes that the temperature records show a mean temperature increase of 0.7℃ between 1890 and 2008, which corresponds to an increase of 0.06℃ per decade. However, the increase during the period 1980-2008 corresponds to 0.14℃ per decade and suggests an accelerating trend in global warming. Other indicators include: (a) six of the ten warmest years in Ireland have occurred since 1990; (b) a reduction in the number of frost days and shortening of frost season length; and (3) an increase in annual rainfall in northern and western areas with a decrease or small increase in the south and east. Further, ocean acidification has emerged as another significant issue, which will have harmful effects on marine organisms and has the potential to disrupt global marine ecosystems.

Climate change impacts are projected to increase during the rest of this century, with significant uncertainties remaining in relation to the scale and extent of these impacts. Projections of global temperatures to 2030, and beyond, based on multiple climate models, indicate widening band of potential trajectories, with predicted temperatures of 0.5–2℃ above 1960–1990 temperatures. The greatest uncertainly lies in how effective global actions will be in reducing greenhouse gas emissions. Predicted adverse impacts include:

- Sea level rise, with minor inundation of low lying coastal areas.
- More intense or extreme storms (incl. storm surges) and rainfall events
- Increased likelihood and magnitude of river and coastal flooding
- Water shortages in summer in the east
- Adverse impacts on water quality
- Changes in distribution of plant and animal species
- Effects on fisheries sensitive to changes in temperature

Paradoxically, some studies have reported that global warming due to climate change could shut-down or retard the North Atlantic Current, and result in colder average temperatures in Ireland. A huge amount of heat is circulated by a single ocean current system - the Atlantic Meridional Overturning Circulation (AMOC), also known as the Atlantic Conveyor Belt. The system is driven by density, with denser waters that are cold or salty sinking to the ocean floor in the North Atlantic and flowing southwards, while warm tropical waters at the surface flow northwards in the North Atlantic Current or Gulf Stream, rendering northern Europe unusually mild for its latitude. This density-driven mechanism could become weakened if the northern waters get too warm or too

fresh from melting ice. IPCC (2013) report that the AMOC will most likely weaken over the 21st century, with a best estimate of 34% loss.

4.5.3.2.4 Vulnerability to Climate Change

Vulnerability to climate change has been defined as "the degree to which a system [natural or human] is susceptible to, or unable to cope with, adverse effects of climate change, including climate variability and extremes. Vulnerability is a function of the character, magnitude, and rate of climate variation to which a system is exposed, its sensitivity, and its adaptive capacity" (IPCC 2013). Thus, exposure is viewed as an external dimension, while sensitivity and adaptive capacity are viewed as internal dimensions of vulnerability.

Exposure to climate variation is primarily a function of geography, in that coastal communities will have higher exposure to sea level rise and cyclones, while communities in semi-arid areas may be most exposed to drought. IPCC (2013) state that "Sensitivity is the degree to which a given community or ecosystem is affected by climatic stresses", while "Adaptive Capacity is the ability of a system to adjust to climate change (including climate variability and extremes) to moderate potential damages, to take advantage of opportunities, or to cope with the consequences". Access to and control over natural, human, social, physical and financial resources is one of the most important factors shaping the adaptive capacity of individuals and communities. Whereas climate impacts can generally be described quantitatively by changes in biophysical indicators or in socio-economic indicators, there is no agreed metric to quantitatively describe the vulnerability of a natural system or sector. Consequently, vulnerability seems to be a relative measure rather than a quantity that can be expressed in absolute terms. Therefore, a vulnerability assessment might consider climate change projections, the socio-economic setting, and estimates of the adaptive capacity of the project.

Resilience is the ability of a system to resist, absorb, and recover from the effects of hazards in a timely and efficient manner, preserving or restoring its essential basic structures, functions and identity. Resilience is a familiar concept in the context of disaster risk reduction (DRR) and is increasingly being discussed in terms of adaptation to climate change. Resilience enables management of hazards to minimize their effects and/or to recover quickly from any negative impacts and needs to be incorporated into the fabric of projects to future-proof them against increasingly extreme weather.

4.5.3.3 Air Quality

Air quality in Ireland is of a high standard across the country and is among the best in Europe, meeting all EU air quality standards in 2010. This is due largely to prevailing clean Atlantic air and a lack of large cities and heavy industry. Over the past decade, levels of particulate matter have decreased in cities and large urban areas, arising principally from improvements in vehicle engine technology.

For Ireland to comply with its international commitments on air quality and air emissions, industrial emissions of pollutants to air must continue to be rigorously

controlled; policies must be implemented to increase the use of alternatives to the private car and improve efficiencies of motorised transport. Government departments, national agencies and local authorities must make air quality an integral part of their traffic management and planning processes. Households and businesses must shift from solid fuel to cleaner and more efficient alternatives including gas.

Cross reference section 4.6.3 for a full discussion of the national and European policy and legislative background to air quality.

4.5.4 ASSESSMENT OF IMPACTS

The following Impact Assessment matrix provides an indication of the significance of potential effects arising during the life cycle of the development not accounting for any mitigation measures.

Table 4.5-1 Climate - Impact Matrix

'Do Nothing' Impacts	●		
Factors	**Construction**	**Operation**	**Decommissioning**
Direct Impacts	X	X	X
Indirect Impacts			
Cumulative Impacts			
Residual Impacts			
'Worst Case' Impacts			

None/imperceptible: X; Slight: ●; Moderate: ●; Significant/Very significant: ●.
Refer to Appendix 5.2 for definition of Significance

4.5.4.1 'Do Nothing' Impacts

If the SRF is not licensed to commence recovery operations, then inert soils and stone waste materials may have to be transported further afield with a consequential impact in terms of increased exhaust emissions for transport of materials to more removed SRF facilities and/or landfill sites. It is considered that the proposed commencement of operation of the SRF will have a slight to imperceptible positive impact with respect to climate due to restoration to agriculture or possibly recreational land.

4.5.4.2 Direct & Indirect Impacts

The proposed SRF, co-located within the old quarry workings, will handle c.300,000 tonnes per annum of inert soil, stone and dredge spoil, and is not of sufficient scale to have any direct or indirect impacts on the regional or local climatic conditions.

4.5.4.3 Cumulative Impacts

The effect of climatic conditions (e.g., rainfall, wind, etc.) on other potential impacts of the development (e.g., dust deposition, drainage, etc.), are dealt with in the relevant sections of this EIAR. The cumulative impact with respect to the operation of the SRF has also been taken into consideration throughout the preparation of the EIAR.

4.5.4.4 Residual Impacts

It is considered that following completion of the backfilling works there will be a slight to imperceptible positive impact with respect to climate due to restoration to agriculture or possibly recreational land.

4.5.4.5 'Worst Case' Impact

There is no 'worst case' impact on the regional or local climatic conditions with respect to the proposed SRF at Garryhesta quarry.

4.5.5 MITIGATION & MONITORING

As the development is not expected to affect the local climate or microclimate of the area, there is no requirement for mitigation or monitoring within this development proposal in respect of climatic issues.

Nonetheless, the proposed development to partly restore the lands will probably lead to a reduction in the emissions from fossil fuels and dust from the site, further lessening any impact on the climate.

Although the site is entirely within the catchment the Bride River, the SRF does not add or remove water from the hydrological system. In the event of a storm or heavy rainfall, the worked areas of the quarry, whether partly restored or not, would retain water and thus lower the risk of flooding.

4.5.6 REFERENCES

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4.6 AIR

4.6.1 INTRODUCTION

This section of the report deals with the issue of air quality associated with the development of a Soil Recovery Facility (SRF) at Garryhesta Pit. It will assess the level of airborne dust and particulate matter in the vicinity of the site, the impacts and appropriate mitigation measures, if required, by the applicant to remedy any significant adverse effects on the environment.

4.6.2 METHODOLOGY

The baseline study comprised a desktop review of:

- Relevant policy, legislation and guidance with respect to air quality and emissions.
- Existing dust monitoring results were analysed to evaluate the current air quality conditions.
- the impact of the development on the existing air quality of the area.

4.6.3 POLICY & LEGISLATION

4.6.3.1 International Agreements

4.6.3.1.1 Climate Change

Recent climate change has been attributed to human activities through our emissions of greenhouse gases that are changing the composition of the earth's atmosphere. The Fifth Assessment Report of the Inter-Governmental Panel on Climate Change (IPCC) published in 2013 states that "Human influence has been detected in warming of the atmosphere and the ocean, in changes in the global water cycle, in reductions in snow and ice, in global mean sea level rise, and in changes in some climate extremes (IPCC, 2013). It is extremely likely that human influence has been the dominant cause of the observed warming since the mid-20th century. Cumulative emissions of CO_2 largely determine global mean surface warming by the late 21st century and beyond. Most aspects of climate change will persist for many centuries even if emissions of CO_2 are stopped".

The United Nations Framework Convention on Climate Change (UNFCCC) was ratified by member countries, including Ireland, in April 1994. It was soon augmented in 1997 by an international agreement linked to the existing treaty, known as the Kyoto Protocol, with stricter demands for reducing greenhouse-gas emissions. The Paris Agreement was signed in 2015 by over 200 nations, and for the first time, brings all nations into a common cause to undertake ambitious efforts to combat climate change. The central aim of the agreement is to strengthen the global response to the threat of climate change by keeping a global temperature rise this century below 2°C above pre-

industrial levels, and to pursue efforts to limit the temperature increase even further to 1.5°C.

The EU agreed the "2030 Climate and Energy Policy Framework" in 2014 (EU, 2014), with a binding EU target of at least a 40% domestic reduction in greenhouse gas emissions by 2030 compared to 1990. It was agreed the target will be delivered collectively by the EU, and that all member states will participate in this effort, balancing considerations of fairness and solidarity.

Refer to section 4.5.3.2 for discussion of Climate Change and particularly Kyoto Protocol & Paris Agreements.

4.6.3.1.2 Transboundary Pollution

The Convention on Long-Range Transboundary Air Pollution (LRTAP convention) is the main international framework for cooperation and measures to limit and gradually reduce and prevent air pollution. Fifty-one countries, including all EU member states, Canada, the United States and several countries in Central Asia, are parties to the convention. Since its signature in 1979, the LRTAP convention has been extended by 8 specific protocols, including the 1999 Gothenburg Protocol to stop acidification, eutrophication and ground-level ozone. The protocol was approved by the Council on behalf of the EU member states, including Ireland, and was transposed into EU law mostly through the 2001 National Emissions Ceiling (NEC) Directive and the 2001 Directive on emissions from large combustion plants.

The initial objective of the Protocol was to control and reduce emissions of Sulphur dioxide (SO_2), nitrogen oxides (NOX), volatile organic compounds (VOCs) and ammonia (NH_3). To achieve its initial targets, Ireland was required to meet national emission ceilings of 42 kt for SO_2 (67% below 2001 levels), 65 kt for NOX (52% reduction), 55 kt for VOCs (37% reduction) and 116 kt for NH_3 (6% reduction) by 2010. In 2012, the protocol was modified with the changes aimed at strengthening efforts to meet the objectives on the long-term protection of human health and the environment. The amendments not only introduced commitments for parties to reduce emissions of volatile organic compounds (VOCs), but also mandatory emission limit values for the main air pollutants by 2020 and beyond, and to include emission reduction commitments for $PM_{2.5}$. The 2020 emission targets for Ireland are 25 kt for SO_2 (65% on 2005 levels), 65 kt for NOX (49% reduction on 2005 levels), 43 kt for VOCs (25% reduction on 2005 levels), 108 kt for NH_3 (1% reduction on 2005 levels) and 10 kt for $PM_{2.5}$ (18% reduction on 2005 levels).

European Commission Directive 2001/81/EC, the NEC Directive, prescribed the same emission limits as the 1999 Gothenburg Protocol. A national programme for the progressive reduction of emissions of the four main transboundary pollutants has been in place since April 2005 (DoEHLG, 2004). Data available from the EU in 2010 indicated that Ireland complied with the emissions ceilings for SO_2, VOCs and NH_3, but failed to comply with the ceiling for NOX.

Directive (EU) 2016/2284 on the reduction of national emissions of certain atmospheric pollutants, amending Directive 2003/35/EC and repealing Directive 2001/81/EC, will

apply the 2010 NEC Directive limits until 2020, and establish new national emission reduction commitments that will be applicable from 2020 and 2030 for SO_2, NOX, NMVOC, NH_3, CH_4, and $PM_{2.5}$. In relation to Ireland, 2020-29 emission targets are for SO_2 (65% below 2005 levels), for NOX (49% reduction), for VOCs (25% reduction), for NH_3 (1% reduction) and for $PM_{2.5}$ (18% reduction). In 2030, Ireland's emission targets are for SO_2 (83% below 2005 levels), for NOX (75% reduction), for VOCs (32% reduction), for NH_3 (7% reduction), for $PM_{2\,5}$ (35% reduction) and for CH_4 (7% reduction).

4.6.3.2 Air Quality Standards

The principal national legislation for the control of air pollution is the Air Pollution Act, 1987 (SI No. 6 of 1987). This Act provides a comprehensive statutory framework for the control of air quality by Local Authorities, specifically through 'orders' or 'plans' produced under Part IV Special Control Areas and Part V Air Quality Management Plans and Standards to which Local Authorities must have regard to in planning. Part V of the Act also makes provision for transposing Air Quality Standards into law.

The Act also has relevance to potential nuisance emissions of dust and or odours. Section 24(2) of the Act states 'The occupier of any premises shall not cause or permit an emission from such premises in such a quantity, or in such a manner, as to be a nuisance'.

In order to protect our health, vegetation and ecosystems, EU Directives set down air quality standards for a wide variety of pollutants. The current standards are contained in the Clean Air for Europe (CAFE) Directive (EP & CEU, 2008) and the Fourth Daughter Directive (EP & CEU, 2004). These Directives also include rules on how Member States should monitor, assess and manage ambient air quality.

The CAFE Directive was transposed into Irish legislation as the Air Quality Standards Regulations 2011 (S.I. 180 of 2011), which revoked and replaced three earlier statutory instruments (S.I. 33 of 1999, S.I. 271 of 2002 and S.I. 53 of 2004).

These regulations set limit values/ target values for a range of pollutants, including sulphur dioxide; nitrogen dioxide and other oxides of nitrogen; particulate matter (PM10 and PM2.5); lead; benzene; carbon monoxide; and ozone.

The above directives require that Member States divide their territory into zones for the assessment and management of air quality. The zones adopted in Ireland are Zone A, the Dublin conurbation; Zone B, the Cork conurbation; Zone C, comprising 21 large towns in Ireland with a population >15,000; and Zone D, the remaining area of Ireland.

Under the EU Directives, Ireland is required to monitor a number of air pollutants that have an impact on health and vegetation. These include NO_X, SO_2, carbon monoxide (CO), ground level ozone (O_3), particulate matter (PM_{10} and $PM_{2.5}$), benzene, heavy metals and polycyclic aromatic hydrocarbons (PAHs). Across Europe the most problematic pollutants have consistently been NO_X, PM and O_3. Recently PAHs have also been identified as pollutants of concern.

NO_X refers to the two pollutants nitric oxide (NO) and nitrogen dioxide (NO_2). The main sources of these pollutants are vehicle exhausts and combustion sources. Exposure to NO_2 is harmful to health, while NO_X contributes to the formation of ground-level ozone and acid rain. NO_2 levels across Ireland have remained relatively static since 2005; and although an increasing trend was identified from 2008-2010 with the limit value exceeded in Dublin in 2009, from 2010 to 2015 no exceedances occurred. The 2009 exceedance occurred before the limit value came into force on 1 January 2010. Although NO_2 levels decreased from 2010 to 2012, some locations such as Zone B have indicated an increase in the 2013 and 2014 period. Figure 4.6-1 shows annual mean nitrogen dioxide concentrations from 2005 to 2015 for monitoring sites across Ireland (EPA 2016).

PM_{10} and $PM_{2.5}$ are particles with diameters less than 10 micrometres and less than 2.5 micrometres, respectively. The health impacts of these small particles relate to their ability to penetrate deep into the respiratory tract. In Ireland, the main sources are domestic use of solid fuel and vehicular traffic.

Having regard to PM_{10} during the 2005 to 2015 period, in cities, traffic emissions were the main source of PM_{10} whilst in areas not connected to the natural gas grid and smaller towns, emissions from residential solid fuel combustion was prevalent. Due to these factors, levels of PM10 are similar across all zones and during the ten-year period, no distinguishable trends or decreases were noted (EPA 2016).

Under the CAFE Directive, Ireland is required to achieve reductions in levels of $PM_{2.5}$ of 10% between 2012 and 2020. This reduction is challenging, as it will require an integrated approach across a number of sectors including industrial, transport and residential emissions. Figure 4.6-2 below shows annual mean PM_{10} concentrations 2005–2015 for monitoring sites across Ireland.

The sources of PAHs include industry, traffic emissions and domestic use of solid fuels such as wood and coal. Long-term exposure to low levels of PAHs may cause a number of diseases including lung cancer.

PAHs were monitored in Ireland for the first time in 2009 at five monitoring stations. From 2013 to 2015 PAH concentrations were relatively stable, however, Benxo[a]pyrene (BaP) concentrations are above the EEA air quality estimated reference level at four out of five stations. Reductions in emissions from traffic and from domestic use of solid fuels are required to reduce ambient levels of PAHs.

Ozone is a gas that is formed as a secondary pollutant at ground-level by the reaction of a mixture of other chemicals – NO_X, CO and VOCs – in the presence of sunlight. Ozone is a powerful oxidising agent and can affect health and vegetation.

Table 4.6-1 below shows VOC emissions exceeding the national 2013 ceiling. This has occurred since 2010 and is primarily due to including a new source category (emissions from manure management in agriculture).

Short acute ozone pollution episodes are infrequent in Ireland; however, they have happened in the past, and will happen in the future. They are most likely to occur in summer months when a stable anti-cyclone is established over Ireland, bringing

settled, warm weather combined with transmission of polluted air masses from other European countries. Reducing ozone requires limiting emissions of its precursors locally, regionally and globally. The objectives of both the Convention on Long-range Transboundary Air Pollution (CLrtAP) and National Emissions Ceilings (NEC) Directive include addressing ground-level ozone. (EPA 2012).

The other health-relevant pollutants measured are SO2, CO, benzene, lead, arsenic, cadmium, nickel and mercury. Levels of all these pollutants are low in Ireland and below all relevant limit and target values (EPA 2015).

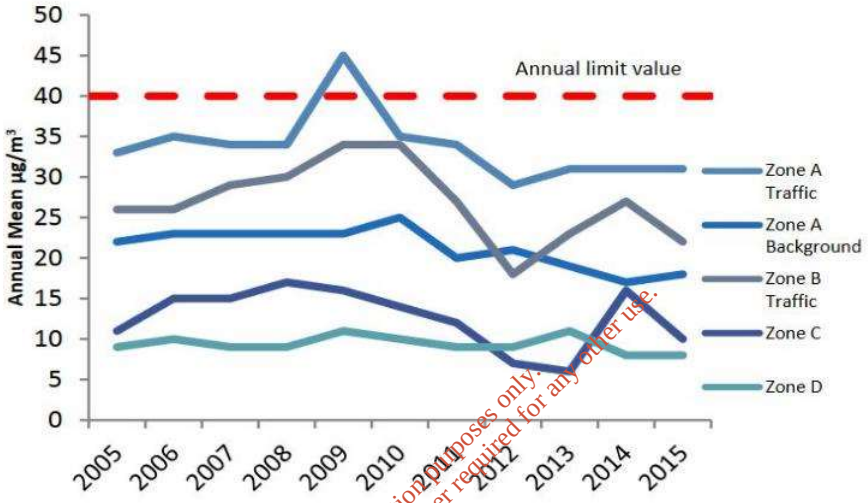

Figure 4.6-1 Annual Mean Nitrogen Dioxide Concentrations 2005-2015 (Source: EPA)

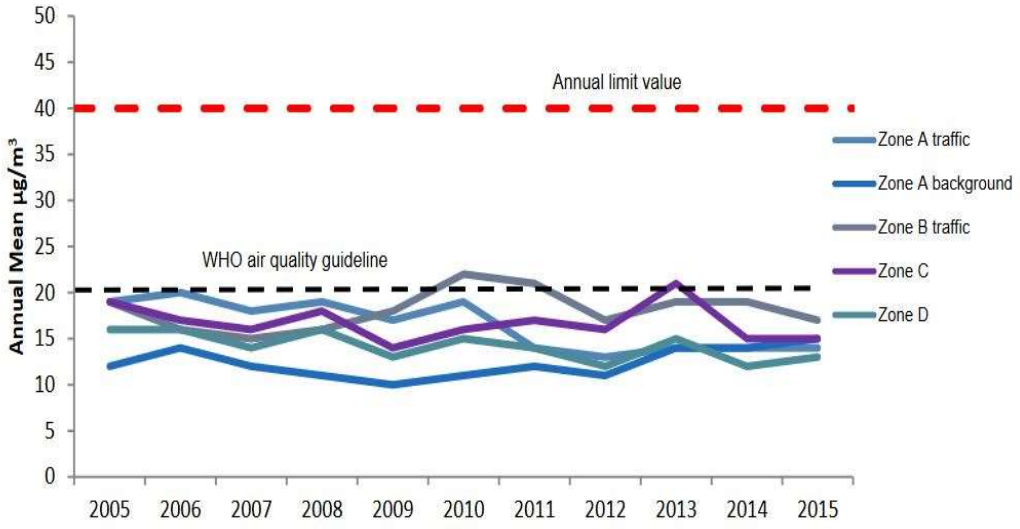

Figure 4.6-2 Annual Mean PM_{10} Concentrations 2005-2015 (Source: EPA)

Table 4.6-1 National Total Emissions of the Four NEC Pollutants 2005-2013

	2005 (kt)	2006 (kt)	2007 (kt)	2008 (kt)	2009 (kt)	2010 (kt)	2011 (kt)	2012 (kt)	2013 (kt)	2013 Emission Ceiling (kt)	Ceiling achieved?
SO_2	71.2	60.7	55.1	45.3	32.7	26	26.7	25.2	25.4	42	Yes
NO_x	116.6	113.4	113.0	106.2	88.8	72.6	73.4	75.9	76.5	65	No
VOCs	59.7	58.4	56.9	55.2	52.2	91.4	88.7	88.2	90	55	No
NH_3	113.3	112.4	107.6	107.4	107.8	106.2	104.9	105.9	107.8	116	Yes

(Source: EPA)

Air Quality in Ireland is generally of an acceptable standard, not exceeding any EU legislative or target values. However, when compared with WHO guideline values and EEA reference level values, ozone, particulate matter and PAHs emerge as pollutants of concern in the short term with NO_2 expected to rise due to increased road emissions.

With regard to air emissions, the strategies implemented to achieve compliance with the EU NEC Directive have successfully controlled emissions of sulphur dioxide, ammonia and volatile organic compounds. Emissions of all three are expected to remain below the prescribed ceilings.

For Ireland to comply with its international commitments on air quality and air emissions, industrial emissions of pollutants to air must continue to be rigorously controlled; policies must be implemented to increase the use of alternatives to the private car and improve efficiencies of motorised transport, which accounts for 40% of national energy consumption. Government departments, national agencies and local authorities must make air quality an integral part of their traffic management and planning processes. The introduction of the nationwide ban on smokey coal in 2018 is to be welcomed and should help shift the use of solid fuel to cleaner alternatives including gas.

4.6.3.3 Extractive Industry Guidelines

The impact of dust is usually monitored by measuring rates of dust deposition (DoE, 1995). There are currently no Irish statutory standards relating specifically to dust deposition thresholds for inert dust. There are a number of methods to measure dust deposition but only the German TA Luft Air Quality Standards specify a method of measuring dust deposition – The Bergerhoff Method (German Standard VDI 2119, 1972). It is the only enforceable method available. On this basis, both the DoEHLG (2004) and EPA (2006) recommended that the following TA Luft dust deposition limit value be adopted at site boundaries associated with quarry developments – total dust deposition (soluble and insoluble): 350 mg/m^2/day (when averaged over a 30-day period). This limit is in accordance with condition No. 13 of existing planning permission (QR19 06/11798 & PL04.225332) for the quarry development.

4.6.4 BASELINE DESCRIPTION OF RECEIVING ENVIRONMENT

4.6.4.1 Sensitive Receptors

The proposed soil recovery facility will comprise a c. 7.9 ha section of the existing quarry workings at Garhyhesta, as shown by the Application Area Map Figure 1.2. The total landholding extends to c. 77.2 ha and is shown highlighted in blue. Thus, the proposed application site area (for infilling) will be confined to a relatively small section of the sand and gravel pit, much of which has already been worked out.

Land-use in the surrounding area is largely agriculture and quarrying with scattered rural pattern of residential dwellings along the N22 which runs immediately to the north of the site and along other local roads to the south and east of the site. The site is well screened from outside views along the N22 by well-established planting.

The principle concern in respect of emissions from the facility is the effect on residential amenity.

Although there are residences abutting the larger quarry site, there are no residences abutting the boundaries of the site of the proposed SRF co-located within the quarry. There are 10 residences within c. 250m and 19 within c. 500m of the proposed SRF site. (Refer to EIS Figures 1.1 and 1.2).

The Applicant, Roadstone, has operated sand and gravel pits at Garryhesta Pit, Classis Pit and Donovan's Pit since the 1940's, as well as Dineen's Pit, Classis West and South in Ovens, County Cork more recently. The existing Classis Pit and production facility is currently being supplied with aggregate (sand and gravel) from the linked pits at Garyhesta and Dineens via an existing conveyor belt.

The relatively high rainfall of the area, and experience of similar environments elsewhere in Ireland, suggests that baseline dust levels of approximately 40 to 60 mg/m^2/day would be expected for an open pastoral landscape during drier periods of the year (May to September).

4.6.4.2 Meteorology

Cross reference section 4.5.3.1 for a full discussion of wind (4.5.3.1.3) and rainfall (4.5.3.1.1).

4.6.4.3 Air Quality

The Environmental Protection Agency (EPA) manages the National Ambient Air Quality Network. For monitoring purposes, the country is divided into four air quality zones as follows: 'A' (Dublin); 'B' (Cork); 'C' (Large Towns), and; 'D' (Rural). The Garryhesta area falls into zone 'B' being on the western border of the Cork Air Quality zone.

As stated previously (Refer to Section 4.6.3.2 above) under the EU Directives, Ireland is required to monitor a number of air pollutants that have an impact on health and vegetation. The nearest Air Quality monitoring station to Garryhesta Pit is situated on the Cork South Link road.

The EPA's Air Quality Index for Health (AQIH) is a scale from one to 10 that ranks air quality and is applied to characterise the current air quality in each zone. A reading of 10 means the air quality is very poor and a reading of one to three inclusive means that the air quality is good. The current air quality index for the Rural West (AQIH) Region is "1-good" (Refer to Figure 4.6-3).

Figure 4.6-3 Air Quality Index for Health Map (EPA April 2018)

The AQIH is based on measurements of five air pollutants, all of which can harm health.

The five pollutants are:

- Ozone gas
- Nitrogen dioxide gas
- Sulphur dioxide gas
- $PM_{2.5}$ particles and
- PM_{10} particles

4.6.4.4 Environmental Monitoring

Dust deposition monitoring has been carried out at the site in compliance with condition No. 13 of existing planning permission (QR19 06/11798 & PL04.225332) for the quarry development. Dust monitoring is carried out at three monitoring locations (D1, D2, D3) (Refer to EIAR Figures 1.3 & 3.6). This condition is also in accordance with guidance issued by both the Department of the Environment and the EPA in relation to dust deposition monitoring for these types of developments and will continue to be applied. Recent monitoring results are provided in Table 4.6-2 below.

Table 4.6-2 Dust Deposition Results (mg/m²/day)

Period	D1	D2	D3
Jan-17	128	No access	No access
Feb-17	119	No access	No access
Mar-17	136	Contaminated	60
Apr-17	81	Organic	70
May-17	Contaminated	Contaminated	58
Jun-17	52	180	52
Jul-17	101	173	43
Aug-17	131	Contaminated	125
Sep-17	122	191	70
Oct-17	Contaminated	Contaminated	Contaminated
Nov-17	71	Contaminated	92
Dec-17	76	125	266
Jan-18	168	Contaminated	158
Feb-18	278	84	155

It is evident that a number of the monitoring points are prone to contamination by organic leaf matter. This is due to the proximity of these locations to boundary vegetation. Growth of vegetation comprising predominantly gorse also prevented access to monitoring locations on a number of occasions. Following a recent review Roadstone have relocated the dust monitoring stations to more suitable open locations as shown by Environmental Monitoring Plan Figure 3.6. It is also proposed to establish an additional dust monitoring station (D4) on the southern boundary of the landholding.

The existing dust monitoring programme will allow on-going monitoring of fugitive dust emissions from the site, thereby assisting in ensuring compliance with the accepted TA Luft dust deposition limit value be adopted at site boundaries associated with quarry developments – total dust deposition (soluble and insoluble): 350 mg/m²/day (when averaged over a 30-day period). This limit is in accordance with condition No. 13 of existing planning permission (QR19 06/11798 & PL04.225332) for the quarry development.

4.6.5 ASSESSMENT OF IMPACTS

4.6.5.1 Aspects of Dust Deposition

For the purpose of this assessment, dust is defined as particulate matter that emanates from the site, or from the vehicles that serve it, which is borne by air and carried downwind from the point of origin or source. The amount of dust that may be emitted from any operation, activity or wind action is a function of two main factors:

- The susceptibility of the material involved to produce dust (i.e., 'erodibility').
- The erosive actions to which the material is subjected that could produce dust.

Susceptibility of Materials to Erosion

The nature and particle size of the materials being handled at a site have a fundamental influence on their tendency to be broken down and to generate fugitive dust emissions. Particles that may become suspended in air are generally a maximum of 75µm in diameter (i.e., silt size or smaller). It is also dependent on material density and to some extent particle shape. Materials erodibility is therefore directly related to the proportion of particles smaller than this size. Erodibility is also affected by the cohesion within the material. Cohesion increases with clay and moisture content but decreases with sand content. The presence of larger particles such as coarse sand, gravel or stone also reduces the tendency to erosion and by implication dust generation.

Erosive Actions

Experience of inert SRF's, quarry workings and associated ancillary activities indicates that mechanical activity is the most significant factor in material erosion and dust generation. Dust emanates from a number of site activities as detailed in section 4.6.5.3. However, the effect of wind and high ambient temperatures are also important factors in dust generation and migration. Problems may arise at sites when all these factors arise simultaneously.

Dust generation occurs from three main sources:

- **Point Source** – where dust is generated by activities such as loading, conveyor transfer points.
- **Line Source** – where dust is generated by activities identified above along well-defined haul roads and open conveyors.
- **Dispersed Source** – where dust is generated by activities such as general site activity.

Dust Dispersal

The amount of dust capable of being dispersed to a particular location during windy conditions is related to several factors including:

a) Distance from source to receptor.

b) Prevailing weather conditions.

c) Intervening topography between source and receptor.

As dust travels downwind from the source it initially disperses outwards and upwards and then progressively falls to the ground surface. Larger particles will fall first and therefore will not migrate as far as the smaller particles. The concentration of dust therefore reduces very quickly from the emission source. Most emitted dust is in fact deposited close to its source, generally within a distance of a few tens of metres.

The following Impact Assessment matrix provides an indication of the significance of potential effects arising during the life cycle of the development not accounting for any mitigation measures.

Table 4.6-3 Air - Impact Matrix

'Do Nothing' Impacts			
Factors	**Construction**	**Operation**	Decommissioning
Direct Impacts	●	●	X
Indirect Impacts	X	X	X
Cumulative Impacts	X	X	X
Residual Impacts	X	X	X
'Worst Case' Impacts	X	X	X

None/imperceptible: X; Slight: ●; Moderate: ●; Significant/Very significant: ●.
Refer to Appendix 5.2 for definition of Significance

4.6.5.2 'Do Nothing' Impacts

If the SRF is not permitted to commence recovery operations, then inert soils and stone waste materials may have to be transported further afield with a consequential impact in terms of increased exhaust emissions for transport of materials to more removed SRF facilities and/or landfill sites. It is considered that the proposed commencement of operation of the SRF will have a slight to imperceptible positive impact with respect to climate due to restoration to agriculture or possibly recreational land.

4.6.5.3 Direct Impacts

Fugitive dust emissions are generated wherever there is movement of dust relative to the air. The emission of fugitive dust from inert SRF activities is very dependent on weather conditions. Where nuisance complaints from activities arise, they are generally as a result of a combination of specific site activities and particular weather conditions (e.g. dry, windy).

Within the application area, the following site activities may give rise to potential fugitive dust emissions:

- Internal movement of vehicles
- Loading and Unloading of Vehicles

They are generally dispersed sources rather than specific point sources, and this dictates the measures required to mitigate potential dust related impacts.

The following flow diagram shows the sources of fugitive dust emissions arising on site and the methods of treatment/ abatement employed.

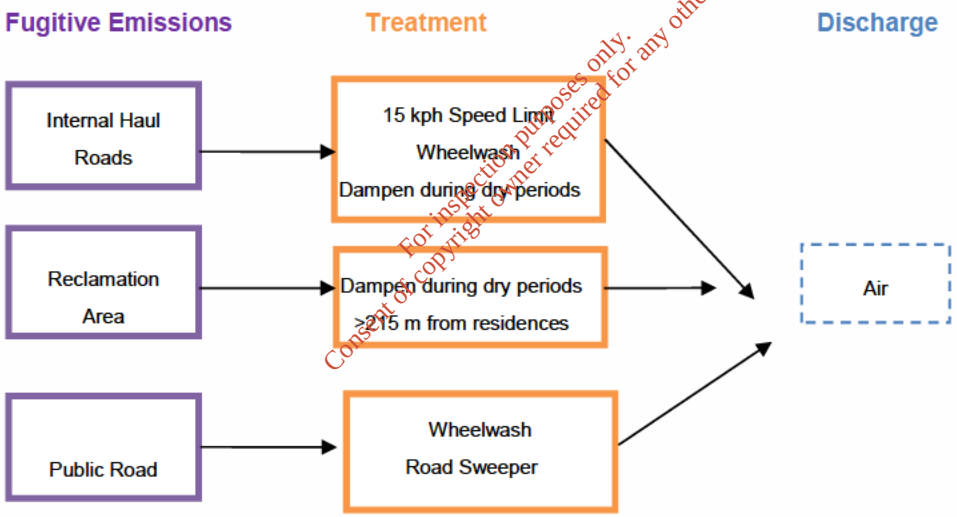

Figure 4.6-4 Operational Activities

The impacts of any dust deposition from the operations will be direct, of short duration, temporary and largely confined to the site area. Mitigation measures will be implemented to minimise any impacts as much as practical (Refer to 4.6.6 below).

The Air Quality Standards Regulations (2002 S.I. No. 271 of 2002) sets limit values for sulphur dioxide, nitrogen dioxide, particulate matter and lead in ambient air. The regulations apply to ambient air quality in the vicinity of land use/development types including Soil Recovery Facilities. The development requires movement of materials by road, and transport by other methods is not practical in this situation. Given the proximity of the site to the National Road network fuel consumption and therefore

exhaust emissions will be reduced relative to more removed locations. The current air quality in the region is known to be "good" (Refer to 4.6.4.3 above), and thus the impact on air quality with respect to the SRF is considered to be negligible.

4.6.5.4 Indirect Impacts

Apart from the direct impact of the deposition of particulate material, there may be an associated visual impact with fugitive dust generation. This impact will be minimised by the mitigation measures described to minimise dust in 4.6.6 below.

4.6.5.5 Cumulative Impacts

As stated above (Refer to 4.6.4.1 above) the proposed soil recovery facility will comprise a c. 7.9 ha section of the existing quarry workings at Garhyhesta, as shown by the Application Area Map Figure 1.2. The total landholding extends to c. 77.2 ha and is shown highlighted in blue. Thus, the proposed application site area (for infilling) will be confined to a relatively small section of the sand and gravel pit, much of which has already been worked out.

The proposed SRF constitutes a relatively small portion of dust emissions for the overall quarry activities which includes extraction, processing, stockpiling of aggregates, and movement of materials. Progressive restoration of the quarry over time will also reduce the area of exposed ground within the existing quarry. As such the cumulative impact of dust emissions at the quarry is assessed through the existing environmental monitoring programme that has been established in compliance with the planning permission associated with the quarry.

The results of dust deposition monitoring show that the dust levels at the quarry comply with the recommended dust deposition limit of 350 mg/m^2/day (averaged over a 30-day period and measured at the quarry site boundary).

Mitigation measures are already in place at the site and included in the existing site Environmental Management System. Continual monitoring and measurement will ensure the effective application of these mitigation measures (Refer to 4.6.6 below) an ensure that activity at the quarry including the SRF will not result in any significant environmental impact.

4.6.5.6 Residual Impacts

Given the low inherent potential for dust generation and dispersion from the proposed development following restoration, the rural location, and the mitigation measures incorporated in the design, it is anticipated that the effect on the existing air quality will be negligible, and no residual impacts are predicted.

4.6.5.7 'Worst Case' Impact

The site is not located within any designated areas such as proposed Natural Heritage Areas (pNHA), candidate Special Areas of Conservation (SAC) or Special Protection Areas (SPA). The nearest designated area, the Lee Valley pNHA (Site Code: 0094) is located over 4km northeast of the site.

The nearest large population centre is the town of Ballincollig, approximately 7km to the northeast, whilst there are no significant population centres within a 1km radius of the site. The nearest small settlement to the site is Farran Village situated 2km to the west.

Although there are residences abutting the larger quarry site, there are no residences abutting the boundaries of the site of the proposed SRF co-located within the quarry. There are 10 residences within c. 250m and 19 within c. 500m of the proposed SRF site.

Thus, it is expected that there will be imperceptible impact with respect to local amenity and residential receptors as a result of the development of an SRF at Garryhesta.

4.6.6 MITIGATION & MONITORING

Mitigation measures are already in place with respect to the quarry to reduce dust emissions, to aid fugitive dust reduction, and to ensure that the operations remain within the stated thresholds (Refer to 4.6.3.3 above). The company has in place an Environmental Management System (EMS) covering the entire quarry that sets out procedures to follow to ensure emissions are kept to a minimum. The EMS is updated annually.

A number of measures have/will be adopted to minimise dust emissions to the atmosphere from general site activity, internal haulage and land reclamation operations as follows:

- In accordance with condition No. 14 of Planning Permission (QR19 06/11798 & PL04.225332) a fixed water spray system has been installed to include the access road and internal roads,
- During dry weather the haul roads and tipping area will be sprayed with water to dampen any likely dust blows.
- A mobile water browser is provided in periods of dry or windy weather to cover locations where it is impractical or inappropriate to use a fixed water spray system.
- Consideration will be given to location of mobile plant so as to ensure that any principle dust sources cannot adversely affect sensitive off-site locations.
- A wheel wash facility will be installed on site and all vehicles required to pass through the wheel wash on exiting the site.
- Main site haulage routes within the site shall be maintained with a good temporary surface, as is the case at present.
- All internal roadways will be adequately drained, to prevent ponding.

- A road sweeper is available for use on site and adjacent sections of the N22 at least on a weekly basis and/or if a spillage occurs onto the public roadway.
- Reclaimed areas will be seeded at the earliest appropriate time.

Dust emissions from the facility will be controlled and monitored. Dust emissions and their management will be addressed in a revamped 'Environmental Management System' (EMS) for the entire Garryhesta site.

Regular servicing of facility plant & machinery will ensure that exhaust emissions are kept to a minimum.

It is considered given the nature of the activity, control and abatement measures and management of the SRF facility that emissions of pollutants (as defined in Waste Management Acts 1996 to 2003 and Air Pollution Acts 1992 and 1987 respectively) to the atmosphere are not likely to degrade the environment (i.e., be injurious to public health, or have a deleterious effect on flora or fauna or damage property or impair or interfere with amenities or with the environment).

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4.7 NOISE & VIBRATION

4.7.1 INTRODUCTION

This section of the report deals with the issue of noise associated with the proposed development of a Soil Recovery Facility (SRF) at Garryhesta Pit.

The section will determine the existing environment with respect to noise by assessing the level of noise in the vicinity of the site, the potential impacts on the environment, and propose appropriate mitigation measures, if required, by the applicant to avoid, reduce or remedy any significant adverse impacts on the environment.

4.7.2 METHODOLOGY

The baseline study comprised a desktop review of relevant policy, legislation including guidance with respect to noise emissions.

The purpose of the baseline study is to assess the existing levels of noise. Noise monitoring is carried out at the site in accordance with conditions imposed under planning permission (QR19 06/11798 & PL04.225332).

Routine noise monitoring is carried out on site by Southern Scientific Ltd in accordance with the company's Environmental Management System (EMS) and compliance with conditions imposed under (QR19 06/11798 & PL04.225332) with respect to the quarry.

Noise measurements surveys were undertaken at a number of noise sensitive locations and the results analysed to determine noise conditions. From these results, an assessment can be made of the impact of the development on the existing noise levels of the area.

4.7.2.1 Sources of information

The following has been taken into consideration with respect to noise monitoring surveys:

- Measurement of noise levels was undertaken using a Type 1 Sound Level Meter;
- Cognisance was taken of the EPA's 'Guidance Note for Noise: Licence Applications, Surveys and Assessments in relation to Scheduled Activities (NG4);
- The surveys were carried out in accordance with 'ISO 1996 Acoustics - Description and Measurement of Environmental Noise: Parts 1/2/3'.
- British Standard 5228-1:2009+A:2014 Noise and vibration control on construction and open sites, Part 1: Noise (BS5228) sets out a methodology for predicting noise levels arising from a wide variety of construction and related activities. It can be used to predict noise levels arising from the operations of proposed minerals extraction sites. BS5228 also sets out tables of sound power levels generated by a wide variety of mobile equipment. Recognised as good

practice standards for scope, content and methodology of noise impact assessment, these guidelines address the key principles of noise impact assessment and are applicable to all development proposals where noise effects are likely to occur.

4.7.2.2 Policy & Legislation

The strategic control of environmental noise is directed by the Environmental Noise Regulations, which transposed EU Directive 2002/49/EC. This Directive was developed to provide a common framework to avoid, prevent, or reduce the harmful effects of environmental noise. The regulations focus on the process for addressing environmental noise from major infrastructure such as airports, major roads, and large agglomerations.

Sections 106 to 108 of the *Environmental Protection Agency Act* deal with noise on a smaller (i.e. more local) scale:

- Section 106 deals with control of environmental noise by the Minister and the Agency;
- Section 107 sets out the powers prescribed by the Act to a local authority or the Agency to prevent or limit noise. It typically relates to noise from sites regulated by the Agency or a local authority. This allows local authorities or the Agency to serve notices on premises/sites where prevention or limitation of noise is required. The Environmental Protection Agency Act 1992 (Noise) Regulations 1994 provide for a prosecution where there is a failure to comply with the requirements of the issued notice, and;
- Section 108 describes the provisions for complaints regarding noise nuisance to be taken to the District Court by any person or agency. It allows for any person, local authority or the Agency to make a complaint to the District Court where noise levels are considered to be generating a reasonable cause for annoyance. Where the court finds in favour of a noise nuisance complaint, the person or body responsible for the noise must reduce it to a specific level, to limit it or cease it altogether.

4.7.2.3 Cork County Development Plan 2014

The following CDP Objectives are considered relevant with respect to Noise Emissions

GI 13-1: Noise Emissions

(a) Seek the minimisation and control of noise pollution associated with activities or development, having regard to relevant standards, published guidance and receiving environment.

A detailed assessment of potential noise impacts of the proposed development is provided within this report. Given the proximity of the site to the N22 National Primary Route the impact of noise due to site traffic is is considered to be insignificant in terms of the noise impact and effect. Traffic on the adjacent N22 is the dominant noise source at this location. The Proposed Development will not give rise to significant

adverse noise related effects on nearby noise sensitive locations provided the limits and conditions are complied with and mitigation measures are in place.

4.7.2.4 Emission Limit Value

The following are Environmental noise limits based on Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4, January 2016) as produced by the Environmental Protection Agency (EPA 2016). It should be noted *"that the guidance within this document relates to the assessment and measurement of noise in relation to* ***Agency scheduled activities only***".

Table 4.7-1 Recommended General Noise Limit Criteria (For EPA Scheduled Activities (NG4, 2016)

Daytime Noise Criterion, dB $L_{Ar,T}$ (07:00 to 19:00hrs)	Evening Noise Criterion, dB $L_{Ar,T}$ (19:00 to 23:00hrs)	Night-time Noise Criterion, dB $L_{Ar,T}$ (23:00 to 07:00hrs)
55dB	50dB	45dB

Where tonal and/or Impulsive noise is identified a rating level based on the penalty as outlined in Table 4.7-2 is to be applied to the measured L_{Aeq}.

Table 4.7-2 Recommended Tonal/Impulsive Noise Ratings

Period	Sound Characteristic	Correction to L_{Aeq} to Arrive at Rating Level $L_{Ar,T}$ (dB)
Daytime & Evening	Tonal/Impulsive	5
Night-time	Tonal/Impulsive noise from the facility should not be audible at any NSL	

If more than one adjustment is potentially applicable for the type or character of a given single sound source (i.e. a source that is both tonal and impulsive), only a single adjustment shall be applied.

The EPA Guidance Note (NG4) also addresses a number of specific activities including Quarrying and Mining Operations. Detailed guidance in relation to noise and vibration associated with these activities is provided in the Agency publication Environmental Management in the Extractive Industry (EPA, 2006a). Section 3.5 Noise & Vibration of this document sets out appropriate Emission Limit Values (ELV's) and deals with control of noise, vibration and air overpressure i.e.

In relation to quarry developments and ancillary activities, it is recommended that noise from the activities on site shall not exceed the following noise ELVs at the nearest noise-sensitive receptor:

Daytime	(08:00 — 20:00)	L_{Aeq} (1 hour) 55 dB (A)
Nighttime	(20:00 — 08:00)	L_{Aeq} (1 hour) 45 dB (A)

(Note: 95% of all noise levels shall comply with the specified limit value(s). No noise level shall exceed the limit value by more than 2 dBA).

These same "*appropriate Emission Limit Values (ELV's)"* for quarry developments are also set out in the 2nd Edition of the Irish Concrete Federation Environmental Code (ICF, 2005). As acknowledged in these guidelines *"the Code has gained national recognition and has now become a reference document in the Department of the Environment, Heritage and Local Government's "Quarries and Ancillary Activities – Guidelines for Planning Authorities" and in the EPA "Environmental Management in the Extractive Industry (Non-Scheduled Minerals) – Guidelines for Operators".*

These levels are also consistent with guidance issued by the Department of the Environment: "Quarries and Ancillary Activities – Guidelines for Planning Authorities (2004) DOEHLG".

The most recent noise limit imposed at the quarry is in accordance with Condition No.32 of Planning Permission (QR19 06/11798 & PL04.225332). i.e.

"*During the operation of the quarry, the noise level from within the site, measured at noise sensitive locations in the vicinity, shall not exceed an L_{Aeq} value of 55 dB(A) during the period 0800 hours to 1800 hours from Monday to Friday (inclusive) and 0800 hours to 1600 hours on Saturdays and an L_{Aeq},15mins value of 45 dB(A) at any other time".*

It is considered that the noise limit imposed at the proposed SRF should be in accordance with existing condition No. 32 of Planning Permission (QR19 06/11798 & PL04.225332) being consistent with both the EPA(2006a) and DoEHLG(2004b) guidelines as detailed above.

Adoption of the above ELV's will ensure that there is no significant impact on noise sensitive receptors in the vicinity of the site.

4.7.3 BASELINE DESCRIPTION OF RECEIVING ENVIRONMENT

4.7.3.1 Proposed Development

The proposed soil recovery facility will comprise a c. 7.9 ha section of the existing quarry workings at Garhyhesta, as shown by the Application Area Map Figure 1.2. The total landholding extends to c. 77.2 ha and is shown highlighted in blue. Thus, the proposed application site area (for infilling) will be confined to a relatively small section of the sand and gravel pit, much of which has already been worked out.

Land-use in the surrounding area is largely agriculture and quarrying with scattered rural pattern of residential dwellings along the N22 which runs immediately to the north of the site and along other local roads to the south and east of the site. The site is well screened from outside views along the N22 by well-established planting. Traffic on the adjacent N22 is the dominant noise source at this location.

The principle concern in respect of emissions from the facility is the effect on residential amenity.

Although there are residences abutting the larger quarry site, there are no residences abutting the boundaries of the site of the proposed SRF co-located within the quarry. There are 10 residences within c. 250m and 19 within c. 500m of the proposed SRF site. (Refer to EIS Figures 1.1 and 1.2).

The Applicant, Roadstone, has operated sand and gravel pits at Garryhesta Pit, Classis Pit, Donovan's Pit and since the 1940's, as well as Dineen's Pit, Classis West and South in Ovens, County Cork more recently. The existing Classis Pit and Production Facility is currently being supplied with aggregate (sand and gravel) from the linked pits at Garyhesta and Dineens via an existing conveyor belt.

4.7.3.2 Noise Monitoring

Roadstone currently carryout out noise monitoring on a quarterly basis in accordance with the EMS for the quarry.

The Garryhesta Facility is regulated by Cork County Council and in compliance with Condition No.32 of Planning Permission (QR19 06/11798 & PL04.225332). which places a daytime noise limit of 55dB(A) at the nearest sensitive receptors.

Noise monitoring is carried out at 5 monitoring locations at the quarry (N1-N5). A copy of the most recent noise monitoring survey undertaken by Southern Scientific Ltd is included in Appendix 5.6. The report provides a description of noise sources at each monitoring location during survey period. This report includes a figure showing the locations of the monitoring points.

These locations are listed in Table 4.7-3 below.

Table 4.7-3 Noise Monitoring Locations

ID	Location
N1	Boundary position at north east of site
N2	Boundary position at south east of site
N3	Boundary position at east of site
N4	Boundary position at north of site (west of quarry entrance)
N5	Boundary position at north of site (further west of N4)

A summary of recent noise surveys results is provided in Table 4.7-4 below.

The results demonstrate the measured day time L_{Aeq} was within 55dB(A) at N1.

Noise from local road traffic impacted on noise measured at N2 and N3.

According to the monitoring reports provided by Southern Scientific Ltd. noise generated from traffic on the N22 significantly impacted the noise levels measured at monitoring locations N4 & N5. The L_{A10} is the A-weighted sound level, which is exceeded for 10% of the measurement interval and is usually used to quantify traffic

noise or other short duration/passing events. Examination of the Noise monitoring reports shows the L_{A10} for both N4 and N5 tend to be typically greater than 80 dB(A).

Noise from quarry activities, which are mainly confined to the south of the quarry, was generally not audible at any of the monitoring these locations and therefore did not contribute significantly to the measured noise levels. There was no significant tonal component to the noise measured at any of the monitoring locations.

The most recent monitoring report has been provided as an attachment to this report (Refer to Appendix 5.6).

It is evident from analysis of the above results that the noise environment in the immediate vicinity of the existing quarry site is determined primarily by noise from the National Primary road (N22), and low-level noise emissions from the vehicles and plant within the quarry.

Table 4.7-4 Noise Monitoring Results

GARRYHESTA NOISE MONITORING					
Date	N1 $L_{Aeq, 30\ min}$	N2 $L_{Aeq, 30\ min}$	N3 $L_{Aeq, 30\ min}$	N4 (Traffic N22) $L_{Aeq, 30\ min}$	N5 (Traffic N22) $L_{Aeq, 30\ min}$
05/09/2013	46	42	41	58	60
11/12/2013	47	43	40	56	57
05/03/2014	48	44	40	57	57
23/09/2014	44	41.5	44.5	51.6	57
26/11/2014	45.2	48.5	49	55	54.7
26/03/2015	46.5	48.1	53.1	59.1	59.3
15/06/2015	43.1	34.7	34.9	52.6	55
29/07/2015	42.9	47.5	47.1	60.2	55.5
15/12/2015	49	46.1	44.8	60.7	63.5
09/02/2016	48	46.6	50.3	61.6	59.8
27/05/2016	39.6	40.3	44.1	51.6	52.9
11/08/2016	46.4	44.3	46	61.7	54.6
21/11/2016	45.2	52.3	52.2	59.1	55.5
21/02/2017	51.5	59.0	55.3	80.2	75.9
10/05/2017	41.7	58.1	52.3	79.1	73.9
24/07/2017	48.2	59.1	52.7	78.9	77.2

An additional noise monitoring station (N6) is to be established on the southern boundary of the landholding for future reference. Noise monitoring location N5 is also to be slightly relocated to the north western boundary due to difficulties with access and vegetation growth. The Environmental Monitoring locations are shown on Figure 3.6.

4.7.4 ASSESSMENT OF IMPACTS

The principle concern in respect of potential noise emissions from the proposed SRF is the effect on residential amenity.

The following Impact Assessment matrix provides an indication of the significance of potential effects arising during the life cycle of the development not accounting for any mitigation measures.

Table 4.7-5 Noise - Impact Matrix

'Do Nothing' Impacts			
Factors	**Construction**	**Operation**	Decommissioning
Direct Impacts			X
Indirect Impacts	X	X	X
Cumulative Impacts	X	X	X
Residual Impacts	X	X	X
`Worst Case' Impacts	X	X	X

None/imperceptible: X; Slight:  ; Moderate:  ; Significant/Very significant:  .
Refer to Appendix 5.2 for definition of Significance

4.7.4.1 'Do Nothing' Impacts

It is evident from analysis of the above results (Refer to Section 4.7.3.2 above) that the noise environment in the immediate vicinity of the existing quarry site is determined primarily by noise from the National Primary road (N22), and low-level noise emissions from the vehicles and plant within the quarry.

Residences along this road are typically experiencing noise levels of 80 dBL_{Aeq} during daytime hours due to passing traffic on the N22 Primary Route.

4.7.4.2 Direct Impacts

The main source of noise will be from the movement of trucks on the haul road and the tipping, placing and grading of material.

The following flow diagram shows the main sources of noise emissions arising on site and the methods of treatment/abatement to be employed.

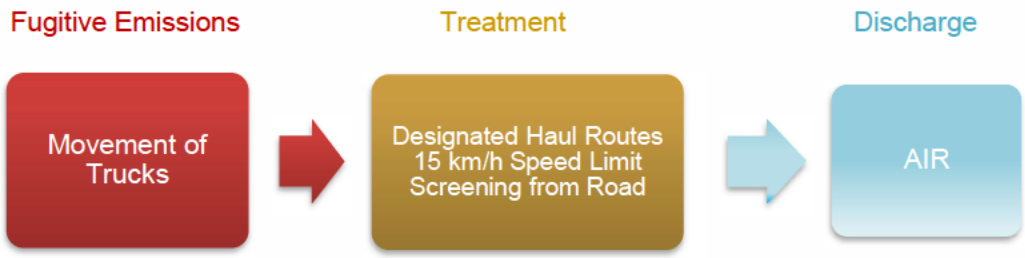

Figure 4.7-1 Operational Activities

The principal noise sources at the application site will be intermittent noise generated by movement of a bulldozer and trucks on and off site.

In order to assess the impact of the proposed SRF operations on residences in the locality a noise prediction exercise was undertaken, whereby the levels of noise at the nearest noise sensitive receptors were calculated. The methodology was based on British Standard 5228-1:2009+A:2014 Noise and vibration control on construction and open sites. The nearest noise sensitive residences are located on the opposite side of the N22 Primary Road. Residences along this road are typically experiencing noise levels of 80 dBL_{Aeq} during daytime hours due to passing traffic.

Under this "worst case" scenario the bulldozer is located at its closest planned position to the susceptible residence under consideration. Results of this analysis (Refer to Table 4.7.6) indicate that the combined noise levels at the nearest susceptible residences for a "worst case" scenario is 53dBL_{Aeq}.

For the purpose of the prediction assessment we have allowed a conservative level of 10 dB for screening. However, in our experience it has been shown that quarry face/screening can result in a reduction of up to 15-20dB.

Residences along this road are typically experiencing noise levels of 80 dBL_{Aeq} during daytime hours due to passing traffic on the N22 Primary Route.

When this is taken into account along with the results of the noise prediction analysis, it is considered that the applicant will be able to ensure that the noise levels due to the SRF facility are within the accepted thresholds for this type of development.

Table 4.7-6 Prediction of Noise for a Worst-Case Scenario at nearest residence

Plant Type	Average (dB)		Distance	Vehicles		Adjustments			Resultant LAeq	Duration of Activity (h)	Duration of Activity as Percentage of 10h	Correction to $L_{Aeq(10h)}$	Activity $L_{Aeq\ (10h)}$
	LWA	L_{Aeq}		No./hr	Km / hr	Distance (dB)	Screening (dB)	Reflection (dB)					
Dozer[1]		75	65			-16[1]	-10	+3	52	8	80	-1	51
Trucks [2]	107	79	155	35	15	-22[3]	-10	+3	49	8	80	-1	48

Combined Noise Level at Nearest noise sensitive residence = **53 dB L_{Aeq}**

NOTES:

1. Activity L_{Aeq} Method

Distance Adjustment (K_h) = $20\text{Log}_{10}\frac{R}{10}$

2. Prediction of LAeq from mobile plant using a regular well-defined haul route

$L_{Aeq} = L_{WA} - 33 + 10\log_{10}Q - 10\log_{10}V - 10\log_{10}d$

where

L_{WA}= is the sound power level of the plant

Q = is the number of vehicles per hour

V = is the average vehicle speed (in km/h)

d = is the distance of receiving position from the centre of haul road (in m)

3. Distance Adjustment = $10\ \text{Log}_{10}d$

4.7.4.3 Indirect Impacts

There are no indirect impacts with respect to noise.

4.7.4.4 Cumulative Impacts

As stated above (Refer to Section 4.7.3.1 above) the proposed soil recovery facility will comprise a c. 7.9 ha section of the existing quarry workings at Garhyhesta, as shown by the Application Area Map Figure 1.2. The total landholding extends to c. 77.2 ha and is shown highlighted in blue. Thus, the proposed application site area (for infilling) will be confined to a relatively small section of the sand and gravel pit, much of which has already been worked out.

The quarry has in place a noise monitoring programme and noise monitoring has shown that noise from quarry activities, which are mainly confined to the south of the quarry, was generally not audible at any of the monitoring locations and therefore did not contribute significantly to the measured noise levels.

It is evident from analysis of the above results (Refer to Section 4.7.3.2 above) that the noise environment in the immediate vicinity of the existing quarry site is determined primarily by noise from the National Primary road (N22), and low-level noise emissions from the vehicles and plant within the quarry. Residences along this road are typically experiencing noise levels of 80 dBL_{Aeq} during daytime hours due to passing traffic on the N22 Primary Route.

The cumulative impact of noise emissions at the quarry is assessed through the existing environmental monitoring programme that has been established in compliance with the planning permission associated with the quarry.

Noise prediction modelling (Refer to Section 4.7.4.2 above) indicate that the combined noise levels at the nearest susceptible residences for a “worst case” scenario is 53dBL_{Aeq} which is within the accepted thresholds for this type of development. It should also be noted that this area of the pit is effectively worked out and as such the only activity taking place in this section of the pit will be the restoration of the site by backfilling.

Mitigation measures are already in place at the site and included in the existing site Environmental Management System. Continual monitoring and measurement will ensure the effective application of these mitigation measures (Refer to Section 4.7.5 below) an ensure that activity at the quarry including the SRF will not result in any significant environmental impact.

4.7.4.5 Residual Impacts

It is considered that following restoration and the mitigation measures incorporated in the design that there will be no significant effects with regard to noise levels on the local residences, their property, livestock and amenity and no residual impacts are predicted.

4.7.4.6 'Worst Case' Impact

The site is not located within any designated areas such as proposed Natural Heritage Areas (pNHA), candidate Special Areas of Conservation (SAC) or Special Protection Areas (SPA). The nearest designated area, the Lee Valley pNHA (Site Code: 0094) is located over 4km northeast of the site.

The nearest large population centre is the town of Ballincollig, approximately 7km to the northeast, whilst there are no significant population centres within a 1km radius of the site. The nearest small settlement to the site is Farran Village situated 2km to the west.

Noise prediction analysis (Refer to Section 4.7.4.2 above) has shown that the combined noise levels at the nearest susceptible residences adjoining the N22 for a "worst case" scenario is 53dB$L_{Aeq.}$

Residences along this road are typically experiencing noise levels of 80 dBL_{Aeq} during daytime hours due to passing traffic on the N22 Primary Route.

When this is taken into account along with the results of the noise prediction analysis, it is considered that the applicant will be able to ensure that the noise levels due to the SRF facility are within the accepted thresholds for this type of development.

4.7.5 MITIGATION & MONITORING MEASURES

Mitigation measures are already in place with respect to the quarry to reduce noise emissions and to ensure that the operations remain within the stated thresholds (Refer to Section 4.7.2.4 above). The company has in place an Environmental Management System (EMS) covering the entire quarry that sets out procedures to follow to ensure emissions are kept to a minimum. The EMS is updated annually.

4.7.5.1 Mitigation

Noise resulting from the operations can be kept to acceptable levels by the implementation of good design, effective operation and management and by the adoption of 'best practices'. Reducing noise at source wherever possible is the most effective way of minimising the impact but barriers and screens between noise source and receptor can also be used to very good effect.

In compliance with the current planning permission for the quarry development and environmental due diligence, the applicant has put in place a number of mitigation measures that will benefit the proposed development of the SRF.

The type of mitigation techniques implemented to reduce noise are detailed below:

- The site benefits from an established mature planted screening berm along the site boundary with the N22 Primary Route.
- The provision of temporary screen banks to screen site activities from outside views as necessary.

- The existing designated internal haul roads will be utilised to manage traffic entering and leaving the site to ensure that site traffic is removed from nearest noise sensitive receptors.
- Internal haul road gradients will be kept as low as possible to reduce engine / brake noise from heavy vehicles.
- All machinery used will be CE certified for compliance with EU noise control limits.
- Regular maintenance of all plant and machinery is an integral part of site management and is important in helping to minimise noise impact.
- All plant and machinery is switched off when not in use.
- A noise management programme will be defined as part of the EMS.

4.7.5.2 Monitoring

Noise monitoring will continue to ensure that the operations comply with recognised thresholds for this type of development.

The results of monitoring to date shows that the development can comply with the noise level threshold as specified and as a consequence the development will have no significant effects regards noise levels in the area. Noise emissions and their management are addressed in the 'Environmental Management System' (EMS) for Garryhesta Pit.

This programme will allow on-going monitoring of noise emissions from the site, thereby assisting in ensuring compliance with any future requirements or regulations.

Through implementation of the proposed mitigation measures it is considered the development will continue to have no significant effects with regard to noise levels on the local residences, their property, livestock and amenity.

4.7.6 REFERENCES

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Internet Sources

www.epa.ie EPA

4.8 LANDSCAPE

4.8.1 INTRODUCTION

Cork is home to scenic coastal and upland landscapes of international importance, particularly along the peninsulas in the southwest, which constitute invaluable elements of its natural resource base, and which need to be protected from inappropriate development. Such areas not only have intrinsic value as places of beauty, but also because of their importance in terms of recreation, tourism and other uses. They are also a source of pride and inspiration for many residents and visitors alike. All aspects of our natural, built and cultural heritage come together in the landscapes we experience every day. Landscapes are an important part of people's lives, giving individuals a sense of identity and belonging, contributing to our well-being. Sensitive development and conservation of this resource is an essential underpinning of the rural economy and quality of life. This section of the EIAR addresses the landscape and visual impacts with respect to an accompanying planning application for the proposed development of a Soil Recovery Facility (SRF) at the Garryhesta sand and gravel pit site. The section is essentially an overview of the landscape and visual amenity within the vicinity of the proposed development, coupled with an assessment of the potential impact, if any, of the proposed development on the existing environment in respect of these issues.

The application site is located within the Townland of Knockanemore c. 5.5km west of the town of Ballincollig, Co. Cork. The site has direct access to the N22 National Primary Road, which constitutes the principal east-west traffic artery running through the west and central south Cork, linking the Cork City with Ballincollig and Macroom, as well as Killarney and Tralee further west in Co. Kerry. The site location is highlighted on EIAR Figure 1.1, whilst on EIAR Figure 1.2, the applicants land holding and quarry site, which covers an area of c. 77.2 ha, is shown edged blue, while the site of the proposed SRF is shown edged red.

The landscape consists of the visible characteristics of an area or region, including those elements that are physiographic (e.g., mountains and rivers), biological (e.g., vegetation and animals), transient (e.g., weather and climate), and human (e.g., built structures and land use). Landscapes variously combine human cultural influences superimposed on nature, creating places of unique character and identity, and by contributing to individual and social wellbeing and quality of life, is important in human fulfilment and in reinforcement of identity. Landscape also constitutes a resource favourable to economic activities, particularly tourism.

The European Landscape Convention 2000 states that landscape is "an area as perceived by people, whose visual features and character are the result of the action of natural and / or cultural (that is human) factors…landscapes evolve through time as a result of being acted upon by natural forces and human beings".

EPA (2015) offers guidance on the description of the landscape in terms of context, character, significance and sensitivities, the analysis of the potential impacts on the landscape, and any proposed mitigation measures. This section also indicates the associated sections within the EIAR that consider these impacts and any proposed mitigation measures.

The assessment of the landscape and visual impacts of the proposed SRF has been prepared in accordance with the Advice Notes for preparing Environmental Impact Statements, Draft

(EPA, 2015). Guidelines on the Information to be Contained in Environmental Impact Assessment Reports, Draft (EPA, 2017) were also consulted.

4.8.2 METHODOLOGY

The landscape and visual baseline study comprised a desktop study with follow-up field survey in the vicinity of the site. Although closely linked, landscape and visual impacts are assessed separately.

Landscape Impact Assessment (LIA) is concerned with changes in the physical landscape brought about by the proposed development, which may alter its character and how this is experienced. This requires a detailed analysis of the individual elements and characteristics of the landscape, which combine to form the overall landscape character. By assessing the quality of the elements in the landscape and identifying the key sensitivities, it is possible to assess the ability of the landscape to absorb the type and scale of change associated with the proposed development, without causing unacceptable adverse changes to its character.

Visual Impact Assessment (VIA) is concerned with changes in the composition of views produced by changes to the landscape, how these are perceived and the effects on visual amenity. Visual impacts are measured on the basis of: (1) visual obstruction due to partial or intermittent blocking of a view; or (2) visual intrusion due to interruption of a view without blocking.

Analysis of the visual baseline information was used to identify the extent and nature of the existing views of the site from the principal representative viewpoints, and the nature and characteristics of the visual amenity of the potentially sensitive visual receptors.

In the EIAR assessment, consideration is given to both the importance of an attribute and the magnitude of the potential environmental impacts as a result of the proposed development. The impact ratings are in accordance with impact assessment criteria provided in guidance from the EPA (EPA, 2017) (See also Appendix 5.4. General Guidance on Baseline Environment & Impacts).

4.8.2.1 Methodology for Assessment of Landscape Aspects

Landscape effects consist of the changes in the landscape, its character and quality that might result from development. The effect that these changes have on the landscape reflects the sensitivity of that landscape to change and the magnitude of that change.

The assessment methodology was conducted in accordance with Guidelines on the Information to be Contained in Environmental Impact Assessment Reports, Draft (EPA, 2017). During the assessment, consideration was given to both the importance of an attribute and the magnitude of the potential environmental impacts of the proposed activities on that cited attribute. These impact ratings are in accordance with impact assessment criteria provided in guidance from the EPA (EPA, 2017) (See also Appendix 5.4. General Guidance on Baseline Environment & Impacts).

For the purpose of assessment, a matrix has been developed (Refer to Table 4.8-3 below) to define the significance of the landscape impacts. In completing the matrix, the landscape

resource is considered in terms of magnitude of change in landscape characteristics and sensitivity of the landscape to accommodate change or intervention without suffering unacceptable effects to its character and values. The significance of impact is the relationship between magnitude and sensitivity.

The sensitivity of the area was devised by consideration of designations such as Special Protection Areas, Natural Heritage Areas, by reference to Ordnance Survey 1:50,000 discovery sheet mapping, aerial photography and any distinctive features of interest within the study area.

4.8.2.2 Methodology for Assessment of Visual Aspects

Visual impact is the result of a change in view from receptors such as residences, prospects, public pathways and roads with views of the site. The magnitude of impact is assessed according to the scale of the effect, which will depend largely upon the size and type of the development and the distance of the receptor from the site.

Residential properties are considered the most sensitive receptors to changes in view whereas road users are the least sensitive as their experience is transient. The significance of visual impact depends upon the sensitivity of the receptor and the magnitude and duration of the effect.

The visual study consisted of a number of steps:

1. As part of the assessment an examination of the Regional Planning Guidelines 2010-2022 of the South West Regional Authority, the Cork County Development Plan (CDP) 2014 and supporting documentation, including the Draft Landscape Character Assessment of County Cork, was undertaken.
2. Ordnance Survey Ireland (OSi) Discovery Series 1:50,000 and OSi 1:5,000 raster mapping and aerial photography were examined (Refer to Figures 1.1 to 1.3).
3. A UAV survey was conducted by ASM Ireland in March 2016. Multiple aerial photographs taken with the on-board 16 mp camera are digitally stitched together, from which very accurate maps are created using the principle of photogrammetry (ASM 2013). The site and immediate environs were surveyed with high horizontal and vertical spatial resolution (*i.e.*, 3cm per pixel), and produced a topographic survey with accuracy of up to 10cm. The topographic survey data were modeled using digital terrain modeling software (Refer to EIAR Figure 1.3) through which cross sections were produced (Refer to figure 3.4).
4. Visual impacts are best assessed from specific viewpoints. Principal viewpoints were mapped, and these views illustrated by photographs with annotations to describe any important characteristics, and the changes that have arisen as a result of the development (Refer to Figure 1.3 and Plates 4.8.1 to 4.8.4).
5. For the purpose of assessment, a matrix has been developed (Refer to Table 4.8-4 below) to define the significance of the visual impact with respect to the principal viewpoints identified.

4.8.2.3 Policy & Legislation

There are two main documents that deal with long-term national and regional development strategies, and these underpin the direction of spatial development at the strategic level in the County. Firstly, at the national level, the National Spatial Strategy, and secondly at the regional level, the Southwest Regional Planning Guidelines.

The 2002 National Spatial Strategy (NSS) was designed to provide a framework for balanced social, economic and physical development between the regions for the next 20 years (DoELG, 2002). It therefore provided the strategic planning context for government policies and investment in housing, water services, transport, communications, energy, health and education infrastructure. The NSS was revoked in 2013, but its legacy persists in the Regional Planning Guidelines and County Development Plans.

In early, 2018, the government published "Project Ireland 2040", the new overarching public policy initiative, which consists of the National Planning Framework to 2040 and the National Development Plan 2018-2027 (DoHPLG, 2018), which will replace the revoked NSS and the Infrastructure and Capital Investment Plan 2016-2021, respectively. This represents an alignment of the investment strategy with the strategic planning policy, to create a unified and coherent plan, which will drive the long-term economic, environmental and social progress across all parts of the country over the next ten years. This will ultimately feed into the planning processes when incorporated into the new Regional Spatial and Economic Strategies (RSES) that will replace the Regional Planning Guidelines in early 2019.

Currently, the Regional Planning Guidelines (RPGs) extend the implementation of the NSS down to the regional and local levels by linking national spatial policy with planning by local authorities. The RPGs are influenced by a wide range of international, national and regional level plans, programmes and legislation, and in turn form a framework for lower level plans and programmes (e.g., County Development Plans, Local Area Plans, etc.). The South West Regional Planning Guidelines 2010-2022 are currently in force (South West Regional Authority, 2010).

Local authorities create their County Development Plans (CPDs) based on these regional strategies and guidelines. Thus, the plans must be consistent with longer term planning and sustainable development objectives, including those set out in the National Spatial Strategy and any Regional Planning Guidelines. A County Development Plan sets out a strategic framework for the proper planning and sustainable development of the administrative area of the local authority, over a six-year period. The Cork County Draft Landscape Character Assessment 2007 (Cork County Council, 2007) constitutes part of the Cork County Development Plan 2015-2022 (Cork County Council, 2014).

4.8.2.3.1 Planning Policy

The European Landscape Convention (ELC), to which Ireland is a signatory, was adopted in 2000, and requires signatories to recognise landscapes in law and establish policies aimed at their protection, management and planning. The ELC aims to encourage public bodies to adopt policies and measures at national, regional and local level to protect, manage and plan landscapes. Under the convention, landscape means "an area, as perceived by people,

whose character is the result of the action and interaction of natural and/or human factors", and can include high quality natural areas, rural lands, urban areas, peri-urban areas, degraded areas and everyday spaces.

Planning legislation and national guidelines, such as the Draft Guidelines on Landscape and Landscape Assessment (DoEHLG) indicate that conservation of the landscape in all its contexts must now be integrated into all aspects of planning policy. The guidance requires Development Plans to include objectives for the preservation of landscape, views and prospects and the amenity of places and features of beauty.

The South West Regional Planning Guidelines (RPG) 2010-2022 recognise the European Landscape Convention (ELC), and the requirement to "recognise landscapes in law, to establish and implement landscape policies, to establish policies for the participation of the public in the definition and implementation of policies and to integrate landscape policies with regional and town planning policies". The RPG also acknowledges that Landscape Character Assessment (LCA) offers the potential to establish a coherent strategy for integrating landscape and land use and transportation policies as well as economic, energy policies, etc.

The RPG stipulates the following policies and objectives:

REAS-01 Regional Landscape Strategy

It is an objective to support a common approach to ensure consistency in Landscape Character Assessments (LCAs) for all areas of the region which will help identify landscape capacity, landscape value and which will promote the protection, planning and sustainable management of all landscapes in the region. This approach should include consultation with adjoining Local Authorities.

The Draft Landscape Character Assessment County Cork (Cork, 2007), which constitutes part of the Cork County Development Plan (CDP) 2015-2022 (Cork, 2014), identifies and describes the landscape character of the entire County. It also evaluates the capacity of different areas to accept change, without disproportionate effects and proposes a series of policies to guide developments in each type of landscape. The Landscape Character Assessment (LCA) established 76 landscape character areas reflecting the complexity and diversity of the entire County, which were amalgamated into a set of 16 landscape character types based on similarities that provide a more general categorization of the County's landscape.

The LCA methodology involved an evaluation of each landscape character type in terms of its Landscape Value, Sensitivity and Importance. The Value of each Character Type is defined as the environmental or cultural benefits, including services and functions, which are derived from various landscape attributes. The Sensitivity of each character type is defined as the ability to accommodate change or intervention without suffering unacceptable effects to its character and values. The Importance of a landscape character type is rated as Local, County, or National. The LCA will inform decision making in relation to the protection of the environment, natural resources and heritage and will be used to guide development. Thus, Landscape Character Types that have a very high or high landscape value and high or very high landscape sensitivity and are of county or national importance are considered to be our most valuable landscapes, and therefore it is proposed to designate them as High Value Landscapes (HVL). Within these High Value Landscapes, considerable care will be needed

to successfully locate, site and design large scale developments without them becoming unduly obtrusive.

The key role of the Cork County Draft Landscape Strategy is to assist in the achievement of sustainable development, by promoting an approach to landscape planning and management, which links objectives and recommendations for landscape character to existing planning policies. The capacity of each landscape character type to absorb new development will largely depend on the sensitivity of the landscape type. Developments which are likely to create a significant environmental and particularly visual impact will best be absorbed in areas where the landscape is robust, i.e. has the capacity to absorb development without significantly changing its character. All developments should be assessed on a site by site basis to avoid, minimise or mitigate any potential environmental or visual impact.

4.8.2.3.1.1 Landscape Protection

The following County Development Plan policies and objectives are considered relevant with respect to landscape protection. It is an objective of the plan:

GI 6-1: Landscape

a) Protect the visual and scenic amenities of County Cork's built and natural environment.
b) Landscape issues will be an important factor in all land-use proposals, ensuring that a pro-active view of development is undertaken while maintaining respect for the environment and heritage generally in line with the principle of sustainability.
c) Ensure that new development meets high standards of siting and design.
d) Protect skylines and ridgelines from development.
e) Discourage proposals necessitating the removal of extensive amounts of trees, hedgerows and historic walls or other distinctive boundary treatments.

GI 6-2: Draft Landscape Strategy

Ensure that the management of development throughout the County will have regard for the value of the landscape, its character, distinctiveness and sensitivity as recognised in the Cork County Draft Landscape Strategy and its recommendations, in order to minimize the visual and environmental impact of development, particularly in areas designated as High Value Landscapes where higher development standards (layout, design, landscaping, materials used) will be required.

4.8.2.3.1.2 Views and Prospects

County Cork contains many vantage points from which views and prospects of great natural beauty may be obtained over both seascape and rural landscape. This scenery and landscape is of enormous amenity value to residents and tourists and constitutes a valuable economic asset. The protection of this asset is therefore of primary importance in developing the potential of the County. Therefore, the plan identifies specific Scenic Routes consisting of important and valued views and prospects. It is important to protect the character and quality of those particular stretches of scenic routes that have special views and prospects particularly those associated with High Value Landscapes.

The following development plan policies and objectives are considered relevant with respect to protection of views and prospects. It is an objective of the plan:

GI 7-1: General Views and Prospects

Preserve the character of all important views and prospects, particularly sea views, river or lake views, views of unspoilt mountains, upland or coastal landscapes, views of historical or cultural significance (including buildings and townscapes) and views of natural beauty as recognized in the Draft Landscape Strategy.

GI 7-2: Scenic Routes

Protect the character of those views and prospects obtainable from scenic routes and in particular stretches of scenic routes that have very special views and prospects identified in this plan. The scenic routes identified in this plan are shown on the scenic amenity maps in the CDP Map Browser and are listed in Volume 2 Chapter 5 Scenic Routes of this plan.

GI 7-3: Development on Scenic Routes

a) Require those seeking to carry out development in the environs of a scenic route and/or an area with important views and prospects, to demonstrate that there will be no adverse obstruction or degradation of the views towards and from vulnerable landscape features. In such areas, the appropriateness of the design, site layout, and landscaping of the proposed development must be demonstrated along with mitigation measures to prevent significant alterations to the appearance or character of the area.

b) Encourage appropriate landscaping and screen planting of developments along scenic routes which provides guidance in relation to landscaping. See Chapter 12 Heritage - Objective HE 4-6 of CPD.

4.8.2.3.1.3 Prominent and Strategic Metropolitan Cork Greenbelt Areas

The plan recognises the importance of protecting prominent areas of the Metropolitan Cork Greenbelt which are of strategic importance to the purpose and function of the Greenbelt and greenbelt settlements. These areas require the highest degree of protection because they are made up of the prominent open hilltops, valley sides and ridges that give Metropolitan Cork its distinctive character and the strategic, largely undeveloped gaps between the main Greenbelt settlements.

It is an objective of the plan:

GI 8-1: Prominent and Strategic Metropolitan Greenbelt Areas requiring Special Protection

Protect those prominent open hilltops, valley sides and ridges that define the character of the Metropolitan Cork Greenbelt and those areas which form strategic, largely undeveloped gaps between the main Greenbelt settlements. These areas are labeled MGB1 in the Metropolitan Greenbelt map (Figure 13.3) and it is an objective to preserve them from development.

4.8.2.4 Designations

The proposed development site is not located within any designated site (*i.e.* SAC, NHA, SPA etc). The nearest such area being Cork Harbour SPA (Site Code 4030) is located approximately 20km to the east of the proposed development site. Screening for Appropriate Assessment has been carried out (Refer to Appendix 5.2). It has been assessed that there is no likelihood of significant ecological effects from this development on any of the sites in the Natura 2000 network or on their conservation objectives. Thus, the further, more detailed, stages of appropriate assessment are not required.

The proposed development was the subject of an assessment that involved the investigation of the cultural heritage including the archaeological, structural and historical background of both the application area and the surrounding area (i.e., 1km radius) using a wide range of existing information as well as a field assessment (Refer to EIAR Section 4.9).

There are no Recorded Monuments within the proposed development site, but there are three within the 1km study area. These are:

- Ringfort – rath (Code CO072-113001-). Scheduled for inclusion in the next revision of the RMP. This is the closest recorded site to the proposed development area and is located c. 0.85km to the northwest in the townland of Clashanure.
- Fulacht fia (Code CO073-093-). Scheduled for inclusion in the next revision of the RMP. Located c. 0.85km to the southeast in the townland of Knockanemore.
- Earthwork (Code CO073-052----). Scheduled for inclusion in the next revision of the RMP. Located c. 0.90km to the southeast in the townland of Knockanemore.

There are no Protected Structures within the proposed development site, nor within the 1km study area site (Refer Map Browser, Vol. 4, CPD; Cork 2014). However, there are three structures within the 1km study area that are listed in the National Inventory of Architectural Heritage (NIAH). These are:

- House (Reg. No. 20907226). Dated 1880 – 1920 with regional rating. Located c. 300m to the east in the townland of Knockanemore.
- Valley View House (Reg. No. 20907224). Dated to 1890 – 1930 with regional rating. Located c. 325m to the north in the townland of Lackenareague.
- Srelane House (Reg. No. 20907308). Dated 1900 – 1920 with regional rating. Located c. 850m to the east in the townland of Knockanemore.

There are no Architectural Conservation Areas or NIAH historic gardens or designed landscapes within the proposed development area, or within the 1km study area. There will be no construction or operational visual impact on the archaeological, architectural or cultural heritage resource.

There are two scenic routes running essentially E-W within c. 5km north of the application site. These routes lie in a high value landscape defined as Hilly River and Reservoir Valleys (Cork 2014). These are:

- S37 (R618), which runs E-W from Carrigohane, Cork City to Macroom, north of the Inniscarra Reservoir, largely within the Lee River Valley.

- S38 (L2202), which runs E-W from Classis to Coachford via Currabeg, south of the Inniscarra Reservoir, on upland partly overlooking the Bride River Valley.

There is only one scenic route that will be potentially affected by the proposed development (Refer to Figure 4.10.3). The L2202 is designated Scenic Route S38 and runs E-W from Classis to Coachford via Currabeg, south of the Inniscarra Reservoir, and on upland partly overlooking the Bride River Valley. The proposed development is not open to view from vantages from this route being screened by intervening topography and mature hedgerow planting. The view from this scenic route is also the far side of an east west running ridge which screens views towards the site and south. The main view from this scenic route is northwards towards the Inishcarra reservoir on the River Lee.

4.8.2.5 Field Study

Site visits were undertaken on 23rd September 2016 and 28th April 2017. The purpose of the site visits was to become familiar with the site, establish the general landscape character of the area and identify principle representative viewpoints including residences, prospects, public pathways and roads with views of the site. The actual extent of visibility was also checked in the field due to the localised screening effects of buildings, walls, fences, trees, hedgerows and banks. Potential seasonal screening effects were also identified where necessary and recorded.

The visual survey also includes and is supported by a photographic record from the principal and other relevant viewpoints. The photographs were taken at eye level (i.e., 1.6 metres above ground level) at the point of interest towards the development area using a digital camera. A panoramic image was produced by the careful 'stitching' together of single-frame images for each identified view.

The analysis of the visual baseline information identifies the extent and nature of the existing views of the site from the principal representative viewpoints, and the nature and characteristics of the visual amenity of the potentially sensitive visual receptors.

Principal viewpoints were mapped, and these views illustrated by photographs with annotations to describe any important characteristics, and the changes that have arisen as a result of the development (Refer to Plates 4.8.1 to 4.8.4).

4.8.3 BASELINE DESCRIPTION OF RECEIVING ENVIRONMENT

4.8.3.1 Landscape Baseline Conditions

4.8.3.1.1 Site Area Description

The site of Garryhesta quarry and the proposed SRF is located in a nominally rural area in the townland of Knockanemore, c. 1km and 5.5km west of the village of Ovens and the town of Ballincollig, respectively. The townland occurs in an area classified as a Rural Area Under Strong Urban Influence and has a moderately high population density of 146.5 persons per km^2, due to the higher population growth occurring in villages and rural areas around the main Gateway of Cork City.

The site of the SRF (lands to be restored) will occupy a subordinate footprint of c.6.7 ha, located in the western section of the larger quarry site of 77.2 ha. The total application area including the site infrastructure covers 7.9 ha of lands. The site is located on lands immediately south of, and with direct access to, the N22 National Primary Road. Thus, the site has the benefit of being strategically located on the principal east-west traffic artery in central south Cork, linking the City of Cork with the towns of Ballincollig, Macroom, Killarney and Tralee. The site location is highlighted on Figure 1.1 at a scale of 1: 50,000.

Topography

The Garryhesta site is located in the valley of the Bride River, a long narrow geomorphic feature running roughly east-northeast to west-southwest in a geological structure known as the Cork Syncline. The walls of the valley are composed of Old Red Sandstone rock, while the valley floor is composed of a deep fill of Quaternary-age, unconsolidated sands and gravels overlying Carboniferous rocks, which are mostly limestones.

The Bride River meanders strongly in a roughly easterly direction, mostly on the southern side of the valley in the vicinity of the site. The Bride River drains into the Lee River approximately 8 km to the east, near Ballincollig. The surrounding landscape consists of a gently undulating to hummocky valley floor, in which the Bride River meanders, within the regional River Lee Catchment. The prominent ENE-WSW orientation of the distinctive series of valleys (i.e., Blackwater River, Womanagh River, Lee River, Bride River, Owenboy River and Ringabella Creek) defines the drainage pattern, with the rivers and streams in the wider region draining east within the valleys, often before turning sharply south to the coast.

The site of the proposed SRF relates to a subordinate site co-located within the Garryhesta quarry site. The topography in the area of the site is gently undulating with an elevation range of between approximately 45 – 65 m AOD (above Ordnance Datum), with the landform gradually descending to the south towards the Bride River (c. 40m AOD). The quarry has been developed on thick sequences of bedded and sorted, glaciofluvial, outwash sands and gravels hat blanket the floor of the Bride River Valley. There are several other quarries along the N22 reflecting a history of sand and gravel extraction from the deposits.

The wider local landscape is undulating, with higher ground on the valley walls and uplands immediately to the north, and also c. 2.5km to the south of the site. Thus, much of the surrounding area comprises relatively flat low-lying land at or below the elevation of the site, with the highest ground in the area generally to the north.

The quarry area is largely dominated by bare, exposed ground with fragments of grassland and scrub at the edges and on areas that remain undeveloped. Overburden stripped to access the sand and gravel resource has been used to construct peripheral screening berms and for restoration of completed sections of the excavation. A high (c. 3 to 4m) earthen berm with screening from mature planting of deciduous trees fringe the entire length of the northern boundary of the quarry site, which is contiguous with the N22, while the other boundaries are largely maintained with mature hedgerows. The proposed SRF will thus be well screened from public view from the N22 by the existing screening. There are partially open views of the quarry at the site entrance along the N22, but this is only a passing view and the site of the proposed SRF is removed from the site entrance.

There are several rural roads in the area, but all views of the site from the north, east, south and west are screened from these vantages by intervening topography, hedgerows and scrub. No significant views of the quarry site were identified (Refer to Figure 1.3 and Plates 4.8.1 to 4.8.4).

Land Use

Garryhesta is located in south central Cork between Cork City (c. 15.5km to the east) and Macroom (c. 18.5km to the west). The site lies close to a N-S trending line from roughly Ballincollig to Kilmurry, which separates two landscape types, namely the Hilly River and Reservoir Valleys (i.e., Type 8) and the Broad Fertile Lowland Valleys (i.e., Type 6a), as shown in Figure 4.8.1. (Cork 2014). The 2012 Corine Map (EPA 2017) shows that the land use only differs slightly between these two landscapes, with Type 8 dominated by pasture, while Type 6a is also dominated by pasture, but with significant amounts of tillage on non-irrigated land (211), land given over to complex cultivation patterns (242), land principally occupied by agriculture with areas of natural vegetation (243) and coniferous forest (312) increasingly to the west (Refer Figure 4.8.2).

The Ovens area is characterised by a mixed land use pattern, albeit dominated by pasture and lesser non-irrigated land for tillage, with considerable area given over to mineral extraction and discontinuous urban fabric of Ovens, Killumney and Ballincollig. The field pattern consists of generally large intensively managed agricultural fields bordered by variably managed hedgerows. There is only minor broad-leaved forest, which is restricted to fringes in river valleys, ravines and hedgerows. The nearest watercourse to the site is the Bride River, which flows roughly W-E approximately 1km south of the site.

The Applicant, Roadstone, has operated sand and gravel pits at Garryhesta Pit, Classis Pit, Donovan's Pit since the 1940's, as well as Dineen's Pit, Classis West and South in Ovens, County Cork more recently. The existing Classis Pit and Production Facility is currently being supplied with aggregate (sand and gravel) from the adjacent and linked pits at Classis West and South via an existing conveyor belt.

The site of the SRF (lands to be restored) will occupy a subordinate footprint of c.6.7 ha, located in the western section of the larger quarry site of 77.2 ha. The total application area including the site infrastructure covers 7.9 ha of lands (Refer to EIAR Figures 1.2 & 1.3).

The proposed Soil Recovery Facility (SRF) will utilise the permitted quarry infrastructure including internal roads, site office, welfare facilities and other ancillaries to complete the works (Refer to Figure 1.3 - Existing Site Survey Plan). Access to the site will be from the permitted main entrance on the N22 National Primary Road. A wheel wash and weighbridge will be provided as part of the proposed development and the existing workshop will be utilised as a quarantine area. A hard-stand with drainage to oil interceptor will also be provided as a designated refueling area.

The predominant land use within the proposed site, which is to be co-located within the quarry site, is by definition that of quarrying activities related to the extraction of sand and gravel and associated operations. A High (c. 3 to 4m) grassed earthen berm with mature deciduous tree planting fringe the north boundary of the site, while the other boundaries are largely maintained with mature hedgerows and scrub (Refer to Existing Site Survey Plan Figure 1.3).

On completion of site activities, the site of the quarry and SRF will be decommissioned and reinstated in accordance with the approved quarry restoration scheme, and thus integrated back into the surrounding landscape. The land use will probably revert to agricultural or recreational use.

Drainage & Geology

The site is located in the catchment of the River Bride which is a sub-catchment of the River Lee. The River Bride flows in an easterly direction approximately 1.5km to the south of the site. The River Bride then flows into the River Lee approximately 3km to the east of the site. Surface water features in the vicinity of the site include a stream and small man-made pond. The stream rises on high ground to the northwest of the site and then flows along the western and southern boundary of the application site (i.e. proposed infill area) prior to flowing into a small man-made pond which exists immediately to the southeast of the application site. A local drainage map is shown as Figure 4.4.2. Drainage within the area is discussed in more detail in Section 4.4.

Details with respect to the local bedrock geology and soils are provided within Section 4.3 – Land, Soils and Geology. Based on the GSI bedrock map of the area the application site is underlain by two separate bedrock formations. The southern half of the site is mapped to be underlain by Dinantian mudstones and sandstones while the northern half is mapped to be underlain by Devonian Old Red Sandstones (ORS). The remaining area of the overall landholding to the south of the site is mapped to be underlain by Dinantian pure unbedded limestones.

The dominant subsoil occurring at the Garryhesta site is described as a thick sequence of bedded and sorted, glaciofluvial, outwash sands and gravels. Pits up to 40m deep are seen at Garryhesta, with up to 30m depth of clean sediments exposed in the existing pit. The combined soil and subsoil thickness is greater than 30m, with a thin layer of topsoil overlying *c*. 1.5-2m of glacial till 'overburden' and up to *c*. 30-40m of glaciofluvial sand and gravel.

Tourism

The coastal and countryside landscapes of County Cork are a key green infrastructure asset not only for their intrinsic value as places of natural beauty, but also because of their importance in terms of recreation, tourism and other uses. They are also a source of pride and inspiration for many residents and visitors alike. The site at Garryhesta is located c. 13.5km west of both Cork City and Cork Airport, and along the N22, which serves visitors travelling from Cork to Macroom, Killarney and on to Tralee. Both Cork with Killarney are major tourist destinations, while the world-renowned Blarney Castle lies c. 10 km to the northeast, and the historic port of Kinsale lies c. 22.5km south on the coast, and offers golfing, yachting, sea angling, and dolphin and whale watching.

There are community facilities c. 1.5km the southeast at Ovens (i.e., Ovens Church, Ovens National School and Eire Og GAA Club). Sports are actively pursued in the local area, and include football, soccer, tennis, sailing, waterskiing, rowing, swimming, hillwalking, fishing, golfing and pitch and put.

There are numerous walking and cycling trails in south Cork, including Farran Forest Park Loop, Farran Wood, Gunpowder Trail – Heron Trail, Ballincollig, Slí na Sláinte, Blarney, Slí na Sláinte, Kinsale, and the Carrigaline to Crosshaven Greenway. Other activities are available at the National Rowing Centre, Farran Wood, the Cork Powerboat and Waterski Club, Agharinagh, Aquaventures Dive Centre, Baltimore, Swell Surf School, Kilgraney, Kartmania, Little Island, and ActionPak Paintball, Kinsale. There are numerous yacht and kayak clubs, inland fishing for brown trout, salmon, bream and pike, sea fishing for bass, seatrout and pollack, as well as sandy public beaches and small seaside resorts.

Golf enthusiasts visiting the area can enjoy a choice of excellent golf courses within short driving distance, including Blarney Golf Club, Muskerry Golf Club, Cork Golf Club, Douglas Golf Club, the nearby (< 1km) Lee Valley Golf and Country Club, Clashanure, and the nearby (c. 2.5km) Lakewood Sports and Social Club, Ballincollig for pitch and put.

Ovens and its wider environs are steeped in history and have a wealth of historical and archaeological sites. Cork City boasts the English Market, Cork City Gaol, Elizabeth Fort, and St. Fin Barre's Cathedral, whilst Blarney Castle, Charles Fort, Kinsale, Spike Island, Bantry House and the Jameson Heritage Centre, Midleton Distillery are all cultural bastions. The nearby ruins of Kilcrea Friary and Kilcrea Castle are located in the immediate area of Ovens. The ruins of several churches and large country houses, as well as numerous megalithic monuments, standing stones, rock scribings, ring forts, souterrains, enclosures, earthworks, holy wells, etc. are located within c. 2.5km of the site (Refer Map Browser, Vol. 4, CPD; Cork 2014).

Residential

The site lies on the western periphery of the Prominent and Strategic Metropolitan Greenbelts Areas of Cork City (Cork 2014). The site of the proposed SRF actually corresponds to the western extreme of these Metropolitan Greenbelt Areas (Refer Figure 4.10.1). The latter is rural area under strong urban influence that forms part of the Cork Gateway and is within close commuting distance of Cork City and Environs. The County Development Plan identifies the importance of protecting prominent areas of the Metropolitan Cork Greenbelt. It is the objective of the plan to "protect those prominent open hilltops, valley sides and ridges that define the character of the Metropolitan Cork Greenbelt and those areas which form strategic, largely undeveloped gaps between the main Greenbelt settlements" (Cork 2014).

The immediate area is moderately well populated with 10 residences within c. 250m and 19 within c. 500m of the proposed SRF site, while there are a number of residences, including several clusters of residences or hamlets/graigs, within 1km. The distance between the siting of the proposed SRF and the nearest neighbouring residences is c. 100m directly across the N22. There are no large residential settlements close to the site, with the town of Ballincollig c. 5.5km to the east, the village of Ovens c. 1.5km to the southeast, the village of Killumney 2km to the south, the village of Farran 2km to the west, and the village of Aherla c. 4km to the southwest. Residential development consists of isolated farm dwellings and of owner occupied bungalow/houses along public roads; occasionally in clusters (Refer to EIAR Figures 1.2 and 1.3). With the exception of the N22 Primary National Road, the roads are of a local character and typical of a rural location.

4.8.3.1.2 Landscape & Landscape Character Assessment

Ireland ratified the European Landscape Convention in 2002 and agreed to implement national measures to promote landscape planning, protection and management. The Planning and Development Act 2000, as amended requires every planning authority to include objectives in their Development Plan for the preservation of the character of the landscape insofar as proper planning and sustainable development of the area requires it, including the preservation of views and prospects and the amenities of places and features of natural beauty or interest.

Following publication of Draft Guidelines for Planning Authorities in respect of landscape assessment in 2000, County Councils adopted a new method of landscape assessment that allowed for a more proactive approach with the county divided into a number of landscape character areas. The Landscape Character Areas are single unique areas, which are geographical areas of a particular landscape type or types.

Cork County Council carried out a detailed Landscape Character Assessment of County Cork in 2007. The purpose of the study was to objectively describe, map and classify the landscape character of each part of the county. Importantly, defining landscape character enables an understanding of the inherent value and importance of individual landscape elements and processes that may alter landscape character in the future. The capacity of each area to accept change without disproportionate effects was evaluated, and the landscape sensitivity of each area was detailed. Another benefit of such analysis is driving sustainable development, the principle underlying current planning legislation, by promoting a unified approach to landscape planning and management.

Cork presents a wide range of landscapes, which range from complex agricultural patterns in the lowlands with small roads and houses, to a deeply indented and islanded Atlantic coastline. Cork County's Landscape Character Areas have been amalgamated into a set of 16 Landscape Character Types based on similarities evident within the various areas. These landscape character types provide a more general categorization of the County's landscape.

The site at Garryhesta was determined to be within Area 6a: Broad Fertile Lowland Valleys (Blarney-Ballincollig-Carrigaline-West to Dunmanway) (See EIAR Figure 4.8.1).

Table 4.8-1 Landscape Character Area

	Landscape Character Type	Landscape Value	Landscape Sensitivity	Landscape Importance
6a	Broad Fertile Lowland Valleys	High	High	County

This landscape type stretches west and east from the environs of Cork City. The valleys in these areas are created by the rivers flowing east to west and are surrounded by low well-spaced ridges. These shallow and flat valleys wind as they follow the course of the river, rising to the north and south with gentle slopes where the valley is wide but with steeper faced slopes where the valley narrows. Further upstream to the west the broad flatness narrows and winds between low hills.

Landcover comprises highly fertile, regularly shaped fields typically of medium size and with mature broadleaf hedgerows. Agricultural use primarily involves intensive dairying as well as tillage, with farmsteads relatively well screened by the hedgerows. Some of the larger settlements include Bandon, Ballincollig and Blarney to the west of Cork City, Castlemartyr to the east and Rathcormack to the north. Major roads such as the N22 between Macroom and Cork City and the N71 between Innishannon and Bandon tend to follow the rivers, often providing distant views across the landscape.

Thirteen sites of national value have been identified in this part of Cork County, all of which are proposed for protection as NHAs and one as a cSAC. Habitats of high ecological value within the area are associated with the river valleys of the Bandon and the Lee. They include wet grassland, freshwater marsh, fen and both wet and dry woodland as well as the rivers themselves and some small lakes and ponds. Semi-natural woodlands are found in the river valleys, with a particularly important example of alluvial woodland on the Bandon River. The best examples have a good diversity of native trees and diverse ground flora.

Scenic Routes

There are 11 Scenic Routes within this Landscape Type.

There is only one scenic route that will be potentially affected by the proposed development (Refer to Figure 4.10.3). The L2202 is designated Scenic Route S38 and runs E-W from Classis to Coachford via Currabeg, south of the Inniscarra Reservoir, and on upland partly overlooking the Bride River Valley. The proposed development is not open to view from vantages from this route being screened by intervening topography and mature hedgerow planting. The view from this scenic route is also the far side of an east west running ridge which screens views towards the site and south. The main view from this scenic route is northwards towards the Inishcarra reservoir on the River Lee.

Landscape Character Areas

Landscape Type 6a includes the following Landscape Character Areas:

- 8 - Blarney (Wooded Valley of Low Hills and scattered Settlement Clusters)
- 27 - River Bride West (Broad Shallow Patchwork Valley)
- 58 - Enniskeane / Bandon / Ballinhassig (Broad Shallow Patchwork Lower Valley)
- 17 - Dunmanway (Semi-rugged and marginal mosaic Basin)

Key Characteristics

Land use, field, boundaries, trees and wildlife

- Landcover comprises a mosaic of regularly shaped fields typically of medium size. The fields throughout this landscape are bounded mostly by mature broadleaf hedgerows but also by post and wire fencing. Lower hedgerows prevail further to the west on higher ground.

- Scrub and areas of gorse are relatively rare but groups of broadleaf trees and shelterbelts are common, providing punctuation across the landscape or hinting at the presence of farmsteads.
- There are large field sizes to the east of this Landscape Character Type.
- Heathland on hilltops is more evident further west. Field sizes are also noticeably smaller in the western part of this Landscape Character Type.
- In the south west of this Landscape Character Type agriculture is interspersed with areas of marginal land and established broadleaf forestry.
- The valleys in these areas are created by the rivers flowing east to west, for example the Lee and Bandon Rivers, and are surrounded by low well-spaced ridges. They have also created imposing views across the landscape.

Built Environment

- Farmsteads comprise houses as well as metal sheds (with older barrel vaulted or modern A-frame roofs) and traditional out buildings, most of which are relatively well screened by the hedgerows.
- This landscape type is located close to Cork City and two of the key settlements of metropolitan Cork are located within or at the edge of the landscape (Carrigaline and Ballincollig). The main settlement of Bandon is also located to the South West of the area.
- In general the towns in the area have a strong character / urban fabric reflecting the historic agricultural wealth of the area.

Socio Economic

- Some of the larger settlements include Bandon, Ballincollig and Blarney.
- The agricultural use of this landscape primarily involves intensive dairying as well as tillage. The latter provides seasonal colour variation.
- Major roads such as the N22 between Macroom and Cork City and the N71 between Innishannon and Bandon tend to follow the rivers, often providing distant views across the landscape.
- There is some quarry activity in this area.

Ecology

- The River Lee and the River Bandon flowing on an east-west axis of limestone between low well-spaced ridges of sandstone create the topography this area.
- Comprising mostly brown podzolic soils, this landscape is highly fertile, especially along the alluvial floodplain.

Pressure to Change

The CPD recognises that Landscape Character Type 6a is under pressure, particularly from:

1. Population growth in the main settlements of Blarney, Ballincollig, Carrigaline and Bandon.
2. Rural housing and the development of isolated dwellings in the countryside, with inappropriate ribboning of development on approach roads to settlements.
3. Housing - sizable housing estates on the fringes of main settlements represent a particular force for change and may have an adverse impact on the quality and character of some of the area's most distinctive local landscapes. The key pressure for change in this area seems to be urbanisation especially near Cork City and two of the key settlements of metropolitan Cork (Carrigaline and Ballincollig), which are located within or at the edge of the landscape.
4. Natural resources - there may be pressure arising from the quarrying activity in the area. The main quarries in the area are located at Ballygarvan, Ballincollig, Inishannon, Murragh and Killeady.
5. There is also significant pressure for change from windfarm development, intensification of agriculture, road infrastructure and peri-urban development, and tourism.

Relevant Recommendations

- Protect and preserve the Lee Valley and the Bandon River and their surrounding floodplains as unique landscape features in this Landscape Character Type and as valuable resource for scenic and amenity values.
- Control development that will adversely affect distinctive linear sections of the Lee River Valley, especially its open flood plains, when viewed from relevant scenic routes and settlements.
- Conserve and enhance the characteristics in this Landscape Character Type (LCT) that are important to tourism.
- Have regard to the rich and diverse natural heritage in this Landscape Character Type and the concentration of NHA's that are designated for protection. While protecting these areas it is also important to recognise their potential as key recreation and amenity sources.
- Ensure that current quarrying sites undergo a rigorous monitoring regime by ensuring that agreed mitigation measures are fully implemented.
- Require that new quarries undergo a landscape and visual impact assessment with appropriate restoration plan to respect landscape character. Screen planting should respect landscape character.
- Recognise that the lowlands are made up of a variety of working landscapes that are critical resources for sustaining the economic and social well-being of the county.
- Recognise that agriculture is a major land use in this LCT. This will help maintain the existing features of this landscape while also supporting the local economy and rural diversification.

As stated earlier, the Landscape Character Types that have a very high or high landscape value and high or very high landscape sensitivity and are of county or national importance are considered to be our most valuable landscapes, and therefore it is proposed to designate them as High Value Landscapes (HVL). Type 6a is rated as having high Value and high Sensitivity and County Importance yet is not designated as a High Value Landscape (Refer Map Browser, Vol. 4; Cork 2014).

4.8.3.1.3 Characteristics of the Development

The proposed Soil Recovery Facility (SRF) will utilise the permitted quarry infrastructure including internal roads, site office, welfare facilities and other ancillaries to complete the works (Refer to Figure 1.3 - Existing Site Survey Plan). Access to the site will be from the permitted main entrance on the N22 National Primary Road. A wheel wash and weighbridge will be provided as part of the proposed development and the existing workshop will be utilised as a quarantine area. A hard-stand with drainage to oil interceptor will also be provided as a designated refueling area. The total application area including the site infrastructure covers 7.9 ha of lands. The development will be subject to the requirements of a waste management licence.

Operations at the SRF will involve: importation by truck of inert soil and stone and river dredge material; examination of the material for contaminants; placement and levelling of material in the quarry void; capping with subsoil and topsoil; and finally reseeding.

The recovery operations will be sited within the quarry area, being removed from residential property and screened from outside views by the existing perimeter screening berms, topography and vegetation.

The quarry area to be restored is largely dominated by recolonising bare, exposed ground with willow or gorse scrub. The pit slopes have been partially covered by an open scrub of common gorse.

Earthen berms (c. 3 to 4m) with high screening from mature planting of deciduous trees fringe the entire length of the northern boundary of the quarry site, which is contiguous with the N22, while the other boundaries are largely maintained with mature hedgerows. The proposed SRF will thus be well screened from public view from the N22 by the existing screening. There are partially open views of the quarry at the site entrance along the N22, but this is only a passing view and the site of the proposed SRF is removed from the site entrance.

There are several rural roads in the area, but all views of the site from the north, east, south and west are screened from these vantages by intervening topography, hedgerows and scrub, no significant views of the quarry site were identified (Refer to Figure 1.3 and Plates 4.8.1 to 4.8.4).

The area has an established history of quarry working, and these activities have co-existed with other predominantly agricultural based land uses. Co-location of the SRF within the quarry is a synergistic integration of two complementary and mutually beneficial processes, and a requirement to complete restoration of the quarry and full reinstatement of the land.

4.8.3.2 Visual Baseline Conditions

As detailed above the desktop study was used to determine the nature of the visual amenity of the area along with the approximate visibility of the development, which is determined through topographic analysis of map data. Potential receptors of visual effects, including residents and visitors through the area were also identified. The desk study provided the basis for subsequent field surveys and was used to delineate the likely zone of visual influence, identify the principal viewpoints and highlight sensitive visual receptors.

For the purpose of this assessment refer to Figures 1.1 to 1.3, which highlight the study area delineated as the likely zone of visual influence, principal viewpoints and sensitive visual receptors identified.

Site visits were undertaken on 23rd September 2016 and 28th April 2017. Principal viewpoints were mapped, and these views illustrated by photographs with annotations to describe any important characteristics, and the changes that may arise as a result of the development (Refer to Figure 1.3 and Plates 4.8.1 to 4.8.4).

4.8.4 ASSESSMENT OF IMPACTS

The following Impact Assessment matrix provides an indication of the significance of potential effects arising during the life cycle of the development not accounting for any mitigation measures.

Table 4.8.2: Landscape - Impact Matrix

'Do Nothing' Impacts	●		
Factors	**Construction**	**Operation**	Decommissioning
Direct Impacts	●	●	X
Indirect Impacts	X	X	X
Cumulative Impacts	X	X	X
Residual Impacts	X	X	X
'Worst Case' Impacts	X	X	X

None/imperceptible: X; Slight: ●; Moderate: ●; Significant/Very significant: ●.
Refer to Appendix 5.2 for definition of Significance

4.8.4.1 'Do Nothing' Impacts

The Garryhesta site would remain as an unrestored quarry site, without the backfilling generated by the proposed SRF. As the quarry area to be restored is currently inactive and well screened, the absence of the proposed SRF would have no significant impact on the landscape.

4.8.4.2 Direct Impacts

The proposed site is within Landscape Character Area Type 6a which is rated as having high Value and high Sensitivity and County Importance yet is not designated as a High Value Landscape (Refer Map Browser, Vol. 4; Cork 2014). The quarry site at Garryhesta, which includes the site of the proposed SRF, is not included in any area with an ecological designation (pNHA, cSAC or SPA). The site is not open to view from the nearest scenic route S38 which runs E-W from Classis to Coachford via Currabeg, south of the Inniscarra Reservoir.

The predominant land use within the proposed site, which is to be co-located within the quarry site, is by definition that of quarrying activities related to the extraction of sand and gravel and associated operations.

The proposed SRF is potentially more readily absorbed by the pre-existence of, and co-location within the quarry. Perimeter berms particularly along the northern site boundary with the N22 road have already been constructed as part of the quarry development works to screen the quarry including the proposed location of the SRF. As such there are no significant construction works required with respect to screening of the proposed development prior to commencement of operations.

Potential Landscape Impacts

The principal attributes (and impacts) to be assessed include *inter alia* the following:

- Change of landform from a, disused section of quarry to restored land, with appropriate screening and planting.
- Change of land use from quarrying/extraction to restored land.
- The loss of ecological habitat as a result of the quarry activity
- The loss if any of cultural heritage features to the quarry activity
- Views of screening berms on northern boundary from N22

The results of the impact assessment are presented in Table 4.8-3 below.

Potential Visual Impacts

The results of the visual field survey have shown that views towards the SRF site from the north, east, south and west are screened from these vantages by intervening topography, hedgerows and vegetation. No significant views of the quarry site were identified (Refer to Figure 1.3 and Table 4.8-4 below and Plates 4.8.1 to 4.8.4).

4.8.4.3 Indirect Impacts

There are no indirect impacts associated with the proposed development and the surrounding areas.

4.8.4.4 Cumulative Impacts

The proposed soil recovery facility including site infrastructure will comprise a c. 7.9 ha section of the existing quarry workings at Garhyhesta, as shown by the Application Area Map Figure 1.2. Thus, the proposed application site area (for infilling) will be confined to a relatively small section of the sand and gravel pit, much of which has already been worked out.

The only other land use activities visible in the area are quarries, existing farming operations and single dwelling houses. There will be no significant in combination landscape impacts resulting from this project, and other local existing developments, quarries, projects and plans.

The interaction of the quarry and proposed SRF is seen as 'symbiotic' and positive, with no negative cumulative impacts on the landscape.

4.8.4.5 Residual Impacts

It is considered that following restoration and the mitigation measures incorporated in the design that there will be no significant effects in terms of Landscape.

4.8.4.6 'Worst Case' Impacts

The site is well screened from outside views along the N22 by well-established planting and screening berms (Refer to EIAR Figures 3.1 to 3.4). As such mitigations measures with respect to visual impact are already in place and the worst-case impact due to the restoration of the pit by backfilling will be imperceptible to slight.

Table 4.8-3 Landscape Impact Assessment Matrix

Topic area	Description of impact	Magnitude[1]	Sensitivity[1]	Level of importance[1]					Quality[2]			Duration[2]					Significance[2]	Mitigation
				I	N	R	C	L	Positive	Neutral	Negative	ST	MT	LT	P	T		
Landform	Change of landform from a disused section of quarry to beneficial agricultural use and secure wild ife refuge.	VL	VL														Imperceptible to Slight	Area will be restored to beneficial agricultural use and secure wildlife refuge.
Land use	Change of land use from quarrying/extraction to beneficial agricultural use and secure wild ife refuge	VL	VL														Imperceptible to Slight	The final restoration of the entire quarry site will return the SRF site to agricultural use
Loss of ecological habitat	The recovery of soils and dredging spoil on this site will result in a local impact on ecology but will not result in any loss of heritage values in the locality. The changes will be both negative (loss of open habitats) and positive (gain of woodland/scrub over time).	N	N														Slight	Area will be restored to beneficial agricultural use and secure wildlife refuge.
Loss of cultural heritage	No direct impacts on known archaeological or architectural heritage	N	N														Imperceptible	As the proposed development will have no direct or indirect impact on the archaeological, architectural or cultural heritage resource, it is considered mitigation measures are not required.
Views of screening berms	Views of screening berm along Northern Boundary with N22 Road.	L	VL														Imperceptible to Slight	The screening berms and existing mature planting will be maintained to prevent outside views of the quarry lands under restoration.

Key

Level of importance I International; N National; R Regional; C County; L Local

Magnitude and sensitivity N Negligible; VL Very Low; L Low; ML Medium–Low; M Medium; MH Medium–High; H High; VH Very High

Notes

1 Criteria used based on The Landscape Institute with the Institute of Environmental Management & Assessment, (2005) Guidelines for Landscape and Visual Impact Assessment - 2nd Ed.

2 The terminology used based on Table 3.3 EPA (2017) Guidelines on the Information to be contained in an Environmental Impact Assessment Report, Draft, Environmental Protection Agency (EPA) Wexford.

Table 4.8-4 Predicted Visual Impacts with Mitigation

NATURE OF IMPACT				Level of importance[1]					Quality[2]			Duration[2]					Magnitude[1]	Receptor Sensitivity[1]	Significance [2]	Mitigation
Viewpoint	Plate	Location	Description	I	N	R	C	L	Positive	Neutral	Negative	ST	MT	LT	P	T				
1	4.8.1	View from N22 towards Site Entrance	Existing quarry entrance to be used by proposed SRF. SRF site is not open to view being screened by intervening screen planting.														N	VL	Imperceptible	No mitigation measures required with respect to this vantage.
2	4.8.2	View towards proposed SRF from N22 Road to West	SRF site is not open to view being screened by existing hedgerow planting. Quarry Area to be backfilled is also below field of view.														VL	VL	Slight to Imperceptible	No specific mitigation measures for the SRF considered necessary with respect to this vantage.
3	4.8.3	View from N22 opposite nearest residence	SRF site is not open to view being screened by existing Screen planting. Quarry Area to be backfilled is also below field of view.														VL	VL	Slight to Imperceptible	No specific mitigation measures for the SRF considered necessary with respect to this vantage.
4	4.8.4	View from N22 directly North of proposed SRF	SRF site is not open to view being screened by existing Screen planting. Quarry Area to be backfilled is also below field of view.														VL	VL	Slight to Imperceptible	No specific mitigation measures for the SRF considered necessary with respect to this vantage.

Key

Level of importance I = International; N = National; R = Regional; C = County; L = Local

Magnitude and sensitivity N = Negligible; VL = Very Low; L = Low; ML = Medium–Low; M = Medium; MH = Medium–High; H = High; VH = Very High

Notes

1 Criteria used based on The Landscape Institute with the Institute of Environmental Management & Assessment, (2005) Guidelines for Landscape and Visual Impact Assessment - 2nd Ed.

2 The terminology used based on Table 3.3 EPA (2017) Guidelines on the Information to be contained in an Environmental Impact Assessment Report, Draft, Environmental Protection Agency (EPA) Wexford.

4.8.5 MITIGATION MEASURES

Mitigation measures include avoidance, reduction, compensation and remedy of potential impacts. The primary means of mitigation involves an efficient design and layout for the SRF that optimises use of existing infrastructure and plant, screening using berms and trees, and the full restoration of SRF and quarry site, once operations at the site cease.

The objective of the restoration scheme is to ensure visual amenity and to restore the excavation to a beneficial after-use. This would be in accordance with the proper planning and sustainable development of the area.

Because the SRF will be co-located within the Garryhesta quarry site, it will benefit from existing mitigation measures. The quarry is screened from outside views and nearest residences by intervening screening berms, topography and hedgerows. The boundaries are maintained with hedgerows and stock fencing.

The proposed development is not visible being below surrounding ground level and the existing roadside and intervening hedgerows effectively screen the development from transient passing views along the N22 road.

The restoration plan involves the progressive backfilling of the quarry void on a phased basis, with natural inert soil and stone and river dredging spoil sourced externally and imported. Topsoil will be seeded, and the area returned to useable agricultural grassland. The phased scheme for final restoration of the area is shown by Figures 3.1 to 3.4.

The applicant is an experienced earthmoving contractor. Soils will be handled in accordance with accepted guidelines and good practice (Refer to EIAR Sections 3.4.1 & 4.3.5.

Once the topsoil is re-instated it will be seeded with a suitable mix of grasses suitable for pasture in order to quickly stabilise the topsoil. Once the grass sward has become established the restored farmland can be kept either as pasture or hay meadow.

Roadstone propose to carry out the reclamation works in accordance with the Green, Low Carbon, Agri-environment Scheme (GLAS). i.e. Consideration will be given through the land reclamation scheme to conservation of arable grass margins, conservation of solitary bees, coppicing and planting of native trees and hedgerows, establishment of traditional hay meadow.

4.8.6 REFERENCES

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https://www.google.ie/maps Google Maps.

4.8.7 FIGURES

Figure 4.8 1 Landscape Character Type Map of County Cork

Figure 4.8 2 Corine 2012 Map of Ovens Area

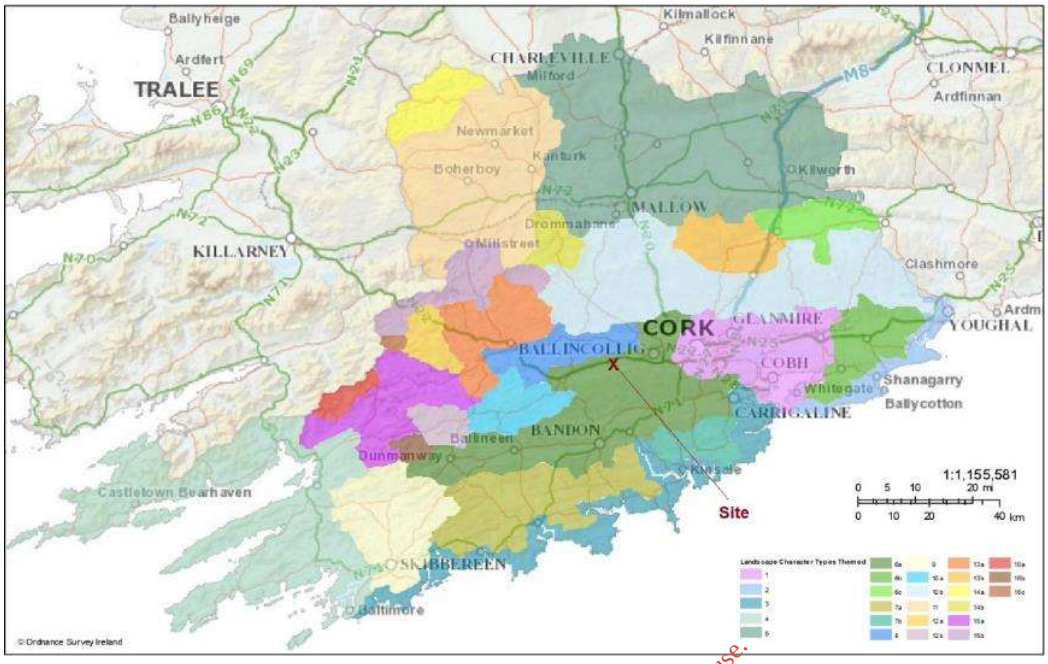


Figure 4.8-1 Landscape Character Type Map of County Cork

Note. Map showing Landscape Character Types. Location of site is indicated within Type 6A: Broad Fertile Lowland Valleys. Legend and scale bar at lower right. Modified from Cork (2014).

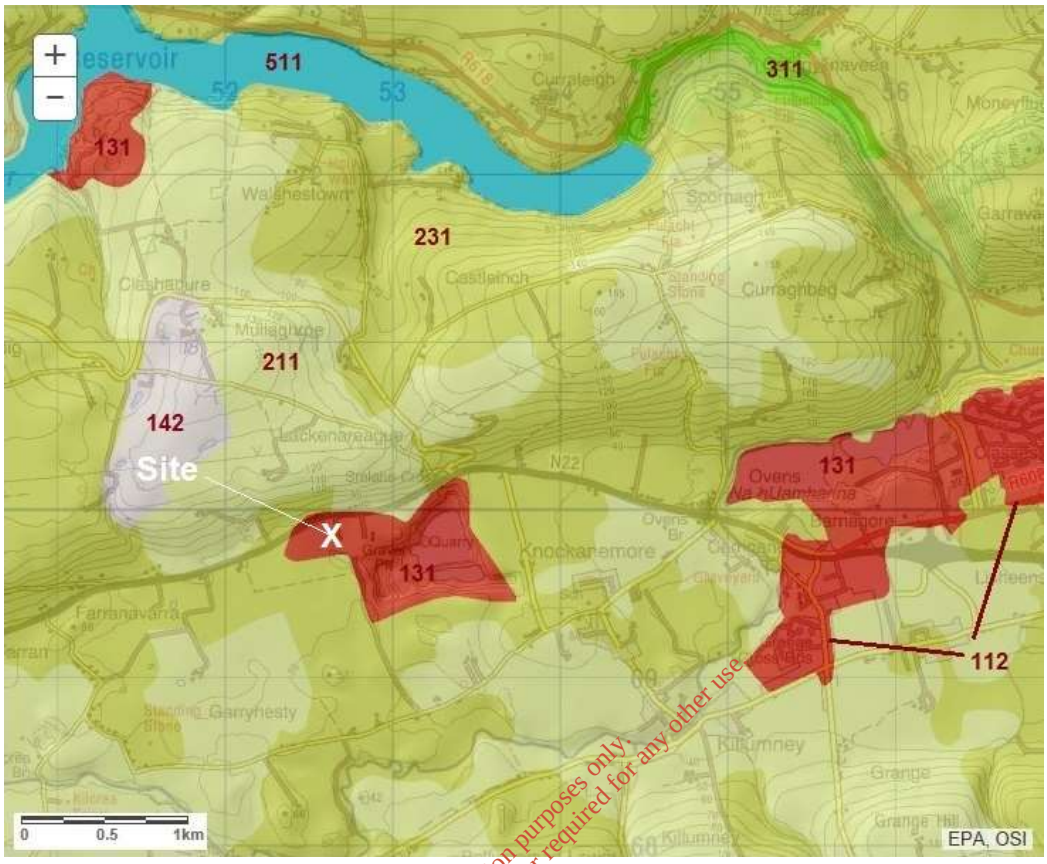


Figure 4.8-2 Corine 2012 Map of Ovens Area.

Note. Discontinuous urban fabric (112); Mineral extraction sites (131); Sport and Leisure Facilities (142); Non-irrigated land (211); Pastures (231); Broad-leaved forest (311); and Stream courses (511). Location of site is indicated. Scale bar at lower left. Modified from EPA (2017).

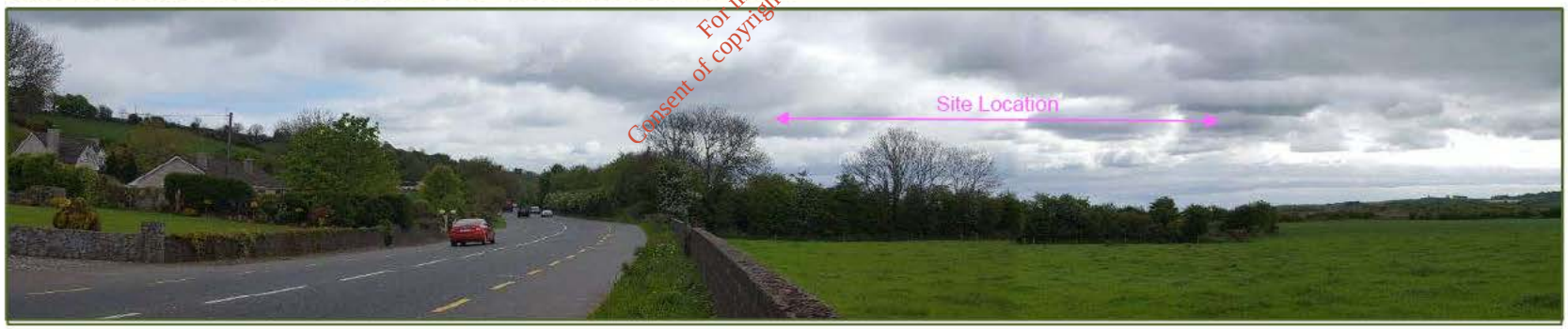
4.8.8 PLATES

Plate 4.8-1 View from N22 towards Site Entrance

Description: Existing quarry entrance to be used by proposed SRF. SRF site is not open to view being screened by intervening screen planting

Mitigation: None considered necessary from this vantage.

Plate 4.8-2 View towards proposed SRF from N22 Road to West



Description: SRF site is not open to view being screened by existing hedgerow planting. Quarry Area to be backfilled is also below field of view.

Mitigation: None considered necessary from this vantage.

Plate 4.8-3 View from N22 opposite nearest residence

Description: SRF site is not open to view being screened by existing Screen planting. Quarry Area to be backfilled is also below field of view.

Mitigation: None considered necessary from this vantage.

Plate 4.8-4 View from N22 directly North of proposed SRF

View Looking East

View looking North and to west

Description: SRF site is not open to view being screened by existing Screen planting. Quarry Area to be backfilled is also below field of view.

Mitigation: None considered necessary from this vantage.