Table 8.1 **European Sites**

Site	Code	Qualifying Interests/Special Conservation Interests	Location & Distance
Special Protection Areas (SPA)			
South Dublin Bay and River Tolka Estuary SPA	004024	Birds A162 Redshank (*Tringa totanus*) A193 Common Tern (*Sterna hirundo*) A157 Bar-tailed Godwit (*Limosa lapponica*) A130 Oystercatcher (*Haematopus ostralegus*) A141 Grey Plover (Pluvialis squatarola) A149 Dunlin (Calidris alpina) A137 Ringed Plover (*Charadrius hiaticula*) A194 Arctic Tern (*Sterna paradisaea*) A192 Roseate Tern (*Sterna dougallii*) A143 Knot (Calidris canutus) A179 Black-headed Gull (Chroicocephalus ridibundus) A144 Sanderling (*Calidris alba*) A046 Light-bellied Brent Goose (*Branta bernicla* hrota) Habitats Wetlands	8.0 km southeast.

Site	Code	Qualifying Interests/Special Conservation Interests	Location & Distance
Malahide Estuary (Broadmeadown/Swords) SPA	004025	Birds A130 Oystercatcher (*Haematopus ostralegus*) A005 Great Crested Grebe (*Podiceps cristatus*) A162 Redshank (*Tringa totanus*) A067 Goldeneye (Bucephala clangula) A141 Grey Plover (Pluvialis squatarola) A149 Dunlin (Calidris alpina) A046 Light-bellied Brent Goose (*Branta bernicla hrota*) A054 Pintail (*Anas acuta*) A048 Shelduck (*Tadorna tadorna*) A069 Red-breasted Merganser (*Mergus serrator*) A143 Knot (Calidris canutus) A156 Black-tailed Godwit (*Limosa limosa*) A140 Golden Plover (*Pluvialis apricaria*) A157 Bar-tailed Godwit (*Limosa lapponica*) Habitats Wetlands	9.8 km northeast.

Site	Code	Qualifying Interests/Special Conservation Interests	Location & Distance
North Bull Island SPA	004006	Birds A179 Black-headed Gull (Chroicocephalus ridibundus) A048 Shelduck (*Tadorna tadorna*) A054 Pintail (*Anas acuta*) A160 Curlew (Numenius arquata) A157 Bar-tailed Godwit (*Limosa lapponica*) A046 Light-bellied Brent Goose (*Branta bernicla hrota*) A056 Shoveler (*Anas clypeata*) A169 Turnstone (Arenaria interpres) A141 Grey Plover (Pluvialis squatarola) A052 Teal (Anas crecca) A144 Sanderling (*Calidris alba*) A130 Oystercatcher (*Haematopus ostralegus*) A140 Golden Plover (*Pluvialis apricaria*) A149 Dunlin (Calidris alpina) A156 Black-tailed Godwit (*Limosa limo*sa) A162 Redshank (*Tringa totanus*) A143 Knot (Calidris canutus) Habitats Wetlands	10.5 km east. .

Site	Code	Qualifying Interests/Special Conservation Interests	Location & Distance
Baldoyle Bay SPA	004016	Birds A140 Golden Plover (*Pluvialis apricaria*) A137 Ringed Plover (*Charadrius hiaticula*) A048 Shelduck (*Tadorna tadorna*) A046 Light-bellied Brent Goose (*Branta bernicla* hrota) A157 Bar-tailed Godwit (*Limosa lapponica*) A141 Grey Plover (Pluvialis squatarola) Habitats Wetlands	11.7 km east.
Rogerstown Estuary SPA	004015	Birds A149 Dunlin (Calidris alpina) A046 Light-bellied Brent Goose (*Branta bernicla hrota*) A048 Shelduck (*Tadorna tadorna*) A137 Ringed Plover (*Charadrius hiaticula*) A141 Grey Plover (Pluvialis squatarola) A156 Black-tailed Godwit (*Limosa limosa*) A056 Shoveler (*Anas clypeata*)	14.2 km northeast.

Site	Code	Qualifying Interests/Special Conservation Interests	Location & Distance
		A043 Greylag Goose (*Anser anser*) A130 Oystercatcher (*Haematopus ostralegus*) A162 Redshank (*Tringa totanus*) A143 Knot (Calidris canutus) Habitats Wetlands	
Malahide Estuary SAC	000205	Habitats 1140 Mudflats and sandflats not covered by seawater at low tide 1310 Salicornia and other annuals colonising mud and sand 1330 Atlantic salt meadows (Glauco-Puccinellietalia maritimae) 1410 Mediterranean salt meadows (Juncetalia maritimi) 2120 Shifting dunes along the shoreline with Ammophila arenaria (white dunes) 2130 Fixed coastal dunes with herbaceous vegetation (grey dunes)*	9.8 km northeast.

Site	Code	Qualifying Interests/Special Conservation Interests	Location & Distance
North Dublin Bay SAC	000210	Habitats 1140 Mudflats and sandflats not covered by seawater at low tide 1210 Annual vegetation of drift lines 1310 Salicornia and other annuals colonising mud and sand 1330 Atlantic salt meadows (Glauco-Puccinellietalia maritimae) 1410 Mediterranean salt meadows (Juncetalia maritimi) 2110 Embryonic shifting dunes 2120 Shifting dunes along the shoreline with Ammophila arenaria (white dunes) 2130 Fixed coastal dunes with herbaceous vegetation (grey dunes)* 2190 Humid dune slacks Species 1395 Petalwort (Petalophyllum ralfsii)	10.4 km southeast. .
South Dublin Bay SAC	000206	Habitats 1140 Mudflats and sandflats not covered by seawater at low tide 1210 Annual vegetation of drift lines 1310 Salicornia and other annuals colonising mud and sand 2110 Embryonic shifting dunes	10.7 km east.

Site	Code	Qualifying Interests/Special Conservation Interests	Location & Distance
Baldoyle Bay SAC	000199	Habitats 1140 Mudflats and sandflats not covered by seawater at low tide 1310 Salicornia and other annuals colonising mud and sand 1330 Atlantic salt meadows (Glauco-Puccinellietalia maritimae) 1410 Mediterranean salt meadows (Juncetalia maritimi)	11.8 km east.
Rye Water Valley/Carton SAC	001398	Habitats 7220 Petrifying springs with tufa formation (Cratoneurion)* Species 1014 Narrow-mouthed Whorl Snail (Vertigo angustior) 1016 Desmoulins's Whorl Snail (Vertigo moulinsiana)	12.1 km southwest.
Rogerstown Estuary SAC	000208	Habitats 1130 Estuaries 1140 Mudflats and sandflats not covered by seawater at low tide 1310 Salicornia and other annuals colonising mud and sand 1330 Atlantic salt meadows (Glauco-Puccinellietalia maritimae) 1410 Mediterranean salt meadows (Juncetalia maritimi) 2120 Shifting dunes along the shoreline with Ammophila arenaria (white dunes) 2130 Fixed coastal dunes with herbaceous vegetation (grey dunes)*	13.1 km northeast.

North Bull Island SPA

North Bull Island SPA covers all of the inner part of north Dublin Bay, with the seaward boundary extending from the Bull Wall lighthouse across to Drumleck Point at Howth Head. The North Bull Island sand spit is a relatively recent depositional feature, formed as a result of improvements to Dublin Port during the 18th and 19th centuries. It is almost 5 km long and 1 km wide and runs parallel to the coast between Clontarf and Sutton. Part of the interior of the island has been converted to golf courses.

The site is of special conservation interest for the following species: Light-bellied Brent Goose, Shelduck, Teal, Pintail, Shoveler, Oystercatcher, Golden Plover, Grey Plover, Knot, Sanderling, Dunlin, Black-tailed Godwit, Bar-tailed Godwit, Curlew, Redshank, Turnstone and Black-headed Gull. The site is also of special conservation interest for holding an assemblage of over 20,000 wintering waterbirds.

The EU Birds Directive pays particular attention to wetlands and, as these form part of this SPA, the site and its associated waterbirds are of special conservation interest for Wetland & Waterbirds.

Baldoyle Bay SPA

Baldoyle Bay SPA, located to the north and east of Baldoyle and to the south of Portmarnock. The site is a relatively small, narrow estuary separated from the open sea by a large sand dune system. Two small rivers, the Mayne River and the Sluice River, flow into the inner part of the estuary.

The site is a special conservation interest for the following species: Light-bellied Brent Goose, Shelduck, Ringed Plover, Golden Plover, Grey Plover and Bar-tailed Godwit. The site and its associated waterbirds are of special conservation interest for Wetland & Waterbirds. Regular breeding birds include Shelduck, Mallard and Ringed Plover. In Autumn, passage migrants such as Curlew Sandpiper, Spotted Redshank and Green Sandpiper are regular in small numbers. Little Egret, a species which has recently colonised Ireland, also occurs at this site.

Rogerstown Estuary SPA

Rogerstown Estuary SPA is situated about 2 km north of Donabate. It is a relatively small, funnel shaped estuary separated from the sea by a sand and shingle peninsula; the site extends eastwards to include an area of shallow marine water. The estuary receives the waters of the Ballyboghil and Ballough rivers and has a wide salinity range, from near full seawater to near full freshwater.

The site is of special conservation interest for the following species: Greylag Goose, Light-bellied Brent Goose, Shelduck, Shoveler, Oystercatcher, Ringed Plover, Grey Plover, Knot, Dunlin, Black-tailed Godwit and Redshank.

The site and its associated waterbirds are of special conservation interest for Wetland & Waterbirds. Rogerstown Estuary SPA is an important link in the chain of estuaries on the east coast. It supports an internationally important population of Light-bellied Brent Goose and nationally important populations of a further 10 species. The presence of Little Egret and Golden Plover is of note, as these species are listed on Annex I of the EU Birds Directive. Rogerstown Estuary is also a Ramsar Convention site, and part of Rogerstown Estuary SPA is designated as a Statutory Nature Reserve and a Wildfowl Sanctuary.

North Dublin Bay SAC

North Dublin Bay SAC covers the inner part of north Dublin Bay, the seaward boundary extending from the Bull Wall lighthouse across to the Martello Tower at Howth Head. The North Bull Island is the focal point of this site. This site is an excellent example of a coastal site with all the main habitats represented. The site holds good examples of nine habitats that are listed on Annex I of the EU Habitats Directive; one of these is listed with priority status. Several of the wintering bird species have populations of international importance, while some of the invertebrates are of national importance. The site contains a numbers of rare and scarce plants including some which are legally protected. Its proximity to the capital city makes North Dublin Bay an excellent site for educational studies and research.

8.6.2 National Sites

Natural Heritage Areas (NHAs) and proposed Natural Heritage Areas (pNHAs) are national designations under the Wildlife Act 1976, as amended. A Natural Heritage Area (NHA) is designated for its wildlife value and receives statutory protection. These areas are considered nationally important for the habitats present or which holds species of plants and animals whose habitats needs protection. Under the Wildlife Amendment Act (2000), NHAs are legally protected from damage from the date they are formally proposed for designation.

Proposed Natural Heritage Areas (pNHA) were published on a non-statutory basis in 1995 and have not since been statutorily designated. These sites are also of significance for wildlife and habitats. Prior to statutory designation, pNHAs are still subject to limited protection, in the form of:

- Agri-environmental farm planning schemes support the objective of maintaining and enhancing the conservation status of pNHAs;
- There is a requirement for the Forest Service to gain NPWS approval before they will pay afforestation grants on pNHA lands; and,
- A recognition of the ecological value of pNHAs by Planning and Licencing Authorities.

The NHAs (pNHAs) located in the vicinity of the proposed development site are listed in Table 8.2 and are shown in Figure 8.1. The proposed development site is not located within any NHA or pNHA. There are a number of pNHAs in its vicinity. The closest pNHA is Santry Demesne pNHA, located 3.9km to the east. The Santry Demesne pNHA is a public park with associated house and gardens. .

8.6.3 Important Bird Areas Dublin Bay and Baldoyle Bay

Important Bird and Biodiversity Areas (IBAs) are sites selected as important for bird conservation because they regularly hold significant populations of one or more globally or regionally threatened, endemic or congregator bird species or highly representative bird assemblages.

The European IBA Programme identifies, monitors and protects key sites for birds all over the continent. It aims to ensure that the conservation value of IBAs in Europe (now numbering more than 5,000 sites or about 40% of all IBAs identified globally to date) is maintained, and where possible enhanced. The Programme aims to guide the implementation of national conservation strategies, through the promotion and development of national protected areas to form a network of sites ensuring that migratory species find suitable breeding, stop-over and wintering places along their respective flyways.

Table 8.2 Natural Heritage Sites

Natural Heritage Areas (NHAs) and proposed Natural Heritage Areas (pNHAs)	Site Code	Overlapping with European site	Location & Description
Santry Demesne pNHA	000178	No	3.9km east. Former demesne woodland which contains a protected plant species: Hairy St-John's Wort. .
Royal Canal pNHA	002103	No	3.4km south. Extensive freshwater feature of value to a range of biodiversity, and with value as an ecological corridor.
Sluice River Marsh pNHA	001763	No	4.0km east-northeast. Freshwater marsh
Liffey Valley pNHA	000128	No	5.8km southwest. Presence of legally protected plant species, hairy St. John's-wort *Hypericum hirsutum*, rare Red List plant species green figwort *Scrophularia umbrosa* and yellow archangel *Lamiastrum galeobdolon* and the diversity of habitat present.
Grand Canal pNHA	002104	No	8.7km south. Diversity of species canal supports and presence of legally protected plant species, opposite-leaved pondweed *Groenlandia densa*
Feltrim Hill pNHA	001208	No	8.9km northeast. Good example of knoll-reef phenomenon. Previously known to contain two rare plant species, namely spring squill Scilla verna and long-stalked crane's-bill *Geranium columbinum*

Natural Heritage Areas (NHAs) and proposed Natural Heritage Areas (pNHAs)	Site Code	Overlapping with European site	Location & Description
South Dublin Bay pNHA	000210	South Dublin Bay SAC and South Dublin Bay and River Tolka Estuary SPA	10.7km southeast. See South Dublin Bay SAC above for description.
North Dublin Bay pNHA	000206	North Dublin Bay SAC and North Bull Island SPA	11.1km southeast. See North Dublin Bay SAC and North Bull Island SPA above for description. Potential source-pathway-receptor link has been identified (surface water run-off during construction and/or operational phases, and the spread of invasive species).
Malahide Estuary pNHA	000205	Malahide Estuary SPA/ Malahide Estuary (Broadmeadown/Swords) SPA	11.5km northeast. See Malahide Estuary SPA/ Malahide Estuary (Broadmeadown/Swords) SPA above for description. .
Baldoyle Bay pNHA	000199	Balldoyle Bay SAC/Baldoyle Bay SPA	11.9km east. See Balldoyle Bay SAC/Baldoyle Bay SPA above for description. .
Dodder Valley pNHA	000991	No	13.0km south .
Rogerstown Estuary pNHA	000208	Rogerstown Estuary SAC/Rogerstown Estuary SPA	13.8km northeast. See Rogerstown Estuary SAC/Rogerstown Estuary SPA for description. .

8.6.4 Important Bird Areas Dublin Bay and Baldoyle Bay

Important Bird and Biodiversity Areas (IBAs) are sites selected as important for bird conservation because they regularly hold significant populations of one or more globally or regionally threatened, endemic or congregator bird species or highly representative bird assemblages. The proposed development lies 10.7km from Dublin Bay (IE109) and 11.9km from Baldoyle Bay (IE112). These sites qualify for designation under the following IBA Criteria (2000):

- A4iii - The site is known or thought to hold, on a regular basis, ≥ 20,000 waterbirds or ≥ 10,000 pairs of seabird of one or more species.
- B1i - The site is known or thought to hold ≥ 1% of a flyway or other distinct population of a waterbird species.
- B2 - The site is one of the most important in the country for a species with an unfavourable conservation status in Europe and for which the site-protection approach is thought to be appropriate.
- C2. Concentrations of a species threatened at the European Union level. The site is known to regularly hold at least 1% of a flyway population or of the EU population of a species threatened at the EU level (listed on Annex I and referred to in Article 4.1 of the EC Birds Directive).
- C3 - The site is known to regularly hold at least 1% of a flyway population or of the EU population of a species threatened at the EU level (not listed on Annex 1 of The Birds Directive).
- C4 - The site is known to regularly hold at least 20,000 migratory waterbirds and/or 10,000 pairs of migratory species of one or more species.
- C6 - The site is one of the five most important in the European region in question for a species or subspecies considered threatened in the European Union.

Details of triggers species for Dublin Bay IBA and Baldoyle Bay IBA are listed in Table 8.3 and Table 8.4.

Table 8.3 Summary of the Dublin Bay IBA Trigger Species

Species	Current IUCN Red List Category	Season	Year(s) of estimate	Population estimate	IBA Criteria Triggered
Brent Goose *Branta bernicla*	NT	winter	2002-2006	2,730-5,290 individuals	B1i, B2, C3
Bar-tailed Godwit *Limosa lapponica*	NT	Winter	2002-2006	771-2,511 individuals	B1i, C2, C6
Black-tailed Godwit *Limosa*	NT	Winter	2002-2006	679-1,448 individuals	B1i, C3
Red Knot *Calidris canutus*	NT	Winter	2002-2006	2,506-5,375 individuals	B2
Common Tern *Sterna hirundo*	LC	Breeding	2008-2009	404-477 breeding pairs	C6
A4iii Species group – waterbirds	n/a	Winter	2002-2006	27,472-34,996 individuals	A4iii, C4

Table 8.4 Summary of the Baldoyle Bay IBA Trigger Species

Species	Current IUCN Red List Category	Season	Year(s) of estimate	Population estimate	IBA Criteria Triggered
Brent Goose *Branta bernicla*	NT	winter	2002-2006	668-908 individuals	B1i, B2, C3

8.6.5 RAMSAR Sites

The Convention on Wetlands, called the Ramsar Convention, is an intergovernmental treaty that provides a framework for national action and international cooperation for the conservation and wise use of wetlands and their resources. A key commitment of Ramsar Contracting Parties is to identify and place suitable wetlands onto the List of Wetlands of International Importance. There are a number of Ramsar sites around Dublin Bay i.e. North Bull Island, Sandymount Strand/Tolka Estuary, Baldoyle Bay and Rogerstown Estuary, which is a non-statutory designation.

8.6.6 Flora

The development site lies within Ordnance Survey National Grid 10km square O14. The National Biodiversity Data Centre (NBDC) online database provides data on the distribution of mammals, birds, and invertebrates within the 10km grid squares. The NBDC database lists one protected plant species within O14 i.e., Meadow Barley (*Hordeum secalinum*). This species is protected by the Flora (Protection) Order, 2022 (S.I. No. 235/2022). Blue Fleabane (*Erigeron acer*), Smooth Brome (*Bromus racemosus*) and Glebionis segetum, are endangered plant species that have also been recorded within O14.

The Flora (Protection) Order, 2022 (S.I. No. 235/2022) also gives legal protection to 65 species of bryophytes in the Republic of Ireland (25 liverworts and 40 mosses). No rare or threatened bryophyte species have been recorded in the vicinity of the proposed development site (NPWS map viewer).

Table 8.5 lists threatened species and their designations recorded within O14. No rare, threatened or legally protected plant species, as listed in the Irish Red Data Book (Wyse Jackson *et al* 2016; Curtis & McGough, 1988), were found within the site nor have they been recorded in the general area in the past.

Table 8.5. NBDC Listed Flowering and Endangered Flowering plants Grid Square O14

Flowering plant Species	Latin Name	Designations/Threatened Status
Blue Fleabane	*Erigeron acer*	Threatened Species: Least concern
Smooth Brome	*Bromus racemosus*	Threatened Species: Vulnerable
Meadow Barley	*Hordeum secalinum*	Flora Protection Order & Threatened Species: Endangered
	Glebionis segetum	Threatened Species: Near threatened

Source NBDC database 28/03/23

8.6.7 Habitats

Walk-over surveys were completed on the 4th of December 2020, 1st March, 2021 and the 27th of August 2022. The aim of the surveys was to provide information on habitats and species within the area of the proposed project and within the receiving environment.

An overview of habitats recorded within the proposed development site is provided in Figure 8.2 and these habitats are described in Table 8.6. Photographs of the site are also included below. The ecological value of habitats was defined using the classification scheme outlined in the *Guidelines for Assessment of Ecological Impacts of National Road Schemes* (National Roads Authority, 2009) (Appendix 8.2).

It should be noted that the value of a habitat is site specific and partially related to the amount of that habitat in the surrounding landscape. Habitats that are considered to be good examples of Annex I and Priority habitats are classed as being of International or National Importance. Semi-natural habitats with high biodiversity in a county context and that are vulnerable, are considered to be of County Importance. Habitats that are semi-natural, or locally important for wildlife, are considered to be of Local Importance (higher value) and sites containing small areas of semi-natural habitat or maintain connectivity between habitats are considered to be of Local Importance (lower value).

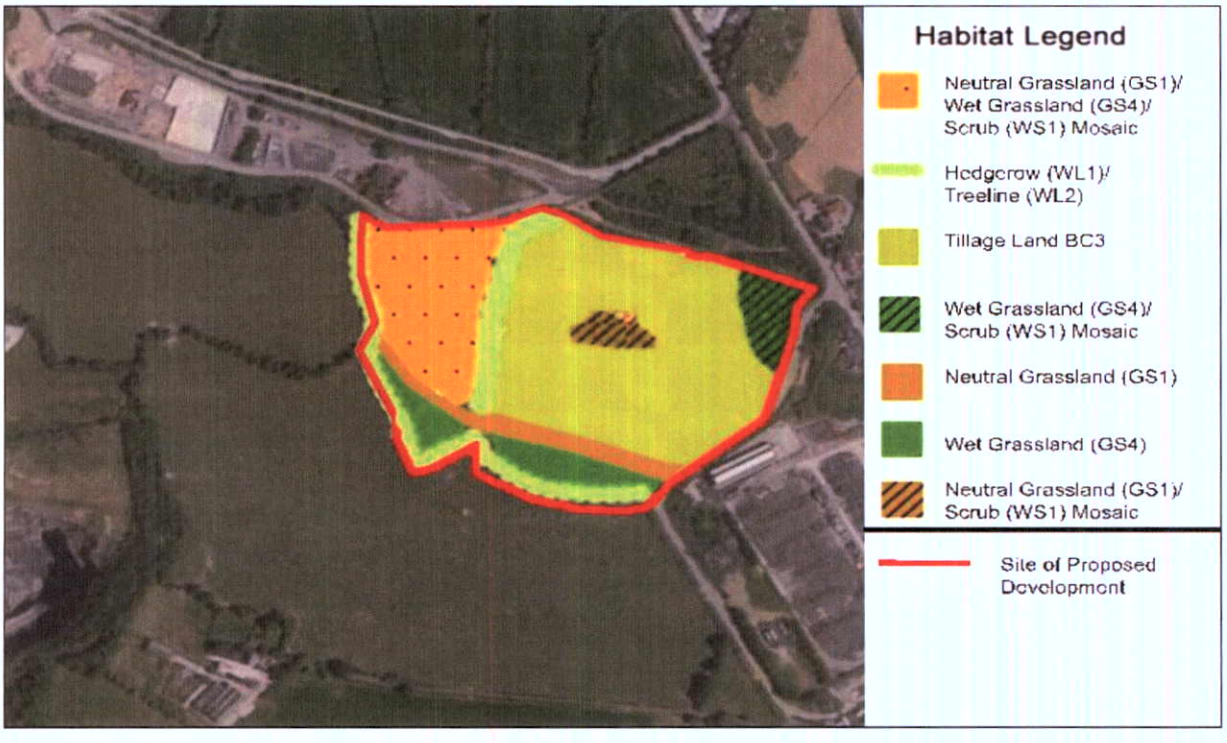

Figure 8.2 Habitats

The proposed development site contains two agricultural fields separated by an overgrown treeline. The site covers a mixture of flat to undulating land with a high point of c. 90m at an old sand pit/quarry (at the centre of the eastern field) to a low point of c. 80m along the southern site boundary. Soils are a mixture of dry minerals with sand from the old quarry site.

The larger eastern field was formerly used for tillage farming, but this area is no longer cultivated. The centre of this field was historically used as a sandpit and the dry mineral and sandy soils from this activity persist in the field. The smaller western field was formerly grazed, most likely by horses, but has been un-grazed for several years.

A mix of Hedgerow (WL1)/Treeline (WL2) occurs along the southern and western site boundaries of the site. The dominant species within this boundary habitat is Hawthorn (*Crataegus monogyna*), however Blackthorn (*Prunus spinosa*), Elm (*Ulmus sp*), Ash (*Fraxinus excelsior*), Great Willow (*Epilobium hirsutum*) and Downy Birch (*Betula pubescens*) are also present.

The internal Boundary has more species diversity than the external boundaries, including elm (Ulmus spp.), Ash (*Fraxinus excelsior*) and one Oak (*Quercus robur*). All hedges are in excess of 150 years old and are a higher value habitat at a local level. Both Elm disease (*Ophiostoma ulmi*) and ash dieback disease (*Hymenoscyphus fraxinus*) are present.

The larger eastern field is classified as Tilled land (BC3). This area was previously cropped for cereals but has not been actively farmed for tillage for several years. Ground at the centre of this field is slightly raised due to its previous use as a sand pit/quarry and supports a mosaic of Neutral Grassland (GS1)/Scrub (WS1). In the absence of active management, common ruderal species have become established i.e., Dandelion (Taraxacum *spp.*), Willowherb (*Epilobium spp.*), Creeping Thistle (*Circium arvense*) and ragworts (*Senecio* spp.). These species are of value for seed eating bird species such as Linnet (*Linaria cannabina*) which was recorded here.

Table 8.6. Habitats within the Proposed Development Site

Habitat Type	Habitat Description	Habitat value (NRA Guidelines)
Hedgerow (WL1)/Treeline (WL2)	A mix of Hedgerow (WL1)/Treeline (WL2) are located on the southern, western boundaries and on the internal boundary between the two fields. The dominant species is Hawthorn *Crataegus monogyna*, but Blackthorn *Prunus spinosa*, Elm *Ulmus spp.*, Ash *Fraxinus excelsior,* and Downy Birch *Betula pubescens* were also noted. The boundary between the two fields is dominated by Ash and Elm.	Local importance (Higher Value).
Tilled Land (BC3)	The larger eastern field is classified as Tilled land (BC3). This area was previously cropped for cereals but has not been actively farmed for tillage for a few years. In the absence of active management, common ruderal species have become established i.e., Dandelion (*Taraxacum spp.*), Willow-herbs (*Epilobium* spp.) and ragworts (*Senecio* spp.). These species are of value for seed eating bird species such as Linnet (*Linaria cannabina*) which was recorded here.	Local importance (Lower value).
Wet Grassland (GS4)/Scrub (WS1)	A Wet Grassland (GS4)/Scrub (WS1) mosaic has become established on the boundary of the proposed development site. The best example of this habitat is located in the north-eastern corner of the site. This area has gleyed soil conditions and the waterlogging. Wet grassland (GS4) has links with Annex I: Wet grassland may contain examples of the annexed habitat, 'Molinia meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*) (6410)'. This is a poor example of wet grassland habitat and does not correspond to this Annex I habitat.	Local importance (Higher value)
Neutral Grassland (GS1)	On the western field where grazing has not taken place for 2-3 years, Wet Grassland (GS4) has formed a mosaic with Neutral Grassland (GS1). The area has reverted to rank grassland with encroachment from Scrub (WS1), in particular Hawthorn. A small manmade berm spans both fields near the southern boundary of the site and Neutral grassland (GS1) has established along its ridge. Neutral grassland (GS1) has Links with Annex I: Calcareous grasslands with either high numbers or diversity of orchids correspond to the priority habitat, 'semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometea) (*important orchid sites) (6210)'. Grassland with scattered Juniper (*Juniperus communis*) could also be included in the Annex I category, 'Juniperus communis formations on heaths or calcareous grasslands (5130)'. The habitats recorded on site do not correspond to these Annex I habitats.	Local importance (Higher value)

Habitat Type	Habitat Description	Habitat value (NRA Guidelines)
Neutral Grassland (GS1)/Scrub (WS1) Mosaic	Ground at the centre of this field is slightly raised due to its previous use as a sand pit/quarry and supports a Neutral Grassland (GS1)/Scrub (WS1) habitat mosaic. Neutral Grassland (GS1) has links with Annex I: Calcareous grasslands with either high numbers or diversity of orchids correspond to the priority habitat, 'semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometea) (*important orchid sites) (6210)'. Grassland with scattered Juniper (*Juniperus communis*) could also be included in the Annex I category, 'Juniperus communis formations on heaths or calcareous grasslands (5130)'. The habitats recorded on site do not correspond to these Annex I habitats.	Local importance (Higher value)

A Wet Grassland (GS4)/Scrub (WS1) mosaic has become established on the boundary of the proposed development site. Scrub species such as Great Willow, Blackthorn and Hawthorn are spreading inwards from the boundary hedgerows. The best example of this habitat is located in the north-eastern corner of the site, where gleyed soil conditions and the waterlogging has allowed species such as Hard Rush (*Juncus inflexus*) and Canary Grass (*Phalaris arundinacea*) to grow. Other wet grassland species recorded within the proposed development site include Meadowsweet (*Filipendula ulmaria*), Marsh Thistle (*Cirsium palustre*) and Silverweed (*Potentilla anserina*).

In the western field where grazing has not taken place for 2-3 years, Wet Grassland (GS4) has formed a mosaic with Neutral Grassland (GS1). The area has reverted to rank grassland with encroachment from Scrub (WS1) in particular hawthorn. Buddleia (*Buddleia davidii*) was also recorded within this area.

A small manmade berm spans both fields near the southern boundary of the site and Neutral grassland (GS1) has established along its ridge. Species recorded within neutral grassland habitat include Meadow Vetchling (*Lathyrus pratensis*), Cow Parsley (*Anthriscus sylvestris*) and coarse grasses such as False Oat Grass (*Arrhenatherum elatius*) and Cocksfoot (*Dactylis glomerata*). Rosebay Willowherb (*Chamaenerion angustifolium*) was growing in thick patches during the August survey, and Creeping Cinquefoil (*Potentilla reptans*), Common Fleabane (*Pulicaria dysenterica*) and Tufted Vetch (*Vicia cracca*) were locally common. There are no watercourses within the proposed development site.

Photograph 8.1. Treeline between eastern and western field

Photograph 8.2. Eastern Field: Entrance at north showing tillage land, neutral grassland and scrub in background.

Photograph 8.3. Western field: Rank grassland-wet and dry, with scrub

Photograph 8.4. Treeline between eastern and western field

Photograph 8.5. Eastern Field: Neutral grassland and scrub at the south of tillage land

Photograph 8.6. Western field: Rank grassland-wet and dry, with scrub

8.6.8 Invasive Species

Non-native plants are defined as those plants which have been introduced outside of their native range by humans and their activities, either purposefully or accidentally. Invasive non-native species are so-called as they typically display one or more of the following characteristics or features:

- Prolific reproduction through seed dispersal and/or re-growth from plant fragments;
- Rapid growth patterns; and
- Resistance to standard weed control methods.

Where a non-native species displays invasive qualities and is not managed it can potentially:

- Out compete native vegetation, affecting plant community structure and habitat for wildlife;
- Cause damage to infrastructure including road carriageways, footpaths, walls and foundations; and,
- Have an adverse effect on landscape quality.

The NBDC lists a number of high impact invasive species that have been recorded within O14 (Table 8.7).

Table 8.7. NBDC List of High Impact Invasive Species in O14

Species name	Species group
Ruddy Duck (*Oxyura jamaicensis*)	bird
Arthurdendyus triangulatus	flatworm (Turbellaria)
Cherry Laurel (*Prunus laurocerasus*)	flowering plant
Common Cord-grass (*Spartina anglica*)	flowering plant
Giant Hogweed (*Heracleum mantegazzianum*)	flowering plant
Japanese Knotweed (*Fallopia japonica*)	flowering plant
Eastern Grey Squirrel (*Sciurus carolinensis*)	terrestrial mammal
American Mink (*Mustela vison*)	terrestrial mammal
Brown Rat (*Rattus norvegicus*)	terrestrial mammal

Source NBDC 28/03/23

Section 49(2)The Birds and Natural Habitats Regulations 2011 (SI 477 of 2011 prohibits the introduction and dispersal of species listed in the Third Schedule, which includes Japanese Knotweed *Fallopia japonica*, as follows: "*any person who plants, disperses, allows or causes to disperse, spreads or otherwise causes to grow [....] shall be guilty of an offence*."

No Third Schedule invasive species or species which are at risk of having damaging effects (Kelly *et al* 2013), were recorded within the proposed development site.

The medium impact invasive species, as classified by the NDBC, Buddleia (*Buddleia davidii*) was recorded within the western field. This species is listed on the Invasive Species Ireland *"Amber List: Recorded Species"* (which under the right conditions could represent a significant impact on native species or habitats).

Buddleia is also included in the *NRA Guidelines on the Management of Noxious Weeds and Non-native Species on National Roads* (NRA, 2010) as these species have been shown to have an adverse impact on landscape quality, native biodiversity or infrastructure. This species is not in the Third Schedule of the Birds and Natural Habitats Regulations 2011 (SI 477 of 2011). Therefore, its presence at the site does not have the potential to lead to an offence under the Birds and Natural Habitats Regulations 2011 (SI 477 of 2011).

8.6.9 Fauna

8.6.9.1 Bats

In Ireland, nine species of bat are currently known to be resident with the residency of the tenth recorded species yet to be proven. These are classified into two Families: the Rhinolophidae (Horseshoe bats) and the Vespertilionidae (Common bats). The lesser horseshoe bat *Rhinolophus hipposideros* is the only representative of the former Family in Ireland. All the other Irish bat species are of the latter Family and these include three pipistrelle species: common *Pipistrellus pipistrellus*,

soprano *P. pygmaeus* and Nathusius' *P. nathusii*, four *Myotids*: Natterer's *Myotis nattereri*, Daubenton's *M. daubentonii*, whiskered *M. mystacinus*, Brandt's *M. brandtii*, the brown long-eared *Plecotus auritus* and Leisler's *Nyctalus leisleri* bats.

Whiskered and Natterer's bats are listed as '*Threatened in Ireland*', while the other species are listed as '*Internationally Important*' in the Irish Red Data Book 2: Vertebrates (Whilde, 1993). The population status of both Whiskered and Natterer's bats was considered '*indeterminate*' because of the small numbers known of each, a few hundred and approximately a thousand respectively. Ireland is considered to be an international stronghold for Leisler's bat, whose global status is described as being at '*low risk, near threatened*' (LR; nt) by the IUCN (Hutson, *et al.*, 2001).

Near threatened status is applied to those taxa that are close to being listed as vulnerable (facing a high risk of extinction in the wild in the medium-term future on the basis of a range of criteria defined by the IUCN). The Irish population of the Lesser Horseshoe Bat is estimated at 14,000 individuals and is considered of International Importance because it has declined dramatically and become extinct in many other parts of Europe. Data collected shows that the species increased significantly between from the early 1990's to present.

A review of existing bat records within O14 identified that six Irish bat species have been recorded (Table 8.8). It is noted that other species which have not been included within this database are also likely to occur. Lesser horseshoe bat is the only species of bat listed on Annex II of the Habitats Directive (Directive 92/43/EEC) and this species does not occur in this area. While the remaining Irish bat species; Nathusius' pipistrelle and Brandt's bats have not been recorded in the local area to date, Whiskered Bats could occur as this species is widespread in the Irish countryside. Nathusius' pipistrelle and Brandt's bat, are rarer Irish species, which are less likely to occur.

Table 8.8. Presence of Irish Bat Species within Grid Square O14

Common name	Scientific name	Presence
Lesser Noctule	*Nyctalus leisleri*	Present
Pipistrelle	*Pipistrellus pipistrellus sensu lato*	Present
Soprano Pipistrelle	*Pipistrellus pygmaeus*	Present
Daubenton's Bat	*Myotis daubentonii*	Present
Natterer's Bat	*Myotis nattereri*	Present
Brown Long-eared Bat	*Plecotus auritus*	Present
Whiskered Bat	*Myotis mystacinus*	Absent
Lesser Horseshoe	*Rhinolophus hipposideros*	Absent
Nathusius's Pipistrelle	*Pipistrellus nathusii*	Absent

Source NBDC 28/03/23

All bat species are protected under the Wildlife Acts (1976 & 2000) which make it an offence to wilfully interfere with or destroy the breeding or resting place of all species; however, the Acts permit limited exemptions for certain kinds of development. All species of bats in Ireland are listed in Schedule 5 of the 1976 Act and are therefore subject to the provisions of Section 23 which make it an offence to:

- Intentionally kill, injure or take a bat;
- Possess or control any live or dead specimen or anything derived from a bat;
- Wilfully interfere with any structure or place used for breeding or resting by a bat; or
- Wilfully interfere with a bat while it is occupying a structure or place which it uses for that purpose.

All bats are listed in Annex IV of the EU Habitats Directive. The domestic legislation that implements this Directive gives strict protection to individual bats and their breeding and resting places. It should also be noted that any works interfering with bats and especially their roosts, including for instance, the installation of lighting in the vicinity of the latter, may only be carried out under a licence to derogate from Regulation 23 of the Habitats Regulations 1997, (which transposed the EU Habitats Directive into Irish law) issued by NPWS.

Furthermore, the European Communities (Birds and Natural Habitats) Regulations 2011 require the protection of the Irish bat fauna and specify derogation licensing requirements. Table 8.9 summarises the protection given to bats by national and international legislation and conventions.

Table 8.9. Legislative Protection for Bats in Ireland

Legislation/Convention	Relevance to Irish bats
Irish Wildlife Act (1976) & Irish Wildlife (Amendment) Act 2000.	It is an offence to wilfully interfere with or destroy the breeding or resting place of bats, (with some exemptions for certain kinds of construction development). Provides for the creation of NHAs.
EC Directive on the Conservation of Natural Habitats and of Wild Fauna and Flora (Directive 92/43/EEC), commonly known as the 'Habitats Directive	Lists all the vesper bats in Annex IV as in need of strict protection and also encourages Member States to conserve landscape features such as river corridors, field boundaries, ponds and woodlands. It also requests that Member States establish a system to monitor the incidental capture and killing of the animals listed in Annex IV. The lesser horseshoe bat is further listed in Annex II of the EU Habitats Directive The level of protection offered to lesser horseshoe bats effectively means that areas important for this species are designated as Special Areas of Conservation.
The Convention on the Conservation of European Wildlife and Natural Habitats, commonly known as the 'Berne Convention'.	It obliges states to protect and conserve animals and their habitats, especially those listed as endangered or vulnerable. Also obliges parties to promote national policies for the conservation of wild fauna and natural habitats
The Convention on the Conservation of Migratory Species of Wild Animals, commonly known as the 'Bonn Convention'.	This led to the European Bats Agreement (EUROBATS), which lists a wide range of objectives, including promoting research programmes relating to the conservation and management of bats, promoting bat conservation and public awareness of bats, and identifying and protecting important feeding areas of bats from damage and disturbance.

A study by Lundy *et al.* (2011) examined the relative importance of landscape and habitat associations across Ireland. Maximum Entropy Models (MEM) were constructed for each bat species using records from the National Bat Database from 2000-2009. This method allows species' records that have not been collected in a systematic survey to be analysed. The results help explain patterns of species' occurrence and predict where species might occur. Landcover (CORINE), topography, climate, soil pH, riparian habitat and human bias factors were incorporated into the models.

The analyses provide a picture of the broad scale geographic patterns of occurrence and local roosting habitat requirements for Irish bat species and also provides a 'Habitat Suitability' Index. The Index ranges from 0 to 100, with 0 being least favourable and 100 most favourable for bats. The habitat indices for all Irish bats for the landscape within the vicinity of the proposed development site are in Table 8.10. The indices indicate that the proposed development site is of low to moderate value for bat species.

Table 8.10. Predicted Habitat Suitability Indices at the Proposed Development Site

Bat species	Common Name	Habitat indices
All Bats		24.67
Pipistrellus pygmaeus	Soprano pipistrelle	35
Plecotus auratus	Brown long-eared bat	34
Pipistrellus pipistrellus	Common pipistrelle	39
Rhinolophus hipposideros	Lesser horseshoe	0
Nyctalus leisleri	Leisler's bat	38
Myotis mystacinus	Whiskered bat	27
Myotis daubentoniid	Daubenton's bat	19
Pipistrellus nathusii	Nathusius' pipistrelle	5
Myotis nattereri	Natterer's bat	25

Source: NBDC 28/03/23

Evidence of bat activity associated with potential roost sites includes bat droppings, urine staining, feeding remains and dead/alive bats. Indicators that potential roost locations and access points are likely to be inactive include the presence of cobwebs and general detritus within the apertures. Potential roost features associated with trees include cracks, crevices, loose bark, woodpecker holes and splits. Evidence indicating bat presence includes dark stains running below holes or cracks, bat droppings, odours, or scratch marks.

Bats generally make use of large mature trees that contain natural holes, cracks/splits in major limbs, loose bark, hollows/cavities, dense epicormic growth (bats may roost within it) and bird and bat boxes. The importance of trees to bats varies with species, season and foraging behaviour. For Leisler's bats, trees are essential for both summer and winter roosts while Daubenton's and Natterer's bats utilise trees more often during the summer months. Other species such as brown long-eared bats and pipistrelle bats avail of trees in the winter months.

In general, individual males throughout the season use tree roosts, more often, while females will use trees for temporary night roosts or night perches for consuming prey. Hollow trees are widely used by bats for both summer and winter roosts (weather dependent) and bats will roost in 'sound' trees in crevices, holes and under split bark. Bats rest, give birth, raise young and hibernate in tree holes, crevices and beneath loose bark.

Tree species use by bats include Oak, Ash, Beech and Scot's pine. Trees, especially native ones also play host to numerous insect species which are prey items for bat species and also provide shelter for swarming insects which bats will avail of. In addition, trees are important commuting routes for bats. A gap in a hedge/treeline of greater than 10m may force some species of bats to seek an alternative commuting route.

Lighting deters some bat species from foraging. Studies have shown that illumination levels as low as 0.06 lux can effect on the behaviour of bats. Even a full moon night (0.02 lux) can reduce bat activity to more sheltered, darker wildlife corridors and foraging areas (e.g., woodlands). The slower flying broad-winged species (Natterer's bats, Daubenton's bats, whiskered bats, Brandt's bats, lesser horseshoe bats and brown long-eared bats) are known to avoid street lights.

In a study of a roost in Suffolk, UK, the numbers of Natterer's Bats also often use features such as hedgerows, treelines, woodland edges and waterways as commuting pathways between roosts and foraging areas. Sheltering vegetation, such as treelines and woodland, not only acts as cover from potential predators and the weather, but also provides structure for acoustic orientation and navigation. Sheltered areas also allow insects to gather and therefore support bat foraging.

Linear features within the proposed development site including treelines and hedgerows, have the potential to link roost sites to foraging areas and facilitate the dispersal of bats into the wider landscape. Areas of grassland with hedgerows and treelines, within and outside the proposed development site, have the potential to provide feeding habitat.

A bat survey was carried out on 27th August 2022 to determine if bats were roosting in the trees within the site boundaries, and whether the trees and hedgerows within the site boundary were used by foraging/commuting bats. A visual assessment was carried out to identify, from ground level in daylight, any potential roost features (PRF) that had suitability to support roosting bats.

The ash trees within the internal boundary which will be remove are considered of low potential value for bats with no obvious cavities. The Elm are not sufficient size to be of value for bats. Overall, the trees within the internal boundary were considered to be of low potential value for bats, with no obvious cavities and no obvious PRFs. Therefore the trees are considered of low to suitability as bat roosts under the guidelines set out in '*Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd edn)*' (Collins 2016).

A bat activity survey was also carried out on 27th August 2022 to assess potential bat usage more accurately. The survey was carried out using a Batbox Duet bat detector. This survey followed the guidelines set out in '*Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd edn)*' (Collins 2016). The survey commenced at 19.48 and sunset was at 20.28.

Weather conditions were suitable with bright, dry conditions and suitable temperatures (>11°C). Transects were walked several times during the survey, including the western treeline (A), the central treeline (B) and the southern treeline (C) (Figure 8.3). No signals or sightings were obtained at transect A or transect C. Signals were occasional during the survey period (Table 8.11).

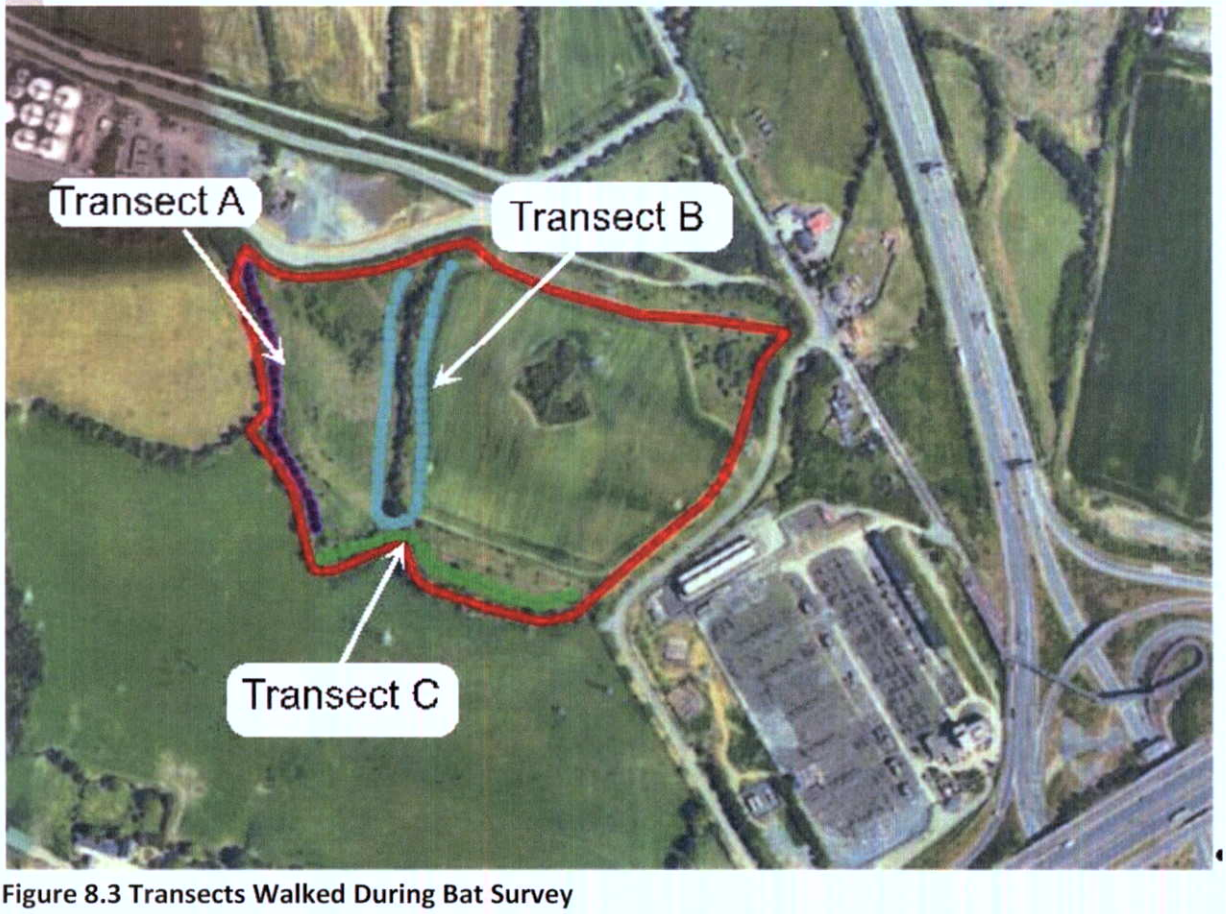

Figure 8.3 Transects Walked During Bat Survey

Table 8.11. Bat Survey Data For 27/08/22

Transect	Time	Bat species	Count/Behaviour/Height/Pattern	LAND TYPE
B	21.00	Common Pipistrelle	1/flying/5m/following treeline	Treeline
B	21.18	Leisler's	2/flying/15m/following treeline	Treeline
B	21.45	Common Pipistrelle	1/flying/6m/following treeline	Treeline
B	22.04	Common Pipistrelle	2/flying/6m/following treeline	Treeline

The results are indicative of some limited foraging in the general area. Common Pipistrelle was detected on three occasions, at the same location on Transect B, likely the same individual. One Leisler's Bat was detected on Transect B also at its north end. No bats were seen emerging from trees and as noted above, no suitable roosting habitat was recorded in the visual survey.

The survey indicates that low numbers of individual bats were using the hedgerows for foraging, perhaps 1-2 common pipistrelles and 1 Leisler's Bat for commuting. However, the trees on site, as part of a connecting corridor with the wider landscape, could provide a foraging and commuting corridor of local importance for bats. It is noted that a lack of lighting from the surrounding sites may make the area suitable for bat activity.

Overall, the habitats within the planning boundary are of low to moderate value for foraging bats and the linear features, i.e., treelines and hedgerows, provide moderate bat foraging habitat. Agricultural grassland and tillage areas provide low value habitat.

8.6.9.2 Otter

Otters, along with their breeding and resting places are protected under the provisions of the Wildlife Act 1976, as amended by the Wildlife (Amendment) Act, 2000. Otters have additional protection because of their inclusion in Annex II and Annex IV of the Habitats Direct which is transposed into Irish law in the European Communities (Natural Habitats) Regulations (S.I 94 of 1997), as amended. Otters are also listed as requiring strict protection in Appendix II of the Berne Convention on the Conservation of European Wildlife and Natural Habitats and are included in the Convention on International Trade of Endangered species (CITES).

Although rare in parts of Europe they are widely distributed in the Irish countryside in both marine and freshwater habitats. Otters are solitary and nocturnal and as such are rarely seen. Thus, surveys for Otters rely on detecting signs of their presence. These include spraints (faeces), anal gland secretions, paths, slides, footprints and remains of prey items. Spraints are of value as they are used as territorial markers and are often found on prominent locations such as grass tussocks, stream junctions and under bridges. In addition, they are relatively straightforward to identify.

Otters occasionally dig out their own burrows but generally they make use of existing cavities as resting placing or for breeding sites. Suitable locations include eroded riverbanks, under trees along rivers,

under fallen trees, within rock piles or in dry drainage pipes or culverts etc. If ground conditions are suitable the holt may consist of a complex tunnel and chamber system. Otters often lie out above ground especially within reed beds where depressions in the vegetation called "couches" are formed.

Generally, holts or resting areas can be located by detecting signs such as spraints or tracks. Each Otter holds a territory with as many as 30-40 resting places and each Otter can have a large home range, the actual size of which can vary depending on the quality of habitat, availability of food, and competition from neighbouring Otters. Not all resting places will be actively used.

Natal holts which are used by breeding females can be extremely difficult to locate. They are often located a considerable distance from any aquatic habitats and Otters may also use habitats adjoining small streams with minimal or no fish populations. In addition, natal holts are usually carefully hidden and without obvious sprainting sites. Otters do not have a well-defined breeding season.

It is noted that Otters are largely nocturnal, particularly in areas subject to high levels of disturbance as evidenced by the presence of Otters in the centre of Cork and Limerick City. Thus, Otters can adapt to increased noise and activity levels; however, breeding holts are generally located in areas where disturbance is lower.

A review of existing records within a 10km radius of the proposed development site (grid square O14) showed that Otter or signs of Otter have been recorded on 14 occasions, the most recent being in May 2015 (Source NBDC 28/03/23).

While Otters are known to occur within the vicinity, no signs of Otter (i.e. spraints, track, holts couches, feeding signs etc.) were recorded during the site surveys. There are no watercourses located within the proposed development site and the closest watercourse is Huntstown Stream which is located approximately 970m north of the site. Other streams in the vicinity include the Abbotstown Stream 1.5km west and Bachelor's Stream 1.6km southeast.

Wet grassland habitat at the site could potentially provide habitat for Common Frog, although given the small areas of habitat present and the absence of waterbodies, this is not unlikely to be a valuable foraging area for Otter. Given the lack of watercourses onsite and the level of road traffic in the vicinity, the proposed development site does not provide critical resources for this species and is of negligible value for Otter.

8.6.9.3 Other terrestrial mammals

Fourteen other species of terrestrial mammal have been recorded within grid square O14. Seven of which are protected under the Irish Wildlife Act; namely Badger (*Meles meles*), Pygmy Shrew (*Sorex minutus*), Red Squirrel (Sciurus vulgaris), Hedgehog (*Erinaceus europaeus*), Irish Hare (*Lepus timidus hibernicus*), Irish Stoat (*Mustela erminea hibernica*) and Pine Marten (*Martes martes*).

Badger

Badger setts are protected under the provisions of the Wildlife Act 1976, as amended, and it is an offence to intentionally, knowingly or unknowingly kill or injure a protected species, or to wilfully interfere with or destroy the breeding site or resting place of a protected wild animal. Badger setts are formed by a complex group of interlinked tunnels, and therefore works in proximity to setts can potentially cause damage to a protected species. Badgers are also protected under Appendix III of the Berne. No signs of Badger, were recorded during site surveys.

Hedgehog

Hedgehog is listed in Appendix III of the Berne Convention and can be found throughout Ireland, with male hedgehogs having an annual range of around 56 hectares. Due to the habitats recorded within the proposed development site and surrounding landscape, Hedgehog are likely to occur.

Irish Stoat

Irish stoats occur in most habitats with sufficient cover, including urban areas. Stoat could potentially occur within the proposed development site given there is suitable habitat for prey species.

Red Squirrel

Red Squirrel is listed in Appendix III of the Berne Convention and can be found throughout Ireland. Red Squirrel is known to occur in the wider area (NBDC records), however there is no suitable habitat for Red Squirrel within the proposed development site.

Irish Hare

Irish Hare is listed in Appendix III of the Berne Convention, Annex V(a) of the EC Habitats Directive (92/43/EEC) and as an internationally important species in the Irish Red Data Book. The Irish hare is adaptable and lives in a wide variety of habitats. It typically reaches its highest densities on farmland, particularly where there is a mix of grassland and arable fields along with hedgerows and other cover. Hare could potentially occur within the proposed development site.

Pygmy Shrew

Pygmy Shrew is common throughout mainland Ireland and has a preference for habitats such as hedgerows and grasslands; they have also been found utilizing stone walls. Pygmy Shrew could potentially occur within the proposed development site.

Pine Marten

Pine Marten are habitat specialists, requiring forest or scrub habitat to exist in an area. They are adept at climbing trees as they have powerful non-retractable claws. The species is primarily active at night and individuals live in territories that can vary in size from 50 hectares to 400 hectares. Males typically have bigger territories than females and there can be partial overlap between adjacent territories. There are no records of pine marten in the vicinity of the proposed development site and given the lack of suitable habitat onsite they are unlikely to occur.

8.6.9.4 Amphibians and Reptiles

According to records held by the NBDC the amphibian species Common Frog (*Rana temporaria*) and Smooth Newt (*Lissotriton vulgaris*) have been recorded in Grid Square O14. Common Frog is listed in Annex V of the EU Habitats Directive and is protected under the Wildlife Acts. The species was not recorded during the site visit. The wet grassland and waterlogged areas of the proposed development site could potentially provide habitat for adult frogs, but there is no breeding habitat within the site.

The Smooth Newt is the only member of the Urodela (the tailed amphibians) found in Ireland. While commonly encountered near water bodies, adult newts are actually terrestrial, only returning to water bodies to breed. There are no suitable habitats for Smooth Newt within the proposed development site.

Two species of reptile have been recorded within O14 Red-eared Terrapin (*Trachemys scripta*) and Yellow-bellied Slider (*Trachemys scripta scripta*). Both are non-native species which will not occur within the proposed development site. No valuable habitats for reptiles were recorded within the proposed development site.

8.6.9.5 Birds

The NBDC online lists 15 Annex I Bird species which have been recorded within O14, namely Little Egret (*Egretta garzetta*), Little Gull (*Larus minutus*), Peregrine Falcon (*Falco peregrinus*), Golden Plover (*Pluvialis apricaria*), Bar-tailed Godwit *(Limosa lapponica*), Common Kingfisher (*Alcedo atthis*), Common Tern *(Sterna hirundo*), Corn Crake (*Crex crex*), Dunlin (*Calidris alpina*), Hen Harrier (*Circus cyaneus*), Mediterranean Gull (*Larus melanocephalus*), Ruff (*Philomachus pugnax*), Short-eared Owl (*Asio flammeus*), Snowy Owl (*Bubo scandiaca*) and Whooper Swan (*Cygnus cygnus*). The habitats within the proposed development site do not represent critical foraging or breeding habitat for these Annex I birds.

Bird surveys were carried out in conjunction with the habitat survey during 4th of December 2020, 1st March, 2021 and the 27th of August 2022. During the surveys, all birds seen or heard within the proposed development site or utilising habitats in proximity to it, were recorded.

Birds species listed in Annex I of the Birds Directive are considered a conservation priority. Certain bird species are listed by BirdWatch Ireland as Birds of Conservation Concern in Ireland (BOCCI). These are bird species suffering declines in population size.

BirdWatch Ireland and the Royal Society for the Protection of Birds have identified and classified these species by the rate of decline into Red and Amber lists (Gilbert et al. 2021). Red List bird species are of high conservation concern and the Amber List species are of medium conservation. Green listed species are regularly occurring bird species whose conservation status is currently considered favourable. Birds species listed in Annex I of the Birds Directive (2009/147/EC) are considered a conservation priority. Species recorded within the site are shown in Table 8.12.

Terrestrial habitats within the proposed development site are of local value for terrestrial bird species that are relatively common in the Irish countryside. Vegetation within the fallow lands, particularly the early successional, seed producing species, provides some feeding/nesting resources for birds. Two RedLlist bird species i.e. Meadow Pipit and Snipe, were recorded within grassland habitats.

The rank grassland within the site is generally not suitable for wading birds, as they find it difficult to move around and feed in such habitats (Chapman 2017). The overgrown grassland at the site do not provide suitable habitat for foraging or roosting wading birds or waterfowl. However Snipe will use rank grasslands and were recorded within the proposed development site. Meadow Pipit were also recorded within these habitats.

Both species are probable breeders at the site. Snipe and Meadow Pipit are a ground nesting species which makes them particularly vulnerable to disturbance and egg damage during the breeding season. Intensification of agriculture and the loss of suitable grassland habitats is a significant threat to grassland nesting species such as Snipe and Meadow Pipit.

Two Amber Listed species were also recorded within the proposed development site i.e., Linnet and Swallow. Linnet are probable breeders at the site, foraging on early successional plant species within semi-natural grassland and scrub habitats. Swallows were recorded foraging at the site.

Table 8.12. Bird Species Recorded in the Site Surveys

Species		Birds Directive Annex I	BOCCI	
			Red List	Amber List
Turdus merula	Blackbird			
Corvus cornix	Hooded Crow			
Erithacus rubecula	Robin			
Carduelis cannabina	Linnet			X
Gallinago	Snipe		X	
Turdus philomelos	Song thrush			
Cyanistes caeruleus	Blue tit			
Troglodytes troglodytes	Wren			
Corvus frugilegus	Rook			
Columba palumbus	Woodpigeon			
Parus major	Great Tit			
Prunella modularis	Dunnock			
Anthus pratensis	Meadow Pipit		x	
Buteo buteo	Buzzard			
Hirundo rustica	Swallow			X
Sylvia atricapilla	Blackcap			
Carduelis carduelis	Goldfinch			

Mature trees and areas of scrub at the site are likely to provide valuable nesting habitat for birds. A well-managed, mature, hedgerow provides a range of habitats for invertebrates, birds and mammals. Old hedgerow trees are often the most valuable because their many branches, fissured bark and holes provide nesting and roosting spaces for birds such as tits and tree creepers.

Hedgerows are chosen by a sizeable number of common bird species for nesting and roosting: 55 of the 110-bird species recorded regularly in Birdwatch Ireland's Countryside Bird Survey use them during the breeding season. These include the Linnet and Yellowhammer, two species which have declined in Ireland.

Scattered around the boundary of the proposed development site are patches of scrub habitat. Scrub can provide high quality breeding habitat for many birds and like woodland habitats the bird species present will depend on the location, size, plant species and structure of the scrub habitat.

The surrounding landscape is dominated by a mix of urban development to the south, east and west and agricultural land to the north. Passerine species are some of the most commonly seen farmland

birds. Swallow, Starling, House Sparrow, Tree Sparrow, Linnet and Yellowhammer are all associated with agricultural areas and farmyards. These species could potentially utilise the habitats within the proposed development site for foraging and breeding.

The intensity of grazing has been variable within the proposed development over the last few years. This has allowed scrub and a greater range of perennial herbaceous species to become established. However, the range of bird species recorded is not significantly different to that which occurs on the farmed grassland habitats in the surrounding countryside.

Overall, the proposed development site is of a local value for bird species that are common in the Irish countryside. However, given the small size of the site, this is of limited value and the area to be affected is not likely to be a critical feeding resource for bird species in the context of the wider landscape.

8.6.9.6 Other Species

The NBDC does not have records of any protected, rare or notable species of invertebrates within 2km of the proposed development site. While no site is without invertebrate interest, it is considered unlikely that the proposed development site would support protected invertebrate species given the common and intensively managed habitats which dominate the site.

8.7 Impacts Construction Stage

8.7.1 Designated Sites

DixonBrosnan prepared a screening for Appropriate Assessment (AA) report, which accompanies the planning application. The screening investigated the potential for the proposed development to have significant effects on European sites (SAC/cSAC/SPA). DixonBrosnan concluded that the proposed development either alone, or in-combination with other plans and/or projects does not have the potential to significantly affect any European Site, in light of their conservation objectives. Therefore, a Stage 2 Appropriate Assessment was not required.

8.7.2 Habitats

Direct impacts on habitats as a result of construction works are described in Table 8.14. It should be noted that the value of a habitat is site specific and will be partially related to the amount of that habitat in the surrounding landscape.

Table 8.14. Potential Impacts on Habitats

Habitat Type	Habitat value (NRA Guidelines)	Predicted impacts in the absence of mitigation
Hedgerow (WL1)/Treeline (WL2)	Local importance (Higher Value).	The internal hedgerow/treeline will be removed. Hedgerow/treeline along the southern and western will be retained. Negative, moderate, long-term
Tilled Land (BC3)	Local importance (Lower value).	This habitat will be removed. Negative, imperceptible, long-term
Wet Grassland (GS4)/Scrub (WS1)	Local importance (Higher value)	This habitat will be removed. Negative, slight, long-term

Habitat Type	Habitat value (NRA Guidelines)	Predicted impacts in the absence of mitigation
Neutral Grassland (GS1)	Local importance (Higher value)	This habitat will be removed. Negative, slight, long-term
Neutral Grassland (GS1)/Scrub (WS1) Mosaic	Local importance (Higher value)	This habitat will be removed. Negative, slight, long-term

8.7.3 Invasive Species

No third schedule invasive species or species at risk of having damaging effects were recorded within the proposed development site. The medium impact invasive species Buddleia is present. The NBDC lists this as a medium impact species due to its potential to have an adverse impact on landscape quality, native biodiversity or infrastructure.

No precise studies have been done on the level of impact of Buddleia due to its long history of naturalisation, but it is likely to displace native plants where it is present. While there is potential in the absence of mitigation for construction works to spread this species, given the relatively low risk posed by these species to the surrounding habitats the impact is predicted to be negative, not significant and long-term.

8.7.4 Mammals

8.7.4.1 Bats

There are no buildings within the proposed development site. No trees with the potential to support bat roosts were recorded within the site boundary. While no bat roosts were detected, the presence of occasional bats in semi-mature trees earmarked for removal cannot altogether be excluded and therefore, in the absence of mitigation, direct impacts on bats during tree removal cannot be ruled out.

Linear features within the proposed development site boundary, including treelines and hedgerows have low to moderate local value as bat foraging/commuting areas, linking roost sites outside the site to foraging areas and facilitating the dispersal of bats into the wider landscape. Treelines and hedgerows are an important linear landscape features for commuting bats, as bats prefer to travel in the shelter of such features to reduce predation. Loss of such habitats affects the ability of bats to travel safely from roosting sites to foraging areas. A gap of as little as 10m may force some species to seek an alternative commuting route and even change roosting sites.

During construction, the internal hedgerow/treeline, as well as areas of semi-natural grassland and scrub habitat will be removed. This internal hedgerow/treeline is more diverse than the boundary habitats and small numbers of bats were recorded foraging/commuting. No bats were recorded foraging on the less diverse hedgerow/treelines on the southern and western site boundaries which will be retained. However, it is noted that a range of supplementary planting using native trees proposed along these boundary habitats could increase their foraging potential for local bat populations (See Park Hood Drawing 7670-L-001 for details).

In the absence of mitigation, the construction stage will result in the long-term loss of low to moderate value local bat foraging habitat. Habitat fragmentation due to the loss of commuting habitat also has the potential to impact local bat populations. The most significant impact will be the removal of the internal hedgerow/treeline, where small numbers of two species of bat i.e. Common and Soprano

Pipistrelle were recorded foraging and Leisler's Bat was recorded commuting. In the absence of mitigation, this could potentially impact on local populations of bats commuting/foraging in this area.

Construction works will be largely carried out during daylight hours and therefore no significant disturbance impacts from lighting. During the winter months, where lighting may be required during daytime hours, bats will be in hibernation and no significant impact will occur.

Overall, the loss of semi-natural habitat, in particular treelines/hedgerows, will reduce the foraging/commuting habitats available for bats. The impact on foraging bats will be negative, moderate and medium term at a local geographic level.

8.7.4.2 Otter

No signs of Otter were recorded within 150m of the proposed development and there are no watercourses or waterbodies within the site. Wet grassland habitat at the site could potentially provide habitat for Common Frog, which is an important prey species for Otter. Although given the small areas of habitat present and the absence of waterbodies, the proposed development site is unlikely to be a valuable foraging area for Otter.

In theory, construction works could indirectly affect fish stocks and aquatic invertebrates via impacts on water quality downstream. However it is noted that there are no watercourses within or in the vicinity of the proposed development site. The closest watercourse, the Huntstown Stream, is located approximately 970m north of the proposed development site and given the absence of drainage ditches within the site, there is no direct hydrological connection to this stream.

During the works noise and disturbance levels will increase; however works will primarily take place during daytime hours, which will avoid the largely nocturnal foraging habits of Otter. In the event of Otters passing through or occasionally forage within this area, there may be some short-term displacement of Otter. However, the increased noise and disturbance will not significantly impact on Otter due to their ability to move away from short-term disturbance.

Overall, given the low value of the site for Otter, the impact of construction works will be negative, not significant and short-term at a local geographic level in the absence of mitigation.

8.7.4.3 Other Mammals

No other protected mammal species were recorded at the proposed development site. However, Irish Stoat, Pygmy Shrew, Irish Hare and Hedgehog could potentially use this site. As part of the landscape plan, areas of shrubs will be formed that could provide ecological value/foraging opportunities. Treelines/hedgerows on the southern and western boundary will also be retained and supplementary planting using native tree species will be added to these linear features.

Common mammal species are likely to continue to use retained/newly landscaped habitats at the site, albeit is much lower numbers. However, these species are likely to be displaced from the site in the short-term during construction works due to increased noise and disturbance.

The habitats that will be affected are common and there is no evidence to indicate they are of particular value for these species in the context of the surrounding countryside. Effects on these species during construction due to loss of habitat, increased noise and disturbance and lighting are predicted to be negative, slight and short-term at a local geographic level in the absence of mitigation.

8.7.5 Amphibians & Reptiles

Construction works will lead to the removal of an area of wet grassland habitat, which could potentially lead to a loss of low value habitat for Common Frog. However, no signs of Common Frog were recorded during site surveys and therefore significant impacts are unlikely. The impact on this species will be negative, imperceptible and long-term at a local geographic level. No signs of Smooth Newt were recorded and no impact on this species will occur. Impacts of reptiles will be neutral, imperceptible and short-term.

8.7.6 Birds

The most significant impacts on breeding birds will through habitat loss, fragmentation and modification. In the absence of mitigation, potential impacts include disturbance and injury to eggs, young and nests, and long-term loss of potential nesting sites and foraging habitat.

As noted above, semi-natural grassland habitats, an internal hedgerow/treeline and scrub will be removed. While displaced common bird species, such as Blackbird, Wren and Robin, are likely to use alternative grasslands and hedgerow/treeline habitats in the vicinity, intensification of agriculture and the loss of suitable grassland habitats is a significant threat to grassland nesting species such as Snipe and Meadow Pipit. The removal of semi-natural grassland habitats means that these species will no longer breed or forage within the site boundary.

The loss of semi-natural grassland is also likely to reduce foraging/nesting habitat for species such as Linnet and Goldfinch. However, the retention of the boundary hedgerow/treeline as well as supplementary native planting e.g. Holly and Hawthorn, in these areas will create year round foraging opportunities for local bird species.

During the works increased noise and disturbance is likely to disturb and/or displace breeding birds from the site; however noise levels will fall off quickly outside the site boundary.

The majority of birds recorded at the proposed development site are common birds and are typical of an urban fringe landscape. Many of these species may be habituated to human activity and disturbance. Given the mobile nature of birds, the common nature of habitats within the site and the availability of alternative foraging habitat in the immediate vicinity, the impact from disturbance will be slight during the works at a local level. However, as noted above grassland nesting species such as Meadow Pipit and Snipe will be more vulnerable to disturbance.

In the absence of mitigation, potential impacts include disturbance and injury to eggs, young and nests, and long-term loss of potential nesting sites and foraging habitat. Overall the impact on breeding birds is likely to be negative, moderate and short-term at a local level in the absence of mitigation.

8.7.7 Other Species

The habitats to be affected support common species of invertebrates and there is no evidence to indicate that the proposed development site is of particular value for other species in the context of the surrounding countryside. No significant effects on invertebrate species have been identified.

8.7.8 Water Quality & Aquatic Ecology

In the absence of appropriate design and mitigation, high levels of silt in surface water run-off from construction works area could theoretically impact on fish and invertebrate species in nearby watercourses. It is noted that additional information on potential impacts on water quality is provided in Chapter 7 Water.

There are no surface watercourses /drains within the proposed development site and closest water feature is the Huntstown Stream, which is approximately 970m north of the site. While spillage and leaks could potentially impact on exposed subsoils, there is no direct pathway for surface water runoff to local watercourses during the construction phase.

Given the distance from local watercourses and the lack of hydrological/hydrogeological connections, the impact on fish and aquatic invertebrates during construction will be neutral, imperceptible, local, unlikely and short-term.

8.7.9 Air Emissions

No significant emissions to air will occur during construction.

8.8 Impacts Operational Stage

8.8.1 Designated Sites

There will be no impacts on Designated Sites

8.8.2 Habitats

The mapping on the OPW www.floodinfo.ie website confirms the development area is neither in nor adjacent to a location that is at risk of fluvial, pluvial or groundwater flooding and there are no records of any flood events either at, or in proximity to the site.

Sustainable Urban Drainage (SUDS) features will be provided to ensure that flood risk/runoff is managed. Therefore, no significant impacts on aquatic habitats during operation of the proposed development have been identified.

Maintenance works may be required on occasion along boundary habitats. However, no significant operational impacts on terrestrial habitats have been identified.

8.8.3 Invasive Species

No impacts will occur.

8.8.4 Mammals

8.8.4.1 Bats

Habitat fragmentation due to the loss of the foraging and commuting habitat has the potential to continue to impact local bat populations. The retention of boundary habitats, although currently or lower foraging value, will retain some foraging or commuting habitat for bats at the proposed development site. The tree planting strategy, which includes native species and will enhance retained habitats within the site and potentially create connectivity with the wider landscape.

Increased activity and human presence, noise and artificial lighting may impact and disturb or displace bats. Lighting around the proposed buildings and outdoor areas including new paths, parking areas and access roads means that bat foraging in these areas is likely to be reduced. Light spillage from the development onto the retained boundary habitats could prevent/reduce bat foraging.

Lighting deters some bat species in particular Myotis species such as Daubenton's Bat, from foraging (Azam et al. 2018). Studies have shown that illumination levels as low as 0.06 lux can influence the behaviour of bats. Even a full moon night (0.02 lux) can reduce bat activity within more sheltered, darker wildlife corridors and foraging areas (e.g., woodlands). It is noted that Pipistrelle species appear to be more tolerant of light and disturbance (Speakman 1991; Stones et al. 2009; Haffner 1986). Leisler's Bats will also opportunistically feed on such insect gatherings in lit areas (Bat Conservation Ireland 2010). However, more recent research suggests that even in light opportunistic foraging species, foraging activity may be impacted by increased lighting (Hooker et al. 2022).

The impact on bats during the operational stage will be negative, slight, likely and long-term at a local level.

8.8.4.2 Otter

Increased activity and human presence, noise and artificial lighting may disturb or displace Otter, including light spillage onto previously unlit boundary habitats. Badly designed lighting could displace Otter from nearby habitats and create a barrier to connectively in the wider area. The lighting will be designed to minimise light spillage outside the site boundary. However, there will be some light spillage on the retained boundary habitats on the western and southern boundaries. Noise and activity at the site will increase.

No signs of Otter were recorded and there are historical records of Otter in the vicinity. The impacts on Otter will be neutral, imperceptible long-term at a local geographic level.

8.8.4.3 Other Mammals

Increased activity and human presence, noise, fencing and additional lighting may disturb or displace other mammal species such Pygmy Shrew and Hedgehog from favoured foraging habitats. However, given the retention of treelines/hedgerows at the site and the availability of similar habitat in the vicinity and the mobile nature of these species, potential impacts on other mammals during operation are predicted to be negative, slight and long-term at a local level.

8.8.4.4 Amphibians & Reptiles

There will be no impact on amphibians and reptiles.

8.8.5 Birds

Following the habitat removal in the construction stage, the Red List species Meadow Pipit and Snipe will be displaced from the site. Overall there will be a nett reduction in the habitat available for these threated bird species.

Common bird species are likely to continue to forage and breed within retained hedgerow/treeline at the site. However, increased human presence and increased noise and lighting reduce the numbers of birds using these habitats. In areas where nesting habitat is retained within the site e.g. hedgerow/treeline, increased disturbance may impact on breeding birds.

The impact on birds will be negative, slight, likely and long-term at a local level due to disturbance and/or displacement of bird species.

8.8.6 Other Species

The habitats that will be affected support common species of invertebrates and there is no evidence to indicate that the development site is of particular value for other species in the context of the surrounding countryside. No significant effects on invertebrate species have been identified.

8.8.7 Water Quality & Aquatic Ecology

In the operational stage there will be no emission to surface waters. Rainwater run-off that is not harvested will infiltrate to ground via the soakaway and the permeable paving. There is the potential for accidental spills to occur during filling of the diesel storage tank and the refuelling of the mobile plant which could infiltrate to ground through damaged paving. There is also the potential for minor oil leaks in the permeable paved areas and leaks from the foul sewers to infiltrate to ground and groundwater. However, even in the absence of mitigation, given the distance of the site from local waterbodies, there is no potential for direct discharges of these watercourses.

Given the distance from local watercourses and the lack of hydrological/hydrogeological connections to local watercourses, the impact on fish and aquatic invertebrates will be neutral, imperceptible, not likely, local and short-term.

8.8.8 Air Quality

The assessment of the impacts of the proposed development on air quality has concluded that in relation to ecological sites the impact will be negative, imperceptible, local, likely and long-term.

8.8.9 Fire

In the event of a fire, which is the 'worst case' there may be damage to the landscape areas and trees inside the site boundary; however these are low ecological value habitats and readily replaced.

8.9 **Baseline**

Most of the habitats that will be affected have been significantly modified from their natural state by human activity. In pockets of semi-natural habitats within the site boundary, the general pattern of succession from grassland to scrub to woodland would be expected to continue. In the absence of development, it is expected that the lands within the development boundary would largely remain under the same management regimes.

No significant changes to the habitats within the boundary are likely to occur, in the "baseline" scenario. However given the site location and land zoning it is likely that it will be developed for industrial use in the short term.

8.10 **Prevention and Mitigation**

8.10.1 Design Stage

The landscape design approach was to retain the existing trees and hedgerows on the boundary wherever possible. A detailed landscape plan has been prepared and it includes the planting of native shrub species in an area east of the MRF, to compensate for the loss of the internal boundary hedgerow/tree line. Planting of native shrubs and trees will also be carried out to supplement the boundary hedgerows.

8.10.1.1 Lighting

The lighting scheme will be designed to minimise the impact of external lighting upon bat populations by retaining dark areas around the external boundaries. The scheme will optimise the lighting configuration to achieve recommended illuminance levels, while minimising light spill through a combination of column location and height, luminaire wattage and optical setting.

8.10.1.2

The fire safety measures included in the design to mitigate the risk of fire outbreak are described in Section 10.8.1.6.

8.10.2 Construction Stage

It is essential that all construction staff, including all sub-contracted workers, are informed of valuable habitats and made aware that no construction waste of any kind (rubble, soil, etc.) is to be deposited in these areas and that care must be taken with liquids or other materials to avoid spillage.

All staff and subcontractors will be responsible for:

- Understanding the importance of avoiding pollution onsite, including noise and dust, and how to respond in the event of an incident to avoid or limit environmental impact;
- Responding in the event of an incident to avoid or limit environmental impact, and
- Monitoring the workplace for potential environmental risks and alert the site manager if any are observed.

An Outline CEMP has been prepared for proposed development and a copy is in Appendix 3.3. It contains all of the mitigation measures to prevent and mitigate impacts on Land, Water, Air and Human Health, all of which are also directly relevant to Biodiversity. Additional biodiversity mitigation measures are set out below.

8.10.2.1 Habitats and Floral Species

The Wildlife Act 1976, as amended, makes it is an offence to cut, grub, burn or destroy any vegetation on uncultivated land or such growing in any hedge or ditch from the 1st March to the 31st August. Exemptions include the clearance of vegetation in the course of road or other construction works or in the development or preparation of sites on which any building or other structure will be constructed. Therefore, where possible, vegetation will be removed outside of the breeding season and in particular, removal during the peak-breeding season (April-June inclusive) will be avoided.

To prevent incidental damage woodland, hedgerow, tree and scrub vegetation that are located in close proximity to working areas will be clearly marked and fenced off to avoid accidental damage during excavations and site preparation. The existing hedgerows on the southern and western property boundaries that are to be retained will be protected (in accordance with the recommendations included in BS 5837: 2012) by:-

- The provision of adequate fencing around trees to prevent harmful encroachment / damage by vehicles or storage of materials during construction;
- The avoidance of any reduction in levels in the root protection area of individual trees; and

- Inspection for disease, dead wood or storm damage and, if necessary, treating or carrying out tree surgery, following the advice of qualified tree surgeon if necessary.

Further details on tree protection measures are in the Park Hood Landscape Management and Maintenance Plan in Appendix 11.1.

Habitats that are damaged and disturbed will be reinstated and landscaped once construction is complete.

8.10.2.2 Bats

During the site works, general mitigation measures for bats will follow Marnell *et al.* (2022), Kelleher and Marnell (2006) and NRA (2005c). These documents outline the measures required pre-construction (site clearance) stage to minimise negative effects on roosting bats and to prevent avoidable effects resulting from significant alterations to the immediate landscape. All mitigation measures, including detailed method statements will be agreed with the NPWS prior to commencement of works that could affect any bat populations on site.

Although mature trees with the potential to be of significant value as bat roosts are absent from the site, the following precautionary measures will be implemented during the removal of semi-mature and mature trees.

- The Environmental Clerk of Works will work with the Contractor to ensure that trees earmarked for retention are adequately protected.
- If bats are recorded by the bat specialist within any trees no works will proceed without a relevant derogation licence from the NPWS.
- Tree-felling will ideally be undertaken in the period September to late October/early November. During this period bats are capable of flight and may avoid the risks of tree-felling if proper measures are undertaken.
- Felled trees will not be mulched immediately. Such trees will be left lying several hours and preferably overnight before any further sawing or mulching. This will allow any bats within the tree to emerge and avoid accidental death. The bat specialist will be on-hand during felling operations to inspect felled trees for bats. If bats are seen or heard in a tree that has been felled, work will cease and the local NPWS Conservation Ranger will be contacted.
- Tree will be retained where possible and no 'tidying up' of dead wood and spilt limbs on tree specimens will be undertaken unless necessary for health and safety.
- Treelines outside the proposed development area but adjacent to it and thus at risk, will be clearly marked by a bat specialist to avoid any inadvertent damage.
- During construction directional lighting will be employed to minimise light spill onto adjacent areas. Where practicable during night-time works, there will be no directional lighting focused towards boundary habitats and focusing lights downwards will minimise light spillage.

The lighting mitigation measures will follow recommendations outlined in Bat Conservation Ireland (2010) and Bat Conservation Trust (2018).

8.10.2.3 Birds

Where possible, vegetation will be removed outside of the breeding season and in particular, removal during the peak-breeding season (April-June inclusive) will be avoided. This will also minimise the

potential disturbance of breeding birds outside the site boundary. If works are carried out during the breeding season, a pre-construction survey will be carried out and if birds are detected appropriate mitigation measures will be implemented.

8.10.2.4 Invasive Species

Prior to the commencement of construction works an invasive species survey will be undertaken within the proposed development boundary by a competent expert to determine if invasive species listed under Part 1 of the Third Schedule of S.I No. 477 of 2011 have become established. If invasive species are identified a site-specific Invasive Species Management Plan will be developed and implemented by a competent specialist on behalf of the Contractor.

Buddleia favours disturbed sites and physical grubbing of plants can provide ideal conditions for the germination of seeds. Therefore, care needs to be taken to ensure re-vegetation of controlled areas is undertaken swiftly. The branches of Buddleia are capable of rooting as cuttings, so care should also be taken to ensure material is disposed of in a manner to avoid this risk.

As mature plants occur within the proposed works area, the preferred method of treatment is cutting back to a basal stump or grubbing out followed by chemical treatment. Herbicide applications will consider sensitive receptors such as locally important habitats and must only be applied in line with manufacturer's recommendations.

Recommended practice for the application of herbicides requires cutting back of plants to a basal stump during active growth (late spring to early summer) which is then treated (brushed on) immediately with a systemic weed killer mix (Starr et al. 2003). Foliar application of triclopyr or glyphosate may be adequate for limited infestations of younger plants but should be followed up at 6 monthly interval until the plant is no longer extant within the works area.

8.10.2.5 Lighting

Lighting associated with the site works could cause disturbance/displacement of fauna. If of sufficient intensity and duration, there could be impacts on reproductive success. Site lighting will typically be provided by tower mounted temporary portable construction floodlights.

The floodlights will be cowled and angled downwards to minimise spillage to surrounding properties. Lighting mitigation measures will follow Bats & Lighting Guidance Notes for: Planners, engineers, architects and developers (Bat Conservation Ireland, 2010). The following measures will be applied in relation to construction works lighting:

8.11 **Monitoring**

8.11.1 Construction Stage

A Bat Specialist will attend on site during the removal of the mature and semi-mature trees.

8.11.2 Operational Stage

The inspection regimen referenced in the Landscape Management Plan will be implemented.

8.12 Cumulative Effects

A search of the Fingal County Council and An Bord Pleanála planning databases was carried out to identify any potential cumulative effects on biodiversity. The proposed development site is located in an area surrounded by existing industrial and road infrastructure, with considerable levels of disturbance.

The cumulative impacts of the proposed development and nearby consented projects are described in Table 8.15. No significant cumulative impacts with the proposed development have been identified.

Table 8.15 Potential Cumulative Effects

Development	Project Details	Potential Cumulative Impacts
FW22A/0258 Planning granted 14th March 2023 Located approximate 150m north and 200m west of proposed development site.	The development comprises the construction and operation of 3 no weighbridges (each with a dedicated weighbridge office), a new 2,160m2 soil waste inspection and quarantine shed, new site offices and associated parking facilities. The development will facilitate internal re-routing of soil intake for future backfilling and restoration of Huntstown South Quarry (previously approved under planning permission Ref. FW12A/0022).	In the event that the construction phase of the proposed development was to overlap with this scheme, potential cumulative impacts could arise. Cumulative noise/ visual disturbance impacts to local fauna. Should this situation arise, construction activities will be planned and phased, in consultation with the relevant construction management team. Construction mitigation measures have been outlined in this EIAR chapter and the CEMP which accompanies this application. These measures will ensure that no significant cumulative noise/disturbance effects or habitat loss for Badgers will occur during construction works. No potential cumulative operational impacts from noise and disturbance have been identified. No significant adverse impacts from changes in water or air quality were identified during the operational phase of the proposed development. Therefore, no cumulative impacts for water or air have been identified. Following the implementation of mitigation measures, no significant cumulative effects have been identified.
Development	**Project details**	**Potential cumulative impacts**
FW22A/0213 Planning granted 14th March 2023 Located approximately 100m east of proposed development site	The development is within a total site area of up to c. 1 ha. to include 1 no. DSO (Distribution System Operator) electrical substation building. 1 no. customer switchgear, electrical inverter / transformer station modules. 40 no. containerised battery storage units on concrete support structures, heating, ventilation and air conditioning units (HVAC units), access tracks and upgraded site entrance, underground cabling route c. 1.45 km to existing ESB 220kV Finglas Electricity Substation, associated electrical cabling and ducting, security gates, palisade perimeter security fencing, CCTV security	In the event that the construction phase of the proposed development was to overlap with this scheme, potential cumulative impacts could arise. Cumulative noise/ visual disturbance impacts to local fauna. Should this situation arise, construction activities will be planned and phased, in consultation with the relevant construction management team. Construction mitigation measures have been outlined in this EIAR chapter and the CEMP which accompanies this application. These measures will ensure that

	monitoring system and landscaping works and all associated ancillary site infrastructure.	no significant cumulative noise/disturbance effects or habitat loss for Badgers will occur during construction works. No potential cumulative operational impacts from noise and disturbance have been identified. No significant adverse impacts from changes in water or air quality were identified during the operational phase of the proposed development. Therefore, no cumulative impacts for water or air have been identified. Following the implementation of mitigation measures, no significant cumulative effects have been identified.
FW21A/0151 Application under appeal Located approximately 120m north of proposed development site	• Demolition of 2 no. existing residential dwellings and ancillary structures to the east of the site (c.344qm total floor area); • Construction of 2 no. data hall buildings (Buildings A and B) comprising data hall rooms, mechanical and electrical galleries, ancillary offices including meeting rooms, workshop spaces, staff areas including break rooms, toilets, shower/changing facilities, storage areas, lobbies, outdoor staff areas, loading bays and docks, associated plant throughout, photovoltaic panels and screened plant areas at roof levels, circulation areas and stair and lift cores throughout; • External plant and 58 no. emergency generators located within a generator yard to the east and west of Buildings A and B at ground level. The area is enclosed by a c.6.5m high louvered screen wall; • The proposed data halls (Buildings A and B) are arranged over 3 storeys with a gross floor area of C.37,647sqm each; • The overall height of the data hall buildings is c28m to roof parapet level and c32m including roof plant, roof vents and flues. The total height of Buildings A and B does not exceed 112m OD (above sea level); • The proposed development includes the provision of a temporary substation (c.32sqm), water treatment building (c. 369sqm and c.7.7m high), 7 no. water storage tanks (2,800m3 in total and c.6.4m high each), 2 no. sprinkler tanks (c.670m3 each and c.7.9m high each) with 2 no. pump houses each (c.40sqm and c. 6m high each); • The total gross floor area of the data halls and ancillary structures is c.75,775sqm; • All associated site development works, services provision, drainage upgrade works, 2 no. attenuation basins, landscaping and berming (c.6m high), boundary treatment works and	In the event that the construction phase of the proposed development was to overlap with this scheme, potential cumulative impacts could arise. Cumulative noise/ visual disturbance impacts to local fauna. Should this situation arise, construction activities will be planned and phased, in consultation with the relevant construction management team. Construction mitigation measures have been outlined in this EIAR chapter and the CEMP which accompanies this application. These measures will ensure that no significant cumulative noise/disturbance effects or habitat loss for Badgers will occur during construction works. No potential cumulative operational impacts from noise and disturbance have been identified. No significant adverse impacts from changes in water or air quality were identified during the operational phase of the proposed development. Therefore, no cumulative impacts for water or air have been identified. Following the implementation of mitigation measures, no significant cumulative effects have been identified.

	security fencing up to c.2.4m high, new vehicular entrance from the North Road, secondary access to the south west of the site from the existing private road, all internal access roads, security gates, pedestrian/cyclist routes, lighting, 2 no. bin stores, 2 no. bicycle stores serving 48 no. bicycle spaces, 208 no. parking spaces including 10 no. accessible spaces, 20 no. electric vehicle charging spaces and 8 no. motorcycle spaces; • Existing electricity overhead lines traversing the site will be undergrounded under concurrent application Ref. FW21A/0144; • A proposed 220kv substation located to the south west of this site will be subject of a separate Strategic Infrastructure Development application to An Bord Pleanála under section 182A of the Planning and Development Act 2000 (as amended);.	

8.13 **Residual Impacts**

8.13.1 Habitats

Retention of hedgerow/treelines on the western and southern boundary will maintain some foraging and commuting habitat for birds, bats and other fauna. However, the loss of semi-natural grassland, the internal hedgerow/treeline and scrub habitat means there will be a nett loss of habitats at the site. This will have a negative, slight, local, likely and long-term local impact.

8.13.2 Invasive Species

Following the implementation of mitigation measures, there will be no residual impact from the spread of invasive species.

8.13.3 Water Quality

Given the absence of direct discharges to surface water and the distance of the site from local watercourses, there will be no residual impact on local water quality and aquatic ecology.

8.13.4 Air Quality

The implementation of the CEMP will ensure that the impact construction activities on air quality be negative, imperceptible, localised and temporary. In the operational stage the impacts will be negative, not significant, localised, likely and long term. There will be no significant residual impacts on sensitive ecological receptors.

8.13.5 Bats

Specific mitigation measures will be put in place to ensure that direct impacts on bats from tree removal are avoided. Given the low value roosting potential of trees earmarked for removal and the mitigation measures outlined above, no significant impact from tree removal will occur.

The hedgerow/treelines on the western and southern site boundaries will be retained. However the internal hedgerow/treeline as well as an areas of semi-natural grassland and scrub within the site will be removed. The removal of these habitats has the potential to lead to the loss bat foraging habitat

and reduce connectivity to the wider area. No bat activity was recorded along the hedgerow/treelines that will be retained, however supplementary native planting could improve their foraging/commuting value for bats.

Lit areas of the site may be avoided by bats, although they are likely to continue to forage in dark areas. Construction and operational lighting design will ensure that dark areas are maintained at the site. However, increased lighting along retained hedgerow/treeline is likely to reduce the value of foraging habitat in some areas. The residual impact will be negative, moderate, likely and long-term at a local level.

8.13.6 Otter

Increased activity and human presence, noise and artificial lighting may impact and disturb/displace Otter during construction and operational stages. No signs of Otter were recorded and there are historical records of Otter in the vicinity. The residual impacts will be neutral, imperceptible, not likely and long-term at a local geographic level.

8.13.7 Other Mammals

Other protected mammal species such as Hedgehog, Pygmy Shrew, Irish Stoat and Irish Hare could potentially use the proposed development site. These are mobile species that can move away from the site of disturbance. There will be a net loss of feeding habitat. However the retained boundary habitats will maintain some areas of cover for small mammals.

Small mammals such as Hedgehog and Pygmy Shrew are likely to recolonise newly planted hedgerows/treelines at the site following construction and continue to use retained habitats. Larger species such as Irish Hare are likely to use other areas of grassland habitat in the vicinity. The residual impact will be negative, not significant, likely and long-term at a local level.

8.13.8 Amphibians and reptiles

There will be no residual impact on amphibian and/or reptile species.

8.13.9 Birds

Breeding birds will be displaced from grassland and boundary habitats within the site boundary during construction works. Noise levels during construction are likely to be significant and birds will be displaced during peak construction works. During operation and following the implementation of the landscape plan, common woodland edge bird species are likely to recolonise retained and landscaped hedgerow and grassland habitats at the site, albeit in lower numbers. The removal of semi-natural grassland areas will prevent ground nesting birds such as Snipe and Meadow Pipit from breeding or foraging at the site. The residual impact on birds will be negative, moderate and long-term at a local level.

8.13.10 Other Species

Following mitigation measures, residual impacts on other species, including fish, terrestrial and aquatic invertebrates, will be neutral, imperceptible and long-term.

8.13.11 Summary of Residual Impacts

Likely Significant Effect	Quality	Significance	Extent	Probability	Duration
Habitats	Negative	Slight	Local	Likely	Long Term
Bats	Negative	Moderate.	Local	Likely	Long Term
Otter	Neutral	Imperceptible	Local	Unlikely	Long Term
Other Mammals	Negative	Not Significant	Local	Likely	Long Term
Amphibians & Reptiles	Negative	Not Significant	Local	Likely	Long Term
Birds	Negative	Slight	Local	Likely	Long Term
Other Species	Negative	Not Significant	Local	Likely	Long Term

8.14 References

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9. AIR

9.1 Introduction

This Chapter describes the ambient air quality and the impacts of the proposed development on air quality in the receiving environment including a 'baseline' scenario. It focuses on the local environment in the vicinity of the proposed development, referred to in this chapter as the' study area'. It identifies the prevention, mitigation and monitoring measures that will be implemented to reduce the significance of the potential impacts and assesses the residual potential impacts.

The Chapter was prepared by Dr. Micheal Fogarty and Mr. Simon Welchman of Katestone. Dr Fogarty is a Senior Air Quality Consultant with 13 years of experience in Ireland and Australia. He holds a B.Eng, M.Eng and PhD from the UCD College of Engineering and Architecture. He specialises in the areas of air quality and odour impact assessment. Mr. Wlechman has been a director of Katestone since 2004 with more than twenty-seven years of experience working as an air quality expert in the private sector and for the environmental regulator.

9.2 Relevant Legislation & Guidance

The general EIA guidelines and legislation are listed in Sections 1.2 and the specific legislation and guidelines relevant to air quality that set out the general principles and suitable methods to complete the air quality assessment taken into account in the preparation of this Chapter are:

- Air Pollution Act 1987, as amended.
- Environmental Protection Agency Acts 1992, as amended
- Air Quality Standards Regulations 2011 (S.I. No. 180 / 2011), as amended.
- The Ambient Air Quality and Cleaner Air for Europe (CAFE) Directive (2008/50/EC).
- The fourth Daughter Directive (2004/107/EC).
- EPA (2020) Air Dispersion Modelling from Industrial Installations Guidance Note (AG4).
- NRA (2011) Treatment of Air Quality During the Planning and Construction of National Road Schemes.
- UK Highways Agency (2019) Design Manual for Roads and Bridges - Sustainability & Environment Appraisal- Air quality - LA 105.
- NRA (2008) Environmental Impact Assessment of National Road Schemes – A Practical Guide.
- Institute of Air Quality Management (IAQM) (2014) Guidance on the assessment of dust from demolition and construction.
- DEHLG (2004) Quarries and Ancillary Activities Guidelines for Planning Authorities.

- Environmental Management Guidelines – Environmental Management in the Extractive Industry (EPA 2006).

9.3 **Methodology**

The assessment was based on data derived from ambient air quality databases maintained by the EPA collected at the nearest ambient monitoring station an odour impact and air quality modelling assessment completed by Katestone.

9.3.1 Air Quality Information Sources

The following sources were used in the preparation of this air quality assessment:

- EPA (2018) Air Quality in Ireland 2017 – Indicators of Air Quality;
- EPA (2019) Air Quality in Ireland 2018 – Indicators of Air Quality;
- EPA (2020) Air Quality in Ireland 2019 – Indicators of Air Quality;
- Met Éireann (2021) meteorological monitoring data.

9.3.2 Assessment of Construction Impact

The National Road Authority (NRA) guidance document titled Treatment of Air Quality During the Planning and Construction of National Road Schemes (NRA, 2011) addresses the potential impacts of construction activities on local air quality. It states *"The potential impact of both dust and vehicle emissions during the construction phase should be considered within the EIS. Dust emissions can lead to elevated PM_{10} and $PM_{2.5}$ concentrations and may also cause dust soiling."* The predominant emission of concern in the construction stage will be dust.

The DEHLG guidance document Quarries and Ancillary Activities Guidelines for Planning Authorities, states that *Residents living in proximity to quarries can potentially be affected by dust up to 0.5km from the source, although continual or severe concerns about dust are most likely to be experienced within about 100m of the dust source.*

The Institute of Air Quality Management (IAQM) 2014 Guidance provide guidance on how to undertake a construction impact assessment (including demolition and earthworks as appropriate). It describes a stepped assessment procedure to consider potential impacts. Katestone considers the methodology described in IAQM Guidance to be the most comprehensive and robust guidance for the assessment of impacts during the construction stage of proposed developments and adopted this approach.

Step 1 is to determine the likelihood of significant impacts based on the distance between the works and sensitive receptors, both human and ecological. If there are no receptors within the specified distance of the works then no further assessment is required. If there are receptors within the specified distances then a more detailed assessment of the dust impacts (Step 2) is required.

This Step applies to four activities (demolition; earthworks; construction; and track out) and takes account of the scale and nature of the works, which determines the potential dust emission magnitude (Step 2A); and the sensitivity of the area (Step 2B). These factors are combined in Step 2C to establish the risk of dust impacts.

Step 3 is to determine the site-specific mitigation for each of the four activities listed in Step 2. Step 4 is to examine the residual effects and to determine whether or not these are significant and Step 5 is the preparation of the dust assessment report.

The Step 1 screening criteria that trigger the Step 2 assessment are:

- a 'human receptor' within:
  - 350 m of the boundary of the site; or
  - 50 m of the route(s) used by construction vehicles on the public highway, up to 500 m from the site entrance(s)

- an 'ecological receptor' within: - 50 m of the boundary of the site; or
  - 50 m of the route(s) used by construction vehicles on the public highway, up to 500 m from the site entrance(s).

The risk of dust arising in sufficient quantities to cause annoyance and/or health and/or ecological impacts are determined using four risk categories: negligible, low, medium and high risk. A site specific risk category is based on two factors:

- The scale and nature of the works, which determines the potential dust emission magnitude as small, medium or large (Step 2A); and

- The sensitivity of the area to dust impacts (Step 2B), which is defined as low, medium or high sensitivity.

The two factors are combined in Step 2C to determine the risk of dust impacts with no mitigation applied. The parameters used to characterise each construction activity and the limits used to define the extent of the activity in Step 2 are in Table 9.1. The sensitivity of an area to dust impacts (Step 2B) is dependent on:

- The type of receptors (human health and dust soiling impacts);
- The number of receptors in a potentially affected area (human health and dust soiling impacts);
- The distance of the receptors from the source of emissions or if known, from the dust generating activities (human health and dust soiling impacts), and
- Background levels of PM_{10} (human health impacts only).

The classification of areas with high sensitivity, medium sensitivity and low sensitivity based on the type of receptors is presented in the following tables:

- Table 9.2 for Dust Soiling Effects
- Table 9.3 for the Health Effects of PM_{10}.

Once the type of receptors has been determined, the sensitivity of an area to dust impacts (Step 2B) is determined by combining this information with the number of receptors in a potentially affected area, the distance of the receptors from the source of emissions or if known, from the dust generating activities and background levels of PM_{10} (human health impacts only) using the frameworks described in the following tables:

- Table 9.4 for Dust Soiling Effects on People and Property
- Table 9.5 Human Health impacts from Emissions of PM_{10}.

Table 9-1 Parameters Used to Characterise Each Construction Activity

Activity	Parameter	Parameter unit	Categories - Scale of activity		
			Small	Medium	Large
Demolition	Total building volume	m^3	<20000	20,000 - 50,000	>50000
Earthworks	Total site area	m^2		2,500 – 10,000	>10,000
Construction	Total building volume	m^3	<25,000	25,000 – 100,000	>100,000
Track out	HDV (>3.5t) outward movements	movements/day	<10	10 - 50	>50

Table 9-2 Indicative Examples used to characterise location sensitivity to dust soiling effects

Receptor sensitivity	Indicative examples listed in IAQM (2014)
High sensitivity receptor	Dwellings, museum and other culturally important collections, medium and long term car parks and car showrooms
Medium sensitivity receptor	Parks and places of work
Low sensitivity receptor	Playing fields, farmland (unless commercially sensitive horticultural), footpaths, short term car parks and roads.

Table 9-3 Indicative examples used to characterise location sensitivity to the health effects of PM_{10}

Receptor sensitivity	Indicative examples listed in IAQM (2014)
High sensitivity receptor	Residential properties. Hospitals, schools and residential care homes
Medium sensitivity receptor	Office and shop workers
Low sensitivity receptor	Public footpaths, playing fields, parks and shopping streets

Table 9-4 Framework used to determine the sensitivity of an area to dust soiling effects.

Receptor Sensitivity	Number of Receptors	Distance from the Source (m)			
		<20	<50	<100	<350
High	>100	High	High	Medium	Low
	10 -100	High	Medium	Low	Low
	1 - 10	Medium	Low	Low	Low
Medium	>1	Medium	Low	Low	Low
Low	>1	Low	Low	Low	Low

Table 9-5 Framework used to determine the sensitivity of a location to human health impacts from emissions of PM_{10}

Receptor Sensitivity	Annual Mean PM_{10} concentration	Number of Receptors	Distance from the Source (m)				
			<20	<50	<100	<200	<350
High	>32 µg/m³	>100	High	High	High	Medium	Low
		10 -100	High	High	Medium	Low	Low
		1 - 10	High	Medium	Low	Low	Low
	28-32 µg/m³	>100	High	High	Low	Low	Low
		10 -100	High	Medium	Low	Low	Low
		1 - 10	High	Medium	Low	Low	Low
	24-28 µg/m³	>100	High	Medium	Low	Low	Low
		10 -100	High	Medium	Low	Low	Low
		1 - 10	Medium	Low	Low	Low	Low
	<24 µg/m³	>100	Medium	Low	Low	Low	Low
		10 -100	Low	Low	Low	Low	Low
		1 - 10	Low	Low	Low	Low	Low
Medium	-	>10	High	Medium	Low	Low	Low
	-	1 - 10	Medium	Low	Low	Low	Low
Low	-	>10	Low	Low	Low	Low	Low

Step 2C combines the sensitivity of an area and the magnitude of dust emissions to determine the risk of dust impacts which is established separately for demolition, earthworks, construction and track out. The frameworks used to determine the risk of dust impacts is presented in:

- Table 9.6 for Demolition Activities
- Table 9.7 for Earthwork and Construction Activities
- Table 9.8 for Track out Activities.

Step 3 determines the site-specific mitigation measures based on the risk categories for each of the four activities. The final step (Step 4) is to determine whether there are significant effects arising from the construction stage. Significance is only assigned to the effect after consideration of the mitigation measures.

Table 9-6 Framework used to determine the risk of dust impacts - demolition

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Medium Risk
Medium	High Risk	Medium Risk	Low Risk
Low	Medium Risk	Low Risk	Negligible

Table 9-7 Framework used to determine the risk of dust impacts – earthworks/construction

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible

Table 9-8 Framework used to determine the risk of dust impacts - track out

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Low Risk	Negligible
Low	Low Risk	Low Risk	Negligible

9.3.3 Assessment of Operational Impacts

The sources of emissions in the operational will include emissions of odour from the exhaust stack of the OCU and exhaust gas emissions from road transport associated with hauling material to and from the proposed development.

9.3.3.1 Odour

The methodology is based on a dispersion modelling study incorporating source characteristics and operational activity data with meteorological data that is representative of the site and surrounding region. The assessment was in accordance with industry standards, regulatory requirements and best practice approaches and included:

- Selection of relevant odour assessment criteria.

- Derivation of an odour emissions rate for the OCU stack based on its air flow capacity and manufacturer's design odour emission limit.

- Derivation of an odour emissions rate for the Huntstown Bioenergy Facility based on emission characteristics identifies in licence documentation for this facility.

- Characterisation of meteorological conditions in the region and generation of a representative meteorological dataset using observations from Dublin Airport.

- Dispersion modelling using the regulatory dispersion model, AERMOD, to predict ground-level concentrations of odour across a Cartesian grid that covers the study area and at the closest sensitive receptor locations to the site boundary.

- Comparison of the predicted ground-level concentrations of odour against the relevant odour assessment criterion.

Meteorological Data

The EPA's Air Dispersion Modelling Guidance Note (AG4) (EPA, 2020) states:

> *"The dispersion process is dependent on the underlying meteorological conditions and ensuring that the air dispersion model includes representative meteorological data is critical....The USEPA (24) has defined meteorological representativeness as: "the extent to which a set of {meteorological} measurements taken in a space-time domain reflects the actual conditions in the same or different space-time domain taken on a scale appropriate for a specific application"...and has expanded on this definition by outlining the factors to consider in the selection of appropriate meteorological data:*
>
> - *Proximity of the meteorological station to the modelling domain;*
> - *The complexity of the terrain;*
> - *The exposure of the meteorological monitoring site;*
> - *The period of time during which data is collected."*

Data gathered at Met Eireann's meteorological observation station at Dublin Airport is likely to be representative of meteorological conditions at the Site as defined in EPA's Air Dispersion Modelling Guidance Note (AG4).

AERMET is a general-purpose meteorological pre-processor for organizing meteorological data into a format suitable for use by the AERMOD air quality dispersion model. The AERMET meteorological pre-processor was configured with surface data from Dublin Airport and upper air data from Castor Bay, Co. Down and used to generate a meteorological file suitable for use in the AERMOD dispersion model.

AERMET requires inputs of roughness length (Z_o), Bowen ratio and Albedo. The AERMET User's Guide stipulates that Z_o should be determined based on land cover within a 1.0 km radius of the meteorological site. If the value of Z_o varies significantly by direction, then sector dependency should be used. Sector width should be >= 30°. The Bowen ratio and Albedo should be determined based on land cover within a 10 km x 10 km domain. A simple unweighted mean has been used for the Albedo and a weighted geometric mean for the Bowen ratio as required by the AERMET User's Guide. The approach to determining these parameters is described in Appendix 9.1.

Dispersion Modelling

The dispersion modelling was conducted in accordance with recognised techniques specified in EPA's AG4 document (EPA, 2020). AERMOD was used to predict ground-level concentrations of odour across the model domain due to emission sources at the site for five years of meteorological data. The modelling assumed that emissions occur 24 hours each day, for all hours of each modelled year.

Building Downwash

When modelling emissions from an industrial installation it should be borne in mind that stacks that are relatively short can be subjected to additional turbulence due to the presence of nearby buildings. Buildings are considered nearby if they are within five times the lesser of the building height or maximum projected building width (but not greater than 800m) (EPA, 2020).

The plume from a short stack is likely to be down washed if its height is less than two and a half times the height of nearby buildings within a distance of 10 x L from each source, where L is the lesser of the height or width of the building. A Building Profile Input Program (BPIP) was used to determine the effects of buildings at the site on the point sources of emissions. The Plume Rise Model Enhancements (PRIME) algorithm is recommended in EPA Guidance for use with AERMOD. PRIME was used in the dispersion modelling assessment to determine the effect of building induced turbulence on plumes from point sources at the proposed development.

The PRIME algorithm takes into account the position of each stack relative to each relevant building and the projected shape of each building for 36 wind directions (at 10º intervals). The model determines the change in plume centre-line location with downwind distance based on the slope of the mean streamlines and coupled to a numerical plume rise model.

Proposed Development

Three buildings/structures were included in the BPIP program to represent buildings and structures at the MRF. The coordinates used in the configuration of the onsite buildings and structures in the BPIP program are presented in Table 9-9.

Table 9-9 The Buildings and Structures and Configuration of the proposed development in BPIP

Building	Easting UTM (m)	Northing UTM (m)	Height (m)
Food Cleaning Plant Building	678,040.3	5920,991	14
	678,033.5	5921,031	
	678,156.8	5921,053	
	678,164.1	5921,012	
Odour Control Unit	678,050.9	5920,944	15.14
	678,048.5	5920,943	
	678,052.2	5920,935	
	678,054.4	5920,937	
	678,039.3	5920,972	
	678,048.6	5920,976	
	678,053.1	5920,965	
MRF Building	678,104.9	5920,830	15.14
	678,050.9	5920,944	
	678,087.5	5920,962	
	678,141.4	5920,847	

The Huntstown Bioenergy Facility

Three buildings/structures were included in the BPIP program to represent buildings and structures at the Huntstown Bioenergy Facility. The coordinates used in the configuration of the onsite buildings and structures in the BPIP program are presented in Table 9.10.

Table 9-10 The Buildings and Structures and Configuration of the Huntstown Bioenergy Facility in BPIP

Building	Easting	Northing	Height (m)
	UTM (m)	UTM (m)	
AD Building	677,667	5921,268	25.4
	677,676	5921,289	
	677,703	5921,277	
	677,679	5921,224	
OCU	678,051	5920,944	25.4
	678,049	5920,943	
	678,052	5920,935	
	678,054	5920,937	
Gas Processing Equipment	678,165	5920,859	25.4
	678,160	5920,870	
	678,169	5920,874	
	678,174	5920,863	
Tank Farm	678,044	5920,961	25.4
	678,039	5920,972	
	678,049	5920,976	
	678,053	5920,965	

Sensitive Receptors

The sensitive receptors that are of interest in relation to odour emissions from the proposed development include:

- Residential locations located south and northeast of the site boundary, and
- Commercial units and industrial facilities located northeast, northwest and southeast of the site boundary.

The closest sensitive residential receptors are:

- 160 m east of the site boundary and 435 m east of the OCU Stack.
- 265 m southwest of the site boundary and 360 m southwest of the OCU Stack

The closest sensitive commercial or industrial receptors are located 40 m south of the site boundary (adjacent to the site entrance) and approximately 338 m southeast of the OCU Stack

The sensitive residential and commercial and industrial receptors were included in the dispersion modelling assessment.

Source Configuration

The parameters used to characterise the OCU stack in the dispersion modelling assessment are presented in Table 9-11.

Table 9-11 Source parameters for the OCU stack at the MRF as modelled

Source Name	Location		Diameter	Height	Temperature	Velocity
	Easting	Northing				
	m	m	m	m	°C	m/s
OCU Stack	678,052	5,920,939	1.2	16	15	7.9

The parameters used to characterise the OCU stack at the Huntstown Bioenergy Facility in the dispersion modelling assessment are presented in **Table 9-12**.

Table 9-12 Source parameters for the OCU stack at the MRF as modelled

Source Name	Location		Diameter	Height	Temperature	Velocity
	Easting	Northing				
	m	m	m	m	°C	m/s
Huntstown Bioenergy OCU Stack[1]	677,697	5921,211	1.5	25	20	17.3

[1] Data taken from EPA Licence for Huntstown Bioenergy Limited (EPA, 2020b) and the EIS Submitted as part of the licence application for the facility (SLR, 2013)

Emissions

The odorous waste streams will be handled and processed in the MSW / Brown Bin Bay in the MRF. The Bay will be maintained under negative air pressure with air being treated in an odour control unit (OCU) and vented through an elevated odour exhaust stack located on the western side of the building.

Negative pressure will be maintained in the Bay by:

- Having a well-sealed building, and
- Exhausting air to the OCU at a rate that results in two (2) air changes per hour inside the MSW/Brown Bin Bay.

The OCU will be designed to have a maximum exhaust concentration of odour of 1,000 ou_E/m^3.

The odour emission rate adopted in the assessment was calculated as the product of the maximum exhaust concentration of odour of the OCU and the design air flowrate of the extraction system. The values used to determine the odour emission rate adopted in the modelling assessment are presented in Table 9-13.

Table 9-13 Odour Emission Rate Modelling Assessment for the OCU Stack

Parameter	Value	Unit	Comment/Reference
Building Volume	16,120	m^3	Confirmed by O'Callaghan Moran
Air Changes Per Hour	2		Confirmed by O'Callaghan Moran
Air Flowrate	32,240	m^3/h	Calculated
Air Flowrate	9.0	m^3/s	Calculated
Stack Diameter	1.2	m	Confirmed by O'Callaghan Moran
Stack Air flowrate	7.9	m/s	Calculated based on assumed diameter

Parameter	Value	Unit	Comment/Reference
Modelled Odour Concentration	1,000.0	ou_E/m^3	Odour concentration limit for the OCU
Stack Odour Emission rate	8,955.6	ou_E/s	Calculated

The odour emission rate adopted in the assessment for the odour control unit at the Huntstown Bioenergy Facility was calculated as the product of the maximum exhaust concentration of odour of its OCU (Licence limit as per EPA, 2020b) and the design air flowrate of the exhaust system. The values used to determine the odour emission rate adopted in the modelling assessment are presented in Table 9-14.

Table 9-14 Odour Emission Rate Modelling Assessment for the OCU Stack

Parameter	Value	Unit	Comment/Reference
Air Flowrate	30.6	m^3/s	Licence Limit at 20°C as per EPA, 2020b
Stack Diameter	1.5	0	SLR, 2013
Stack Air Velocity	17.3	0	Calculated
Modelled Odour Concentration	1,000	ou_E/m^3	Licence Limit as per EPA, 2020b
Stack Odour Emission rate	30,556	ou_E/s	Calculated
Stack Height	25	m	As per EPA, 2020b

9.3.3.2 Traffic

Road transport associated with a development can be the source of emissions of several air pollutants, which are also produced by a wide range of industrial, commercial and domestic processes. The pollutants of most concern near roads are nitrogen dioxide (NO_2) and particles (PM_{10}) in relation to human health and oxides of nitrogen (NO_x) in relation to vegetation and ecosystems.

The assessment of potential transport related air quality impacts from the proposed development was conducted using the screening method set out in the Design Manual for Roads and Bridges (DMRB) (Highways England, 2019).

The DMRB provides a framework for assessing, mitigating and reporting the effects of motorway and all-purpose trunk road projects on air quality by determining whether the impacts of a project on human health or designated habitats can trigger a significant air quality effect. Part LA105 sets out the requirements for assessing and reporting the effects of highway projects on air quality (Highways England, 2019). It includes assessment methodologies to consider the impact of traffic emissions on human health and ecological sites, including the health of protected species and on habitats and other species identified as being of principal importance for the conservation of biodiversity.

The methodology includes a scoping approach to determine whether the air quality impacts of a project can either be scoped out, or require an assessment based on the changes between the' do something' traffic (with the project) compared to the do minimum traffic (without the project). If a project triggers the traffic scoping criteria, either a simple or detailed assessment shall be required.

The scoping criteria used were:

1) annual average daily traffic (AADT) >=1,000; or
2) heavy duty vehicle (HDV) AADT >=200; or
3) a change in speed band; or
4) a change in carriageway alignment by >=5m

The network of all roads that trigger the traffic screening criteria and adjoining roads within 200m is defined as the affected road network (ARN)

The proposed development will increase volumes of traffic associated with:

- The transportation of waste streams that will be delivered to and processed at the site and ultimately hauled from the site for further processing
- Staff and service vehicles attending the site.

In relation to selecting sensitive receptors to consider potential human health impacts, DMRB states:

> *Sensitive receptors shall be chosen within 200m of the ARN and include residential properties, schools and hospitals for the assessment of annual mean air quality thresholds. Where there is a risk of the short-term air quality thresholds being exceeded.*

In relation to selecting sensitive receptors to consider potential ecological impacts, DMRB states:

> *Internationally, nationally and locally designated sites of ecological conservation importance on protected species and on habitats and other species identified as being of principal importance for the conservation of biodiversity (known as designated habitats) within 200m of the ARN shall be included in the air quality assessment.*

If the scoping assessment indicates that an assessment is required, DMRB provides a risk-based mechanism to determine whether a simple or detailed air quality assessment is required. The level of assessment is determined by the level of risk and the stage of assessment for a project. A simple assessment provides sufficient information to confirm that the project does not result in any exceedances of the air quality thresholds. A detailed level of assessment is more likely where there is a risk of exceeding air quality thresholds and for the detailed design stage of the project lifecycle.

9.3.4 Evaluation Criteria

9.3.4.1 Air Quality

The significance of air quality impacts in the operational stage were determined based on compliance with the limit values of the *Air Quality Standards Regulations 2011, (S.I. No. 180 / 2011)* as amended (Air Quality Standards), which are presented in Table 9-15. The annual average limit values for SO_2 and NO_x are for the protection of vegetation and ecosystems, respectively. All other limit values specified in the Table are for the protection of human health.

Table 9-15 Air Quality Standards Regulations 2011 (S.I. No. 180/2011)

Air contaminant	Averaging period	Limit value (µg/m³)	Basis of application of limit value
CO	8-hour	10000	Maximum
NO_2	1-hour	200	Not to be exceeded more than 18 times in a calendar year
	annual	40	Average
PM_{10}	24-hour	50	35th Highest
	annual	40	Average
$PM_{2.5}$	annual	25	Average
SO_2	1-hour	350	Not to be exceeded more than 24 times in a calendar year
	24-hour	125	Not to be exceeded more than 3 times in a calendar year
	annual	20	Average
NO_x	annual	30	Average

The criteria described in NRA (2011) were used to determine the significance of air quality impacts from traffic in the operational stage. The NRA methodology to determine the significance of air quality impacts involves categorising the magnitude of change in concentrations of air contaminants according to the criteria identified in Table 9-16.

The NRA methodology includes definitions of impact magnitude for changes in the number of days with PM_{10} concentration greater than 50 µg/m³ and for changes in annual mean $PM_{2.5}$. Table 9-16 excludes these as the Highway Agency's latest spreadsheet calculates annual average concentrations of NO_x and PM_{10} and not shorter-term average concentrations.

The relationship between the annual average and 1-hour average concentration is discussed in NRA (2011) which states:

> *The standards for nitrogen dioxide are expressed in terms of both the annual mean and the number of hours above 200 µg/m³. It is not straightforward to predict exceedances of the 1-hour standard and all models are inevitably poorer at predicting short-term peaks than they are at predicting annual mean concentrations. However, empirical data suggest that the hourly mean standard is unlikely to be exceeded at roadside locations unless the annual mean is above 60 µg/m³.*

The relationship between the annual average and the number of exceedances of the 24-hour average concentration standard for PM_{10} is also discussed in NRA (2011) which states:

> *The standards for PM_{10} are expressed as the annual mean and the number of days above 50 µg/m³. Dispersion models are inherently less accurate at predicting exceedances of the 24-hour mean PM_{10} standard than for the annual mean standard. An empirical relationship between the annual mean concentration and the number of days >50 µg/m³ PM_{10} has been derived in LAQM.TG(09) and takes the form:*
>
> *No. 24-hour mean exceedances = -18.5 + 0.00145 x annual mean³ + (206/annual mean)*

This relationship has been adopted to determine if the impact of traffic emissions on air quality is likely to result in exceedances of the 24-hour average concentration standard for PM_{10}.

Table 9-16 Definition of Impact Magnitude for Changes in Ambient Pollutant Concentrations

Magnitude of Change	Annual Mean NO_2/PM_{10}
Large	Increase/decrease ≥4 µg/m³
Medium	Increase/decrease 2 - <4 µg/m³
Small	Increase/decrease 0.4 - <2 µg/m³
Imperceptible	Increase/decrease <0.4 µg/m³

9.3.4.2 Nuisance Dust

Dust particles in the ambient environment can cause nuisance. Localised increases in dust particles are often associated with exposure of soil surfaces, or activities that involve the disturbance of soil or rock-based materials, such as agricultural and construction activities.

Whether dust deposition becomes an issue for the general public depends on a variety of factors including the sensitivity of nearby locations, the repetition of any dust deposition occurring and the characteristics of the deposited materials. The focus for dust control and emissions is on minimising the potential for a nuisance occurring in the first instance and implementing good site practices where practicable.

There are currently no Irish or European Union air quality standards for deposited dust. In 2004, the DEHLG issued Quarries and Ancillary Activities Guidelines for Planning Authorities, which states "There are currently no Irish statutory standards or EPA guidelines relating specifically to dust deposition thresholds for inert mineral/aggregate dust"

A subsequent report issued by the EPA and titled: Environmental Management Guidelines - Environmental Management in the Extractive Industry (EPA, 2006) states:

> *The impact of dust is usually monitored by measuring rates of dust deposition (DoE, 1995). There are currently no Irish statutory standards or EPA guidelines relating specifically to dust deposition thresholds for inert mineral dust. There are a number of methods to measure dust deposition but only the German TA Luft Air Quality Standards (TA Luft, 1986) specify a method of measuring dust deposition – The Bergerhoff Method (German Standard VDI 2119, 1972) – with dust nuisance. It is the only enforceable method available.*

The TA Luft air quality standard has become the most commonly used method for the assessment of dust deposition. This involves determining a mass dust deposition rate per unit area over a given time period, using a direct collection pot with standard dimensions of either glass or plastic. The system benefits from being a direct collection method i.e. less transferring of material and consequent reduction in sampling errors. This method is defined as an internationally recognised standard and has been adopted by the EPA as the method of choice for measuring deposited dust associated with licensed facilities.

The TA Luft has recommended a threshold guideline value of 350 mg/m²/day for dust deposition. Below this threshold guideline value dust deposition problems are considered less likely. The EPA and local authorities generally apply the TA Luft guideline to development consents and Industrial Emissions Licences

9.3.4.3 Odour

In 2020, the EPA issued its updated guidance document air quality impact assessment (known as AG4). Appendix H of this document provides guidance that is specific to the assessment of odour impacts using dispersion modelling techniques. In relation to the odour assessment criteria, AG4 states:

> *Currently there is no general statutory odour standard in Ireland relating to industrial installations.*
> .....
> *Guidance from the UK (EA, 2011, and adapted for Irish EPA use) recommends that odour standards should vary from 1.5 – 6.0 OUE/m3 as a 98th%ile of one hour averaging periods at the worst-case sensitive receptor based on the offensiveness of the odour and with adjustments for local factors such as population density...*

Table A4 of AG4 contains indicative odour standards based on offensiveness of odour that have been adopted for use in Ireland. Relevant aspects are:

- The most offensive odours should be assessed against an Indicative Criterion of 1.5 OU_E/m^3 as a 98th%ile of hourly averages at the worst-case sensitive receptor
- Moderately offensive odours should be assessed against an Indicative Criterion of 3.0 OU_E/m^3 as a 98th%ile of hourly averages at the worst-case sensitive receptor

- Less offensive odours should be assessed against an Indicative Criterion of 6.0 OU_E/m^3 as a 98th%ile of hourly averages at the worst-case sensitive receptor.

The industrial sectors that fit into each category are described as follows:

- Most offensive:
  - Processes involving decaying animal or fish remains.
  - Processes involving septic effluent or sludge waste sites including landfills, waste transfer stations and non-green waste composting facilities.
- Moderately offensive
  - Intensive Livestock Rearing
  - Fat Frying / Meat Cooking (Food Processing)
  - Animal Feed
  - Sugar Beet Processing
  - Well aerated green waste composting.
- Less offensive
  - Brewery / Grain / Oats Production
  - Coffee Roasting
  - Bakery
  - Confectionery.

The sources of odour at the proposed development fall into the most offensive category based on EPA guidance and the odour exposure criterion relevant to operations at the site is C_{98}, 1-hour ≤ 1.5 ou_E/m^3.

9.4 **Receiving Environment**

9.4.1 Regional & Local Meteorological Conditions

The dominant influence on Ireland's climate is the Atlantic Ocean. Consequently, Ireland does not suffer from the extremes of temperature experienced by many other countries at similar latitude. The warm North Atlantic Drift has a marked influence on sea temperatures. This maritime influence is strongest near the Atlantic coasts and decreases with distance inland. The hills and mountains, many of which are near the coasts, provide shelter from strong winds and from the direct oceanic influence. Winters tend to be cool and windy, while summers, when the depression track is further north and depressions less deep, are mostly mild and less windy (Met Eireann https://www.met.ie/climate/climate-of-ireland).

The site is located 13 km from the east coast. Meteorological conditions at the site are therefore not significantly affected by coastal influences, which generally occur within 10 km of the coast (EPA, 2020). Land features (terrain and land use) in the vicinity of the site can be described as agricultural and industrial land, which is flat.

At its closest point, the site is approximately 3.0 km from the Tolka River Valley, which runs from northwest to southeast through Dublin and is the lowest point in the terrain in the vicinity of the site. The proximity of a site to rivers can affect local meteorological parameters such as wind speed and wind direction. The wind direction observed at a site can be heavily affected by the orientation of the river with winds aligning with the orientation of the river. Rivers are generally at the lowest point in the local terrain, often in valleys that induce drainage air flows. The site is in the flatlands of the River Tolka and River Liffey Valley that is generally oriented west to east.

The nearest meteorological station operated by Met Eireann is at Dublin Airport, which is approximately 4 km northeast of the site. Dublin Airport is approximately 9 km from the eastern coastline. It is in a relatively flat topography with terrain that gently slopes from the higher ground to the west down to the Irish Sea. The general climate (in terms of temperature, relative humidity and rainfall) and local meteorological conditions that affect dispersion (predominantly wind speed and direction) at Dublin Airport would provide a highly indicative representation of climate at the site.

The data from the observation station at Dublin is considered highly representative of the development area due to:

- The close proximity of the observation station to the Site
- The similar nature of the terrain at both locations
- The similar nature of land use at both locations
- The absence of major terrain features in the vicinity of the observation station and the Site
- The absence of coastal affects at the observation station and the Site
- Both locations being located in a flat valley that runs from west to east.

The climate and local meteorological conditions of the site was therefore characterised using the parameters observed at Dublin Airport. The observation station at Dublin Airport has recorded long term data that represents regional climate characteristics. Long term meteorological data reported between 1981 and 2020 at Dublin Airport is summarised in Table 9-17.

Table 9-17 Long-Term Average Meteorological Parameters Dublin Airport

Parameter	30-year average
Mean Temperature (°C)	9.8
Mean Relative Humidity (9 AM UTC) (%)	83.0
Mean Daily Sunshine Duration (Hours)[1]	3.9
Annual Rainfall (mm)	758.0
Averaged total rainfall (mm) (Summer)	196.2
Averaged total rainfall (mm) (Winter)	184.1
Average Windspeed (m/s)	5.3
Monthly average windspeed (m/s) (Summer)	4.45
Monthly average windspeed (m/s) (Winter)	6.1

Wind speed and wind direction are important parameters for the transport and dispersion of air pollutants from a source. A wind rose representing the annual distribution of 1-hour average winds at Dublin Airport is presented in Figure 9-1.

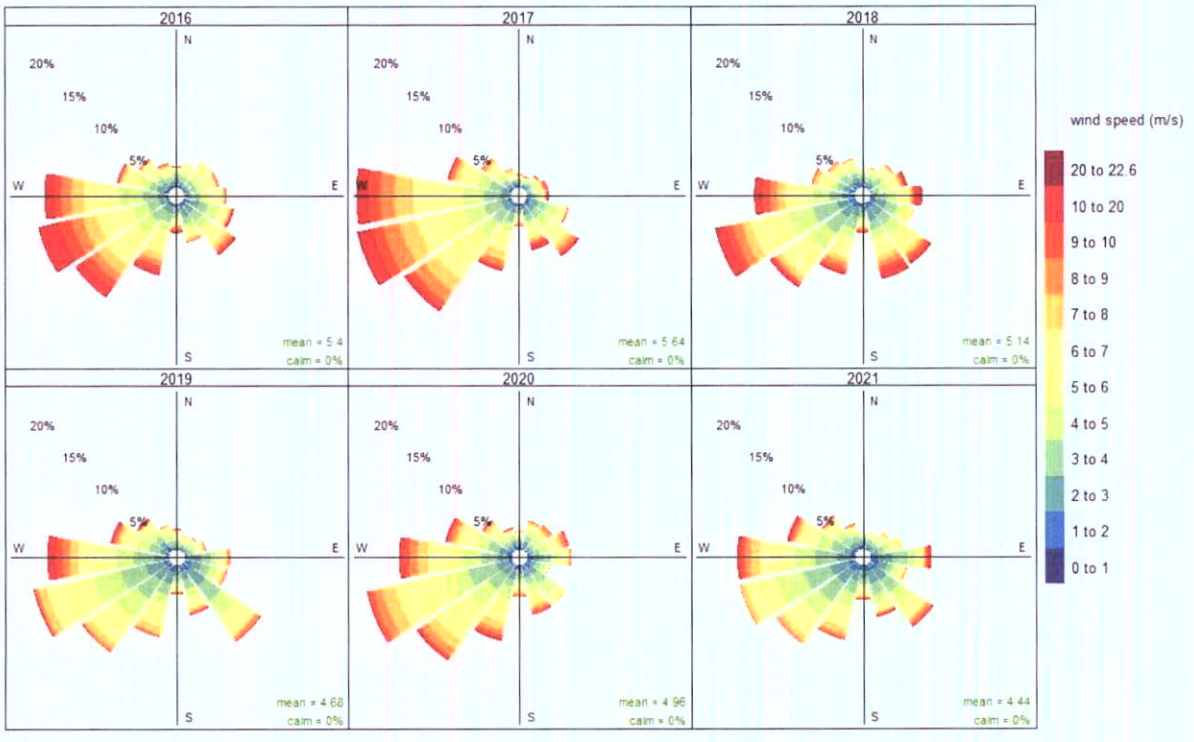

Figure 9-1 Annual windrose for Dublin Airport (Source of data: Met Eireann)

Diurnal and seasonal windroses for Dublin Airport are presented in Figure 9-2 and Figure 9-3. The prevailing wind at Dublin Airport is from the west and southwest. Winds are aligned to the valley in which the observation station is situated. Winds from the north and northeast are infrequent. The winter months are and windier than the summer months, however summer months are wetter.

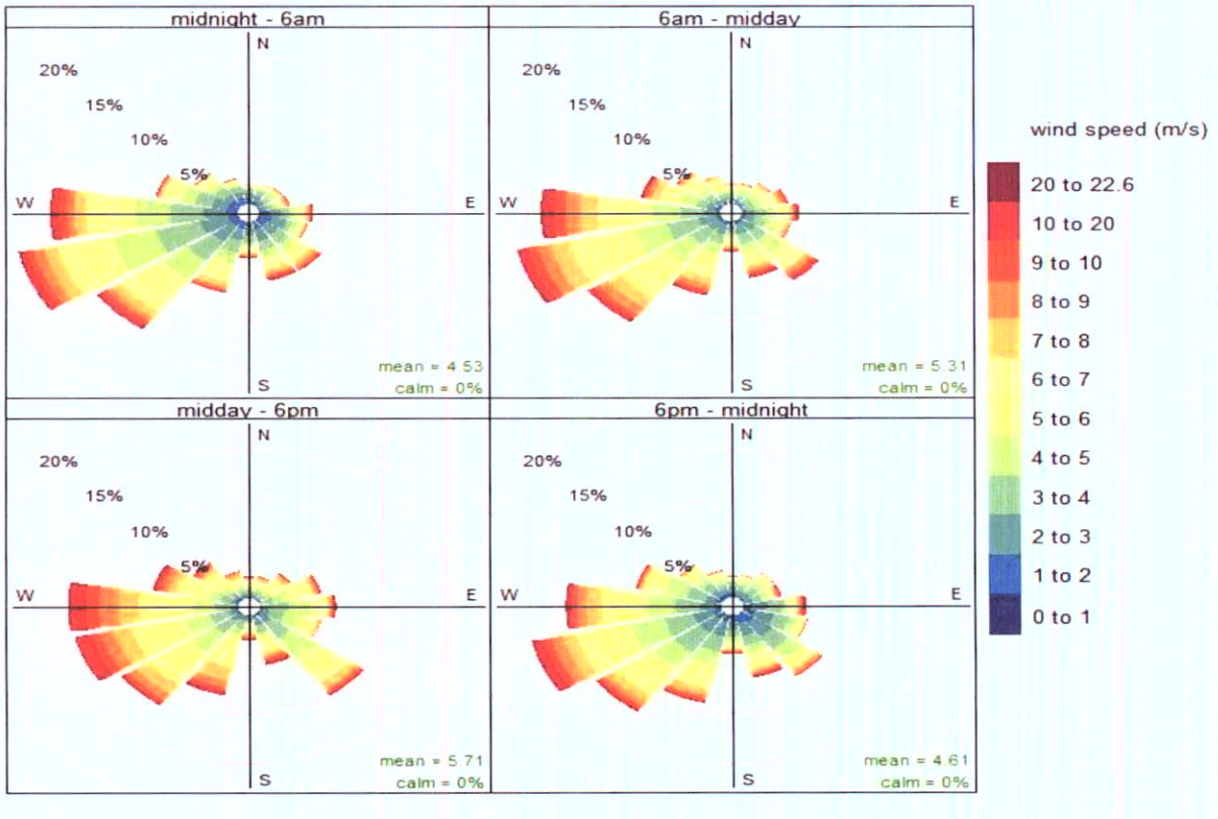

Figure 9-2 Diurnal windroses for Dublin Airport (Source of data: Met Eireann)

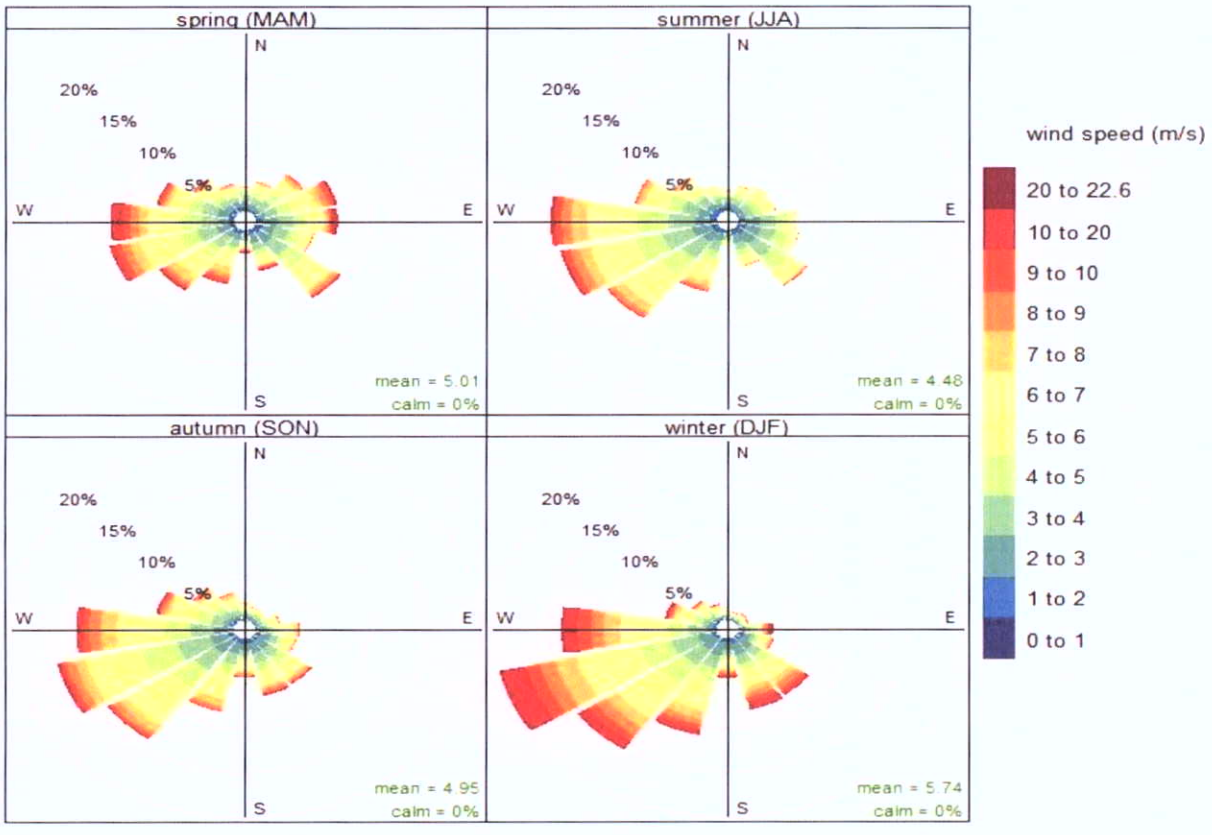

Figure 9-3 Seasonal Windroses for Dublin Airport (Source of data: Met Eireann)

9.4.2 Baseline Air Quality

9.4.2.1 Air Quality

Under the Clean Air for Europe Directive, EU member states must designate "Zones" for the purpose of managing air quality. In Ireland, four zones are defined in the *Air Quality Standards Regulations 2011* (DEHLG, 2011). The Proposed Facility is in Zone A, which is Dublin.

The site and its surroundings are presented in Figure 9-4 that shows it is surrounded by industrial and commercial installations and farmland. It is approximately 800m north of the residential areas of Finglas. There are a number of isolated dwellings in closer proximity to the site.

Baseline air quality in the study area is affected by:

- Typical baseline levels of air contaminants that are prevalent at Zone A locations that are representative of the site, and
- Emissions from industrial installations located in close proximity to the site.

The industrial installations located in close proximity to the site that will affect local air quality include:

- The Roadstone Huntstown Quarry
- The Huntstown Power Station