Appendix A8.1 to A8.9
Biodiversity:
Supporting Information

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8. APPENDICES - BIODIVERSITY

8.1 Appendix A8.1: Desktop Records

Desktop records of protected, rare, or other notable plant species are listed below in Table 8.1. These are plant species which are legally protected under the Flora (Protection) Order, 2022 and/or are listed as Critically Endangered, Endangered or Vulnerable on the relevant national Red Data list for Ireland.

Table 8.1 Records of protected, red-listed or notable flora recorded from the desk study in the vicinity of the study area

Common Name/ Scientific name	Legal Status[1]	Red List Status	Source
Betony *Stachys officinalis*	FPO	Near threatened	NBDC online database record (O13)
Black Horehound *Ballota nigra*	None	Near threatened	NBDC online database record (O13, O24, and O25)
Brackish Water-crowfoot *Ranunculus baudotii*	None	Near threatened	NBDC online database record (O16)
Bugloss *Anchusa arvensis*	None	Near threatened	NBDC online database record (O24 and O25)
Common Gromwell *Lithospermum officinale*	None	Near threatened	NBDC online database record (O13)
Curved Hard-grass *Parapholis incurva*	FPO	Endangered	NBDC online database record (O23)
Dittander *Lepidium latifolium*	None	Vulnerable	NBDC online database record (O13)
Dwarf Mallow *Malva neglecta*	None	Near threatened	NBDC online database record (O13)
Great Burnet *Sanguisorba officinalis*	FPO	Endangered	NBDC online database record (O13)
Greater Knapweed *Centaurea scabiosa*	None	Near threatened	NBDC online database record (O13)
Green-winged Orchid *Orchis morio*	None	Vulnerable	NBDC online database record (O25)
Hairy St John's-wort *Hypericum hirsutum*	None	Endangered	NBDC online database record (O13)
Hairy Violet	FPO	Endangered	NBDC online database record (O13)

[1] HDII/IV/V = Habitats Directive Annexes II/IV/V; FPO = Flora (Protection) Order, 2022; WA = Wildlife Acts

Common Name/ Scientific name	Legal Status[1]	Red List Status	Source
Viola hirta			
Irish Whitebeam *Sorbus hibernica*	None	Vulnerable	NBDC online database record (O13 and O24)
Lesser Centaury *Centaurium pulchellum*	FPO	Endangered	NBDC online database record (O23)
Little-robin *Geranium purpureum*	None	Endangered	NBDC online database record (O23)
Meadow Barley *Hordeum secalinum*	FPO	Endangered	NBDC online database record (O13, O14, O17, O23, O24, and O25)
Meadow Crane's-bill *Geranium pratense*	None	Vulnerable	NBDC online database record (O13)
Milk Thistle *Silybum marianum*	None	Near threatened	NBDC online database record (O13 and O24)
Nettle-leaved Bellflower *Campanula trachelium*	None	Endangered	NBDC online database record (O13)
Opposite-leaved Pondweed *Groenlandia densa*	FPO	Endangered	NBDC online database record (O13)
Prickly Poppy *Papaver argemone*	None	Vulnerable	NBDC online database record (O24 and O25)
Prostrate Broom *Cytisus scoparius* subspp *maritimus*	None	Vulnerable	NBDC online database record (O23 and O24)
Purple Spurge *Euphorbia peplis*	None	Regionally Extinct	NBDC online database record (O13)
Rough Clover *Trifolium scabrum*	None	Near threatened	NBDC online database record (O17 and O26)
Round-leaved Crane's-bill *Geranium rotundifolium*	None	Endangered	NBDC online database record (O13)
Saltmarsh Flat-sedge *Blysmus rufus*	None	Near threatened	NBDC online database record (O23)
Sea Pea *Lathyrus japonicus*	FPO	Data deficient	NBDC online database record (O23)
Sea-kale *Crambe maritima*	None	Near threatened	NBDC online database record (O16 and O23)
Slender Thistle *Carduus tenuiflorus*	None	Near threatened	NBDC online database record (O13, O18, O23, and O24)
Slender Tufted-sedge *Carex acuta*	None	Near threatened	NBDC online database record (O23)
Smooth Brome *Bromus racemosus*	None	Vulnerable	NBDC online database record (O14)

Common Name/ Scientific name	Legal Status[1]	Red List Status	Source
Spring Vetch *Vicia lathyroides*	None	Least concern	NBDC online database record (O13)
Strawberry-tree *Arbutus unedo*	None	Near threatened	NBDC online database record (O13 and O23)
Tubular Water-dropwort *Oenanthe fistulosa*	None	Near threatened	NBDC online database record (O13)
Water-violet *Hottonia palustris*	None	Vulnerable	NBDC online database record (O13)
Cladonia portentosa	HD_V	Data deficient	NBDC online database record (O23)
Bearded Pawwort *Barbilophozia barbata*	None	Critically Endangered	NBDC online database record (O23)
Cliff Scalewort *Porella cordaeana*	None	Near threatened	NBDC online database record (O07, O16, and O17)
Petalwort *Petalophyllum ralfsii*	FPO, HD_II	Least concern	NBDC online database record (O23 and O24)

Desktop records of protected, rare, or other notable fauna species are listed below in Table 8.2. In relation to amphibian, reptile and mammal species those which are protected under the Wildlife Acts, the Habitats Directive and/or are listed as threatened (Vulnerable to Critically Endangered) on the relevant national Red Lists are included. In the case of bird species, only those species listed in Annex I of the Birds Directive or on the Birds of Conservation Concern in Ireland (BoCCI) Red List are included in the table below. For invertebrate species, those which are listed as threatened (Vulnerable to Critically Endangered) on the relevant national Red List are included.

Table 8.2 Records of protected, red-listed or notable fauna from the desktop study in the vicinity of the study area

Common Name/ Scientific Name	Legal Status[2]	Red List Status[3]	Source
Amphibians			
Common frog *Rana temporaria*	HD_V, WA	Least concern	NBDC online database record (O06, O07, O08, O13, O14, O15, O16, O17, O18, O23, O24, O25, and O26)
Smooth newt *Lissotriton vulgaris*	WA	Least concern	NBDC online database record (O07, O08, O13, O14, O16, O17, O23, O24, O25, and O26)
Reptiles			
Common lizard *Lacerta vivipara*	WA	Least concern	NBDC online database record (O07, O08, O13, O17, O18, O23, O24, O25, and O26)
Kemp's Ridley *Lepidochelys kempii*	HD_IV, WA	n/a	NBDC online database record (O23)
Loggerhead Turtle *Caretta caretta*	HD_II & IV, WA	n/a	NBDC online database record (O23)
Mammals (Marine)			
Atlantic White-sided Dolphin *Lagenorhynchus acutus*	HD_IV, WA	n/a	NBDC online database record (O18)
Bottle-nosed dolphin *Tursiops truncatus*	HD_II & IV, WA	n/a	NBDC online database record (O16, O17, O18, O23, O24, and O26)
Common dolphin *Delphinus delphis*	HD_IV, WA	n/a	NBDC online database record (O13, O16, O17, O18, O23, O24, and O26)

[2] HD_II/IV/V = Habitats Directive Annexes II/IV/V; WA = Wildlife Acts; BD_I/II/III = Birds Directive Annex I/II/III; OSPAR = Convention for the protection of the marine environment of the North-east Atlantic 1992

[3] Mammal Red-list from Marnell, F., Kingston, N. & Looney, D. (2009) *Ireland Red List No. 3: Terrestrial Mammals* and Marnell, F., Looney, D. & Lawton, C. (2019) *Ireland Red List No. 12: Terrestrial Mammals*.

Birds from Gilbert, G., Stanbury, A. & Lewis, L (2021) Birds of Conservation Concern in Ireland 4: 2020–2026. *Irish Birds 43*: 1–22.

Amphibians, reptiles and fish from King, J.L., Marnell, F., Kingston, N., Rosell, R., Boylan, P., Caffrey, J.M., Fitzpatrick, Ú., Gargan, P.G., Kelly, F.L., O'Grady, M.F., Poole, R., Roche, W.K. & Cassidy, D. (2011) Ireland Red List No. 5: Amphibians, Reptiles & Freshwater Fish.

Non-Marine Molluscs from Byrne, A., Moorkens, E.A., Anderson, R., Killeen, I.J. & Regan, E.C. (2009) *Ireland Red List No. 2 – Non-Marine Molluscs*.

Butterflies from Regan, E.C., Nelson, B., Aldwell, B., Bertrand, C., Bond, K., Harding, J., Nash, D., Nixon, D., & Wilson, C.J. (2010) Ireland Red List No. 4 – Butterflies.

Moths from Allen, D., O'Donnell, M., Nelson, B., Tyner, A., Bond, K.G.M., Bryant, T., Crory, A., Mellon, C., O'Boyle, J., O'Donnell, E., Rolston, T., Sheppard, R., Strickland, P., Fitzpatrick, U., & Regan, E. (2016) *Ireland Red List No. 9: Macro-moths (Lepidoptera).*

Damselflies and dragonflies from Nelson, B., Ronayne, C. & Thompson, R. (2011) *Ireland Red List No.6: Damselflies & Dragonflies (Odonata).*

Water beetles from Foster, G. N., Nelson, B. H. & O Connor, Á. (2009) *Ireland Red List No. 1 – Water beetles.*

Common Name/ Scientific Name	Legal Status[2]	Red List Status[3]	Source
Common porpoise *Phocoena phocoena*	HD_II & IV, WA	n/a	NBDC online database record (O13, O16, O17, O18, O23, O24, O25, and O26)
Common seal *Phoca vitulina*	HD_II & IV, WA	n/a	NBDC online database record (O17, O18, O23, O24, O25, and O26)
Fin Whale *Balaenoptera physalus*	HD_IV, WA	n/a	NBDC online database record (O13 and O23)
Grey seal *Halichoerus grypus*	HD_II & IV, WA	n/a	NBDC online database record (O13, O16, O17, O18, O23, O24, O25, and O26)
Humpback Whale *Megaptera novaeangliae*	HD_IV, WA	n/a	NBDC online database record (O24 and O26)
Long-finned Pilot Whale *Globicephala melas*	HD_IV, WA	n/a	NBDC online database record (O16 and O17)
Minke Whale *Balaenoptera acutorostrata*	HD_IV, WA	n/a	NBDC online database record (O17, O23, and O25)
Northern Bottlenose Whale *Hyperoodon ampullatus*	HD_IV, WA	n/a	NBDC online database record (O16, O23, O24, and O25)
Pygmy Sperm Whale *Kogia breviceps*	HD_IV, WA	n/a	NBDC online database record (O23)
Risso's Dolphin *Grampus griseus*	HD_IV, WA	n/a	NBDC online database record (O23)
Sperm Whale *Physeter macrocephalus*	HD_IV, WA	n/a	NBDC online database record (O13)
Striped Dolphin *Stenella coeruleoalba*	HD_IV, WA	n/a	NBDC online database record (O13, O17, O24, and O25)
White-beaked Dolphin *Lagenorhynchus albirostris*	HD_IV, WA	n/a	NBDC online database record (O23)
Mammals (Terrestrial)			
Badger *Meles meles*	WA	Least concern	NBDC online database record (O13 and O25)
Brown Long-eared Bat *Plecotus auritus*	HD_IV, WA	Least concern	BCI database record NBDC online database record (O25)
Daubenton's Bat *Myotis daubentonii*	HD_IV, WA	Least concern	BCI database record NBDC online database record (O25)
Hedgehog *Erinaceus europaeus*	WA	Least concern	NBDC online database record (O25)
Irish Hare *Lepus timidus subspp hibernicus*	HD_V, WA	Least concern	NBDC online database record (O25)

Common Name/ Scientific Name	Legal Status[2]	Red List Status[3]	Source
Stoat *Mustela erminea subspp hibernica*	WA	Least concern	NBDC online database record (O25)
Lesser Noctule *Nyctalus leisleri*	HD_IV, WA	Least concern	BCI database record NBDC online database record (O25)
Nathusius's Pipistrelle *Pipistrellus nathusii*	HD_IV, WA	Least concern	BCI database record NBDC online database record (O25)
Otter *Lutra lutra*	HD_II & IV, WA	Least concern	NBDC online database record (O13 and O25)
Pine Marten *Martes martes*	HD_V, WA	Least concern	NBDC online database record (O25)
Pipistrelle *Pipistrellus pipistrellus sensu lato*	HD_IV, WA	Least concern	BCI database record NBDC online database record (O25)
Pygmy Shrew *Sorex minutus*	WA	Least concern	NBDC online database record (O13 and O25)
Red Squirrel *Sciurus vulgaris*	WA	Least concern	NBDC online database record (O13)
Soprano Pipistrelle *Pipistrellus pygmaeus*	HD_IV, WA	Least concern	BCI database record NBDC online database record (O25)
Fish			
Atlantic Cod *Gadus morhua*	**OSPAR**	**Threatened**	**NBDC online database record (O23)**
Brown/ Sea trout *Salmo trutta*	Protected under Fisheries Acts and fishing by-laws	Least concern	NBDC online database record (O13 and O14)
Eel *Anguilla anguilla*	OSPAR Protected under Fisheries Acts and fishing by-laws	Critically endangered	NBDC online database record (O06, O07, O13, O14, and O24)
Birds			
Arctic Tern *Sterna paradisaea*	WA, BD_I	Amber	NBDC online database record (O13)
Atlantic Puffin *Fratercula arctica*	WA	Amber	NBDC online database record (O23)
Barn Owl *Tyto alba*	WA	Red	NBDC online database record (O06)
Barn Swallow *Hirundo rustica*	WA	Amber	NBDC online database record (O06)
Barnacle Goose	WA	Amber	NBDC online database record (O13)

Common Name/ Scientific Name	Legal Status[2]	Red List Status[3]	Source
Branta leucopsis			
Bar-tailed Godwit *Limosa lapponica*	WA, BD_I	Amber	NBDC online database record (O07)
Bearded Tit *Panurus biarmicus*	WA	n/a	NBDC online database record (O08)
Bewick's Swan *Cygnus columbianus* subspp *bewickii*	WA, BD_I	Red	NBDC online database record (O18)
Black Guillemot *Cepphus grylle*	WA	Amber	NBDC online database record (O13)
Black Tern *Chlidonias niger*	WA, BD_I	n/a	NBDC online database record (O23)
Black-headed Gull *Larus ridibundus*	WA	Red	NBDC online database record (O06)
Black-legged Kittiwake *Rissa tridactyla*	WA	Amber	NBDC online database record (O07)
Black-necked Grebe *Podiceps nigricollis*	WA	Red	NBDC online database record (O24)
Black-tailed Godwit *Limosa limosa*	WA	Amber	NBDC online database record (O13)
Black-throated Diver *Gavia arctica*	WA, BD_I	Amber	NBDC online database record (O18)
Brent Goose *Branta bernicla*	WA	Amber	NBDC online database record (O13)
Common Coot *Fulica atra*	WA, BD_II(I), BD_III(II)	Amber	NBDC online database record (O06)
Common Eider *Somateria mollissima*	WA, BD_II(II), BD_III(II)	Amber	NBDC online database record (O17)
Common Goldeneye *Bucephala clangula*	WA, BD_II(II)	Amber	NBDC online database record (O07)
Common Grasshopper Warbler *Locustella naevia*	WA	Amber	NBDC online database record (O07)
Common Greenshank *Tringa nebularia*	WA	Amber	NBDC online database record (O07)
Common Guillemot *Uria aalge*	WA	Amber	NBDC online database record (O08)
Common Kestrel *Falco tinnunculus*	WA	Amber	NBDC online database record (O06)
Common Kingfisher *Alcedo atthis*	WA, BD_I	Amber	NBDC online database record (O06)

Common Name/ Scientific Name	Legal Status[2]	Red List Status[3]	Source
Common Linnet *Carduelis cannabina*	WA	Amber	NBDC online database record (O06)
Common Pheasant *Phasianus colchicus*	WA, BD_II(I), BD_III(I)	n/a	NBDC online database record (O07)
Common Pochard *Aythya ferina*	WA, BD_II(I), BD_III(II)	Amber	NBDC online database record (O07)
Common Quail *Coturnix coturnix*	WA	Red	NBDC online database record (O07)
Common Redshank *Tringa totanus*	WA	Red	NBDC online database record (O07)
Common Sandpiper *Actitis hypoleucos*	WA	Amber	NBDC online database record (O07)
Common Scoter *Melanitta nigra*	WA, BD_II(II), BD_III(III)	Red	NBDC online database record (O16)
Common Shelduck *Tadorna tadorna*	WA	Amber	NBDC online database record (O07)
Common Snipe *Gallinago gallinago*	WA, BD_II(I), BD_III(III)	Amber	NBDC online database record (O06)
Common Starling *Sturnus vulgaris*	WA	Amber	NBDC online database record (O06)
Common Swift *Apus apus*	WA	Amber	NBDC online database record (O06)
Common Tern *Sterna hirundo*	WA, BD_I	Amber	NBDC online database record (O07)
Common Wood Pigeon *Columba palumbus*	WA, BD_II(I), BD_III(I)	n/a	NBDC online database record (O07)
Corn Bunting *Emberiza calandra*	WA	n/a	NBDC online database record (O06)
Corn Crake *Crex crex*	WA, BD_I	Red	NBDC online database record (O06)
Dunlin *Calidris alpina*	WA, BD_I	Amber	NBDC online database record (O13)
Eurasian Curlew *Numenius arquata*	WA, BD_II(II)	Red	NBDC online database record (O06)
Eurasian Marsh Harrier *Circus aeruginosus*	WA	n/a	NBDC online database record (O25)
Eurasian Oystercatcher *Haematopus ostralegus*	WA	Amber	NBDC online database record (O07)

Common Name/ Scientific Name	Legal Status[2]	Red List Status[3]	Source
Eurasian Teal *Anas crecca*	WA, BD_II(I), BD_III(II)	Amber	NBDC online database record (O06)
Eurasian Tree Sparrow *Passer montanus*	WA	Amber	NBDC online database record (O06)
Eurasian Wigeon *Anas penelope*	WA, BD_II(I), BD_III(II)	Amber	NBDC online database record (O07)
Eurasian Woodcock *Scolopax rusticola*	WA, BD_II(I), BD_III(III)	Amber	NBDC online database record (O06)
European Golden Plover *Pluvialis apricaria*	WA, BD_I, BD_II(II), BD_III(III)	Red	NBDC online database record (O06)
European Nightjar *Caprimulgus europaeus*	WA, BD_I	Red	NBDC online database record (O08)
European Shag *Phalacrocorax aristotelis*	WA	Amber	NBDC online database record (O13)
European Storm-petrel *Hydrobates pelagicus*	WA, BD_I	Amber	NBDC online database record (O26)
European Turtle Dove *Streptopelia turtur*	WA	Amber	NBDC online database record (O13)
Gadwall *Anas strepera*	WA, BD_II(I)	Amber	NBDC online database record (O08)
Garganey *Anas querquedula*	WA, BD_II(I)	Amber	NBDC online database record (O16)
Goosander *Mergus merganser*	WA, BD_II(II)	Amber	NBDC online database record (O07)
Great Black-backed Gull *Larus marinus*	WA	Amber	NBDC online database record (O07)
Great Cormorant *Phalacrocorax carbo*	WA	Amber	NBDC online database record (O06)
Great Crested Grebe *Podiceps cristatus*	WA	Amber	NBDC online database record (O07)
Great Northern Diver *Gavia immer*	WA, BD_I	n/a	NBDC online database record (O13)
Great Skua *Stercorarius skua*	WA	Amber	NBDC online database record (O17)
Greater Scaup *Aythya marila*	WA, BD_II(II), BD_III(III)	Amber	NBDC online database record (O13)
Greater White-fronted Goose *Anser albifrons*	WA, BD_I, BD_II(II), BD_III(III)	Amber	NBDC online database record (O17)

Common Name/ Scientific Name	Legal Status[2]	Red List Status[3]	Source
Grey Partridge *Perdix perdix*	WA, BD_II(I), BD_III(I)	Red	NBDC online database record (O06)
Grey Plover *Pluvialis squatarola*	WA	Amber	NBDC online database record (O13)
Hen Harrier *Circus cyaneus*	WA, BD_I	Amber	NBDC online database record (O07)
Herring Gull *Larus argentatus*	WA	Red	NBDC online database record (O06)
House Martin *Delichon urbicum*	WA	Amber	NBDC online database record (O06)
House Sparrow *Passer domesticus*	WA	Amber	NBDC online database record (O06)
Jack Snipe *Lymnocryptes minimus*	WA, BD_II(I), BD_III(III)	n/a	NBDC online database record (O16)
Kentish Plover *Charadrius alexandrinus*	WA, BD_I	n/a	NBDC online database record (O13)
Lesser Black-backed Gull *Larus fuscus*	WA	Amber	NBDC online database record (O07)
Lesser Whitethroat *Sylvia curruca*	WA	Amber	NBDC online database record (O13)
Little Egret *Egretta garzetta*	WA, BD_I	n/a	NBDC online database record (O07)
Little Grebe *Tachybaptus ruficollis*	WA	Amber	NBDC online database record (O06)
Little Gull *Larus minutus*	WA, BD_I	n/a	NBDC online database record (O14)
Little Tern *Sternula albifrons*	WA, BD_I	Amber	NBDC online database record (O13)
Long-tailed Duck *Clangula hyemalis*	WA, BD_II(II)	n/a	NBDC online database record (O08)
Mallard *Anas platyrhynchos*	WA, BD_II(I), BD_III(I)	n/a	NBDC online database record (O06)
Manx Shearwater *Puffinus puffinus*	WA	Amber	NBDC online database record (O13)
Mediterranean Gull *Ichthyaetus (Larus) melanocephalus*	WA, BD_I	Amber	NBDC online database record (O13)
Merlin *Falco columbarius*	WA, BD_I	Amber	NBDC online database record (O07)
Mew Gull	WA	Amber	NBDC online database record (O06)

Common Name/ Scientific Name	Legal Status[2]	Red List Status[3]	Source
Larus canus			
Mute Swan *Cygnus olor*	WA	Amber	NBDC online database record (O06)
Northern Gannet *Morus bassanus*	WA	Amber	NBDC online database record (O08)
Northern Goshawk *Accipiter gentilis*	WA	Amber	NBDC online database record (O14)
Northern Lapwing *Vanellus vanellus*	WA, BD_II(II)	Red	NBDC online database record (O06)
Northern Pintail *Anas acuta*	WA, BD_II(I), BD_III(II)	Red	NBDC online database record (O07)
Northern Shoveler *Anas clypeata*	WA, BD_II(I), BD_III(III)	Red	NBDC online database record (O07)
Northern Wheatear *Oenanthe oenanthe*	WA	Amber	NBDC online database record (O06)
Peregrine Falcon *Falco peregrinus*	WA, BD_I	n/a	NBDC online database record (O07)
Pink-footed Goose *Anser brachyrhynchus*	WA, BD_II(II)	n/a	NBDC online database record (O14)
Razorbill *Alca torda*	WA	Amber	NBDC online database record (O16)
Red Kite *Milvus milvus*	WA	Amber	NBDC online database record (O06)
Red Knot *Calidris canutus*	WA	Red	NBDC online database record (O13)
Red-breasted Merganser *Mergus serrator*	WA, BD_II(II)	n/a	NBDC online database record (O07)
Red-footed Falcon *Falco vespertinus*	WA, BD_I	n/a	NBDC online database record (O13)
Red-necked Phalarope *Phalaropus lobatus*	WA, BD_I	Red	NBDC online database record (O23)
Red-throated Diver *Gavia stellata*	WA, BD_I	Amber	NBDC online database record (O13)
Ringed Plover *Charadrius hiaticula*	WA	Amber	NBDC online database record (O13)
Rock Pigeon *Columba livia*	WA, BD_II(I)	n/a	NBDC online database record (O07)
Roseate Tern *Sterna dougallii*	WA, BD_I	Amber	NBDC online database record (O16)

Common Name/ Scientific Name	Legal Status[2]	Red List Status[3]	Source
Ruff *Philomachus pugnax*	WA, BD_I	Amber	NBDC online database record (O14)
Sand Martin *Riparia riparia*	WA	Amber	NBDC online database record (O06)
Sandwich Tern *Sterna sandvicensis*	WA, BD_I	Amber	NBDC online database record (O17)
Short-eared Owl *Asio flammeus*	WA, BD_I	Amber	NBDC online database record (O14)
Sky Lark *Alauda arvensis*	WA	Amber	NBDC online database record (O06)
Slavonian Grebe *Podiceps auritus*	WA	Amber	NBDC online database record (O14)
Snowy Owl *Bubo scandiaca*	WA, BD_I	Amber	NBDC online database record (O14)
Spotted Crake *Porzana porzana*	WA	Amber	NBDC online database record (O13)
Spotted Flycatcher *Muscicapa striata*	WA	Amber	NBDC online database record (O06)
Stock Pigeon *Columba oenas*	WA	Amber	NBDC online database record (O06)
Tufted Duck *Aythya fuligula*	WA, BD_II(I), BD_III(II)	Amber	NBDC online database record (O07)
Twite *Carduelis flavirostris*	WA	Red	NBDC online database record (O13)
Velvet Scoter *Melanitta fusca*	WA, BD_II(II)	n/a	NBDC online database record (O14)
Water Rail *Rallus aquaticus*	WA	Amber	NBDC online database record (O06)
Whinchat *Saxicola rubetra*	WA	Amber	NBDC online database record (O17)
White-tailed Eagle *Haliaeetus albicilla*	WA	n/a	NBDC online database record (O14)
Whooper Swan *Cygnus cygnus*	WA, BD_I	Amber	NBDC online database record (O07)
Wood Lark *Lullula arborea*	WA	n/a	NBDC online database record (O13)
Wood Sandpiper *Tringa glareola*	WA, BD_I	Amber	NBDC online database record (O25)
Yellow Wagtail *Motacilla flava*	WA	Amber	NBDC online database record (O23)

Common Name/ Scientific Name	Legal Status[2]	Red List Status[3]	Source
Yellowhammer *Emberiza citrinella*	WA	Red	NBDC online database record (O06)
Invertebrates			
Agabus (Gaurodytes) conspersus	none	Endangered	NBDC online database record (O23 and O24)
Andrena (Andrena) fucata	none	Near threatened	NBDC online database record (O15, O16, O24, O25, and O26)
Andrena (Cnemidandrena) denticulata	none	Vulnerable	NBDC online database record (O23)
Andrena (Cnemidandrena) fuscipes	none	Vulnerable	NBDC online database record (O23)
Andrena (Leucandrena) barbilabris	none	Near threatened	NBDC online database record (O15, O16, O17, O18, O24, and O25)
Andrena (Melandrena) nigroaenea	none	Vulnerable	NBDC online database record (O07, O13, O14, O15, O16, O18, O23, O24, and O25)
Andrena (Micrandrena) semilaevis	none	Vulnerable	NBDC online database record (O15, O16, O23, O24, O25, and O26)
Bagous (Hydronomus) alismatis	none	Critically Endangered	NBDC online database record (O13 and O14)
Barbut's Cuckoo Bee *Bombus (Psithyrus) barbutellus*	none	Endangered	NBDC online database record (O13, O24, and O25)
Blind Snail *Cecilioides (Cecilioides) acicula*	none	Vulnerable	NBDC online database record (O07, O16, O17, and O24)
Colletes (Colletes) similis	none	Near threatened	NBDC online database record (O17, O18, O23, O24, and O25)
Common Shelled Slug *Testacella (Testacella) haliotidea*	none	Vulnerable	NBDC online database record (O13)
Common Whorl Snail *Vertigo (Vertigo) pygmaea*	none	Near threatened	NBDC online database record (O07, O08, O17, O23, and O24)
Dark Green Fritillary *Argynnis aglaja*	none	Vulnerable	NBDC online database record (O08, O13, O17, O18, O23, and O24)
Desmoulin's Whorl Snail *Vertigo (Vertigo) moulinsiana*	HD_II, WA	HD_II, WA, Endangered	NBDC online database record (O07)
Ear Pond Snail *Radix auricularia*	none	Vulnerable	NBDC online database record (O13, O17, and O18)
English Chrysalis Snail *Leiostyla (Leiostyla) anglica*	none	Vulnerable	NBDC online database record (O07, O08, O13, O16, O17, O23, and O24)
Ephemerella notata	none	Endangered	NBDC online database record (O06, O07, O14, and O15)
Field Cuckoo Bee *Bombus (Psithyrus) campestris*	none	Vulnerable	NBDC online database record (O07, O13, and O24)
Gatekeeper *Pyronia tithonus*	none	Near threatened	NBDC online database record (O23 and O24)
Gipsy Cuckoo Bee *Bombus (Psithyrus) bohemicus*	none	Near threatened	NBDC online database record (O07, O23, O24, O25, and O26)
Globular Pea Mussel *Pisidium hibernicum*	none	Near threatened	NBDC online database record (O13)

Common Name/ Scientific Name	Legal Status[2]	Red List Status[3]	Source
Glutinous Snail *Myxas glutinosa*	none	Endangered	NBDC online database record (O13)
Gooden's Nomad Bee *Nomada goodeniana*	none	Endangered	NBDC online database record (O13, O14, O15, O16, O17, O24, O25, and O26)
Grayling *Hipparchia semele*	none	Near threatened	NBDC online database record (O13, O14, O23, O24, and O25)
Great Yellow Bumble Bee *Bombus (Subterraneobombus) distinguendus*	none	Endangered	NBDC online database record (O13, O17, O23, and O24)
Gyrinus natator	none	Near threatened	NBDC online database record (O24)
Gyrinus urinator	none	Near threatened	NBDC online database record (O07 and O14)
Halictus (Seladonia) tumulorum	none	Near threatened	NBDC online database record (O07, O13, O16, O23, O24, O25, and O26)
Heath Snail Helicella itala	none	Vulnerable	NBDC online database record (O13, O16, O17, O23, O24, and O25)
Helophorus (Helophorus) fulgidicollis	none	Vulnerable	NBDC online database record (O23 and O24)
Hill Cuckoo Bee *Bombus (Psithyrus) rupestris*	none	Endangered	NBDC online database record (O13, O23, and O25)
Hydraena rufipes	none	Endangered	NBDC online database record (O07)
Hygrotus (Coelambus) novemlineatus	none	Vulnerable	NBDC online database record (O07)
Hylaeus (Prosopis) brevicornis	none	Endangered	NBDC online database record (O13)
Kageronia fuscogrisea	none	Near threatened	NBDC online database record (O07)
Labiobaetis atrebatinus	none	Endangered	NBDC online database record (O07 and O13)
Laccophilus hyalinus	none	Vulnerable	NBDC online database record (O07)
Laccornis oblongus	none	Near threatened	NBDC online database record (O06)
Lake Orb Mussel *Musculium lacustre*	none	Vulnerable	NBDC online database record (O13, O14, O17, and O18)
Large Red Tailed Bumble Bee *Bombus (Melanobombus) lapidarius*	none	Near threatened	NBDC online database record (O06, O07, O13, O14, O16, O17, O18, O23, O24, O25, and O26)
Lasioglossum (Evylaeus) rufitarse	none	Vulnerable	NBDC online database record (O07)
Lesser Bulin *Merdigera obscura*	none	Endangered	NBDC online database record (O07, O17, and O23)

Common Name/ Scientific Name	Legal Status[2]	Red List Status[3]	Source
Macroplea appendiculata	none	Near threatened	NBDC online database record (O13)
Marsh Fritillary *Euphydryas aurinia*	HD_II	HD_II, Vulnerable	NBDC online database record (O13, O14, and O23)
Marsh Whorl Snail *Vertigo (Vertigo) antivertigo*	none	Vulnerable	NBDC online database record (O07, O08, O17, and O23)
Mauge's Shelled Slug *Testacella (Testacella) maugei*	none	Near threatened	NBDC online database record (O13 and O14)
Megachile (Delomegachile) willughbiella	none	Near threatened	NBDC online database record (O13, O16, O24, O25, and O26)
Megachile (Megachile) centuncularis	none	Near threatened	NBDC online database record (O13, O14, O16, and O25)
Moss Bladder Snail *Aplexa hypnorum*	none	Vulnerable	NBDC online database record (O18)
Moss Carder-bee *Bombus (Thoracombus) muscorum*	none	Near threatened	NBDC online database record (O07, O13, O14, O16, O17, O18, O23, O24, O25, and O26)
Moss Chrysalis Snail *Pupilla (Pupilla) muscorum*	none	Endangered	NBDC online database record (O06, O07, O08, O14, O17, O23, O24, and O25)
Neat Mining Bee *Lasioglossum (Evylaeus) nitidiusculum*	none	Vulnerable	NBDC online database record (O16, O23, O24, and O25)
Nomada panzeri	none	Near threatened	NBDC online database record (O23, O24, O25, and O26)
Nomada striata	none	Endangered	NBDC online database record (O25)
Northern Colletes *Colletes (Colletes) floralis*	none	Vulnerable	NBDC online database record (O17, O23, and O26)
Ochthebius (Asiobates) auriculatus	none	Near threatened	NBDC online database record (O17, O23, and O24)
Ochthebius (Asiobates) bicolon	none	Vulnerable	NBDC online database record (O23)
Ochthebius (Ochthebius) marinus	none	Near threatened	NBDC online database record (O07, O17, O23, and O24)
Ochthebius (Ochthebius) viridis	none	Near threatened	NBDC online database record (O17)
Osmia (Helicosmia) aurulenta	none	Near threatened	NBDC online database record (O17, O24, and O25)
Pisidium pseudosphaerium	none	Endangered	NBDC online database record (O13)
Pisidium pulchellum	none	Endangered	NBDC online database record (O13)
Point Snail *Acicula fusca*	none	Vulnerable	NBDC online database record (O07, O08, and O17)

Common Name/ Scientific Name	Legal Status[2]	Red List Status[3]	Source
Prickly Snail *Acanthinula aculeata*	none	Near threatened	NBDC online database record (O07, O17, and O23)
Procloeon bifidum	none	Vulnerable	NBDC online database record (O07 and O13)
Red-tailed Carder Bee *Bombus (Thoracombus) ruderarius*	none	Vulnerable	NBDC online database record (O14, O18, O24, and O25)
Rhithrogena germanica	none	Vulnerable	NBDC online database record (O13)
Scarce Blue-tailed Damselfly *Ischnura pumilio*	none	Vulnerable	NBDC online database record (O13 and O18)
Silky Snail *Ashfordia granulata*	none	Near threatened	NBDC online database record (O13)
Small Blue *Cupido minimus*	none	Endangered	NBDC online database record (O17, O23, O24, O25, and O26)
Small Heath *Coenonympha pamphilus*	none	Near threatened	NBDC online database record (O07, O08, O13, O17, O18, O23, O24, and O25)
Smooth Grass Snail *Vallonia pulchella*	none	Vulnerable	NBDC online database record (O06, O13, O17, O18, and O25)
Smooth Ramshorn *Gyraulus (Torquis) laevis*	none	Endangered	NBDC online database record (O07, O13, and O17)
Sphaerium nucleus	none	Vulnerable	NBDC online database record (O07)
Sphecodes ferruginatus	none	Endangered	NBDC online database record (O15)
Striated Whorl Snail *Vertigo (Vertigo) substriata*	none	Near threatened	NBDC online database record (O06, O07, O08, and O23)
Swan Mussel *Anodonta (Anodonta) cygnea*	none	Vulnerable	NBDC online database record (O13)
Tree Snail *Balea (Balea) perversa*	none	Vulnerable	NBDC online database record (O06, O07, O08, O17, O18, O23, and O24)
Trimmer's Mining Bee *Andrena (Hoplandrena) trimmerana*	none	Critically Endangered	NBDC online database record (O24)
Ventrosia ventrosa	none	Vulnerable	NBDC online database record (O23)
Wall brown *Lasiommata megera*	none	Endangered	NBDC online database record (O06, O07, O08, O13, O14, O15, O16, O17, O18, O23, O24, O25, and O26)

8.2 Appendix A8.2: Examples of Valuing Important Ecological Features

International Importance:

- 'European Site' including Special Area of Conservation (SAC), Site of Community Importance (SCI), Special Protection Area (SPA) or proposed Special Area of Conservation.
- Proposed Special Protection Area (pSPA).
- Site that fulfils the criteria for designation as a 'European Site' (see Annex III of the Habitats Directive, as amended).
- Features essential to maintaining the coherence of the Natura 2000 Network.[4]
- Site containing 'best examples' of the habitat types listed in Annex I of the Habitats Directive.
- Resident or regularly occurring populations (assessed to be important at the national level)[5] of the following:
  - Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive; and/or
  - Species of animal and plants listed in Annex II and/or IV of the Habitats Directive.
- Ramsar Site (Convention on Wetlands of International Importance Especially Waterfowl Habitat 1971).
- World Heritage Site (Convention for the Protection of World Cultural & Natural Heritage, 1972).
- Biosphere Reserve (UNESCO Man & The Biosphere Programme).
- Site hosting significant species populations under the Bonn Convention (Convention on the Conservation of Migratory Species of Wild Animals, 1979).
- Site hosting significant populations under the Berne Convention (Convention on the Conservation of European Wildlife and Natural Habitats, 1979).
- Biogenetic Reserve under the Council of Europe.
- European Diploma Site under the Council of Europe.
- Salmonid water designated pursuant to the European Communities (Quality of Salmonid Waters) Regulations, 1988, (S.I. No. 293 of 1988).[6]

National Importance:

- Site designated or proposed as a Natural Heritage Area (NHA).
- Statutory Nature Reserve.
- Refuge for Fauna and Flora protected under the Wildlife Acts.
- National Park.
- Undesignated site fulfilling the criteria for designation as a Natural Heritage Area (NHA); Statutory Nature Reserve; Refuge for Fauna and Flora protected under the Wildlife Act; and/or a National Park.
- Resident or regularly occurring populations (assessed to be important at the national level)[7] of the following:
  - Species protected under the Wildlife Acts; and/or
  - Species listed on the relevant Red Data list.

[4] See Articles 3 and 10 of the Habitats Directive

[5] It is suggested that, in general, 1% of the national population of such species qualifies as an internationally important population. However, a smaller population may qualify as internationally important where the population forms a critical part of a wider population or the species is at a critical phase of its life cycle.

[6] Note that such waters are designated based on these waters' capabilities of supporting salmon (*Salmo salar*), trout (*Salmo trutta*), char (*Salvelinus*) and whitefish (*Coregonus*)

[7] It is suggested that, in general, 1% of the national population of such species qualifies as a nationally important population. However, a smaller population may qualify as nationally important where the population forms a critical part of a wider population or the species is at a critical phase of its life cycle.

- Site containing 'viable areas'[8] of the habitat types listed in Annex I of the Habitats Directive

County Importance:

- Area of Special Amenity.[9]
- Area subject to a Tree Preservation Order.
- Area of High Amenity, or equivalent, designated under the County Development Plan.
- Resident or regularly occurring populations (assessed to be important at the County level)[10] of
- the following:
  - Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive;
  - Species of animal and plants listed in Annex II and/or IV of the Habitats Directive;
  - Species protected under the Wildlife Acts; and/or
  - Species listed on the relevant Red Data list.
- Site containing area or areas of the habitat types listed in Annex I of the Habitats Directive that do not fulfil the criteria for valuation as of International or National importance.
- County important populations of species, or viable areas of semi-natural habitats or natural heritage features identified in the National or Local Biodiversity Action Plan, if this has been prepared.
- Sites containing semi-natural habitat types with high biodiversity in a county context and a high degree of naturalness, or populations of species that are uncommon within the county.
- Sites containing habitats and species that are rare or are undergoing a decline in quality or extent at a national level.

Local Importance (higher value):

- Locally important populations of priority species or habitats or natural heritage features identified in the Local BAP, if this has been prepared;
- Resident or regularly occurring populations (assessed to be important at the Local level)[11] of the following:
  - Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive;
  - Species of animal and plants listed in Annex II and/or IV of the Habitats Directive;
  - Species protected under the Wildlife Acts; and/or
  - Species listed on the relevant Red Data list.
- Sites containing semi-natural habitat types with high biodiversity in a local context and a high degree of naturalness, or populations of species that are uncommon in the locality;
- Sites or features containing common or lower value habitats, including naturalised species that are nevertheless essential in maintaining links and ecological corridors between features of higher ecological value.

[8] A 'viable area' is defined as an area of a habitat that, given the particular characteristics of that habitat, was of a sufficient size and shape, such that its integrity (in terms of species composition, and ecological processes and function) would be maintained in the face of stochastic change (for example, as a result of climatic variation).

[9] It should be noted that whilst areas such as Areas of Special Amenity, areas subject to a Tree Preservation Order and Areas of High Amenity are often designated on the basis of their ecological value, they may also be designated for other reasons, such as their amenity or recreational value. Therefore, it should not be automatically assumed that such sites are of County importance from an ecological perspective.

[10] It is suggested that, in general, 1% of the County population of such species qualifies as a County important population. However, a smaller population may qualify as County important where the population forms a critical part of a wider population or the species is at a critical phase of its life cycle.

[11] It is suggested that, in general, 1% of the local population of such species qualifies as a locally important population. However, a smaller population may qualify as locally important where the population forms a critical part of a wider population or the species is at a critical phase of its life cycle.

Local Importance (lower value):
• Sites containing small areas of semi-natural habitat that are of some local importance for wildlife; • Sites or features containing non-native species that are of some importance in maintaining habitat links.

8.3 Appendix A8.3: Flora Species by habitat

Flora Species List By Habitat (Habitats of Local Importance (Higher Value) or more)

Common name	Scientific Name	Common name	Scientific Name
Dry Calcareous and neutral grassland (GS1)		**Dry meadows and grassy verges (GS2)**	
Yarrow	*Achillea millefolium*	False Oat-Grass	*Arrhenatherum elatius*
Pyramidal Orchid	*Anacamptis pyramidalis*	Hart's-tongue	*Asplenium scolopendrium*
Sweet Vernal-grass	*Anthoxanthum odoratum*	Hedge Bindweed	*Calystegia sepium*
Kidney Vetch	*Anthyllis vulneraria*	Common Knapweed	*Centaurea nigra*
False Oat-Grass	*Arrhenatherum elatius*	Red Valerian	*Centranthus ruber*
Quaking-grass	*Briza media*	Rosebay Willowherb	*Chamerion angustifolium*
Common Knapweed	*Centaurea nigra*	Creeping Thistle	*Cirsium arvense*
Common Centaury	*Centaurium erythraea*	Spear Thistle	*Cirsium vulgare*
Crested Dog's-tail	*Cynosurus cristatus*	Field Bindweed	*Convolvulus arvensis*
Cock's-foot	*Dactylis glomerata*	Montbretia (*C. aurea* x *pottsii*)	*Crocosmia x crocosmiiflora*
Carrot	*Daucus carota*	Cock's-foot	*Dactylis glomerata*
Red Fescue	*Festuca rubra* agg.	Carrot	*Daucus carota*
Lady's Bedstraw	*Galium verum*	Hemp-agrimony	*Eupatorium cannabinum*
Perforate St John's-wort	*Hypericum perforatum*	Fennel	*Foeniculum vulgare*
Common Ragwort	*Jacobaea vulgaris*	Lady's Bedstraw	*Galium verum*
Field Scabious	*Knautia arvensis*	Herb-Robert	*Geranium robertianum*
Oxeye Daisy	*Leucanthemum vulgare*	Ivy	*Hedera helix* agg.
Pale Flax	*Linum bienne*	Hogweed	*Heracleum sphondylium*
Fairy Flax	*Linum catharticum*	Yorkshire-fog	*Holcus lanatus*
Common Bird's-foot-trefoil	*Lotus corniculatus*	Perforate St John's-wort	*Hypericum perforatum*
Black Medick	*Medicago lupulina*	Common Ragwort	*Jacobaea vulgaris*
Tall Melilot	*Melilotus altissimus*	Field Scabious	*Knautia arvensis*
Common Restharrow	*Ononis repens*	Nipplewort	*Lapsana communis*
Winter Heliotrope	*Petasites pyrenaicus*	Meadow Vetchling	*Lathyrus pratensis*

Common name	Scientific Name	Common name	Scientific Name
Fox-and-cubs	*Pilosella aurantiaca*	Perennial Rye-grass	*Lolium perenne*
Mouse-ear-hawkweed	*Pilosella officinarum*	Mallow species	*Malva* spp.
Ribwort Plantain	*Plantago lanceolata*	Black Medick	*Medicago lupulina*
Cowslip	*Primula veris*	Tall melilot	*Melilotus altissimus*
Bladder Campion	*Silene vulgaris*	Butterbur	*Petasites hybridus*
Hedge Mustard	*Sisymbrium officinale*	Winter Heliotrope	*Petasites pyrenaicus*
Wild Thyme	*Thymus drucei*	Ribwort Plantain	*Plantago lanceolata*
Goat's-beard	*Tragopogon pratensis*	Greater Plantain	*Plantago major*
Reed and large sedge swamps (FS1) and Tall-herb swamps (FS2)		Knotgrass	*Polygonum aviculare*
Common reed	*Phragmites australis*	Soft Shield-fern	*Polystichum setiferum*
Hedgerows (WL1)		Creeping Cinquefoil	*Potentilla reptans*
Sycamore	*Acer pseudoplatanus*	Creeping Buttercup	*Ranunculus repens*
Alder	*Alnus glutinosa*	Broad-leaved Dock	*Rumex obtusifolius*
Hawthorn	*Crataegus monogyna*	a dock species	*Rumex* spp
Ash	*Fraxinus excelsior*	Autumn Hawkbit	*Scorzoneroides autumnalis*
Ivy	*Hedera helix* agg.	Narrow-leaved Ragwort	*Senecio inaequidens*
Honeysuckle	*Lonicera periclymenum*	Campion species	*Silene* spp.
Blackthorn	*Prunus spinosa*	Smooth Sow-thistle	*Sonchus oleraceus*
Dog-rose	*Rosa canina agg.*	Red Clover	*Trifolium pratense*
Japanese Rose	*Rosa rugosa*	Colt's-foot	*Tussilago farfara*
Bramble	*Rubus fruticosus* agg.	Common Nettle	*Urtica dioica*
Elder	*Sambucus nigra*	Germander Speedwell	*Veronica chamaedrys*
Snowberry	*Symphoricarpos albus*	Tufted Vetch	*Vicia cracca*
Treelines (WL2)		Common Vetch	*Vicia sativa*
Sycamore	*Acer pseudoplatanus*	Bush Vetch	*Vicia sepium*
Alder	*Alnus glutinosa*	**Wet willow-alder-ash woodland (WN6)**	
Leyland Cypress	*Cupressus x leylandii*	Wild Angelica	*Angelica sylvestris*
Beech	*Fagus sylvatica*	Hart's-tongue	*Asplenium scolopendrium*
Ash	*Fraxinus excelsior*	False-brome	*Brachypodium sylvaticum*
Sitka Spruce	*Picea sitchensis*	Hawthorn	*Crataegus monogyna*
Scots Pine	*Pinus sylvestris*	Unidentified willowherb	*Epilobium* spp

Common name	Scientific Name	Common name	Scientific Name
Wild Cherry	*Prunus avium*	Great Horsetail	*Equisetum telmateia*
Pedunculate oak	*Quercus robur*	Meadowsweet	*Filipendula ulmaria*
Unidentified Willow	*Salix* spp.	Ash	*Fraxinus excelsior*
Lime	*Tilia x europaea*	Herb-Robert	*Geranium robertianum*
Wych Elm	*Ulmus glabra*	Ivy	*Hedera helix* agg.
(Mixed) broadleaved woodland (WD1)		Hogweed	*Heracleum sphondylium*
Sycamore	*Acer pseudoplatanus*	Blackthorn	*Prunus spinosa*
Pendulous Sedge	*Carex pendula*	Meadow Buttercup	*Ranunculus acris*
Beech	*Fagus sylvatica*	Wood Dock	*Rumex sanguineus*
Ash	*Fraxinus excelsior*	Rusty Willow	*Salix cinerea* subspp *oleifolia*
Scots Pine	*Pinus sylvestris*	Elder	*Sambucus nigra*
Soft Shield-fern	*Polystichum setiferum*	Common Vetch	*Vicia sativa*
Pedunculate oak	*Quercus robur*	Violet species	*Viola* spp
Rhododendron	*Rhododendron ponticum*	**(Mixed) conifer woodland (WD3)**	
Scattered trees and parkland (WD5)		Sycamore	*Acer pseudoplatanus*
Field Maple	*Acer campestre*	Pendulous Sedge	*Carex pendula*
Sycamore	*Acer pseudoplatanus*	Monterey Cypress	*Cupressus macrocarpa*
Daisy	*Bellis perennis*	Beech	*Fagus sylvatica*
Monterey Cypress	*Cupressus macrocarpa*	Ash	*Fraxinus excelsior*
Beech	*Fagus sylvatica*	Austrian Pine / Corsican Pine	*Pinus nigra*
Ash	*Fraxinus excelsior*	Maritime Pine	*Pinus pinaster*
Ivy	*Hedera helix* agg.	Soft Shield-fern	*Polystichum setiferum*
Annual Meadow-grass	*Poa annua*	Rusty Willow	*Salix cinerea* subspp *oleifolia*
Cherry Plum	*Prunus cerasifera*	**Shingle and gravel banks (CB1)**	
A willow species	*Salix* spp	Sea Beet	*Beta vulgaris* subspp *maritima*
Dandelion	*Taraxacum officinale* agg.	Sea Sandwort	*Honckenya peploides*
Lower salt marsh (CM1)		Sea Plantain	*Plantago maritima*
Thrift	*Armeria maritima*	Common Saltmarsh-grass	*Puccinellia maritima*
Sea-purslane	*Atriplex portulacoides*	Curled Dock	*Rumex crispus*
Sea Beet	*Beta vulgaris* subspp *maritima*	Smooth Sow-thistle	*Sonchus oleraceus*
Common Centaury	*Centaurium erythraea*	Annual Sea-blite	*Suaeda maritima*

Common name	Scientific Name	Common name	Scientific Name
Common Couch	*Elytrigia repens*	Sea Mayweed	*Tripleurospermum maritimum*
Red Fescue	*Festuca rubra* agg.	**Upper salt marsh (CM2)**	
Rock Sea-lavender	*Limonium binervosum*	Sea-purslane	*Sesuvium portulacastrum*
Common Saltmarsh-grass	*Puccinellia maritima*	Sea Beet	*Beta maritima*
a glasswort	*Salicornia* spp	Sea Rush	*Juncus maritimus*
Common Cord-grass	*Spartina anglica*	Sea Plantain	*Plantago maritima*
Rock Sea-spurrey	*Spergularia rupicola*	Borrer's Saltmarsh-grass	*Puccinellia fasciculata*
A spurrey species	*Spergularia* spp	Common Cord-grass	*Spartina anglica*
Sea Arrowgrass	*Triglochin maritima*	Rock Sea-spurrey	*Spergularia rupicola*
Embryonic dunes (CD1)		Sea Arrowgrass	*Triglochin maritima*
Marram	*Ammophila arenaria*	**Fixed dunes (CD3)**	
Sea-purslane	*Sesuvium portulacastrum*	Marram	*Ammophila arenaria*
Red Valerian	*Centranthus ruber*	Kidney Vetch	*Anthyllis vulneraria*
Carrot	*Daucus carota*	Red Fescue	*Festuca rubra* agg.
Sea Sandwort	*Honckenya peploides*	Common Bird's-foot-trefoil	*Lotus corniculatus*
Common Ragwort	*Jacobaea vulgaris*	Wild pansy	*Viola tricolor* subspp *curtisii*
Lyme-grass	*Leymus arenarius*	**Shingle and gravel shores (LS1)**	
Sea Plantain	*Plantago maritima*	Saltwort	*Salsola kali*
Sea Radish	*Raphanus raphanistrum* subspp *maritimus*		
Prickly Sow-thistle	*Sonchus asper*		
Common Cord-grass	*Spartina anglica*		
Dandelion	*Taraxacum officinale* agg.		
Sea Mayweed	*Tripleurospermum maritimum*		

8.4 Appendix A8.4: Bridge Inspection Results

Bridge Number	Suitability	Activity survey?	Endoscoped?
UBB30	Negligible	No	No
OBB33	Low	Yes	No
OBB33A	Negligible	No	No
OBB35	Moderate	Yes	No
UBB36	Negligible	No	No
OBB38	Moderate	Yes	No
OBB38A	Negligible	No	No
OBB39	Low	Yes	Yes
OBB41	Low	Yes	No
OBB44	Low	No	Yes
OBB46	Low	Yes	No
OBB47	Moderate	Yes	No
OBB49	Moderate	Yes	No
OBB51A	Negligible	No	No
OBB54	Low	Yes	No
OBB55	Negligible	No	Yes
UBB56	High	Yes	No
OBB57A	Negligible	No	No
UBB65	Low	Yes	No
OBB68	Low	Yes	No
UBB72	Low	Yes	No
OBB74A	Negligible	No	No
OBB78	Low	Yes	Yes
OBB80/80A/80B	Moderate	Yes	No
OBB81C	Negligible	No	No
OBB81	Negligible	No	No
UBB82	Moderate	Yes	No

8.5 Appendix A8.5: Bat Survey Results

This appendix provides a summary of the survey results from the bat surveys undertaken for the Proposed Development.

8.5.1 OBB33 (Donabate Station Roadbridge)

Two dusks and one dawn survey were conducted at Donabate Station. Light spill was high with white LED on the platform and the neighbouring streetlights above the bridge. No bats were observed to be roosting within the bridge structure.

Bat activity within the locality was low, with a total of five bat calls recorded. This included two Leisler calls, two common pipistrelle calls, and one soprano pipistrelle call.

8.5.2 OBB35 (Beaverstown Golf Club)

Two dusks and one dawn survey were conducted at safe localities adjacent to the rail line. Light spill was low with lighting coming from Beaverstown Golf Club and neighbouring house from motion sensor flood light. There is no lighting under the arch of the bridge. No bats were observed to be roosting within the bridge structure. Bat activity within the locality was moderate-high, with a total of 141 bat calls recorded. This included 19 Leisler calls, 87 common pipistrelle calls, 21 soprano pipistrelle calls, 13 Myotis calls, and one brown long-eared call.

8.5.3 OBB38 (carrying Rogerstown Lane) (online)

Two dusks and one dawn survey were conducted online with Personal Track Safety from Irish Rail staff members. Light spill was low with white LED lighting coming from Rusk/Lusk station around the bend from the bridge. There was no lighting and dark under the arch and surrounding of the bridge. No bats were observed to be roosting within the bridge structure. Bat activity within the locality was low, with a total of 23 bat calls recorded. This included three Leisler calls, 12 common pipistrelle calls, and eight soprano pipistrelle calls.

8.5.4 OBB39 (carrying Station Road / R128) – Rusk & Lusk station

One dusk and one dawn survey were conducted at safe localities of Rush/Lusk Station. Light spill was high with the white LED on the platform and the neighbouring streetlights above the bridge. No bats were observed to be roosting within the bridge structure. Bat activity within the locality was low, with a total of one bat call recorded which was a soprano pipistrelle. This bridge was further investigated due to the proposed works beneath the arch of the bridge. The tunnel was too high to safely assess with an endoscope, but viewed with binoculars. No visible gaps or cracks were evident in the archway and not suitable for roosting bats. The side walls of the bridge had no suitable roosting bat features. Therefore, the bridge is negligible for roosting bats.

8.5.5 OBB41 (carrying Ratharton Bridge)

One dusk survey was conducted above the bridge on the roadside. Light spill was low with very dark conditions. No bats were observed to be roosting within the bridge structure. Bat activity within the locality was low, with a total of one bat call recorded. Common pipistrelle and Leisler's were recorded in the vicinity from the neighbouring agricultural lands.

8.5.6 OBB44 (carrying Tyrrelstown Big)

No bat surveys were conducted at this bridge due to the negligible suitability from the initial bat-bridge assessment and no visibility from public areas. This bridge was further investigated following agreement with IÉ due to the proposed works beneath the arch of the bridge. The tunnel was too high to assess with an endoscope but viewed with binoculars. Gaps between the side walls and road bridge were able to be assessed with the endoscope. This resulted in only visually seeing mammal droppings (mouse/rat) and blue tit nest. Side walls had holes present which were occupied by nesting material, none were occupied by nesting birds at the time of survey.

No visible gaps or cracks were evident in the archway and not suitable for roosting bats. The side walls of the bridge had no suitable roosting bat features either. Therefore, the bridge was considered low for roosting bats.

8.5.7 OBB46 (Carrying L1285 / Baldongan Close)

One dusk survey was conducted above the bridge on the roadside. Light spill was identified from two white LED streetlights either side of the bridge along pedestrian areas. No bats were observed to be roosting within the bridge structure. Bat activity within the locality was low, with a total of one bat call recorded. Common pipistrelle and Leisler's were recorded in the vicinity from the neighbouring agricultural and residential lands. One pipistrelle was observed flying through the bridge arch to forage either side.

8.5.8 OBB47 (Hacketstown/Skerries Golf Club) (online)

Owing to the previous assessment of high potential to support roosting bats, two dusks and two dawn surveys were conducted above the bridge, with one dawn being conducted on the railway line with Personal Track Safety from Iarnród Éireann staff members. There is no lighting and dark under the arch and surrounding of the bridge. No bats were observed to be roosting within the bridge structure. Bat activity within the locality was moderate, with a total of 73 bat calls recorded. This included nine Leisler calls, 27 Common pipistrelle calls, 30 Soprano pipistrelle calls, and seven Pipistrelle species calls.

8.5.9 OBB49 (carrying Golf Links Road) (online)

Two dusks and a dawn survey were conducted adjacent to the rail line. Light spill was low with some lighting coming from Skerries golf club. There is no lighting under the arch of the bridge. No bats were observed to be roosting within the bridge structure. Bat activity within the locality was high, with a total of 225 bat calls recorded. This included 65 Leisler calls, 153 common pipistrelle calls, five soprano pipistrelle calls, and four *Myotis* spp. calls.

8.5.10 OBB54 (The Ladies Stairs)

One dusk and one dawn survey were conducted at safe localities on the public path adjacent the roadside. Light spill was low with dark conditions. There is no lighting under the bridge. No bats were observed to be roosting within the bridge structure. Bat activity within the locality was considered high, with a total of 153 bat calls recorded. This included 65 Leisler calls, 81 common pipistrelle calls, four soprano pipistrelle calls, one pipistrelle species and two brown long-eared calls.

8.5.11 Balbriggan transect

The transect covered the tree areas along the R127, Fancourt Road and Pinewood Green Road, and the hedgerows along the parkland by Balbriggan Football Club. One survey was conducted in these areas and it yielded low bat activity, with 10 common pipistrelle recorded. No roosting bats or roosting bat features were observed along the treeline and hedgerow of the transects.

8.5.12 OBB55 (carrying Lawless Terrace / R127)

No dedicated bat survey was possible at this bridge but was checked during the transect survey conducted within the Balbriggan area, from the public pathways in the locality. No bats were recorded in close proximity of the bridge during this transect.

This bridge was further investigated due to the proposed works beneath the arch of the bridge. The tunnel was too high to assess with an endoscope but viewed with binoculars. One seepage gap and the gap lines of the bridges on the roof of the tunnel were able to be endoscope, approximately 5cm deep. The southern side walls of the bridge were present with ivy, but did not hide any cavities for bats to roost in. Therefore, the bridge was considered negligible for roosting bats.

8.5.13 UBB56 (Balbriggan Viaduct)

Four dusks and two dawn surveys were conducted beneath the viaduct. Light spill was high with multiple white LED lights in public areas. Multi-coloured LED lights were added to each archway during the summer of 2021. No bats were observed to be roosting within the viaduct structure. Bat activity within the locality was considered moderate-high, with a total of 131 bat calls recorded. This included 24 Leisler calls, 99 common pipistrelle calls, two soprano pipistrelle calls, and six *Myotis* spp. calls. This bridge was not possible to endoscope due to the height of the bridge.

8.5.14 OBB62 Unnamed bridge – Bell's Lane/Bremore

One dusk and one dawn survey was conducted on the farm access track above the bridge. Light spill was low. There is no lighting under the arch of the bridge. No bats were observed to be roosting within the bridge structure. Bat activity within the locality was considered moderate, with a total of 111 bat calls recorded. This included 38 Leisler calls, 64 common pipistrelle calls, seven soprano pipistrelle calls, one *Myotis* spp. call, and one brown long-eared bat call.

8.5.15 OBB66 Gormanston Station

One dusk survey was conducted at Gormanston station. Light conditions were high with a white LED on the platform and the neighbouring streetlights above the bridge. No bats were observed to be roosting within the bridge structure. Bat activity within the locality was low. Common pipistrelle, soprano pipistrelle and Leisler's bat were recorded in the vicinity from the neighbouring agricultural and residential lands.

8.5.16 OBB68 (local access next to Gormanston Camp)

One dusk and one dawn survey were conducted at safe localities adjacent to the rail line. Light spill was very low.

There is no lighting under the arch of the bridge. No bats were observed to be roosting within the bridge structure. Bat activity within the locality was low, with a total of 12 bat calls recorded. This included five Leisler calls, six common pipistrelle calls, and one soprano pipistrelle calls.

8.5.17 UBB72 (Laytown/River Nanny Viaduct)

One dusk and a dawn survey were conducted at safe localities on the public areas adjacent the bridge. Light spill was low with pedestrian lights at both ends of the pedestrian bridge over the River Nanny. There is no lighting under the bridge. No bats were observed to be roosting within the bridge structure. Bat activity within the locality was low. Common pipistrelle and Leisler's were recorded in the vicinity from the public areas.

8.5.18 OBB77 (carrying Colpe East)

Two dusks and a dawn survey were conducted above the bridge on the roadside. Light spill was low. There is no lighting under the arch of the bridge. No bats were observed to be roosting within the bridge structure. Bat activity within the locality was moderate, with a total of 122 bat calls recorded. This included 52 Leisler calls, 45 common pipistrelle calls, 19 soprano pipistrelle calls, one *Pipistrellus* species, and five *Myotis* spp. calls.

8.5.19 OBB78 (carrying Colpe Road)

One dusk and one dawn survey were conducted adjacent to the rail line. Light conditions were considered negligible-low with lighting coming from above the bridge and the neighbouring estate. There is no lighting under the arch of the bridge. No bats were observed to be roosting within the bridge structure. Bat activity within the locality was moderate, with a total of 119 bat calls recorded. This included five Leisler calls, 107 common pipistrelle calls, and seven soprano pipistrelle calls.

This bridge was further investigated due to the proposed works beneath the arch of the bridge. The tunnel was too high to assess with an endoscope but viewed with binoculars. The layered structure concrete blocks located at both side walls of the bridge, with cracks between each layer, were assessed with the endoscope. The crumbling infill material behind the blocks were not suitable for roosting bats. Therefore, the bridge was considered low for roosting bats.

8.5.20 OBB80/80A/80B (carrying McGrath's Lane Overbridge)

Two dusks and one dawn survey were conducted online with Personal Track Safety from Irish Rail staff members. Light conditions were high with white LED lighting coming from Drogheda station and the yard both sides of the bridge. The arches of OBB80A & OBB80B are lit up. No bats were observed to be roosting within the bridge structure. Bat activity within the locality was low, with a total of 15 bat calls recorded. This included six common pipistrelle calls, and nine soprano pipistrelle calls.

8.5.21 UBB82 (Boyne Viaduct)

One dusk survey was conducted at public areas beneath the viaduct. Light conditions were moderate-high with the white LED leading from the carpark to the steps toward Drogheda station. Bat activity within the locality was low. Common pipistrelle, soprano pipistrelle and Leisler's bat were recorded in the vicinity of the viaduct.

8.5.22 Survey Results

Table 8.3 shows the metadata and survey summary for each survey at each bridge undertaken between 2021 – 2022.

Table 8.3 Survey Summary of all Bat surveys undertaken at bridges across the Proposed Development

Bridge ID	Date	Survey time (sunset/sunrise)	Weather Details	Survey Summary
OBB33	18/08/2021	20.29 – 22:09 (20:46)	Partially overcast, 18°C, no rain, light easterly wind	A Leisler's bat was recorded at 20:52, 21:21 and 22:03. A common pipistrelle was detected at 21:48 and 21:52 while a soprano pip was recorded once at 21:08. All calls were recorded over and to the north of the bridge.
OBB66	19/08/2021	20:28 – 22:04 (20:43)	Clear skies, 16°C, no rain, light easterly wind	Common pipistrelles were recorded most frequently between 21:29 and 22:00 both side of the bridge and occasionally observed south of the structure. Leisler's bat was recorded between 21:31 and 22:00 either side of the bridge while soprano pips was recorded twice at 21:56 and 21:57.
OBB35	25/08/2021	20:15 – 22:15 (20:30)	Clear skies, 17°C, no rain, no wind	Leisler's bat was recorded frequently during the survey from 20:17 foraging over and south of the bridge. Soprano pipistrelle was detected occasionally from 21:00 to 21:53, however common pipistrelle was frequently encountered from 20:59 throughout - both pipistrelles were observed foraging under, over and south of the bridge. Social calls of Leisler's were heard.
OBB49	26/08/2021	20:13 – 22:20 (20:28)	Clear skies, 17°C, no rain, no wind	The first Leisler's bat was heard after sunset at 20:57 and was observed flying along the western hedgerow south of the bridge. Leisler's were frequently detected throughout the survey. Common pipistrelle was first recorded from 20:58 and was the most frequently encountered species but were not observed. Soprano pipistrelle was recorded at 21:08 and were detected occasionally up to 21:58.
OBB62	27/08/2021	20:10 – 22:02 (20:25)	Clear skies, 13-15°C, no rain, light northeast wind	The first Leisler's was recorded at 20:50, there were two further passes for the species up to 21:53.

Bridge ID	Date	Survey time (sunset/sunrise)	Weather Details	Survey Summary
				Common pipistrelle was recorded regularly from 20:56 up to 21:58 and was observed foraging along the eastern hedgerow along the tracks on three occasions. Soprano pip was much less frequently recorded of the pips on two occasions from 21:05 to 21:26.
OBB80/80A/80B	02/09/2021	04:49 – 06:52 (06:36)	Overcast, 13-14°C, no rain, light easterly wind	Activity at this bridge was very low with just a single Soprano pip recorded north of the east tunnel at 05:08 and a Lesler's south of the west tunnel at 06:15.
OBB78	03/09/2021	5:06 – 06:45 (06:38)	Overcast, 14-15°C, no rain, light easterly wind	Only two species were recorded. Common pips were frequently recorded from 05:06 up to the last recorded activity at 06:07 - they were observed foraging overhead and flying over the bridge to the south. Soprano pips were recorded on just two occasions at 05:34 and 05:45.
OBB68	04/09/2021	05:07 – 06:49 (6:39)	Overcast, 16°C, no rain, no wind	Common pipistrelle recorded occasionally from 05:25 and observed flying under bridge at 06:05. A few passes of Leisler's also recorded.
OBB33	10/09/2021	05:20 – 06:57 (06:50)	Overcast, 17-18°C, no rain, no wind	No bats were recorded during the entire survey.
UBB56	06/08/2021	04:00 – 05:50 (05:49)	Overcast, 16°C, intermittent light rain, light northerly wind	No bats observed re-entering. Leisler's detected at 04:12 and 04:17 at south end of viaduct. Common pipistrelle detected at 04:50 to 04:55 and observed at 05:23 at north end of viaduct.
OBB47	23/08/2021	20:19 – 21:58 (20:34)	Overcast, 15-16°C, no rain, fog, no wind	Soprano pipistrelle at 21:05 flying west and at 21:07. Common pip recorded on four occasions between 21:08 and 21:43 while Leisler's bat was recorded once at 21:15.
OBB38	05/09/2021	05:10 – 06:55 (06:41)	Overcast, 14°C, no rain, moderate southeasterly wind	No bats recorded
UBB56	25/08/2021	20:13 – 22:30 (20:31)	Clear skies, 17°C, no rain, light easterly wind	No emergence observed: Leislers detected 21:21 northeast /harbour side. Soprano pipistrelle detected at 21:38 northeast harbour side. 21:47 a common pipistrelle North end of Archway.

Bridge ID	Date	Survey time (sunset/sunrise)	Weather Details	Survey Summary
				Common pipistrelle was seen at 21:56 - 21:58 by RNLI boat house. A soprano pipistrelle 54khz detected & common pipistrelle seen (44 – 45 – 49khz), commuting/foraging back and forth east – west direction towards harbour light.
OBB54	12/08/2021	04:10 – 05:50 (05:56)	Partially cloudy, 14°C, no rain, no wind	First bat at 04:13 was a common pipistrelle, no bat since 05:10 and bright conditions before sunrise time
OBB35	26/08/2021	04:50 – 06:35 (06:24)	Partially cloudy, 14-16°C, no rain, no wind	Dewey conditions; Mainly Common Pipistrelle but odd Soprano Pipistrelle and social calls
OBB80/80A/80B	01/09/2021	20:00 – 22:00 (20:14)	Clear skies, 16-17°C, no wind, no rain	Bats that were seen flew parallel to bridge from east to west (or vice versa)
OBB78	02/09/2021	20:00 – 22:00 (20:12)	Clear skies, 16°C, no wind, no rain	Bats were seen flying through tunnel, mainly using hedgerows both sides, none observed coming from bridge structure. Lots of activity and social calls
OBB68	03/09/2021	19:55 – 21:55 (20:10)	Overcast, 14-18°C, no rain, light southerly wind	Only one bat (not seen) during entire survey.
OBB38	04/09/2021	19:58 – 22:05 (20:07)	Partially overcast, 18°C. no rain, light easterly winds	No bats seen, but hedgerows very thick here. No holes within tunnel of bridge could be seen.
OBB77	05/08/2021	04:15 – 06:15 (05:48)	Overcast, 14-19°C, light rain, no winds	Bats frequently using tree line directly beside bridge to feed. Mostly common pipistrelle and Leisler's. No re-entry seen
OBB54	09/08/2021	20:30 – 22:45 (21:04)	Clear skies, 17-19°C, no rain, light easterly wind	Bats exclusively recorded among trees on west side of track.
OBB77	10/08/2021	20:30 – 22:45 (21:02)	Overcast. 14-19°C, light rain, no wind	No emergence observed. Common pipistrelle and Leisler's recorded frequently
OBB39	18/08/2021	20:00 – 23:00 (20:46)	Mostly clear skies, 14-17°C, no rain, no wind	Very little activity recorded
OBB49	27/08/2021	04:40 – 06:45 (06:24)	Partially overcast, 11-15°C, fog, no wind	Very little activity recorded
OBB62	28/08/2021	20:15 – 22:30 (06:27)	Overcast, 10°C, fog, no wind	Bats used trees on either side of the bridge for feeding. No re-entry recorded
UBB56	25/08/2021	20:15 – 22:30 (20:30)	Clear skies, 17°C, no rain, light easterly wind	No bats observed to emerge. Pipistrelle seen at 22:06 and 22:10 at south end of the viaduct, the harbour side.

Bridge ID	Date	Survey time (sunset/sunrise)	Weather Details	Survey Summary
				Few pipistrelles and Leisler calls detected throughout the survey.
OBB47	02/09/2021	05:00 – 06:50 (06:35)	Overcast, 14°C, no rain, moderate north easterly wind	No bats were visually observed. Few Pipistrelles and Leisler's calls were recorded throughout the survey. The last call, soprano pip, was recorded at 05:54. No swarm was observed at the house either.
OBB39	02/09/2021	04:54 – 06:40 (05:59)	Overcast, 14°C, no rain, moderate north easterly wind	One soprano pipistrelle recorded during survey.
OBB66	07/09/2021	05:00 – 07:00 (06:44)	Partially overcast, 12°C, no rain, no wind	Only one bat recorded during survey, a Leisler's bat to the south of the bridge
OBB33	05/05/2022	20:40 – 22:30 (21:00)	Overcast, 16°C, no rain, light winds	Only one bat recorded, not observed. Soprano pipistrelle
OBB35	23/05/2022	21:10 – 23:00 (21:30)	Overcast, 11°C, intermittent light rain, light winds	Common and Soprano Pipistrelle recorded, as well as a Leisler's bat. Soprano Pipistrelle observed feeding for most of the survey on the north side of the bridge. Flying in circles, and flying under and over the bridge when switching sides
OBB38	27/05/2022	21:15 – 23:20 (21:34)	Clear skies, 17°C, no rain, wind	Common pipistrelle and Leisler's Bat recorded. Activity was intermittent throughout survey. Mostly commuting with some short period of feeding around bridge and trees to the north of bridge. One individual flew under the bridge several times
OBB41	30/05/2022	21:22 – 23:22 (21:42)	Partially overcast, 8°C, no rain, light wind	Common Pipistrelle and Leisler's Recorded. At least two separate pip individuals observed, possibly three. All came from area close by but not from the bridge itself
OBB46	26/05/2022	21:13 – 23:13 (21:33)	Clear skies, 16°C, no rain, light wind	Common Pipistrelle and Leisler's Bat recorded. Only the Common Pipistrelle was observed. Flew back and forth on both sides of the bridge, flying beneath it to switch sides.
OBB47	28/05/2022	03:20 – 05:05 (05:07)	Partially overcast, 16°C, no rain, no wind	Very low levels of activity recorded. Soprano pipistrelle and Leisler's passing along treeline/hedgerow
UBB56	28/06/2022	21:30 – 23:15 (21:56)	Partially overcast, 15°C, no rain, light wind	Very low activity, one far away Leisler's recorded commuting by.
UBB82	13/06/2022	21:36 – 23:15 (21:53)	Overcast, 17°C, no rain, no wind	Low numbers of bats recorded foraging/commuting by the bridge.

Bridge ID	Date	Survey time (sunset/sunrise)	Weather Details	Survey Summary
UBB72	20/06/2022	21:44 – 23:05 (21:53)	Clear skies, 14-17°C, no rain, light winds	Low activity with most records of at least two Common pipistrelle recorded west of the bridge and one Leisler's
UBB65	09/06/2022	21:30 – 23:15 (21:50)	Clear skies, 19°C, no rain, light winds	Low activity, Leisler's recorded flying over river and out over beach. Common pipistrelles recorded flying from area near house east of the bridge
OBB80/80A/80B	14/07/2022	03:30 – 05:50 (05:20)	Overcast, 15°C, no rain, light wind	Low activity, no bats were seen but Common Pipistrelle and Leisler's were recorded on bat detectors. One surveyor stood to the south of the bridge while the other covered the north side. All three arches were observed by periodically moving to stand in front of each in turn while keeping an eye on all 3 when possible. Most attention was spent on the western most arch, OBB80, as it was in an area with no direct light and showed greatest potential for roosting
OBB49	01/06/2022	21:30 – 23:15 (21:43)	Clear skies, 14°C, no rain, no wind	Bat species recorded were; Leisler's bat, common pipistrelle, and soprano pipistrelle. No emergence was recorded, all three species were observed commuting by the area, and the common pipistrelle was noted to be feeding for some time to the north of the bridge, and making several passes under the bridge.
OBB77	21/06/2022	21:41 – 23:15 (21:56)	Overcast, 17°C, no rain, no wind	Low activity, Leisler's recorded flying over, common pipistrelle recorded flying around bridge briefly

8.6 Appendix A8.6: Wintering Bird Survey Results

The desk study records from the NBDC include 148 wintering waterfowl, gull and wader species. Including 31 species listed under Annex I of the Birds Directive within *c.* 2km of the Proposed Development site. These records are present in Appendix 8.2.

Table 8.4, Table 8.5, Table 8.6, Table 8.7, Table 8.8 below provides a summary of the findings of the winter bird surveys with respect to those species which are of highest conservation concern, and were recorded within winter bird survey sites:

- Special Conservation Interests (SCIs), for a wintering population, of nearby SPAs;
- Species listed under Annex I of the Birds Directive (2008/144/EC); and

- Red, Amber and Green BoCCI species listed for their wintering populations.

Table 8.10 details the summary of flight lines of all birds recorded flying over the Proposed Development, Table 8.9 includes results of the wintering bird surveys at Construction Compounds, and Table 8.11 details the survey conditions of all surveys undertaken.

Table 8.4 Vantage Point Records of Wintering Birds of Conservation Concern at the Laytown September 2021 – March 2023

Common name/ Scientific name/BTO Code	Recorded activity, peak count, not including fly overs		Conservation Importance			Threshold of Inter-national Population [12]	Threshold of National Population [13]
	Oct 2021 – Mar 2022	Oct 2022 – Mar 2023	BoCCI (B – Breeding / W - Wintering)	Annex I	Nearest European site		
Bar-tailed godwit *Limosa lapponica* (BA)	17 foraging at Laytown beach (05/11/2021)	4 foraging at Laytown beach (02/12/2022)	Red (W)	✓	Malahide Estuary SPA, within the Proposed Development	1,500	170
Black-headed gull *Chroicocephalus ridibundus* (BH)	56 foraging at Laytown beach (02/12/2021)	28 foraging at Laytown beach (02/12/2022)	Amber (B/W)	-	South Dublin Bay and River Tolka Estuary SPA, *c.* 500m south east of the Proposed Development	31,000	n/a
Black-tailed godwit *Limosa limosa* (BW)	24 foraging at Laytown beach (28/09/2021)	3 flying over Laytown viaduct (17/11/2022; 09/02/2023)	Red (W)	-	Malahide Estuary SPA and Rogerstown Estuary SPA, within the Proposed Development	1,100	200

[12] Wetlands International. 2012. Waterbird Population Estimates, Fifth Edition. Summary Report Wetlands International, Wageningen The Netherlands (with estimates available at http://wpe.wetlands.org/).

[13] Crowe, O., & Holt, C. 2013. Estimates of waterbird numbers wintering in Ireland, 2006/07 – 2010/11. Irish Birds 9, 545-552.

Common name/ Scientific name/BTO Code	Recorded activity, peak count, not including fly overs		Conservation Importance			Threshold of Inter-national Population [14]	Threshold of National Population [15]
	Oct 2021 – Mar 2022	Oct 2022 – Mar 2023	BoCCI (B – Breeding / W - Wintering)	Annex I	Nearest European site		
Light-bellied brent goose *Branta bernicla* (BG)	104 foraging at Laytown beach (05/11/2021)	83 foraging at Laytown beach (15/12/2022)	Amber (W)	-	Malahide Estuary SPA and Rogerstown Estuary SPA, within the Proposed Development	400	350
Common gull *Larus canus* (CM)	31 foraging at Laytown beach (05/11/2021)	38 foraging at Seafield GAA pitches (17/11/2022)	Amber (B/W)	-	Dundalk Bay SPA, *c.* 17.5km north of the Proposed Development	16,400	n/a
Cormorant *Phalacrocorax carbo* (CA)	1 foraging in Irish sea and also recorded within the River Nanny (28/09/2021; 08/10/2021; 22/10/2021; & 06/10/2022)	1 flying over Laytown viaduct (08/11/2022; 17/11/2022; 15/12/2022; 05/01/2023; 09/02/2023; & 24/03/2023)	Amber (B/W)	-	Skerries Islands SPA, located *c.* 1.4km east of the Proposed Development	1,200	110
Curlew *Numenius arquata* (CU)	6 foraging at Laytown beach (22/10/2021)	25 flying over Laytown viaduct (24/03/2023)	Red (B/W)	-	North Bull Island SPA, located c. 1km east of the Proposed Development	7,600	350

[14] Wetlands International. 2012. Waterbird Population Estimates, Fifth Edition. Summary Report Wetlands International, Wageningen The Netherlands (with estimates available at http://wpe.wetlands.org/).

[15] Crowe, O., & Holt, C. 2013. Estimates of waterbird numbers wintering in Ireland, 2006/07 – 2010/11. Irish Birds 9, 545-552.

Common name/ Scientific name/BTO Code	Recorded activity, peak count, not including fly overs		Conservation Importance			Threshold of Inter-national Population [16]	Threshold of National Population [17]
	Oct 2021 – Mar 2022	Oct 2022 – Mar 2023	BoCCI (B – Breeding / W - Wintering)	Annex I	Nearest European site		
Dunlin *Calidris alpina* (DN)	57 foraging at Laytown beach (04/02/2022)	90 foraging at Laytown beach (05/01/2023)	Red (B/W)	✓	Malahide Estuary SPA and Rogerstown Estuary SPA, within the Proposed Development	13,300	460
Golden plover *Pluvialis apricaria* (GP)	330 loafing at Laytown beach (04/03/2022)	23 foraging at Laytown beach (09/02/2023)	Red (B/W)	✓	Malahide Estuary SPA, within the Proposed Development	9,300	920
Great crested grebe *Podiceps cristatus* (GG)	None recorded during surveys in 2021/22 period	9 swimming in Irish Sea (08/11/2022)	Amber (B/W)	-	Malahide Estuary SPA, within the Proposed Development	6,300	30
Great northern diver *Gavia immer* (ND)	None recorded during surveys in 2021/22 period	2 foraging in Irish Sea (08/11/2022)	Amber (W)	✓	North-West Irish Sea SPA located 10m from the Proposed Development Proposed Development	50	20

[16] Wetlands International. 2012. Waterbird Population Estimates, Fifth Edition. Summary Report Wetlands International, Wageningen The Netherlands (with estimates available at http://wpe.wetlands.org/).

[17] Crowe, O., & Holt, C. 2013. Estimates of waterbird numbers wintering in Ireland, 2006/07 – 2010/11. Irish Birds 9, 545-552.

Common name/ Scientific name/BTO Code	Recorded activity, peak count, not including fly overs		Conservation Importance			Threshold of Inter-national Population [18]	Threshold of National Population [19]
	Oct 2021 – Mar 2022	Oct 2022 – Mar 2023	BoCCI (B – Breeding / W - Wintering)	Annex I	Nearest European site		
Greenshank *Tringa nebularia* (GK)	2 foraging at Laytown beach (28/09/2021)	1 foraging at Laytown beach (15/12/2022 & 09/02/2023)	Green (W)	-	The River Shannon and River Fergus Estuaries SPA, *c*. 185km south west of the Proposed Development	3,300	20
Grey plover *Pluvialis squatarola* (GV)	1 foraging at Laytown beach (02/12/2021; 06/01/2022; 04/02/2022; & 04/03/2022)	2 foraging at Laytown beach (08/11/2022 & 17/11/2022)	Red (W)	-	Malahide Estuary SPA and Rogerstown Estuary SPA, within the Proposed Development	2,000	30
Herring gull *Larus argentatus* (HG)	201 loafing at Laytown beach (22/10/2021)	108 loafing at Laytown beach (08/11/2022)	Amber (B/W)	-	River Nanny Estuary and Shore SPA, within the Proposed Development site	14,400	n/a
Knot *Calidris canutus* (KN)	8 foraging at Laytown beach (06/01/2022)	None recorded during surveys in 2022/23 period	Red (W)	-	Malahide Estuary SPA and Rogerstown Estuary SPA, within the Proposed Development	5,300	160

[18] Wetlands International. 2012. Waterbird Population Estimates, Fifth Edition. Summary Report Wetlands International, Wageningen The Netherlands (with estimates available at http://wpe.wetlands.org/).

[19] Crowe, O., & Holt, C. 2013. Estimates of waterbird numbers wintering in Ireland, 2006/07 – 2010/11. Irish Birds 9, 545-552.

Common name/ Scientific name/BTO Code	Recorded activity, peak count, not including fly overs		Conservation Importance			Threshold of Inter-national Population [20]	Threshold of National Population [21]
	Oct 2021 – Mar 2022	Oct 2022 – Mar 2023	BoCCI (B – Breeding / W - Wintering)	Annex I	Nearest European site		
Lapwing V*anellus vanellus* (L.)	48 foraging at salt marsh area of River Nanny (04/02/2021)	170 landed in agricultural fields south-west of Laytown viaduct (17/11/2022)	Red (B/W)	-	Boyne Estuary SPA, *c*. 400m north east of the Proposed Development	72,300	850
Lesser black-backed gull *Larus fuscus* (LB)	1 loafing at Laytown beach (22/10/2021)	1 flying over Laytown viaduct (02/12/2022)	Amber (B/W)	-	Lambay Island SPA, *c.* 7.5km east of the Proposed Development	5,500 (Western Europe)/ 6,300 (Southern Scandinavia)	n/a
Little grebe *Tachybaptus ruficollis* (LG)	1 swimming at salt marsh area of River Nanny (17/12/2021; 06/01/2022; & 04/02/2022)	2 foraging at salt marsh area of River Nanny (08/11/2022)	Amber (B/W)	-	Wexford Harbour and Slobs SPA, *c*. 102km south of the Proposed Development	4,700	20
Mallard *Anas platyrhynchos* (MA)	37 rafting at salt marsh area of River Nanny (17/12/2021)	5 foraging at salt marsh area of River Nanny (15/12/2022)	Amber (B/W)	-	Dundalk Bay SPA, *c*. 17.5km north of the Proposed Development	53,000	280

[20] Wetlands International. 2012. Waterbird Population Estimates, Fifth Edition. Summary Report Wetlands International, Wageningen The Netherlands (with estimates available at http://wpe.wetlands.org/).

[21] Crowe, O., & Holt, C. 2013. Estimates of waterbird numbers wintering in Ireland, 2006/07 – 2010/11. Irish Birds 9, 545-552.

Common name/ Scientific name/BTO Code	Recorded activity, peak count, not including fly overs		Conservation Importance			Threshold of Inter-national Population [22]	Threshold of National Population [23]
	Oct 2021 – Mar 2022	Oct 2022 – Mar 2023	BoCCI (B – Breeding / W - Wintering)	Annex I	Nearest European site		
Oystercatcher *Haematopus ostralegus* (OC)	344 foraging at Laytown beach (04/02/2022)	40 flying over Laytown viaduct (17/11/2022)			Malahide Estuary SPA, Rogerstown Estuary SPA, and River Nanny Estuary and Shore SPA within the Proposed Development	8,200	610
Redshank *Tringa tetanus* (RK)	70 foraging at Laytown beach (28/09/2021)	21 foraging at Laytown beach (15/12/2022)	Red (B/W)	-	Malahide Estuary SPA and Rogerstown Estuary SPA, within the Proposed Development	2,400 (Iceland & Faeroe Islands)/760 (Britain & Ireland)	240
Red-throated diver G*avia stellata* (RD)	3 foraging in Irish Sea beyond Laytown beach (22/10/2021)	None recorded during surveys in 2022/23 period	Amber (B/W)	✓	North-West Irish Sea SPA located *c.* 10m from the Proposed Development	3,000	20
Ringed plover *Charadrius hiaticula* (RP)	65 foraging at Laytown beach (17/12/2021)	70 foraging at Laytown beach (09/02/023)	Amber (B/W)	-	Rogerstown Estuary SPA, and River Nanny Estuary and Shore SPA within the Proposed Development	540	120

[22] Wetlands International. 2012. Waterbird Population Estimates, Fifth Edition. Summary Report Wetlands International, Wageningen The Netherlands (with estimates available at http://wpe.wetlands.org/).

[23] Crowe, O., & Holt, C. 2013. Estimates of waterbird numbers wintering in Ireland, 2006/07 – 2010/11. Irish Birds 9, 545-552.

Common name/ Scientific name/BTO Code	Recorded activity, peak count, not including fly overs		Conservation Importance			Threshold of Inter-national Population [22]	Threshold of National Population [23]
	Oct 2021 – Mar 2022	Oct 2022 – Mar 2023	BoCCI (B – Breeding / W - Wintering)	Annex I	Nearest European site		
Sanderling *Calidris alba* (SS)	8 foraging at Laytown beach (22/10/2021)	20 foraging at Laytown beach (08/11/2022)	-	-	River Nanny Estuary and Shore SPA, located within the Proposed Development	2,000	85
Teal *Anas crecca* (T.)	52 foraging at salt marsh area of River Nanny (17/12/2021)	19 loafing at salt marsh area of River Nanny (08/11/2022)	Amber (B/W)	-	North Bull Island SPA, *c.* 1km east of the Proposed Development	5,000	360
Turnstone *Arenaria interpres* (TT)	16 foraging at Laytown beach (05/11/2021)	15 foraging at Laytown beach (15/12/2022)	Amber (W)	-	Boyne Estuary SPA, *c.* 400m north of the Proposed Development	1,400	95
Wigeon *Mareca penelope* (WN)	18 foraging at salt marsh area of River Nanny (04/02/2022)	2 swimming at salt marsh area of River Nanny (08/11/2022)	Amber (B/W)	-	The Murrough SPA, *c.* 30km south of the Proposed Development	140,000	560
Whooper swan *Cygnus cygnus* (WS)	6 flying over at salt marsh area of River Nanny (22/10/2021)	None recorded during surveys in 2022/23 period	Amber (B/W)	✓	Lough Derravaragh SPA, *c.* 64km east of the Proposed Development	340	150

Table 8.5 Vantage Point Records of Wintering Birds of Conservation Concern at the Gormanston September 2021 – March 2023

Common name/ Scientific name/BTO Code	Recorded activity, peak count, not including fly overs		Conservation Importance			Threshold of Inter-national Population [24]	Threshold of National Population [25]
	Sep 2021 – Mar 2022	Sep 2022 – Mar 2023	BoCCI (B – Breeding / W - Wintering)	Annex I	Nearest European site		
Black guillemot *Cepphus grille* (TY)	8 foraging in the Irish sea (08/10/2021)	None recorded during surveys in 2022/23 period	Amber (B)		South Dublin Bay and River Tolka Estuary SPA, c. 500m south east of the Proposed Development	n/a	n/a
Black-headed gull *Chroicocephalus ridibundus* (BH)	650 foraging at Gormanston camp grassland (08/10/2021)	9 flying over rail line (17/11/2022)	Amber (B/W)	-	Malahide Estuary SPA and Rogerstown Estuary SPA, within the Proposed Development	31,000	n/a
Black-tailed godwit *Limosa limosa* (BW)	1 foraging on the beach at Benhead (02/12/2021)	4 foraging on agricultural grassland east of rail line (02/12/2022)	Red (W)	-	Inner Galway Bay SPA, located c. 180km west of the Proposed Development	1,100	200
Black-throated diver *Gavia arctica* (BV)	1 foraging in the Irish sea (05/11/2021)	None recorded during surveys in 2022/23 period	Amber (W)		Malahide Estuary SPA and Rogerstown Estuary SPA, within the Proposed Development	3,500	n/a

[24] Wetlands International. 2012. Waterbird Population Estimates, Fifth Edition. Summary Report Wetlands International, Wageningen The Netherlands (with estimates available at http://wpe.wetlands.org/).

[25] Crowe, O., & Holt, C. 2013. Estimates of waterbird numbers wintering in Ireland, 2006/07 – 2010/11. Irish Birds 9, 545-552.

Common name/ Scientific name/BTO Code	Recorded activity, peak count, not including fly overs		Conservation Importance			Threshold of Inter-national Population [26]	Threshold of National Population [27]
	Sep 2021 – Mar 2022	Sep 2022 – Mar 2023	BoCCI (B – Breeding / W - Wintering)	Annex I	Nearest European site		
Light-bellied brent goose *Branta bernicla* (BG)	14 foraging at tideline along Benhead (04/03/2021)	200 foraging on agricultural arable field east of rail line beside Benhead (02/12/2022)	Amber (W)	-	Dundalk Bay SPA, c. 17.5km north of the Proposed Development	400	350
Buzzard *Buteo buteo* (BZ)	1 perched/flying at Gormanston camp (28/09/2021; 22/10/2021; 05/11/2021; 02/12/2021; 20/01/2022; 04/03/2022; & 15/03/2022)	2 foraging agricultural field east of rail line (08/11/2022)	-	-	Dundalk Bay SPA, c. 17.5km north of the Proposed Development	n/a	n/a
Common gull *Larus canus* (CM)	10 flying over rail line adjacent to Gormanston camp (17/12/2021)	2 flying over rail line (17/11/2022 & 24/02/2023)	Amber (B/W)	-	Skerries Islands SPA, located c. 1.4km east of the Proposed Development	16,400	n/a
Common scoter *Melanitta nigra* (CX)	1,750 swimming in the Irish Sea (15/03/2022)	2,000 swimming in the Irish Sea (24/02/2023)	Red (B/W)		North Bull Island SPA, located c. 1km east of the Proposed Development	7,500	110
Cormorant *Phalacrocorax carbo* (CA)	7 loafing on the Irish Sea (08/10/2021)	3 swimming in the Irish Sea (24/02/2023)	Amber (B/W)	-	Saltee Islands SPA located c. Xkm south of the Proposed Development	1,200	110

[26] Wetlands International. 2012. Waterbird Population Estimates, Fifth Edition. Summary Report Wetlands International, Wageningen The Netherlands (with estimates available at http://wpe.wetlands.org/).

[27] Crowe, O., & Holt, C. 2013. Estimates of waterbird numbers wintering in Ireland, 2006/07 – 2010/11. Irish Birds 9, 545-552.

Common name/ Scientific name/BTO Code	Recorded activity, peak count, not including fly overs		Conservation Importance			Threshold of Inter-national Population [28]	Threshold of National Population [29]
	Sep 2021 – Mar 2022	Sep 2022 – Mar 2023	BoCCI (B – Breeding / W - Wintering)	Annex I	Nearest European site		
Curlew *Numenius arquata* (CU)	221 foraging on the grassland in Gormanston camp (06/01/2022)	240 foraging on the grassland in Gormanston camp (15/12/2022)	Red (B/W)	-	Malahide Estuary SPA, within the Proposed Development	7,600	350
Fieldfare *Turdus pilaris* (FF)	None recorded during surveys in 2021/22 period	3 foraging agricultural field east of rail line (24/01/2023)	-	-	Malahide Estuary SPA, within the Proposed Development	n/a	n/a
Gannet *Morus bassana* (GX)	None recorded during surveys in 2021/22 period	1 flying near Benhead beach along Irish Sea (24/03/2023)	Amber (B)	-	Inner Galway Bay SPA, located c. 180km west of the Proposed Development	n/a	n/a
Golden plover *Pluvialis apricaria* (GP)	1,160 foraging on the grassland in Gormanston camp (20/01/2022)	72 roosting on the grassland in Gormanston camp (24/01/2023)	Red (B/W)	-	The River Shannon and River Fergus Estuaries SPA, c. 185km south west of the Proposed Development	9,300	920

[28] Wetlands International. 2012. Waterbird Population Estimates, Fifth Edition. Summary Report Wetlands International, Wageningen The Netherlands (with estimates available at http://wpe.wetlands.org/).

[29] Crowe, O., & Holt, C. 2013. Estimates of waterbird numbers wintering in Ireland, 2006/07 – 2010/11. Irish Birds 9, 545-552.

Common name/ Scientific name/BTO Code	Recorded activity, peak count, not including fly overs		Conservation Importance			Threshold of Inter-national Population [30]	Threshold of National Population [31]
	Sep 2021 – Mar 2022	Sep 2022 – Mar 2023	BoCCI (B – Breeding / W - Wintering)	Annex I	Nearest European site		
Great black-backed gull *Larus marinus* (GB)	3 flying over rail line adjacent to Gormanston camp (15/03/2022)	5 flying over rail line adjacent to Gormanston camp (24/02/2023)	Amber (B/W)	-	Malahide Estuary SPA and Rogerstown Estuary SPA, within the Proposed Development	3,600	n/a
Great crested grebe *Podiceps cristatus* (GG)	8 loafing on the Irish Sea (08/10/2021)	2 swimming on the Irish Sea (17/11/2022)	Amber (B/W)		Lambay Island SPA, c. 7.5km east of the Proposed Development	6,300	30
Great northern diver *Gavia stellata* (ND)	8 foraging on the Irish Sea (04/03/2022)	None recorded during surveys in 2022/23 period	Amber (W)		River Nanny Estuary and Shore SPA, within the Proposed Development site	50	20
Greenshank *Tringa nebularia* (GK)	1 foraging on the beach at Benhead (02/12/2021)	None recorded during surveys in 2022/23 period	Green (W)	-	Boyne Estuary SPA, c. 400m north east of the Proposed Development	3,300	20
Grey plover *Pluvialis squatarola* (GV)	2 foraging on the beach parallel to Gormanston camp (02/12/2021)	None recorded during surveys in 2022/23 period	Red (W)	-	Lambay Island SPA, c. 7.5km east of the Proposed Development	2,000	30

[30] Wetlands International. 2012. Waterbird Population Estimates, Fifth Edition. Summary Report Wetlands International, Wageningen The Netherlands (with estimates available at http://wpe.wetlands.org/).

[31] Crowe, O., & Holt, C. 2013. Estimates of waterbird numbers wintering in Ireland, 2006/07 – 2010/11. Irish Birds 9, 545-552.

Common name/ Scientific name/BTO Code	Recorded activity, peak count, not including fly overs		Conservation Importance			Threshold of Inter-national Population [30]	Threshold of National Population [31]
	Sep 2021 – Mar 2022	Sep 2022 – Mar 2023	BoCCI (B – Breeding / W - Wintering)	Annex I	Nearest European site		
Common guillemot *Uria aalge* (GU)	3 swimming on the Irish Sea (05/11/2021)	None recorded during surveys in 2022/23 period	Amber (B)		-	n/a	n/a
Herring gull *Larus argentatus* (HG)	22 flying over rail line at Mosney accommodation (15/03/2022)	35 foraging in Irish Sea (09/02/2023 & 24/02/2023)	Amber (B/W)	-	Dundalk Bay SPA, c. 17.5km north of the Proposed Development	14,400	n/a
Kestrel *Falco tinnunculus* (K.)	1 flying over rail line at Gormanston camp (15/03/2022)	1 flying over rail line at Gormanston camp (24/03/2023)	Red (B)	-	Wicklow Mountains SPA c. Xkm south of the Proposed Development	n/a	n/a
Lapwing *Vanellus vanellus* (L.)	156 foraging on the grassland in Gormanston camp (20/01/2022)	160 flying over rail line and landing nearby (05/01/2023)	Red (B/W)	-	Malahide Estuary SPA, Rogerstown Estuary SPA, and River Nanny Estuary and Shore SPA within the Proposed Development	72,300	850
Lesser black-backed gull *Larus fuscus* (LB)	None recorded during surveys in 2021/22 period	2 flying over rail line (24/03/2023)	Amber (B/W)	-	Lambay Island SPA, c. 7.5km east of the Proposed Development	5,500 (Western Europe)/ 6,300 (Southern Scandinavia)	n/a
Little egret *Egretta garzetta* (ET)	2 flying along the Irish Sea parallel to Gormanston camp (19/11/2021)	None recorded during surveys in 2022/23 period	-	✓	Malahide Estuary SPA and Rogerstown Estuary SPA, within the Proposed Development	1,100	20

Common name/ Scientific name/BTO Code	Recorded activity, peak count, not including fly overs		Conservation Importance			Threshold of Inter-national Population [30]	Threshold of National Population [31]
	Sep 2021 – Mar 2022	Sep 2022 – Mar 2023	BoCCI (B – Breeding / W - Wintering)	Annex I	Nearest European site		
Mallard *Anas platyrhynchos* (MA)	3 flying over rail line at Mosney accommodation (15/03/2022)	None recorded during surveys in 2022/23 period	Amber (B/W)	-	The Murrough SPA, c. 30km south of the Proposed Development	53,000	280
Merlin *Falco columbarius* (ML)	None recorded during surveys in 2021/22 period	1 perched on agricultural grassland east of rail line (09/02/2023)	Amber (B)	✓	Rogerstown Estuary SPA, and River Nanny Estuary and Shore SPA within the Proposed Development	n/a	n/a
Oystercatcher *Haematopus ostralegus* (OC)	61 roosting on the beach at Ben Head (02/12/2021)	48 foraging on agricultural grassland east of rail line (09/02/2023)	Red (B/W)		River Nanny Estuary and Shore SPA, located within the Proposed Development	8,200	610
Razorbill *Alca torda* (RZ)	2 perched on the rocks at Ben Head (06/01/2021)	None recorded during surveys in 2022/23 period	Red (B)		Wexford slobs or Shannon	n/a	n/a
Redshank *Tringa tetanus* (RK)	1 foraging on the beach at Ben Head (02/12/2021)	None recorded during surveys in 2022/23 period	Red (B/W)	-	Skerries Islands SPA, located c. 1.4km east of the Proposed Development	2,400 (Iceland & Faeroe Islands)/760 (Britain & Ireland)	240
Red-throated diver *Gavia stellata* (RH)	17 swimming on the Irish Sea (06/01/2022)	2 swimming on the Irish Sea (09/02/2023 & 24/03/2023)	Amber (B/W)		Boyne Estuary SPA, c. 400m north of the Proposed Development	3,000	20

Common name/ Scientific name/BTO Code	Recorded activity, peak count, not including fly overs		Conservation Importance			Threshold of Inter-national Population [30]	Threshold of National Population [31]
	Sep 2021 – Mar 2022	Sep 2022 – Mar 2023	BoCCI (B – Breeding / W - Wintering)	Annex I	Nearest European site		
Ringed plover *Charadrius hiaticula* (RP)	11 foraging on the beach at Ben Head (05/11/2021)	None recorded during surveys in 2022/23 period	Amber (B/W)		South Dublin Bay and River Tolka Estuary SPA, c. 500m south east of the Proposed Development	540	120
Redwing *Turdus iliacus* (RE)	None recorded during surveys in 2021/22 period	16 foraging on agricultural grassland east of rail line (24/01/2023)	Red (W)		Malahide Estuary SPA and Rogerstown Estuary SPA, within the Proposed Development	n/a	n/a
Sanderling *Calidris alba* (SS)	11 foraging on the beach at Ben Head (05/11/2021)	None recorded during surveys in 2022/23 period	-		Inner Galway Bay SPA, located c. 180km west of the Proposed Development	2,000	85
Scaup *Anas marila* (SP)	1 flying and hunting on the Irish Sea (17/12/2021)	None recorded during surveys in 2022/23 period	Red (W)		Malahide Estuary SPA and Rogerstown Estuary SPA, within the Proposed Development	n/a	n/a
Shag *Gulosus aristotellis* (SH)	1 foraging on the Irish Sea (08/10/2021)	None recorded during surveys in 2022/23 period	Amber (B)		Dundalk Bay SPA, c. 17.5km north of the Proposed Development	2,000	n/a

Common name/ Scientific name/BTO Code	Recorded activity, peak count, not including fly overs		Conservation Importance			Threshold of Inter-national Population [32]	Threshold of National Population [33]
	Sep 2021 – Mar 2022	Sep 2022 – Mar 2023	BoCCI (B – Breeding / W - Wintering)	Annex I	Nearest European site		
Sparrowhawk *Accipiter nisus* (SH)	1 hunting across the rail line on the agricultural lands next to Gormanston camp (22/10/2021; 02/12/2021; 17/12/2021; 06/01/2022; 04/02/2022; 15/03/2022)	None recorded during surveys in 2022/23 period	-		Dundalk Bay SPA, c. 17.5km north of the Proposed Development	n/a	n/a
Common snipe *Gallinago gallinago* (SN)	None recorded during surveys in 2021/22 period	2 flushed from grassland (24/02/2023)	Red (B/W)		Skerries Islands SPA, located c. 1.4km east of the Proposed Development	100,000	n/a
Starling *Sturnus vulgaris* (SG)	200 flying across the rail line at Gormanston camp (05/11/2021)	None recorded during surveys in 2022/23 period	Amber (B)		North Bull Island SPA, located c. 1km east of the Proposed Development	n/a	n/a
Turnstone *Arenaria interpres* (TT)	11 foraging on the rocks at Ben Head (04/02/2022)	None recorded during surveys in 2022/23 period	Amber (W)		Saltee Islands SPA located c. Xkm south of the Proposed Development	1,400	95

[32] Wetlands International. 2012. Waterbird Population Estimates, Fifth Edition. Summary Report Wetlands International, Wageningen The Netherlands (with estimates available at http://wpe.wetlands.org/).

[33] Crowe, O., & Holt, C. 2013. Estimates of waterbird numbers wintering in Ireland, 2006/07 – 2010/11. Irish Birds 9, 545-552.

Table 8.6 Vantage Point Records of Wintering Birds of Conservation Concern at the Balbriggan September 2021 – March 2023

Common name/Scientific name/BTO Code	Recorded activity, peak count, not including fly overs		Conservation Importance			Threshold of Inter-national Population [34]	Threshold of National Population [35]
	Sep 2021 – Mar 2022	Sep 2022 – Mar 2023	BoCCI (B – Breeding / W - Wintering)	Annex I	SPA designated for SCI species within ZoI		
Black-headed gull *Chroicocephalus ridibundus* (BH)	59 foraging on Balbriggan football pitches (08/10/2021)	11 foraging on Balbriggan football pitches (02/12/2022)	Amber (B/W)	-	South Dublin Bay and River Tolka Estuary SPA, c. 500m south east of the Proposed Development	31,000	n/a
Light-bellied Brent goose *Branta bernicla* (BG)	13 foraging on Balbriggan beach (04/03/2021)	None recorded during surveys in 2022/23 period	Amber (W)	-	Malahide Estuary SPA and Rogerstown Estuary SPA, within the Proposed Development	400	350
Common gull *Larus canus* (CM)	None recorded during surveys in 2021/22 period	1 flying over rail line (24/02/2023)	Amber (B/W)	-	Dundalk Bay SPA, c. 17.5km north of the Proposed Development	16,400	n/a
Curlew *Numenius arquata* (CU)	2 flying over the rail line at Balbriggan pitches (02/12/2022)	15 foraging on Balbriggan football pitches (24/01/2023)	Red (B/W)	-	North Bull Island SPA, located c. 1km east of the Proposed Development	7,600	350
Grey heron *Ardea cinerea* (H.)	1 flying over the rail line at Balbriggan pitches (04/03/2022)	None recorded during surveys in 2022/23 period	-	-	Wexford slobs or Galway bay	5,000	25
Herring gull *Larus argentatus* (HG)	22 foraging on Balbriggan football pitches (08/10/2021)	41 foraging on Balbriggan football pitches (24/01/2023)	Amber (B/W)	-	River Nanny Estuary and Shore SPA, within the Proposed Development site	14,400	n/a

[34] Wetlands International. 2012. Waterbird Population Estimates, Fifth Edition. Summary Report Wetlands International, Wageningen The Netherlands (with estimates available at http://wpe.wetlands.org/).

[35] Crowe, O., & Holt, C. 2013. Estimates of waterbird numbers wintering in Ireland, 2006/07 – 2010/11. Irish Birds 9, 545-552.

Common name/Scientific name/BTO Code	Recorded activity, peak count, not including fly overs		Conservation Importance			Threshold of Inter-national Population [34]	Threshold of National Population [35]
	Sep 2021 – Mar 2022	Sep 2022 – Mar 2023	BoCCI (B – Breeding / W - Wintering)	Annex I	SPA designated for SCI species within ZoI		
Oystercatcher *Haematopus ostralegus* (OC)	62 foraging on Balbriggan football pitches (16/02/2022)	112 foraging on Balbriggan football pitches (05/01/2023)	Red (B/W)		Malahide Estuary SPA, Rogerstown Estuary SPA, and River Nanny Estuary and Shore SPA within the Proposed Development	8,200	610
Redshank *Tringa totanus* (RK)	8 foraging on Balbriggan football pitches and grassland next to Lambeecher estate (20/01/2022; 16/02/2022)	7 foraging on Balbriggan football pitches (15/12/2023 & 09/02/2023)	Red (B/W)	-	Malahide Estuary SPA and Rogerstown Estuary SPA, within the Proposed Development	2,400 (Iceland & Faeroe Islands)/760 (Britain & Ireland)	240
Starling *Sturnus vulgaris* (SG)	30 foraging on Balbriggan football pitches (16/02/2022)	None recorded during surveys in 2022/23 period	Amber (B)		South Dublin Bay and River Tolka Estuary SPA, c. 500m south east of the Proposed Development	n/a	n/a

Table 8.7 Vantage Point Records of Wintering Birds of Conservation Concern at the Rogerstown September 2021 – March 2023

Common name/Scientific name/BTO Code	Recorded activity, peak count, not including fly overs		Conservation Importance			Threshold of International Population [36]	Threshold of National Population [37]
	Sep 2021 – Mar 2022	Sep 2022 – Mar 2023	BoCCI (B – Breeding / W – Wintering/ P – Passage)	Annex I	SPA designated for SCI species within ZoI		
Bar-tailed godwit *Limosa lapponica* (BA)	34 foraging on Rogerstown esturary (21/01/2022)	36 foraging on grassland of Rogerstown park (24/01/2023)	Red (W)	-	Malahide Estuary SPA, within the Proposed Development	1,500	170
Black-headed gull *Chroicocephalus ridibundus* (BH)	107 flying over the rail line (16/12/2021)	60 flushed from grassland of Rogerstown park (24/01/2023)	Amber (B/W)	-	South Dublin Bay and River Tolka Estuary SPA, c. 500m south east of the Proposed Development	31,000	n/a
Black-tailed godwit *Limosa limosa* (BW)	450 loafing on Rogerstown estuary (29/03/2022)	166 foraging on Rogerstown esturary (16/03/2023)	Red (W)	-	Malahide Estuary SPA and Rogerstown Estuary SPA, within the Proposed Development	1,100	200
Light-bellied brent goose *Branta bernicla* (BG)	75 flying over the rail line (03/12/2021)	564 foraging on agricultural grassland north of Rogerstown esturary (02/12/2022)	Amber (W)	-	Malahide Estuary SPA and Rogerstown Estuary SPA, within the Proposed Development	400	350

[36] Wetlands International. 2012. Waterbird Population Estimates, Fifth Edition. Summary Report Wetlands International, Wageningen The Netherlands (with estimates available at http://wpe.wetlands.org/).

[37] Crowe, O., & Holt, C. 2013. Estimates of waterbird numbers wintering in Ireland, 2006/07 – 2010/11. Irish Birds 9, 545-552.

Common name/Scientific name/BTO Code	Recorded activity, peak count, not including fly overs		Conservation Importance			Threshold of Inter-national Population[38]	Threshold of National Population [39]
	Sep 2021 – Mar 2022	Sep 2022 – Mar 2023	BoCCI (B – Breeding / W – Wintering/ P – Passage)	Annex I	SPA designated for SCI species within ZoI		
Buzzard *Buteo buteo* (BZ)	3 soaring over rail line at Rogerstown park (15/03/2022)	1 perched on treelines surrounding Rogerstown estuary (02/12/2022 & 16/12/2022)	-	-	Dundalk Bay SPA, c. 17.5km north of the Proposed Development	n/a	n/a
Common gull *Larus canus* (CM)	9 flying over rail line (04/03/2022)	4 flying over rail line (23/03/2023)	Amber (B/W)	-	Skerries Islands SPA, located c. 1.4km east of the Proposed Development	16,400	n/a
Cormorant *Phalacrocorax carbo* (CA)	2 swimming in Rogerstown estuary (18/11/2021) and 2 flying over the rail line (04/11/2021; 18/11/2021)	1 foraging and perching in Rogerstown estuary (12/10/2022; 17/11/2022; 16/12/2022; & 05/01/2023)	Amber (B/W)	-	North Bull Island SPA, located c. 1km east of the Proposed Development	1,200	110
Curlew *Numenius arquata* (CU)	295 foraging at Rogerstown estuary (04/02/2022)	295 foraging at Rogerstown estuary (05/01/2023)	Red (B/W)	-	Malahide Estuary SPA and Rogerstown Estuary SPA, within the Proposed Development	7,600	350
Dunlin *Calidris alpina* (DN)	3,000 foraging at Rogerstown estuary (21/01/2022)	1,313 foraging at Rogerstown estuary (16/12/2022)	Red (B/W)	-	Malahide Estuary SPA, within the Proposed Development	13,300	460

[38] Wetlands International. 2012. Waterbird Population Estimates, Fifth Edition. Summary Report Wetlands International, Wageningen The Netherlands (with estimates available at http://wpe.wetlands.org/).

[39] Crowe, O., & Holt, C. 2013. Estimates of waterbird numbers wintering in Ireland, 2006/07 – 2010/11. Irish Birds 9, 545-552.

Common name/Scientific name/BTO Code	Recorded activity, peak count, not including fly overs		Conservation Importance			Threshold of Inter-national Population[38]	Threshold of National Population [39]
	Sep 2021 – Mar 2022	Sep 2022 – Mar 2023	BoCCI (B – Breeding / W – Wintering/ P – Passage)	Annex I	SPA designated for SCI species within ZoI		
Golden plover *Pluvialis apricaria* (GP)	900 at Rogerstown estuary (04/02/2022; 15/03/2022)	846 foraging at Rogerstown estuary (04/02/2022; 15/03/2022)	Red (B/W)	-	The River Shannon and River Fergus Estuaries SPA, c. 185km south west of the Proposed Development	9,300	920
Great black-backed gull *Larus marinus* (GB)	2 foraging at Rogerstown estuary (14/10/2021)	2 foraging and loafing at Rogerstown estuary (12/10/2022; 05/01/2023; & 24/02/2023)	Amber (B/W)	-	Wexford slobs or galway bay	3,600	n/a
Greenshank *Tringa nebularia* (GK)	7 foraging at Rogerstown estuary (16/12/2021)	17 loafing at rock armour of Rogerstown estuary beside rail line (05/01/2023)	Green (W)	-	Malahide Estuary SPA and Rogerstown Estuary SPA, within the Proposed Development	3,300	20
Grey heron *Ardea cinerea* (H.)	4 perched on exposed rocks next to rail line of Rogerstown estuary (14/10/2021)	1 foraging at Rogerstown estuary (04/11/2022; 17/11/2022; 02/12/2022; 05/01/2023; & 24/02/2023) and 1 flying over rail line (16/12/2022)	-	-	River Nanny Estuary and Shore SPA, within the Proposed Development site	5,000	25
Grey plover *Pluvialis squatarola* (GV)	39 foraging at Rogerstown estuary (21/01/2022)	104 foraging at Rogerstown estuary (24/02/2023)	Red (W)	-	Malahide Estuary SPA and Rogerstown Estuary SPA, within the Proposed Development	2,000	30

Common name/Scientific name/BTO Code	Recorded activity, peak count, not including fly overs		Conservation Importance			Threshold of Inter-national Population[38]	Threshold of National Population [39]
	Sep 2021 – Mar 2022	Sep 2022 – Mar 2023	BoCCI (B – Breeding / W – Wintering/ P – Passage)	Annex I	SPA designated for SCI species within ZoI		
Herring gull *Larus argentatus* (HG)	230 flying over rail line (07/01/2022)	27 flying over rail line (02/12/2022)	Amber (B/W)	-	Boyne Estuary SPA, c. 400m north east of the Proposed Development	14,400	n/a
Kestrel *Falco tinnunculus* (K.)	1 flying over rail line (07/01/2022; 04/03/2022)	1 flying over rail line (04/11/2022)	Red (B)	-	Lambay Island SPA, c. 7.5km east of the Proposed Development	n/a	n/a
Knot *Calidris canutus* (KN)	1,650 foraging at Rogerstown estuary (21/01/2022)	300 landed in Rogerstown estuary with joining an additional 30 (12/10/2022)	Red (W)	-	-	5,300	160
Lapwing *Vanellus vanellus* (L.)	35 flying over rail line (18/11/2021)	120 flying over rail line (24/01/2023)	Red (B/W)	-	Wexford Harbour and Slobs SPA, c. 102km south of the Proposed Development	72,300	850
Lesser black-backed gull *Larus fuscus* (LB)	7 swimming in Rogerstown estuary (29/03/2022)	None recorded during surveys in 2022/23 period	Amber (B/W)	-	-	5,500 (Western Europe)/ 6,300 (Southern Scandinavia)	n/a
Little egret *Egretta garzetta* (ET)	3 foraging at Rogerstown estuary (14/10/2022) and flying over rail line (04/03/2022)	3 foraging at Rogerstown estuary (12/10/2022)	-	✓	Dundalk Bay SPA, c. 17.5km north of the Proposed Development	1,100	20

Common name/Scientific name/BTO Code	Recorded activity, peak count, not including fly overs		Conservation Importance			Threshold of Inter-national Population [40]	Threshold of National Population [41]
	Sep 2021 – Mar 2022	Sep 2022 – Mar 2023	BoCCI (B – Breeding / W – Wintering/ P – Passage)	Annex I	SPA designated for SCI species within ZoI		
Little grebe *Tachybaptus ruficollis* (LG)	16 swimming in Rogerstown estuary (03/12/2021)	None recorded during surveys in 2022/23 period	Amber (B/W)	-	Malahide Estuary SPA, Rogerstown Estuary SPA, and River Nanny Estuary and Shore SPA within the Proposed Development	4,700	20
Little gull *Hydrocoloeus minutus* (LU)	28 flying over rail line (16/12/2021)	None recorded during surveys in 2022/23 period	Amber (P)		Wicklow Mountains SPA	1,000	n/a
Mallard *Anas platyrhynchos* (MA)	63 foraging at Rogerstown estuary (14/10/2021)	33 loafing at Rogerstown estuary (02/12/2022)	Amber (B/W)	-	Malahide Estuary SPA within the Proposed Development	53,000	280
Mute swan *Cygnus olor* (MS)	2 foraging at Rogerstown estuary (21/10/2021)	None recorded during surveys in 2022/23 period	Amber (B/W)		Malahide Estuary SPA and Rogerstown Estuary SPA, within the Proposed Development	90	90
Oystercatcher *Haematopus ostralegus* (OC)	700 soaring over Rogerstown park (21/10/2021)	40 flying over rail line (17/11/2022)	Red (B/W)		Rogerstown Estuary SPA, and River Nanny Estuary and Shore SPA within the Proposed Development	8,200	610

[40] Wetlands International. 2012. Waterbird Population Estimates, Fifth Edition. Summary Report Wetlands International, Wageningen The Netherlands (with estimates available at http://wpe.wetlands.org/).

[41] Crowe, O., & Holt, C. 2013. Estimates of waterbird numbers wintering in Ireland, 2006/07 – 2010/11. Irish Birds 9, 545-552.

Common name/Scientific name/BTO Code	Recorded activity, peak count, not including fly overs		Conservation Importance			Threshold of Inter-national Population [40]	Threshold of National Population [41]
	Sep 2021 – Mar 2022	Sep 2022 – Mar 2023	BoCCI (B – Breeding / W – Wintering/ P – Passage)	Annex I	SPA designated for SCI species within ZoI		
Peregrine falcon *Falco peregrinus* (PE)	2 flying over rail line (21/10/2021)	1 flying over rail line (04/11/2022)	-		Malahide Estuary SPA and Rogerstown Estuary SPA, within the Proposed Development	n/a	n/a
Red-breasted merganser *Mergus serrator* (RM)	10 foraging at Rogerstown estuary (21/10/2021)	4 foraging at Rogerstown estuary (04/11/2022)	Amber (B/W)		River Nanny Estuary and Shore SPA, located within the Proposed Development	860	25
Redshank *Tringa totanus* (RK)	97 foraging and roosting at Rogerstown estuary (16/12/2021; 21/01/2022)	97 foraging Rogerstown estuary (24/01/2023)	Red (B/W)	-	Rogerstown Estuary SPA within the Proposed Development	2,400 (Iceland & Faeroe Islands)/760 (Britain & Ireland)	240
Redwing *Turdus iliacus* (RE)	None recorded during surveys in 2021/22 period	26 foraging on grassland at Rogerstown Park (16/12/2023)	Red (W)		North Bull Island SPA, c. 1km east of the Proposed Development	n/a	n/a
Ringed plover *Charadrius hiaticula* (RP)	150 foraging at Rogerstown estuary (21/01/2022)	100 loafing at agricultural grassland north of Rogerstown estuary (09/02/2023)	Amber (B/W)		Boyne Estuary SPA, c. 400m north of the Proposed Development	540	120
Shelduck *Tadorna tadorna* (SU)	170 swimming at Rogerstown estuary (04/02/2022)	121 swimming at Rogerstown estuary (24/02/2023)	Amber (B/W)		The Murrough SPA, c. 30km south of the Proposed Development	2,500	100
Sanderling *Calidris alba* (SS)	None recorded during surveys in 2021/22 period	1 loafing at Rogerstown estuary (24/01/2023)	-		Malahide Estuary SPA, within the Proposed Development	2,000	85

Common name/Scientific name/BTO Code	Recorded activity, peak count, not including fly overs		Conservation Importance			Threshold of Inter-national Population [40]	Threshold of National Population [41]
	Sep 2021 – Mar 2022	Sep 2022 – Mar 2023	BoCCI (B – Breeding / W – Wintering/ P – Passage)	Annex I	SPA designated for SCI species within ZoI		
Shoveler *Spatula clypeata* (SV)	8 flying over rail line (07/01/2022)	None recorded during surveys in 2022/23 period	Red (B/W)		South Dublin Bay and River Tolka Estuary SPA, c. 500m south east of the Proposed Development	650	20
Common snipe *Gallinago gallinago* (SN)	None recorded during surveys in 2021/22 period	3 flushed from Rogerstown estuary (05/01/2023)	Red (B/W)		Malahide Estuary SPA and Rogerstown Estuary SPA, within the Proposed Development	100,000	n/a
Sparrowhawk *Accipiter nisus* (SH)	1 flying over rail line (21/10/2021)	None recorded during surveys in 2022/23 period	-		Malahide Estuary SPA and Rogerstown Estuary SPA, within the Proposed Development	n/a	n/a
Teal *Anas crecca* (T.)	240 loafing at Rogerstown estuary (16/12/2021)	124 swimming at Rogerstown estuary (24/02/2023)	Amber (B/W)		Dundalk Bay SPA, c. 17.5km north of the Proposed Development	5,000	360
Turnstone *Arenaria interpres* (TT)	4 foraging at Rogerstown estuary (21/10/2021)	12 foraging at Rogerstown estuary (16/12/2022)	Amber (W)		Skerries Islands SPA, located c. 1.4km east of the Proposed Development	1,400	95
Whooper swan *Cygnus cygnus* (WS)	1 flying over rail line (04/11/2021)	None recorded during surveys in 2022/23 period	Amber (B/W)	Yes	North Bull Island SPA, located c. 1km east of the Proposed Development	340	150

Common name/Scientific name/BTO Code	Recorded activity, peak count, not including fly overs		Conservation Importance			Threshold of Inter-national Population [42]	Threshold of National Population [43]
	Sep 2021 – Mar 2022	Sep 2022 – Mar 2023	BoCCI (B – Breeding / W – Wintering/ P – Passage)	Annex I	SPA designated for SCI species within ZoI		
Wigeon *Mareca Penelope* (WN)	430 loafing at Rogerstown estuary (21/01/2022)	198 swimming at Rogerstown estuary (05/01/2023)	Amber (B/W)		Malahide Estuary SPA and Rogerstown Estuary SPA, within the Proposed Development	140,000	560

Table 8.8 Vantage Point Records of Wintering Birds of Conservation Concern at the Malahide September 2021 – March 2023

Common name/Scientific name/BTO Code	Recorded activity, peak count, not including fly overs		Conservation Importance			Threshold of Inter-national Population [44]	Threshold of National Population [45]
	Sep 2021 – Mar 2022	Sep 2022 – Mar 2023	BoCCI (B – Breeding / W – Wintering/ P – Passage)	Annex I	SPA designated for SCI species within ZoI		
Bar-tailed godwit *Limosa lapponica* (BA)	5 foraging at Malahide estuary (06/01/2022)	10 flying over the rail line (09/02/2023)	Red (W)	-	Malahide Estuary SPA, within the Proposed Development	1,500	170
Black-headed gull *Chroicocephalus ridibundus* (BH)	230 flying over the rail line (03/12/2021)	10 flying over the rail line (16/03/2023)	Amber (B/W)	-	South Dublin Bay and River Tolka Estuary SPA, c. 500m south east of the Proposed Development	31,000	n/a

[42] Wetlands International. 2012. Waterbird Population Estimates, Fifth Edition. Summary Report Wetlands International, Wageningen The Netherlands (with estimates available at http://wpe.wetlands.org/).

[43] Crowe, O., & Holt, C. 2013. Estimates of waterbird numbers wintering in Ireland, 2006/07 – 2010/11. Irish Birds 9, 545-552.

[44] Wetlands International. 2012. Waterbird Population Estimates, Fifth Edition. Summary Report Wetlands International, Wageningen The Netherlands (with estimates available at http://wpe.wetlands.org/).

[45] Crowe, O., & Holt, C. 2013. Estimates of waterbird numbers wintering in Ireland, 2006/07 – 2010/11. Irish Birds 9, 545-552.

Common name/Scientific name/BTO Code	Recorded activity, peak count, not including fly overs		Conservation Importance			Threshold of Inter-national Population [44]	Threshold of National Population [45]
	Sep 2021 – Mar 2022	Sep 2022 – Mar 2023	BoCCI (B – Breeding / W – Wintering/ P – Passage)	Annex I	SPA designated for SCI species within ZoI		
Black-tailed godwit *Limosa limosa* (BW)	102 perched on Malahide estuary (16/02/2022)	176 foraging in Malahide estuary (16/03/2023)	Red (W)	-	Malahide Estuary SPA and Rogerstown Estuary SPA, within the Proposed Development	1,100	200
Light-bellied Brent goose *Branta bernicla* (BG)	300 landing in an agricultural field in Broadmeadow estuary (16/12/2021)	400 foraging in Malahide estuary (16/12/2022)	Amber (W)	-	Malahide Estuary SPA and Rogerstown Estuary SPA, within the Proposed Development	400	350
Buzzard *Buteo buteo* (BZ)	3 flying over rail line (21/10/2021)	1 perched beside rail line (04/11/202; 17/11/2022; 02/12/2022; 16/12/2022; & 05/01/2023) with 1 flying over the rail line (17/11/2022)	-	-	grebe	n/a	n/a
Common gull *Larus canus* (CM)	8 swimming in Malahide estuary (04/02/2022)	2 loafing in Malahide estuary (16/03/2023)	Amber (B/W)	-	South Dublin Bay and River Tolka Estuary SPA, c. 500m south east of the Proposed Development	16,400	n/a
Common tern *Sterna hirundo* (CN)	2 common terns flying over rail line (29/09/2021)	None recorded during surveys in 2022/23 period	Amber (B)		Skerries Islands SPA, located c. 1.4km east of the Proposed Development	n/a	n/a

Common name/Scientific name/BTO Code	Recorded activity, peak count, not including fly overs		Conservation Importance			Threshold of Inter-national Population [46]	Threshold of National Population [47]
	Sep 2021 – Mar 2022	Sep 2022 – Mar 2023	BoCCI (B – Breeding / W – Wintering/ P – Passage)	Annex I	SPA designated for SCI species within ZoI		
Cormorant *Phalacrocorax carbo* (CA)	40 foraging (04/11/2021) and roosting (29/09/2021) in Malahide estuary	43 loafing in Malahide estuary (16/12/2022)	Amber (B/W)	-	North Bull Island SPA, located c. 1km east of the Proposed Development	1,200	110
Curlew *Numenius arquata* (CU)	55 flying over rail line (16/12/2021)	84 foraging at Malahide estuary (17/11/2022)	Red (B/W)	-	Malahide Estuary SPA and Rogerstown Estuary SPA, within the Proposed Development	7,600	350
Dunlin *Calidris alpina* (DN)	160 foraging in Malahide estuary (16/03/2022)	388 foraging in Malahide estuary (24/02/2023)	Red (B/W)	-	Malahide Estuary SPA, within the Proposed Development	13,300	460
Golden plover *Pluvialis apricaria* (GP)	None recorded during surveys in 2021/22 period	1 loafing in Malahide estuary (17/11/2022)	Red (B/W)	-	Malahide Estuary SPA, within the Proposed Development	9,300	920
Great black-backed gull *Larus marinus* (GB)	8 loafing in Malahide estuary (21/10/2021)	3 flying over the rail line (04/11/2022)	Amber (B/W)	-	The River Shannon and River Fergus Estuaries SPA, c. 185km south west of the Proposed Development	3,600	n/a
Great crested grebe *Podiceps cristatus* (GG)	2 foraging in Malahide estuary (07/01/2022)	1 swimming in Malahide estuary (12/10/2022)	Amber (B/W)		Wexford slobs or galway bay	6,300	30

[46] Wetlands International. 2012. Waterbird Population Estimates, Fifth Edition. Summary Report Wetlands International, Wageningen The Netherlands (with estimates available at http://wpe.wetlands.org/).

[47] Crowe, O., & Holt, C. 2013. Estimates of waterbird numbers wintering in Ireland, 2006/07 – 2010/11. Irish Birds 9, 545-552.

Common name/Scientific name/BTO Code	Recorded activity, peak count, not including fly overs		Conservation Importance			Threshold of Inter-national Population [46]	Threshold of National Population [47]
	Sep 2021 – Mar 2022	Sep 2022 – Mar 2023	BoCCI (B – Breeding / W – Wintering/ P – Passage)	Annex I	SPA designated for SCI species within ZoI		
Greenshank *Tringa nebularia* (GK)	21 foraging in Malahide estuary (21/10/2022)	18 perched in Malahide estuary (23/03/2023)	Green (W)	-	Malahide Estuary SPA and Rogerstown Estuary SPA, within the Proposed Development	3,300	20
Grey heron *Ardea cinerea* (H.)	16 roosting in Malahide estuary (04/11/2021)	2 flying beside the rail line (05/01/2023)	-	-	River Nanny Estuary and Shore SPA, within the Proposed Development site	5,000	25
Grey plover *Pluvialis squatarola* (GV)	7 foraging in Malahide estuary (06/01/2022)	None recorded during surveys in 2022/23 period	Red (W)	-	Malahide Estuary SPA and Rogerstown Estuary SPA, within the Proposed Development	2,000	30
Herring gull *Larus argentatus* (HG)	130 flying over rail line (18/11/2021)	25 flying over the rail line (16/03/2023)	Amber (B/W)	-	Boyne Estuary SPA, c. 400m north east of the Proposed Development	14,400	n/a
Kestrel *Falco tinnunculus* (K.)	1 flying over rail line and hunting on agricultural lands (29/09/2021; 16/03/2022)	None recorded during surveys in 2022/23 period	Red (B)	-	Lambay Island SPA, c. 7.5km east of the Proposed Development	n/a	n/a
Knot *Calidris canutus* (KN)	750 flying and landing in Malahide estuary (04/02/2022)	22 foraging in Malahide estuary (02/12/2022)	Red (W)	-	-	5,300	160
Lapwing *Vanellus vanellus* (L.)	150 flying over rail line (04/02/2022)	119 loafing in Malahide estuary (05/01/2023)	Red (B/W)	-	Dundalk Bay SPA, c. 17.5km north of the Proposed Development	72,300	850

Common name/Scientific name/BTO Code	Recorded activity, peak count, not including fly overs		Conservation Importance			Threshold of Inter-national Population [46]	Threshold of National Population [47]
	Sep 2021 – Mar 2022	Sep 2022 – Mar 2023	BoCCI (B – Breeding / W – Wintering/ P – Passage)	Annex I	SPA designated for SCI species within ZoI		
Lesser black-backed gull *Larus fuscus* (LB)	1 flying over rail line and also landing on viaduct (29/09/2021)	2 swimming in Malahide estuary (16/03/2023) with 2 flying over the rail line (24/02/2023 & 16/03/2023)	Amber (B/W)	-	Malahide Estuary SPA, Rogerstown Estuary SPA, and River Nanny Estuary and Shore SPA within the Proposed Development	5,500 (Western Europe)/ 6,300 (Southern Scandinavia)	n/a
Little egret *Egretta garzetta* (ET)	11 preening in Malahide estuary (21/10/2021)	3 foraging in Malahide estuary (24/02/2023)	-	✓	Wicklow Mountains SPA	1,100	20
Mallard *Anas platyrhynchos* (MA)	27 foraging in Malahide estuary (14/10/2021)	19 foraging in Malahide estuary (16/12/2022)	Amber (B/W)	-	Malahide Estuary SPA within the Proposed Development	53,000	280
Mute swan *Cygnus olor* (MS)	4 flying over rail line (29/09/2021)	5 swimming in Malahide estuary (02/12/2022)	Amber (B/W)		Malahide Estuary SPA within the Proposed Development	90	90
Oystercatcher *Haematopus ostralegus* (OC)	250 foraging in Malahide estuary (21/10/2021)	284 foraging in Malahide estuary (05/01/2023)	Red (B/W)		Malahide Estuary SPA and Rogerstown Estuary SPA, within the Proposed Development	8,200	610
Peregrine falcon *Falco peregrinus* (PE)	None recorded during surveys in 2021/22 period	1 preening on the ground (16/03/2023) and 1 flying over rail line (04/11/2022 & 24/02/2023)	-		Rogerstown Estuary SPA, and River Nanny Estuary and Shore SPA within the Proposed Development	n/a	n/a

Common name/Scientific name/BTO Code	Recorded activity, peak count, not including fly overs		Conservation Importance			Threshold of Inter-national Population [48]	Threshold of National Population [49]
	Sep 2021 – Mar 2022	Sep 2022 – Mar 2023	BoCCI (B – Breeding / W – Wintering/ P – Passage)	Annex I	SPA designated for SCI species within ZoI		
Pintail *Anas acuta* (PT)	15 swimming in Malahide estuary (21/01/2022)	37 swimming in Malahide estuary (05/01/2023)	Amber (W)		Ladys island or Galway bay	600	20
Red-breasted merganser *Mergus serrator* (RM)	6 flying over rail line (03/12/2021)	2 foraging and loafing in Malahide estuary (16/12/2022 & 05/01/2023) and 2 flying over rail line (16/03/2023)	Amber (B/W)		Malahide Estuary SPA and Rogerstown Estuary SPA, within the Proposed Development	860	25
Redshank *Tringa totanus* (RK)	85 foraging in Malahide estuary beside rail line (04/11/2021)	120 foraging in Malahide estuary (05/01/2023)	Red (B/W)	-	Rogerstown Estuary SPA within the Proposed Development	2,400 (Iceland & Faeroe Islands)/760 (Britain & Ireland)	240
Ringed plover *Charadrius hiaticula* (RP)	None recorded during surveys in 2021/22 period	11 foraging in Malahide estuary (16/12/2022)	Amber (B/W)		North Bull Island SPA, c. 1km east of the Proposed Development	540	120
Sandwich tern *Thalasseus sandvicensis* (TE)	1 flying around Malahide estuary (29/09/2021)	None recorded during surveys in 2022/23 period	Amber (B)		Boyne Estuary SPA, c. 400m north of the Proposed Development	n/a	n/a
Shelduck *Tadorna tadorna* (SU)	500 swimming in Malahide estuary (21/01/2022)	332 swimming in Malahide estuary (05/01/2023)	Amber (B/W)		The Murrough SPA, c. 30km south of the Proposed Development	2,500	100

[48] Wetlands International. 2012. Waterbird Population Estimates, Fifth Edition. Summary Report Wetlands International, Wageningen The Netherlands (with estimates available at http://wpe.wetlands.org/).

[49] Crowe, O., & Holt, C. 2013. Estimates of waterbird numbers wintering in Ireland, 2006/07 – 2010/11. Irish Birds 9, 545-552.

Common name/Scientific name/BTO Code	Recorded activity, peak count, not including fly overs		Conservation Importance			Threshold of Inter-national Population [48]	Threshold of National Population [49]
	Sep 2021 – Mar 2022	Sep 2022 – Mar 2023	BoCCI (B – Breeding / W – Wintering/ P – Passage)	Annex I	SPA designated for SCI species within ZoI		
Shoveler *Spatula clypeata* (SV)	9 swimming in Malahide estuary (21/01/2022)	11 foraging in Malahide estuary (16/12/2022)	Red (B/W)		Malahide Estuary SPA, within the Proposed Development	650	20
Sparrowhawk *Accipiter nisus* (SH)	None recorded during surveys in 2021/22 period	1 flying over rail line (02/12/2022)	-		South Dublin Bay and River Tolka Estuary SPA, c. 500m south east of the Proposed Development	n/a	n/a
Teal *Anas crecca* (T.)	260 foraging in Malahide estuary (16/02/2022)	285 foraging in Malahide estuary (16/12/2022)	Amber (B/W)		Malahide Estuary SPA and Rogerstown Estuary SPA, within the Proposed Development	5,000	360
Turnstone *Arenaria interpres* (TT)	54 foraging in Malahide estuary (29/03/2022)	5 foraging in Malahide estuary (16/12/2022)	Amber (W)		Malahide Estuary SPA and Rogerstown Estuary SPA, within the Proposed Development	1,400	95
Wigeon *Mareca penelope* (WN)	54 foraging in Malahide estuary (21/01/2022)	76 foraging in Malahide estuary (05/01/2023)	Amber (B/W)			140,000	560

Table 8.9 Summary of wintering bird surveys undertaken at Construction Compounds only

Common name/Scientific name/BTO Code	Recorded activity, peak count, not including fly overs		Conservation Importance			Threshold of Inter-national Population [50]	Threshold of National Population [51]
	Sep – Dec 2023	Location	BoCCI (B – Breeding / W - Wintering)	Annex I	Nearest European site		
Herring gull Larus argentatus (HG)	30 Transit/Commuting (19/10/2023)	Laytown beach	Amber (B/W)	-	River Nanny Estuary and Shore SPA	14,400	n/a
Black-headed gull Chroicocephalus ridibundus (BH)	4 Transit/commuting (19/10/2023)	Drogheda	Amber (B/W)	-	South Dublin Bay and River Tolka Estuary SPA	31,000	n/a
Dunlin Calidris alpina (DN)	10 Foraging (16/11/2023)	Laytown beach	Red (B/W)	-	Malahide Estuary SPA and Rogerstown Estuary SPA	13,300	460
Teal Anas crecca (T.)	29 rafting (16/11/2023)	Laytown beach	Amber (B/W)	-	North Bull Island SPA	5,000	360
Redshank Tringa tetanus (RK)	43 Roosting/loafing (16/11/2023)	Laytown beach	Red (B/W)	-	Malahide Estuary SPA and Rogerstown Estuary SPA	2,400 (Iceland & Faeroe Islands)/760 (Britain & Ireland)	240
Teal Anas crecca (T.)	53 Rafting (16/11/2023)	Laytown beach	Amber (B/W)	-	North Bull Island SPA	5,000	360
Little grebe Tachybaptus ruficollis (LG)	2 Foraging (16/11/2023)	Laytown beach	Amber (B/W)	-		4,700	20
Common gull Larus canus (CM)	1 Transit/commuting (16/11/2023)	Drogheda	Amber (B/W)	-	Dundalk Bay SPA, c. 17.5km north of the Proposed Development	16,400	n/a

[50] Wetlands International. 2012. Waterbird Population Estimates, Fifth Edition. Summary Report Wetlands International, Wageningen The Netherlands (with estimates available at http://wpe.wetlands.org/).

[51] Crowe, O., & Holt, C. 2013. Estimates of waterbird numbers wintering in Ireland, 2006/07 – 2010/11. Irish Birds 9, 545-552.

Common name/Scientific name/BTO Code	Recorded activity, peak count, not including fly overs		Conservation Importance			Threshold of Inter-national Population [52]	Threshold of National Population [53]
	Sep – Dec 2023	Location	BoCCI (B – Breeding / W - Wintering)	Annex I	Nearest European site		
Common gull Larus canus (CM)	6 Transit/commuting (16/11/2023)	Laytown beach	Amber (B/W)	-	Dundalk Bay SPA, c. 17.5km north of the Proposed Development	16,400	n/a
Redshank Tringa tetanus (RK)	20 Transit/commuting (16/11/2023)	Laytown beach	Red (B/W)	-	Malahide Estuary SPA and Rogerstown Estuary SPA	2,400 (Iceland & Faeroe Islands)/760 (Britain & Ireland)	240
Black-headed gull Chroicocephalus ridibundus (BH)	6 Transit/commuting (16/11/2023)	Gormanstown	Amber (B/W)	-	South Dublin Bay and River Tolka Estuary SPA,	31,000	n/a
Lapwing Vanellus vanellus (L.)	35 Transit/commuting (16/11/2023)	Laytown beach	Red (B/W)	-	Boyne Estuary SPA	72,300	850
Lapwing Vanellus vanellus (L.)	40 Transit/commuting (16/11/2023)	Laytown beach	Red (B/W)	-	Boyne Estuary SPA	72,300	850
Little egret Egretta garzetta (ET)	1 Transit/commuting (16/11/2023)	Laytown beach	Green	✓		1,100	20
Curlew Numenius arquata (CU)	15 Transit/commuting (17/11/2023)	Barnageerag h	Red (B/W)	-	North Bull Island SPA	7,600	350
Herring gull Larus argentatus (HG)	3 Perched (17/11/2023)	Barnageerag h	Amber (B/W)	-	Skerries Islands SPA	14,400	n/a
Herring gull Larus argentatus (HG)	1 Perched (17/11/2023)	Barnageerag h	Amber (B/W)	-	Skerries Islands SPA	14,400	n/a

[52] Wetlands International. 2012. Waterbird Population Estimates, Fifth Edition. Summary Report Wetlands International, Wageningen The Netherlands (with estimates available at http://wpe.wetlands.org/).

[53] Crowe, O., & Holt, C. 2013. Estimates of waterbird numbers wintering in Ireland, 2006/07 – 2010/11. Irish Birds 9, 545-552.

Common name/Scientific name/BTO Code	Recorded activity, peak count, not including fly overs		Conservation Importance			Threshold of Inter-national Population [52]	Threshold of National Population [53]
	Sep – Dec 2023	Location	BoCCI (B – Breeding / W - Wintering)	Annex I	Nearest European site		
Greenshank Tringa nebularia (GK)	7 Roosting/loafing (14/12/2023)	Laytown beach	Green (W)	-	The River Shannon and River Fergus Estuaries SPA	3,300	20
Redshank Tringa tetanus (RK)	26 Roosting/loafing (14/12/2023)	Laytown beach	Red (B/W)	-	River Nanny Estuary and Shore SPA	2,400 (Iceland & Faeroe Islands)/760 (Britain & Ireland)	240
Wigeon Mareca Penelope (WN)	5 Rafting (14/12/2023)	Laytown beach	Amber (B/W)	-	The Murrough SPA	140,000	560
Knot Calidris canutus (KN)	3 Roosting/loafing (14/12/2023)	Laytown beach	Red (W)	-	River Nanny Estuary and Shore SPA	5,300	160
Black-headed gull Chroicocephalus ridibundus (BH)	1 Foraging (14/12/2023) Gaa pitch	Laytown beach	Amber (B/W)	-	South Dublin Bay and River Tolka Estuary SPA,	31,000	n/a
Shelduck Tadorna tadorna (SU)	2 Rafting (14/12/2023)	Laytown beach	Amber (B/W)	-		2,500	100
Black-tailed godwit Limosa limosa (BW)	25 Perched (14/12/2023) Flushed when car drove by landed in same place.	Laytown beach	Red (W)	-	Malahide Estuary SPA and Rogerstown Estuary SPA	1,100	200
Lesser black-backed gull Larus fuscus (LB)	1 Perched (14/12/2023) Perching on roof	Barnageeragh	Amber (B/W)	-	Lambay Island SPA	5,500 (Western Europe)/ 6,300 (Southern Scandinavia)	n/a
Mallard Anas platyrhynchos (MA)	27 Rafting (14/12/2023)	Laytown beach	Amber (B/W)	-	Dundalk Bay SPA	53,000	280

Common name/Scientific name/BTO Code	Recorded activity, peak count, not including fly overs		Conservation Importance			Threshold of Inter-national Population [52]	Threshold of National Population [53]
	Sep – Dec 2023	Location	BoCCI (B – Breeding / W - Wintering)	Annex I	Nearest European site		
Teal Anas crecca (T.)	41 Rafting (14/12/2023) flushed by passing cars and landed within the estuary. stayed below train line bridge and in area west of bridge.	Laytown beach	Amber (B/W)	-	North Bull Island SPA	5,000	360
Herring gull Larus argentatus (HG)	11 Flushed (14/12/2023)	Drogheda	Amber (B/W)	-	River Nanny Estuary and Shore SPA	14,400	n/a
Grey heron Ardea cinerea (H.)	1 Transit/commuting (14/12/2023)	Laytown	-	-	-	5,000	25
Light-bellied brent goose Branta bernicla (BG)	17 Transit/commuting (14/12/2023)	Laytown beach	Amber (W)	-	South Dublin Bay and River Tolka Estuary SPA	400	350
Oystercatcher Haematopus ostralegus (OC)	16 Transit/commuting (14/12/2023)	Laytown beach	Red (B/W)	-	River Nanny Estuary and Shore SPA	8,200	610

Table 8.10 Summary of flight lines of all birds species

Common name/Scientific name/BTO Code	Total number of flights over rail line between Sep – March 2021/22 & 2022/2023	Total number of flights within collision risk zone (0-10m) between Sep – March 2021/22 & 2022/2023	Summary
Bar-tailed godwit *Limosa lapponica* (BA)	7	3 (43%)	In absence of mitigation bar-tailed godwit are at risk of collision with proposed works. This is based on 2 years of data
Black-headed gull *Chroicocephalus ridibundus* (BH)	675	262 (39%)	In absence of mitigation black-headed gull are at risk of collision with proposed works. This is based on 2 years of data
Black-tailed godwit *Limosa limosa* (BW)	146	55 (37%)	In absence of mitigation black-tailed godwit are at risk of collision with proposed works. This is based on 2 years of data
Light-bellied Brent goose *Branta bernicla* (BG)	286	144 (50%)	In absence of mitigation light-bellied brent geese are at risk of collision with proposed works. This is based on 2 years of data
Buzzard *Buteo buteo* (BZ)	27	12 (44%)	In absence of mitigation buzzard are at risk of collision with proposed works. This is based on 2 years of data
Common gull *Larus canus* (CM)	106	22 (20%)	In absence of mitigation common gull are not at risk of collision with proposed works. This is based on 2 years of data
Common tern *Sterna hirundo* (CN)	1	0 (0%)	Ad-hoc record of bird flying over rail line, not considered to be frequent during winter period
Cormorant *Phalacrocorax carbo* (CA)	290	184 (63%)	In absence of mitigation cormorant are at risk of collision with proposed works. This is based on 2 years of data
Curlew *Numenius arquata* (CU)	354	122 (34%)	In absence of mitigation curlew are at risk of collision with proposed works. This is based on 2 years of data
Dunlin *Calidris alpina* (DN)	31	15 (48%)	In absence of mitigation dunlin are at risk of collision with proposed works. This is based on 2 years of data
Gannet *Morus bassana* (GX)	1	0 (0%)	In absence of mitigation gannet are not at risk of collision with proposed works. This is based on 2 years of data

Common name/Scientific name/BTO Code	Total number of flights over rail line between Sep – March 2021/22 & 2022/2023	Total number of flights within collision risk zone (0-10m) between Sep – March 2021/22 & 2022/2023	Summary
Gargarney *Anas querquedula* (GY)	1	0 (0%)	In absence of mitigation gargarney are not at risk of collision with proposed works. This is based on 2 years of data
Golden plover *Pluvialis apricaria* (GP)	38	3 (7%)	In absence of mitigation golden plover are not at risk of collision with proposed works. This is based on 2 years of data
Great black-backed gull *Larus marinus* (GB)	67	35 (52%)	In absence of mitigation great black-backed gull are at risk of collision with proposed works. This is based on 2 years of data
Greenshank *Tringa nebularia* (GK)	3	1 (33%)	In absence of mitigation greenshank are at risk of collision with proposed works. This is based on 2 years of data
Grey heron *Ardea cinerea* (H.)	16	9 (69%)	In absence of mitigation grey heron are at risk of collision with proposed works. This is based on 2 years of data
Grey plover *Pluvialis squatarola* (GV)	4	0 (%)	In absence of mitigation grey plover are not at risk of collision with proposed works. This is based on 2 years of data
Herring gull *Larus argentatus* (HG)	1,406	374 (26%)	In absence of mitigation herring gull are at risk of collision with proposed works. This is based on 2 years of data
Kestrel *Falco tinnunculus* (K.)	5	2 (40%)	In absence of mitigation kestrel are at risk of collision with proposed works. This is based on 2 years of data
Knot Calidris *canutus* (KN)	19	5 (26%)	In absence of mitigation knot are at risk of collision with proposed works. This is based on 2 years of data
Lapwing *Vanellus vanellus* (L.)	50	6 (12%)	In absence of mitigation lapwing are not at risk of collision with proposed works. This is based on 2 years of data
Lesser black-backed gull *Larus fuscus* (LB)	12	5 (42%)	In absence of mitigation lesser black-backed gull are at risk of collision with proposed works. This is based on 2 years of data
Little gull *Hydrocoloeus minutus* (LU)	1	0 (0%)	In absence of mitigation little gull are not at risk of collision with proposed works. This is based on 2 years of data

Common name/Scientific name/BTO Code	Total number of flights over rail line between Sep – March 2021/22 & 2022/2023	Total number of flights within collision risk zone (0-10m) between Sep – March 2021/22 & 2022/2023	Summary
Little egret *Egretta garzetta* (ET)	73	40 (54%)	In absence of mitigation little egret are at risk of collision with proposed works. This is based on 2 years of data
Mallard *Anas platyrhynchos* (MA)	78	21 (30%)	In absence of mitigation mallard are at risk of collision with proposed works. This is based on 2 years of data
Mute swan *Cygnus olor* (MS)	6	4 (66%)	In absence of mitigation mute swan are at risk of collision with proposed works. This is based on 2 years of data
Oystercatcher *Haematopus ostralegus* (OC)	373	256 (69%)	In absence of mitigation oystercatcher are at risk of collision with proposed works. This is based on 2 years of data
Peregrine falcon *Falco peregrinus* (PE)	6	1 (16%)	In absence of mitigation peregrine falcon are not at risk of collision with proposed works. This is based on 2 years of data
Red-breasted merganser *Mergus serrator* (RM)	19	13 (68%)	In absence of mitigation red-breasted merganser are at risk of collision with proposed works. This is based on 2 years of data
Redshank *Tringa totanus* (RK)	265	197 (74%)	In absence of mitigation redshank are at risk of collision with proposed works. This is based on 2 years of data
Ringed plover *Charadrius hiaticula* (RP)	4	2 (50%)	In absence of mitigation ringed plover are at risk of collision with proposed works. This is based on 2 years of data
Sandwich tern *Thalasseus sandvicensis* (TE)	1	0 (0%)	Ad-hoc record of bird flying over rail line, not considered to be frequent during winter period
Scaup *Anas marila* (SP)	3	1 (33%)	In absence of mitigation scaup are at risk of collision with proposed works. This is based on 2 years of data
Shelduck *Tadorna tadorna* (SU)	54	18 (33%)	In absence of mitigation shelduck are at risk of collision with proposed works. This is based on 2 years of data
Shoveler *Spatula clypeata* (SV)	4	2 (50%)	In absence of mitigation sloveler are at risk of collision with proposed works. This is based on 2 years of data

Common name/Scientific name/BTO Code	Total number of flights over rail line between Sep – March 2021/22 & 2022/2023	Total number of flights within collision risk zone (0-10m) between Sep – March 2021/22 & 2022/2023	Summary
Common snipe *Gallinago gallinago* (SN)	4	0 (0%)	In absence of mitigation common snipe are not at risk of collision with proposed works. This is based on 2 years of data
Sparrowhawk *Accipiter nisus* (SH)	10	6 (60%)	In absence of mitigation sparrowhawk are at risk of collision with proposed works. This is based on 2 years of data
Teal *Anas crecca* (T.)	95	68 (71%)	In absence of mitigation teal are at risk of collision with proposed works. This is based on 2 years of data
Turnstone *Arenaria interpres* (TT)	5	3 (60%)	In absence of mitigation turnstone are at risk of collision with proposed works. This is based on 2 years of data
Wigeon *Mareca penelope* (WN)	130	28 (22%)	In absence of mitigation wigeon are not at risk of collision with proposed works. This is based on 2 years of data
Whooper swan *Cygnus cygnus* (WS)	1	0 (0%)	In absence of mitigation whooper swan are not at risk of collision with proposed works. This is based on 2 years of data

Table 8.11 Summary of weather conditions of all wintering bird surveys

Date	Site	High Tide (HT) / Low Tide (LT) / Rising Tide	Survey Time	Weather Conditions
2021-2022				
28/09/2021	Laytown	LT	09:30-12:30	Dry, scattered clouds with slight breeze and moderate visibility. Temperatures approximately 11°C
28/09/2021	Gormanston camp	HT	14:35-17:35	Dry, scattered clouds with slight breeze and good visibility. Temperatures approximately 15°C
28/09/2021	Balbriggan	HT	17:45-18:05	Dry, scattered clouds with slight breeze and good visibility. Temperatures approximately 15°C
29/09/2021	Rogerstown	LT	10:15-13:15	Dry and sunny with strong easterly breeze and good visibility. Temperatures between 9°C and 15°C
29/09/2021	Malahide	Rising Tide	14:50-17:50	Dry, scattered clouds with moderate breeze and good visibility. Temperatures between 13°C and 15°C
08/10/2021	Balbriggan	LT	08:03-08:37	Dry, overcast with light breeze and good visibility. Temperatures approximately 16°C
08/10/2021	Gormanston camp	LT	09:00-12:00	Dry, broken clouds with light breeze and good visibility. Temperatures approximately 16°C
08/10/2021	Laytown	HT	13:00-16:00	Dry, broken clouds with light breeze and good visibility. Temperatures approximately 17°C
14/10/2021	Malahide	HT	08:00-11:00	Dry, overcast, with light breeze and excellent visibility. Temperatures approximately 13°C
14/10/2021	Rogerstown	LT	12:31-15:31	Dry, overcast with light breeze and excellent visibility. Temperatures approximately 14°C
21/10/2021	Malahide	LT	08:00-11:00	Dry, few clouds with slight breeze and good visibility. Temperatures approximately 6°C
21/10/2021	Rogerstown	HT	12:30-15:30	Dry, few clouds with slight breeze and moderate visibility. Temperatures approximately 11°C
22/10/2021	Laytown	LT	08:25-11:25	Drizzle, broken clouds with slight breeze and good visibility. Temperatures approximately 9°C
22/10/2021	Gormanston camp	HT	12:30-15:30	Drizzle, scattered clouds with slight breeze and good visibility. Temperatures approximately 13°C
22/10/2021	Balbriggan	HT	15:45-16:00	Dry, broken clouds with slight breeze and good visibility. Temperatures approximately 13°C
04/11/2021	Malahide	HT	09:15-12:15	Dry, scattered clouds with slight breeze and good visibility. Temperatures approximately 6°C
04/11/2021	Rogerstown	LT	13:45-16:45	Dry, scattered clouds with slight breeze and good visibility. Temperatures approximately 10°C
05/11/2021	Laytown	HT	09:00-12:00	Dry, overcast with moderate breeze and excellent visibility. Temperatures approximately 8°C

Date	Site	High Tide (HT) / Low Tide (LT) / Rising Tide	Survey Time	Weather Conditions
05/11/2021	Gormanston camp	LT	13:00-16:00	Dry, overcast with moderate breeze and excellent visibility. Temperatures approximately 8°C
18/11/2021	Rogerstown	HT	08:34-11:34	Dry, scattered clouds with slight breeze and good visibility. Temperatures approximately 13°C
18/11/2021	Malahide	LT	13:00-16:00	Dry, broken clouds with slight breeze and excellent visibility. Temperatures approximately 13°C
19/11/2021	Laytown	HT	08:45-11:45	Dry, scattered clouds with slight breeze and excellent visibility. Temperatures approximately 11°C
19/11/2021	Gormanston camp	LT	12:50-15:50	Dry, scattered clouds with slight breeze and excellent visibility. Temperatures approximately 12°C
19/11/2021	Balbriggan	LT	16:11-16:31	Dry, broken clouds with slight breeze and excellent visibility. Temperatures approximately 12°C
02/12/2021	Gormanston camp	HT	08:25-11:25	Dry, scattered clouds with no breeze and good visibility. Temperatures approximately 3°C
02/12/2021	Balbriggan	HT	07:50-08:15	Dry, scattered clouds with no breeze and moderate visibility. Temperatures approximately 3°C
02/12/2021	Laytown	LT	12:20-15:20	Dry, scattered clouds with no breeze and good visibility. Temperatures approximately 5°C
03/12/2021	Rogerstown	HT	08:32-11:32	Dry, overcast with moderate breeze and good visibility. Temperatures between 6°C and 7°C
16/12/2021	Malahide	HT	08:30-11:30	Dry, broken clouds with slight breeze and excellent visibility. Temperatures approximately 11°C
16/12/2021	Rogerstown	LT	13:00-16:00	Dry, broken clouds with slight breeze and excellent visibility. Temperatures approximately 11°C
17/12/2021	Laytown	HT	08:50-11:50	Dry, overcast with slight breeze and excellent visibility. Temperatures approximately 8°C
17/12/2021	Gormanston camp	LT	12:35-15:35	Dry, overcast with moderate breeze and good visibility. Temperatures approximately 8°C
17/12/2021	Balbriggan	LT	15:50-16:15	Dry, overcast with moderate breeze and good visibility. Temperatures approximately 7°C
06/01/2022	Laytown	LT	08:45-11:45	Showers, broken clouds with slight breeze and good visibility. Temperatures approximately 6°C
06/01/2022	Gormanston camp	HT	13:00-13:00	Showers, scattered clouds with moderate breeze and good visibility. Temperatures approximately 7°C

Date	Site	High Tide (HT) / Low Tide (LT) / Rising Tide	Survey Time	Weather Conditions
07/01/2022	Malahide	LT	08:45-11:45	Dry, broken clouds with moderate breeze and good visibility. Temperatures between 1°C and 2°C
07/01/2022	Rogerstown	HT	13:00-15:50	Dry, scattered clouds with moderate breeze and good visibility. Temperatures between 1°C and 3°C
20/01/2022	Gormanston camp	HT	09:35-12:35	Dry, few clouds with slight breeze and excellent visibility. Temperatures approximately 3°C
20/01/2022	Laytown	HT	13:30-16:30	Dry, overcast with slight breeze and excellent visibility. Temperatures approximately 6°C
21/01/2022	Rogerstown	LT	08:30-11:30	Dry, broken clouds with slight breeze and good visibility. Temperatures approximately 5°C
21/01/2022	Malahide	HT	13:15-16:15	Dry, broken clouds with slight breeze and good visibility. Temperatures approximately 5°C
03/02/2022	Malahide	LT	08:45-11:45	Dry, scattered clouds with moderate breeze and good visibility. Temperatures approximately 3°C
03/02/2022	Rogerstown	HT	12:40-15:40	Dry, scattered clouds with moderate breeze and good visibility. Temperatures approximately 5°C
04/02/2022	Laytown	LT	08:10-11:10	Dry, scattered clouds with moderate breeze and good visibility. Temperatures approximately 3°C
04/02/2022	Gormanston camp	HT	12:10-15:00	Dry, scattered clouds with moderate breeze and good visibility. Temperatures approximately 4°C
04/02/2022	Balbriggan	HT	15:25-15:45	Dry, scattered clouds with moderate breeze and good visibility. Temperatures approximately 4°C
16/02/2022	Rogerstown	HT	09:00-12:00	Dry, broken clouds with moderate breeze and good visibility. Temperatures approximately 12°C
16/02/2022	Malahide	LT	14:15-17:15	Showers, overcast with strong breeze and good visibility. Temperatures approximately 11°C
16/02/2022	Rogerstown	HT	09:00-12:00	Broken clouds with moderate breeze. Temperatures approximately 13°C
16/02/2022	Laytown	HT	12:45-15:45	Rain, overcast with moderate breeze and fair visibility. Temperatures approximately 12°C
04/03/2022	Rogerstown	LT	08:30-11:30	Dry, few clouds with slight breeze and good visibility. Temperatures between 2°C and 7°C
04/03/2022	Malahide	HT	13:00-16:00	Dry, scattered clouds with slight breeze and good visibility. Temperatures approximately 9°C
04/03/2022	Laytown	LT	07:58-10:58	Dry, sunny with slight breeze and moderate visibility. Temperatures approximately 3°C
04/03/2022	Gormanston camp	HT	12:00-15:00	Dry, scattered clouds with slight breeze and good visibility. Temperatures approximately 7°C
04/03/2022	Balbriggan	HT	15:15	Dry, scattered clouds with slight breeze and good visibility. Temperatures approximately 7°C

Date	Site	High Tide (HT) / Low Tide (LT) / Rising Tide	Survey Time	Weather Conditions
15/03/2022	Laytown	HT	08:20-11:20	Dry, overcast with slight breeze and good visibility. Temperatures between 5°C and 9°C
15/03/2022	Gormanston camp	LT	12:30-12:30	Dry, scattered clouds with slight breeze and good visibility. Temperatures approximately 10°C
15/03/2022	Rogerstown	HT	08:50-11:50	Dry, overcast with slight breeze and good visibility. Temperatures between 6°C and 10°C
16/03/2022	Malahide	LT	13:00-16:00	Dry, scattered clouds with slight breeze and good visibility. Temperatures approximately 10°C
29/03/2022	Rogerstown	LT	09:15-12:15	Dry, scattered clouds with slight breeze and good visibility. Temperatures approximately 11°C
29/03/2022	Malahide	HT	13:45-16:45	Dry, overcast with slight breeze and good visibility. Temperatures approximately 12°C
29/03/2022	Laytown	HT	09:15-12:15	Dry, overcast with slight breeze and good visibility. Temperatures approximately 9°C
29/03/2022	Gormanston camp	LT	13:00-16:00	Dry, overcast with slight breeze and good visibility. Temperatures approximately 8°C
29/03/2022	Balbriggan	LT	16:10-16:35	Dry, overcast with slight breeze and good visibility. Temperatures approximately 8°C
2022-2023				
12/10/2022	Rogerstown	LT	08:00-11:00	Dry, Overcast with gentle breeze and excellent visibility. Temperatures approximately 13ºC
12/10/2022	Malahide	HT	12:00-15:00	Dry, Overcast with gentle breeze and good visibility. Temperatures approximately 13ºC
04/11/2022	Malahide	HT	08:00-11:00	Dry, scattered clouds and light air. and good visibility. Temperatures approximately 6ºC
04/11/2022	Rogerstown	LT	12:00-15:00	Dry, scattered clouds with light breeze and good visibility. Temperatures approximately 10ºC
08/11/2022	Balbriggan	LT	08:30-08:45	Dry, few clouds and good visibility. Temperatures approximately 10ºC
08/11/2022	Gormanston camp	LT	09:00-12:00	Dry, few clouds and good visibility. Temperatures approximately 10ºC
08/11/2022	Laytown	HT	12:30-15:30	Light drizzle, scattered clouds, with high wind, moderate/near gale, and good visibility. Temperatures approximately 10ºC
17/11/2022	Laytown	LT	08:30-11:30	Dry, scattered clouds with gentle breeze and good visibility. Temperatures approximately 4ºC
17/11/2022	Gormanston camp	HT	12:30-15:30	Dry, scattered clouds with light breeze and good visibility. Temperatures approximately 6ºC
17/11/2022	Rogerstown	HT	08:15-11:15	Mist, scattered clouds with light breeze and good visibility. Temperatures approximately 4ºC

Date	Site	High Tide (HT) / Low Tide (LT) / Rising Tide	Survey Time	Weather Conditions
17/11/2022	Malahide	LT	12:15-15:15	Dry, broken clouds with light breeze and good visibility. Temperatures approximately 7ºC
02/12/2022	Malahide	HT	08:25-11:25	Dry, scattered clouds and calm. good visibility. Temperatures approximately 5ºC
02/12/2022	Rogerstown	LT	12:20-15:20	Dry, scattered clouds and calm. good visibility. Temperatures approximately 9ºC
02/12/2022	Balbriggan	HT	08:00-12:00	Dry, few clouds, with light air. Excellent visibility. Temperatures approximately 7ºC
02/12/2022	Laytown	LT	12:40-15:40	Dry, scattered clouds, with light air. Excellent visibility. Temperatures approximately 10ºC
15/12/2022	Laytown	HT	08:45-11:45	Dry, few clouds, and calm. Excellent visibility. Temperatures approximately 3ºC
15/12/2022	Gormanston camp	HT	12:30-15:30	Dry, few clouds, and light breeze. Excellent visibility. Temperatures approximately 1ºC
15/12/2022	Balbriggan	LT	08:15-08:35	Dry, few clouds, and calm. Excellent visibility. Temperatures approximately 3ºC
16/12/2022	Rogerstown	LT	08:30-11:30	Dry, few clouds, and calm. good visibility. Temperatures approximately -1ºC
16/12/2022	Malahide	HT	12:30-15:30	Dry, few clouds, with light air. good visibility. Temperatures approximately -2ºC
05/01/2023	Rogerstown	HT	08:30-11:30	Dry, scattered clouds with gentle breeze. Good visibility. Temperatures approximately 11ºC
05/01/2023	Malahide	LT	12:30-15:30	Dry, scattered clouds with strong breeze. Good visibility. Temperatures approximately 13ºC
05/01/2023	Gormanston camp	HT	09:35-12:35	Dry, overcast with strong breeze. Good visibility. Temperatures approximately 11ºC
05/01/2023	Laytown	LT	13:15-16:45	Dry, overcast with strong breeze. Good visibility. Temperatures approximately 13ºC
24/01/2023	Rogerstown	LT	09:00-12:00	Dry, few clouds and calm. poor visibility. Temperatures approximately 7ºC
24/01/2023	Malahide	HT	13:15-16:15	Dry, scattered clouds with light breeze. Moderate visibility. Temperatures approximately 11ºC
24/01/2023	Balbriggan	LT	08:30-08:50	Dry, scattered clouds with light breeze. Excellent visibility. Temperatures approximately 8ºC
24/01/2023	Gormanston Camp	LT	09:00-12:00	Dry, scattered clouds with light breeze. Excellent visibility. Temperatures approximately 8ºC
24/01/2023	Laytown	HT	12:30-15:30	Dry, broken clouds with gentle breeze. Excellent visibility. Temperatures approximately 11ºC
09/02/2023	Laytown	LT	08:15-11:15	Dry, few clouds with light breeze. good visibility. Temperatures approximately 3ºC

Date	Site	High Tide (HT) / Low Tide (LT) / Rising Tide	Survey Time	Weather Conditions
09/02/2023	Gormanston camp	HT	12:15-15:15	Dry, few clouds with gentle breeze. good visibility. Temperatures approximately 6ºC
09/02/2023	Malahide	LT	08:00-11:00	Dry, few clouds with light air and good visibility. Temperatures approximately 2ºC
09/02/2023	Rogerstown	HT	12:00-15:00	Dry, few clouds with light breeze and good visibility. Temperatures approximately 8ºC
24/02/2023	Gormanston camp	LT	08:45-11:45	Dry, broken clouds with gentle breeze and good visibility. Temperatures approximately 7ºC
24/02/2023	Laytown	HT	12:45-15:45	Dry, broken clouds with moderate breeze and good visibility. Temperatures approximately 9ºC
24/02/2023	Malahide	LT	08:00-11:00	Dry, broken clouds with light air and good visibility. Temperatures approximately 7ºC
24/02/2023	Rogerstown	HT	12:00-15:00	Dry, broken clouds with light air and good visibility. Temperatures approximately 10ºC
08/03/2023	Laytown	LT	08:00-11:00	Light Drizzle, broken clouds and strong breeze, with good visibility. Temperatures approximately 2ºC
08/03/2023	Gormanston Camp	HT	12:00-15:00	Dry, broken clouds with strong breeze and good visibility. Temperatures approximately 5ºC
08/03/2023	Balbriggan	HT	15:15-15:45	Dry, broken clouds with strong breeze and good visibility. Temperatures approximately 4ºC
23/03/2023	Malahide	LT	07:45-10:45	Dry, few clouds with moderate breeze and good visibility. Temperatures approximately 8ºC
23/03/2023	Rogerstown	HT	12:00-15:00	Light Drizzle, broken clouds with moderate breeze and good visibility. Temperatures approximately 12ºC
2023 - 2024[54]				
14/09/2023	Drogheda	Not relevant	10:00-12:30	Dry, broken clouds with a gentle breeze and good visibility. Temperatures approximately 17°C
14/09/2023	Laytown beach	Not relevant	13:00-15:30	Dry, broken clouds with a gentle breeze and good visibility. Temperatures approximately 16°C
15/09/2023	Gormanston	Not relevant	10:00-12:30	Pouring rain, overcast with a light breeze and moderate visibility. Temperatures approximately 13°C
15/09/2023	Barnageeragh	Not relevant	12:45-15:30	Raining, overcast with a light breeze and poor visibility. Temperatures approximately 13°C
19/10/2023	Barnageeragh	Not relevant	09:30-16:30	Raining, overcast with a gentle breeze and moderate visibility. Temperatures approximately 13°C

[54] Construction Compound locations with suitable wintering bird habitat only

Date	Site	High Tide (HT) / Low Tide (LT) / Rising Tide	Survey Time	Weather Conditions
16/11/2023	Drogheda	Not relevant	08:40-10:46	Dry, broken clouds with light air and good visibility. Temperatures approximately 5°C
16/11/2023	Laytown beach	HT	11:10-13:10	Dry, broken clouds with light air and excellent visibility. Temperatures approximately 9°C. HT @ 1247.
16/11/2023	Gormanstown beach	Not relevant	14:10-16:05	Light drizzle, overcast with a light breeze and good visibility. Temperatures approximately 7°C. HT @ 1255.
17/11/2023	Barnageerah	Not relevant	09:40-11:40	Dry, few clouds with light breeze and excellent visibility. Temperatures approximately 6°C. HT @ 1341.
14/12/2023	Drogheda	Not relevant	08:15-1015	Dry, broken clouds with light air and good visibility. Temperatures approximately 8°C. Visibility improved.
14/12/2023	Laytown beach	Not relevant	10:40-12:40	Dry, broken clouds with a light breeze and excellent visibility. Temperatures approximately 9°C
14/12/2023	Gormanstown beach	Not relevant	13:20-14:30	Light drizzle, broken clouds with a light breeze and good visibility. Temperatures approximately 9°C. V quiet site.
14/12/2023	Barnageeragh	Not relevant	14:45-16:15	Dry, broken clouds with a light breeze and good visibility. Temperatures approximately 10°C

8.7 Appendix A8.7: Invasive Species Management Plan (ISMP)

8.7.1 Introduction

This Invasive Species Management Plan (hereafter referred to as the ISMP) for the Proposed Development contains management recommendations in respect of preventing the spread of and managing a range of non-native invasive species along the Proposed Development. Invasive Species (IS), Invasive Alien Species (IAS) or Invasive Alien Plant Species (IAPS) are terms sometimes referenced in legislation and or guidance. They are referred to as non-native invasive species in this report but the terms are interchangeable.

The ISMP describes the options available to manage and prevent the spread of Third Schedule, non-native invasive plant species identified in the vicinity of the Proposed Development. Only non-native invasive species listed on the Third Schedule of the Birds and Natural Habitats Regulations 2011 (S.I. No. 477 of 2011) (as amended) ("the Birds and Natural Habitats Regulations) are dealt with in this ISMP.

The ISMP will be developed prior to the commencement of any on-site works for the Proposed Development. Construction works can disturb stands of Third Schedule non-native invasive plants and / or soils contaminated with non-native invasive plant material, as well as potentially lead to a new infestation.

Therefore, management measures which will be contained in the ISMP will be implemented to avoid any direct or indirect impacts to habitats and species contained within the locality or as a result of its introduction to the area.

8.7.2 Legislative Context

The Birds and Natural Habitats Regulations contain specific provisions that govern control of listed invasive species. It is an offence to release or allow to disperse or escape, to breed, propagate, import, transport, sell or advertise species listed on Schedule 3 of the Birds and Natural Habitats Regulations without a Licence. The two regulations that deal specifically with this scheduled list of species are:

- Regulation 49: Prohibition of introduction and dispersal of certain species; and
- Regulation 50: Prohibition on dealing in and keeping certain species.
- Following on from the provisions referred to above, the following are strictly prohibited:
- Dumping invasive species cuttings in anywhere other than in facilities licensed to accept them;
- Planting or otherwise causing to grow in the wild, hence the landowner (in respect of the Proposed Development, this being IÉ and its appointed contractor) should be careful not to cause further spread);
- Disposing of invasive species at a landfill site without first informing the landfill site (that is licensed under the Waste Act to take such Third Schedule material - plant or soil) that the waste contains invasive species material (this action requires an appropriate licence);
- Moving soil which contains Third Schedule-specific non-native invasive species in the state unless under licence from the National Parks and Wildlife Service (NPWS) (this licence is separate from and does not discharge any person being in receipt of other necessary waste permits / licences etc.); and
- Regulation (EU) No 1143/2014 of the European Parliament and of the Council of 22 October 2014 on the prevention and management of the introduction and spread of invasive alien species) ("the IAS Regulation") lists specific Species of Union Concern, some of which overlap with the Third Schedule species.

The IAS Regulation conveys the rules to prevent, minimise and mitigate the adverse impacts of the introduction and spread (both with and without intention) of invasive alien species on biodiversity and the related ecosystem services, as well as other adverse impacts on human health or the economy. Outcome 2H (and it four supporting actions 2H1-2H4) of Ireland's fourth National Biodiversity Action Plan 2023-2030 (Department of Housing, Local Government and Heritage 2023) requires that "Invasive alien species (IAS) are controlled and managed on an all-island basis to reduce the harmful impact they have on biodiversity and measures are undertaken to tackle the introduction and spread of new IAS to the environment".

8.7.3 Limitations

It should be noted that any decision on efficacy of chemical treatments can only be provided by registered pesticides advisor. A suitably qualified specialist will be appointed by the contractor to monitor the treatment of non-native invasive species. This live ISMP shall be updated as necessary by the specialist.

8.7.4 Methodology

8.7.4.1 Guidance

This ISMP and the mitigation strategies that are discussed relating to invasive plant species have been prepared with regard to the following guidance documents, where relevant:

- The Management of Invasive Alien Plant Species on National Roads – Technical Guidance (Transport Infrastructure Ireland (TII) 2020a)
- The Management of Invasive Alien Plant Species on National Roads – Standard (TII 2020b)
- Managing Japanese knotweed on Development Sites (Version 3, amended in 2013, withdrawn from online publication in 2016): The Knotweed Code of Practice (Environment Agency (EA) 2013) (This document, although no longer supported by the EA, is nonetheless a practical document in determining the approach and control mechanisms for Japanese knotweed);
- Managing Invasive Non-Native Plants in or near Freshwater (EA 2010);
- Best Practice Management Guidelines for Japanese knotweed (Invasive Species Ireland (ISS) 2008a);
- Best Practice Management Guidelines for Himalayan balsam (ISS 2008b);
- Best Practice Management Guidelines for Giant hogweed (ISS 2008c);
- Countryside Management Publications, Giant hogweed (Department of Agriculture and Rural Development (Northern Ireland) (2016);
- Aquatic and Riparian Plant Management: Controls for Vegetation in Watercourses, Technical Guide (EA 2014); and
- Biosecurity Protocol for Field Survey Work (Inland Fisheries Ireland 2010).

8.7.4.2 General Measures to Control and Prevent the Spread of Non-Native Invasive Plant Species

8.7.4.2.1 Pre-Construction Survey

During the interim between the original non-native invasive species surveys and commencement of construction following grant of the Railway Order, it is possible that the existing stands of Third Schedule non-native invasive species may have expanded (if unmanaged) or decreased (if active management regime in place), or that newly established Third Schedule non-native Invasive species may have become established within the footprint of the Proposed Development. A confirmatory pre-construction invasive species survey will be undertaken by a suitably qualified specialist, arranged by IÉ, to confirm the absence, presence and / or extent of all Third Schedule non-native invasive species within the footprint of the Proposed Development. Where an infestation is confirmed / identified within the footprint of the Proposed Development, this will require the implementation of the ISMP.

Data collected as part of the pre-construction invasive species survey will include a detailed description of the infestation including the approximate area of the respective colonies (m2), where feasible, approximate total number of stems, pattern of growth and information on other vegetation present). This information will enable calculations of volumes of infested soils to be excavated where necessary, as part of the measures outlined below.

Following on from the pre-construction invasive species survey, the ISMP will be updated, as advised by a suitably qualified specialist, with regard to the Management of Invasive Alien Plant Species on National Roads - Technical Guidance (TII 2020a) and Standard (TII 2020b) and other species-specific guidance documents including those listed in the ISMP, as necessary. The updated ISMP will detail the strategy that will be adopted during the construction and decommissioning phase in order to manage and prevent the spread of invasive plant species, and where a Third Schedule non-native invasive species are encountered directly in the works area, the method of treatment / eradication.

8.7.4.2.2 Invasive Species Management Plan (ISMP)

Following on from the pre-construction invasive species survey, the ISMP will be updated to detail the exact measures for any non-native invasive species population present within the footprint of the Proposed Development. Depending on the extent and nature of the works, a number of approaches / treatments may be approved, all following on from the measures in the ISMP.

IÉ will ensure that all control measures specified in the ISMP shall be implemented by a suitably qualified and licenced specialist prior to the Construction and decommissioning Phase of the Proposed Development to control the spread of newly established non-native invasive species within the footprint of the Proposed Development. Furthermore, the appointed contractor will adhere to control measures specified within the ISMP throughout the construction and decommissioning phase of the Proposed Development. The site will be monitored by the appointed contractor after control measures have been implemented. Any re-growth will be subsequently treated.

All measures that are prescribed in the ISMP shall be equally applicable to advance works as to construction works. In the operational phase the management of the infrastructure will be the responsibility of the local authority and the control of invasive species will be as per their plans and procedures, and responsibilities under The Birds and Natural Habitats Regulations.

8.7.4.2.3 *General Measures to Avoid the Spread of Non-Native Invasive Species*

The unintentional spread of non-native invasive species during construction works (within a construction site or unwittingly from outside of a site, such as through the importation of materials or poor biosecurity practices regarding plant and machinery) can be a significant issue, and if not managed properly, can result in the spread of non-native invasive species to uninfested areas (within or adjacent to works areas), which would increase the future cost and effort required to control the species and could pose further public health and safety risks (Japanese knotweed can cause damage to weaknesses in built environment, whilst Giant hogweed is a documented environmental public health hazard).

The most common ways that invasive species can be spread is:

- Site and vegetation clearance, mowing, hedge-cutting or other landscaping activities;
- Spread of seeds or plant fragments during the movement or transport of soil;
- Spread of seeds or plant fragments through the local surface water and drainage network;
- Contamination of vehicles or equipment with seeds or plant fragments which are then transported to other areas;
- Importation of soil from off-site sources contaminated with invasive species plant material; and

- Leaving riparian corridors bare of vegetation thus allowing establishment of seed material from outside the site.

8.7.4.2.4 *Site Establishment*

During advance works and prior to commencement of construction, any areas where Third Schedule non-native invasive species have been recorded by the pre-construction surveys must be clearly fenced off prior to and during construction (in order to avoid spreading seeds or plant fragments around or off the construction site) until such time that the mitigation measures are implemented and treatment has been completed, or that works in these areas are monitored in accordance with the requirements of the ISMP.

This includes the construction compound and the entirety of the Proposed Development footprint. Earthworks or machinery movement must be avoided in any areas where non-native invasive species have been identified during the pre-construction surveys, until the relevant stands have been eradicated.

8.7.4.2.5 *Biosecurity and Site Hygiene*

It is important to ensure that the spread of non-native invasive species, where present, is curtailed. It is also necessary to ensure that in areas where non-native invasive species are not present, that they are not unintentionally spread e.g., through the importation of contaminated material being brought onto the site.

Unwashed construction equipment, plant, vehicles, and footwear can provide a vector for the spread of non-native invasive species within the Proposed Development and from areas outside the Proposed Development, where infestation is present or where vector material potentially containing seed / root material is attached to plant. The following hygiene measures shall be undertaken for the Proposed Development.

- Known or potentially infested areas within the working area of the Proposed Development shall be clearly fenced off in advance of works and access restricted until such time that treatment has commenced and / or construction works are monitored in accordance with the ISMP in the area. In relation to Japanese knotweed, the guidance recommends an exclusion buffer of 7m (metres) in all directions (within the works area and 3m vertically underground);
- Erection of clear signage at the construction compound etc. and inclusion of detail during tool-box talks or similar (environmental induction) for construction staff in respect of the management of Third Schedule non-native invasive species. The signage and notification should be easily understood so that users are aware of the measures to be taken for known non-native invasive species, or what they should do in the case of suspected non-native invasive species identified. In particular the potential health risks posed by Giant hogweed, where it is recorded from within or adjacent to a Proposed Development should be clearly notified to personnel;
- Identify dedicated access points into and out of fenced off areas. These shall not be breached until such time that eradication / removal of non-native invasive species is confirmed or monitoring of the treatment / eradication process is commenced;
- Where possible, the locations of dedicated footwear and wheel wash facilities should be identified in the ISMP.

Where a dedicated / bespoke wheel wash cannot be installed owing to space limitations, the appointed contractor will ensure that no excavated loose material is allowed offsite from within an exclusion zone. Similarly, where plant that is used to excavate soils, it shall be visually checked for loose soil before movement to another part of site (where possible, the movements of tracked machinery should be restricted within the non-native invasive species exclusion zone. Loose soil shall be scraped off and disposed of, and a solution of Virkon© (or similar approved disinfectant) applied to machinery to ensure that no obscured seed / root material remains viable;

- Vehicular movements within the exclusion area shall be minimised as far as is practical.
- Machinery which has been used for the transport and / or excavation of infected / suspected infected vector material shall be thoroughly washed down, and the washings captured for disposal. All such machinery / plant shall not be permitted to commence work elsewhere on or off-site until written confirmation of same has been undertaken;
- Dedicated wash down and solution capture should be set up in the construction compound. All washings should be stored in a quarantined bunded container that is rated for such storage until such time that they are removed offsite for disposal and a facility that is authorised to accept such waste;
- Except in very particular circumstances, under the guidance of the specialist, there shall be no temporary storage of infected / suspected infected soils on-site. They must be removed offsite as per guidance above; and
- Where small volumes e.g., volume capable of being double bagged in quarantine bags such as cut plants, bulbs or loose soil occur, it may be practical to bag the material and bring it to a clearly demarcated and dedicated quarantine area within the construction compound until such time that the material is disposed of to an authorised facility, similar to the process of disposing of bulk excavated infected soil.

8.7.4.2.6 *Soil Excavation*

No excavations within a clearly demarcated and fenced off buffer zone shall be permitted. For Japanese knotweed, guidance recommends a horizontal distance of up to 7m from the outside of the stand. This could include under built ground, should suitable areas of weakness or uncompacted ground be encountered by the plants' rhizomes. For other species there will be different buffer zones as guided by the specialist.

Where the excavation of soil containing Third Schedule non-native invasive species (vector material) is the preferred option, the operation shall be monitored for its entirety until the risk of spread of Third Schedule non-native invasive species is negated.

There should be no temporary storage on-site of bulk excavated infected material. Where the ISMP calls for shallow / deep burial, this material shall be removed from the excavated area and transported immediately to approved receptor area on site. Furthermore, the temporary storage of uninfected material should not occur within a European or National site nor within 10m of any watercourse and any land within an identified flood zone. Where temporary stockpiles of infected material cannot for practical limitations, be situated away from a potential flood risk area, the appointed contractor will be required to include a flood response plan within the Environmental Incident Response Plan to ensure that any inundation of Construction Compound does not result in a pollution event to nearby water bodies.

Plant and machinery used in the control, excavation and transport of invasive material shall also be subject to the recommendations described in above.

The installation of industry-rated non-native invasive species-proof membrane before infilling construction of road / paths surface may be required. All waste arising out of this process which has been in contact with the excavated ground shall be treated as infected waste and disposed of at a facility that is authorised to accept such waste.

Where the movement of any Third Schedule non-native invasive species is required off-site, a licence will be required from National Parks and Wildlife Service (NPWS) in advance of any movement to a site/facility licensed to accept such waste, as per the Birds and Natural Habitats Regulation. This licence is separate to; and does not negate the need for licences / permits / authorisations required under waste legislation.

8.7.4.2.7 *Disposal of Material*

Where any non-native invasive plant material is collected (e.g., by hand-pulling or mowing), it is important that its disposal does not result in a risk of further spread. The movement of invasive plant material, offsite, requires a licence from the NPWS, as per the Birds and Natural Habitats Regulations. Invasive species (particularly roots, flower heads or seeds) must be disposed of at licensed waste facilities or composting sites, appropriately buried, or incinerated having regard to relevant legislation, e.g., Waste Management Act 1996, as amended (" the Waste Management Act"); Section 4 of the Air Pollution Act 1987; relevant local authority byelaws and any other relevant legislation. All disposals must be carried out in accordance with the relevant waste management legislation, as per guidance from the Transport Infrastructure Ireland (TII) Guidelines for the Management of Waste from National Road Construction Projects (TII 2017).

It should be noted that some invasive species plant material or soil (vector material) containing residual herbicides may be classified as either 'hazardous waste' or 'non-hazardous waste' under the terms of the Waste Management Act, and both categories may require special disposal procedures or permissions. Advice should be sought from a suitably qualified waste expert regarding the classification of waste and the suitability of different disposal measures.

8.7.4.2.8 *Importation of Soil and Other Material*

The bulk importation of material from offsite could potentially result in the accidental spread of Third Schedule non-native invasive species, as it is uncertain if these site(s) are free from non-native invasive species. This is likely less an issue for road building material. However, in terms of landscaping, if soil is imported to the site for landscaping, infilling or embankments, the appointed contractor shall seek documentation from suppliers confirming that the material is free from invasive species.

8.7.5 Assessment of Management Options for Third Schedule Non-Native Invasive Species

The general measures included above are required to ensure good on-site practices in respect of known or potential Third Schedule non-native invasive species.

Sections below further identify practical management controls. The colour scheme shown is a qualitative tool intended to assist the reader to focus on the most likely practical solutions.

It is acknowledged that more than one potential control measure exists and that a single or combination of measures may be required. The recommendations presented in this ISMP provide the minimum requirements for the likely control measures and the measures outlined in this ISMP shall be developed (with further detail on methodology used at each location, timing, practical management etc.) by the appointed contractor (or the specialist as appropriate).

The use of chemical treatments is recognised as a potential treatment option. However, the services of a registered pesticide advisor must be employed in the specifying named chemicals including those rated for use adjacent to aquatic environments where required, treatment type, dosage, and timing etc., and / or use of pesticides in the management of potential Third Schedule non-native invasive species within the Proposed Development.

The selected management control to be defined for each non-native invasive species stand within the Proposed Development will depend on:

- Results of the pre-construction survey; and,
- Construction requirements – timing of works at specific locations, level of infestation and practical considerations such as reducing disturbance to road users / homeowners.

The ISMP, which will be updated following on from the pre-construction surveys, may require the utilisation of a number of controls that are described and assessed below.

8.7.5.1 Japanese knotweed (Reynoutria japonica)

Japanese knotweed is high impact non-native invasive species that is particularly effective at colonising disturbed ground (e.g., construction sites) and can spread by the re-growth of cut fragments or root material, so if it is broken up during site clearance or other earthworks it can readily re-grow in new areas to which soil is moved. Japanese knotweed readily reproduces asexually (in Ireland, at least, as only Female plants have been recorded) and regrowth can occur from plant material weighing as little as 0.7g (grams) of viable material. It is acknowledged to be very difficult to effectively control and an even more difficult weed to fully eradicate.

Given the nature of Japanese knotweed, chemical treatments are often preferred over physical methods as they can, if implemented properly reduce the disturbance of the plant / population thus reducing the chances of its spread. If herbicide is applied as the treatment option, it will need to be reapplied for up to five years after the first application to ensure the plant control measures have been effective; or monitored for a minimum of two years during which no regrowth is recorded.

Table 8.12 below presents an assessment of potential treatment options available for the treatment of Japanese knotweed. The various methods are analysed and described in further detail as necessary. It should be noted that where it might occur within a development, that a number of the measures described below may be applicable, depending on the nature of works, the timing etc. The ISMP is a live document. Arising from the outcome of the Preconstruction surveys noted at section 8.8.4.2.1, the appointed contractor's specialist will, following detail the treatment options based on the potential options presented below.

Table 8.12 Assessment of Management Methods for Japanese knotweed

Approach	Treatment Options	Comment	Potential for Implementation on the Proposed Development
Physical	Dig and dispose offsite, under licence	This option requires that all plant material (above and below ground) is excavated along with soil and disposed of to a facility authorized to accept it. In addition to waste permits / authorizations, a wildlife licence issued by NPWS is required for the transport of Third Schedule non-native invasive species offsite. Depending on the nature of the excavation the proximity of services etc., the use of root barrier membrane could be required.	Likely – given the nature of the scheme, there may be a need to excavate soil and plant material to enable construction works to go ahead in timely manner.
	Dig and dispose onsite. - Shallow burial - Deep burial	A wildlife licence from NPWS is not ordinarily required if the burial of collected material is proposed for within the development site. Shallow burial in a constructed cell such as a dedicated sealed cell within a constructed berm will allow for periodic monitoring and of easy chemical treatment of any regrowth. Deep burial entails a dedicated sealed cell within a constructed excavation, that is at least 2m below the surface of the ground. The landscaping regime should not specify trees or scrub to be planted above. Either shallow or deep option could require the use of root barrier membrane. The use of chemical pre-treatment of deep/shallow cells could also be required.	Unlikely – given the lack of suitable lands outside of ownership of IÉ
	Screen on site – remove fragments offsite & reuse soil.	A control option that can be used to reduce the volume of soil/sediment to be moved elsewhere for burial, this option requires suitable plant, adequate space and volumes of soil to make the operation at a location cost effective. This option often requires the use of root barrier membrane owing to reuse of screened soil. The use of chemical pre-treatment of deep / shallow cells could also be required.	Possible but unlikely given the space requirements for a screener (unless a bespoke small-scale screener is available).
	Cutting and / or Strimming	Not recommended and does not apparently diminish vigour of plants over time. Largely cosmetic and can result in considerable spread of viable vegetative material that can readily regenerate on suitable conditions.	Not Recommended.
Chemical	Spot	Used for isolated plants – knapsack or weep sprayers. Chemical treatments for infestations near water should be rated for use near aquatic locations.	Chemical treatments are often a preferred option for treating Japanese knotweed, but the process can take between 3 to 5 years before eradication can be guaranteed and requires at least 2-year post implementation monitoring.
	Spray	Used for isolated plants or large populations using knapsack or weep sprayers. In accessible areas including along riverbanks, lance sprayers can be used. Chemical	

Approach	Treatment Options	Comment	Potential for Implementation on the Proposed Development
		treatments for infestations near water should be rated for use at or near aquatic locations. Can result in chemical drift.	
	Stem Injection	This method is considered very effective, if the injection is timed appropriately for growth phase. However, it is labour-intensive (sometimes) requiring some cutting) and is usually only carried out on small/isolated populations. Chemical treatments for infestations near water should be rated for use at or near aquatic locations.	Possible and requires specialist equipment to enable working alongside the biohazardous plant. – Despite some advantages over other conventional chemical treatments e.g., reduces drift, not weather dependent.

8.7.5.2 Root Barrier Membrane

Following on from the excavation of Japanese knotweed, there may be a need to install a root barrier membrane. These are specialised products that can provide protection to structures / services etc. from regrowth from within or outside a site if suitably rated and properly installed. Thereafter, any small adjacent infestation can be more readily treated with chemical treatment for example.

8.7.5.3 Reseeding Following Eradication

This is not strictly a control method. However, where treated ground is not being built upon, planting or resowing mixtures of native grass species helps to restore the original vegetation and aids post control management of affected sites. A grass sward established in autumn will compete with germinating Japanese knotweed seedlings in the following spring.

8.7.5.4 *Giant hogweed (Heracleum mantegazzianum)*

This is a high-risk invasive species, that is also a biohazard in that it can pose a threat to humans. The chemistry of its sap is such that exposure to it on skin can result in prolonged photosensitizing reactions with blistering. Thus, a clearly demarcated exclusion buffer, in excess of 4m, is recommend for any individual / populations of this species before commencing works.

It spreads via heavy seeds which can easily be transported by water; hence it is often found along river corridors. While the plant favours riverbanks, it is known to be found on waste / derelict ground as well as railway lines for instance. Its presence can impact local biodiversity and undermine bankside integrity. The seedling stage is the most vulnerable. Mortality of seedlings is comparable to many other plants and its seed bank is considered to be persistent for a short number of years only. Since Giant hogweed can only reproduce via seed, control measures applied before flowering and fruit set will limit subsequent generations (and even then, only with favourable conditions). The ideal time to control Giant hogweed via chemical treatment is April, with follow on monthly applications targeting regrowth, although for this treatment options, it can require up to five years before successful eradication.

Table 8.13 presents an assessment of potential treatment options available for the treatment of Giant hogweed.

The various potential treatment methods are analysed and described in further detail as necessary. The ISMP is a live document. Arising from the outcome of the Preconstruction surveys noted at section 8.8.4.2.1, the appointed contractors specialist will, following detail the treatment options based on the potential options presented below.

Table 8.13 Assessment of Management Methods for Giant hogweed

Approach	Treatment Options	Comment	Potential for Implementation on the Proposed Development
Physical	Above ground Cutting	Not recommended. Largely cosmetic and prolongs flowering until such time that control halted. However, if digging is used, it is recommended that the removal be attempted in April /early May when the plant is usually less than 30cm tall. However, the root must be captured also.	Unlikely - requires specialist equipment to enable working alongside the biohazardous plant
	Root cutting	Individual plants may be killed by cutting at a 45-degree angle 15cm below ground level with a spade in April or May. Can be laborious unless small/isolated stands. Can be effective if combined with chemical treatment over four to five years repeat treatment	Given the nature of the project, could be used to remove biohazard plant and thereafter allow for chemical control against any regrowth. Requires specialist equipment to enable working alongside the biohazardous plant
	Strimming	Not recommended owing to spread of sap.	Not Recommended.
	Ploughing	Can provide total control where seedlings and young plants encroach onto agricultural land. However not practical in metropolitan areas and isolated stand along riverbanks.	Unlikely given the locations that Giant hogweed is often found in.
	Grazing	Grazing should begin when early foliage appears in April and should continue until early autumn when re-sprouting stops. Eradication can take between 5-10 years so that seed bank and root stock is fully depleted of resources.	Not possible in metropolitan area
	Pulling	Hand pulling is only suitable for small/immature plants (and with suitable PPE to protect exposure of bare skin). Potential remains for tap root to remain underground and regenerate.	Unlikely for mature plants. Requires specialist equipment to enable working alongside the biohazardous small/immature plants
	Biological Control	Other than natural soil biota, it is not currently permitted to introduce any organisms to areas to deal with Giant hogweed. Research ongoing which would requires permitting thereafter.	Not possible at present.
	Dig and dispose offsite, under licence	This option requires that all plant material (above and below ground) is excavated along with soil and disposed of to a facility authorized to accept it. Given the phytotoxic nature of the plant, it should not	Possible and depending on location may be required.

Approach	Treatment Options	Comment	Potential for Implementation on the Proposed Development
		be buried onsite nor disposed of with general C&D waste. In addition to waste permits / authorisations, a wildlife licence issued by NPWS is required for the transport of Third Schedule non-native invasive species offsite.	
Chemical	Spot Treatment	Used for isolated plants – knapsack or weep sprayers. Chemical treatments for infestations near water should be rated for use near aquatic locations.	Most widely used method, but to be wholly effective, requires total control over ~5 years of treatments within a river catchment or the isolated location. Is weather dependent and can result in chemical drift to adjacent vegetation or watercourses.
	Spray	More suitable for large stands, where machine-mounted blanket sprays are used. Chemical treatments for infestations near water should be rated for use near aquatic locations.	Possible but unlikely owing to nature and size of population recorded on scheme.
	Stem Injection	Can only be carried out on young stems. Due to difficulties with the timing of application and the potential safety risk of contact with the large leaves this method requires specialist safety equipment.	Possible and requires specialist equipment to enable working alongside the biohazardous plant – Despite some advantages over other conventional chemical treatments e.g., reduces drift, not weather dependent.

8.7.5.5 Temporary Storage of Collected Material

Given the phytotoxic nature of Giant hogweed, cut material should not be discarded. Ideally it should be disposed of immediately with similar non-native invasive species waste to a facility authorised to accept such waste.

However, given the nature and relative sizes of Giant hogweed infestations it may be suitable to collect cut biomass (where not disposed of immediately to a facility authorised to accept such waste), and to double bag it for transport to dedicated quarantine area (location to be approved as part of the ISMP to decompose before disposal with similar non-native invasive species waste in facility authorised to accept such waste.

The locations of areas for which Giant hogweed has been eradicated should be notified to the local authority, so that any future public health issue involving similar symptoms can be tracked.

8.7.5.6 Reseeding Following Eradication

This is not strictly a control method. However, where treated ground is not being built upon, planting or resowing mixtures of native grass species helps to restore the original vegetation and aids post control management of affected sites. A grass sward established in autumn will compete with germinating Giant hogweed seedlings in the following spring and retard its establishment.

8.7.5.7 *Himalayan balsam (Impatiens glandulifera)*

This high-risk invasive species is easily disturbed, particularly if in flower and readily becomes re-established along riparian corridors, which are annually subject to alluvial flooding. Unlike Japanese knotweed though, it does not reproduce asexually. Plants can produce in excess of 6000 seeds, and it aggressively colonises bare ground along riverbanks - including wet woodlands as well as waste ground where suitable conditions exist. Due to its rapid growth, it can outcompete most native species. While its seedbanks are viable for up to 18 months, the resupply of seed is often achieved through annual river flooding and riparian inundation with freshly deposited soil-laden alluvium.

Table 8.14 presents an assessment of potential treatment options available for the treatment of Himalayan balsam. The various methods are analysed and described in further detail as necessary. The ISMP is a live document. Arising from the outcome of the Preconstruction surveys noted at section 8.8.4.2.1, the appointed contractors specialist will, following detail the treatment options based on the potential options presented below. Control measures for Himalayan balsam should aim to prevent flowering and are therefore undertaken before June. However, eradication may take up to five years. It should be noted that successful localised management of Himalayan balsam is difficult along watercourses, as the spread of this non-native invasive species from upstream areas (e.g., outside of the Proposed Development) onto bare ground often occurs after winter flooding.

Table 8.14 Assessment of Management Methods for Himalayan balsam

Approach	Treatment Options	Comment	Potential for Implementation on the Proposed Development
Physical	Hand Pull	Small isolated and immature infestations, such as in gardens or roadsides can usually be readily pulled prior to flowering e.g., care must be taken not to leave lower plant sections as these can regrow rapidly. Additionally, any flower heads (if present) should be covered by a tied bag before pulling to ensure no seed drop.	Possible – ideal for smaller areas adjacent to the likely works boundary.
	Dig and dispose offsite, under licence	This option requires that all plant material (above and below ground) is excavated along with soil and disposed of to a facility authorised to accept it. In addition to waste permits / authorisations, a wildlife licence issued by NPWS is required for the transport of Third Schedule non-native invasive species offsite.	Possible – given the nature of the scheme, this may be an optimal control measure.
	Mechanical	Repeated cutting or mowing, is effective for larger stands, but plants can regrow if the lower parts (above lowest node) are left intact. Regeneration can be further halted by ensuring full ground vegetative layer through reseeding.	Possible but unlikely main option given the nature of works along existing road infrastructure.
	Grazing	Regular grazing is said to suppress the plant over time.	Not practical – given the nature of the metropolitan landscape and nature of the scheme.
Chemical	Spot/Weed Wiper	Can be used for smaller infestations in spring before flowering occurs, but as late as to allow germinating	Possible – within the works boundary – Where ground

Approach	Treatment Options	Comment	Potential for Implementation on the Proposed Development
		seedlings to have become established and thus be able to uptake the chemical treatment. adjacent to the likely works boundary – chemical treatments for infestations near water should be rated for use near aquatic locations.	is to be excavated, may require physical control also.
	Foliar Spray	Can be applied to larger infestations via knapsack spray / lance spray etc. in spring before flowering occurs, but as late as to allow germinating seedlings to have become established and thus be able to uptake the chemical treatment. Chemical treatments for infestations near water should be rated for use near aquatic locations.	Possible – within the works boundary – Where ground is to be excavated, may require physical control also.

8.7.5.8 Temporary Storage of Collected Material

Given the nature and relative extent of Himalayan balsam infestations in some urban situations, collected biomass (pulled stems / roots and bagged flower heads), where not disposed of immediately to a facility authorised to accept such waste, could be double bagged and put in dedicated quarantine areas (locations to be approved as part of the ISMP). Here, the material could be left to decompose before disposal with similar non-native invasive species waste at an authorised facility.

8.7.5.9 Reseeding Following Eradication

Areas devoid of, or cleared of, vegetative cover near watercourses should be resown with appropriate riparian ground cover species in summer months to ensure that bare banks do not provide favourable conditions for Himalayan balsam to become re-established and to protect banks from accelerated erosion.

For any area of ground that is cleared of this non-native invasive species, and which is not subsequently constructed upon, follow-on mechanical cutting regimes and / or chemical treatments may be required to ensure the seed bank is fully exhausted.

8.8 Appendix A8.8: Biodiversity Friendly Grassland Management

This management plan is provided for the area of habitat in north Malahide/south of Donabate, by the user worked level crossing XB001, as shown below on Figure 8.1. The management of this area as a wildlife refuge is the responsibility of Iarnród Éireann (IÉ) throughout ownership. IÉ will maintain the area as described below.

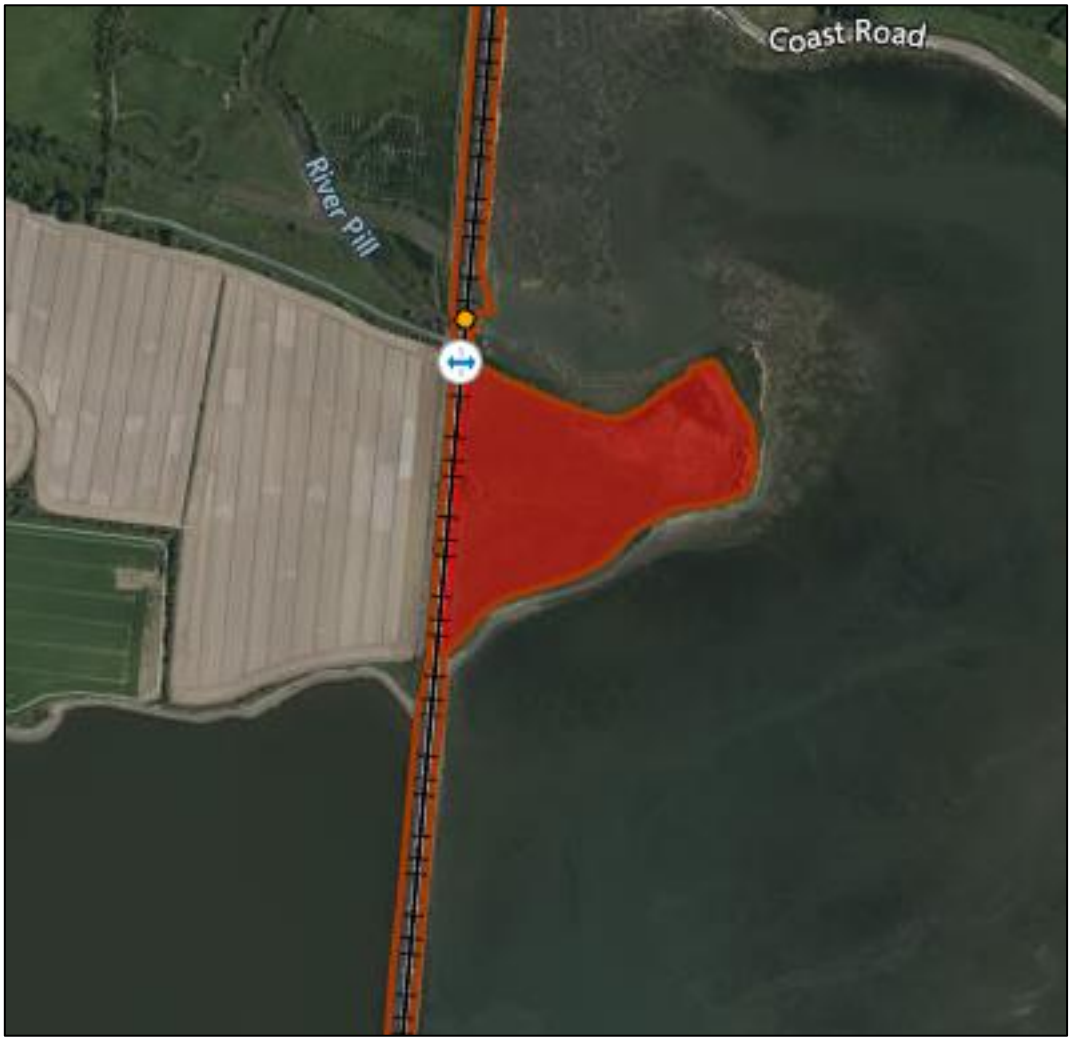

Figure 8.1 Wildlife Refuge Area north of Malahide (red area)

8.8.1 Changing the cutting regime to a low intensity management regime

In order to encourage what is already present in the seed bank, aim to take two cuttings a year, one in January/February, and then a second one in August/September (this applies to the dry meadows and grassy verges habitats at the site). Take care to remove most of the cuttings, as this helps to reduce nutrient build-up in the soil. Wild herbaceous forbs thrive in relatively nutrient poor soils, as they have less competition from fast-growing species, in particular nutrient-demanding rank grasses. Taking a cutting in January/February helps to reduce grass dominance, leaving space for herbaceous forbs to germinate, while taking a second cutting in late summer/autumn allows plants to set seed before they are cut.

If it is not possible to take so few cuttings per year, implementing this cutting regime on a section of the land should be considered, leaving some areas of longer grass for insects, and rotating where this section is located on a yearly basis. Implementing good management can sometimes be sufficient to increase floral diversity in a grassland, however, it may be necessary to introduce key species that are missing from local sources, if there is no seed source within the existing grassland (e.g. yellow rattle – see below). Some areas of dry meadows and grassy verges habitat within the site will need to be left alone throughout the seasons (including in winter) without any cutting as these long areas of grass are utilised by snipe and meadow pipit (during winter) within the site.

Plate 8.1 An example of alternating wild and mown semi-natural grassland

Table 8.15 Management Measures

Management Year	Guidance
Management guidance: Year 1	The first summer is often dominated by a flush of annual weeds and grasses. Regular cutting in Year 1 is essential to help suppress these and help perennial wildflowers to become established. Mowing will kill the annuals but not the perennials. Aim for 2 – 3 cuts in first 12 months to take the height down to around 5 – 7cm (first cut end of March if autumn sowing). If the site is fertile it might be necessary to cut more. Volume of material is usually low so can flail and leave cuttings. If there is a large amount of vegetation try to collect and remove if possible. You may not see many flowers in year one but should get a good show by year two. Manually pull for control of injurious weeds if they are a problem, or as a last resort apply herbicide to spot treat or weed wipe.
Management guidance: Year 2 onwards	An initial cut in spring (March/April) can help to reduce grass dominance. Allow wildflowers to grow up and set seed between April – mid July/end of August. Take a hay cut from the area – ideally turn and dry the hay over 3 – 5 days to allow the seed to shed.

Management Year	Guidance
	Collect or bale the cuttings and remove from the area – this will help to remove nutrients from the site to lower the fertility. It will also stop the cut vegetation smothering the wildflower seeds and preventing germination the following year.
	Yellow rattle *Rhinanthus minor* is an annual plant that is semi-parasitic on grass. It is a very useful plant to help control grass growth, and to increase the viability of other wild grassland plants. However, as it is an annual it needs to set seed (around July) to persist in a traditional seed mix. As regular cutting is recommended in year one of the project, yellow rattle would not be able to survive this regime. An option available would be to establish a diverse array of other wild plants using seed mixtures (or green-hay), and then to add yellow rattle to the field at the end of year 1 (late August onwards) and manage as described below. Sourcing from a local native, wild population is again highly desirable.  *Plate 8.2Yellow rattle flowers* The grass should be cut short (2 -3 cm) before sowing and scarified to create bare patches. Broadcast yellow rattle seed onto soil at a rate of 1 – 2g/m^2 (by hand). After sowing, continue cutting or grazing over winter/early spring to keep the grass short. At the beginning of March, aim for short grass (2 – 3 cm) ready for the yellow rattle seedlings to start pushing up. Do not cut the grass between early March and late July to allow the seed to set. Then manage as a normal meadow by cutting for hay and removing the cuttings.

8.9 Appendix A8.9: Habitat Relevé Results

8.9.1 Malahide North

- Environmental mapping datasets, both NPWS and Airo[55] show the occurrence of Atlantic saltmarsh (ASM) [1330] in the study area. However, it is dominated by extensive non-native Common Cordgrass *Spartina* swards, which is long established.
- Bulk of the marsh is dominated by extensive *Spartina* [1320] mudflats which is consolidating muds.

[55] https://airomaps.geohive.ie/ESM/

Only small, narrow and discontinuous bits of ASM along the interface with the southern side of the railway embankment, where it typically transitions into transitional non annex grassland (Non-annex CM2 habitat as per SMP baseline surveys for NPWS – McCorry and Ryle 2009)

- Inside the Common cordgrass *Spartina anglica* (A third schedule non-native invasive species) which occurs on shingly type substrate but is quickly dominated by estuarine muds, the development of a network of creeks was noted, but few pans (even in established saltmarsh where relevé was taken).
- The narrow ASM backline is dominated by Sea-purslane *Atriplex portulacoides* but has patches of *Puccinellia fasciculata* with lesser contributions from Sea plantain Plantago maritima and Sea arrowgrass *Triglochin maritima*. Minor amounts of Spurrey *Spergularia* spp. noted but it was not common. Sea beet *Beta vulgaris* subsp *maritima* and Common couch *Elytrigia repens* transition in and up onto the embankment, while occasional patches of sea beet of pebble-rich substrate along frontline towards the culverted river under railway bridge noted. Also, a small increase in extent of ASM at bend towards flowing river water.
- On southern side of the flowing drain, there is a band of mid marsh occurring behind the narrowing *Spartina*. *Puccinellia* not as prevalent, and habitat is dominated by *Plantago maritima* and Rock sea lavender *Limonium binervosum*. 1 relevé (vegetation recording quadrat) was taken here. This habitat extended eastwards towards tip but did not follow it as beyond likely impact of works.
- Crossing over the ungrazed neutral triangular grassland field in direction of Malahide marina., where on opposite side, the substrate under the frontline vegetation is not mud but shingle/pebble. Common Saltmarsh Grass *Puccinellia maritima* and Annual sea-blite *Suaeda maritima* dominate but heading westwards towards the embankment, more ASM develops on the low terrace. Behind all of this is perennial vegetation of stony banks [1220] with *Beta vulgaris* subsp *maritima* dominating but with some Sea mayweed *Tripleurospermum maritimum* about. Minor contributions from Danish scurvygrass *Cochlearia danica* about
- No Saltmarsh vegetation alongside the embankment southwards into the estuary.
- Relevé A 22/06/2022
- 2 X 2 m quadrat
- 100% vegetation cover
- Vegetation height 5cm to 20cm
- Grid reference 722673.97 648449.59
- *Armeria maritima* 15%
- *Plantago maritima* 75%
- *Limonium binervosum* 5%
- *Puccinellia maritima* 5%
- *Triglochin maritimum* <1% (+)[56]
- *Spergularia rupicola* 1%
- *Centaurium erythraea* <1% (r)

[56] In terms of plant coverage, "+" = any number of plants, less the 1% groundcover. "r" represents less than 1% groundcover and only 1 plant present in the relevé.