

PROPOSED ENNISCORTHY FLOOD DEFENCE SCHEME

BIRD BASELINE SURVEYS

REPORT PREPARED FOR SCOTT CAWLEY

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1. DESCRIPTION AND CONTEXT OF THE STUDY AREA

The approximate extent of works associated with the proposed Enniscorthy flood defence scheme is shown in blue in Figure 1. The Slaney River corridor is relatively narrow in the vicinity of Enniscorthy, being constrained by higher ground including steep wooded slopes with outcropping rock. River floodplains to the north and the south of Enniscorthy are approximately 220m wide, at their widest points.

Agricultural land along the river corridor includes pasture and arable land. Field boundaries include mature treelines. There are a number of relatively small woodland plantations on the sloping sides of the river valley.



Figure 1. Approximate extent of the proposed Enniscorthy Flood Defence Scheme (blue line), and place names used in this report.

The northernmost extent of Wexford Harbour and Slobs SPA is also indicated.

The Slaney River shows tidal fluctuation in water levels through Enniscorthy. Tidal range is in the order of 1.5m during spring tides, and 0.5m on neap tides, measured at the gauging station downstream of Seamus Rafter Bridge (Figure 2). The Upper Slaney Estuary transitional water body (IE_SE_040_0300) extends to Enniscorthy Bridge (Old Bridge). This tidal influence affects birds in two ways:

1. Water levels fluctuate with the tidal cycle in watercourses, drainage channels and ditches connected to the Slaney, and support wetland habitats on the southern floodplain in particular, irrespective of rainfall and river flooding. The wetland habitats within the southern floodplain (Bare Meadow, Kilagoley, and Motabeg) did not completely dry out during the course of the bird studies commenced in February 2016 and continuing to May 2017.
2. Gravel and silty areas within the Slaney channel and its banks become exposed at low tide, particularly during spring tides, and are accessible by birds for feeding, preening, and resting.

Vegetation and habitats, including habitats listed in Annex 1 of the Habitats Directive (92/43/EU) are described in other baseline ecological reports prepared for the proposed Enniscorthy Flood Defence Scheme. Habitat features relevant to birds are shown in Figure 3.

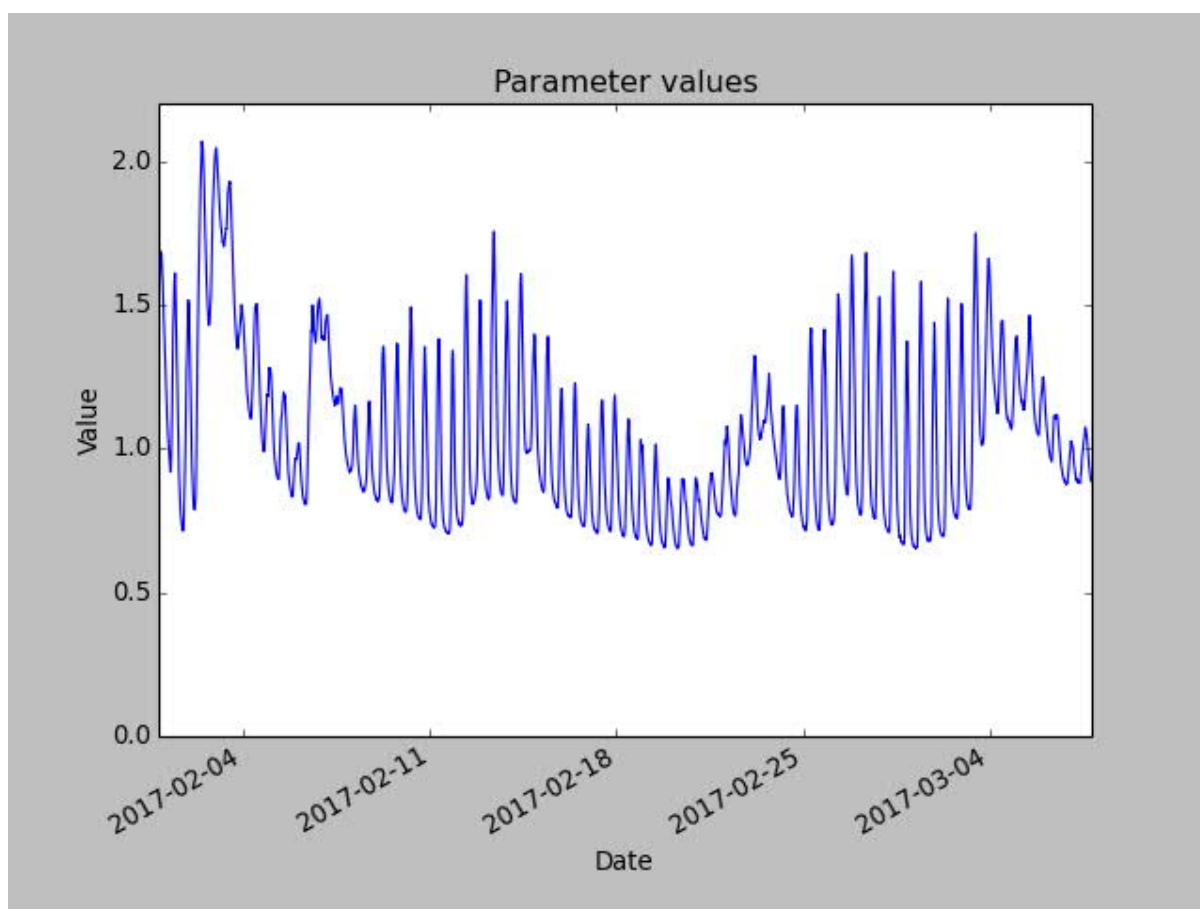
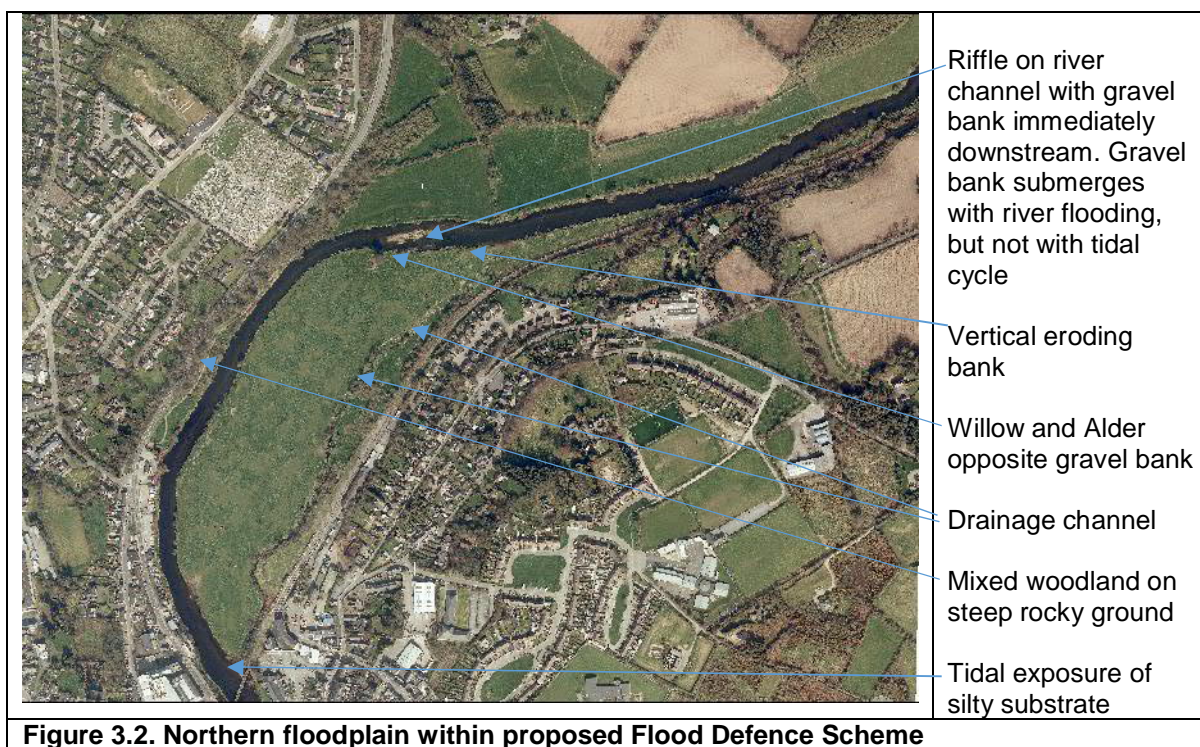
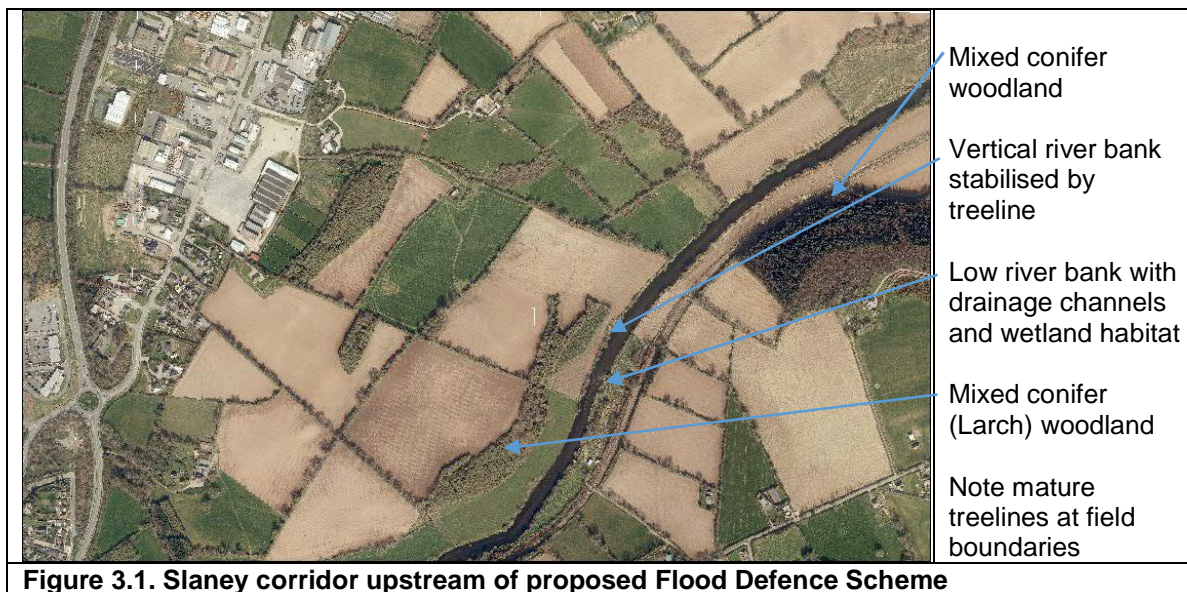
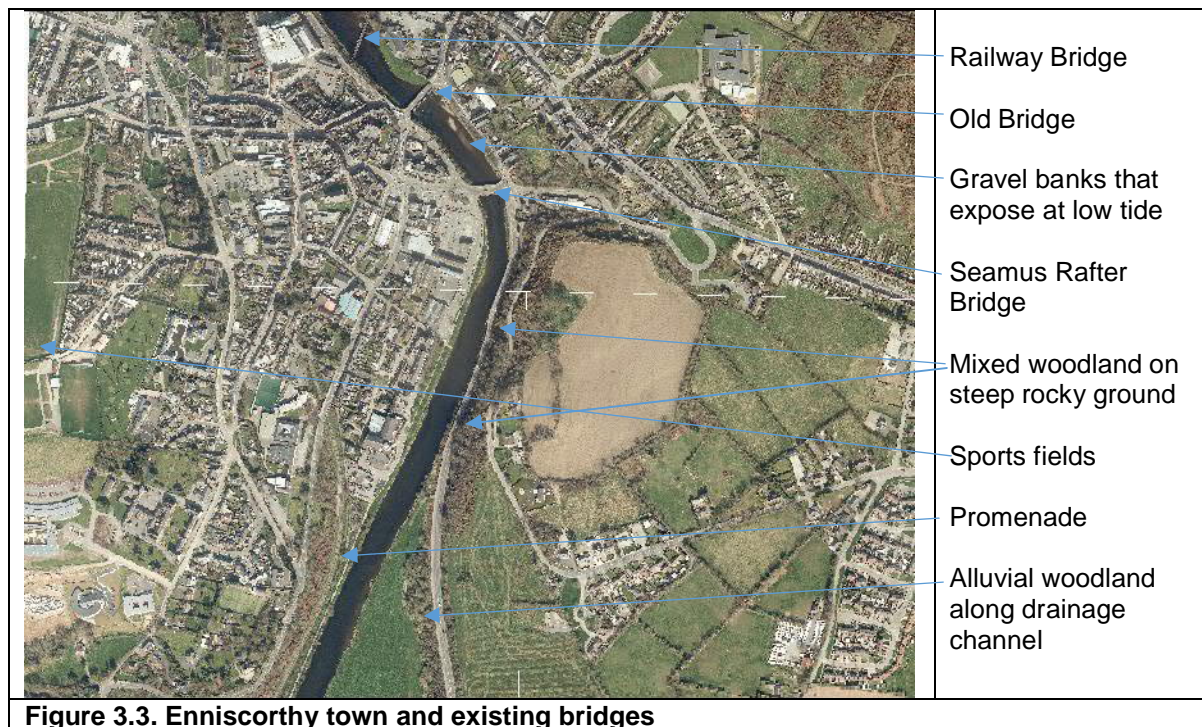


Figure 2. Water level readings for 12008 Rafter Bridge D/S for the period 31st January to 7th March 2017. OPW data reproduced from www.waterlevel.ie.





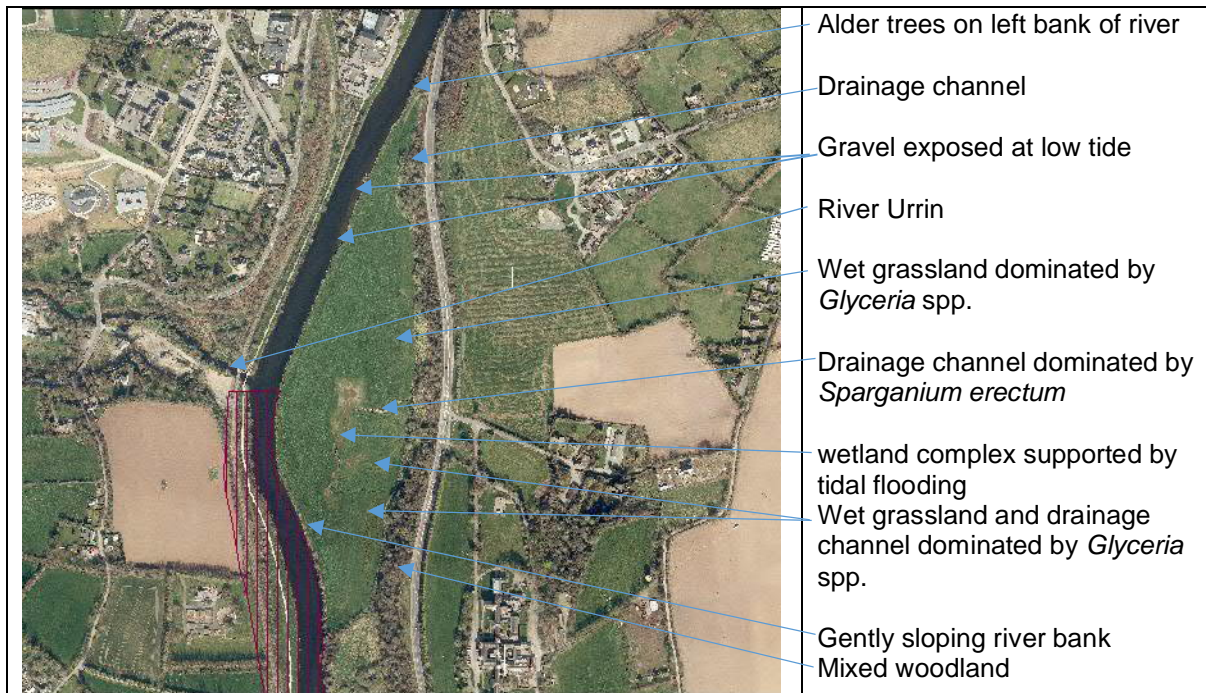


Figure 3.4. Southern floodplain Killagoley – the Bare Meadow



Figure 3.5. Southern floodplain Motabeg

Figure 3. Habitat features relevant to birds.

The northern floodplain (Figure 3.2) was ungrazed during 2016 and 2017. This floodplain is relatively dry and is grass dominated. The left (facing downstream) river bank has scattered cover of Alder and Willow scrub, interspersed with vertical and near vertical eroding banks, with slumping evident in many areas. Herbaceous vegetation developed on slumped bank material along the base of the left bank during the summer of 2016, and included the invasive plant species Himalayan balsam. A drainage channel to the east of the northern floodplain supports dense emergent aquatic vegetation near its

northern end, its southern portion is overgrown with willow, and the muddy substrate exposes at low tide. The right bank opposite the northern floodplain includes pasture land subject to fluvial flooding, with scattered Alder and Willow along the river bank. A public walkway to the south runs through a wooded area with outcropping rock, and to the south of this the river bank is dominated by the invasive plant species Japanese knotweed.

Within the town, the river is confined by masonry quay walls. A gravel bank exposes at low tide between Old Bridge and Seamus Rafter Bridge (Figure 3.3).

The Bare Meadow (Killagoley southern floodplain, Figure 3.4) was grazed by horses from early summer to late autumn, with highest numbers of horses present during the summer. There is a natural levee along the left (facing downstream) river bank, which is higher than the wetland area in the floodplain to the east. There is a narrow strip of Reed canary grass *Phalaris arundinacea* along the river bank at the base of the levee, this submerges at high tide. The levee terminates with a short gently sloping section of river bank that is used by swans to walk from the river to the floodplain. The wetland area within the Killagoley southern floodplain is subject to tidal flooding via drainage ditches, and surface water persisted throughout the bird studies, although the extent of surface water ponds has varied; this habitat has been classified as corresponding to a mosaic of Tall-herb Swamps (FS2) with Mesotrophic lakes (FL4), with some affinities to the Annex 1 listed habitat 3270, as described in [Ref.xxx](#). Walk over surveys during July 2016 indicate that water reaches the floodplain during spring tides, even when Slaney River flows are low (Figure 4).



Figure 4. Views of central wetland area in the Bare Meadow Killagoley southern floodplain during spring tides on 20 July 2016.

Wet grassland dominated by *Glyceria* spp. lies to the east and south of the permanent water channels. Islands form in the wetland as water levels vary (e.g. arrowed areas in Figure 4, and see Figure 5). The vegetation in the permanent water channels includes *Sparganium erectum* and *Phalaris arundinacea*, and provides feeding, roosting and breeding habitat for waterbirds and riparian bird species. Flora and habitats are described in other baseline reports. The permanent water approximates to the 0.9m Lidar survey area shown in Figure 5.

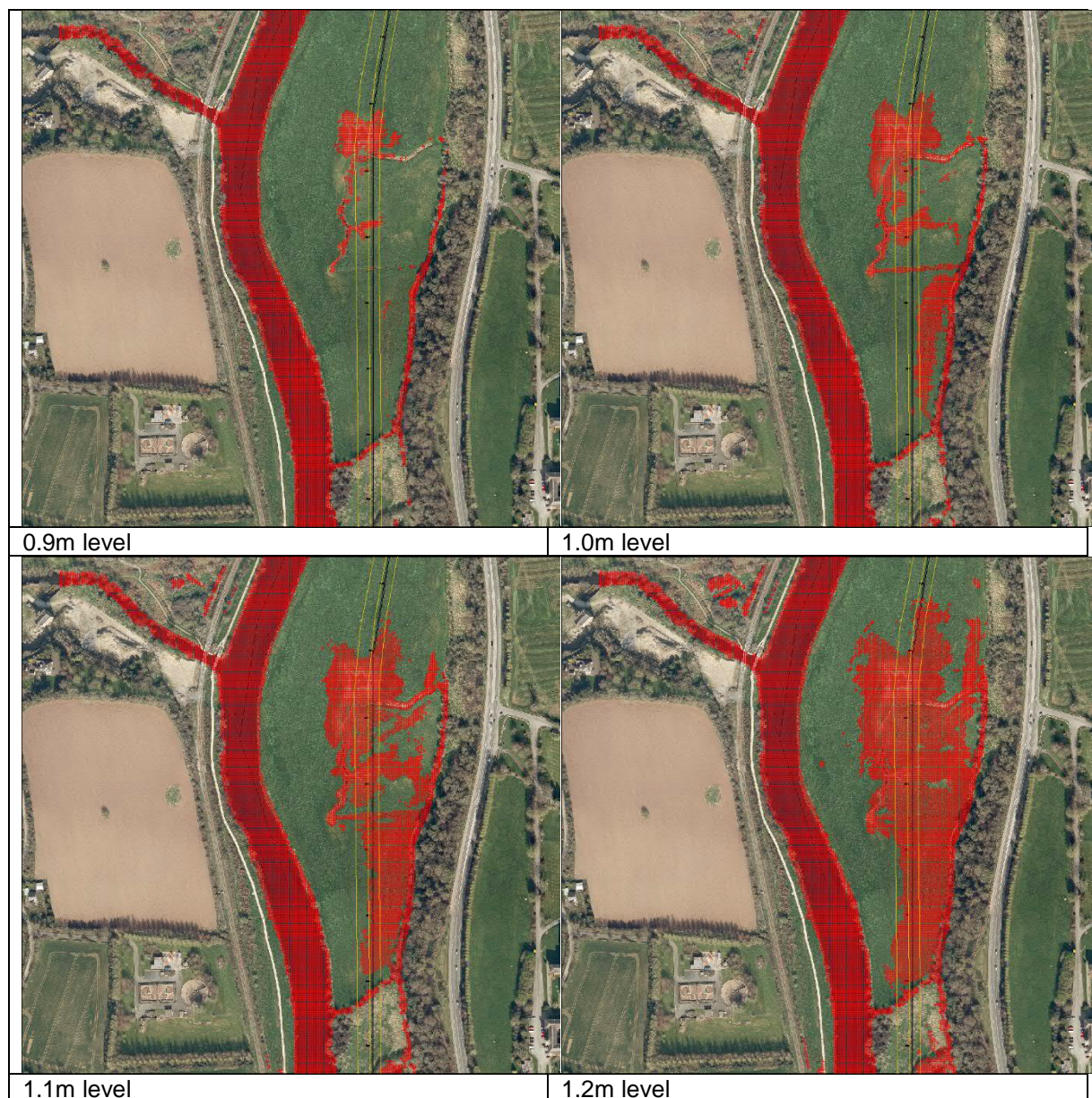


Figure 5. Lidar survey levels on Killagoley southern floodplain, showing data points at and below the following elevation points: 0.9m, 1.0m, 1.1m, and 1.2m. The flood diversion channel originally proposed as part of the Flood Defence Scheme is also shown.

Wet woodland lies between the Killagoley and Motabeg (Figure 3.5.). A small island on the eastern side of the Slaney River is separated from the wet woodland by a muddy channel, which begins to expose at around mid-tide level (Plate 1.1). Flood debris caught in Grey Willow trees in the wet woodland indicate that fluvial flood levels during the winter of 2015/16 reached more than 2m above ground level.



Plate 1.1. Muddy tidal channel between island and wet woodland on left river bank



Plate 1.2. Tidal flooding on the southern floodplain at Motabeg

The Motabeg southern floodplain was grazed by cattle in spring and summer of 2016. There is a constructed levee along the Slaney River bank in this area. The floodplain at Motabeg floods tidally via a drainage channel along the eastern side of the floodplain that is connected to the Slaney at the southern end (Plate 1.2).

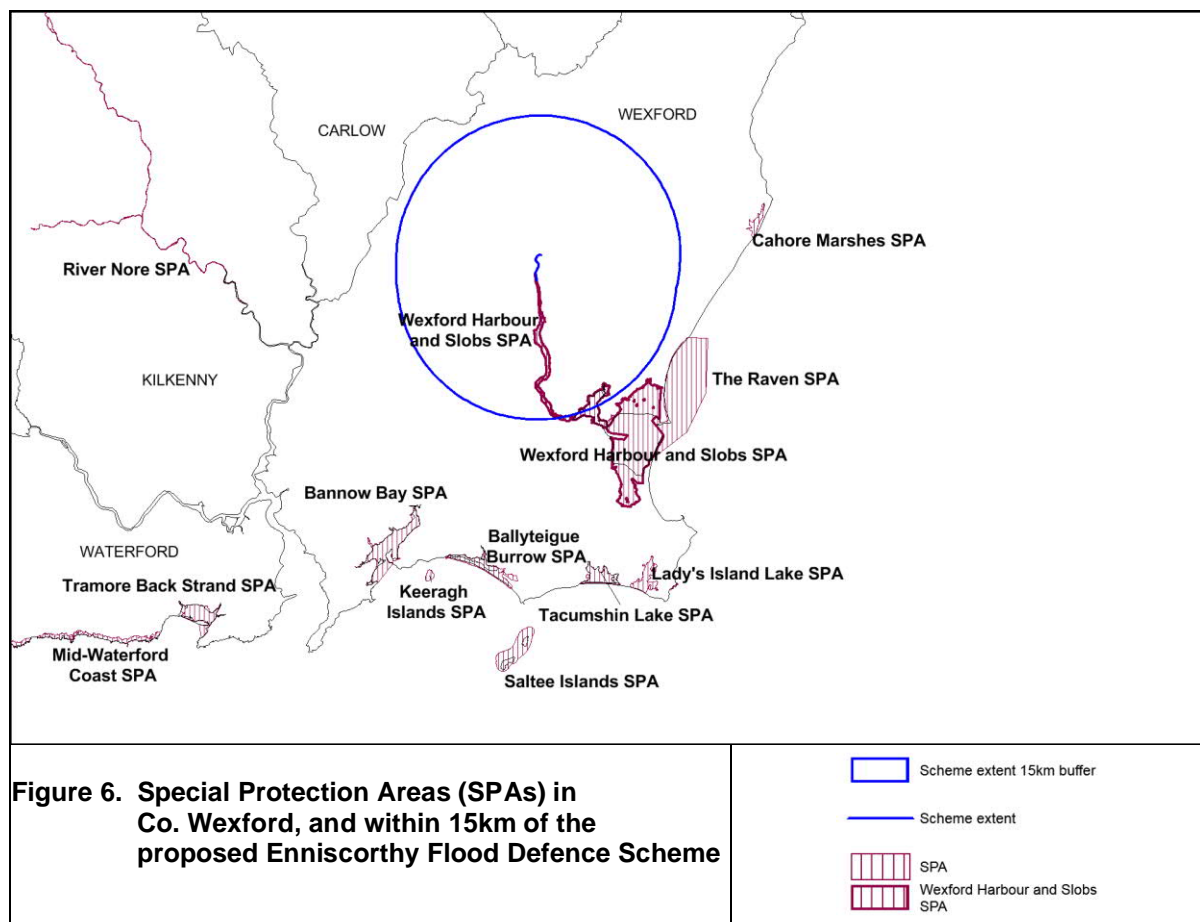
1.1. Special Protection Area designations under the Birds Directive 79/409 and 2009/147/EU

Special Protection Areas (SPAs) within 15km of the proposed Enniscorthy Flood Protection Scheme are shown in Figure 6. Wexford Harbour and Slobbs SPA (Site Code 4076) extends from Wexford Harbour through the River Slaney Estuary as far as the River Urrin inflow to the Slaney (see Figure 3.4), thus the proposed Enniscorthy Flood Protection Scheme lies partly within this SPA. The designated site is complex and encompasses the natural estuarine and coastal habitats of Wexford Harbour, the polderland known as the North and South Slobbs, and the tidal section of the River Slaney as far north as Enniscorthy. This SPA was designated by S.I. No. 194 of 2012 (European Communities (Conservation of Wild Birds (Wexford Harbour and Slobbs Special Protection Area 004076)) Regulations 2012.

The site synopsis for Wexford Harbour and Slobbs SPA is reproduced in Appendix 1. This SPA is of special conservation interest for the following species: Little Grebe, Great Crested Grebe, Cormorant, Grey Heron, Bewick's Swan, Whooper Swan, Greenland White-fronted Goose, Light-bellied Brent Goose, Shelduck, Wigeon, Teal, Mallard, Pintail, Scaup, Goldeneye, Red-breasted Merganser, Hen Harrier, Coot, Oystercatcher, Golden Plover, Grey Plover, Lapwing, Knot, Sanderling, Dunlin, Black-tailed Godwit, Bar-tailed Godwit, Curlew, Redshank, Black-headed Gull, Lesser Black-backed Gull and Little Tern. The site is also of special conservation interest for holding an assemblage of over 20,000 wintering waterbirds. Count data are given in Table 1, reproduced from NPWS 2011. It should be noted that counts at River Slaney and Wexford Bay are not coordinated with those at Wexford Harbour & Slobbs, so the resulting datasets cannot be added together to form one site complex.

Wexford Harbour and Slobbs is one of the top three sites in Ireland for numbers and diversity of wintering birds. The combination of estuarine habitats, including shallow waters for grebes, diving duck and

seaduck, and the farmland of the polders, which include freshwater drainage channels and associated reedswamp habitats, provides optimum feeding and roost areas for a wide range of species. The wetland habitats contained within Wexford Harbour and Slobs SPA are identified to be of conservation importance for breeding and non-breeding (wintering) migratory waterbirds; the wetland habitats are thus considered to be an additional Special Conservation Interest (NPWS, 2011).



Wexford Harbour and Slobs is the single most important site globally for Greenland White-fronted Geese *Anser albifrons flavirostris*. The total population, as indicated by the spring population census, has declined in every year since 2011, and the Wexford spring census total has also declined in every year from 2011 to 2016, with a census counts of 6,421 in the spring of 2016, with the first increase for a number of years to 7,047 in the spring of 2017 (Fox et al, 2016 and 2017).

Wexford Harbour and Slobs SPA currently supports internationally important numbers of five wintering waterbird species: Greenland White-fronted Geese, Whooper Swan, Light-bellied Brent Goose, Golden Plover, and Black-tailed Godwit (NPWS 2011).

There are at least a further 25 species of wintering waterbirds which occur in numbers of national importance in Wexford Harbour and Slobs: Little Grebe, Great Crested Grebe, Cormorant, Little Egret, Grey Heron, Mute Swan, Bewick's Swan, Shelduck, Wigeon, Teal, Mallard, Pintail, Goldeneye, Red-breasted Merganser, Coot, Oystercatcher, Grey Plover, Lapwing, Sanderling, Dunlin, Bar-tailed Godwit, Curlew, Redshank, Black-headed Gull and Lesser Black-backed Gull (NPWS 2011, Tables 4.1 and 5.1).

Waterbirds, defined as “birds that are ecologically dependent on wetlands” (Ramsar Convention, 1971), are a diverse group that includes divers, grebes, swans, geese and ducks, gulls, terns and wading birds. The I-WeBS database shows a total of 91 waterbird species that have been recorded at Wexford Harbour & Slobs (I-WeBS count area) during the period 1994/95 – 2008/09. 45 waterbird species are

present in the I-WeBS dataset for the Lower River Slaney. These totals include species that occur infrequently.

In the period 1994/95 to 2008/09, Wexford Harbour & Slobs supported 56 waterbird species on a regular basis during the non-breeding season. The Lower River Slaney supported 21 waterbird species on a regular basis during the non-breeding season (NPWS, 2011).

Wintering waterbird species listed as Special Conservation Interests in the Wexford Harbour and Slobs Site Synopsis (2014)	Baseline Data for SPA ¹	Wexford Harbour and Slobs ²	River Slaney ³	Wexford Harbour and Slobs ⁴
	1995/96 to 1999/00	2004/05 to 2008/09	2007/08	2009/10
Little Grebe	82	43		45
Great Crested Grebe	117	63		137
Cormorant	495	320	61	626
Grey Heron	52	13		57
Bewick's Swan	191	47		65
Whooper Swan	100	450		512
Greenland White-fronted Goose	9,111	8,703		7,974
Light-bellied Brent Goose	1,469	2,555		2,648
Shelduck	753	489		768
Wigeon	2,752	4,067		6,421
Teal	1,538	1,153	727	552
Mallard	3,290	1,255		1,957
Pintail	66	113		258
Scaup	339	37		4
Goldeneye	182	69		50
Red-breasted Merganser	209	95		314
Coot	351	40		20
Oystercatcher	1,493	487		1,171
Golden Plover	5,013	10,915		12,466
Grey Plover	1,279	106		246
Lapwing	11,826	6,684	800	4,113
Knot	453	21		25
Sanderling	210	16		130
Dunlin	2,485	709		2,607
Black-tailed Godwit	790	1,379	25	1,849
Bar-tailed Godwit	1,696	967		984
Curlew	1,771	800	66	1,593
Redshank	555	298		1,016
Black-headed Gull	5,977	524	1,872	4,086
Lesser Black-backed Gull	1,086	13	37	325

Table 1. Wintering waterbird data for the Wexford Harbour and Slobs SPA.

Data reproduced from NPWS 2011

Notes: Internationally important number are bold faced, nationally important numbers are in italics.

1. Baseline data period is 1995/96 – 1999/00 (five-year means) and comprises the combined data for the Wexford Harbour & Slobs and Slaney River I-WeBS count units. The only exception is for Greenland White-fronted Goose which is based on the data period 1994/95 - 1998/99 with data from species-specific surveys undertaken by NPWS
2. Four-year means for the period 2004/05 to 2008/09; with the exception of Greenland White-fronted Goose which is based on the period 2005/06 to 2009/10.
3. Recent data are the peak count for the count season 2007/08
4. Peak number recorded in high and low tide counts, taken from Tables 5.4 and 5.5 in NPWS 2011.

	Baseline Data Period (5-Yr Average 1995/96 – 1999/00)	Recent Site Average (Peak count 2007/08)
Mute Swan (<i>Cygnus olor</i>)	300 (n)	93
Tufted Duck (<i>Aythya fuligula</i>)	160	-
Moorhen (<i>Gallinula chloropus</i>)	8	1
Greenshank (<i>Tringa nebularia</i>)	5	2
Common Gull (<i>Larus canus</i>)	92	153
Herring Gull (<i>Larus argentatus</i>)	224	10
Great Black-backed Gull (<i>Larus marinus</i>)	107	19

Table 2. Selected non-Special Conservation Interest (SCI) waterbird species that occur within the Lower River Slaney during the non-breeding season.

Data reproduced from NPWS 2011, Table 5.1(b). (n) denotes nationally important number

The River Slaney section of Wexford Harbour and Slobbs SPA is counted infrequently from a boat. The I-WeBS River Slaney site is divided into 3 subsites:

- Ferrycarrig Bridge to Killurin (Deep’s) Bridge
- Killurin (Deep’s) Bridge to Edermine Bridge
- Edermine Bridge to Enniscorthy (the upstream limit of this subsite is the River Urrin inflow to the Slaney).

The estuary of the Slaney upstream of Ferrycarrig is over 500m wide in sections of both the Ferrycarrig Bridge to Killurin (Deep’s) Bridge, and the Killurin (Deep’s) Bridge to Edermine Bridge subsites, and includes extensive reedswamp habitats as well as intertidal mudflats.

The Edermine Bridge to Enniscorthy subsite includes narrow fringing reedswamp dominated by Common Reed *Phragmites australis* immediately upstream of Edermine Bridge, intertidal mudflats are narrow. I-WeBS data are available for 2007/08 and 2012/13 for this subsite, data for 2016/17 have been provided by NPWS. It is thought that waterbirds present on the southern floodplain may not always feature in the I-WeBS count data, since observers do not leave the boat, and waterbirds may not be disturbed and rise from the floodplain because the boat travels very slowly in this area (Alyn Walsh, NPWS pers. comm.). I-WeBS data for all three River Slaney subsites are given in Table 3.



Edermine Bridge at high water



Enniscorthy southern floodplain (Killagoley)

Plate 2. Edermine Bridge, and Enniscorthy southern floodplain (Bare Meadow Killagoley), on 11.02.2016.

PROPOSED ENNISCORTHY FLOOD DEFENCE SCHEME

	1% Nat. ¹	1% Int. ²	FB-KB 2007/08	KB-EB 2007/08	EB-RU 2007/08	FB-KB 2009/10	KB-EB 2009/10	FB-KB 2012/13	KB-EB 2012/13	EB-RU 2012/13	FB-KB 2013/14	FB-KB 2016/17	KB-EB 2016/17	EB-RU 2016/17
Little Grebe	20	4,000	5	2	1				1		2		2	1
Cormorant	120	1,200	31	26	4		6	15	31	11	56	25	19	16
Little Egret	20	1,300	3	12	3	4	4	1	9	4	20	3	19	2
Grey Heron	25	2,700	8	3		6	10	1	6	4	14	5	6	2
Mute Swan	90			93		4	96		81	1	90	2	41	4
Unidentified <i>Anser</i> Sp.											2			
Shelduck	120	3,000				4	1							
Wigeon	630	15,000		30				30	80				10	
Teal	340	5,000	560	164	3			516	295	51	262	235	858	33
Mallard	290	20,000	129	74		9	46	121	148	20	98	6	140	29
Water Rail				2										
Moorhen		20,000			1	1								
Lapwing	1,100	20,000	20	420	360			295	400		170			
Snipe		20,000						8	2	1		56	9	22
Black-tailed Godwit	190	610	25			376	4				20			
Whimbrel		6,700				3								
Curlew	350	8,400	66			15		3	70		60	18	38	
Spotted Redshank		900	2											
Greenshank	20	2,300	2											
Redshank	300	3,900	5	30				2	9		31		2	
Black-headed Gull		20,000	1,398	432	42	5	7	113		4	291	94	889	107
Common Gull		16,400	95	58					62				28	
Lesser Black-backed Gull		5,500	20	14	3						8			4
Herring Gull		10,200	4	5	1	1	4							
Great Black-backed Gull		4,200	4	15			90		22					
Sandwich Tern						2								
Kingfisher								1						

Table 3. I-WeBS count data for the River Slaney subsites FB-KB (Ferrycarrig Bridge – Killurin (Deep’s) Bridge), KB-EB (Killurin (Deep’s) Bridge – Edermine Bridge), and EB – RU (Edermine Bridge – River Urrin (Enniscorthy)).

Counts dates were as follows: 2007/08, 28.01.2008, all three subsites; 2009/10, 12.05.2010, FB-KB and KB-EB only; 2012/13, 24.01.2013, all three subsites; 2013/14, 23.10.2014, FB-KB only; 2016/17, 19.01.2017 all three subsites.

¹ Threshold level for national importance (1% of all-Ireland population of each species or sub-species/flyway)

² Threshold level for International importance (1% of total population of each species or sub-species/flyway)

Table 3 includes data for 27 species, one of which was an unidentified *Anser* goose. Three other species, Sandwich Tern, Shelduck and Whimbrel, were recorded during a survey in May 2010 only. Three of the 23 species recorded during winter surveys on the Lower River Slaney occur in nationally important numbers: Little Egret, Mute Swan, and Teal. Teal are listed as a Special Conservation Interest in the Wexford Harbour and Slobbs SPA and have been recorded in nationally important numbers in all years in which all three sub-sites have been counted during the winter. Mute Swan numbers fell below the threshold for national importance in 2016/17. Little Egret numbers exceeded the threshold for national importance along the River Slaney in 2016/17 for the first time; the range of this species has expanded northwards in recent decades and a wintering population became established in Ireland in the early 1990s. The first breeding record in Ireland was in 1997 (Smiddy and O’Sullivan, 1998).

2. SURVEY TEAM AND METHODOLOGY

2.1. Survey team

Bird surveys were carried out by Eleanor Mayes and Brian Porter. Eleanor Mayes is responsible for data analysis and the preparation of this report.

Eleanor graduated with a B.A. (Mod) in Natural Science (Zoology) in 1978, and has been employed as a professional biologist / ecologist since 1979, completing an M.Sc. in Zoology in 1983. Her ornithological research work includes studies contributing to the conservation management of two Annex 1 listed birds: research on the diet, feeding ecology and energetics of Greenland White-fronted geese in semi-natural and intensive farmland habitats in Ireland (1983-86), and she contributed census co-ordination, census and habitat survey to the investigation of the role of habitat change in the decline of the Corncrake population in Ireland and Britain (1988). She has carried out policy work including analysis of the implementation of the EU Birds Directive in Ireland, and developed of guidance for Habitats Directive and Water Framework Directive cross-compliance in 2008. She has worked as an independent ecological consultant since 1991, working with a range of clients and inter-disciplinary professional teams on a wide range of projects including flood alleviation schemes, recreational infrastructure including inland marinas and waterway restoration developments, waste water and potable water infrastructure, submarine and intertidal cable routes, overhead high voltage power lines, wind farm development proposals, and power stations, preparing material for publication in scientific literature, in report form, preparing and contributing to Article 6 Screening for Appropriate Assessment, Natura Impact Statement, Environmental Impact Statement, Environmental Report, and Ecological Impact Reports. Survey work completed includes ornithological survey (wintering waterbird and breeding bird surveys including breeding waders, vantage point surveys across a range of upland, lowland and wetland habitats), development of GIS databases for use in presentation and analysis of results, and pre-construction, construction phase, and post-construction and operational phase ecological and bird monitoring of approved developments.

Brian is an experienced ornithologist and has been carrying out bird surveys professionally and as a volunteer since 2001, and completed a Diploma in Field Ecology with Distinction in UCC in 2005. He has carried out Hen Harrier surveys largely using SNH methodology for wind farm developments, for Coillte and NPWS, and carried out Radio tracking for the Red Kite re-introduction programme in North Dublin, Merlin & Barn Owl Surveys, and is a Member of Irish Raptor Study Group. He has carried out Offshore Seabird Surveys, Countryside Bird Surveys, Brown & Sheppard Surveys, modified Brown & Sheppard Surveys, Winter Bird Monitoring on Intertidal Estuaries and Coasts, and used Waterbirds Surveys within Irish Coastal Special Protection Areas survey methods, Winter Dawn & Dusk fixed Vantage Point Survey, Breeding Wader Surveys, Swan & Goose Flight Line Surveys and small aircraft flyover swan survey. He carried out a Pre Winter Atlas methodology test project in County Wicklow for BWI & BTO, and has worked within a wide range of upland, lowland, inland and coastal wetland habitats. He works with a number of consultancies, and has worked with Eleanor on a number of projects since 2001.

2.2. Methodology

Following a review of existing documentation and aerial photography of the Enniscorthy area, field surveys commenced on 11th February 2016 with an initial site familiarisation and scoping survey to review the habitats present, the types of bird survey likely to be appropriate, and to establish survey methodologies and vantage points. A dawn watch at Edermine Bridge was carried out, starting shortly before sunrise, to assess and record waterbird movements. Water levels were high in the River Slaney, and tidal fluctuation was noted. The presence of wetland habitats and wintering waterbirds in Bare Meadow on the southern floodplain was noted, and the promenade footbridge over the Urrin River on the right (facing downstream) bank of the Slaney was noted as providing a good vantage point for surveys of the Killagoley southern floodplain, using a telescope and binoculars. The promenade was also walked to assess bird use of the river channel and banks within the proposed Flood Defence Scheme area. The Bare Meadow Killagoley floodplain was counted during every site visit from February 2016 to March 2017 (Figure 7, count dates listed in Table 4). The southern floodplain at Motabeg can not be viewed from the right bank of the Slaney, or from the adjoining N11, and was accessed from the southern end for survey, this area was counted in each month.

Waterbird surveys of the key wetland habitat on the Bare Meadow on the southern floodplain, and the adjoining Slaney River channel, were carried during all site visits from February 2016 to March 2017 inclusive (Table 4). Waterbird responses to disturbance were recorded when possible, and are reported in Appendix 6.

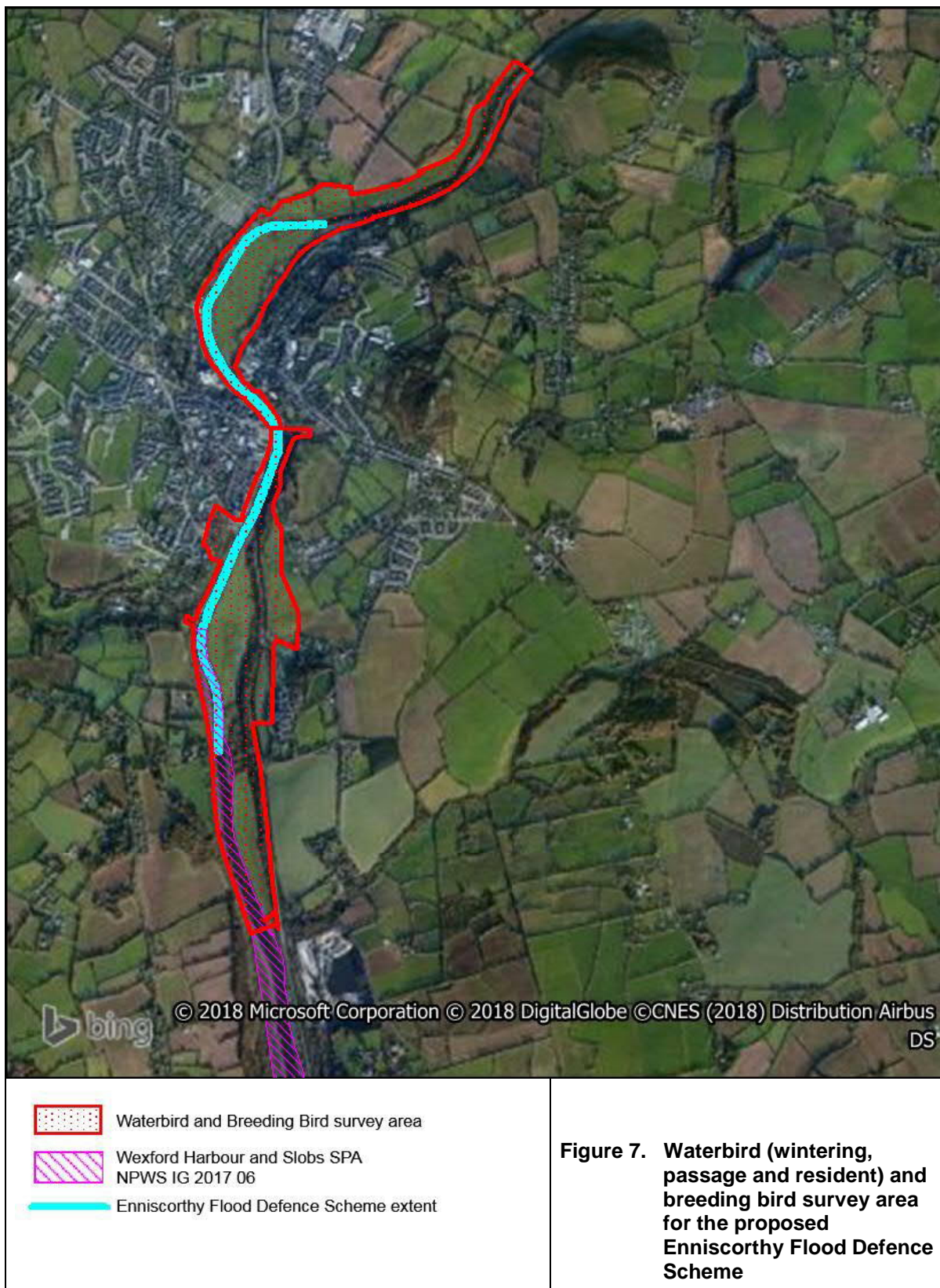
Month	Waterbird count date
February 2016	11, 18, 24
March 2016	3, 10, 22
April 2016	13, 29
May 2016	19, 30
June 2016	17, 27
July 2016	6, 12, 20, 29
August 2016	24, 30
September 2016	19, 29
October 2016	17, 27
November 2016	28
December 2016	13, 15
January 2017	17, 24
February 2017	21
March 2017	16

Table 4. Bare Meadow (southern floodplain, Killagoley) and adjoining River Slaney waterbird count dates

Access to the northern floodplain was subject to prior arrangement with Irish Rail, and this was arranged for walk-over bird surveys in March, April, May and June 2016. This area is overlooked from the right bank of the Slaney, and together with the river channel and banks was surveyed by walk-over survey along the right bank during all other months of the survey programme from February 2016 to March 2017 inclusive (Figure 7).

The overall area included in baseline bird surveys included the River Slaney corridor 1.5 km upstream of the proposed Enniscorthy Flood Defence Scheme (FDS), and the Flood Defence Scheme area including the footprint of the proposed new bridge over the Slaney and the associated roads (Figure 7). Downstream of the proposed Enniscorthy Flood Defence Scheme, dawn watches were carried out of three occasions at Edermine Bridge, with simultaneous watches in Enniscorthy carried out twice, on 24th February and 23rd March 2016 so that waterbird numbers passing both points could be compared.

Downstream of Edermine Bridge, there are relatively few vantage points over the River Slaney estuary. The river corridor downstream of Ballyhoge was checked on 3 occasions, in order to provide some ecological context for the observations recorded in the vicinity of Enniscorthy. The only additional waterbird species recorded in the Slaney Estuary in the Ballyhoge area was Curlew; this species has not been recorded within the Enniscorthy FDS area. Low tide roosts of Gulls were recorded on sand and mudflats exposed at low water in the estuary near Ballyhoge.



Specific additional bird surveys carried out at Enniscorthy were as follows.

2.3. Winter walkover survey

Winter walkover survey of the northern and southern floodplains using modified Brown and Sheppard 1993. This survey was carried out by two observers walking transects 100m apart, and recording all birds observed and heard on maps and/or GIS (Mobile Mapper). The southern floodplain was surveyed on 22nd March 2016 from 13.08 to 17.30, and the northern floodplain on 23rd March 2016 from 11.00 to 12.50. Additional surveys were carried out from a combination of vantage points and river bank walk-over survey by single observers as noted above.

2.4. Countryside bird survey and breeding wader survey

Countryside bird survey (CBS) and breeding wader survey following Bibby, C.J, *et al.* (2000) Bird Census Techniques second edition. Three surveys were carried out, one in each month April, May and June (Table 4). Three visits are required by wader survey methodology to facilitate assessment of breeding success and second/late breeding attempts (e.g. Snipe). These surveys were carried out by two observers walking transects 100m apart within the southern floodplain, and recording all birds observed and heard on maps and/or GIS (Mobile Mapper). In the northern floodplain, observer survey routes followed the drainage channel at the eastern side of the river and continued along the left bank of the Slaney to the Irish Rail fence, 250m upstream of the proposed Flood Defence Scheme, and along the western (right) bank, extending 1.5km upstream of the proposed Flood Defence Scheme. Surveyors switched routes for each survey.

Additional surveys were carried out to check specific issues and individual species in 2016 and from March to May 2017, e.g. Grey Heron nests, Sand Martin colonies (Table 5).

Survey date and area	Start time	Visibility, Precipitation, Wind, and Cloud cover, notes
12.04.2016 Northern floodplain	08.26	Vis: good; Prec. dry;
13.04.2016 Southern floodplain	06.30	Vis: poor- v.good - fog lifts; Prec.: dry; Wind: S F0-1; Cloud: 8/8-3/8
29.04.2016 Southern floodplain	7.50	Additional survey to check for Snipe
18.05.2016 Northern floodplain	08.30	Vis:v.good; Prec.: single shower; Wind: NW F1; Cloud: 8/8
19.05.2016 Southern floodplain	6.20	Vis:v.good; Prec.: dry; Wind: SW F1; Cloud: 8/8
30.05.2016 Southern floodplain		Additional survey prior to site investigation works, Sand Martin colony survey
31.05.2016 Northern floodplain		Additional survey prior to site investigation works, Sand Martin colony survey
16.06.2016 Northern floodplain	9.44	Vis:v.good; Prec.: dry; Wind: N F1 & 0; Cloud: 8/8
17.06.2016 Southern floodplain	8.30	Vis:v.good; Prec.: dry; Wind: N F3; Cloud: 8/8. Sand Martin colony survey
6.07.2106		Sand Martin colony survey
12.07.2016		Sand Martin colony survey
20.07.2016 Southern floodplain	11.30	Check of late heron nest location
24.08.2016		Sand Martin colony survey
16.03.2017		Heronry survey
11.04.2017 CBS New roads footprint east bank	8.15	Vis: good; Prec.: dry; Wind:SW F0-1; Cloud 4/8 Sand Martin and Heron colony survey
4.05.2017		Sand Martin and Heron colony survey
29.05.2017		Sand Martin and Heron colony survey

Table 5. Walk-over and other breeding bird survey dates

2.5. Raptor survey.

Diurnal raptors

Five vantage points (VP) were selected during a scoping survey, which gave views over potential nest sites and habitats suitable for use by birds of prey that are active during daylight hours (Figure 8). Surveys were carried out on 3rd and 10th March, on 5th April 2016, and on 18th May 2016. Habitat suitability viewed from each VP was classified as follows:

NESTING HABITAT SUITABILITY (N.H.S.): - POOR; LIMITED (small area perhaps suitable; GOOD (some ideal areas but some poor); IDEAL (almost all habitat in view very suitable)

FORAGING HABITAT SUITABILITY (F.H.S.): - POOR; LIMITED (small area suitable; GOOD (some ideal areas but not all); IDEAL (all habitat in view very good)



Figure 8. Vantage points used in 2016 to record breeding behaviours and locations of birds of prey.

Barn owl survey

Inspection of mapping and aerial photography, and an initial scoping survey, were used to identify structures potentially suitable for use by Barn Owls in the vicinity of Enniscorthy Flood Defence Scheme. These potential sites are shown in Figure 9.

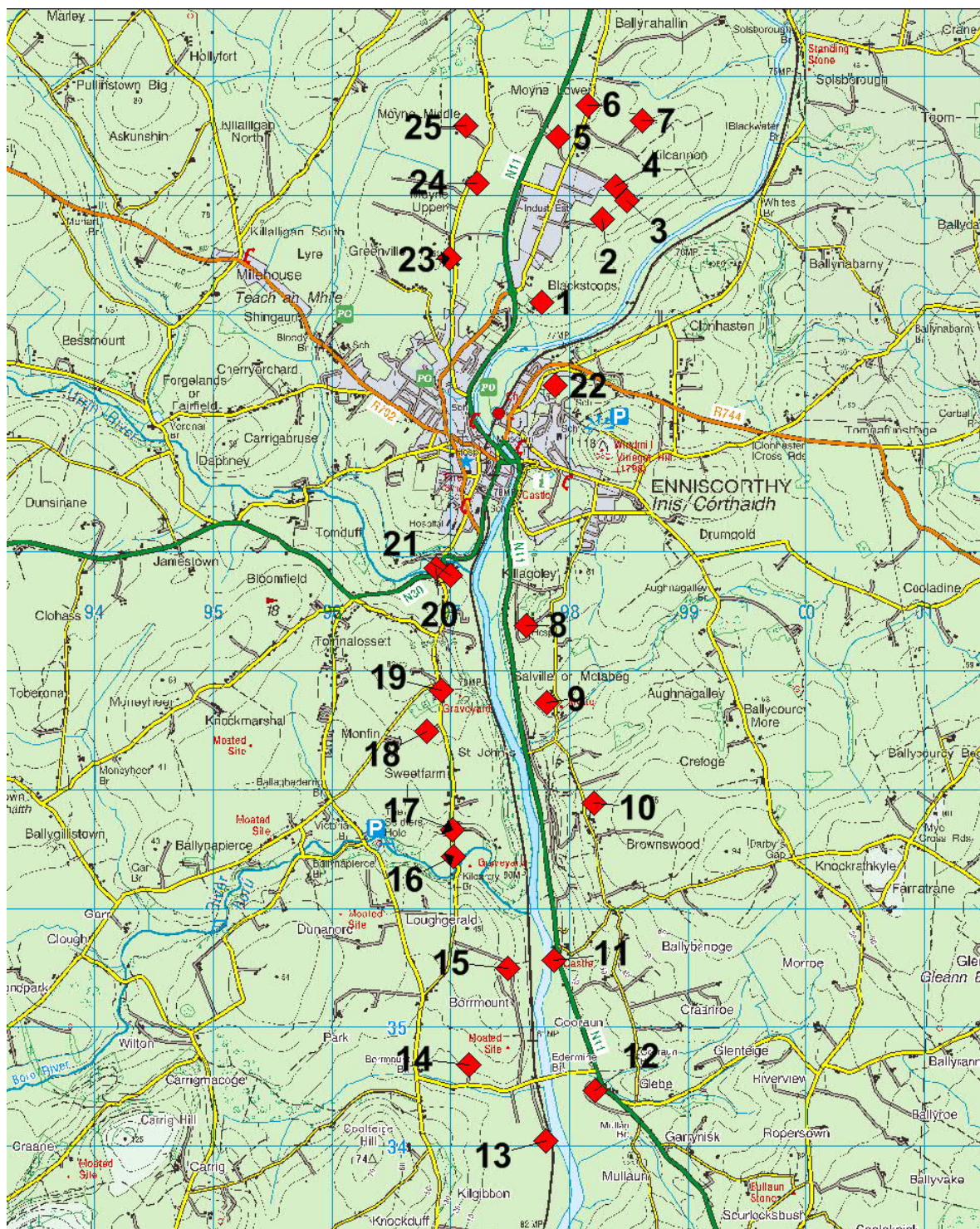


Figure 9. Potentially suitable Barn Owl sites in the vicinity of Enniscorthy Flood Defence Scheme.

Day time surveys of buildings identified as potentially suitable for use by Barn Owls were carried out on 16 and 17 June 2016, using the following methodology.

Barn Owl Survey Method

- 1) Identify suitable buildings provisionally from supplied map with search hinterland identified.
- 2) Obtain permission to access site from landowner. If possible ask landowner if any sightings have been made of BARN Owls in the vicinity.
- 3) Begin to search building (interior and exterior) for Barn Owl evidence in the form of
 - Whitewash
 - Pellets
 - Moulded feathers
 - When inside, check chimney flues if possible to ascertain suitability (blocked=suitable, unblocked=most likely not suitable).
- 4) Check surrounding buildings, posts, trees for evidence of whitewash/nearby roosting or perching sites.
- 5) Record all findings and score site as per fieldsheet. Note the grid references of any findings of note either within the building or without. If possible collect pellets+feathers in sample bags.
- 6) Record presence or absence of additional species as indicated. Particular note should be made of Kestrel or Peregrine nest sites.
- 7) Check trees which are suitable in addition to buildings.
- 8) Proceed to next suitable location. Ensure to cold search for buildings not immediately visible on maps as potentially suitable.

Field sheet information and scores to be included for each site:

Suitability	Nesting Opportunities	Active	Record Other Species
0 = Unsuitable, no potential roosting or nesting locations	0 = Multiple	0 = Yes	BTO Code
1 = Suitable as roost only, may have evidence of roosting	1 = Chimney	1 = No	
2 = Suitable, but limited access, number of nest locations. No evidence.	2 = Roofspace	2 = Undetermined	
3 = Occupied or highly suitable with multiple opportunities for nesting	3 = Cavity		
	4 = Chute		
	5 = Apex of wall		
	6 = Tree Cavity		

Table 6. Barn Owl survey information sheet

Evening watch and listen surveys were carried out in the vicinity of site Nos. 3 and 4 on the evenings on 6 July starting at 22.00, on 12th July starting at 22.00, and on 29 July starting at 22.15.

2.6. Vantage point watches at proposed new bridge location

Vantage point watches were carried out at the proposed new Slaney bridge location linking the N30 New Ross Road, and the N11 Wexford Road, just over 100m south of the Riverside Park Hotel, Enniscorthy. The objective of these surveys was to record bird movements in the immediate vicinity of the bridge, to provide baseline data that could be used to assess the potential for collisions to arise, and to inform bridge design in the interests of road safety and the avoidance injury and fatality to protected bird species. Flight height recording was based height bands relative to the deck level of the proposed bridge, below deck level, and in 5 height bands above deck level, with the bridge deck to parapet structure lying within the 0-5m above height band. Higher height bands were chosen to provide information relevant to the originally proposed cable-stay bridge design, and also with regard to existing structures and landscape features in the vicinity that assisted in the accurate estimation of flight height.

Surveys were carried out in each month, from February 2016 to January 2017 inclusive. Initially, when surveys commenced in February 2016, observations were carried out from the small public park on the New Ross Road, at the deck level of the proposed bridge. This facilitated bird flight height estimates. As spring progressed and leaves opened on trees and shrubs, views of the river corridor from this point became restricted, the vantage point was moved to the roof of the Riverside Park Hotel, and then since this could not always be accessed, to the terrace at the southern end of the hotel. The terrace level is c. 2m higher than the Promenade, and this elevated point afforded good views of the Slaney channel and left bank, the Bare Meadow wetland area in the southern floodplain (Killagoley) and the alluvial, wet and mixed woodland to the east of the floodplain, the mixed woodland on the eastern side of the N11 opposite the hotel, and the alluvial woodland over which the bridge is proposed to pass.

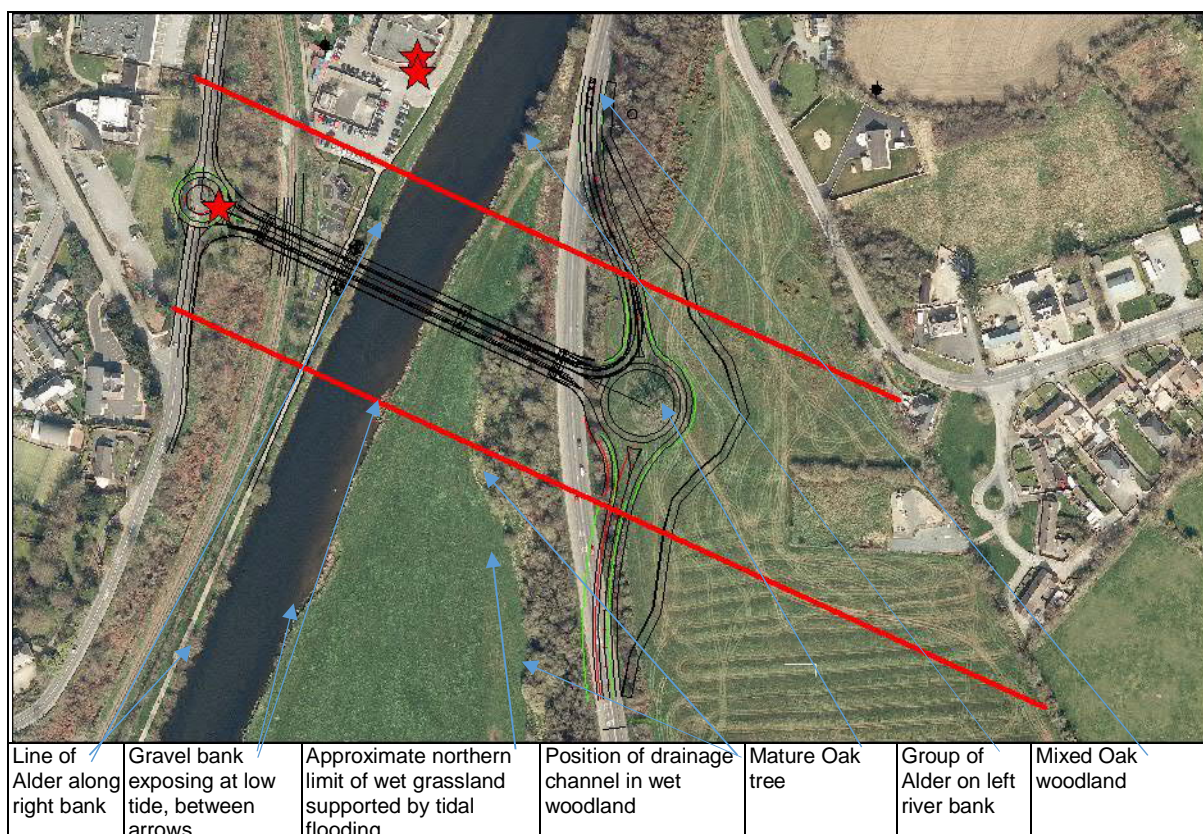


Figure 10. Details of Vantage Point watches at proposed new bridge location.

- ★ Vantage Point locations (see text above)
- Corridor within which movement type and flight height was recorded

The direction of bird movement was recorded in 4 categories:

1. Upstream
2. Downstream
3. Across – movement across the River Slaney channel
4. Milling – temporarily non-directional flight, e.g. Gulls arriving from various directions to avail of a feeding opportunity (flying insects, people feeding birds), or Lapwing in flight in response to a predator

The type of movement was recorded as either

1. On water swimming (including diving, as in feeding Cormorants)
2. Flight

The height of birds in flight was recorded as they flew through the proposed bridge corridor (Figure 10). This corridor includes the proposed width of the bridge (17m), and a 50m strip on each side of the bridge. The visual markers defining the corridor during surveys were on the eastern side of the river:

- To the north of the bridge location, the northern edge of a large stand of the invasive plant species Japanese knotweed, adjoining the N11)
- To the south of the bridge location, the 'corner' of the wet alluvial woodland (see Figure 10).

Flight height was recorded in the following 7 categories:

1. Below bridge deck
2. 0-5m above bridge deck
3. 5-10m above bridge deck
4. 10-20m above bridge deck
5. 20-30m above bridge deck
6. 30m above bridge deck
7. Above / below bridge deck – recorded when the height of flight changed as a bird flew through the corridor (e.g. a bird descended to land on the river, river bank, or southern floodplain, or a bird rose to land in, or fly over a tree or woodland area).

During February and March 2016, the main focus of Vantage Point watches was to record non-breeding waterbird movements in the hours around dawn and dusk. As wintering waterbirds reduced in number seasonally, the focus of surveys shifted to include observations at high, mid, and low tide, so that breeding bird use of the area in the vicinity of the proposed bridge could be included in the assessment. From late July 2017, dusk and dawn watches resumed. Watch duration was reduced to 2 hours, so that 3 watches were carried out in each month, dawn, dusk and a day-time watch at low, mid or high tide. The total durations of each watch type from February 2016 to January 2017 inclusive was as follows:

- Dawn 19h 41m
- Dusk 16h 42m
- High tide 14h 30m
- Mid tide 3h
- Low tide 15h 20m

A total of 69 hours of observations were recorded at the proposed bridge site. Four hours of observations were made from Vinegar Hill (simultaneously with observations from the VP at the proposed bridge site) at dawn and dusk on 28 November 2016, to record and compare bird movements within the Slaney River corridor with those in the general area east and west of the river valley. A total of 6 hours of observations were recorded at dawn at Edermine Bridge; 1 hour during the initial scoping survey on 11th February 2016, and in simultaneous watches with the VP proposed bridge site, for 1 hour and 45 minutes on 24th February, and 3 hours on 23rd March. The dates and durations of each watch are given in Table 7. Weather conditions during each watch are given in Table 8.

Date	Sunrise	Sunset	High water	Low water	Watch type	Vantage Point watch at proposed new bridge location		
						From	To	Duration
11.02.16	7.53	17.27	8.59	15.47	Dawn Edermine			
18.02.16	7.38	17.41	15.11	8.06	Dawn	7.40	9.16	1h 36 m
24.02.16	7.25	17.52	8.02	14.47	Dawn	7.00	10.00	3h
24.02.16	7.25	17.52	8.02	14.47	Low tide	14.00	17.00	3h
10.03.16	6.51	18.21	8.01	15.00	Dusk	16.21	19.21	3h
23.03.16	6.19	18.45	6.54	13.34	Dawn	5.21	8.21	3h
12.04.16	6.32	20.21	11.02	17.13	Low tide	16.20	18.20	2h
13.04.16	6.29	20.23	11.30	17.45	High tide	11.04	13.04	2h
29.04.16	5.54	20.52	11.13	17.41	High tide	11.15	13.15	2h
18.05.16	5.20	21.24	17.25	11.16	High tide	17.00	19.00	2h
19.05.16	5.19	21.25	18.12	12.14	Low tide	11.48	13.48	2h
31.05.16	5.04	21.42	14.53	9.29	Low tide	10.22	12.30	2h 5m
16.06.16	4.56	21.56	16.23	10.11	Mid tide	13.45	14.46	1h 1m
27.06.16	4.59	21.57	11.50	18.09	Mid tide	7.00	9.00	2h
27.06.16	4.59	21.57	11.50	18.09	High tide	10.30	13.00	2h 30m
20.07.16	5.23	21.39	7.48	14.27	High tide	8.20	10.20	2h
29.07.16	5.23	21.39	14.57	20.48	High tide	15.30	17.30	2h
29.07.16	5.37	21.25	14.57	20.48	Dusk	20.00	22.00	2h
24.08.16	6.21	20.32	11.20	17.38	Dawn	6.35	8.38	2h 3m
30.08.16	6.32	20.18	18.20	12.15	Low tide	13.40	15.40	2h
30.08.16	6.32	20.18	18.20	12.15	Dusk	18.00	20.00	2h
19.09.16	7.06	19.30	9.30	16.20	Dawn	7.10	9.10	2h
29.09.16	7.24	19.06	18.48	12.55	Low tide	11.50	14.05	2h 15m
29.09.16	7.24	19.06	18.48	12.55	Dusk	17.35	19.35	2h
17.10.16	7.56	18.24	8.27	15.23	Dawn	7.05	9.07	2h 2m
27.10.16	8.15	18.02	17.29	11.21	Low tide	11.55	13.55	2h
27.10.16	8.15	18.02	17.29	11.21	Dusk	16.18	18.45	2h 27m
28.11.16	8.13	16.13	18.05	12.17	Dawn	7.30	9.30	2h
28.11.16	8.13	16.13	18.05	12.17	Dusk	14.45	16.47	2h 2m
13.12.16	8.33	16.06	5.50	12.21	Mid tide	10.15	12.15	2h
15.12.16	8.34	16.06	7.33	14.21	Dawn	8.05	10.05	2h
17.01.17	8.30	16.41	10.01	16.15	High tide	11.10	13.10	2h
17.01.17	8.30	16.41	10.01	16.15	Dusk	15.40	17.40	2h
24.01.17	8.22	16.53	15.47	9.32	Dawn	7.40	9.40	2h
24.01.17	8.22	16.53	15.47	9.32	Dusk	16.20	17.35	1h 15m
Watch durations at Edermine Bridge								
	From	To	Duration					
11.02.16	7.45	8.45	1h					
24.02.16	7.15	9.00	1h 45m					
23.03.16	5.12	8.20	3h 8m					
Watch durations at Vinegar Hill								
	From	To	Duration					
28.11.16	7.30	9.30	2h					
28.11.16	14.45	16.45	2h					

Table 7. Proposed new Slaney Bridge Vantage Point watch dates, times and details

Notes

Times of sunrise and sunset are for Dublin, reproduced from www.timeanddate.com

Tide times are for Wexford Harbour. High tide at Seamus Rafter Bridge in Enniscorthy occurs approximately 1 hour and 15 minutes after high tide in Wexford Harbour. Low tide at Seamus Rafter Bridge in Enniscorthy occurs between 2 and 3 hours after low tide in Wexford Harbour (see www.waterlevel.ie)

Date	Watch type	Visibility, Precipitation, Wind, Cloud cover during watch
11.02.16	Dawn	
18.02.16	Dawn	
24.02.16	Dawn	Vis: v.good; Prec: dry; Wind: N F0-1; Cloud: 0/8
24.02.16	Low tide	Vis: v.good; Prec: dry; Wind: NNW F2-0; Cloud: 2/8-0/8
10.03.16	Dusk	Vis: v.good; Prec: dry; Wind: S F2-0; Cloud: 3/8-0/8.
23.03.16	Dawn	Vis: good; Prec: dry; Wind: Variable F0; Cloud: 8/8.
12.04.16	Low tide	Vis: v.good; Prec: dry; Wind: SSE F2-1; Cloud: 2/8-1/8
13.04.16	High tide	Vis: good; Prec: dry; Wind: SE F1; Cloud: 8/8-6/8
29.04.16	High tide	Vis: good; Prec: dry; Wind: N F2-3; Cloud: 2/8. Frost overnight.
18.05.16	High tide	Vis: v.good; Prec: dry; Wind: NW F2-1; Cloud: 7/8-3/8-7/8
19.05.16	Low tide	Vis: v.good; Prec: rain clearing early; Wind: S F2; Cloud: 8/8
31.05.16	Low tide	Vis: good; Prec: dry; Wind: SW F 1-2; Cloud 5/8
16.06.16	Mid tide	Vis: good; Prec: dry Wind: NW F 2-3; Cloud 8/8
27.06.16	Mid tide	Vis: good; Prec: dry; Wind: calm at start, NW force 1-3 by end of watch; Cloud;5/8. Gravel banks at toe of left bank exposed
27.06.16	High tide	Vis: good; Prec: light rain from 12.22 to 12 .35. Wind: W F1-3; Cloud: 7/8 cloud cover, westerly breeze Force 1-3. Gravel banks at toe of left bank submerged.
20.07.16	High tide	Vis: good; Prec: dry, rain overnight, Wind: W F 1-2; Cloud: 7/8 light cloud cover.
29.07.16	Low tide	Vis: good; Prec: dry; Wind: NW F 0-1. Cloud 8/8
29.07.16	Dusk	Vis: good; Prec: dry; Wind: W F 2-3; Cloud: sunny initially, cloud building from 20.15. Falling neap tide.
24.08.16	Dawn	Vis: moderate at first in mist up to 5m above proposed bridge deck height, clearing by 07.00, vis then good; Prec: dry; Wind: calm; Cloud <1/8 after mist cleared. Tide falling/low.
30.08.16	Low tide	Vis: good; Prec: dry; Wind: SSW F 3-4; Cloud 8/8.
30.08.16	Dusk	Vis: good; Prec: light rain until 18.30; Wind: SSW F 2-3; Cloud: 8/8. High tide.
19.09.16	Dawn	Vis: good; Prec: dry; Wind: NW F 2-3, reducing 1-2. Cloud: 6/8 light cloud at start, clearing to 2/8 and sun by end of watch. Tide rising above mid tide.
29.09.16	Low tide	Vis: v. good; Prec: dry; Wind: W F 2-3, gusting 4. Cloud: 2/8
29.09.16	Dusk	Vis: good; Prec: dry; Wind W F 2-3; Cloud: 1/8
17.10.16	Dawn	Vis: v.good; Prec: dry; Wind: calm; Cloud 1/8. Tide rising above mid tide
27.10.16	Low tide	Vis: v.good; Prec: dry; Wind: SW F 2-3; Cloud: 3/8 cloud cover to start, 7/8 by mid-watch
27.10.16	Dusk	Vis: good; Prec: dry; Wind: SW F 2-3; Cloud 6/8
28.11.16	Dawn	Vis: v.good; Pre': dry; Wind: E F2; Cloud: 8/8
28.11.16	Dusk	Vis: v.good; Prec: dry; Wind: E F1; Cloud: 8/8
13.12.16	Mid tide	Vis: moderate; Prec: Light rain/drizzle until 10.40; Wind SW F 1-2: Cloud 8/8. River level high, turbid after rain.
15.12.16	Dawn	Vis: poor at start: Prec: light rain clearing by 8.43; Wind: calm; Cloud 8/8. Dark morning, river level high after heavy rain. High tide
17.01.17	High tide	Vis: good; Prec: dry; Wind: calm; Cloud 6/8 to 8/8
17.01.17	Dusk	Vis: good; Prec: dry; Wind SW F 1-2; Cloud 8/8
24.01.17	Dawn	Vis: moderate to good; Prec: light drizzle becoming dry, Wind: SW F 2-3, Cloud 8/8. Mid tide
24.01.17	Dusk	Vis: moderate to good, Prec: light drizzle becoming dry, Wind: SW F 2-3. High tide

Table 8. Weather conditions during Vantage Point watches

3. BIRD SURVEY RESULTS

3.1. Occurrence in the Enniscorthy Flood Defence Scheme area of bird species listed as Special Conservation Interests for Wexford Harbour and Slobs SPA

A total of 32 bird species are listed as Special Conservation Interests (SCI) for Wexford Harbour and Slobs SPA; these species all occurred in internationally or nationally important numbers within the site during the SPA baseline period (see Section 1.2 of this report). Twelve of the SCI species were recorded within the proposed Enniscorthy Flood Defence Scheme (FDS) area during the period February 2016 to March 2017, as shown in Table 9. Teal, one of the SCI species recorded in Enniscorthy FDS area, occurs in nationally important number in the Lower River Slaney (Section 1.1).

A single Whooper Swan was present on the Enniscorthy Flood Defence Scheme area in February 2016, but was not recorded subsequently. This was the sole record of an Annex 1 listed species listed as Special Conservation Interests (SCI) for Wexford Harbour and Slobs SPA.

Two species listed as Special Conservation Interests (SCI) for Wexford Harbour and Slobs SPA were confirmed to breed in the Enniscorthy FDS area during the current bird studies: Grey Heron, and Mallard. Both species are present throughout the year.

Wexford Harbour and Slobs SPA Special Conservation Interests for which the SPA is designated	Birds Directive Annex 1 listed species	Occurrence in Enniscorthy Flood Defence Scheme area February 2016 to March 2017		
		River Slaney	Northern Floodplain	Southern Floodplain
Little Grebe		✓		
Great Crested Grebe		✓		
Cormorant		✓	✓	✓
Grey Heron		✓	✓	✓
Bewick's Swan	✓			
Whooper Swan	✓	✓	✓	✓
Greenland White-fronted Goose	✓			
Light-bellied Brent Goose				
Shelduck				
Wigeon				✓
Teal		✓	✓	✓
Mallard		✓	✓	✓
Pintail				
Scaup				
Goldeneye				
Red-breasted Merganser				
Hen Harrier	✓			

Wexford Harbour and Slobbs SPA Special Conservation Interests for which the SPA is designated	Birds Directive Annex 1 listed species	Occurrence in Enniscorthy Flood Defence Scheme area February 2016 to March 2017		
		River Slaney	Northern Floodplain	Southern Floodplain
Coot				
Oystercatcher				
Golden Plover	✓			
Grey Plover				
Lapwing				✓
Knot				
Sanderling				
Dunlin				
Black-tailed Godwit				
Bar-tailed Godwit	✓			
Curlew				
Redshank				✓
Black-headed Gull		✓	✓	✓
Lesser Black-backed Gull		✓	✓	✓
Little Tern	✓			
Wetland and Waterbirds		✓		✓

Table 9. Occurrence in the Enniscorthy Flood Defence Scheme area of bird species listed as Special Conservation Interests for Wexford Harbour and Slobbs SPA.

Red listed and Amber listed Bird species of Conservation Concern in Ireland are indicated (Colhoun and Cummins (2013)).

Four of the species listed in Table 9 as occurring within Enniscorthy FDS are Red-listed as Birds of Conservation Concern in Ireland: Wigeon (W³), Lapwing (B/W), Redshank (B/W⁴), and Black-headed Gull (B⁵). Five species occurring within Enniscorthy FDS are Amber-listed as Birds of Conservation Concern in Ireland, of which two, Cormorant and Lesser Black-backed Gull occur seasonally in significant numbers.

Thirteen additional waterbird species were recorded within the proposed Enniscorthy FDS area during the period February 2016 to February 2017, and are shown in Table 10. These include the Annex 1 listed species Kingfisher, which occurs as a resident wintering and breeding species in the Enniscorthy FDS area (see Section 3.3.2). Mute Swan and Moorhen are also resident wintering and breeding species within the proposed Enniscorthy FDS area; Mute Swan occur in nationally important number in the Lower River Slaney (Section 1.1). One Red-listed species and three Amber listed species were recorded (Table 10).

³ primary occurrence Wintering

⁴ primary occurrence Breeding/Wintering

⁵ primary occurrence Breeding (Colhoun and Cummins (2013))

Additional waterbird species recorded within the proposed Enniscorthy Flood Defence Scheme area, February 2016 to March 2017	Birds Directive Annex 1 listed species	Occurrence in Enniscorthy Flood Defence Scheme area February to 2016 to March 2017		
		River Slaney	Northern Floodplain	Southern Floodplain
Little Egret	✓	✓	✓	✓
Mute Swan		✓	✓	✓
Goosander		✓		
Moorhen		✓	✓	✓
Snipe			✓	✓
Woodcock				✓
Greenshank				✓
Common Sandpiper		✓		✓
Green Sandpiper		✓	✓	✓
Kingfisher	✓	✓	✓	✓
Common Gull		✓		✓
Herring Gull		✓	✓	✓
Great Black-backed Gull		✓		✓

Table 10. Waterbird species additional to those listed as SCI for Wexford Harbour and Slobbs SPA that occur within the Enniscorthy proposed FDS area.

In addition, two domestic breeds of geese were present within Enniscorthy FDS area:

Domestic breeds	River Slaney	Northern Floodplain	Southern Floodplain
Swan Goose/ Chinese Goose	✓		✓
Greylag Goose/ Domestic Goose	✓		✓

The Asian Swan Goose (*Anser cygnoides*) has been domesticated in China for more than 2,000 years; the Chinese Goose is similar to the wild type in plumage, but is heavier and has a large knob above the bill (Owen, 1977). It is assumed that the two Chinese Geese resident on the River Slaney at Enniscorthy escaped from a wildfowl collection. They are often found associating with three white domestic geese derived from the Greylag (*Anser anser*) along the Promenade in Enniscorthy, and readily approach pedestrians as they have become accustomed to being fed.



Whooper Swan on the Slaney at Enniscorthy

Chinese Geese on the Slaney at Enniscorthy

Conclusions, Section 3.1

The proposed Enniscorthy Flood Defence Scheme area is used by a number of waterbird species that are listed as Special Conservation Interests for Wexford Harbour and Slobbs SPA. Since this SPA extends into the southern end of the proposed FDS works, and the wetland habitats on the southern floodplain in particular are supported by tidal flooding and are in hydraulic continuity with the designated SPA area, it is considered appropriate to assess the following waterbird species as forming part of the qualifying populations of Wexford Harbour and Slobbs SPA:

- Little Grebe
- Great Crested Grebe
- Cormorant
- Grey Heron
- Whooper Swan
- Wigeon
- Teal
- Mallard
- Lapwing
- Redshank
- Black-headed Gull
- Lesser Black-backed Gull

The Conservation Objectives for Wexford Harbour and Slobbs SPA for each of these 12 species is:

To maintain their favourable conservation condition in Wexford Harbour and Slobbs SPA, which is defined by the following list of attributes and targets (NPWS, 2012):

Attribute	Measure	Target
Population trend	Percentage change	Long term population trend stable or increasing
Distribution	Number and range of areas used by waterbirds	There should be no significant decrease in the numbers or range of areas used by waterbird species, other than that occurring from natural patterns of variation

3.2. Waterbird species, counts and distribution

The total number of waterbirds species (excluding domestic breeds) recorded within the proposed Enniscorthy FDS between February 2016 and February 2017 was 25 (Table 11). The total on the southern floodplain and adjoining river channel was 23, (Table 12). Sixteen species were recorded on the northern floodplain and adjoining river channel, including 2 species not recorded on the southern floodplain; Goosander and Great Black-backed Gull (Table 13). A reduced number of species was recorded on the River Slaney within the quay walls of Enniscorthy, from the Rail Bridge to Riverside Park Hotel, where 12 species were recorded (Table 14). All count data are included in Appendix 3. The combined species list is given in Table 10. The waterbirds recorded throughout the study include migratory wintering species, passage migrants, and resident breeding species.

Species	1% national population	Peak count waterbird surveys		Peak count passing proposed new bridge VP			
		Peak count	Peak month	Dawn		Dusk	
				Up	Down	Up	Down
Little Grebe	20	1		1			
Great-crested Grebe	120	1					
Cormorant	120	14	Feb. 16	29	9	1	21
Little Egret	20	5	Sep. 16	1	1	1	2
Grey Heron	25	25	Oct. 16	6	9	12	3
Mute Swan	90	15	Nov. 16	14	12	2	3
Whooper Swan	2	1		1			
Wigeon	630	51	Feb. 17				
Teal	340	174	Dec.16	8	8		7
Mallard	290	58	Dec.16	13	7	11	24
Goosander		5	Jan.17				
Moorhen		9	Nov.16				
Lapwing	1,100	376	Feb. 16	30		80	
Snipe		26	March 16				
Woodcock	1	1					
Redshank	300	26	Dec.16				
Greenshank	20	1					
Green Sandpiper		1					
Common Sandpiper		3					
Kingfisher		3		1		1	1
Black-headed Gull		267	Feb.16	504	110	28	1,124
Common Gull		1		1			2
Lesser Black-backed Gull		4		11	2	1	393
Herring Gull		3		8	3		39
Great Black-backed Gull		1					

Table 11. Peak counts of waterbirds within the proposed Enniscorthy FDS area, and peak counts recorded passing through the proposed new bridge corridor at dawn and dusk.

Note: Data refer in most cases to the southern floodplain and adjoining river channel, but counts are combined from the northern and southern floodplain when these areas were counted within a 1 hour period on the same date.

3.2.1. Waterbirds occurring in nationally important numbers; Grey Heron

Grey Herons were recorded in nationally important numbers within the proposed Enniscorthy FDS area during waterbird counts. The numbers recorded were highest during the late summer and autumn, and reduced over winter, presumably arising from the dispersion of young birds away from the breeding colony, and from the reduced time that Grey Herons spend feeding outside the breeding season. The breeding population recorded also indicates national importance in terms of the 1% threshold level of 25 birds, since a minimum of 11 nests were recorded in 2016, and 12 nests recorded in 2017, with re-occupation of nests after successful fledging of early broods (see Section 3.). Grey Herons occur in Enniscorthy as a resident breeding species, and make feeding, roosting and breeding use of the FDS area.

Grey Herons are regarded as generalists in habitat use, they are typically found in association with shallow waters along watercourses and shorelines and in wetland habitats, usually in locations with roost trees nearby. In general, Grey Herons feed most actively at dawn and dusk, and roost during the middle of the day and at night, but can feed for up to 23 hours a day during the breeding season while provisioning young. In tidal situations, birds forage according to how tides make food available (literature review in IUCN-SSC Heron Specialist Group).

Areas found to be used consistently by Grey Herons within the FDS area are shown in Figure 11. The main roost area is around the permanent water ponds in the centre of the Killagoley southern floodplain (Figures 4 and 11.2), where they roost among tall vegetation at the water’s edge. The peak count here was 21 Grey Herons, recorded in October 2016. Tree roosts were also used for shorter periods of time, often in direct sunshine, in oak woodland, alluvial woodland, and in river bank trees. Some herons moved to tree roosts on the falling tide and then moved a short distance to feed along the Slaney river bank and in shallow water (see Section 3.8, and Table 20).

Grey Herons feed while standing or walking slowly at the base of the river bank, and in shallow water. Within most of the Enniscorthy FDS area, feeding opportunities are limited at high tide because of water depth, and most feeding activity was observed at lower stages of the tide. The island in the Slaney at the northern floodplain (Figure 11.1) is available throughout the tidal cycle, though it submerges at high river flows. Most feeding activity was recorded along the left (east) bank of the Slaney and within the river channel at low water.



Figure 11.1. Areas used by Grey Herons in the Slaney northern floodplain and Enniscorthy town

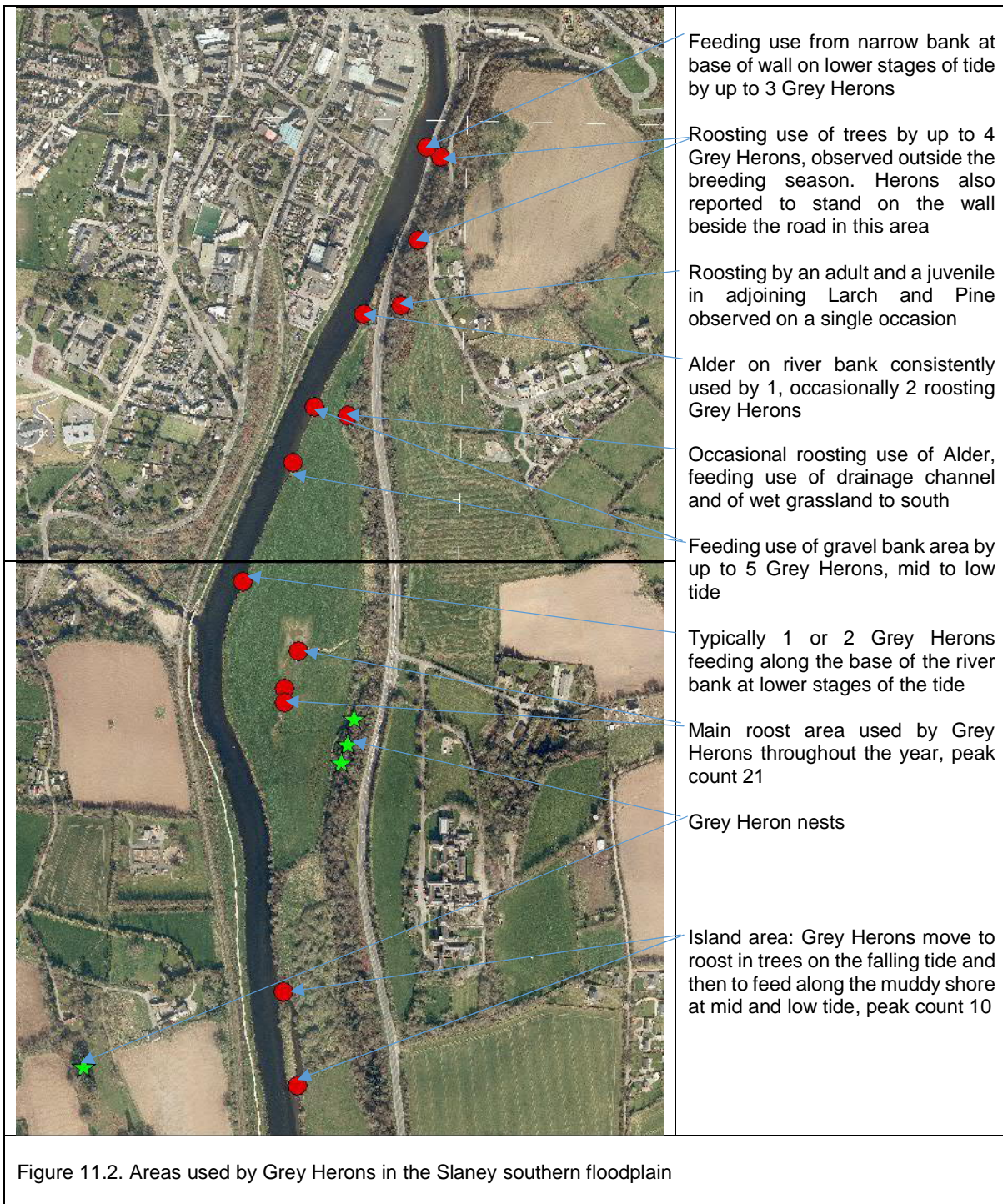


Figure 11. Areas used by Grey Herons within the proposed Enniscorthy FDS area

The right bank to the south of the town is subject to disturbance from people and dogs using the promenade, though occasional use by herons was recorded, mainly early in the morning and late in the evening. A juvenile Grey Heron feeding from the right bank flew off across the river in response to passing pedestrians and returned on three occasions, before remaining to feed on the left bank. Generally, Grey Herons feeding along the left bank remained undisturbed by people using the promenade, much of which is screened from the river by trees, although herons sometimes flew off from the left bank when this observer stopped on the right bank to view them.

The sole prey item seen to be taken from the river by a Grey Heron at Enniscorthy was an Eel. Herons also visit the drainage channels to the east of the northern and southern floodplains to feed. Feeding was observed on the southern floodplain occasionally, with systematic feeding in wet grassland by 5 Grey Herons and 3 Little Egrets observed in October 2016, and in both wet and dry grassland in January 2017 by 3 Grey Herons, one of which was seen to eat a frog and a number of unidentified invertebrate prey items.

During vantage point watches of the proposed new bridge location, more herons were recorded moving downstream than upstream during dawn watches (total downstream movements 37, total upstream movements 22, peak downstream movement 9 birds on 24 August, peak upstream movement 6 on 23 March 2016). During dusk watches, more herons were recorded moving upstream than downstream past the proposed bridge location (total 39 upstream movements, total 9 downstream movements, peak upstream movement 12 on 27 October 2016, peak downstream movement 3 on 24 January 2017). The largest upstream movements during dusk watches coincided with high tide (6 on 30 August, 7 on 29 September, and 12 on 27 October 2016); given the limited availability of feeding habitat within the FDS area at high tide, these birds may have been moving further upstream though this was not verified.

There was some evidence of Grey Herons moving to feed in sections of the river that are illuminated by street lights at night. Birds were observed leaving roosts in oak woodland to feed along the river bank downstream of Seamus Rafter Bridge after sunset in late July 2016, when dusk coincided with low water, and were often present in this section at first light in the morning. These observations are suggestive rather than conclusive evidence of Grey Herons utilising the assistance of artificial lighting to feed in Enniscorthy. They are known to feed at night, and feed under artificial light and in the dark at fish farms (literature review in IUCN-SSC Heron Specialist Group). The Slaney river section within Enniscorthy town is likely to be less subject to disturbance at night, with feeding opportunities subject to tide level.

The full feeding range of the resident Grey Heron population at Enniscorthy has not been established. There were no observations of Grey Herons flying upstream of the FDS area during the day, and feeding birds disturbed from the gravel island and riffle area on the northern floodplain invariably flew south, downstream. The river immediately upstream of this riffle is relatively deep and with mainly steep banks through Blackstoops and Clonhasten, though there are riffles in the Slaney channel further upstream at Whitesbridge, and shallow sections at Scarawalsh that would be expected to provide ideal feeding habitat for Grey Herons. It is assumed that these areas are visited by Grey Herons from the Enniscorthy area. Downstream movements of Grey Herons past the southern end of the FDS area were observed regularly, with two or three feeding birds often present between Motabeg and Edermine Bridge on the lower stages of the tide. A three hour dawn watch at Edermine Bridge on 23 March 2016 recorded a single Grey Heron flying upstream towards Enniscorthy. I-WeBS counts recorded between 11 and 16 Grey Herons between Ferrycarrig Bridge and the River Urrin (Table 3).

Grey Herons have been recorded feeding between 2 and 38km away from a breeding colony site, colonies tend to be located within convenient flying distance of feeding areas (literature review in IUCN-SSC Heron Specialist Group). Three types of Grey Heron feeding site have been described:

1. individual defended feeding sites of a single area of about 20h of wetland
2. individual non-territorial feeding areas in 2 or 3 patches more distant from the colony, and
3. neutral feeding sites used by many herons, either where high densities of food occur for short periods, or sites too close to the colony to be defended successfully.

The River Slaney and associated wetlands at Enniscorthy would seem to fit into the type 3 feeding site, with Grey Herons feeding in close proximity to the breeding colony, and typically 10 to 15 Grey Herons feeding within the FDS area, mostly during the lower stages of the tide.

3.2.2. Waterbirds occurring in lower than Nationally important numbers

Cormorants commute daily to and from overnight roosts downstream, to the south of Edermine Bridge, as do Little Egret and all gull species. The other waterbird species (swans, ducks, waders, and moorhen) recorded in numbers lower than the threshold level for national importance in the vicinity of Enniscorthy roost overnight within the Enniscorthy FDS area; the key overnight roost for these species are the Reedswamp and associated open water and wetlands in the southern floodplain at Bare Meadow, Killagoley.

Cormorant

The peak count of Cormorants within the proposed Enniscorthy FDS area was 14, recorded in February 2016. Numbers were highest during the winter months, and lowest from April through September 2016 during the breeding season when adult Cormorants were at breeding colonies elsewhere (Tables 11, 12, 13 and 14). Cormorants were recorded feeding in the Slaney throughout the FDS area, and both upstream and downstream of it. The peak count of Cormorants recorded flying upstream past the Riverside Park Hotel at dawn was 29, and the peak count moving downstream was 21 (Table 11).

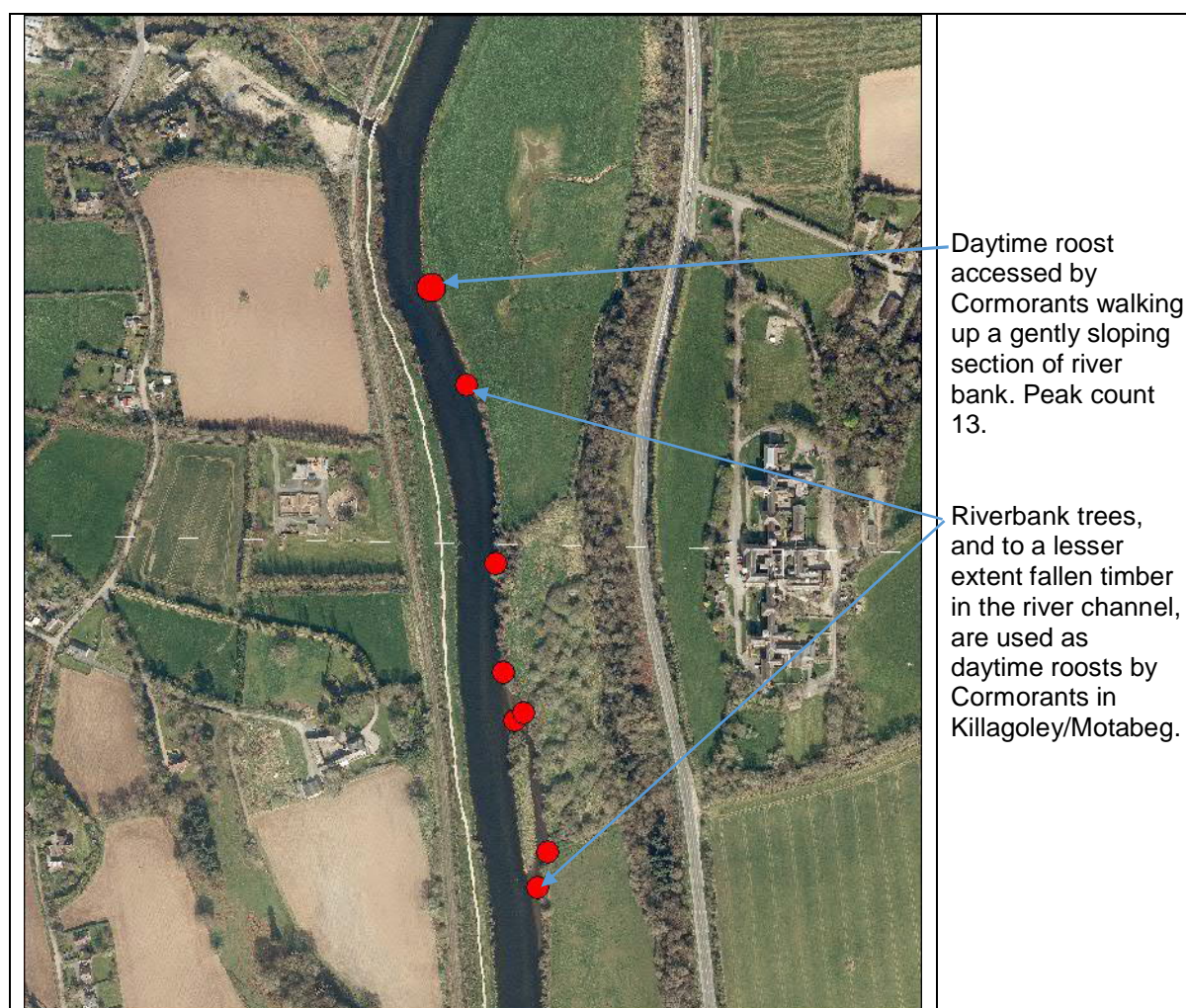


Figure 12. Daytime roost sites used by Cormorants in the Enniscorthy FDS area.

Cormorants dive to hunt fish, and were recorded mainly feeding in the deeper waters of the Slaney River within the FDS area, i.e. deeper water sections and during the higher stages of the tide in

shallower sections. Cormorants roost during the day between feeding bouts, on the Slaney river bank, and also in river bank trees and on fallen timber along the margins of the river channel. The main Cormorant roost areas are located on the left bank of the Slaney in the southern floodplain, and are shown in Figure 12. The left bank is less subject to disturbance than the right bank where the promenade is located, on the western side of the Slaney.

Gulls

The gull species occurring in the Enniscorthy area typically use a range of feeding sites, including coastal, estuarine, river and wetland habitats, agricultural and amenity lands, and urban habitats where they scavenge waste food including food intended to be provided for swans, geese and ducks. Simultaneous dawn watches at Edermine Bridge and at the proposed new bridge location in Enniscorthy on 24 February 2016, and simultaneous dawn and dusk watches at the proposed new bridge location and at Vinegar Hill on 28 November 2016, indicated that gulls moving between overnight coastal /estuarine roosting and daytime feeding areas do not all follow the Slaney River corridor. On 24 February 2016, 1,714 Black-headed Gulls were recorded flying upstream over Edermine Bridge at dawn, but only 232 were recorded flying along the Slaney through the proposed new bridge location in Enniscorthy.

Black-headed Gulls were the most numerous gull species using and passing through the Enniscorthy area. The peak count recorded within the Enniscorthy FDS area during waterbird counts was 267, recorded on the ponds and wetland on the southern floodplain at Killagoley in February 2016 (Tables 11 and 12). Higher numbers were recorded passing through, with a peak upstream movement past the location of the proposed new bridge of 504 on 28 November 2016, and a peak downstream movement of 1,124 on 17 January 2017. The only months in which Black-headed Gulls were not recorded in the vicinity of Enniscorthy were April and May 2016, numbers increased slowly from June with the first juvenile birds recorded with adults on 27th June 2016 (see Tables 12, 13 and 14).

Key areas visited by Black-headed Gulls in the vicinity of Enniscorthy were the ponds and wetland on the southern floodplain at Killagoley, the Waste Water Treatment Plant nearby on the western side of the river corridor, sports fields on higher ground on the western side of the town (see Figures 3.3 and 3.5), and the Slaney River channel. Black-headed Gulls were observed to feed within the river, taking small unidentified prey items from the water surface or just below the surface. The numbers of gulls observed feeding in this way was generally low; Black-headed Gulls stood on the railway bridge and fed in the river channel immediately upstream, mainly at low water (see Appendix 3). The most frequently observed use of the river channel was recorded at low water when gravel banks were exposed, between Old Bridge and Seamus Rafter Bridge, and immediately downstream of the proposed new bridge; Black-headed Gulls visited these areas to bathe and preen, and to rest on the gravels, with up to 60 birds recorded at each of these locations. The ponds and wetland on the southern floodplain at Killagoley were used mainly for resting, bathing and preening roosting, with minor observation of feeding behaviour. Black-headed Gulls also visited dry grassland on the left bankside of the Slaney immediately north of the proposed new bridge location, where they mostly rested, before moving to the gravel bank in the river channel as it exposed on the falling tide (see Figure 3.4).

Common Gulls, Lesser Black-backed Gulls, Herring Gulls and Great Black-backed Gulls were recorded in small numbers in Enniscorthy FDS area (Tables 11, 12, 13, 14 and Appendix 3). Lesser Black-backed Gulls were recorded moving downstream in more significant numbers during dusk watches in the autumn: 268 on 29 September, and 393 on 27 October 2016. These could have been birds on migration, or birds exploiting a temporary food source. The peak count of 393 Lesser Black-backed Gulls passing through Enniscorthy could represent a significant proportion of the Wexford Harbour and Slobs population, which is under-represented in recent I-WeBS count data.

Little Egret

Little Egrets were recorded during the day in Enniscorthy FDS area, with a peak count of 5 in September 2016 (Table 11). This species currently commutes to overnight roost(s) downstream of the FDS area, a peak count of 7 was recorded flying upstream over Edermine Bridge during a dawn watch on 23 March 2016. Little Egrets were recorded feeding in the Slaney River channel throughout the Enniscorthy FDS area (see Tables 12, 13 and 14, and Appendix 3), but occurred most regularly in the Bare Meadow

in the southern floodplain and the adjoining river channel (Table 12). Feeding activity in the river occurred mainly at the lower stages of the tide, with 1 or 2 birds feeding at exposed gravels immediately downstream of the proposed bridge location, and at the muddy substrate at the island on the east side of the river at Killagoley / Motabeg. Four Little Egrets were observed feeding within wet grassland in the Bare Meadow at Killagoley in January 2017. Daytime roosting use is made of the open water on the Bare Meadow (mesotrophic ponds) in the southern floodplain, and of trees along the left bank of the river in the vicinity of the island a short distance downstream.

Swans

Mute Swans occur in nationally important numbers on the River Slaney, with the main concentration of birds usually found between Killurin Bridge and Edermine Bridge (Table 3), including a non-breeding herd as well as breeding pairs (NPWS staff, pers. comm). During FDS baseline studies, Mute Swans fed mainly within the river channel on submerged aquatic vegetation and marginal vegetation. They also made significant grazing use of the Bare Meadow on the southern floodplain at Killagoley during the winter of 2016/17 with 6 swans usually present; they generally accessed this area by walking up a gently sloping area of the river bank (see Figure 12). A winter peak count of 15 Mute Swans was recorded within the FDS area in November 2016, however 18 birds were recorded on 4 May 2017 including 14 non-breeding swans feeding on aquatic vegetation around the gravel island and riffle in the river at the northern floodplain, and 2 breeding pairs.

A single Whooper Swan was present in the FDS area in February, March and April 2016

Duck

Teal was the most numerous duck species recorded within the FDS area, the peak count of 174 recorded during high river water levels in December 2016 reached just above 50% of the threshold level for national importance (Table 11). Teal occur in nationally important numbers in the River Slaney (Table 3), as well as within Wexford Harbour and Slobs. Teal were recorded on the southern floodplain at Killagoley and Motabeg and in the adjoining river channel in all survey months between August and April (Table 12), occurring less regularly and in smaller numbers in the northern floodplain and river (Tables 13 and 14). Teal fed within wet grassland and around the central wetland at Killagoley, and also along the margins of the River Slaney channel particularly at low and mid tide.

Wigeon were recorded between October and March in the southern floodplain at Killagoley and Motabeg, with a peak count of 51 in February 2017 (Tables 11, 12). This herbivorous duck species fed within wet grassland and was not recorded along the river channel or in the northern floodplain. Wigeon has not been recorded to the north of Edermine Bridge in I-WeBS counts of the River Slaney to date (Table 3), however its presence in both winter seasons of the Enniscorthy FDS baseline studies suggests that it is a regular wintering species. Wigeon are largely resident throughout the winter, feeding within the wet grassland area and roosting on open water in the central wetland.

Mallard were recorded in every month. The peak count of 58 was recorded in December 2016. Mallard made feeding use of the wetlands on the southern floodplain, and of the river channel throughout the FDS area where they fed on submerged and emergent and riverbank vegetation and habitats. Mallard also used the river channel where they fed on submerged aquatic vegetation at low water; they cannot reach this at high tide. Gravel banks within the river at the northern floodplain, within the town and immediately downstream of the proposed bridge were used for feeding, resting, and bathing and preening.

Teal, Wigeon and Mallard were recorded on the Bare Meadow on the southern floodplain at Killagoley at first and last light, and roost overnight at the wetland area and on open water in the tidally flooded area of the Bare Meadow. Duck also retreated to open water in this location when disturbed by birds of prey in the general area, notably in February 2017, when 2 Buzzards were present on the ground feeding on unidentified invertebrate prey on the Bare Meadow in the southern floodplain.

Goosander were recorded on the River Slaney on November 28 2016 (2 birds upstream of the FDS area), and on 24 January 2017 when 5 birds were recorded resting, bathing and preening at the gravel bank / island in the river adjoining the northern floodplain within the FDS area. This Amber listed species

(Colhoun and Cummins, 2013) is resident at larger lakes in Counties Donegal and Wicklow, where there are probable small breeding populations, and it occurs as a rare or scarce winter visitor elsewhere in Ireland. Numbers of Goosander in Ireland appear to be increasing currently, from a low base. There have been 35 sightings of Goosander in Co. Wexford since 2009, the first records of Goosander on the Slaney at Enniscorthy were in November 2016 (www.irishbirding.com).

Moorhen

Moorhen were recorded on the Slaney and drainage channel at the northern floodplain (peak count 5), and on the wetlands, drainage channels and River Slaney at the southern floodplain (peak count 8), as a resident species and were present in every month.

Waders

Lapwing were the most numerous wader species recorded in the FDS area, and occurred only on the southern floodplain at Killagoley, where they fed during the day on wet and dry grassland, and roosted overnight at the central wetland. The peak count of 376 was recorded in February 2016, with a similar winter peak of 311 Lapwing recorded in January 2017. There was some evidence of some Lapwing leaving the southern floodplain to feed elsewhere during the winter of 2016/17, and feeding activity seemed less intensive on the southern floodplain during that winter also, with Lapwing staying closer to the wetland and ponds.

Snipe and Redshank were the other two wader species that were recorded consistently on the southern floodplain in both winters of the baseline studies, with a peak count of 26 recorded for both species (Table 11). Redshank were recorded only on the Bare Meadow Killagoley southern floodplain wetland, where they fed by day and roosted overnight. Snipe used both the Killagoley and Motabeg floodplain, and roosted overnight at the Killagoley wetland and ponds in early 2016, but appeared to roost mostly on the island near the east bank of the Slaney at Motabeg during the winter of 2016/17 (see Figure 3.5). There was one record of 2 Snipe on the northern floodplain, in March 2016 (Table 13). Single Redshank were recorded at the southern floodplain in May, September and October 2016 (Table 12).

Single Woodcock (in wet woodland at Motabeg) and Green Sandpiper (muddy channel at Motabeg, and Northern floodplain) were recorded in March 2016, and a single Greenshank was recorded on the Bare Meadow wetland at Killagoley in October 2016 (Tables 11, 12 and 13). Common Sandpiper were recorded in three months, 3 birds were recorded at the muddy channel at the island in Motabeg in July and December 2016, and a single bird was recorded on stony substrate at the river bank in April 2016 (Table 12).

3.2.3. Conclusions

The Grey Heron population using the proposed Enniscorthy FDS area is assessed as nationally important.

Enniscorthy FDS area supports a high diversity of waterbird species, with a total of 25 species recorded including wintering, passage and resident breeding species. The key habitat features supporting these populations are the wetland habitats on the Bare Meadow in the southern floodplain at Killagoley, that are supported by tidal flooding and include a permanently flooded area. Riverbank trees are also used as roosts. FDS design will need to demonstrate that these habitats will not be hydrologically compromised. Disturbance issues also arise during works, and will be difficult to mitigate because this wetland is used throughout the year.

The proposed compound channel design is also important; this has a potential to enhance or reduce habitat suitability for waterbirds. It is suggested that it would be appropriate to slope the 'shelf' slightly down to the main river channel, so that a portion remains uncovered during high water neap tides; this would assist in vegetation establishment (Reed Canary Grass *Phalaris arundinacea*, *Sparganium erectum*, note that some existing sections are quite species rich). Since the proposed 'shelf' width is up to 25m, occasional planting of groups of Alder could be carried out, to assist in stabilising the shelf

without scour around tree trunks during floods becoming an issue. Maintenance of grazing in future southern floodplain management is recommended. Control methodology for alien invasive species, and of rank growth of Dock and Nettle, should also be considered in future management planning.

PROPOSED ENNISCORTHY FLOOD DEFENCE SCHEME

Month	February 16	March 16	April 16	May 16	June 16	July 16	August 16	September 16	October 16	November 16	December 16	January 17	February 17	March 17
Little Grebe	1								1		1			
Great-crested Grebe									1					
Cormorant	14	8	1	1	1		3	3	5	9	12	5	9	9
Little Egret	2	2	2	1		1	3	5	3	3	3	4	1	1
Grey Heron	5	5	3	9	9	12	17	20	21	15	15	12	4	7
Mute Swan	2	3	2	1	1	2	5	5	8	8	10	7	6	2
Whooper Swan	1													
Wigeon	26	17							5	22	37	46	51	
Teal	95	36	2				5	20	54	21	174	33	26	9
Mallard	7	5	13	9	2	10	22	34	40	12	58	24	17	6
Goosander														
Moorhen	7	3	1	2	2	2	8	7	7	4	5	5	3	2
Lapwing	376	16							83	183	220	311		
Snipe	25	26	8									17		13
Woodcock		1												
Redshank	17	22		1				1	1		26	12		
Greenshank									1					
Green Sandpiper		1												
Common Sandpiper			1			3					3			
Kingfisher		1		1		1		1			1		2	
Black-headed Gull	267	171			16	29	180	135	157	64	74	47	41	30
Common Gull									1					
Lesser Black-backed Gull	2	1	4		1		1	2	1		1			
Herring Gull		2	3						2		2	3		
Chinese Goose	2		2	2					2	2	2	2		
Domestic Greylag	3								3	3	3	3		
Buzzard													2	1

Table 12. Peak waterbird counts on the southern floodplain (Bare Meadow and Motabeg) and adjoining River Slaney channel in each month.

PROPOSED ENNISCORTHY FLOOD DEFENCE SCHEME

Month	February 16	March 16	April 16	May 16	June 16	July 16	August 16	September 16	October 16	November 16	December 16	January 17	February 17	March 17
Cormorant		2	3	1					1				1	
Little Egret	1		2											
Grey Heron	1	2	1	2	3	1	2	1	1	2			1	
Mute Swan		3	2	4	3	3	3	1	2	7	2	1	2	2
Whooper Swan		1	1											
Teal		2								6				
Mallard		9	7	14	20			2	1	41	3	10	8	2
Goosander										2		5		
Moorhen									1	5		4	1	
Snipe		2												
Green Sandpiper		1												
Kingfisher	1		1*	2*	2**		1		1	1			1	
Black-headed Gull		4					1	15	12	11				
Lesser Black-backed Gull						2		3		1				
Herring Gull		2												
Great Black-backed Gull					1									

Table 13. Peak waterbird counts on the northern floodplain and adjoining River Slaney channel in each month.

Month	February 16	March 16	April 16	May 16	June 16	July 16	August 16	September 16	October 16	November 16	December 16	January 17	February 17	March 17
Little Grebe										1				
Cormorant	4						1		3	2	1		1	
Little Egret	1	1								1	1			
Grey Heron	1	1		1	3	3	1	3	3	3				
Mute Swan		2							2		1	2		
Teal										4				
Mallard	3	3	2	3	3	2	15	7	9	9		4		
Kingfisher		1					1			1				
Black-headed Gull	41	5			1	5	14	17	34	32	28	10	40	
Lesser Black-backed Gull								3						
Herring Gull														
Great Black-backed Gull														
Chinese Goose					2	2	2	2					2	
Domestic Greylag			3		3	3	3	3					3	3

Table 14. Peak waterbird counts on the River Slaney channel between Railway Bridge and Riverside Park Hotel in each month.

3.3. Breeding waterbirds

3.3.1. Grey Heron

A minimum of 11 Grey Heron nests were recorded in 2016, and 12 active nests were recorded in 2017, all of which were located in Scot's Pine trees near the Slaney to the south of Enniscorthy (Figure 13). Three nests were in trees adjoining the southern floodplain at Killagoley, and 8 or 9 nests were recorded in a treeline on the western side of the River Slaney, to the north of St. John's Wood, in 2016. In 2017, all three nests at Killagoley were active in January, and 9 nests at St. John's Wood were confirmed occupied during surveys in March, April and May 2017. Details of these nests are given in Table 15. Of interest is the observation that 2 nests in which 3 chicks were close to fledging and 1 had fledged on 11 April, had been re-occupied by 29 May, with incubating or brooding adults (possibly different birds to the pairs that had already bred successfully) recorded at both nests. The first fledged juvenile Grey Heron in 2017 was recorded on 11 April, somewhat earlier than in 2016. Two chicks were recorded at almost all nests; Grey Heron eggs hatch asynchronously, depending on egg laying date, so younger chicks may remain in the nest for several days after an older chick has fledged. The distribution of feeding and roosting Grey Herons within the FDS area indicates that birds nesting in these two areas share the resources available in the River Slaney and the associated wetland habitats (see Section 3.2.1).

Grey Herons are primarily colonial nesters, although often in small colonies of 2-10 nests. The largest colonies recorded internationally can include several hundred pairs. There is relatively little information on colony number, distribution and size in Ireland, a survey of heronries in Connemara recorded 29 colonies, with a total of 269 occupied nests, and an average colony size of 9.6 nests. The largest colonies contained 45, 38, and 21 nests (Partridge, 1984).

The Enniscorthy colony, including all 12 nests and the chicks recorded, would appear to give rise to a breeding seasonal peak numbering in the order of 40 or more Grey Herons.

There is a small heronry in woodland at Beggerin Island on the North Slob, in Wexford Harbour and Slobs SPA, where 4 Grey Heron nests were recorded in 2017 (Dominic Berridge, NPWS, pers. comm.).



Figure 13. Grey Heron nests recorded in Enniscorthy FDS area, 2016 and 2017

Record	Easting	Northing	Type	Notes
1	297420	138590	Heron nest 1, east of floodplain	In Scot's Pine. Two chicks recorded here initially in March 2016. Probable predated remains of one chick recorded nearby in wet woodland at Grid Ref. 297,408 138,206 on 22 March 2016. 1 remaining well grown chick, close to fledging by 13.04.16, not seen in nest 29.04.16 or 19.05.16. Adults recorded at nest 1 in January 2017, and an adult was recorded incubating/brooding on 16.03.2017. No activity recorded on 4.05.2017, any young may have already fledged.
2	297430	138620	Heron nest 2, east of floodplain	In Scot's Pine, two chicks in nest confirmed 13.04.2016, smaller than chicks in nest No. 1, still downy. 1 chick confirmed in nest 19.05.2016. Nest 2 confirmed occupied on 21.02.2017, when an incubating adult threatened a Buzzard flying directly over the nest. 1 recently fledged juvenile recorded on 4.05.2017.
3	297439	138659	Heron nest 3, east of floodplain	In Scot's Pine. Nest first noted on 12.07.16 when adult seen attending two well grown young. Both adults (by flight direction) recorded visiting nest, one confirmed carrying fish, on 20.07.16. 2 juveniles confirmed, one seen preening and wing flapping. Both juveniles fledged by 29.07.16, noted returning to nest at 20.55. Adult recorded at nest 3 on 17.01 2017, nest confirmed occupied 21.02 2017, 1 recently fledged juvenile recorded on 4.05.2017.
4	297020	138100	Heronry of 9 nests, west of Slaney in treeline	All nests in Scot's Pine. 8-9 complete nests considered to be used or occupied in 2016, 6 nests had adults or nestlings in or beside them on 18.05.2016. Adult Grey Heron noted flying downstream towards this heronry carrying a stick on 20.07.16. 6 active nests were recorded on 16.03.2017: 2 with adults bringing sticks, 1 with 2 well grown chicks (1 of these had fledged by 11.04.2017), 1 with one adult incubating/brooding and the other adult provisioning, and 2 nests not well seen. Further survey on 11.04.2017 recorded 9 nests: 2 with adults incubating/brooding (one of these had 2 chicks visible by 29 th May, the other was still brooding), 1 with an adult guarding unseen chicks (2 chicks were recorded in this nest on 29 th May), 2 nests each with 2 downy chicks, and 3 nests with well grown chicks: 1 chick visible on branch above nest, 2 visible on branches near nest, and 1 remaining and 1 recently fledged juvenile returning to nest – both of these last two nests had been re-occupied, possibly by different adults, and incubating birds were observed in them on 29 th May 2017 . The 9 th nest had whitewash evidence of occupation in April, and 2 well grown chicks close to fledging were confirmed at it on 29 th May. As of 29 th May, 15 well grown chicks had been recorded at this colony, and 3 adults were incubating/brooding of which 2 were re-occupied nests (possibly by different adult birds) after apparently successful breeding.

Table 15. Details of Grey Heron nests at the southern floodplain Killagoley, and to the west of the Slaney at St. John's.

3.3.2. Kingfisher

Kingfishers were recorded throughout the year on the Slaney, with almost all sightings upstream of the railway bridge to the north of the town, and downstream of Seamus Rafter Bridge to the south. Two Kingfisher territories were identified during baseline studies. This species is listed in Annex 1 of the Birds Directive.

A number of potential nest holes along the left bank of the Slaney in the northern floodplain were kept under observation during early 2016, and while Kingfishers were recorded perched and moving through this area, a nest was found located further upstream and breeding was confirmed by sightings of a pair together, and by provisioning at the location shown in Figure 14. The nest was in a vertical bank extending more than 2m above low to moderate river levels, with a treeline on top, and with branches overhanging the river. In 2017, there were indications of a possible nest site within the FDS area in the northern floodplain; on 29 May 2017 a Kingfisher carrying prey was observed flying downstream and was lost to view as it passed opposite the car park on the right bank, returning upstream without prey within a time interval short enough to suggest it had been provisioning a nest. There was a subsequent observation of a Kingfisher flying downstream along the northern floodplain. This possible nest site was not confirmed.

To the south of Seamus Rafter Bridge, during vantage point watches of the proposed new bridge location, a Kingfisher was recorded twice flying upstream to land with prey on Alder branches overhanging the river opposite Riverview Park Hotel, and then returning downstream. Kingfishers kill fish by whacking them against a firm substrate before swallowing them, thus overhanging branches are an important habitat feature. Observations in the southern part of the FDS area throughout the baseline studies included Kingfishers entering and leaving the Urrin River channel. On 21 February 2017 two Kingfishers were recorded flying downstream to the island along the left bank of the Slaney at Motabeg, the pair returned together, calling, to the Urrin River channel at dusk. The Slaney riverbank in the southern floodplain is generally sloping, and subject to tidal flooding, and is considered unsuitable for nesting; the nest site of this pair was not found but is thought to be along the Urrin River channel.

The nest sites in the two Kingfisher territories identified were located outside the FDS area in 2016, but the associated feeding areas include use of the Slaney within the FDS area, and the watercourses and drainage channels connected to the Slaney, including the drainage channel on the eastern side of the northern floodplain. The habitats within the FDS area at the northern floodplain have the potential to support a nest site. Kingfishers show a preference for river banks of at least 1-2 metres high and for vertical banks, with a slight preference for some emergent/ fringing vegetation while water quality, availability of suitable perches and adequate fish populations are also important in the overall suitability of river corridors (Cummins et al, 2010).



Figure 14. Enniscorthy north of the FDS area, observations of Kingfisher pair near confirmed nest site in 2016.

3.3.3. Mute Swan

In 2016, two pairs of Mute Swans were present in Enniscorthy FDS area. One pair nested on the left bank of the Slaney immediately upstream of the northern floodplain, and one cygnet hatched from this nest. This family party remained on the Slaney in the FDS area throughout 2016. A second pair commenced constructing a nest on the left bank at the southern floodplain, opposite the River Urrin inflow, but this breeding attempt failed after the nest was flooded during a spring tide.

In 2017, two pairs were again present in the FDS area. A nest on the left bank immediately upstream of the railway bridge, at the confluence of the drainage channel on the eastern side of the floodplain with the Slaney, was recorded in April and May. At the southern floodplain, a pair was recorded on 4th May, nesting on the right bank of the Slaney below Gorse bushes, c. 100m downstream of the Urrin inflow.

3.3.4. Mallard

During 2016, there were 5 confirmed Mallard successful breeding outcomes in southern floodplain area. No nests were found, but females with ducklings were recorded using the ponds and wetland area as nursery. Two Mallard broods were recorded on the Slaney at the northern floodplain in 2016, and two pairs were recorded in this area in February 2017, with two additional pairs recorded upstream within 1km of the FDS area. The drainage channel to the east of the northern floodplain provides suitable nursery habitat.

3.3.5. Moorhen

During 2016, 3 Moorhen successful breeding outcomes were recorded in southern floodplain area, and one in the northern floodplain where the drainage channel to the east of the floodplain provides suitable nesting habitat.

3.4. Riparian breeding species

3.4.1. Sand Martin

A Sand Martin colony of about 12 nests was identified by Goodwillie and Associates (2003) on the left bank of the Slaney at the northern floodplain, and Sand Martins were recorded feeding at the riffle during that survey. Some old nest holes were still visible in this area in 2016 and 2017, but no nesting activity occurred. Two Sand Martin colonies, at different locations along the left bank at the northern floodplain, were recorded in 2016 (Figure 15). This species is Amber listed as a Bird of Conservation Concern (Colhoun and Cummins, 2013).

Small numbers of Sand Martins were recorded in Enniscorthy during surveys in April 2016, but were feeding in the general area and no activity was recorded at the colony sites subsequently established in May 2016. Sand Martins are an Amber listed species of conservation concern.

Sand Martin colony No. 1 extended some 60m in length in 2016 (Figure 15). It was recorded from the west bank, as it can't be well seen from the east bank. Most of the nest holes were newly excavated, in a vertical bank at which slumped material along the toe of the bank had been removed during winter floods in 2015/16, however there was evidence of ongoing slumping here during the summer of 2016. Three old holes previously recorded were not recorded as active on 18th May, but one of them was in

use by 31st May. Additional new entrances were recorded at the end of May and in June 2016. A total of 35 active nests were recorded in June 2016, no second broods were confirmed at Colony 1 and no activity was recorded in July or August 2016. (Table 16). No activity was recorded at this colony in April and May 2017, the presence of slumped material and vegetation along the base of the bank is considered to have reduced the suitability of this section of the bank for nesting Sand martins (see Plate 3).

Colony No. 2, immediately upstream of the riffle (Figure 15), was found to have 2 active nests on 18th May 2016. Five active nests were recorded here on 30th May, and activity at these continued into July. Two active nests were recorded on 24 August 2016, with chicks close to fledging confirmed at both; these are assessed as second broods (Table 16, Plate 3).

In 2017, 4-5 active nests were recorded on 11th April, 8 active nests were present at Colony 2 by 4 May and some fledglings were present in the colony area, with 1 nest recorded on 11 April assessed as holding a second clutch by 4th May. On 29th May, 8 active nests including 2 newly occupied and 1 old nest hole were recorded, and all 8 were assessed as being second broods.



Figure 15. Sand Martin colonies recorded within Enniscorthy Flood Defence Scheme Area

Colony 1	Colony 2
2016	2016
18.05.16: 24 active nests 30/31. 05.16: 28 active nests 17.06.16: 35 active nests 6.07.16: 0 active nests 12.07.16: 0 active nests 24.08.16: 0 active nests	18.05.16: 2 active nests 30.05.16: 5 active nests 17.06.16: 5 active nests 6.07.16: 4 active nests 12.07.16: 5 active nests 24.08.16: 2 active nests, second broods,
2017	2017
11.04.2017: 0 active nests 4.05.2017: 0 active nests 29.05.2017: 0 active nests	11.04.2017: 4-5 active nests 4.05.2017: 8 active nests 29.05.2017: 8 active nests, of which 3 were newly occupied, second broods

Table 16. Active Sand Martin nests recorded in 2016 and 2017.

Incubation in Sand Martins lasts for 14-15 days, the fledging period averages 22 days (range 19-24 days). Fledglings remain dependant on parents for about 1 week after leaving the nest. Double brooding is the norm, with egg laying in the first brood typically commencing in late April to early May. Sand Martin nest holes range in length from 35 to 119cm, with an average length of 65cm, and end in a nest chamber 4-6cm in diameter (Snow and Perrins, 1998).

Sand Martins usually nest by burrowing into sand and clay in vertical river banks and sea cliffs, and also use a range of artificial nest sites including sand and gravel pits, peat cuttings, and built structures including quay and harbour walls, and castles. Nests in built structures ranged in height above high water level or ground level by between 1m and more than 7.5m (Whelan *et al*, 2016). The selection of vertical banks and structures for nesting assists in reducing access by potential predators (Cummins *et al*, 2010).

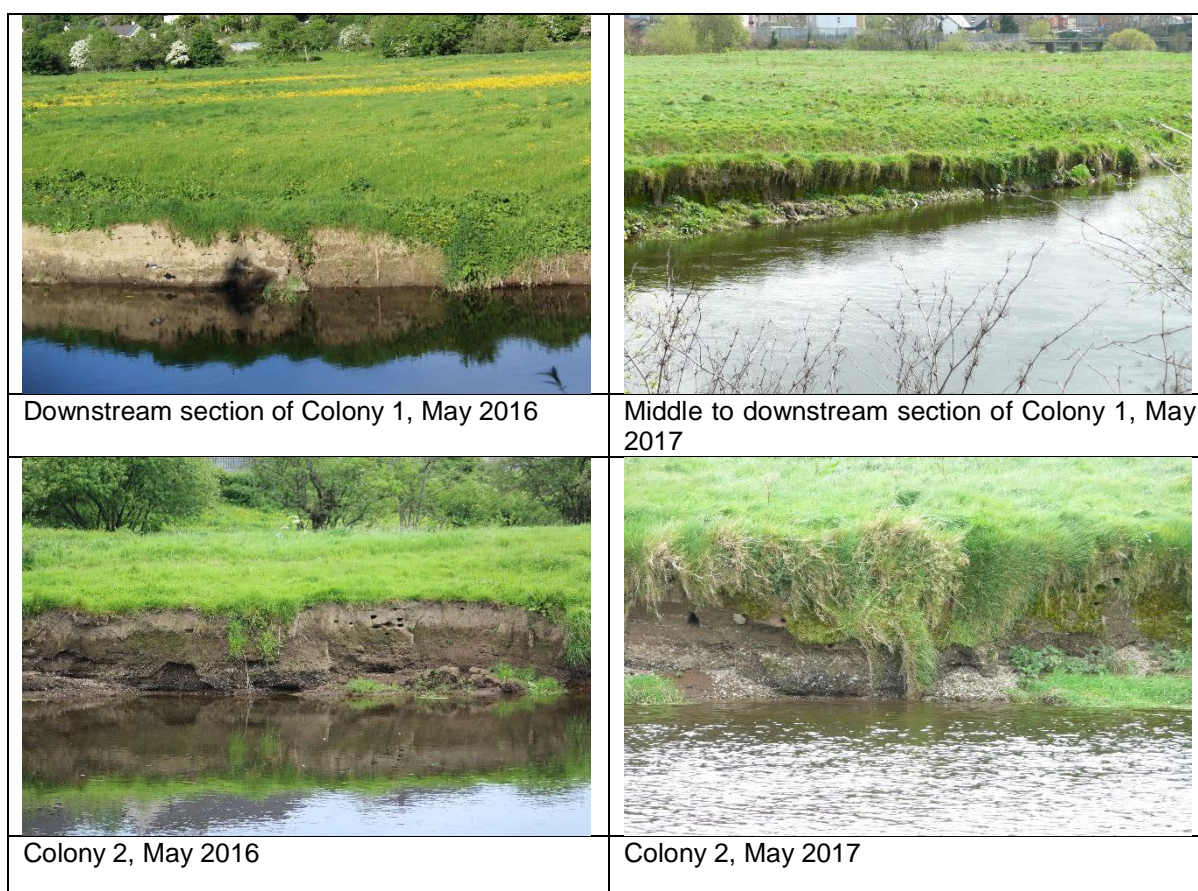


Plate 3. Sand Martin colonies on left bank of the Slaney at the northern floodplain

3.4.2. Other riparian species

Grey Wagtail were recorded as breeding within the FDS area in 2016, with a confirmed nest in the northern floodplain left bank of the Slaney opposite the gravel island in 2016. An adult was also seen feeding a fledgling on the gravel island, and the species was recorded here regularly. On 4th May 2017 a Grey Wagtail was observed in the same location in flight catching insects, and then flying upstream towards the right bank carrying food; the 2017 nest site was not confirmed. An adult Grey Wagtail was recorded with 3 fledglings on the railway bridge on 29th May, and may have nested in the deck of the bridge. Grey Wagtails were also recorded feeding along the River Slaney within Enniscorthy town, and

at the wetland in the southern floodplain (Appendix 3). A Yellow Wagtail was recorded near Old Bridge on 19 September 2016, feeding near two Grey Wagtails.

Grey Wagtails are known to have nested in the stone wall under the N11 downstream of Seamus Rafter Bridge in recent years (NPWS pers. comm.), but this was not observed during this baseline study. Grey Wagtails are a Red-listed species of Conservation Concern in Ireland.

Common Sandpipers were recorded along the Slaney on three occasions during 2016 (Table 11), but was not recorded as breeding. This species prefers more upland stony rivers (Cummins *et al*, 2010) and stony lake shores for breeding, the closest confirmed breeding areas are the Blackstairs and Wicklow Mountains (Balmer *et al*, 2013).

There were two sightings of a single Green Sandpiper, possibly the same bird, on 22 and 23 March 2016 (Tables 11, 12, 13, Appendix 3). It is assumed that this individual was a passage migrant, Green Sandpipers have not been confirmed as a breeding species in Ireland (Cummins *et al*, 2010, Balmer *et al*, 2013).

Dippers were not recorded on the Slaney in the proposed Enniscorthy FDS area, this species is associated with fast flowing stony rivers throughout the year, and the river habitats on the Slaney at Enniscorthy are not considered suitable for this species.

3.5. Raptors

High levels of Buzzard activity were recorded in the Enniscorthy area, with up to 8 individuals recorded simultaneously (Appendix 4). All records of raptors (birds of prey) observed during Vantage Point watches for birds of prey, walk-over surveys, and during waterbird counts are amalgamated in Figure 16 to indicate the general area in which breeding territories were located.

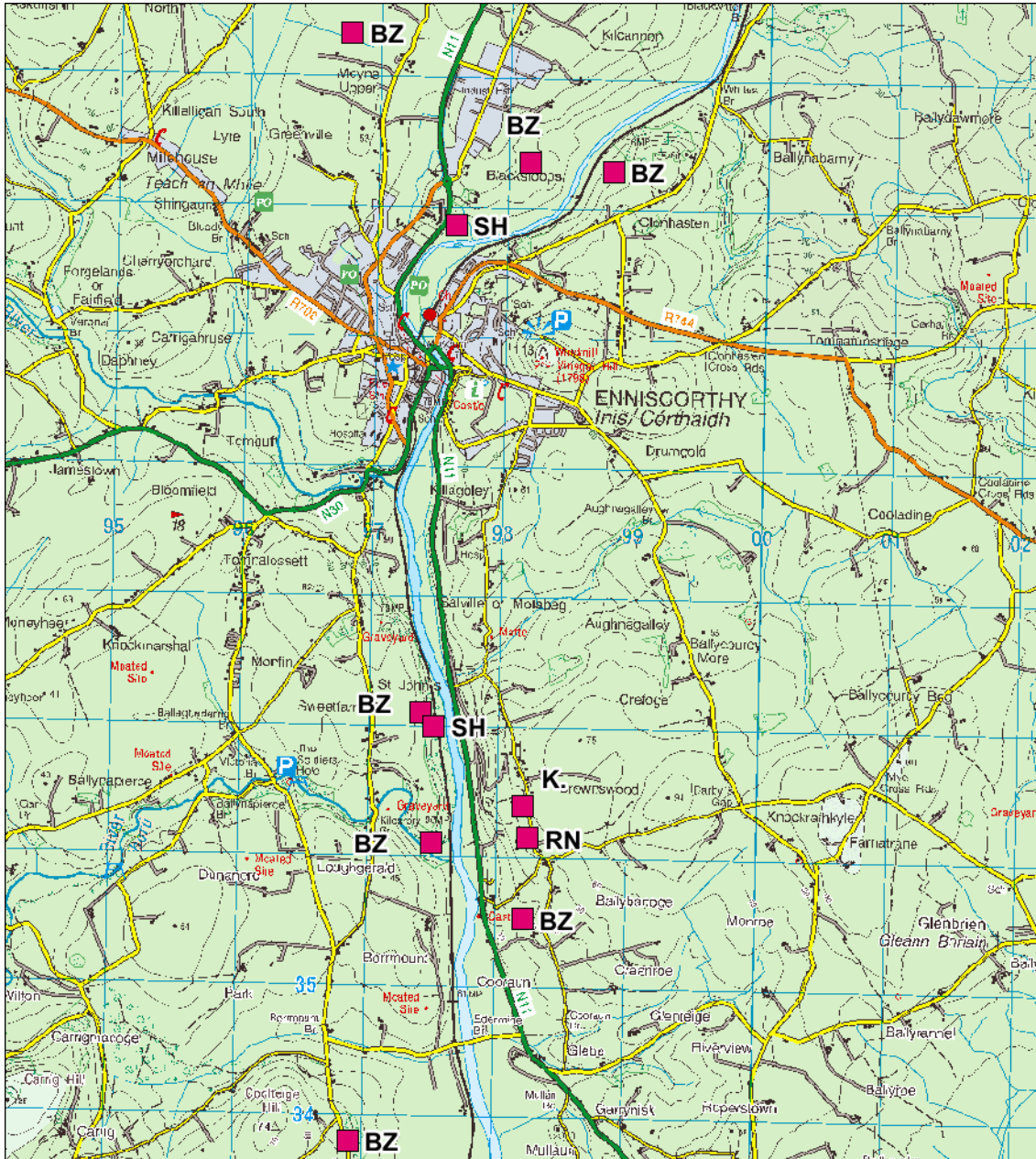


Figure 16. General location of raptor territories at Enniscorthy in 2016.

Six Buzzard territories were recorded to the north of Edermine Bridge. There was at least one territory in the general area of Moyne Upper, one in Blackstoops, and one in Clonhasten, to the north of Enniscorthy. To the south of Enniscorthy, a pair of Buzzards was confirmed in St. John's Wood; the male of this pair could be distinguished throughout the summer of 2016 by missing inner primary feathers on the right wing. There were two further pairs to the south, one in Cooraun on the eastern side of the Slaney, and one on the western side at Loughgerald. A further territory was identified to the

south of Edermine Bridge. Juvenile Buzzards were confirmed to be present during late summer at Blackstoops, Clonhasten, and at St. John's Wood. Additional pairs of Buzzards were located further away from the Slaney corridor. A Buzzard territory boundary was noted on the southern slopes of Vinegar Hill; Buzzards from the St. John's Wood territory approaching this area were generally challenged by birds coming from the north. There is a Rabbit warren in the field to the east of the existing N11, at the site of the proposed approach roads to the roundabout approach to the new bridge; Buzzards regularly quartered this area as Rabbit is a dominant prey species (Nagle et al, 2014). Attempted predation of Mallard ducklings and of a Grey Heron nest by Buzzards were observed at Enniscorthy. In February 2017, two Buzzards were observed by telescope on the ground in the southern floodplain, and were taking invertebrate prey; this behaviour was confirmed by Alyn Walsh of NPWS as occurring in early spring in particular.

Two Sparrowhawk territories were recorded, one in the Blackstoops area near the northern floodplain, and a second territory to the south of the town in St. John's Wood. Kestrel and Raven pairs were confirmed at the southern Roadstone quarry (Figure 16). A Peregrine pair was recorded in 2016 and details provided to the organiser of the 2017 Peregrine survey; as is customary for this Annex 1 listed species, details are withheld from this report.

Although nest sites used by raptors were not found in 2016, no nests sites were located in trees and woodland areas potentially impacted by the proposed FDS.

3.6. Owls

No Barn Owl activity was recorded during the surveys. Sites 3, 22 and 25 were reported to have been used by Barn Owls in the past. There were reports of recent sightings (before the storms of winter 2015/16) of a single Barn Owl along the driveway (site 4) to the buildings at site 3. This area was visited on three occasions at dusk in July 2016, but no owls were seen or heard.

It is noted that all other current local reports of owls refer to Long-eared Owls, which can also look very pale when seen under-lit by vehicle headlights at night.

NPWS knows of only 2 current Barn Owl territories in Co. Wexford, neither of which are in the Enniscorthy area.

None of the potential Barn Owl sites surveyed will be affected by the proposed Enniscorthy Flood Defence Scheme.

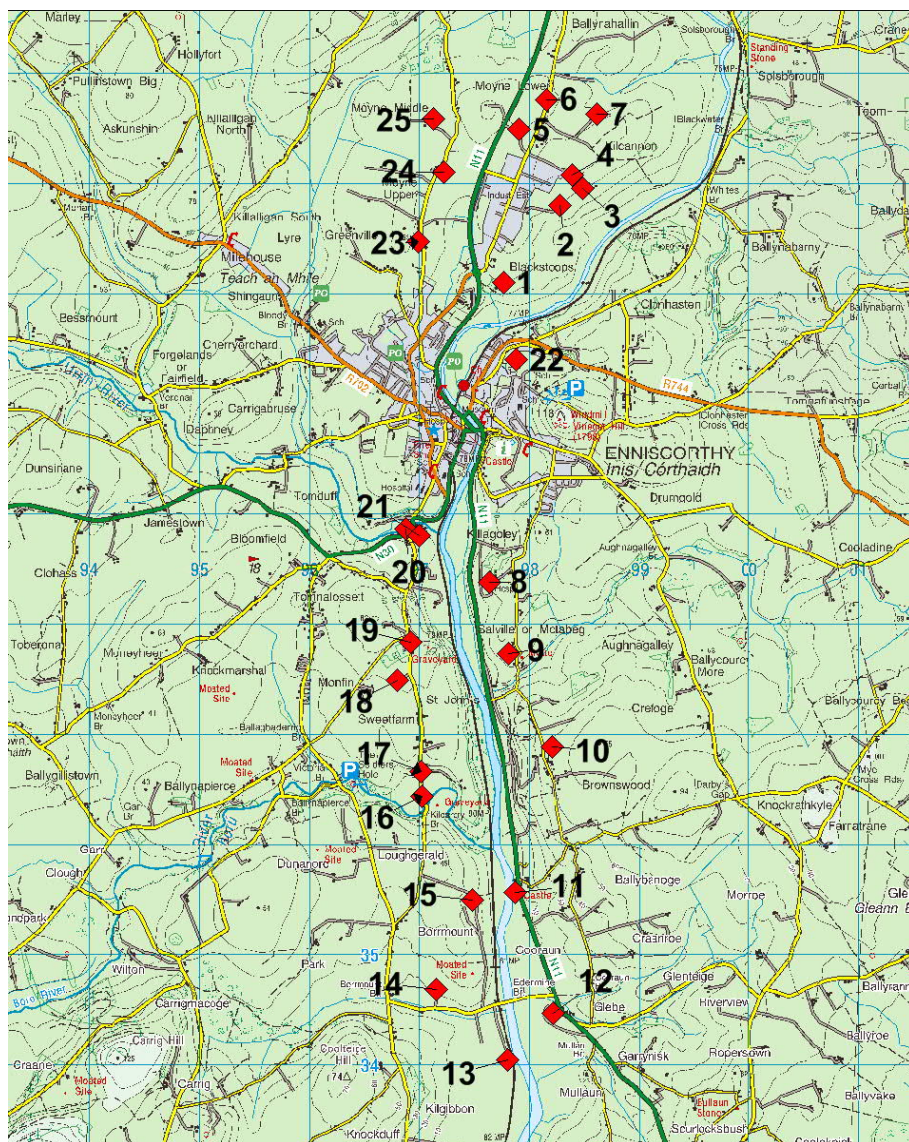


Figure 17. Potentially suitable Barn Owl sites in the vicinity of Enniscorthy Flood Defence Scheme.

Long-eared Owl calls were heard at the Larch plantation on the western side of the Slaney c. 1km upstream of the proposed Flood Defence Scheme area in April 2016, but there were no sightings during subsequent searches, including a thorough search on 28 November 2016. A Long-eared Owl winter roost is reported locally in this woodland, typically of 1-4 birds, with 7 recorded on one occasion, but

according to local information there were no sightings during the winter of 2016/17. Breeding in 2016 is possible but was not confirmed.

3.7. Other breeding birds

The occurrence and distribution of breeding bird species other than those described in sections 3.3 to 3.6 inclusive are described in this section, and are listed in Table 17. These species were recorded primarily in woodland and scrub habitats, including wet and dry woodland. Chaffinch, Robin, and Wren were the species most frequently recorded singing in scattered riverbank shrubs and trees, these also occurred in woodland areas and together with Blackbird were the most commonly recorded resident species. Blackcap was the most commonly recorded warbler, and while more abundant in dry woodland (5 pairs in the right bank woodland adjoining the river at the northern floodplain, c. 20 pairs within the core study area), Blackcaps were also recorded singing in wet woodland, including in the alluvial woodland at the proposed new bridge on the eastern side of the Slaney, in Bramble scrub above the railway line on the western side, and in wet woodland at the eastern side of the northern floodplain. Bird species recorded singing within the footprint of the proposed new bridge and associated roads are listed in Table 17.

Species	Proposed new bridge and roads		River Slaney	Northern Floodplain	Southern Floodplain	Wider scheme area	Notes
	Right bank	Left bank					
Feral Pigeon						✓	Enniscorthy town
Wood Pigeon		✓	✓	✓	✓	✓	Recorded throughout, visits river shallows to drink, nests in woodland and mature trees
Stock Dove						✓	Single record u/s of FDS, left bank rock outcrop
Barn Swallow			✓	✓	✓	✓	Feeding use of floodplains and river corridor, nests at buildings
Swift						✓	Feeding use of floodplains and river corridor, nests at buildings
House Martin						✓	Feeding use of floodplains and river corridor, nests at buildings
Pied Wagtail			✓	✓	✓	✓	Feeding use of floodplains and river corridor, nests at built structures
Wren	✓	✓		✓	✓	✓	Woodland and scrub
Duncock	✓	✓		✓	✓	✓	Woodland and scrub
Robin	✓	✓		✓	✓	✓	Woodland and scrub

PROPOSED ENNISCORTHY FLOOD DEFENCE SCHEME

Species	Proposed new bridge and roads		River Slaney	Northern Floodplain	Southern Floodplain	Wider scheme area	Notes
	Right bank	Left bank					
Stonechat				✓	✓		Pairs recorded breeding not confirmed
Blackbird	✓	✓		✓	✓	✓	Woodland and scrub
Song Thrush	✓	✓		✓	✓	✓	Woodland and scrub
Mistle Thrush				✓		✓	Woodland and scrub
Blackcap	✓	✓		✓	✓	✓	Wet and dry woodland
Chiffchaff		✓		✓	✓	✓	Wet and dry woodland
Willow Warbler				✓	✓	✓	Wet woodland within FDS
Goldcrest	✓			✓	✓	✓	Dry woodland and scrub
Long-tailed Tit	✓	✓		✓	✓	✓	Wet and dry woodland
Blue Tit	✓	✓		✓	✓	✓	Wet and dry woodland
Great Tit	✓	✓		✓	✓	✓	Wet and dry woodland
Coal Tit		✓		✓	✓	✓	Wet and dry woodland
Jay						✓	In mature treelines u/s of FDS
Magpie				✓	✓	✓	Urban and rural
Jackdaw				✓	✓	✓	Urban and rural
Rook				✓	✓	✓	Small rookery in mixed woodland above SF
Hooded Crow				✓	✓	✓	Several nests in dry woodland through FDS
Raven						✓	At quarry outside FDS
Starling				✓		✓	Feeding use of floodplains, 1 breeding record in river corridor
House Sparrow				✓		✓	Feeding use u/s of railway bridge
Chaffinch	✓	✓		✓	✓	✓	Common in riverbank trees and shrubs
Greenfinch	✓	✓				✓	On higher ground above floodplain
Goldfinch		✓				✓	On higher ground above floodplain
Bullfinch	✓					✓	Woodland and scrub
Yellowhammer						✓	Probable breeding upstream of FDS, 3 birds, territorial song June and July

Table 17. Additional breeding bird species not included in Sections 3.3 to 3.6

Note: Red and Amber listed species of Conservation Concern are indicated.

Blackbird, Blue Tit, Starling and Woodpigeon were recorded as breeding in scrub and trees along the right bank between the Railway Bridge and Old Bridge.

No breeding waders were recorded. The southern floodplain was considered to provide suitable breeding habitat for Snipe, Lapwing and Redshank, all of which occurred as wintering species. Lapwing showed some elements of display flight before departure in spring 2016, but no breeding attempts were recorded. The wetland habitats in the southern floodplain may simply be too small to support breeding waders, and the constant presence of Grey Herons, Buzzards, Hooded Crows and other potential predators, as well as disturbance by livestock through the summer and autumn, may combine to make the area unsuitable. The northern floodplain is too dry to support breeding waders.

Meadow Pipit, Skylark, and Linnet were not recorded at any time during the baseline studies. A single Redpoll was recorded in March 2016 but there were no subsequent records of this species.

4. BIRD MOVEMENT AND HEIGHT OF FLIGHT AT THE PROPOSED NEW BRIDGE LOCATION

The total number of recorded waterbird movements through the location of the proposed new bridge during vantage point watches, and the height bands within which they were recorded, are given in Table 18. Recorded movements and heights of non-waterbird species are given in Table 18. Black-headed Gulls and Lesser Black-backed Gulls were the most frequently recorded waterbird species (Table 18, and see Section 3.2.2), followed by Mallard, Lapwing, Cormorant, and Grey Heron.

The timing of waterbird flight activity through the proposed new bridge location during dawn and dusk watches is shown in Figures 18 and 19.

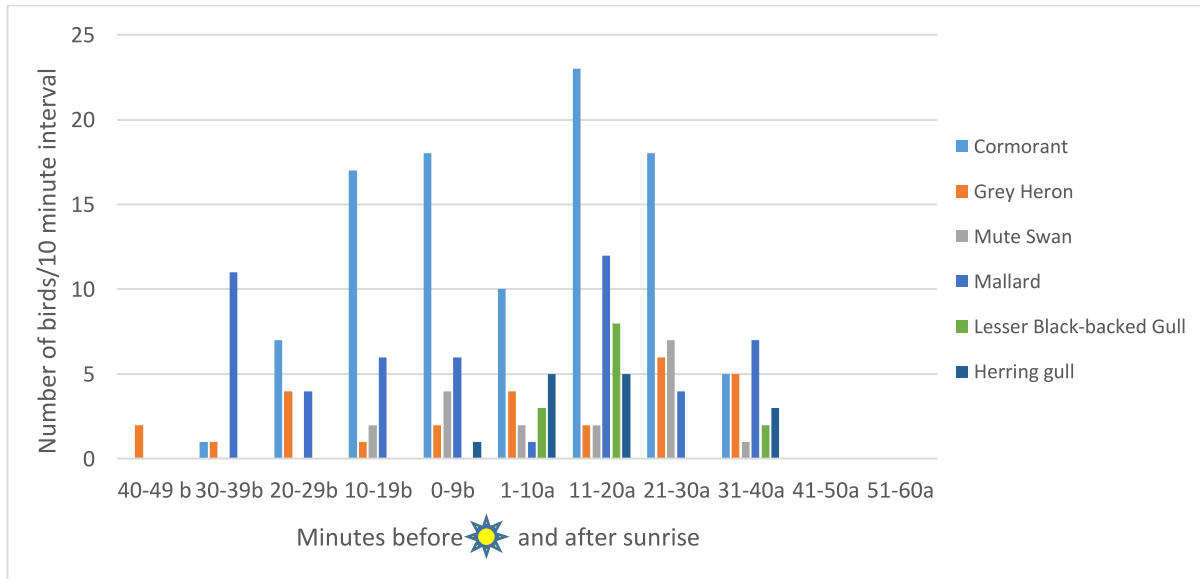


Figure 18. a. Total movements of waterbirds other than Black-headed Gulls recorded before (b) and after (a) sunrise

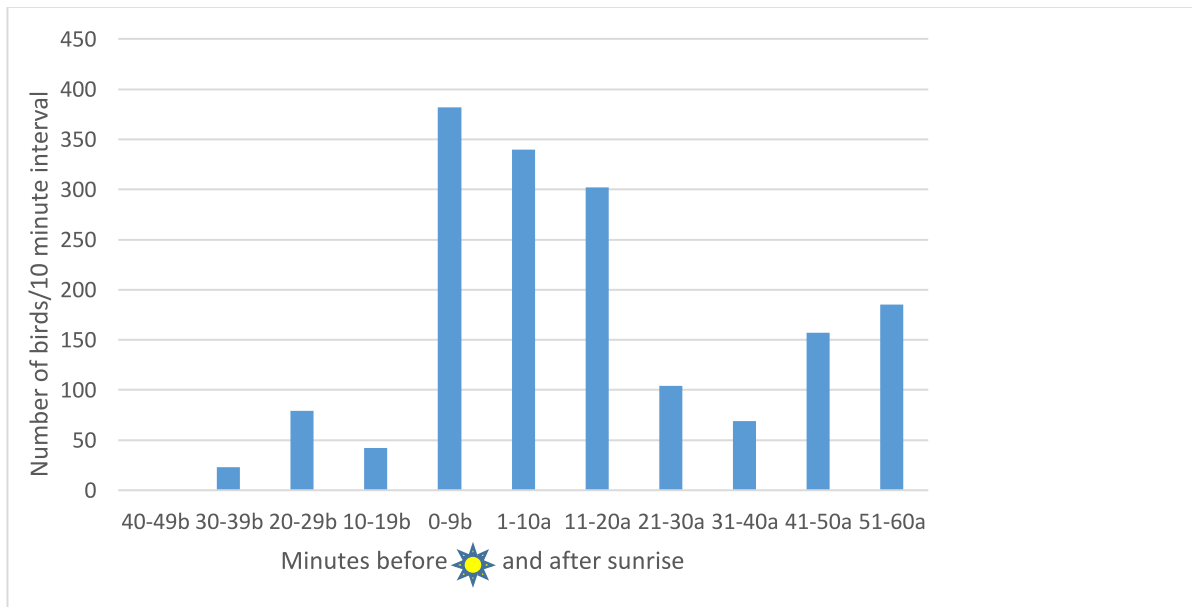


Figure 18. b. Total Black-headed Gull movements recorded before (b) and after (a) sunrise

Grey Herons were the first waterbird species to be recorded in flight before sunrise, and the last recorded after sunset, with the earliest movement recorded 42 minutes before sunrise (Figure 18, and see Section 3.2.1). Cormorant and Mallard were the next species to be recorded moving in the morning, with the earliest Mallard movement recorded 36 minutes before sunrise, and the earliest Cormorant record at 31 minutes before sunrise (Figure 18). In the evening, Cormorants left the Enniscorthy area before sunset, with the last flight recorded 4 minutes before sunset. The latest recorded Mallard flight was 40 minutes after sunset. The last recorded Grey Heron flight was at 57 minutes after sunset (Figure 19).

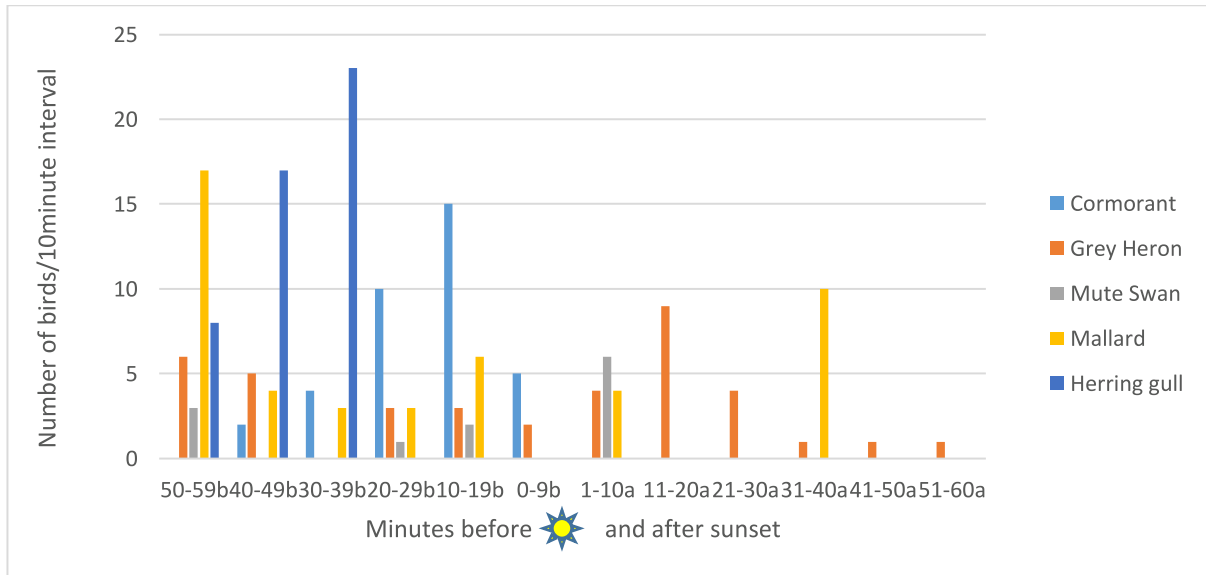


Figure 19.a. Total movements of waterbirds other than Black-headed Gulls recorded before (b) and after (a) sunset

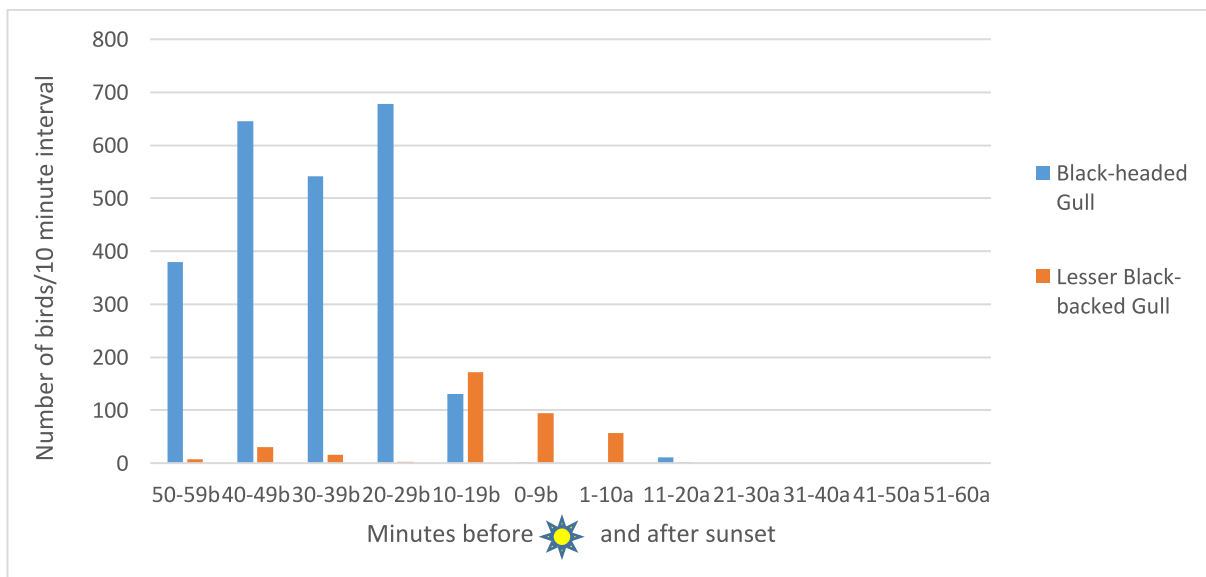


Figure 19.b. Total movements of Black-headed Gulls and Lesser Black-backed Gulls recorded before (b) and after (a) sunset

The earliest Mute Swan movement through the proposed new bridge location was recorded 27 minutes before sunrise, and the latest 38 minutes after sunset (Figures 18 and 19); these records were of birds swimming on the River Slaney, and swans were not recorded in flight before sunrise or after sunset. All

records of Mute Swans recorded during vantage point watches at the proposed new bridge location, from February 2016 to January 2017 inclusive, were of resident breeding birds. A herd of 14 non-breeding Mute Swans were present on the Slaney at the northern floodplain for a number of days in early May 2017.

Most upstream gull movements in the morning at the proposed new bridge location occurred at and immediately after sunrise (Figure 18), and in the evening most downstream gull movements occurred before sunset (Figure 19). This pattern is considered to reflect the distance travelled from overnight estuarine or coastal roosts to Enniscorthy; typically gulls start to move away from overnight roosts at first light, returning to roost areas after sunset until last light.

4.1. Flight height relative to proposed bridge deck level

Recorded waterbird flight height data are given in Table 18. This table includes calculation of the percentage of all flights through the bridge corridor that were below, and within 5m above the deck level of the proposed bridge for each species, since the principal collision risk with the proposed bridge structure arises within these flight height bands (see Figure 10, Section 2.4). Flight height data for birds other than waterbirds are given in Table 19.

With regard to Grey Herons, 75% of all flights recorded were within 5m of the bridge deck level, with 84 recorded flights below deck level and 43 recorded flights between deck level and 5m above deck level (0-5m height category). Many of the Grey Heron flights recorded at the proposed bridge location were short movement flights between feeding sites on the river bank and channel or in the drainage channel to the east of the southern floodplain (see Figure 11, Section 3.2.1). These flight heights were usually low, within 2m of river bank level, for example at mid tide as feeding areas in the vicinity of the proposed bridge became available, and peak heron movement rates were recorded at mid tide (see Tables 20 and 21).

Flights close to bridge deck level at the bridge corridor (both above and below deck level) included movement flights at dawn and dusk to and from tree roosts in the alluvial woodland at the proposed bridge location, tree roosts in the woodland to the east of the N11, and flights between feeding areas and the wetland roost at the ponds in the southern floodplain, where most of the daytime Grey Heron roosting occurred (see Section 3.2.1, Figure 10, and Tables 20 and 21). At the proposed bridge corridor, 25% of Grey Heron flights were more than 5m above deck level, these included movement flights to and from tree roosts, and also longer distance flights within and outside the FDS area. Only three Grey Heron flights of more than 30m above deck level were recorded; two of these were birds gaining height to fly east and north east above the woodland east of the N11.

Grey Heron flight heights during dawn and dusk watches, and during the day at high, mid, and low tide, are given in Table 20. Flight frequency/hour is given in Table 21. Grey Herons moved through the proposed bridge location least frequently at low tide, at which time birds would have been feeding. Flight movement at the bridge location peaked at 5.33 movements/hour at mid tide, relating to the availability of shallow water feeding areas as water levels rose and fell.

Little Egrets mostly flew below deck height, within 2m of the Slaney water surface, and 81% of flights recorded were below deck height and up to 5m above deck height (Table 18).

Cormorant flight activity included commuting flights to and from overnight roosts, as well as local movements of feeding birds (Section 3.2.2); 47% of all flights were below deck height and up to 5m above deck height and 76% of these flights were below deck height at the bridge location (Table 18).

Most Mute Swan movement through the proposed bridge corridor was by swimming birds (61 movements recorded of which 49 were swimming, 80% of total movements, Table 18). Flight height ranged up to 30m above deck height, with 33% of recorded flights below deck height and up to 5m above deck height. One observation was of a Mute Swan changing flight height from below and close to water at bridge deck location, rising as it flew upstream past the hotel towards Seamus Rafter Bridge. Another observation was of a group of 4 Mute Swans flying downstream 10-20m above deck level, and then flying west away from the Slaney floodplain.

Most Mallard flew along the Slaney river corridor, 84% of records were of flying duck and 16% of swimming birds. Flying Mallard were mostly close to deck height, with 77% of recorded flights below deck height and up to 5m above deck height, many of which were close to deck height. All recorded Teal flights were below deck level (Table 18).

All recorded Kingfisher flights were below deck height. Typically, this species moves within the river corridor between the river banks and below bank height, and using perches within this cross sectional area; the highest recorded observation was a Kingfisher briefly perching on a fence post c. 1m high on the left bank at the southern floodplain.

With regard to waders, there was one record of a flock of 60 Lapwing milling above and below deck level at the bridge location, and three records of flocks flying to and from the ponds on the southern floodplain crossing the bridge corridor at heights of at least 10m above deck height (Table 18). A single record of a Redshank, and of a Common Sandpiper observed during walk-over survey, recorded flight below deck level at the bridge location.

Gull flight heights ranged from below deck level to more than 30m above deck level at the bridge location. As noted in Section 3.2.2, Black-headed Gulls are the dominant gull species using the FDS area and commuting daily from estuarine / coastal overnight roosts. Recorded flight height peaked below deck height and at more than 30m above deck height, with 35% of all recorded flights below deck height and up to 5m above deck height (Table 18).

Lesser Black-backed Gulls recorded flying downstream during dusk watches in September and October 2016 were recorded at heights of more than 20m and mostly more than 30m above proposed bridge deck height, moving along the oak woodland and ridge along the eastern side of the river corridor towards the south east. This species typically commutes along topographic ridges, though it does occur in small numbers through the FDS area throughout the year and this is reflected in 7% of recorded flights being below deck height and up to 5m above deck height (Table 18).

Herring Gulls flew mainly at 10 – 20m above deck height when commuting, 19% of recorded flights were below deck height and up to 5m above deck height (Table 18), reflecting birds feeding within the FDS area.

Non-waterbird movements were dominated by Wood Pigeon, Rook and Jackdaw (Table 19). Wood Pigeon feed on floodplain grasslands and also in intensively farmed land, and nest throughout the FDS study area in woodland and mature treelines. Rooks and Jackdaws feed widely within the FDS area and, outside the breeding season, were using an overnight roost site in the Aughnagalley / Drumgold area, c. 2km to the east of the River Slaney corridor, so some the flight activity recorded related to dawn and dusk movements across the river between feeding and roosting areas. Records of Hirundines included movement of Swallows and House Martins upstream on 29 April 2016, and these appeared to be late migrants. Swallows, House Martins and Sand Martins also made feeding use of the river corridor, feeding over the Slaney and also making quick visits to drink.

Waterbirds	Total movements	Direction of movement				On water swimming	Height of flight relative to proposed bridge deck level								
		Up stream	Down stream	Across Slaney	Milling		Below bridge deck	Above 0-5m	Above 5-10m	Above 10-20m	Above 20-30m	Above 30m	Above / below	% below to 5m above	
Little Grebe	1			1		1									
Cormorant	224	117	98	0	0	9	74	24	29	37	32	10	3	47%	
Little Egret	21	10	8	3	0	0	16	1	1	1	1	0	1	81%	
Grey Heron	172	83	69	20	0	0	84	43	17	11	5	3	6	75%	
Domestic geese	20	5	15	0	0	20	0	0	0	0	0	0	0		
Mute Swan	110	29	32	0	0	49	2	2	3	4	0	1	0	33%	
Whooper Swan	2	2				2									
Teal	35	8	15	0	0	23	12	0	0	0	0	0	0	100%	
Mallard	263	111	100	6	9	37	70	81	23	6	6	2	9	77%	
Moorhen	2	1	0	1	0	1	1	0	0	0	0	0	0		
Lapwing	240	110	0	70	60	0	0	0	0	80	0	100	60	25%	
Redshank			1				1								
Kingfisher	6	3	3	0	0	0	6							100%	
Black-headed Gull	5,997	2,094	3,332	154	415	2	1,228	835	571	557	623	1,541	528	35%	
Common Gull	5	3	2	0	0	0	1	0	0	0	1	3	0	20%	
Lesser Black-backed Gull	789	54	727	1	7	0	7	48	40	59	103	529	6	7%	
Herring Gull	101	30	69	1	1	0	5	14	19	49	9	1	4	19%	
Great Black-backed Gull	1				1			1							
Total waterbirds	7,989	2,660	4,471	257	493	144	1,507	909	703	804	780	2,190	617		

Table 18. Total number of recorded movements of each waterbird species recorded moving through the proposed new bridge corridor at Enniscorthy, and flight height relative to proposed bridge deck level.

Notes: Records include swimming waterbirds feeding within the bridge corridor in a few instances, e.g. Cormorant, Teal
 Above/below refers to records during which the height of flight changed as a bird moved through the bridge corridor
 The percentage of waterbirds flying below and within 5m above bridge deck level is given for species in which more than one flight movement was recorded.

Non-waterbird	Total movements	Direction of movement				On water swimming	Height of flight relative to proposed bridge deck level						
		Up stream	Down stream	Across Slaney	Milling		Below bridge deck	Above 0-5m	Above 5-10m	Above 10-20m	Above 20-30m	Above 30m	Above / below
Buzzard	10	4	2	1	3	0	0	1	0	2	3	4	0
Sparrowhawk	2	1	0	1	0	0	1	0	0	1	0	0	0
Kestrel	1	1										1	
Peregrine	1	1							1				
Hirundines	105	73	4	6	22	0	14	64	13	0	0	0	14
Hooded Crow	43	11	2	18	12	0	10	8	17	2	0	1	0
Jackdaw	129	49	22	57	1	0	3	27	15	33	45	4	1
Magpie	29	1	2	22	4	0	1	9	2	1	9	5	2
Rook	422	90	116	170	46	0	19	49	103	109	82	18	37
Wood Pigeon	411	99	87	208	17	0	79	107	57	47	60	41	12
Blackbird, Chaffinch, Great Tit, Long-tailed Tit	16	7	1	8	0	0	15	0	0	1	0	0	0
Total	1,166	337	236	491	105	0	142	322	208	196	199	74	66

Table 19. Total number of movements of each non-waterbird species recorded moving through the proposed new bridge corridor at Enniscorthy.

	Total number of Grey Heron flights	Direction				Flight height relative to proposed bridge deck level						
		Up stream	Down stream	Across	Milling	Below deck flight	Above 0-5m	Above 5-10m	Above 10-20m	Above 20-30m	Above 30m	Above / below
Dawn	70	22	37	11	0	41	14	5	2	2	0	2
Dusk	49	39	9	1	0	16	15	7	5	2	2	2
High tide	27	13	13	1	0	10	10	4	3	0	0	2
Mid tide	16	4	5	7	0	13	1	0	0	0	1	0
Low tide	10	5	5	0	0	4	3	1	1	1	0	0
Total	172	83	69	20	0	84	43	17	11	5	3	6

Table 20. Grey Heron recorded movements and flight height at dawn and dusk, and at different tide levels

	Upstream	Downstream	Across	Total all directions
Dawn	1.12	1.89	0.56	3.56
Dusk	2.34	0.54	0.06	2.93
High tide	0.90	0.90	0.08	1.86
Mid tide	1.33	1.67	2.33	5.33
Low tide	0.33	0.33	0.00	1.65

Table 21. Grey Heron movement rates during dawn and dusk watches, and at different stages of the tide, at the proposed bridge location (number of birds in flight/observation hour)

4.2. Conclusions

Collisions risks arise at the proposed bridge location, arising from early dawn, late dusk, and probable night time flights by a nationally important population of Grey Herons. These birds are resident in the area, and will habituate to the new structure, but because there is a breeding colony, naïve juveniles learning to avoid obstacles will be present every year. This will also apply to Mute Swans, which breed in the FDS area, and the FDS area is visited from time to time by non-breeding swans that may not be accustomed to obstacles. There is a single record of a Mute Swan colliding with the bridge then present at the location of Seamus Rafter Bridge, during the 1980s (Dominic Berridge, NPWS pers. comm.) Collision risk also arises for Cormorants. Other waterbird species manoeuvre more readily in flight. A literature review of collision risk will be included in the assessment phase of the project.

Mitigation will be required, in the form of lighting that will illuminate the top and bottom (i.e. indicated the thickness of the obstacle to approaching waterbirds) of the bridge deck. It is advantageous that the bridge will not be a cable-stay design, this reduces, but will not eliminate collision risk.

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APPENDIX 1. WEXFORD HARBOUR AND SLOBS SPA SITE SYNOPSIS

SITE NAME: WEXFORD HARBOUR AND SLOBS SPA
SITE CODE: 004076

Wexford Harbour is the lowermost part of the estuary of the River Slaney, a major river that drains much of the south-east region. The site is divided between the natural estuarine habitats of Wexford Harbour, the reclaimed polders known as the North and South 'Slobs', and the tidal section of the River Slaney. The seaward boundary extends from the Rosslare peninsula in the south to the area just west of The Raven Point in the north. Shallow marine water is a principal habitat, but at low tide extensive areas of intertidal flats are exposed. These vary from rippled sands in exposed areas to sandy-muds in the more sheltered areas, especially at Hopeland and the inner estuary to the west of Wexford bridge. The flats support a rich macro-invertebrate fauna, including the bivalves Cockle (*Cerastoderma edule*), Baltic Tellin (*Macoma balthica*) and Peppery Furrow-shell (*Scrobicularia plana*), the polychaetes Lugworm (*Arenicola marina*), Catworm (*Nephtys hombergi*) and Ragworm (*Hediste diversicolor*) and the crustacean *Corophium volutator*. Beds of mussels (*Mytilus edulis*) also occur. Salt marshes fringe the intertidal flats, especially in the sheltered areas such as Hopeland and towards Castlebridge. The Slobs are two flat areas of farmland, mainly arable and pasture grassland, empoldered behind 19th century sea-walls. The lands are drained by a network of channels which flow into two central channels, in parts several hundred metres in width. Water from the channels is pumped into the sea with electric pumps. The channels often support swamp vegetation. The river section of the site is extensive, extending to Enniscorthy, a distance of almost 20 km from Wexford town. It is noticeably tidal as far as Edermine Bridge but with tidal influence right up to Enniscorthy. In places, such as the Macmine marshes, it is several hundreds metres wide and here reedswamp is well developed.

The site is a Special Protection Area (SPA) under the E.U. Birds Directive, of special conservation interest for the following species: Little Grebe, Great Crested Grebe, Cormorant, Grey Heron, Bewick's Swan, Whooper Swan, Greenland White-fronted Goose, Light-bellied Brent Goose, Shelduck, Wigeon, Teal, Mallard, Pintail, Scaup, Goldeneye, Red-breasted Merganser, Hen Harrier, Coot, Oystercatcher, Golden Plover, Grey Plover, Lapwing, Knot, Sanderling, Dunlin, Black-tailed Godwit, Bar-tailed Godwit, Curlew, Redshank, Black-headed Gull, Lesser Black-backed Gull and Little Tern. The site is also of special conservation interest for holding an assemblage of over 20,000 wintering waterbirds. The E.U. Birds Directive pays particular attention to wetlands, and as these form part of this SPA, the site and its associated waterbirds are of special conservation interest for Wetland & Waterbirds.

The site is of international importance for several species of waterbirds but also because it regularly supports well in excess of 20,000 waterbirds (average peak of 49,030 for the 5 winters 1996/97-2000/01). Wexford Harbour and Slobs is one of the top three sites in the country for numbers and diversity of wintering birds. The combination of estuarine habitats, including shallow waters for grebes, diving duck and seaduck, and the farmland of the polders, which include freshwater drainage channels, provides optimum feeding and roost areas for a wide range of species. Of particular importance is that it is one of the two most important sites in the world for Greenland White-fronted Goose (9,353) (all given figures for species are average peaks for the 5 winters 1995/96-1999/00). The geese feed almost entirely within the Slobs and roost at The Raven (a separate SPA). The site also has internationally important populations of Mute Swan (543), Light-bellied Brent Goose (1,469), Bar-tailed Godwit (1,696) and Black-tailed Godwit (790).

There are at least a further 26 species of wintering waterbirds which occur in numbers of national importance, i.e. Great Crested Grebe (117), Little Grebe (82), Cormorant (495), Grey Heron (52), Whooper Swan (100), Bewick's Swan (191), Shelduck (753), Wigeon (2,752), Teal (1,538), Mallard (3,290), Pintail (66), Scaup (339), Goldeneye (182), Red-breasted Merganser (209), Coot (351), Oystercatcher (1,493), Golden Plover (5,013), Grey Plover (1,279), Lapwing (11,826), Knot (453), Sanderling (210), Dunlin (2,485), Curlew (1,771), Redshank (555), Black-headed Gull (5,977) and Lesser Black-backed Gull (1,086). Other species that use the site include Ringed Plover (69), Turnstone (41), Greenshank (12), Shoveler (24), Tufted Duck (114), Pochard (218), Common Gull (100+) and Little Egret. Several of the above populations represent substantial proportions of the national totals, especially Shelduck (5.2%), Scaup (5.3%), Red-breasted Merganser (5.7%) and Grey Plover (19.9% and the top site in the country). The Slobs is the most important and indeed one of the few sites in the

country which supports a regular flock of Bewick's Swan. Numbers of wintering birds are often swelled by hard-weather movements from Britain and Europe, notably Golden Plover and Lapwing.

The site is a regular location for scarce passage waders such as Ruff, Spotted Redshank and Green Sandpiper, as well as Curlew Sandpiper in varying numbers. The rare Wood Sandpiper is seen each year, mainly in autumn.

Short-eared Owl and Hen Harrier are regular visitors to the Slobs during winter. Of particular note is the presence of a Hen Harrier communal roost site with a five year mean peak count of 5 birds (2005/06 to 2009/10).

The site is important for Little Tern as it has can hold a nationally important breeding colony (12 pairs in 1995 and 30 pairs in 2000). The Slobs support a nesting colony of Tree Sparrow, a very localised species in Ireland that is listed in the Irish Red Data Book. Another very localised breeding species, Reed Warbler, is well established within the swamp vegetation along the River Slaney and on the South Slob (estimated as at least 10 pairs).

A range of duck species breed, including Teal, Tufted Duck and, probably in most years, Shoveler.

Wexford Harbour and Slobs SPA is one of the most important ornithological sites in the country supporting internationally important populations of Greenland White-fronted Goose, Light-bellied Brent Goose, Black-tailed Godwit and Bar-tailed Godwit. In addition, it has 26 species of wintering waterbirds with populations of national importance and nationally important numbers of breeding Little Tern. Also of significance is that several of the species which occur regularly are listed on Annex I of the E.U. Birds Directive, i.e. Little Egret, Whooper Swan, Bewick's Swan, Greenland White-fronted Goose, Hen Harrier, Golden Plover, Bar-tailed Godwit, Ruff, Wood Sandpiper, Little Tern and Short-eared Owl. The site is an important centre for research, education and tourism. Wexford Wildfowl Reserve, located within Wexford Harbour and Slobs SPA, is a Ramsar Convention site, a Biogenetic Reserve and a Statutory Nature Reserve. Parts of the Wexford Harbour and Slobs SPA are also designated as Wildfowl Sanctuaries.

8.7.2014

APPENDIX 2. I-WEBS DATA FOR THE RIVER SLANEY

**Edermine Bridge - R. Urrin Enniscorthy**

Species	1%	1%	2007/08	2009/10	2012/13	2013/14	Overall peak
	National	International					
Mute Swan	90				1		1
Teal	340	5,000	3		51		51
Mallard	290	20,000			20		20
Little Grebe	20	4,000	1				1
Cormorant	120	1,200	4		11		11
Little Egret	20	1,300	3		4		4
Grey Heron	25	2,700			4		4
Moorhen		20,000	1				1
Lapwing	1,100	20,000	360				360
Snipe		20,000			1		1
Black-headed Gull		20,000	42		4		42
Lesser Black-backed Gull		5,500	3				3
Herring Gull		10,200	1				1

Killurin (Deep's) Bridge - Edermine Bridge

Species	1%	1%	2007/08	2009/10	2012/13	2013/14	Overall peak
	National	International					
Mute Swan	90		93	96	81		96
Shelduck	120	3,000		1			1
Wigeon	630	15,000	30		80		80
Teal	340	5,000	164		295		295
Mallard	290	20,000	74	46	148		148
Little Grebe	20	4,000	2		1		2
Cormorant	120	1,200	26	6	31		31
Little Egret	20	1,300	12	4	9		12
Grey Heron	25	2,700	3	10	6		10
Water Rail			2				2
Lapwing	1,100	20,000	420		400		420
Snipe		20,000			2		2
Black-tailed Godwit	190	610		4			4
Curlew	350	8,400			70		70
Redshank	300	3,900	30		9		30
Black-headed Gull		20,000	432	7			432
Common Gull		16,400	58		62		62
Lesser Black-backed Gull		5,500	14				14
Herring Gull		10,200	5	4			5
Great Black-backed Gull		4,200	15	90	22		90



Ferrycarrig Bridge - Killurin (Deep's) Bridge

Species	1% National	1% International	2007/08	2009/10	2012/13	2013/14	Overall peak
Mute Swan	90			4		90	90
Unidentified Anser sp.						2	2
Shelduck	120	3,000		4			4
Wigeon	630	15,000			30		30
Teal	340	5,000	560		516	262	560
Mallard	290	20,000	129	9	121	98	129
Little Grebe	20	4,000	5			2	5
Cormorant	120	1,200	31		15	56	56
Little Egret	20	1,300	3	4	1	20	20
Grey Heron	25	2,700	8	6	1	14	14
Moorhen		20,000		1			1
Lapwing	1,100	20,000	20		295	170	295
Snipe		20,000			8		8
Black-tailed Godwit	190	610	25	376		20	376
Whimbrel		6,700		3			3
Curlew	350	8,400	66	15	3	60	66
Spotted Redshank		900	2				2
Greenshank	20	2,300	2				2
Redshank	300	3,900	5		2	31	31
Black-headed Gull		20,000	1,398	5	113	291	1,398
Common Gull		16,400	95				95
Lesser Black-backed Gull		5,500	20			8	20
Herring Gull		10,200	4	1			4
Great Black-backed Gull		4,200	4				4
Sandwich Tern				2			2
Kingfisher					1		1

APPENDIX 3. WATERBIRD COUNT DATA FOR THE SOUTHERN FLOODPLAIN, NORTHERN FLOODPLAIN, AND ENNISCORTHY TOWN QUAYS

Date	11.02.16	11.02.16	18.02.16	18.02.16	24.02.16	24.02.16	3.03.16	10.03.16	22.03.16*	13.04.16*	29.04.16*	19.05.16*	30.05.16*
Time start	10.25	13.10	11.20	16.14	12.00	15.50	10.32	15.15	16.14	06.20	07.50	06.20	
Little Grebe				1									
Cormorant	8	9	11		14	2	8	1		1		1	1
Little Egret		1	2	2		2	2	1		2		1	1
Grey Heron	5	2	4	2	2		1	2	5	2	3	9	4
Mute Swan	2				2	2	3	2		2			
Whooper Swan	1	1	1	1	1	1							
Wigeon	11	2	26	21			17	10					
Teal	89	95	85	77	42	63	36	28	33	2			
Mallard	4	7	3	5		7	5	3	4	2	13	6	9+
Moorhen	7	4	3		1	6		3	3	1		2	2
Lapwing	302	376	231	215	57	66	16	1					
Snipe	19	18	18	25		20	26	14	11	8			
Woodcock									1				
Redshank	4	17	9	10			22						1
Green Sandpiper									1				
Common Sandpiper											1		
Kingfisher								1					
Black-headed Gull	38	267	124	131	62	49	39	171	1				1
Lesser Black-backed Gull		2					1			2	4		
Herring Gull					1		2				3		
Swan Goose	2	2	2	2	2	2					2	2	
Domestic Greyag		3	3	3	3	3							

Appendix 3 Table 1. Waterbird counts during each survey on the southern floodplain (east bank) and adjoining river channel.

Count area extends from opposite main entrance to Riverside Park Hotel to Motabeg Counts indicated * included walk-over survey results

Continued overleaf.....

PROPOSED ENNISCORTHY FLOOD DEFENCE SCHEME

Date	31.05.16	17.06.16*	27.06.16	06.07.16	12.07.16	20.07.16*	29.07.16	24.08.16	30.08.16	19.09.16	19.09.16	29.09.16	17.10.16	27.10.16
Time start		08.30	15.30	21.10	19.30	12.07	17.50	14.20	16.30	10.10	15.30	15.30	13.00	15.20
Little Grebe													1	
Great-crested Grebe													1	
Cormorant	1		1					3	1	2	3	3	5	3
Little Egret	1						1	1	3	3	2	5	1	3
Grey Heron	6	8	9	6	11	12	12	17	16	17	20	17	19	21
Mute Swan	1	1	1	2			2	2	5	4	2	5	8	5
Whooper Swan														
Wigeon													1	5
Teal									5	9	12	20	54	40+
Mallard	8	2		9	9	1	10	22	10	21	18	34	40	18
Moorhen	1	1	2		1	1	2	8	3	1	7	6		7
Lapwing													14	83
Snipe														
Woodcock														
Redshank										1			1	
Greenshank													1	
Green Sandpiper														
Common Sandpiper							3							
Kingfisher	1						1				1	1		
Black-headed Gull		6	16		6	29	29	180	42	112	64	135	157	82
Lesser Black-backed Gull	1	1							1		1	2	1	
Common Gull													1	
Herring Gull														2
Swan Goose														2
Domestic Greylag														3

Table 1 continued. Waterbird counts during each survey on the southern floodplain (east bank) and adjoining river channel.

PROPOSED ENNISCORTHY FLOOD DEFENCE SCHEME

Date	28.11.16	13.12.16	15.12.16	17.01.17	24.01.17	21.02.17	16.03.17
Time start	13.30	14.00	11.26	14.20	12.40	15.16	15.40
Little Grebe		1					
Great-crested Grebe							
Cormorant	9		12	5	1	9	3
Little Egret	3	1	3	2	4	1	1
Grey Heron	15	14	15	12	5	4	7
Mute Swan	8		10	7	4	6	2
Whooper Swan							
Wigeon	22+	37	18	31	46	51	
Teal	21+	66	174	33+	33	26	9
Mallard	12+	57	58	14	24	17	
Moorhen	4	3	5	2	5	3	2
Lapwing	183	37	220	311	148		
Snipe					17		10
Woodcock							
Redshank			26		12		
Greenshank							
Green Sandpiper							
Common Sandpiper			3				
Kingfisher			1			2	
Black-headed Gull	64		74		47	41	30
Lesser Black-backed Gull			1				
Common Gull							
Herring Gull			2		3		
Swan Goose		2	2		2		
Domestic Greylag		3	3		3		
Buzzard						2	

Table 1 continued. Waterbird counts during each survey on the southern floodplain (east bank) and adjoining river channel.

PROPOSED ENNISCORTHY FLOOD DEFENCE SCHEME

Date	11.02.16	18.02.16	24.02.16	3.03.16	10.03.16	23.03.16***	12.04.16***	18.05.16***	16.06.16***	12.07.16
Time start	15.53	9.30	15.00	16.18	14.00	11.00	08.26	08.47	09.44	18.00
Cormorant				2		2	3	1		
Little Egret	1	1	1				2			
Grey Heron		1	1			2	1	2	3	1
Mute Swan				2		3	2	4	3	3
Whooper Swan				1	1	1	1			
Teal						2				
Mallard				2		9	7	14	20	
Moorhen										
Snipe						2				
Green Sandpiper						1				
Kingfisher			1				1*	2*	2**	
Grey Wagtail										
Black-headed Gull	4	62			4	1				
Lesser Black-backed Gull		1							4	2
Herring Gull						2				
Great Black-backed Gull									1	

Date	24.08.16	19.09.16	29.09.16	17.10.16	28.11.16***	13.12.16	15.12.16	24.01.17	21.02.17***	16.03.17
Time start	12.23	14.20	14.50	09.45	11.49	13.20	14.10	14.20	12.00	17.15
Cormorant				1					1	
Little Egret										
Grey Heron	2	1		1	2				1	
Mute Swan	3			2	7	1	2	1	2	2
Whooper Swan										
Teal					6					
Mallard			2	1	41		6	10	8	2
Goosander					2			5		
Moorhen				1	5			4	1	
Snipe										
Green Sandpiper										
Kingfisher	1			1	1				1	
Grey Wagtail			1							
Black-headed Gull	1	15		12	11					
Lesser Black-backed Gull		3			1					
Herring Gull										
Great Black-backed Gull										

Appendix 3 Table 2. Northern floodplain and adjoining river channel

Note: * Kingfisher(s) recorded upstream of scheme area; **Kingfisher, 1 recorded within scheme area, and 1 upstream of scheme area. Confirmed nest site upstream of scheme area

***includes river channel upstream of scheme area to Larch woodland Kingfisher nest area

River sections within Enniscorthy Town: counts of waterbirds, red/amber listed riparian species, other species

Date	11.02.16	18.02.16	24.02.16	3.03.16	10.03.16	23.03.16	12.04.16	18.05.16	16.06.16	12.07.16	20.07.16	29.07.16
Time start	16.00	10.15	15.09	16.13	14.40	9.58	17.05				14.19	22.20
Grey Heron			1									
Black-headed Gull	4	41		5	3						5	
Lesser Black-backed Gull						1						

Date	24.08.16	19.09.16	19.09.16	29.09.16	17.10.16	27.10.16	28.11.16	13.12.16	15.12.16	24.01.17	21.02.17	16.03.17
Time start	12.55	11.58	14.40	14.46	09.35	15.00	11.45	13.30	14.15	15.07	14.00	18.15
Grey Heron												
Black-headed Gull	14		4		27			26	9	10		
Lesser Black-backed Gull												

Appendix 3 Table 3. Railway Bridge (roosting use)

Date	11.02.16	18.02.16	24.02.16	3.03.16	10.03.16	23.03.16	12.04.16	18.05.16	16.06.16	12.07.16	20.07.16	29.07.16
Time start	16.05	10.25	14.45	16.12	14.40	9.58	16.55	12.14	15.53		14.19	22.20
Cormorant		1	3									
Little Egret					1							
Grey Heron					1							
Mallard					3	2	2	3	1			
Black-headed Gull			1						1			
Kingfisher					1							
Grey Wagtail								1				

Date	24.08.16	19.09.16	19.09.16	29.09.16	17.10.16	27.10.16	28.11.16	13.12.16	15.12.16	24.01.17	21.02.17	16.03.17
Time start	12.55	11.48	14.45	14.46	09.35	15.00	11.45	13.09	14.15	15.09	14.00	18.15
Cormorant												
Little Egret												
Grey Heron		1										
Domestic Greylag	3											
Swan Goose/Chinese	2											
Mallard	15	9										
Kingfisher												
Black-headed Gull												
Yellow Wagtail		1										
Grey Wagtail												

Appendix 3 Table 4. Railway Bridge to Old Bridge

PROPOSED ENNISCORTHY FLOOD DEFENCE SCHEME

Date	11.02.16	18.02.16	24.02.16	3.03.16	10.03.16	23.03.16	12.04.16	18.05.16	16.06.16	12.07.16	20.07.16	29.07.16
Time start	16.05	10.30	14.40	11.42	15.02	9.55	16.45	11.50	15.37	19.45		22.15
Cormorant												
Little Egret												
Grey Heron								1	2	2	1	1
Mute Swan					2							
Domestic Greylag										3		3
Swan Goose/Chinese										2		2
Mallard							2		2			
Kingfisher												
Black-headed Gull										2	1	
Grey Wagtail					1			2 (pair)				
Pied Wagtail								2 (pair)				

Date	24.08.16	19.09.16	19.09.16	29.09.16	17.10.16	27.10.16	28.11.16	13.12.16	15.12.16	24.01.17	21.02.17	16.03.17
Time start	13.25	11.40	14.50	14.43	09.28	14.54	11.39	13.10	14.15	15.23	14.00	18.20
Cormorant					1						1	
Little Egret												
Grey Heron							1					
Mute Swan												
Domestic Greylag												
Swan Goose/Chinese												
Mallard			7	7	2	2	5			4		
Kingfisher												
Black-headed Gull		1	9	3	1	22	6					
Lesser Black-backed Gull			3									
Yellow wagtail		1										
Grey Wagtail		2		2							1	
Pied Wagtail												

Appendix 3 Table 5. Old Bridge to Seamus Rafter Bridge

PROPOSED ENNISCORTHY FLOOD DEFENCE SCHEME

Date	11.02.16	18.02.16	24.02.16	3.03.16	10.03.16	23.03.16	12.04.16	18.05.16	16.06.16	12.07.16	20.07.16	29.07.16
Time start	16.10	12.40	15.22	11.35	15.08	9.48	16.32	12.45	15.30	20.40	14.27	22.10
Cormorant			4									
Little Egret		1										
Grey Heron									1	3		2
Mute Swan												
Domestic Greylag							3		3		3	
Swan Goose/Chinese									2		2	
Mallard			3				2				2	
Kingfisher												
Black-headed Gull		2	7	3								
Herring Gull												

Date	24.08.16	19.09.16	19.09.16	29.09.16	17.10.16	27.10.16	28.11.16	13.12.16	15.12.16	24.01.17	21.02.17	16.03.17
Time start	13.35	11.30	15.00	14.30	09.15	14.45	11.26	13.09	14.00	15.25	14.10	18.25
Little Grebe							1					
Cormorant	1				2	1	2	1				
Little Egret							1	1				
Grey Heron	1	1	3		1	3*	3					
Mute Swan						2		1		2		
Domestic Greylag		3	3	3							3	3
Swan Goose/Chinese		2	2	2							2	
Mallard			4	10		7	4					
Teal							4					
Kingfisher	1						1					
Black-headed Gull		5	8	4		12	26	2			40	
Lesser Black-backed Gull							1					
Herring Gull												

Appendix 3 Table 6. Seamus Rafter Bridge to southern floodplain (opposite Riverside Park Hotel Entrance)

Note * peak count recorded at a separate time

The southern floodplain count area commences opposite Riverside Park Hotel Entrance and continues south to Motabeg

APPENDIX 4. RAPTOR SURVEY VANTAGE POINT OBSERVATIONS, 2016

Note that a known Peregrine breeding site was confirmed to be occupied in 2016, the location of which is known to NPWS, but the location is not reported at the request of NPWS.

Date	VP ID	Grid Ref'	Watch Period	Townlands/ location name	Habitat suitability	Sighting no. each watch	Species. Sex if known	NOTES
2016								
March 3rd	1	S96781/34059	08.18-09.50		NHS = ideal FHS = ideal	1	BZ	heard mewling south of VP behind adjacent woodland
						2	BZ	mobbed by HC from S977/342
						3	BZ	flying low over fields from S975/345
	2	S98206/36380	12.10-14.30	southern quarry	NHS = ideal FHS = ideal	1	BZ	circling above & behind woodland by VP1 at S967/338
						3	RN	calling and circling between both quarries
						4	2BZ, pair	circling together over woodland by VP1 from S969/336 to S973/344
						5	K. male	lands in to quarry S980/364 in front of VP2 calling. Several BZ in air above
						6	5BZ	circling and soaring over quarry and river
						7	2BZ, pair	displaying over wide area centered at S972/372
						8	K. male	over quarry S982/364 by VP2 calling briefly. Suspect territory here.
						9	BZ	flying south east from S980/361
						10	3BZ	moving south towards Edermine Bridge above east bank
						11	BZ	seen briefly flying north from S976/350. Considerable Buzzard activity - at least two pairs seem to be on territories.
	3	S98066/37015	14.50-15.00	northern quarry	NHS = ideal FHS = ideal			
March 10th	4	S97375/40133	10.20-11.50	footbridge at railway station	NHS = limited FHS = good	1	SH male	flying and perched in belt of oaks by road at S974/407
						2	3+3BZ	soaring and gliding with a further 3 BZ beyond c.4km away from VP all in close association. First 3 BZ drift east towards second 3 BZ from S97/41 to 599/42

PROPOSED ENNISCORTHY FLOOD DEFENCE SCHEME

Date	VP ID	Grid Ref'	Watch Period	Townlands/ location name	Habitat suitability	Sighting no. each watch	Species. Sex if known	NOTES
						3	8BZ	in thermal centered at S97/42 including 3 males with 2 males in display.
						4	BZ	Close to rows of mature trees at S986/417
		S98066/ 3 37015	13.10- 13.40	northern quarry	NHS = ideal FHS = ideal	5	BZ	low over spruce line at S975/367
						6	SH female	lands in tall spruce then rises high towards 3 BZ over ~S97/37 then glides east over river
2016								
April 5th	5	S98766/ 40964	7.55- 10.55	Clonhastan to Blackstoops	NHS = ideal FHS = ideal	1	BZ	low over ploughed fields at S975/424
						2	4BZ	soaring v.high over Enniscorthy town north, 2 birds in close association considered pair staying always over S965/410 area. All birds disperse with one bird flying by VP5 to the north east.
						3	6BZ	male displays from north to four soaring birds including pair again over housing estates centered at c.S970/412. One bird stoops fast to large oaks to sixth BZ perched. Considered perhaps a second pair across river from VP5. 2 TERRITORIES PROBABLE
						4	SH female	passing through area north in front of VP5
						5	BZ	rises from valley at S983/410 and does a partial display east but lost to view. Same area as individual BZ went during sighting"2"
						6	BZ	perched on tall line of sitka at S990/413.
		S98066/ 3 37015	11.15- 13.15	northern quarry	NHS = ideal FHS = ideal	7	RN	over northern quarry towards southern quarry. Back again later in watch
						8	4BZ	centered at S974/371 - circling & landing on spruce. One pair together including copulation on top of spruce tree. TERRITORY CONFIRMED
		S98206/ 2 36380	13.30- 15.45	southern quarry	NHS = ideal FHS = ideal	9	RN	flying and calling over S982/364. Heard on & off during watch
						10	3BZ	s.west of Knockduff area soaring high at S960/329.

PROPOSED ENNISCORTHY FLOOD DEFENCE SCHEME

Date	VP ID	Grid Ref'	Watch Period	Townlands/ location name	Habitat suitability	Sighting no. each watch	Species. Sex if known	NOTES
April 5th	2	S98206/36380	13.30-15.45	southern quarry	NHS = ideal FHS = ideal	11	BZ	flying low n.west from Kilgibbon S969/338
						12	3BZ	high to south of VP2, track one bird for 4km dropping swiftly down to tall trees near castle at S972/323
						13	2BZ	over southern end of belt of spruce along west bank of river with one bird vertically dropping right into spruce at S975/341 considered possible nest location.
						14	BZ	again high over Kilgibbon area. TERRITORY PROBABLE
						15	2BZ	soaring high over Tomlane east side of river at S984/328. TERRITORY POSSIBLE
						16	3BZ	v.high soaring over c.S955/380 - Knockmarshal townland
						17	4BZ	considered two pairs - male in short display to female then flies directly to the other two birds across river at S983/356 but continues soaring east over Brownswood area.
						18	RN pair	displaying & calling over southern quarry, move south to mob BZ. TERRITORY CONFIRMED
						19	5BZ	all birds in close association incl. 2 pairs ranging widely between both sides of river from south of southern quarry to southern end of spruce belt. One bird again drops vertically in to spruce close to but not at exactly the same tree as the individual in 'sighting 13'. 2 TERRITORIES PROBABLE
2016								
May 18th			15.40-16.00	southern quarry	NHS = ideal FHS = ideal			no sightings
NESTING HABITAT SUITABILITY (N.H.S.): - POOR; LIMITED (small area perhaps suitable; GOOD (some ideal areas but some poor); IDEAL (almost all habitat in view very suitable)								
FORAGING HABITAT SUITABILITY (F.H.S.): - POOR; LIMITED (small area suitable; GOOD (some ideal areas but not all); IDEAL (all habitat in view very good)								

APPENDIX 5. BARN OWL SURVEY RESULTS

Field sheet information and scores to be included for each site:

Suitability	Nesting Opportunities	Active	Record Other Species
0 = Unsuitable, no potential roosting or nesting locations	0 = Multiple	0 = Yes	BTO Code
1 = Suitable as roost only, may have evidence of roosting	1 = Chimney	1 = No	
2 = Suitable, but limited access, number of nest locations. No evidence.	2 = Roofspace	2 = Undetermined	
3 = Occupied or highly suitable with multiple opportunities for nesting	3 = Cavity		
	4 = Chute		
	5 = Apex of wall		
	6 = Tree Cavity		

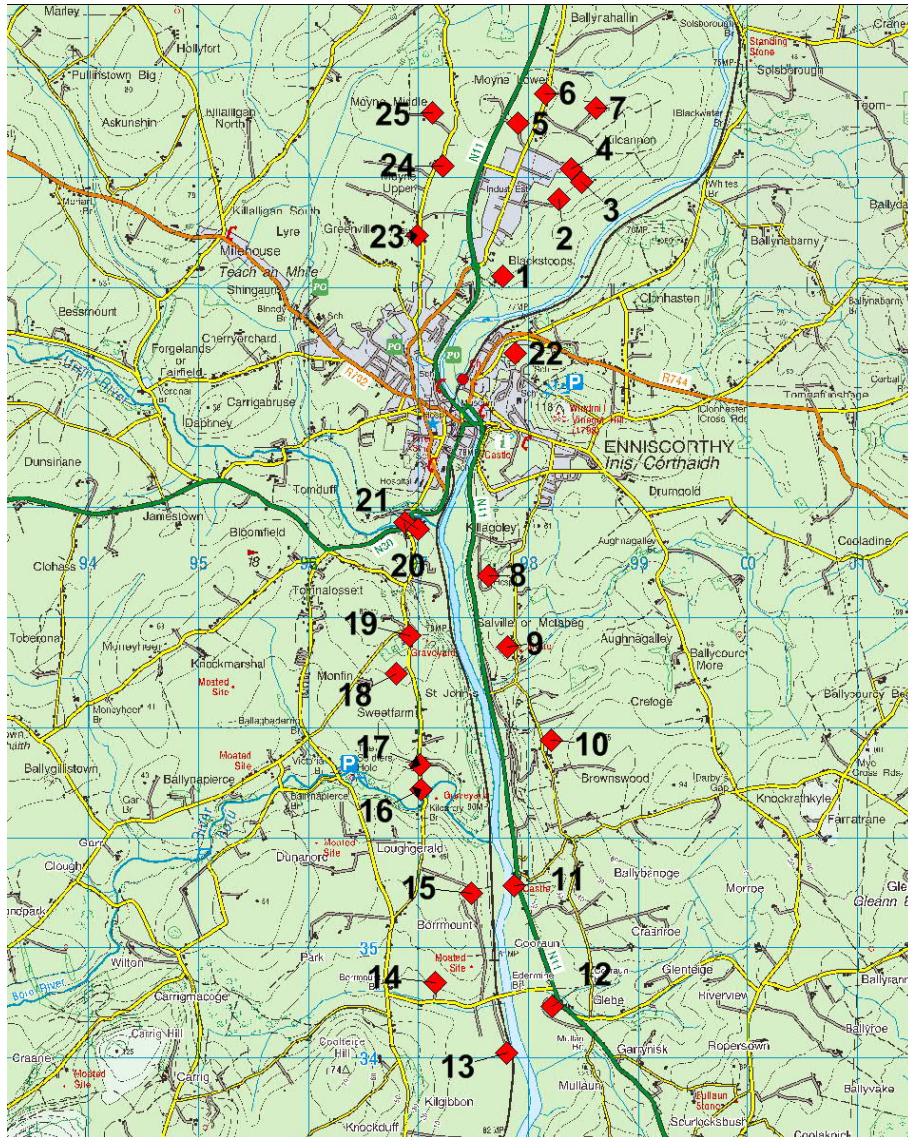
No Barn Owl activity was recorded during the surveys. Sites 3, 22 and 25 were reported to have been used by Barn Owls in the past. There were reports of recent sightings (before the storms of winter 2015/16) of a single Barn Owl along the driveway (site 4) to the buildings at site 3, but it should be noted that all other local reports of owls seem to refer to Long-eared Owls, which can also look very pale when seen underlit by vehicle headlights at night.

None of the sites surveyed will be affected by the proposed Enniscorthy Flood Defence Scheme.

NPWS knows of only 2 current Barn Owl territories in Co. Wexford, neither of which are in the Enniscorthy area.

Long-eared Owl calls were heard at the Larch plantation on the western side of the Slaney c. 1km upstream of the proposed Flood Defence Scheme area in April 2016, but there were no sightings during subsequent searches, including a thorough search on 28 November 2016. A Long-eared Owl winter roost is reported locally in this woodland, typically of 1-4 birds, with 7 recorded on one occasion, but according to local information there were no sightings during the winter of 2016/17. Breeding is suspected but not confirmed.

PROPOSED ENNISCORTHY FLOOD DEFENCE SCHEME



Potentially suitable Barn Owl sites in the vicinity of Enniscorthy Flood Defence Scheme.

Details of all potential Barn Owl sites surveyed in 2016

Date	Site no.	Easting	Northing	Townland	Site type	Suitability	Nesting Opp	Active	Other Species*	Notes
16/06/2016	1	297,767	141,097	Blackstoops	stone barns & corrugated iron sheds	1	2,5	1		
16/06/2016	2	298,280	141,800	Blackstoops	stone barns	2	5,2	1	JD,SL	one roof space suitable - dark, dry, good access and undisturbed
16/06/2016	3	298,484	141,950	Kilcannon	stone barns & corrugated iron sheds	3	6	1		historic sightings of 2 Barn Owl around farm buildings
16/06/2016	4	298,390	142,071	Kilcannon	beech & ash tree line along track to Site 3	3	6	1		single Barn Owl reported seen perched above track on tree limb. Old hollow tall stumps and tree cavities present. General area checked at dusk-after dark on 7, 12 and 29 July, no owl activity recorded
16/06/2016	5	297,906	142,487	Kilcannon	stone & corrugated iron sheds	1	5	1		
16/06/2016	6	298,157	142,758	Kilcannon	stone sheds	1	5	2		not all accessible
16/06/2016	7	298,620	142,628	Kilcannon	old house & stone barns	2	1,2,5	2		no access in to house, no whitewash outside building
16/06/2016	8	297,640	138,380	Killagoley	disused hospital, extensive & various old buildings	3	0	2	JD	no internal access, many nesting opportunities. Caretaker reported never having seen owls
16/06/2016	9	297,810	137,727	Killagoley	large stone stables & coach house	2	2,5	1		
16/06/2016	10	298,214	136,880	Brownswood	several unused large farm barns	1	8	1		
16/06/2016	11	297,872	135,562	Cooraun	Castle ruin	2	3,4	1		not much left of castle, limited nesting opportunities
16/06/2016	12	298,222	134,467	Cooraun/Mullaun	period house- several coach houses, tower, old mill etc.	3	0	2	JD	ideal chimney & roof spaces, not all building accessible inc' old church

PROPOSED ENNISCORTHY FLOOD DEFENCE SCHEME

Date	Site no.	Easting	Northing	Townland	Site type	Suitability	Nesting Opp	Active	Other Species*	Notes
17/06/2016	13	297,808	134,036	Kilgibbon	ruined period house and coach houses	3	0	1		within tillage fields - ideal nest location
17/06/2016	14	297,157	134,675	Borrmount	corrugated barns	0	8	1		all new and currently in agricultural use
17/06/2016	15	297,490	135,489	Borrmount	period house, coach houses and sheds	2	1,2	2	JD,SL,TS	access to some buildings only, potential in period house in some disrepair.
17/06/2016	16	297,027	136,435	Kilcarbry	old mill houses	3	0	2	SL	access denied to intact mill house with potential
17/06/2016	17	297,020	136,660	Kilcarbry	abandoned cottage	1	2	1		too damp for nesting
17/06/2016	18	296,800	137,487	Monfin/St John's	stone barn	1	5	1	SL	
17/06/2016	19	296,923	137,835	Monfin/St John's	stone barn	2	2	1		
17/06/2016	20	296,880	138,858	Tomduff/E'corthy	abandoned house	2	1,2	2	SL	no internal access. No whitewash visible
17/06/2016	21	297,000	138,800	Tomduff/E'corthy	large abandoned mill	3	0	2		completely boarded up with no access even to grounds. Checked at dusk on 7th July from footpath along Urrin River, no owl activity recorded
17/06/2016	22	297,880	140,396	Enniscorthy	stone coach house on estate grounds	2	1,2	2	SL	limited access, areas sealed. Historic record of owl species
17/06/2016	23	296,990	141,471	Moyne Upper	unused big corrugated iron sheds & abandoned cottage	2	1,2,5	1	SD,SL,SG	
17/06/2016	24	297,228	142,103	Moyne Upper	low stone sheds & corrugated iron sheds	1	5	1	JD,SL	most stone sheds recently refurbished
17/06/2016	25	297,129	142,586	Moyne Middle	corrugated sheds	1	8	1	SL,FP	stone barns were replaced over 30 years ago when Barn Owl was present

Note: BTO codes for other species recorded are as follows: JD Jackdaw, SL Swallow, TS Tree Sparrow, SD Stock Dove, SG Starling, FP Feral Pigeon

APPENDIX 6. WATERBIRD ESCAPE DISTANCES RECORDED IN FDS AREA

The responses of waterbirds to various sources of anthropogenic disturbance have been studied in a number of different habitat contexts. Data have been recorded in relation of Alert Distance, at which waterbirds exhibit altered behaviour in response to an approaching perceived threat (ceasing to feed, alert 'head up' posture, vocalisation, etc.) and Escape Distance or Flight Initiation Distance, at which waterbirds either move away within the site or leave the site area.

In the Enniscorthy FDS area, escape distances were recorded where possible, during walk-over surveys. Grey Herons were the most frequently recorded, and observations were recorded throughout the year. Escape distances were observed to vary according to location within the FDS area. In the northern floodplain, Grey Herons feeding at the gravel bank located in the river between CH 6600 and 6700 left the area at escape distances of 120 to 150m. In the southern floodplain at the Bare Meadows, Grey Herons left roost sites at the core wetland area at escape distances of 50 to 90m, sometimes they moved within the Bare Meadow initially, and then left the area if the observer continued to approach directly. There was a single observation of 2 adult Grey Herons arriving to two separate nests in Scot's Pine trees to the east of the Bare Meadow with well grown chicks while 2 observers were present on the Bare Meadow at distances of approximately 50m and 150m from the nests; the adults attended the nests briefly and then left the area.

Escape distances for mixed flocks of duck and waders Wigeon, Teal, Mallard, Lapwing, Snipe and Redshank disturbed on the Bare Meadow during walk over surveys were approximately 150m (observers approaching out of tall vegetation to the south in March and April 2016); all duck and waders left the area. Escape distances recorded for Mallard later in the spring and summer varied with context; escape distances of approximately 100m were observed on two occasions, while female Mallard performed distraction displays and remained in the core wetland area with their (usually concealed) brood.

Escape distances of duck (Wigeon, Teal and Mallard) on the southern floodplain at Motabeg appeared to be greater than at the Bare Meadow, but were not recorded accurately.

Escape distances of 90m and 150m around the core wetland area on the Bare Meadow are mapped in Figure 1 of this Appendix.

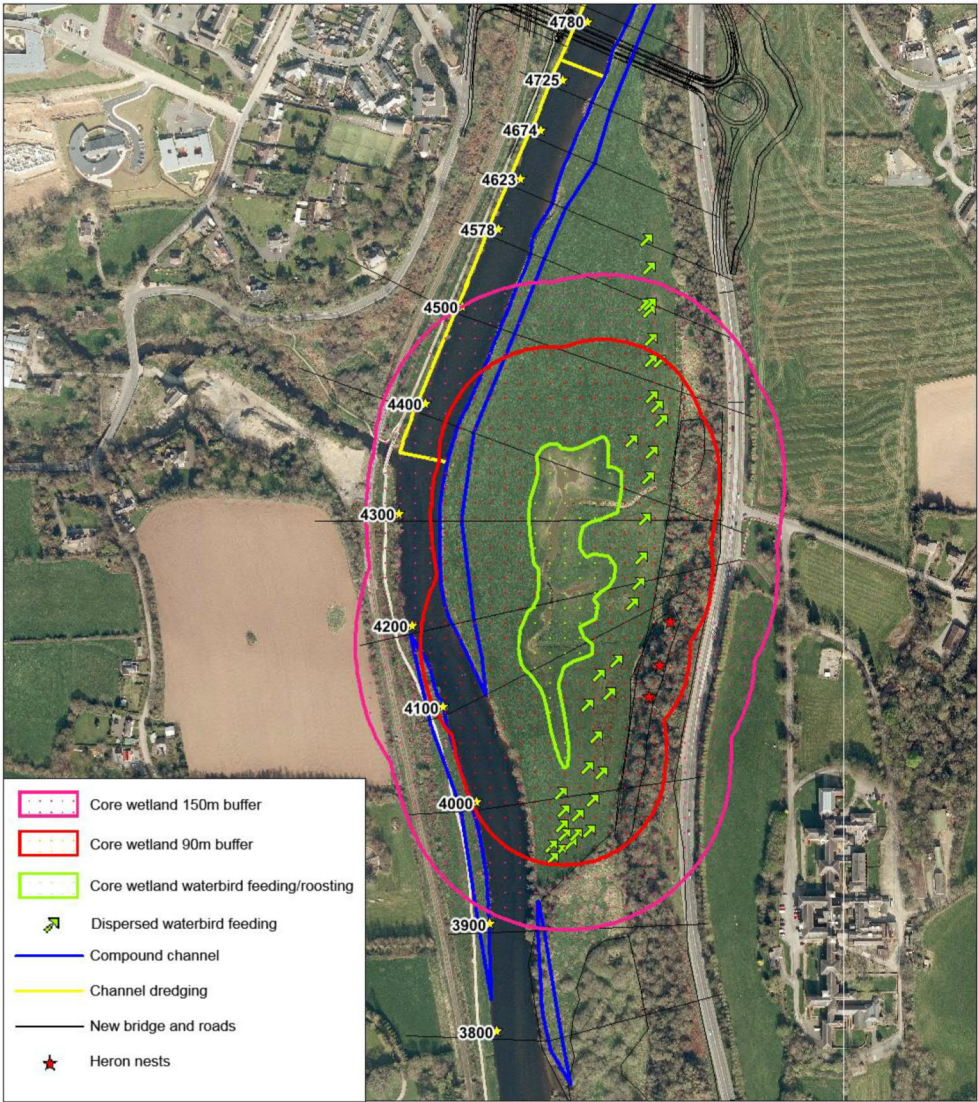
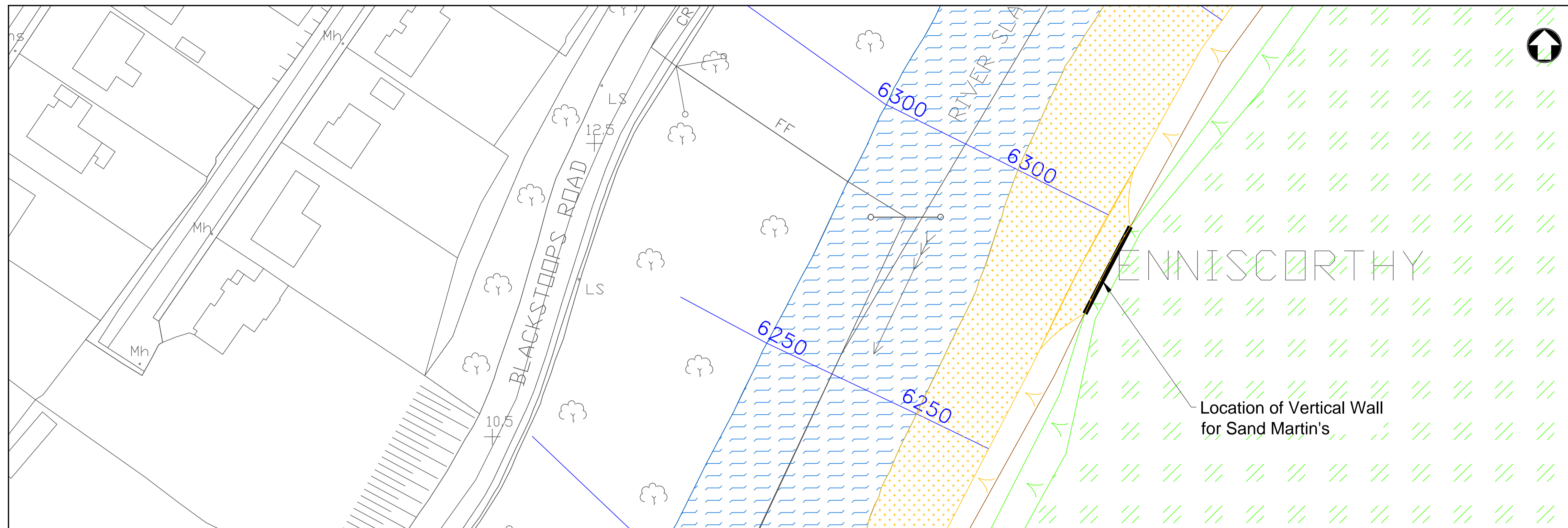
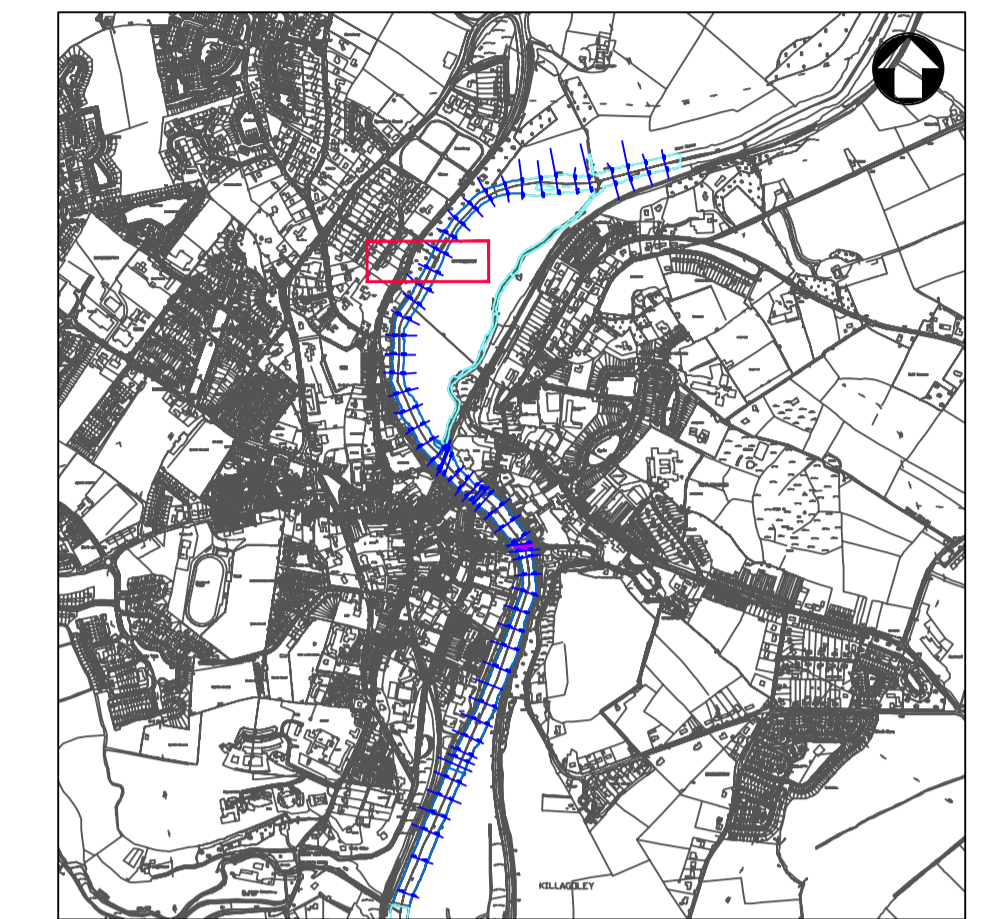


Figure 1. The core wetland area used by roosting and feeding waterbirds at the Bare Meadow, shown with a 90m and a 150m buffer, indicating Escape Distances from pedestrian observers for Grey Herons and for wintering duck and waders respectively.

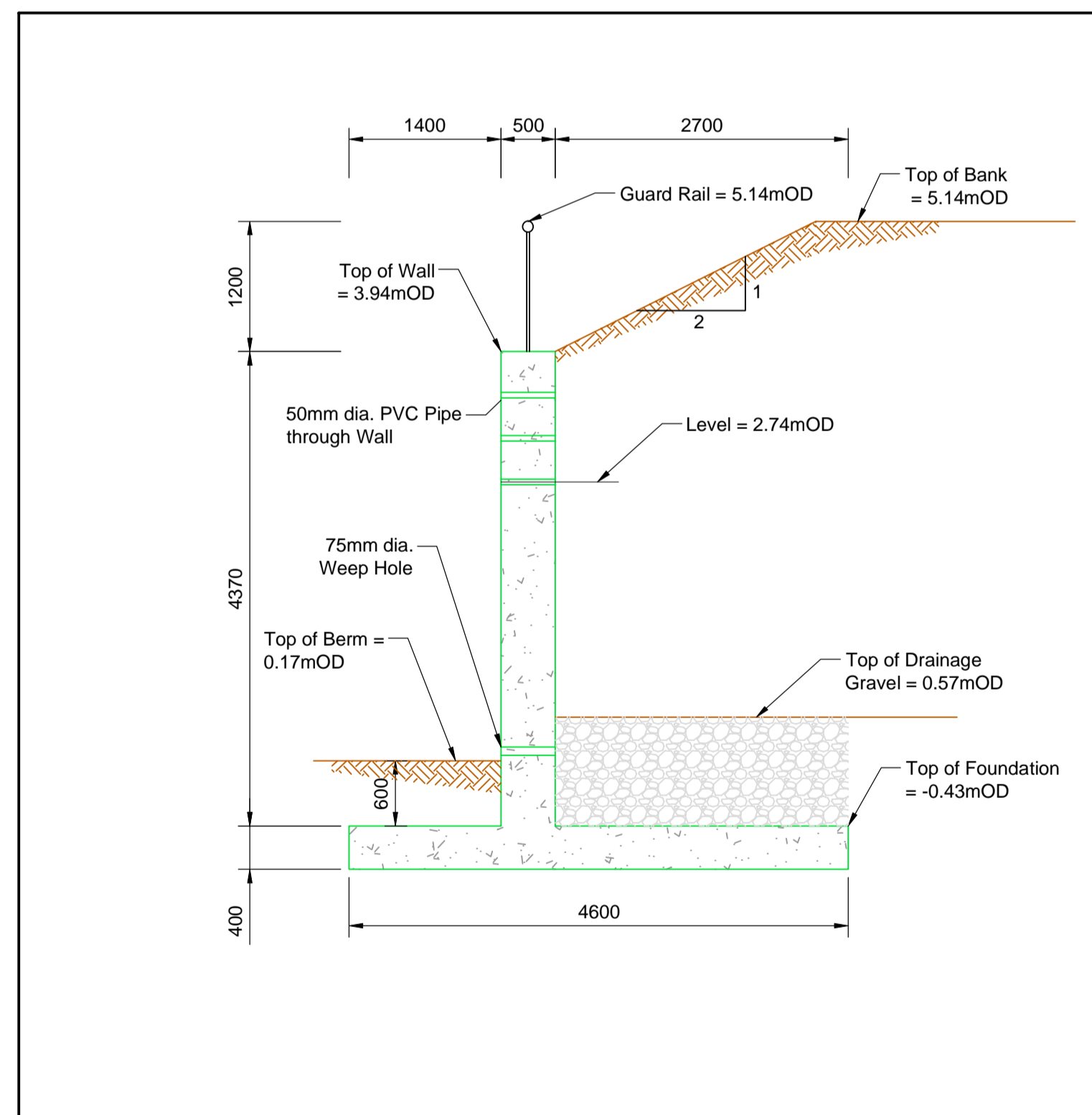


Location Plan
Scale 1:500

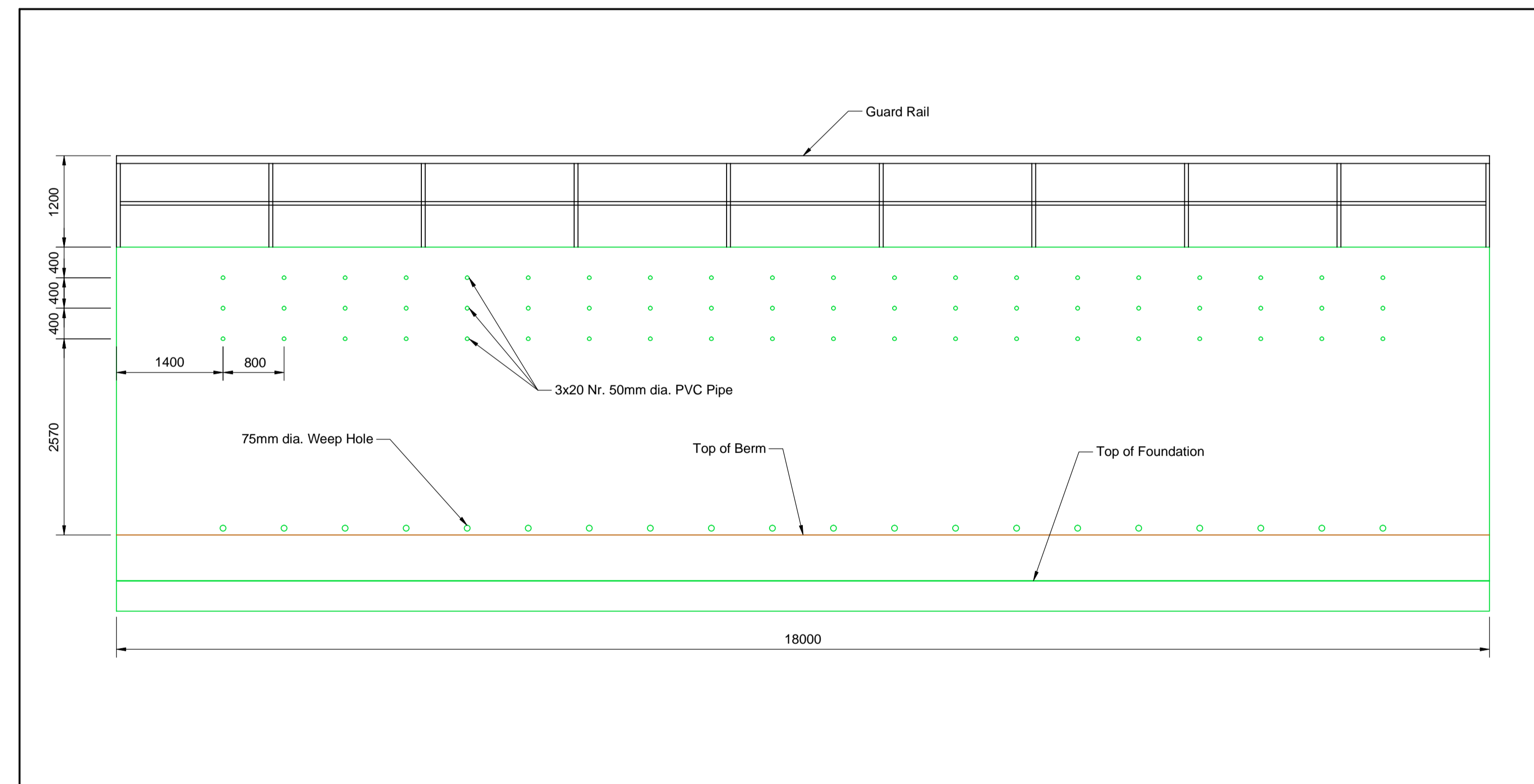
- Notes
1. This drawing is to be read in conjunction with all relevant Engineers drawings and specifications.
 2. Do not scale from this drawing.
 3. All levels are in metres and relate to Ordnance Datum Malin Head.
 4. No work shall be carried out on existing services and utilities without proper approval from the Local Authority or service provider.
 5. All existing services to be located prior to commencement of works, and suitably protected for the duration of the works.
 6. The Contractor is to check the accuracy of all tie-in levels. The Engineer is to be informed of any discrepancy immediately.
 7. The design of any temporary works shall be the responsibility of the Contractor.



- LEGEND
- Proposed Elevated Ground North Island
 - Proposed River Widening Area (Cut)
 - Proposed Infilling



Section through Wall
Scale 1:50



Elevation of Wall
Scale 1:50

Rev	Date	Drawn	Description	Ch'k'd	App'd
P01.1	26/10/17				

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Client

Status Stamp

Title
Enniscorthy Flood Defence Scheme
Sand Martin Nesting Wall

Designed	P Griffin	PG	Eng check	---
Drawn	---	---	Coordination	---
Dwg check	---	---	Approved	---
Scale at A1	Suitability Code	Rev	Security	
As Shown		P01.1	STD	

Drawing Number
355741-MMD-01-XX-DR-S-0050