Environmental Impact Assessment Report (EIAR)

Ringaskiddy Port Re-development – Vol IVb Appendices

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APPENDIX 7.3 SEDIMENT ANALYSIS REPORT

Marine Institute Dredge Sampling Programme

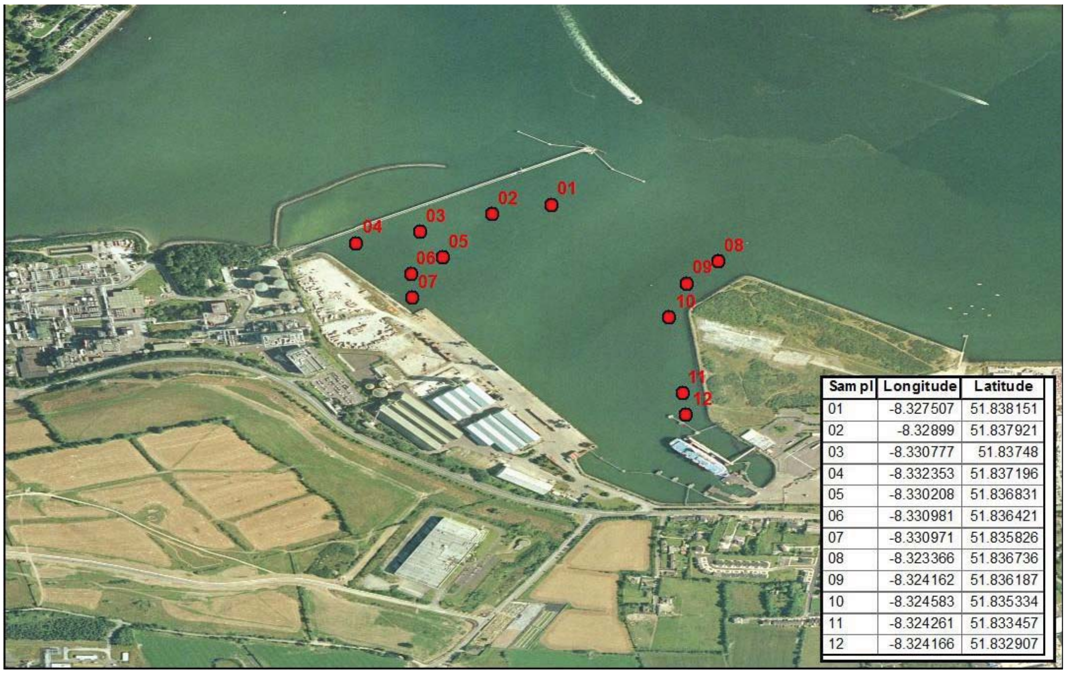
Sampling Programme

The Marine Institute (MI) were consulted in regards to the requirements for a dredge sampling programme both in terms of sample location and parameters for analysis. A Sampling Analysis Plan was provided by the Marine Institute which was issued as part of the tender specification documents to all interested parties for the *Grab Sampling & Contamination Testing* contract in order to ensure compliance with the MI requirements.

The MI advised on the particular substances which should be analysed for. They recommended substances that are considered of most concern for the marine environment, those which have combined properties of persistence, toxicity and liability to bio accumulate. Typically, the most important contaminants associated with dredged material include organotin compounds, heavy metals, polychlorinated biphenyls (PCBs), polycyclic aromatic hydrocarbons (PAHs) and oils (OSPAR, 2004).

Sample location and analysis

Twelve separate sample locations in and around the deepwater berth were selected for monitoring in consultation with Marine Institute Figure 1. Table 1 outlines the recommendations from the Marine Institute on the number of sites and the particular parameters which needed to be analysed for at each site.



Sam pl	Longitude	Latitude
01	-8.327507	51.838151
02	-8.32899	51.837921
03	-8.330777	51.83748
04	-8.332353	51.837196
05	-8.330208	51.836831
06	-8.330981	51.836421
07	-8.330971	51.835826
08	-8.323366	51.836736
09	-8.324162	51.836187
10	-8.324583	51.835334
11	-8.324261	51.833457
12	-8.324166	51.832907

Figure 1 Sediment Sample locations at Cork Harbour

Table 1 Recommendations from Marine Institute on particular parameters for each sample

Sample No.	Sample depth	Longitude (°W)*	Latitude (°N)*	Parameters for analysis
1	Surface	-8.32751	51.83815	1, 2, 3, 4a, 4b, 4c, 4d, 4e, 4f, 4g.
2	Surface	-8.32899	51.83792	1, 2, 3, 4a, 4b, 4c, 4d.
3	Surface	-8.33078	51.83748	1, 2, 3, 4a, 4b, 4c, 4d.
4	Surface	-8.33235	51.83720	1, 2, 3, 4a, 4b, 4c, 4d, 4e, 4f, 4g.
5	Surface	-8.33021	51.83683	1, 2, 3, 4a, 4b, 4c, 4d, 4e, 4f, 4g.
6	Surface	-8.33098	51.83642	1, 2, 3, 4a, 4b, 4c, 4d.
7	Surface	-8.33097	51.83583	1, 2, 3, 4a, 4b, 4c, 4d, 4e, 4f, 4g.
8	Surface	-8.32337	51.83674	1, 2, 3, 4a, 4b, 4c, 4d.
9	Surface	-8.32416	51.83619	1, 2, 3, 4a, 4b, 4c, 4d, 4e, 4f, 4g.
10	Surface	-8.32458	51.83533	1, 2, 3, 4a, 4b, 4c, 4d.
11	Surface	-8.32426	51.83346	1, 2, 3, 4a, 4b, 4c, 4d.
12	Surface	-8.32417	51.83291	1, 2, 3, 4a, 4b, 4c, 4d, 4e, 4f, 4g.

Parameter code*:*

1. Visual inspection, to include colour, texture, odour, presence of animals etc
2. Water content, density (taking into account sample collection and handling)
3. Granulometry including % gravel (> 2mm fraction), % sand (< 2mm fraction) and % mud (< 63µm fraction).
4. The following determinants in the sand-mud (< 2mm) fraction * :
   a) total organic carbon
   b) carbonate
   c) mercury, arsenic, cadmium, copper, lead, zinc, chromium, nickel, lithium, aluminium.
   d) organochlorines including □-HCH (Lindane), and PCBs (to be reported as the 7 individual CB congeners: 28, 52, 101, 118, 138, 153, 180).
   e) total extractable hydrocarbons.
   f) tributyltin (TBT) and dibutyltin (DBT)
   g) Polycyclic aromatic hydrocarbons (PAH) - Acenaphthene, Acenaphthylene, Anthracene, Benzo (a) anthracene, Benzo (a) pyrene, Benzo (b) fluoranthene, Benzo (ghi) perylene, Benzo (k) fluoranthene, Chrysene, Dibenz (a,h) anthracene, Flourene, Fluoranthene, Indeno 1,2,3 – cd pyrene, Naphthalene, Phenanthrene, Pyrene.
   h) Toxicity tests (Microtox or whole sediment bioassay) using appropriate representative aquatic species. (This requirement will depend on the results of the chemical analyses.)

As part of the sediment sampling plan plan the MI also recommended the following:

- Where the gravel fraction (> 2mm) constitutes a significant part of the total sediment, this should be taken into account in the calculation of the concentrations.
- Collection of sufficient samples to allow all the toxicity testing to be carried out on the material.
- Brief details of the methodologies should be supplied with the results. This should include sampling, sub sampling and analytical methods used for each determinant.
- Appropriate marine Certified References Materials (CRM) are to be analysed during each batch of analyses and the results to be reported along with sample results.

Minimum Detection Limits

The MI also outlined the required minimum detection limits for the various determinants. These are given in Table 2 below.

Table 2 Required Minimum Detection Limits for the various determinants

Contaminant	Concentration	Units (dry wt)
Mercury	0.05	mg kg^{-1}
Arsenic	1.0	mg kg^{-1}
Cadmium	0.1	mg kg^{-1}
Copper	5.0	mg kg^{-1}
Lead	5.0	mg kg^{-1}
Zinc	10	mg kg^{-1}
Chromium	5.0	mg kg^{-1}
Nickel	15	mg kg^{-1}
Total extractable hydrocarbons	10.0	mg kg^{-1}
TBT and DBT (not organotin)	0.01	mg kg^{-1}
PCB - individual congener	1.0	$\mu g\ kg^{-1}$
OCP - individual compound	1.0	$\mu g\ kg^{-1}$
PAH - individual compound	20	$\mu g\ kg^{-1}$

Reporting Format

The Marine Institute require that the reports be submitted in a pre supplied excel file which includes the following information:

⇒ Date of sampling

⇒ Location of samples e.g. ING or lat/long

⇒ Treatment of samples and indication of sub-sampling, compositing etc.

⇒ Tabulated geophysical and chemical test results
⇒ Completed excel spreadsheet for results
⇒ Summary method details
⇒ Method performance specifications: Limit of detection, Precision, Bias
⇒ Blanks and in-house references to be run with each sample batch, and reported with sample results.
⇒ Clear expression of units and indication of wet weight or dry weight basis
⇒ Appropriate marine Certified Reference Materials (CRM) to be run with each sample batch, and reported in full with sample results. The measured results as well as the certified results should be reported along with the sample results.
⇒ If determinant is not detected, report less than values, and indicate LoD/ LoQ used.
⇒ Other quality assurance information (e.g. accreditation status)

Certification and Quality Assurance

The MI stated that the analysing laboratory should be experienced in analysing marine sediments, and should participate in recognised proficiency testing schemes. The laboratory should also have submitted a completed QA questionnaire to the MI in order to ensure that quality standards can be met. All of the Sampling Analysis Plan requirements were met by Aquatic Services Unit together with National Laboratory Service (NLS) whom were sub-contracted by Aquatic Services Unit.

Sediment Sampling Methodology

Aquatic Services Unit was appointed to carry out the sediment sampling and analysis in Ringaskiddy with sample collection carried out on 28 January 2014.

The taking of, recovery and submission of marine samples was carried out using the Port of Cork Company survey launch, at a suitable high tide to enable access to all the locations specified by the Marine Institute in Table 1.3.

Prior to the recovery exercise the launch was fitted with a differential Global Positioning System (GPS), positioned directly above the on board recovery point. The launch was then easily navigated to the various points as specified in Table 1.3. At each point a stainless steel grab was lowered onto the river bed. Once the grab made contact with the bed, the recovery line was tightened and the grab sealed the sample. The actual co-ordinated recovery position was then recorded and logged.

The grab was then recovered on board and the sample transferred to suitable prepared containers, sealed, annotated and packed in preparation for shipping. The grab was then cleaned prior to the taking of the next sample; this procedure was continued until a sample was recovered from all of the required locations. The samples were then couriered to the National Laboratory Service in the UK for analysis.

Guideline Values for the Assessment of Dredge Material

All samples which were analysed by the National Laboratory Service were compared against the proposed guidance values for sediment quality guidelines from the "*Guidelines for the Assessment of Dredge Material for Disposal in Irish Waters" (Marine Institute, 2006)*.

There are two sets of guidance values (upper and lower) used in these guidelines. According to the guidance the lower level values correspond to contaminant concentrations below which the sediment, if disposed of at sea, is assumed to have a physical impact only. The upper level guidance values are set at concentrations above which adverse effects might be expected.

Lower level guidance values represent concentrations that are either a) at the upper end of the no-effect range or, b) at background concentrations.

Upper level guidance values are set at the lower end of the known range of effective concentrations i.e. lowest concentrations shown to have adverse effects on marine organisms. The proposed parameter guidelines as given the guidance are listed in Table 3.

Table 3 Parameters and Proposed Guidelines for Sediment Quality

Parameters Units	**Units (dry wta)**	**Lower level**	**Upper Level [b]**
Arsenic	mg kg^{1}	9[c]	70*
Cadmium	mg kg^{1}	0.7	4.2
Chromium	mg kg^{1}	120	370
Copper	mg kg^{1}	40	110[d]
Lead	mg kg^{1}	60	218
Mercury	mg kg^{1}	0.2	0.7
Nickel	mg kg^{1}	21	60
Zinc	mg kg^{1}	160	410
Σ TBT & DBT	mg kg^{1}	0.1	0.5
γ – HCH (Lindane)	μg kg^{1}	0.1	0.5

Parameters Units	Units (dry wta)	Lower level	Upper Level [b]
HCB µg kg-1 0.3 1	µg kg¹	0.3	1
PCB (individual congeners of ICES 7)	µg kg¹	1	180
PCB (Σ ICES 7) µg kg-1 7 1260	µg kg¹	7	1260
PAH (Σ 16)	µg kg¹	4000	
Total extractable hydrcarbons	g kg¹	1	

a- total sediment <2mm

b- ERM (rounded up)

c- ERL (rounded up) – No background Irish data available

d PEL as ERM considered high

* In some locations natural levels of arsenic will exceed this value and in such instances this guidance value will not be appropriate

Sediment Sampling Results

The analysis of the samples was sub-contracted to National Laboratory Service (NLS) laboratories in the UK, and included the following determinants for each sample:

- Ecotoxicology (30 minute EC50)
- Carbon Content
- Gran Size fractions
- Hydrocarbons
- Metals
- PAHs
- TBT and DBT
- Dry Solids

The detailed results and analytical reports from NLS laboratories are outlined below with summary results discussed in Chapter 13 of the EIA. All sample results were below the upper level guideline concentration and, with the exception of all the nickel samples and two of the arsenic samples, were also below the lower level guideline.

EPA Dumping at Sea Permit Application - Material Analysis Reporting Form (Version 1.0)
Sheet 3. Results

Sample ID code	Company Name	Location	Sampling date (dd/mm/yyyy)	Sampling Location ID	Position Latitude (dd mm.mmm)	Position Longitude (dd mm.mmm)	Sampling depth m	Lab Report ID	Sample appearance (e.g. colour, texture, signs of life)	% Moisture
Site 1	Port of Cork	Ringaskiddy	28/01/2014	Ring S1	51d 50.283	-08d 19.643	8	20061567-1	Brown sandy mud dead shell present	37.8
Site 2	Port of Cork	Ringaskiddy	28/01/2014	Ring S2	51d 50.276	-08d 19.731	3	20061567-1	Brown sandy with shell, limited sample dur to substrate	44
Site 3	Port of Cork	Ringaskiddy	28/01/2014	Ring S3	51d 50.245	-08d 19.849	3	20061567-1	Black brown sandy mud	57
Site 4	Port of Cork	Ringaskiddy	28/01/2014	Ring S4	51d 50.223	-08d 19.904	4	20061567-1	Black brown sandy mud	57.9
Site 5	Port of Cork	Ringaskiddy	28/01/2014	Ring S5	51d 50.214	-08d 19.807	12	20061567-1	Brown sandy mud no signs of life	56.1
Site 6	Port of Cork	Ringaskiddy	28/01/2014	Ring S6	51d 50.196	-08 19.864	13	20061567-1	Brown muddy sand no casts	60.2
Site 7	Port of Cork	Ringaskiddy	28/01/2014	Ring S7	51d 50.197	-08d 19.885	12.5	20061567-1	Brown sandy mud no casts, moved station due to presence of tanker on quay.	62.4
Site 8	Port of Cork	Ringaskiddy	28/01/2014	Ring S8	51d 50.208	-08d 19.414	8	20061567-1	Brown sandy mud no casts	12.1
Site 9	Port of Cork	Ringaskiddy	28/01/2014	Ring S9	51d 50.168	-08d 19.457	7	20061567-1	Brown muddy sand no casts	62.7
Site 10	Port of Cork	Ringaskiddy	28/01/2014	Ring S10	51d 50.132	-08d 19.478	5	20061567-1	Brown muddy sand no casts	56.5
Site 11	Port of Cork	Ringaskiddy	28/01/2014	Ring S11	51d 50.023	-08d 19.476	5.5	20061567-1	Dark brown sandy mud strong sulfide smell	59.3
Site 12	Port of Cork	Ringaskiddy	28/01/2014	Ring S12	51d 49.977	-08d 19.465	7	20061567-1	Dark brown sandy mud strong sulfide smell	59.8

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Sample ID code	Particle size >2mm %	Particle size <2mm >63um %	Particle size <63um %	OC %	TEH g kg^{-1}	Cu mg kg^{-1}	Zn mg kg^{-1}	Cd mg kg^{-1}	Hg mg kg^{-1}	Pb mg kg^{-1}	As mg kg^{-1}	Cr mg kg^{-1}	Mn mg kg^{-1}	Ni mg kg^{-1}	Li mg kg^{-1}	Al mg kg^{-1}
Site 1	0.4	67.6	32.1	1.5	0.0359	20.3	85	0.159	0.041	23.9	6.63	61.8		27.4	37.8	39600
Site 2	2.2	50.8	47.0	1.0		16.2	55.7	0.126	0.005	10.8	5.07	55.3		25.2	36	36800
Site 3	0.0	46.3	53.7	1.8		22.1	92.3	0.164	0.053	27.5	8.16	76.8		43.2	40.9	42300
Site 4	0.0	42.5	57.5	1.9	0.0984	25.9	99.9	0.174	0.056	30.7	8.07	94		51.4	43.8	44800
Site 5	0.0	55.5	44.5	1.8	0.057	24.9	96.4	0.152	0.058	30.2	9.39	81		43.2	46	44400
Site 6	0.0	43.7	56.3	1.8		27.3	97	0.141	0.045	30	9.04	82.1		41.5	48.7	46900
Site 7	0.0	46.2	53.8	2.1	0.0767	22.2	93.9	0.134	0.049	27.8	8.59	72.6		37.6	47	44900
Site 8	0.0	48.8	51.2	2.0		30.8	98.8	0.153	0.07	29.8	8.22	90.1		44.5	45.2	44400
Site 9	0.0	45.9	54.1	2.4	0.0534	23.1	95	0.144	0.052	27.7	8.06	73.4		37.5	43.6	41600
Site 10	0.0	39.6	60.4	1.6		28.7	105	0.339	0.083	32.4	7.96	94.2		51.9	45.8	44900
Site 11	0.0	54.8	45.2	1.94		30.4	103	0.183	0.069	31.2	8.44	96.7		51.1	46.5	44300
Site 12	1.6	49.9	48.5	1.96	0.0782	23.3	102	0.155	0.06	29.3	7.87	60.3		35	45.1	42200

EPA Dumping at Sea Permit Application - Material Analysis Reporting Form (Version 1.0)
Sheet 3. Results

Sample ID code	DBT mg kg^{-1}	TBT mg kg^{-1}	Σ TBT + DBT mg kg^{-1}	PCB 028 ug kg^{-1}	PCB 052 ug kg^{-1}	PCB 101 ug kg^{-1}	PCB 138 ug kg^{-1}	PCB 153 ug kg^{-1}	PCB 180 ug kg^{-1}	PCB 118 ug kg^{-1}	PCB Σ7 PCB ug kg^{-1}	PAH Acenaphthene ug kg^{-1}	PAH Acenaphthylene ug kg^{-1}	PAH Anthracene ug kg^{-1}
Site 1	0.00852	0.0104	0.01892	<0.1	<0.1	0.16	0.24	0.24	0.36	0.2	<1.2	3.6	5.3	18.1
Site 2			0	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.7			
Site 3			0	0.2	<0.1	0.12	0.16	0.16	<0.1	0.2	<0.84			
Site 4	0.00654	0.00606	0.0126	0.2	<0.1	0.12	0.16	0.2	0.12	0.2	1	7.9	10.9	18.7
Site 5	<0.007	0.00588	<0.01288	0.16	<0.2	0.12	0.2	0.2	<0.1	0.2	<0.88	6.9	7.9	14
Site 6				0.16	0.16	0.12	0.2	0.2	<0.1	0.2	<1.04			
Site 7	<0.008	0.00348	<0.01148	0.16	<0.1	0.12	0.16	0.2	<0.1	0.2	<0.84	11.9	7.7	14.6
Site 8				0.12	<0.1	<0.1	0.12	<0.1	<0.1	0.12	<0.36			
Site 9	0.00402	0.0044	0.00842	0.28	<0.1	0.16	0.12	0.16	<0.1	<0.2	<0.72	12.3	13.6	30
Site 10				0.2	<0.1	0.12	0.12	<0.1	<0.1	0.16	<0.6			
Site 11				0.2	<0.1	0.16	0.16	0.2	<0.1	0.2	<0.92			
Site 12	0.00504	0.00473	0.00977	0.36	<0.1	0.16	0.16	<0.1	<0.1	0.24	<0.92	6.5	6.1	18

EPA Dumping at Sea Permit Application - Material Analysis Reporting Form (Version 1.0)
Sheet 3. Results

Sample ID code	PAH Benzo (a) anthracene ug kg^{-1}	PAH Benzo (a) pyrene ug kg^{-1}	PAH Benzo (b) fluoranthene ug kg^{-1}	PAH Benzo (ghi) perylene ug kg^{-1}	PAH Benzo (k) fluoranthene ug kg^{-1}	PAH Chrysene ug kg^{-1}	PAH Dibenz (a,h) anthracene ug kg^{-1}	PAH Flourene ug kg^{-1}	PAH Fluoranthene ug kg^{-1}	PAH Indeno (1,2,3–cd) pyrene ug kg^{-1}
Site 1	50.7	49.2	59.8	34.6	27.4	49.8	7.1	<10	88.5	42.8
Site 2										
Site 3										
Site 4	56.2	57.1	88.3	50.1	32	64.2	5.8	21.4	103	64.6
Site 5	49.1	51.1	88.2	48.1	31.8	56.9	<5	17.5	84.5	64.4
Site 6										
Site 7	48.3	50	89.5	47.6	33.6	57.7	<5	15.2	89.8	66.9
Site 8										
Site 9	87.5	85.4	118	62.5	54	98.4	7.5	21.9	159	82.7
Site 10										
Site 11										
Site 12	56.2	63.2	90.4	56.4	41.8	63.4	10.5	11.4	107	72.7

EPA Dumping at Sea Permit Application - Material Analysis Reporting Form (Version 1.0)
Sheet 3. Results

Sample ID code	PAH Naphthalene ug kg^{-1}	PAH Phenanthrene ug kg^{-1}	PAH Pyrene ug kg^{-1}	PAH Σ 16 ug kg^{-1}	Aldrin ug kg^{-1}	DDE-pp ug kg^{-1}	DDT-op ug kg^{-1}	DDT-pp ug kg^{-1}	Dieldrin ug kg^{-1}	Endrin ug kg^{-1}	HCH-alpha ug kg^{-1}	HCH-beta ug kg^{-1}	HCH-delta ug kg^{-1}
Site 1	<30	44.3	77.6	<558.8	<1	<2	<1	<2	<3	<2	<1	<1	<1
Site 2					<1	<2	<1	<2	<3	<2	<1	<1	<1
Site 3					<1	<2	<1	<2	<3	<2	<1	<1	<1
Site 4	33.6	65.5	89.3	768.6	<1	<2	<1	<2	<3	<2	<1	<1	<1
Site 5	<30	61.3	72.9	<654.6	<1	<2	<1	<2	<3	<2	<1	<1	<1
Site 6					<1	<2	<1	<2	<3	<2	<1	<1	<1
Site 7	49.7	61.6	73.6	<717.7	<1	<2	<1	<2	<3	<2	<1	<1	<1
Site 8					<1	<2	<1	<2	<3	<2	<1	<1	<1
Site 9	62.1	87	129	1110.9	<1	<2	<1	<2	<3	<2	<1	<1	<1
Site 10					<1	<2	<1	<2	<3	<2	<1	<1	<1
Site 11					<1	<2	<1	<2	<3	<2	<1	<1	<1
Site 12	35	57.8	89.4	787.8	<1	<2	<1	<2	<3	<2	<1	<1	<1

EPA Dumping at Sea Permit Application - Material Analysis Reporting Form (Version 1.0)
Sheet 3. Results

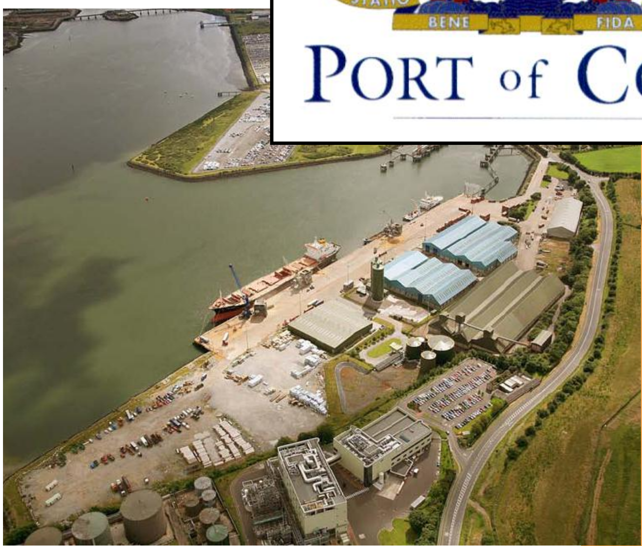
Sample ID code	γ–HCH (Lindane) ug kg^{-1}	HCB ug kg^{-1}	Hexchloro butadiene ug/kg	Isodrin ug kg^{-1}	TDE ug kg^{-1}	Density(g/ml)	Carbonate(%)	TOC(%)	Notes / comments:
Site 1	<2	<1	<1	<2	<1	1.59	2.29	1.48	
Site 2	<2	<1	<1	<2	<1	1.51	2.42	0.98	
Site 3	<2	<1	<1	<2	<1	1.33	2.31	1.77	
Site 4	<2	<1	<1	<2	<1	1.37	2.69	1.89	
Site 5	<2	<1	<1	<2	<1	1.29	2.68	1.76	
Site 6	<2	<1	<1	<2	<1	1.33	2.76	1.75	
Site 7	<2	<1	<1	<2	<1	1.35	2.99	2.11	
Site 8	<2	<1	<1	<2	<1	1.14	3.03	1.95	
Site 9	<2	<1	<1	<2	<1	1.16	1.78	2.4	
Site 10	<2	<1	<1	<2	<1	1.33	2.58	1.57	
Site 11	<2	<1	<1	<2	<1	1.27	2.66	1.94	
Site 12	<2	<1	<1	<2	<1	1.33	2.36	1.96	

APPENDIX 8.1 PRELIMINARY TRAFFIC ASSESSMENT REPORT

Ringaskiddy Preliminary Traffic Assessment Report

Report for Port of Cork

January 2013



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Executive Summary

Purpose of this Report

The Port of Cork Company is intending to prepare a planning application to An Bord Pleanála (ABP) under the Planning & Development (Strategic Infrastructure) Act 2006 (2006 Act) for an expansion of its port facilities at Ringaskiddy, Co. Cork. The expanded facilities at Ringaskiddy will facilitate, on a phased basis, the Port of Cork in transferring container handling out of Tivoli and the bulk goods handling from Tivoli and the City Quays in Cork Docklands in due course. This will provide significant opportunity for sustainable development of non-industrial activity in the heart of Cork City. The key advantage of the Ringaskiddy site is its ability to handle deep water shipping and thus accommodate larger vessels into the future in line with current trends in vessel size growth.

This report represents the first stage of the traffic and transport assessment of the Port of Cork's development proposals at Ringaskiddy. It is necessary for the Port of Cork to submit a planning application through An Bord Pleanála for this development as it is likely to be deemed to be strategic infrastructure. This report presents a detailed discussion of the transport issues surrounding this pending application and includes traffic modelling analysis extracted from the NRA Dunkettle Traffic Model. It is intended that this report will form part of an overall package of analysis that will provide An Bord Pleanála (ABP) with a complete view of the impacts of the Ringaskiddy development proposals. The analysis included in this report is based on surveys of port and strategic network traffic on the N28 in April and May, 2012. This provides a basis for assessing the likely impact and thus the viability of the proposed port development at Ringaskiddy. The subsequent application will include further detailed modelling analyses, also based on the Dunkettle Model, with specific refinements in the Ringaskiddy area.

Background

In November 2007 an application was made to An Bord Pleanála, as required under the 2006 Act, for the development of a container terminal and multi-purpose Ro-Ro berth at Ringaskiddy Deep-water port and ferry terminal (Ringaskiddy Oyster Bank development). ABP refused the application on the grounds that the expansion of Ringaskiddy would generate adverse impacts on the strategic road network and the lack of a rail connection to the Ringaskiddy site was not consistent with sustainable planning.

The Oyster Bank application was submitted against the background of the planned upgrade of the N28 between Ringaskiddy and Bloomfield Interchange to dual carriage way, but this scheme has subsequently been postponed by the NRA. No issues were generally raised regarding the operation of the <u>upgraded</u> N28 itself, however, a significant proportion of port traffic would require passage via Kinsale Road Interchange, Bloomfield Interchange, Jack Lynch Tunnel and the Dunkettle Interchange. These locations on the road network were considered by ABP to be operating at or approaching capacity and therefore would be adversely affected by the level of additional port related traffic anticipated to be generated by the Ringaskiddy (Oyster Bank) development.

Following the 2008 decision by ABP to refuse the Oyster Bank development, the Port of Cork undertook a fundamental review, from first principles, of its Strategic Development Plan to facilitate future growth of its activities. Part of this review process included the identification of options for relocating activities from its upper harbour locations at Tivoli and City Quays, taking full account of ABP's cited reasons of refusal.

Focus of Report

This report reviews many of the assumptions and development proposals of the 2008 Oyster Bank application when compared to the current development proposal and assesses the impact of a reduced level of activity being expanded into Ringaskiddy. The reduced level of development over the Oyster Bank application will result in lower levels of additional traffic being generated by the site. Furthermore, a Ringaskiddy specific Mobility Management Plan will be implemented to restrict traffic generation out of the Port during the peak times on the strategic road network.

It is planned that the Ringaskiddy site will expand in a modular fashion, with new phases of the overall facility being developed as economic and commercial market conditions permit. The modular approach proposed allows for analysis and assessment of the distinct traffic impacts of each element of the development, including:

- ongoing development of existing port activities which are already consented under previous Harbour Works Orders;
- the additional port infrastructure and port activities which are now proposed under the different modules for which strategic infrastructure development approval will be sought; and
- the potential development of adjacent lands within the port complex which may be the subject of future applications for planning permission.

Conclusions

Preliminary analysis of the expected level of traffic generation from the Port of Cork development proposals at Ringaskiddy suggests that:

- the level of port generated traffic is not high enough to produce adverse impacts on the strategic road network during peak periods, particularly in the context of demand management measures being implemented on the N28 corridor by Cork County Council and the NTA and by the Port of Cork itself as part of their mobility management strategy in relation to their site at Ringaskiddy. Demand management will include policy measures implemented by the Port of Cork to suppress HGV movement out of the site during peak times when there is minimal spare capacity on the network;
- the proposed development will not give rise to significant levels of additional traffic on the existing road network;
- local junction improvements on the N28 at Shanbally and Shannonpark will relieve existing congestion and provide sufficient future capacity to cater for additional traffic from Ringaskiddy;
- as a result of the transfer of operations to Ringaskiddy there will be a reduction in traffic from the Cork Docklands on the city centre road network;
- negligible traffic flow changes will be experienced at Dunkettle, Bloomfield Interchanges and the Jack Lynch Tunnel as a result of the port development at Ringaskiddy;
- the levels of additional traffic that will result from this development can be accommodated within the capacity of the existing road network including proposed local junction upgrades above; and
- the traffic data shows that the contribution of the Port to traffic at the Jack Lynch tunnel to be 1% in 2012, rising to 2% in 2030 which is insignificant in terms of average daily traffic at this location..

1 Introduction

1.1 Port of Cork Strategy Review

1.1.1 In 2007, the Port of Cork submitted a Strategic Infrastructure Development application to An Bord Pleanála for a container terminal and multi-purpose berth at Ringaskiddy – Oyster Bank in order cater for future expansion of the total handling capacity of the Port of Cork facilities, as part of its Strategic Development Plan.

1.1.2 An Bord Pleanála refused the application on the two grounds. Firstly it was considered that the expansion of Ringaskiddy would generate adverse impacts on the strategic road network in and around Cork City, and specifically at Bloomfield, Dunkettle and Kinsale Road Interchange, and the Jack Lynch Tunnel. The lack of a rail option/connection to transport freight from the site was the second reason for refusing the application.

1.1.3 Following the 2008 decision by An Bord Pleanála, the Port of Cork undertook a fundamental review of its Strategic Development Plan and completely re-examined the future growth of its activities. As a consequence of this strategic review, which took full account of the ABP's reasons for refusal, proposals have been developed for a smaller scale development at Ringaskiddy. The development is composed of a number of distinct modules that can be phased in, if required, in response to economic and commercial market conditions.

1.1.4 The Port expansion at Ringaskiddy is intended to complement a reduction of Port operations at the existing Tivoli and Cork Docklands, now being rebranded as Cork City Harbour, sites, which cannot handle large vessels due to physical constraints. The Tivoli and Docklands riverside sites are very well located relative to Cork City Centre (Docklands being within 750m and Tivoli, on the commuter Railway, being within 1.5km). As such, both sites have strong potential to be developed for urban renewal / non-industrial use. These are mutually supportive objectives and are part of the CASP Strategy and the local Cork City Development Plan, which target future population and growth to the Cork Metropolitan area, with a strong reliance on the redevelopment of Cork City Harbour to achieve the projected growth. Furthermore, the removal of container handling facilities from the Tivoli site would also have the benefit of reducing the number of HGVs which pass through the City Centre road network. The relocation of bulk goods handling facilities from City Quay areas and the containers from Tivoli, to Ringaskiddy are thus a very important step in creating the space for sustainable development within Cork City, which currently has very limited development land available in well located City areas.

1.1.5 The Port of Cork is also actively developing a Mobility Management Plan to minimise the impact of port generated traffic on the strategic interchanges of the National Road network around Cork City, during peak hours, which would take account of the revised Strategic Plan.

1.2 Report Overview

1.2.1 In response to the reasons for refusal of the Oyster Bank application, and the revision of their Strategic Plan, the Port of Cork has commissioned this report which investigates how port traffic will be affected by the revised proposed development at Ringaskiddy. This report presents analysis of future traffic volume forecasts generated by the port and their impact on the wider road network. The main difference in the present proposals from the Oyster Bank application is that the scale of development is now lower, and therefore, the impacts are considered to be manageable and in line with local, regional, and national policy on sustainable development and sustainable transport.

1.2.2 The main objective of this report is to present the findings of the preliminary analysis of the traffic and transport impacts of the revised proposals. The key finding is that the future traffic generated by the Port of Cork proposal at Ringaskiddy will not adversely impact the road network as a result of:

- the scale of development being proposed resulting in lower amounts of HGVs being generated on the road network than previously envisaged in the 2008 Oyster Bank application;
- the implementation of a mobility management plan by the Port of Cork. This will entail policy measures implemented by the Port of Cork to suppress HGV movement out of the site during peak times when there is limited spare capacity on the network; and
- the changing policy context regarding how growth should be managed in future on the national network, particularly Smarter Travel objectives to prioritise strategic traffic growth—such as from key ports—over growth in unsustainable car travel. This new strategy is reflected in the Cork County Council N28 Corridor Sustainability Travel Strategy (N28 STS).

1.2.3 This report reviews many of the assumptions and development proposals of the Oyster Bank application and envisages a reduced level of activity being expanded into the Ringaskiddy site. The gradual migration of activities from Tivoli and the Docklands will be balanced against the lower level of redevelopment envisaged in the revised strategy in order to maintain overall port handling capacity in line with the revised demand forecasts and market conditions.. A key advantage of the Ringaskiddy site in terms of the relocation of these facilities is its commercial sustainability, in particular its ability to handle deep water shipping and thus accommodate the larger vessels into the future in line with current trends in vessel size growth. This is a key objective to future proof the strategic role of the Port of Cork both regionally and nationally.

1.2.4 A separate report has been prepared to consider the potential of a rail connection and use of rail freight for Port traffic. This report prepared by Booz & Co has been submitted to the Board for its consideration.

Importance of Port of Cork to the Region

1.2.5 The value of the Port of Cork to the wider Irish economy is considerable. It is the second largest multi-modal port in the Republic, and its aggregate contribution is estimated to be €289.7m supporting approximately 1800 full time equivalent (FTE) jobs. Port activities directly contribute €46.7m and approximately 250 FTE jobs and trade through the port is estimated to be linked to 325,000 FTE jobs.[1] It provides strategic access to the Irish economy and is recognised as one of three pillars supporting the critical Gateway centre of Cork (along with the Airport and the University).

[1] *Source: Port of Cork Yearbook 2009/2010.*

1.3 Ringaskiddy Strategy Review – Key Differences since 2008

1.3.1 The key differences between the Oyster Bank application and current proposals in relation to traffic and transport in the Port of Cork Strategy review are as follows:

- lower development levels;
- lower traffic generation;
- accompaniment of a Mobility Management Plan;
- significantly changed national and regional policy context; and
- lower forecast growth in traffic levels on the strategic network;

1.3.2 These are each described in turn below.

Lower Development Levels

1.3.3 The Port of Cork's strategic review does not envisage a requirement for the previous levels of growth in port facilities. The review is based on lower economic growth forecasts, which foresee a tonnage rise of only 40% to 2025/ 2030 across all sites, increasing from 8.5mt in 2010 to 12mt in 2025 / 2030. In the revised strategy, Ringaskiddy will generate 52% less additional traffic than that forecast in the previous application, which involved a considerably greater extent of works. In particular, the Oyster Bank application included the reclamation of 18 hectares of land and a container terminal with a capacity of 400,000 TEU by 2026, compared to the current proposal which includes a terminal size of only 200,000 TEU[2].

Lower Traffic Generation

1.3.4 It was estimated that the Oyster Bank proposal would generate 7,284 vehicle movements per day, of which approximately 50% or 3642 would be HGVs. By comparison, for the current Ringaskiddy proposal it is estimated that, at full capacity, it would generate a total of 3,550 vehicle movements per day, of which approximately 38% or 1370 will be HGVs. The lower estimate, with less than half the number of HGVs generated by 2030 includes assumptions related to implementation of a Mobility Management Plan.

Mobility Management Planning

1.3.5 The use of demand management is another important difference pertaining to the Port of Cork's strategy review. A Mobility Management Plan will be produced by the Port of Cork that will outline policies for limiting the amount of HGVs generated by the port when critical points in the network are at their busiest. The plan will also include objectives on vehicle routing, and outline measures to limit port traffic on ancillary (non-national) routes.

1.3.6 Measures put forward in the plan will include ways of suppressing HGV movement from the site when there is limited spare capacity on the network at peak commuting times. These measures will further decrease the risk of port related traffic from Ringaskiddy adversely impacting sensitive points in the network during peak times. These measures will complement an area wide mobility management plan for Ringaskiddy which will be implemented by Cork County Council as part of the N28 Corridor Sustainable Travel Strategy and it is expected to include similar undertakings concerning commuter travel among the approximate 7,000 employees and students within the major employers and educational facilities in the area as part of their Smarter Travel Workplace Programme.

[2] Source: Port of Cork Planning Statement

Policy Context

1.3.7 Transport policy in relation to the use of strategic road infrastructure has changed since the Oyster Bank application. The next sections outline those policies which are relevant to the planned application at Ringaskiddy.

Smarter Travel

1.3.8 Smarter Travel is government policy which has come into effect since the 2008 ABP refusal. This policy seeks to reduce the share of travel demand growth which is car dependant. Its main objective is to promote a significant modal shift from private transport to public transport and sustainable transport modes for commuters over the period up to 2020. Controlling development so that it is sustainable/ public transport oriented is an objective of this policy and a mechanism by which this can be achieved.

1.3.9 Smarter Travel Policy recognises the role of the strategic national road network in providing for the efficient movement of interurban traffic and specifically mentions port traffic. Therefore, using the strategic road network for port traffic is consistent with the Smarter Travel Policy objectives. Capacity headroom can be used for strategic economic activity (i.e., HGVs from the port) according to the policy, while the management of commuter trips will reduce the use of this infrastructure by cars and contribute to provision of additional capacity headroom which is particularly relevant to the N28.

N28 Corridor Sustainable Travel Strategy

1.3.10 The National Transport Authority (NTA) Smarter Travel Workplace Programme and the complimentary Cork County Council N28 Corridor Sustainable Travel Strategy initiative will seek to reduce N28 commuter trips by at least 5% over the first five years and by 10% over 10 years. The NTA have reported an average nationwide reduction of 18% through their Smarter Travel Workplaces Programme through incentivising car share schemes for large employers and the promotion of alternative travel modes. However, given the current provision of public transport and other modes in the Ringaskiddy area, it is considered that a more modest proposed medium term target of 10% is achievable and would significantly benefit the available capacity on the N28 corridor at peak times.

1.3.11 As part of the N28 Corridor STS initiative a significant number of major employers in the area have signed up to the NTA Smarter Travel workplaces programme. Furthermore Cork County Council have established a technical group who will implement the management and monitoring processes required to support the achievement of these reduced commuter trip targets in partnership with these key employer stakeholders including the Port of Cork. An N28 Corridor Travel Model is being prepared which will test the benefit of the various mode shift travel proposals and these forecasts will be validated and monitored by means of an ongoing programme of monitoring on the N28 corridor. It is also intended that all significant new development within the Ringaskiddy area will be required to prepare and implement mobility management plans as part of their development and their traffic impact will be tested using the N28 Corridor Travel Model.

1.3.12 In addition to the N28 demand management processes, Cork County Council have, with the support of the NTA, proposed to extend the existing Mahon to Monkstown cycleway, to Carrigaline with an extension eastwards to Ringaskiddy village as part of the Cork Cycle Strategy.

Douglas Land Use and Transport Strategy and Carrigaline LAP

1.3.13 The Douglas Land Use and Transport Strategy is currently being prepared by Cork County Council. Among its objectives are targets to reduce car dependency for commuting from Douglas and achieve a mode shift towards walking, cycling, and public transport.

1.3.14 Similar objectives are contained in the Carrigaline LAP, and it will also be included in the objectives of Phase 2 of the N28 Corridor Sustainable Travel Strategy. Carrigaline is a significant contributor of car trips on the N28 especially during peak times and has a very high rate of car use for this journey purpose.

1.3.15 The combined effects of the strategies for Douglas, Carrigaline and Ringaskiddy will be to restrain traffic growth on the N28 and maintain capacity on the infrastructure for strategic traffic such as the freight from the Port and the major "pharma chem" and medical devices manufacturing facilities at Ringaskiddy.

National Ports Policy

1.3.16 The imminent publication of the National Ports Policy is expected to indicate that Cork will be one of three Irish core ports in the Connecting Europe Network. The Ringaskiddy site is the primary deep water facility in Cork at present, and expansion of its deep water facilities is essential for the commercial viability and development of the port. The expansion of the deep water facility at Ringaskiddy will be in alignment with this national policy objective, will maintain the competitive advantage of the region and meet the needs of Ireland inc for the foreseeable future. This national policy focus on the strategic deep water role of Port of Cork at Ringaskiddy supersedes the ports policy context at the time of the 2008 ABP refusal.

Strategic Infrastructure Upgrades

1.3.17 A number of significant upgrades to strategic infrastructure are currently proposed. This includes upgrades on the N28 at the Shannon Park and Shanbally junctions. The NRA also have advanced proposals to upgrade Dunkettle Interchange to free-flow and thus remove one of the main bottlenecks cited in the 2008 decision to refuse by An Bord Pleanála. The proposed upgrade of the Dunkettle Interchange which was recently presented to ABP at Oral Hearing will be a major enhancement to the regional road network.

1.3.18 In addition the Kinsale Road grade separated interchange has been constructed on the M40 Cork Ring Road since it was cited as a critically affected junction in the 2008 ABP refusal and the proposed grade separated interchanges at Sarsfield Road and Bandon Road are also currently under construction.

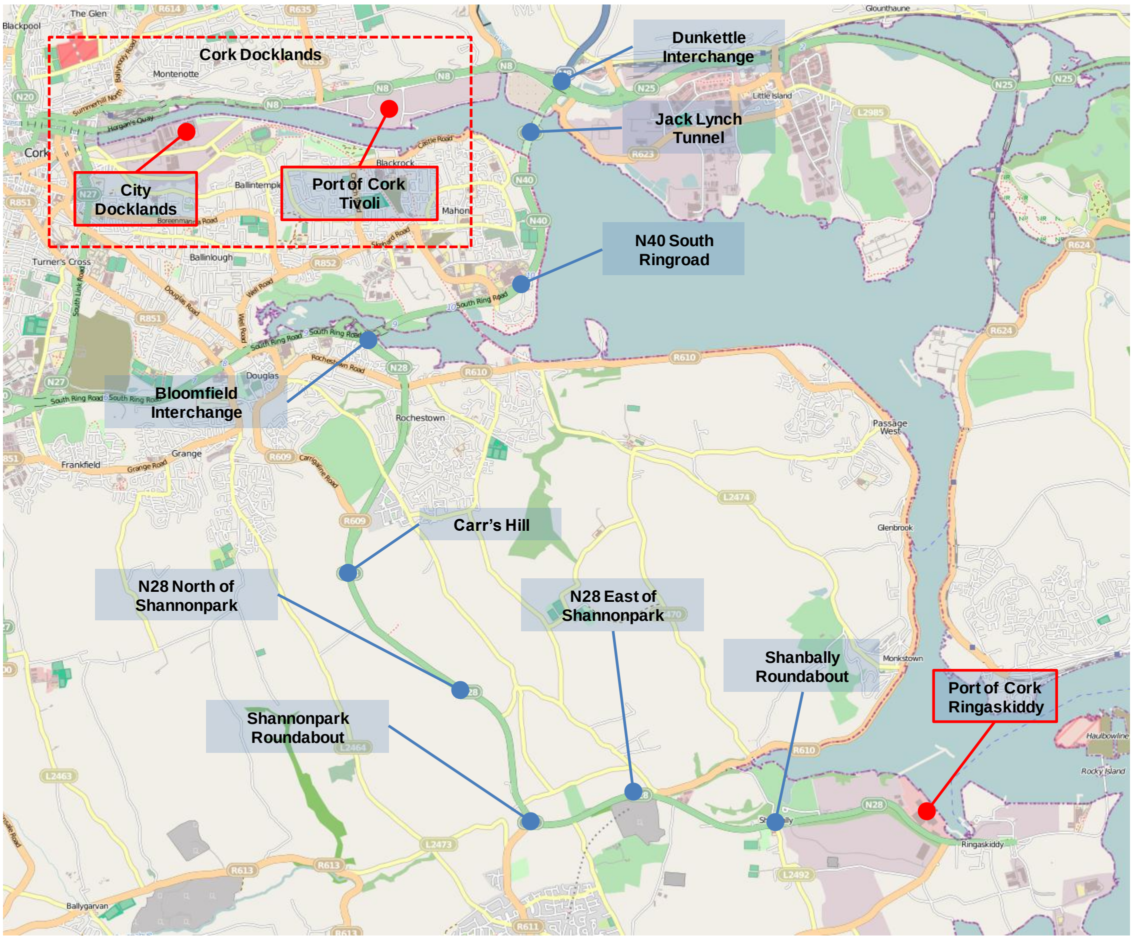

Figure 1.1 Overview of Key Road Network

Traffic Levels on Strategic Road Network

1.3.19 From a sustainable transport perspective there are a number of very important differences relating to the strategic road network between the current situation and the assumptions made at the time of the assessment of the Oyster Bank application. Lower existing traffic levels, a reduced development scenario for Ringaskiddy Port, the implementation of a port Mobility Management plan and the implementation of a strategy for transport on the N28 are the principal differences. These factors significantly improve the feasibility of the proposed development. The following bullets outline the key changes since the previous application:

- the original proposals for the N28 (to which the Oyster Bank application was linked in terms of growth potential) for the upgrade of the N28 to dual-carriageway from Bloomfield to Ringaskiddy have been postponed indefinitely due to cutbacks in the national roads programme;
- there have been reductions in traffic levels on the national road network in the Cork region since 2008 which reflect the economic downturn and national trends. The AADT has fallen by over 6% since 2008 on the N25 at Little Island and by over 12% on the N8 at Dunkettle. As such the strategic road network has more capacity currently available to handle future growth than it did in 2008;
- in line with the current economic downturn, the NRA have revised the traffic growth forecasts for the future and these reduced growth rates are incorporated in the NRA National Traffic model. This model was the basis of the traffic growth forecasts presented to ABP by the NRA for the Dunkettle Interchange SID application in

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November 2012. It is intended that Port of Cork will use these traffic forecasts and this model as the basis of their traffic assessment for the Ringaskiddy application. This will provide consistency for the ABP and address their concerns in relation to traffic impact on the National road network around Cork City; and

- Smarter Travel policy has objectives to prioritise strategic traffic growth on national routes (which includes Port traffic) over commuter traffic growth. Therefore it is reasonable to aspire to utilise the headroom available for traffic growth on the relevant parts of the Cork road network for port expansion within a managed transport context.

1.4 Discussions to Date with An Bord Pleanála (ABP)

1.4.1 The discussions to date with ABP in relation to the present application are as follows:

- November 2011: Pre-planning consultation with An Bord Pleanála – Planning Statement
- 20th December 2011: Ringaskiddy Harbour Development Presentation to An Bord Pleanála
- 24th January 2012: An Bord Pleanála response to pre-application planning request
- 10th February 2012 Rail Report for An Bord Pleanála
- 8th March 2012: Port of Cork response to An Bord Pleanála
- 18th April 2012: Port of Cork second meeting with An Bord Pleanála
- 14th May 2012: ABP Written Record of second meeting.

1.5 Overview of the Assessment

1.5.1 The general process followed for this stage of assessment (and the following more detailed stage) is presented in Figure 1.2 overleaf. In outline, the methodology is as follows:

- undertake a policy review to identify how local, regional, and national transport policy will influence travel demand growth on the relevant network;
- undertake a review of the strategic road network:
  - identify the national network that will be used by port traffic from Ringaskiddy;
  - identify the issues on this network and transport interventions planned;
- assess the level of traffic to be generated by the revised development at Ringaskiddy; and
- estimate the impact.

1.5.2 It should be noted that traffic modelling has not been undertaken in the present assessment. This detailed phase of analysis will follow at a later stage in the SID planning process in order to completely quantify the effects of port related traffic on the strategic road network. However in the preparation of the estimated traffic forecasts indicated in this report we have used the underlying traffic forecasts included in the NRA's Dunkettle Traffic model which is the latest forecast model available. This model was presented to ABP as part of the Dunkettle Interchange application in Nov 2012. We have also used forecast traffic information from the Cork County Council Douglas LUTS Traffic model in the compilation of our traffic forecasts.

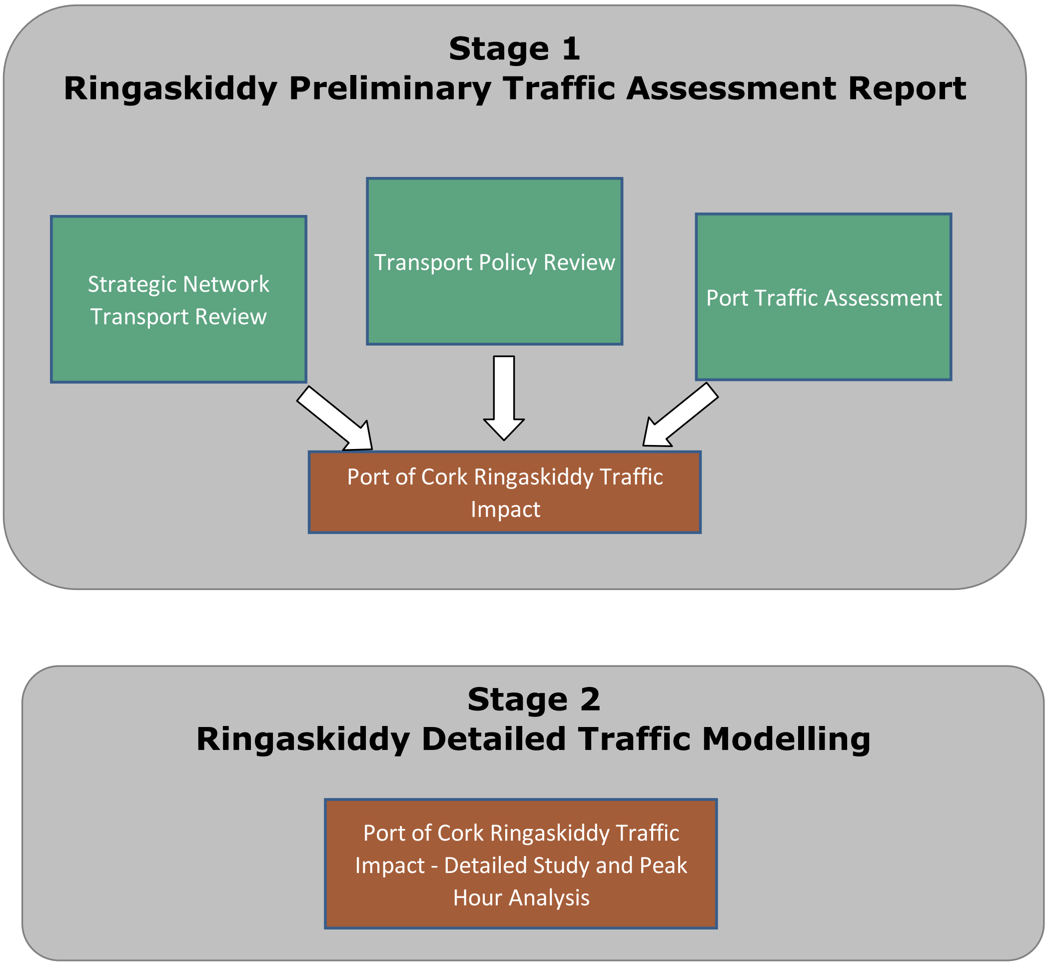


Figure 1.2 Overall Assessment Approach Overview

1.6 Key Assessment Terminology

1.6.1 Presented below are some of the key terms that are used throughout this report to describe the traffic situation and impacts associated with the development at Ringaskiddy.

- **Reference Flow Capacity (RFC)** is the parameter used by the Arcady traffic software programme to measure the capacity of each approach road to a junction. An RFC below 0.85 implies an approach road is operating satisfactorily within capacity; between 0.85 and 1.0 RFC implies the approach road is operating within capacity but at less than optimal efficiency; above 1.0 RFC the approach road is deemed to be above capacity which leads to disproportionate queuing and delays corresponding to a modest increase in traffic.
- **Heavy Goods Vehicle (HGV)** Articulated and Rigid Trucks and vehicles pulling trailers are classified as HGVs.
- **Passenger Car Unit (PCU)** This is a unit of traffic volume, with 1 car = 1 PCU and 1 HGV = 2.5 PCUs.

- **Annual Average Daily Traffic (AADT)** This is an estimate of the mean daily traffic volume at a location over the course of a year. Calculation of AADT involves dividing the total traffic volume in the year by the number of days in the year. The AADT is a measure of the total traffic over a road and thus is useful for pavement and base design. However, it fails to take account of seasonal, monthly, daily and hourly variations in traffic flow[3] and so of itself is not typically an indication of total capacity.
- **Twenty Foot Equivalent Units (TEU)** Is the unit of port container traffic.
- **Degree of (Junction) Saturation (DoS)** is the parameter used by the LinSig traffic software programme to measure the capacity of each approach road to a junction. A DoS below 90% implies an approach road is operating satisfactorily within capacity; between 90% and 100% DoS implies the approach road is operating within capacity but at less than optimal efficiency; above 100% DoS the approach road is deemed to be above capacity which leads to disproportionate queuing and delays in response to a modest increase in traffic.

1.6.2 Figure 1.3 overleaf provides an explanation of key traffic engineering concepts used in the report. These are as follows:

- Capacity;
- Volume / Capacity;
- Level of Service;
- Peak Period;
- Link Capacity; and
- Junction Capacity.

[3] Source: NRA Automatic Traffic Counter Statistics, Explanatory Notes

Figure 1.3 Traffic Flow Concepts

Capacity

the maximum hourly rate at which persons or vehicles can be reasonably expected to traverse a point or uniform segment of a lane or roadway during a given time period under prevailing conditions

Facility Type @ Free Flow Speed	Capacity (Cars per hour per lane)
Freeway: ffs = 70 mph	2400 pcphpl
ffs = 65 mph	2350 pcphpl
ffs = 60 mph	2300 pcphpl
ffs = 55 mph	2250 pcphpl
Multilane: ffs = 60 mph	2200 pcphpl
ffs = 55 mph	2100 pcphpl
ffs = 50 mph	2000 pcphpl
ffs = 45 mph	1900 pcphpl

Volume / Capacity (v/c)

The volume capacity ratio indicates the proportion of the facility's capacity being utilized by current or projected traffic. v/c is usually less than or equal to 1.0. A v/c ratio above 1.0 predicts that a facility will fail.
Reference Flow Capacity (RFC) is equivalent.

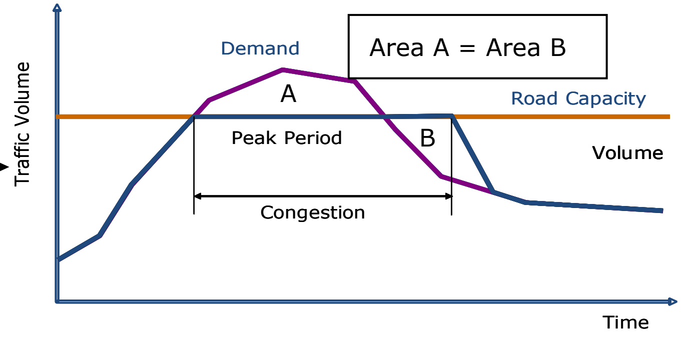
Level of Service

is a quality measure describing operational conditions within a traffic stream, generally in terms of such service measures as speed and travel time, freedom to maneuver, traffic interruptions, and comfort and convenience

A	Free flow
B	Reasonably free flow
C	Stable flow
D	Approaching unstable flow
E	Unstable flow
F	Forced flow

Peak Period

This is associated with the peak in demand during the day; demand is independent of highway capacity. Congestion occurs when the demand exceeds the capacity, i.e., v/c > 1



The area under the graph above the capacity line is equal to the area to the right of the graph below the capacity line resulting in the extension of the congestion period until the excess traffic dissipates.

Link Capacity

Traffic Flow Characteristics
•Intensity
•Density
•Mean speed

Link Characteristics
•Width
•Gradient
•Etc…

Junction Capacity

Traffic Flow Characteristics
•Arrival Rate
•Queues from other intersections

Junction Characteristics
•Type {Signals, Adaptive Signals, Roundabout, Priority}
•Geometry

1.7 The Structure of this Report

1.7.1 This report is structured as follows:

- **Chapter 2 Background**
  - This chapter presents an overview of the application of 2008, how the future situation was expected to develop and the implications for this on the impact of port traffic. The ABP decision to refuse is then briefly discussed. Finally, an overview of the revised Port development strategy is presented.
- **Chapter 3 Assessment Approach**
  - This chapter outlines the approach adopted in determining the revised traffic forecasts generated by the current proposals and demonstrates the lower levels of traffic generated as compared to the Oyster Bank application.
- **Chapter 4 Policy Assessment**
  - In this section relevant national policies are examined which will contribute to the transport impact of the port development and have a bearing on the growth of commuter traffic on the Port Access Corridor. These include Smarter and other local policies such as the Douglas Land Use and Transport Strategy.
- **Chapter 5 Transport Conditions**
  - This chapter presents a review of the current traffic conditions and any future upgrade proposals on the road network of relevance to port traffic.
- **Chapter 6 Port Traffic Assessment**
  - This chapter provides an estimate of the level of port traffic generated, investigates the daily profile of port traffic, shows the influence of mobility management and determines additional daily and peak port traffic on the network, and outlines the expected impact.
- **Chapter 7 Conclusions and Recommendations**
  - The final chapter summarises the main discussion in the report and draws some conclusions.

2 Background

2.1 Introduction

2.1.1 This chapter presents an overview of the Port application in 2008, how the future situation was expected to develop and the implications for this on the impact of port traffic. The ABP decision to refuse is then discussed briefly including the implications for future Port development and for other developments at the strategic Employment Zone at Ringaskiddy. Finally, the revised strategy is presented briefly.

2.2 Ringaskiddy to Cork: 2008 Perspective

2.2.1 For the Ringaskiddy - Oyster Bank application, the upgrading of the N28 was considered to be critical for further large-scale port development, particularly in the context of the existing roundabouts at Shannon Park and Shanbally experiencing significant congestion. As such, it was envisaged the Port development was to be either dovetailed in parallel with the upgrade of the N28 or commenced afterwards. However, this did not resolve issues which may have arisen due to additional peak hour demand at Dunkettle or through the Jack Lynch Tunnel in the view of An Bord Pleanála.

2.2.2 Within the Oyster Bank application, growth in Ringaskiddy traffic was anticipated to be 7,284 daily vehicle movements, of which approximately 50% were HGVs. This is equivalent to 3,600 heavy goods vehicles or 9,000 Passenger Car Units (assuming the equivalence of 1 HGV to 2.5 PCUs).

2.2.3 Further growth in AADT on the N28 was anticipated due to new development in the corridor. It was accepted at the time of the application that an upgraded N28 road would need the capacity to cater for traffic generated by the Port and other anticipated development. It was also acknowledged that if the N28 was not upgraded construction related activity would add to congestion and delay at the overcapacity junctions at Shannon Park and Shanbally.

2.2.4 The assumed underlying traffic growth rates were also much higher (in line with economic forecasts at the time) and it was argued that adverse impacts on performance would occur at Bloomfield and Dunkettle Interchanges due to capacity limitations at the junctions compared to the high projected traffic flows.

2.2.5 Essentially, the Ringaskiddy (Oyster Bank) development was considered by the ABP inspector to "rate poorly in terms of access in the wider road network and will require a large proportion of port related traffic to utilise a road network which is already congested at peak hour times"[4].

[4] ABP Inspector's Report Page 64

2.3 An Bord Pleanála Decision to Refuse Previous Application

2.3.1 In 2008 An Bord Pleanála refused permission to the Port of Cork for their port development at Ringaskiddy - Oyster Bank application on the grounds that the development would:

(a) result in much of the port related traffic traversing the city road network which would adversely impact on the carrying capacity of the strategic road network in and around Cork city and in particular the carrying capacity of the strategic interchanges at Bloomfield, Dunkettle and Kinsale Road and the Jack Lynch Tunnel which it is necessary to preserve; the proposed development would exacerbate serious traffic congestion at these strategic interchanges; and

(b) be unable to make use of rail freight carrying facilities in the future and would therefore, represent a retrograde step in terms of sustainable transport planning (noting reference to the potential for rail freight in the Regional Planning Guidelines for the South West Region 2004-2020 and the Cork Area Strategic Plan 2001-2020).

2.3.2 Following this refusal, the Port of Cork in 2009/ 2010 undertook a fundamental review from first principles of its Strategic Development Plan including a review of its future growth projections of its activities, while maintaining the objective of relocating services from its upper harbour locations at Tivoli and City Quays to the lower Harbour area.

2.3.3 As a consequence of this strategic review - which took full account of the Board's reasons for refusal - future growth projections were much reduced in line with the international and local economic downturn. As a result the future Port development at Ringaskiddy will be at a smaller scale and is to be phased in modules of development, depending on market conditions. The revised strategy will also include the preparation and implementation of a Mobility Management Plan to minimise the impact of port generated traffic on strategic interchanges during peak hours.

2.4 Existing Development at Ringaskiddy

2.4.1 The Port of Cork has existing consent to expand the current scale of port activities and traffic at Ringaskiddy, in accordance with previous Harbour Works Orders governing the provision of the existing port infrastructure at Ringaskiddy. The 2010 Port of Cork Strategic review includes further expansion and development of the port facilities at Ringaskiddy, in addition to the 'headroom' capacity available under previous Harbour Works Orders.

2.4.2 The natural growth of activity at the existing port facilities does not form part of the proposed SID application but it has been taken into account in the estimation of the traffic impact of the proposed new facilities forming the SID application as set out in this report.

2.5 Revised Development at Ringaskiddy

2.5.1 The current Port development at Ringaskiddy, as proposed by the 2010 Strategic Review, is segmented into distinct development modules. The modules are outlined below in Table 2.1

Table 2.1 Ringaskiddy Development Modules

Module Number	Description
1	Proposed New Road Access
2	Proposed Ringaskiddy East Phase 1a
3	Proposed Ringaskiddy East Phase 2
4	Proposed Ringaskiddy East Phase 1b
5	Proposed Ringaskiddy West Extension
6	Proposed Ringaskiddy West Landbank
7	RoRo/Ferry Terminal Approved Growth
8	Deepwater Berth Approved Growth
9	Separate Future Development of Adjacent Lands

2.5.2 It is important to note that:

- Modules 1 to 6 comprise the present Strategic Infrastructure Development application;
- Modes 7 and 8 comprise the ongoing implementation of the previously consented existing port facilities; and
- Module 9 comprises the development of adjacent lands.

2.5.3 The layout of these modules is shown in Figure 2.1 (Aerial Photomontage).

2.5.4 The modules have also been organised into Scenarios for the purpose of traffic analysis. Table 2.2 below shows which modules are included in each of the scenarios considered, e.g., Scenario A includes Modules 1 and 2. Scenario E includes modules 1 to 6, i.e., the SID application.

Table 2.2 Scenario Composition in Terms of Module Numbers

Scenario		Module 1		Module 2		Module 3		Module 4		Module 5		Module 6		Module 7		Module 8		Module 9
A	=	New Road Access	+	Ringaskiddy East Phase 1a														
B	=	New Road Access	+	Ringaskiddy East Phase 1a	+	Ringaskiddy East Phase 2												
C	=	New Road Access	+	Ringaskiddy East Phase 1a	+	Ringaskiddy East Phase 2	+	Ringaskiddy East Phase 1b										
D	=	New Road Access	+	Ringaskiddy East Phase 1a	+	Ringaskiddy East Phase 2	+	Ringaskiddy East Phase 1b	+	Ringaskiddy West Extension								
E	=	New Road Access	+	Ringaskiddy East Phase 1a	+	Ringaskiddy East Phase 2	+	Ringaskiddy East Phase 1b	+	Ringaskiddy West Extension	+	Ringaskiddy West Landback						
F	=	New Road Access	+	Ringaskiddy East Phase 1a	+	Ringaskiddy East Phase 2	+	Ringaskiddy East Phase 1b	+	Ringaskiddy West Extension	+	Ringaskiddy West Landback	+	RoRo/Ferry Terminal Approved Growth				
G	=	New Road Access	+	Ringaskiddy East Phase 1a	+	Ringaskiddy East Phase 2	+	Ringaskiddy East Phase 1b	+	Ringaskiddy West Extension	+	Ringaskiddy West Landback	+	RoRo/Ferry Terminal Approved Growth	+	Deepwater Berth Approved Growth		
H	=	New Road Access	+	Ringaskiddy East Phase 1a	+	Ringaskiddy East Phase 2	+	Ringaskiddy East Phase 1b	+	Ringaskiddy West Landbank	+	Ringaskiddy West Extension	+	RoRo/Ferry Terminal Approved Growth	+	Deepwater Berth Approved Growth	+	Development of Adjacent Lands

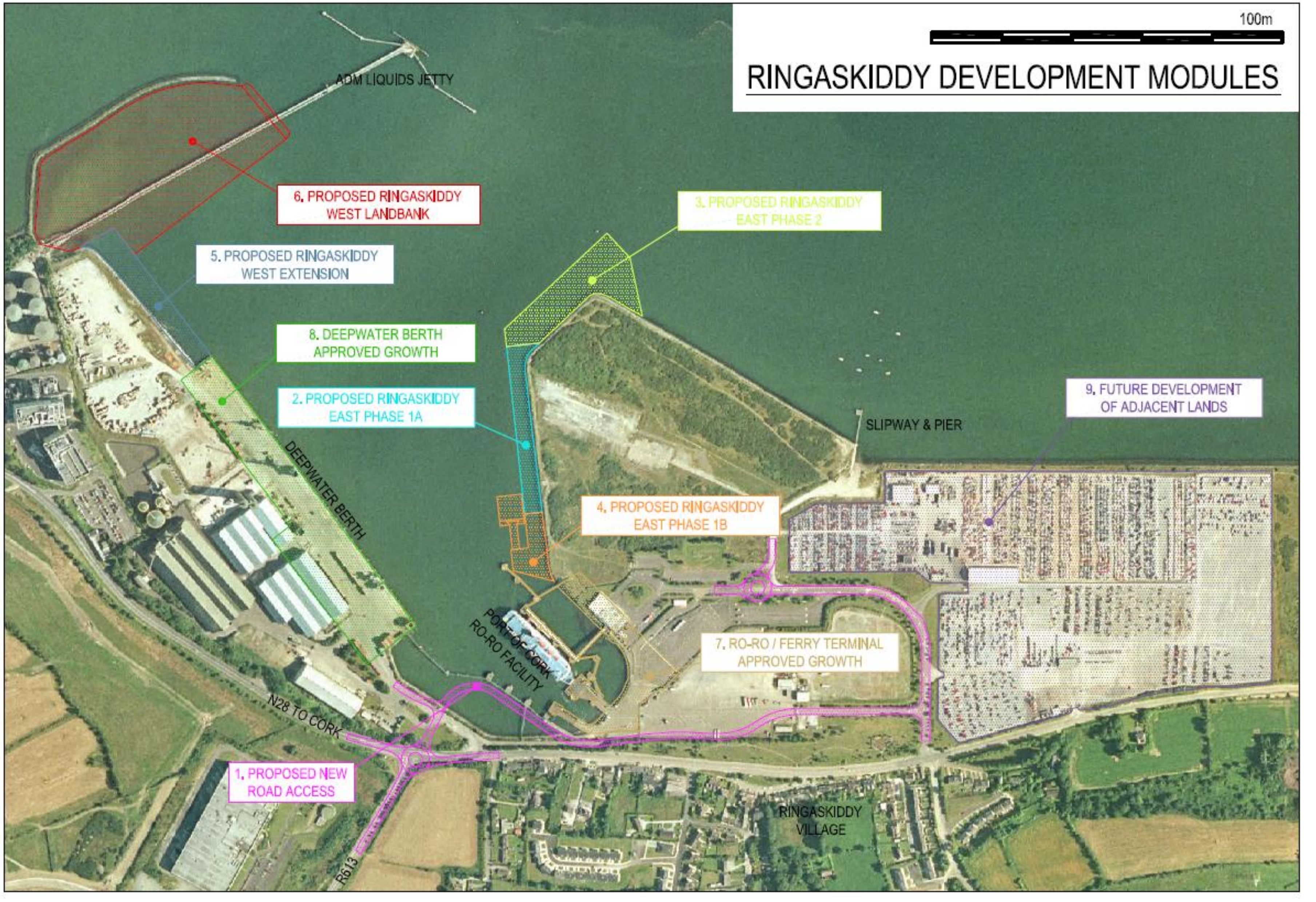


Figure 2.1 Proposed Ringaskiddy Development Modules

3 Assessment Approach

3.1 Introduction

3.1.1 The assessment approach is described in this chapter.

3.2 Approach

3.2.1 A flowchart is presented below in Figure 3.1 that outlines the process involved in performing the assessment in terms of Transport Conditions and Port Traffic. It should be noted that detailed traffic modelling has not been used in the present assessment; this would entail peak hour modelling under a range of port traffic scenarios and will be undertaken at a later stage once the analysis presented in this report is disseminated.

3.2.2 The approach outlined in Figure 3.1 results in separate chapters for each of Policy Assessment, Transport Conditions, and Port Traffic Review. In Chapter 4 Policy Assessment the following is presented:

- **Identify Local, Regional, and National Policy of Relevance:** In this section relevant national policies such as Smarter Travel in addition to other local policies such as the Douglas Land Use and Transport Strategy which will have a bearing on the growth of commuter traffic on the Corridor are considered;
- **Interpret Policies in Context of Port Application;** In this section the above policies are discussed in terms of relevance to the application; and
- **Estimate Impact of Policy on Traffic Growth:** This section draws specific assumptions from the above policies that are used to estimate eventual traffic impacts due to port traffic.

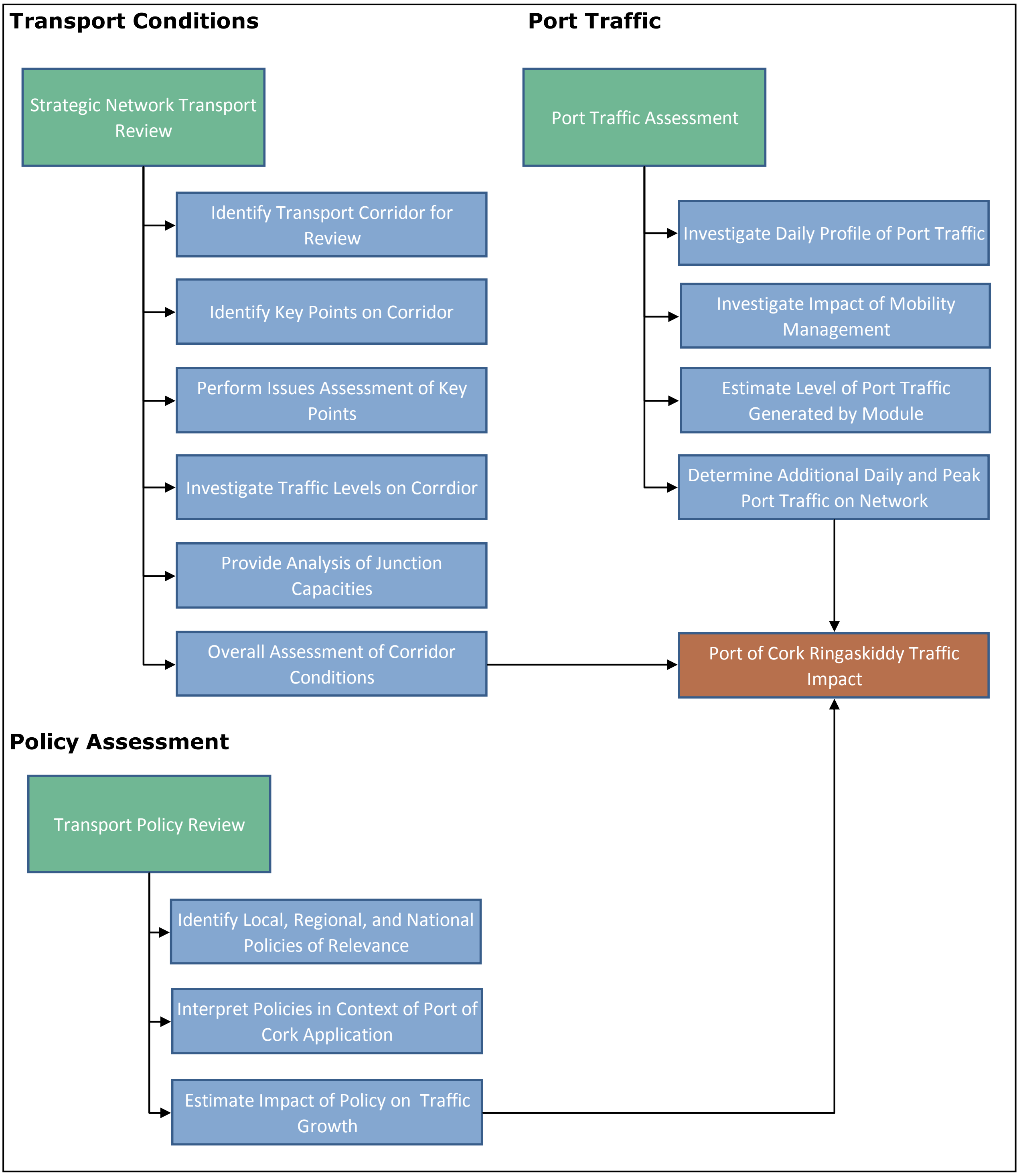
3.2.3 In Chapter 5 Transport Conditions the following is presented:

- **Identify Transport Corridor for Review:** In this section the distribution of traffic from Ringaskiddy is used to identify the main routes likely to be used by traffic using the Ringaskiddy site in the future;
- **Identify Key Points on Corridor:** The critical points on the parts of the network that provide access to the Port at Ringaskiddy are identified;
- **Perform Issues Assessment of Key Points:** This section presents a discussion of the main issues and proposed interventions;
- **Investigate Traffic Levels on Corridor:** This section presents an analysis of traffic survey data;
- **Provide Analysis of Junction Capacities:** This section presents an analysis of key junctions on the corridor and how the planned upgrades will mitigate any congestion; and
- **Outline Level of Service Prevailing on Corridor:** This section provides a summary with a discussion of the level of service which may be operating when the port development at Ringaskiddy is operational.

3.2.4 In Chapter 6 Port Review the following are presented:

- **Estimate Level of Port Traffic Generated by the Development Modules:** This section presents estimates on traffic generation according to each module;
- **Investigate the Daily Profile of Port Traffic :** This section presents the departure profile of port traffic which has been observed at Tivoli and Ringaskiddy and discusses the potential implications of this on the strategic road network;
- **Show Influence of Mobility Management** This section presents assumptions on demand management policies which will limit the generation of HGV trips on the strategic road network during peak periods.
- **Determine Additional Daily and Peak Port Traffic on the Network:** This section combines the above analysis on traffic generation, daily profile, and mobility management in order to determine the ultimate level of traffic estimated to be generated by the port; and
- **Outline Impact of Port Traffic in terms of Level of Service:** This section discusses the potential impact on the network of the level of traffic estimated above.

Figure 3.1 Assessment Flowchart



4 Policy Assessment

4.1 Introduction

4.1.1 In this Chapter the local, regional, and national policy of relevance are identified, including Smarter Travel and other local policies such as the Douglas Land Use and Transport Strategy. The measures proposed in these will have a bearing on the growth of commuter traffic on the Port Access Corridor. These policies are then discussed in the context of the Ringaskiddy application. Finally the estimated Impact on traffic growth is discussed.

4.2 Policies of Relevance

4.2.1 This section describes the national and regional transport policy that will have an affected on the transport situation on the Port Access Corridor. The policies identified are as follows:

- Smarter Travel Policy
- N28 Corridor Sustainable Travel Strategy – Cork County Council
- Smarter Travel Workplace Programme – NTA (National Transport Authority)
- Mobility Management Plan - Ringaskiddy Port – Port of Cork
- Douglas Land and Transport Strategy – Cork County Council
- National Ports Policy – Department of Transport Tourism and Sport
- N40 Demand Management

4.3 Policy Interpretation

Smarter Travel

4.3.1 Smarter Travel is government policy which seeks to reduce the share of travel demand growth which is car dependant. Its main objective is to promote a significant modal shift from private transport to public transport and sustainable transport modes over the period up to 2020. Controlling development so that it is sustainable/ public transport oriented, is a mechanism by which this can be achieved.

4.3.2 Smarter Travel Policy recognises the role of the strategic national road network in providing for the efficient movement of interurban traffic and specifically mentions the port traffic. Therefore using the strategic road network for port traffic is consistent with the Smarter Travel Policy objectives. Capacity headroom can be used for strategic economic activity (i.e., HGVs from the port) according to the policy, while management of commuter trips will reduce the use of this infrastructure by cars and release headroom capacity (particularly on the N28).

N28 Corridor Sustainable Travel Strategy

4.3.3 It is understood that the N28 Corridor Sustainable Travel Strategy being developed by Cork County Council in association with the NTA has among its objectives the following :-

- To reduce the number of single occupancy car commuter trips on the N28 through the promotion of Smarter Travel policies.
- To ensure adequate access to and sustain the long term viability of the Ringaskiddy Strategic (Industrial) Employment Centre and Port Facility.
- To establish a long term Mobility Monitoring Framework and Measurement Process for the management of traffic and travel demand on the N28.
- To prepare an Area Wide Mobility Management Plan for Ringaskiddy to be adopted as Council policy and incorporated into the Cork County Development Plan 2009 as an amendment to the Carrigaline LAP to ensure that appropriate sustainable travel measures are incorporated into the planning control process governing future development in the area.
- To identify a suite of Sustainable Travel low cost infrastructure measures to enhance the availability and accessibility of alternative travel mode choices for N28 Commuters.
- To Identify and deliver localised road infrastructure capacity improvements to the N28 route in the short term.
- To support the NTA's Smarter Travel Workplaces scheme among the key employers in Ringaskiddy and promote awareness of Sustainable Travel choices among N28 commuters.

4.3.4 Phase 1 of the N28 Corridor STS relates to the Ringaskiddy Strategic Employment Area and will focus on the implementation of measures that support sustainable travel alternatives for the N28 commuters who are employed or attend education in the Ringaskiddy area. It will include a travel monitoring and management system for the N28 Corridor which will be implemented by Cork County Council and it will incorporate the proposals and synergies that emerge from the Smarter Travel Workplace Plans developed by the various local companies as part of the NTA's Smarter Travel Workplace Programme.

4.3.5 The objectives of the N28 Corridor STS will include the promotion of sustainable travel objectives including a choice of alternative modes of transport to work among the estimated 7,000 employees and students in the Ringaskiddy area, the vast majority of whom use the N28 to travel to work or college. This will include car sharing, public transport, walking and cycling and the objective of phase 1 of the N28 Corridor STS initiative will be the reduction of single occupancy car based commuter trips in the Ringaskiddy area for existing and future developments.

4.3.6 The N28 Corridor Sustainable Travel Strategy initiative will seek to reduce N28 commuter trips by at least 5% over the first five years and by 10% over 10 years. The NTA Nationwide average reduction achieved through the Smarter Travel Workplace Programme is 18% for large employers but it is considered that this result relates generally to areas which are better served by public transport than Ringaskiddy is currently.

4.3.7 As a participant in the Cork County Council N28 Sustainable Travel Strategy the Port of Cork has signed up to the NTA Smarter Travel Workplaces Programme. In addition seven other major employers have already either signed or indicated their intention to sign up to the programme. As part of the N28 Corridor STS initiative, the NTA have confirmed that they will allocate two facilitators to promote and support their Smarter Travel Workplace Programme in the Ringaskiddy area.

4.3.8 Cork County Council have established an N28 management framework including a technical group, who will implement the management and monitoring processes required to support the achievement of these reduced commuter trip targets in partnership with the key employer stakeholders.

4.3.9 It is envisaged that a Ringaskiddy employer transport forum / consultative group comprising representatives from the local employer stakeholders, Cork County Council and the NTA will be established as part of the N28 Corridor STS implementation plan. This group will provide a consultation and feedback role and support an integrated partnership approach to the achievement of the N28 STS travel targets. It is also envisaged that significant synergies will emerge from the various individual local workplace travel plans which will contribute to the development of alternative travel mode initiatives on an area wide scale in Ringaskiddy which will be developed, implemented and monitored under the N28 STS framework.

4.3.10 In addition a comprehensive multi modal N28 Corridor Travel Model is being prepared which will test the benefit of the various mode shift travel proposals and these forecasts will be validated and monitored by means of an ongoing programme of monitoring of travel in the N28 corridor.

4.3.11 Furthermore a variation to the Carrigaline Local Area Plan (as part of the Cork County Development Plan) will be put in place requiring all significant new development within the Ringaskiddy area to prepare and implement mobility management plans as part of their development proposals and their traffic impact will be tested using the N28 Corridor Travel Model.

4.3.12 As part of the N28 STS Cork County Council, with the support of the NTA, propose to extend the Mahon to Passagewest cycleway as far as Carrigaline with a further spur to Ringaskiddy. This proposal would enable mixed mode travel to Ringaskiddy, permitting park and cycle or set-down and cycle to work from a large catchment area.

4.3.13 In addition Cork County Council is proposing to upgrade the capacity of the junctions at Shannonpark and Shanbally as part of the N28 Corridor STS in conjunction with the NRA and is also proposing improvements to Ringaskiddy village including the provision of a pedestrian crossing, an initiative which would be supported by the Port of Cork.

NTA Smarter Travel Work Place Programme

4.3.14 The NTA Smarter Travel workplaces programme which is being taken up by the majority of major employers in Ringaskiddy will result in a series of plans being developed for each of the sites with the support of a dedicated NTA facilitator. These workplace travel Plans will aim to reduce non-essential car-based work trips and promote public transport, walking and cycling among the employees and customers of the participating companies.

4.3.15 The implementation of these workplace Travel Plans will be reviewed and monitored (on a voluntary participation basis) by Cork County Council as part of the N28 STS and the Smarter Travel proposals and corresponding synergies that emerge will be tested and assessed for incorporation into the N28 STS.

POC Mobility Management Plan – Ringaskiddy

4.3.16 In addition to the above the Port of Cork has confirmed that it intends to prepare a full mobility management plan for all its operations at Ringaskiddy.

4.3.17 The Port of Cork Mobility Management Plan will seek to develop and implement a HGV management system which will mitigate the impact of HGV trips at critical locations on the network during the peak hours. It will seek to include all freight haulage companies using the Port at Ringaskiddy and to optimise the timing and routing of HGV trips on the Port access corridor to mitigate their relatively limited impact on the N28 peak hour traffic flows. It will include a system for monitoring and feedback of HGV traffic information to the Cork County Council N28 Corridor STS - Ringaskiddy Area-wide mobility management system.

Douglas Land Use and Transport Strategy

4.3.18 The Douglas Land Use and Transport Strategy and the Carrigaline LAP both envisage mode shift away from car use for commuters as per the objectives of Smarter Travel. The emerging indications from the Douglas LUTS model and the junction improvements are that there will be a modest reduction in traffic on the N28 and the N40 if and when the Douglas LUTS proposals are implemented. The strategy is currently estimated to be implemented by 2022 but could be sooner depending on funding.

National Ports Policy

4.3.19 The imminent publication of a revised National Ports Policy is expected to endorse the European Commission's designation of Cork as one of three core Irish Ports which will form part of the Core Trans European Transport Network. The Ringaskiddy site is the primary deep water facility in Cork at present, and expansion of its deep water facilities will align with this European and National policy.

N40 Demand Management

4.3.20 Cork County Council and Cork City Council, with the support of the NTA and NRA, have a key role to play in managing demand on the N40 Cork South Ring Road through the implementation of effective land use and transportation policies and the implementation of initiatives which serve to achieve the Smarter Travel mode shift targets in the Cork Area including the N28 Mobility Management Framework.

4.4 Impact of Policy on Traffic Growth

4.4.1 Taken together, the above policies create favourable conditions in which to provide for a modest net increase in port generated traffic. Smarter Travel and the N28 STS will seek to reduce the use of the Port Access Corridor by car based trips, and require sustainable travel measures to be incorporated in any future development. The achievement of the targets for the reduction in work based commuter trips will release additional capacity on the N28 to facilitate strategic traffic including Port traffic.

4.4.2 The National Ports Policy includes Port of Cork as one of three strategic core ports and a nationally strategic deep water facility. According to Smarter Travel, the national road network should support policies relating to the development of these strategic facilities.

4.4.3 Other local strategies such as DLUTS and Carrigaline LAP follow the objectives set down in Smarter Travel and set out specific measures by which commuter traffic growth will be restrained on the Port Access Corridor. This creates a lower risk of background traffic growth competing for limited road space with growth in traffic from the expansion of major Pharma/Chem and medical devices facilities, the Maritime College and the Port at Ringaskiddy.

5 Transport Conditions

5.1 Introduction

5.1.1 This chapter presents an analysis of transport conditions on the relevant corridor serving the port at Ringaskiddy. Firstly, the transport corridor is identified by analysing the distribution of traffic from Ringaskiddy based on a destination survey. Following this, the key points on the corridor are assessed in order to identify areas which may be affected by port traffic.

5.1.2 This is followed by an investigation of traffic levels on the corridor and analysis of junction capacities. The chapter concludes with an assessment of the overall performance of the corridor road network as it currently exists.

5.2 Ringaskiddy to Cork Corridor

Overview

5.2.1 Port of Cork has undertaken extensive surveys in order to determine the geographic spread of its main customer base. Surveys were carried out at both Tivoli Container Terminal and Ringaskiddy Deepwater Port. The surveys showed that 94% of all trips from Tivoli and 82% of all freight trips from Ringaskiddy are within the Munster Region. Table 5.1 below highlights the key results in terms of the major destinations for traffic from Tivoli. Only destinations where the proportion is above 5% are shown.

Table 5.1 Tivoli Customers Distribution

Destination	Avg Daily HGV Trips: Tivoli	% of Total
Cork NE	149	19
Little Island & Glounthaune	100	13
Limerick	68	9
South Tipperary	53	7
Waterford	35	5

5.2.2 The future distribution of traffic destinations from Ringaskiddy is assumed to match the observed distribution from Tivoli due to the relocated activities from Tivoli maintaining the same customer base. This assumed distribution will result in the majority of Port generated traffic using the N28 and then either the N40 for north and east traffic or the N40 South Ring Road for traffic bound for the west. However only the sections of road that serve the north and east areas were cited by ABP in refusing the previous application. Therefore the key corridor in question is comprised of the N28, the N40, Jack Lynch Tunnel, and Dunkettle Interchange. With respect to westbound port traffic it is worth noting that the interchanges on the M40 at Kinsale Road, Sarsfield Road and Bandon Road have been upgraded since the 2008 application. In addition the capacity of the N25 / Silversprings overpass interchange for all Northbound (including port) traffic will be enhanced as a consequence of the relocation of container traffic from Tivoli.

Corridor Definition

5.2.3 The N28 is a national route and is the principal access route between the Port of Cork facilities at Ringaskiddy and the N40 Cork South Ring Road. The N28 is a single carriageway road with at-grade roundabouts and priority junctions.

5.2.4 Figure 5.1 below shows the key points on the N28 / N40 corridor which links Ringaskiddy to the M8 and to most of the onward port traffic destinations. This will be part of the road network used by the majority of Ringaskiddy related port traffic, and was specifically referred to in the decision to refuse the previous application due to its critical importance for movement through Cork City.

5.2.5 Based on the above, it is reasonable to define the road network of interest for the assessment of port traffic from Ringaskiddy as the N28, the N40 South Ring Road, Bloomfield Interchange, the Jack Lynch Tunnel, and the Dunkettle Interchange. This will be termed the Ringaskiddy Port Access Corridor for the purpose of the discussion in this report.

5.2.6 The N28 road between the Port of Cork at Ringaskiddy and the roundabout junction at Shannonpark is for the most part a wide 2 lane section of road with hard shoulders.

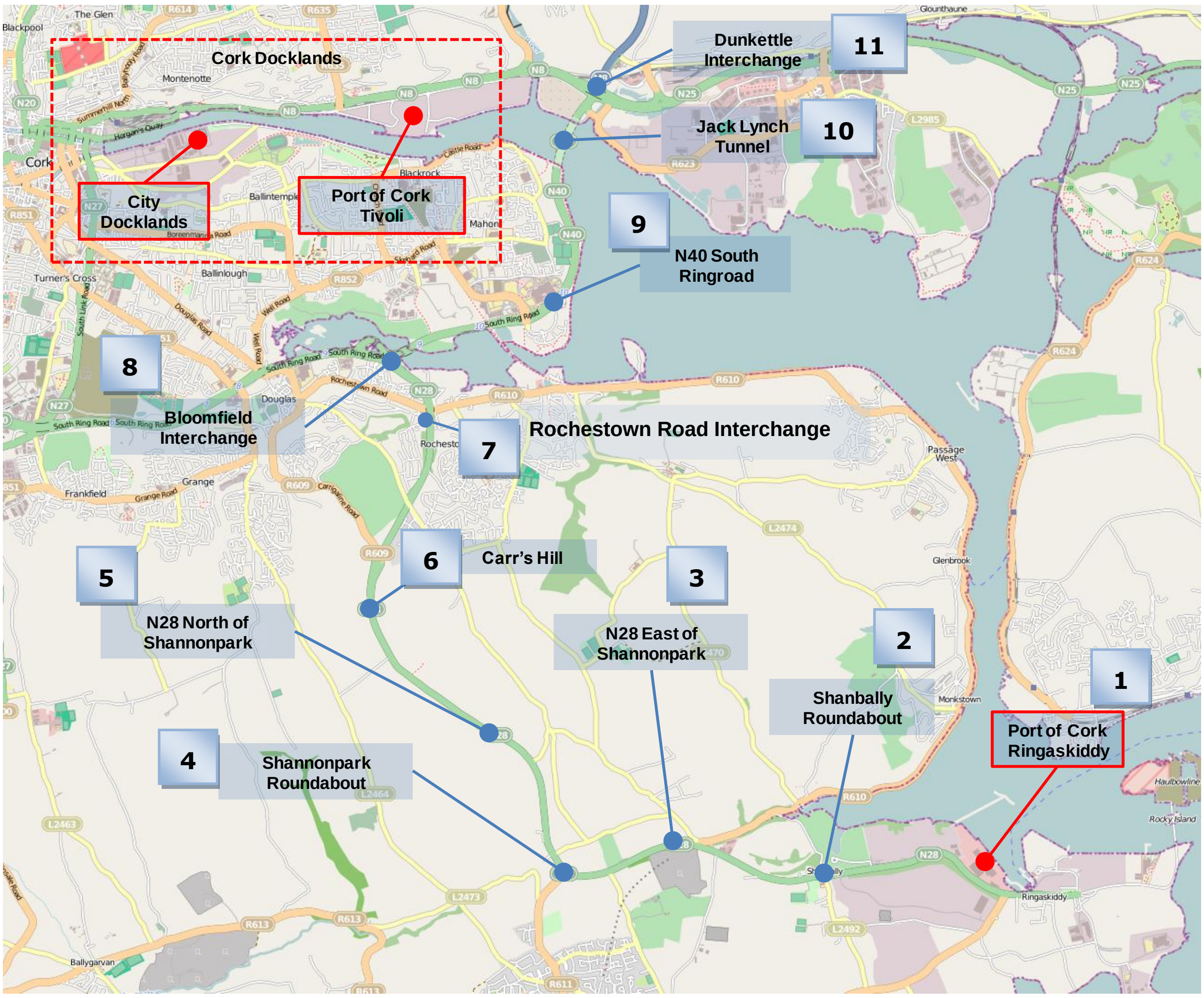


Figure 5.1 Key Network Points on Ringaskiddy Port Access Corridor

5.2.7 On the N28 just north of Shannon Park the capacity of the carriageway is constrained by its narrow layout and the traffic demand in the morning peak hour is approaching its capacity leading to reduced travel speeds and increased journey times on the section of the road between Shannonpark and Bloomfield. The travel time between these points can be up to 11 minutes in the AM peak hour compared to a journey time of 6 minutes or less in the off peak period.

5.3 Issues Assessment of Key Points on Port Access Corridor

5.3.1 Traffic flows vary along the length of the N28 Port Access Corridor as one travels between Haulbowline at the southern end of the N28 to the Dunkettle Interchange. Daily traffic on the N28 show strong AM and PM peaks associated journeys to work from the Carrigaline and Ringaskiddy area.

5.3.2 Independent survey data indicates that there has been a significant reduction in the traffic flow on the N28 since 2009. The number of vehicles on the N28 South of Bloomfield Interchange was 23,968 (average daily traffic between 21/09/09 and 04/10/09). A year 2011 estimate of traffic for the same location derived from several other nearby counters, amounted to 19,248 average daily traffic (i.e. -19% relative to 2009). Furthermore, surveys at the N28 north of Shannonpark Roundabout recorded peak hour flows of 2,945 and 2,581 for the years 2005 and 2011 respectively[5]. There have also been reductions in traffic flows in the Jack Lynch Tunnel and generally on the national road network in the Cork Area.

5.3.3 In addition the current NRA growth rates for future traffic are significantly less than those used in the traffic forecasting for the 2008 Ringaskiddy – Oyster Bank development.

5.3.4 The trend shown in Figure 5.2 below indicates that average daily traffic has fallen by nearly 10% since 2007. This fall in traffic should allay concerns over congestion of the network at the key locations of Dunkettle and the Jack Lynch Tunnel.

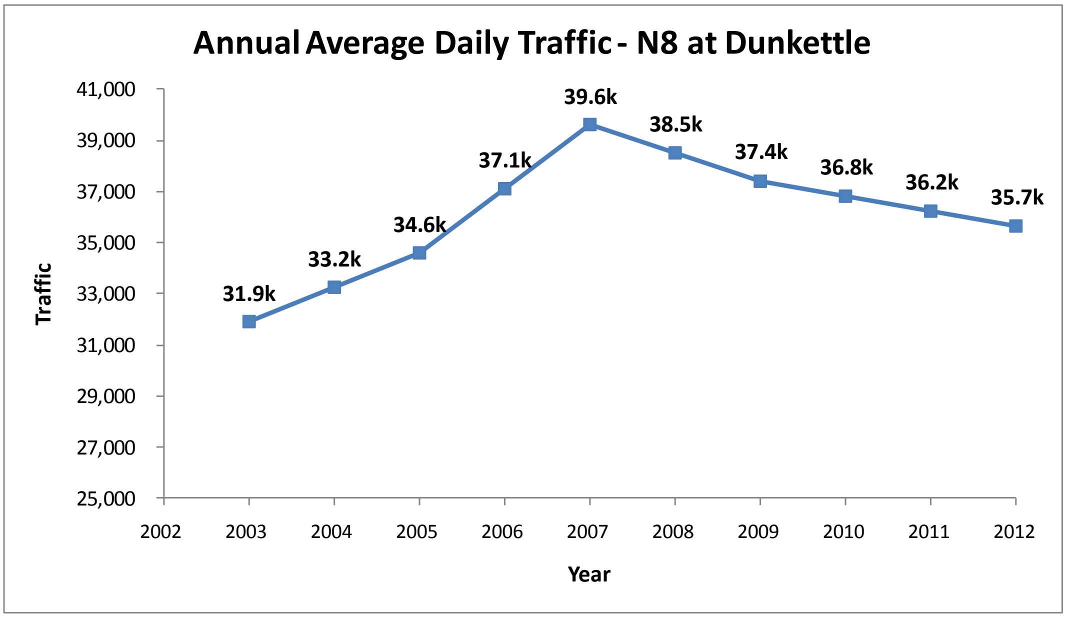


Figure 5.2 Trend in Average Daily Traffic at Dunkettle

[5] Source: RPS Review of Data and Annual Traffic Growth Trends on the N28, Jan 2012

5.3.5 Table 5.2 below presents a tabulated assessment of the current traffic issues experienced on the Port Access Corridor. These locations are shown on the map in Figure 5.1 above.

Table 5.2 N28 Issues Summary

Map Ref	Location	Description	Issues	Proposed Intervention
1	Port of Cork Ringaskiddy	There are two junctions within the village of Ringaskiddy which provide access to major employers in Loughbeg and Ringaskiddy and Carrigaline as well as to the Port of Cork facilities.	Relatively little congestion Local residents have expressed concern about the absence of a controlled pedestrian crossing in the village.	Cork Co. Co. have recently proposed plans for a pedestrian crossing In addition the proposed revised Port entrance layout will remove much of the Port HGV traffic from Ringaskiddy village
2	Shanbally Roundabout **(further analysis in next section)**	Small three arm roundabout in semi built up area. Traffic approaching from Ringaskiddy gives way to southbound traffic onto Marian Terrace	Queuing within the AM and PM peak hours	Signalisation of the roundabout is expected to increase capacity to above current and forecast levels of demand
3	N28 East of Shannonpark	Single lane with numerous at-grade priority junctions for access to housing or employment premises fronting onto the road	Travel time between Shanbally and Shannon Park impacted by queuing during the peak periods.	Signalisation of these junctions will significantly enhance the safety of vulnerable road users including pedestrians and cyclists and manage traffic queuing during peak hours
4	Shannonpark Roundabout **(further analysis in next section)**	Large three arm roundabout in rural area.	Queuing within the AM and PM peak hours	Signalisation of the roundabout is expected to increase capacity to above current and forecast levels of demand
5 and 6	Section of N28 North of Shannonpark to Bloomfield	Single lane with numerous at-grade priority junctions for access to housing or employment premises fronting onto the road	Slow moving peak hour traffic	Mobility management plan will ensure that this is not significantly impacted and efforts will be made to reduce level of Port traffic at peak times.

Map Ref	Location	Description	Issues	Proposed Intervention
8	Bloomfield Interchange	The N28 joins with the N40 South Ring Road at the Bloomfield Interchange, some 10km north of Ringaskiddy. Bloomfield is a high capacity grade separated free-flow junction and the South Ring Road is an Urban Dual Carriageway.	Traffic flows through the Bloomfield Interchange are impacted by heavy traffic flows emerging from the Rochestown Road interchange and by the traffic conditions on the N40 South Ring Road	The signalisation of Clarkes Hill / Rochestown Road and the signalisation of the St Patrick's roundabout on the Rochestown Rd will significantly benefit the operation of the Bloomfield interchange
9	N40 South Ringroad		reduced travel speeds including the route from the N40 Eastbound to the N28 Southbound and the slip road onto the Rochestown Road.	the provision of a grade separated interchange at Kinsale Road opened in 2006 and the provision of grade separated interchanges at Sarsfield Road and at Bandon Road now currently under construction and due for opening in 2013
10	Jack Lynch Tunnel	2 lanes each direction submerged tunnel.	Insufficient capacity for demand at peak times.	No additional tunnels are being considered. Port traffic will be timed to avoid peak demand at the tunnel.
11	Dunkettle Interchange	Dunkettle Interchange exceeds 90,000 AADT	Interchange is working above capacity at peak times on a daily basis	NRA proposal for free flow movement on all approaches to the Dunkettle Interchange and this will have the effect of removing all congestion from this location, arising from the capacity constraints of the existing Dunkettle Interchange, for the future. In addition there is significant capacity available during interpeak and off peak times which can more than accommodate the port generated traffic. Oral hearing held and a decision by An Bord Pleanála is awaited.

5.4 Traffic Levels on Port Access Corridor

5.4.1 Figure 5.3 below shows the AADT values along the corridor in April / May 2011. Specific detail on the amount of this traffic that is generated by the port is presented in Chapter 6. The volume on the section of the N28 between Carrigaline and Ringaskiddy is between 5k and 10k on average per day. While this is a relatively low flow, some junctions on this section of the road experience congestion in the peak periods (as is noted in Section 5.5 below).

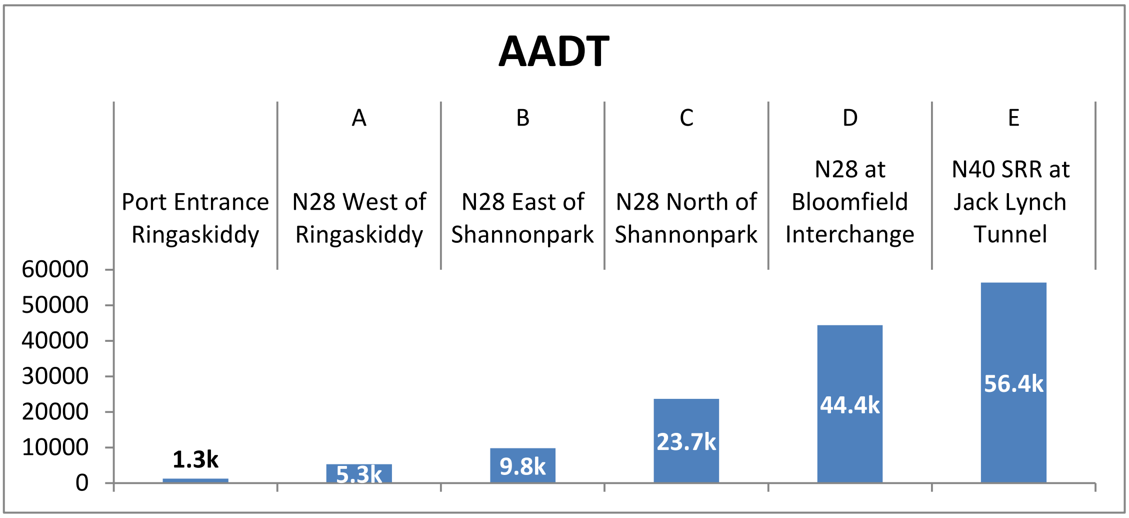


Figure 5.3 Ringaskiddy to Cork AADTs

5.5 Analysis of Junction Capacities

Shanbally and Shannonpark

5.5.1 There are two junctions on the N28 which currently experience significant congestion at peak times and represent a constraint on capacity through the Port Access Corridor. Cork County Council/NRA have developed options to upgrade the capacity of these junctions by adding traffic signalling.

5.5.2 Analysis of these junctions was prepared by RPS in August 2012. Arcady junction modelling software was used for present day and future levels of traffic (based on NRA growth factors) in order to obtain efficiency estimates of junction operation. The growth in traffic was derived from NRA growth factors up to 2030.

5.5.3 The outputs of the modelling are presented below in Tables 5.3 (PM Peak 2011), 5.4 (PM Peak 2030), and 5.5 (PM Peak 2030 with junction upgrades). The results of the analysis illustrate the issues associated with the current configuration in terms of RFC, and how the planned upgrades are expected to mitigate congestion problems at the junctions.

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Table 5.3 PM Peak Junction Capacity Assessment, 2011 – Present Configuration

	AM Peak Hour	Max RFC	PM Peak Hour	Max RFC	% Port of Cork Traffic
Shannonpark	✓	0.81	✓	0.52	3%
Shanbally	✗	1.07	✓	0.72	6%

Table 5.4 PM Peak Junction Capacity Assessment, 2030 – Present Configuration

	AM Peak Hour	Max RFC	PM Peak Hour	Max RFC	% Traffic Growth
Shannonpark	✗	0.96	✓	0.60	+14.25%
Shanbally	✗	1.22	✓	0.84	+14.25%

✓ *Operates within Capacity (RFC <0.85)(see note 5) .*

✗ *Demand exceeds capacity for one or more arms (RFC > 0.85).*

Table 5.5 PM Peak Junction Capacity Assessment, 2030 – Upgraded Configurations

	AM Peak Hour	DoS	PM Peak Hour	DoS	% Traffic Growth
Shannonpark	✓	89%	✓	86%	+14.25%
Shanbally	✓	80%	✓	89%	+14.25%

✓ *Operates within Capacity (RFC <0.85)(see note 5) .*

✗ *Demand exceeds capacity for one or more arms (RFC > 0.85).*

5.5.4 The assessment confirms that the Shannonpark junctions currently operates within its traffic capacity at peak hours and that the Shanbally junction operates within its capacity in the PM peak hour but that capacity is currently exceeded during the AM peak hour. Without upgrades to the junction layouts, both the Shannonpark and Shanbally junctions would not have sufficient capacity in the AM peak hour to accommodate forecast traffic volumes in 2030, as shown in Table 5.4. Analysis is shown in Table 5.5 for the Shannon Park and Shanbally junctions with the signalisation upgrades included.

5.5.5 The modelling of traffic forecasts, details of which are presented in Chapter 6, indicates that these upgrades would provide significant additional capacity to accommodate the underlying traffic growth forecast by the (NRA) model and the projected additional traffic generated by the proposed Ringaskiddy development. The model confirms that these junctions will operate within capacity in the future with the upgrades in place.

5.5.6 In summary, the proposed upgrades to the junctions on the N28 at Shannonpark and Shanbally will significantly improve traffic conditions on the N28 between Ringaskiddy and Bloomfield, and thus provide a more efficient network for the transport of freight from Ringaskiddy in addition to the use of the road for other strategic uses.

Bloomfield

5.5.7 The Dunkettle Model and a similar model for the Douglas area[6] have recently been separately developed for Cork and both contain a representation of the network around Bloomfield Interchange. These models are calibrated to a high standard to take account of 2010/2012 traffic conditions in the area and the latest growth forecasts for traffic on the national and local networks.

5.5.8 Figures 5.4 and 5.5 below show Bloomfield interchange. The link annotation in the figures represents average delay per vehicle per hour. Bloomfield Interchange is shown in the top-centre area of the images. These models are for the AM peak period in 2022 (DLUTS Model Figure 5.4) and 2016 (Dunkettle Model Figure 5.5).

5.5.9 The models show delays in the range of only 3 to 21 seconds on the various approaches and movements through the interchange. These are relatively low values and indicate that the junction is operating well during the peak AM period.

[6] developed for the Douglas Land Use and Transport Study (DLUTS)

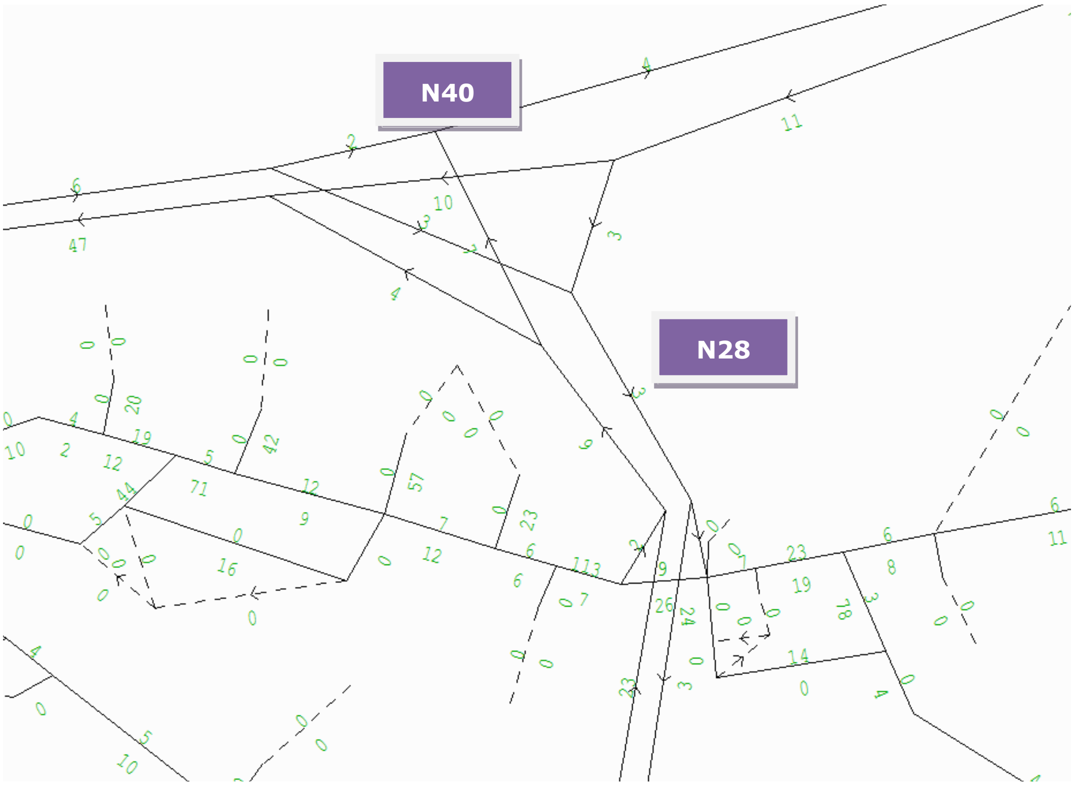

Figure 5.4 Delay (secs) Bloomfield (DLUTS Model, AM 2022)

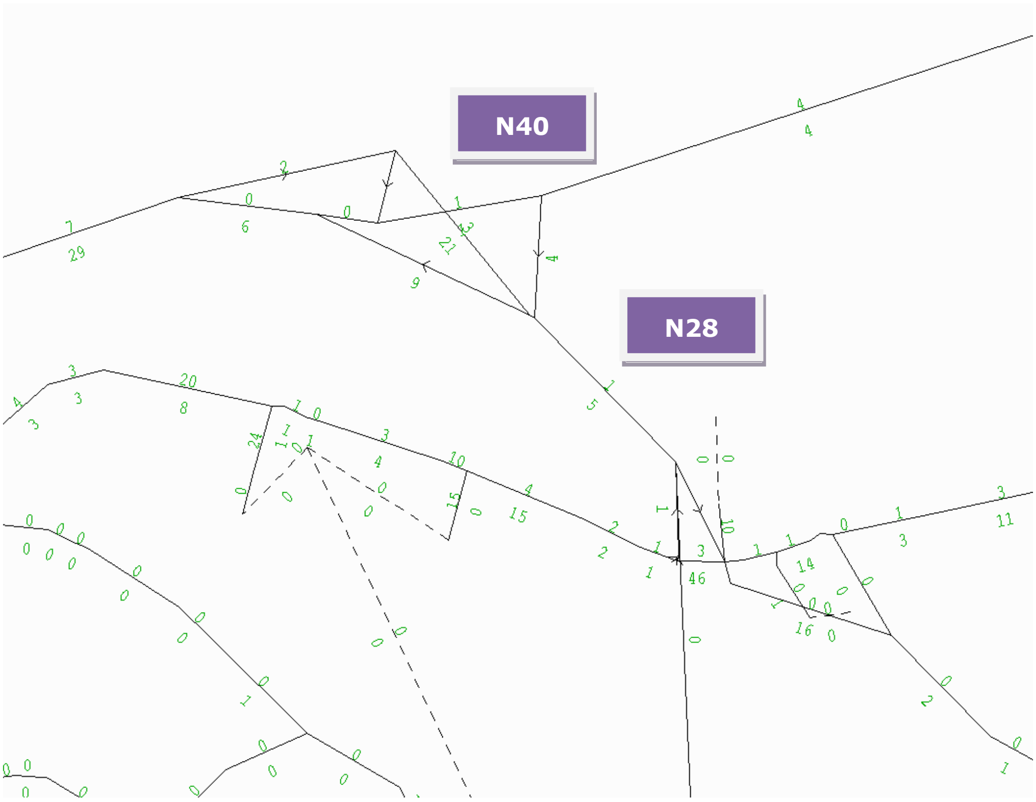

Figure 5.5 Delay (secs) Bloomfield (Dunkettle Model, AM 2016)

5.6 Impact of Mobility Management in Ringaskiddy

5.6.1 As part of the N28 Corridor Sustainable Travel Strategy study, Cork County Council have commissioned preliminary traffic modelling (by MVA) into the potential impact of Workplace Travel Planning at key employment locations around Ringaskiddy and various other measures to attract people towards commuting by sustainable travel modes. The modelling focusses on the associated reduction in traffic levels on the N28.

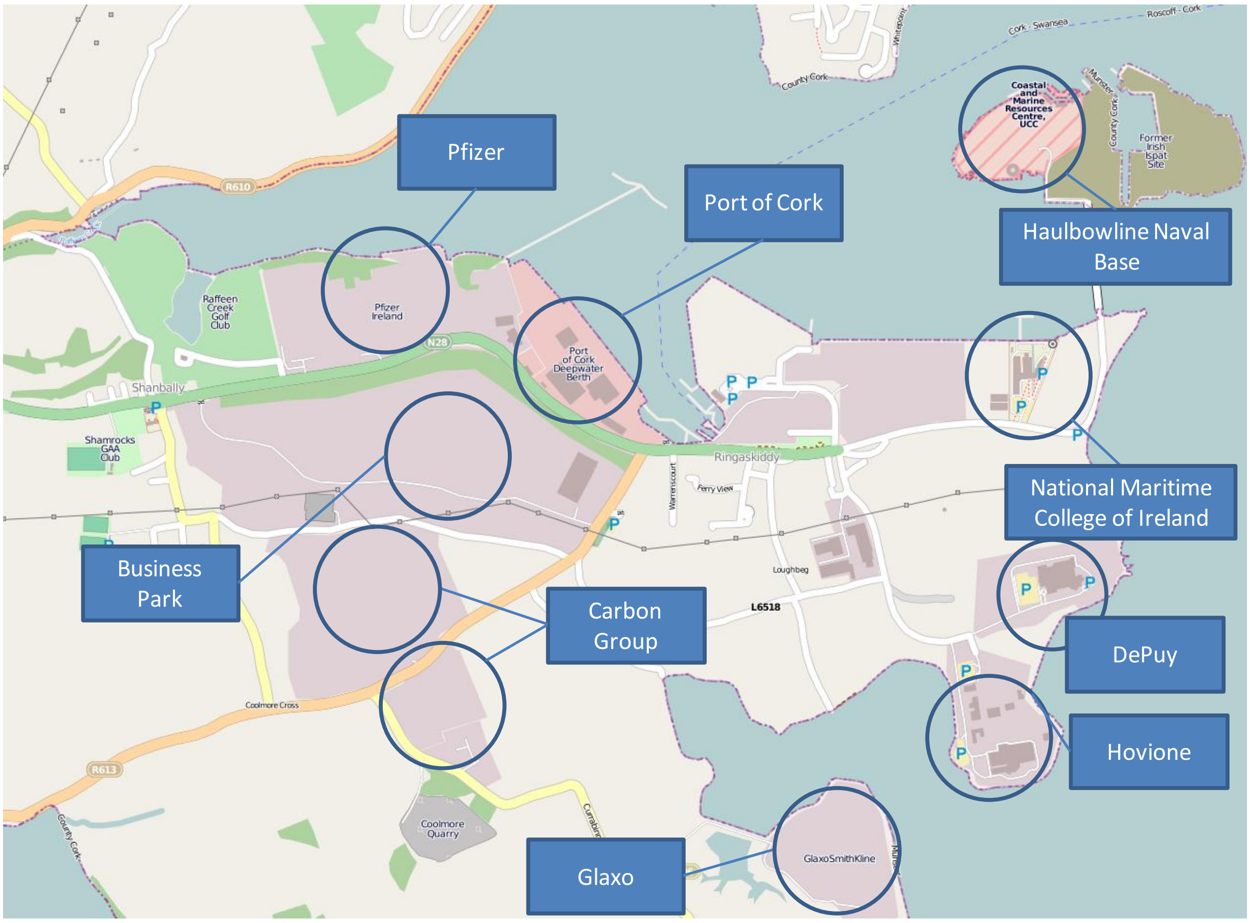

Figure 5.6 Major Employers' Locations in Ringaskiddy

5.6.2 The full set of measures modelled to examine the impact on the level of car commuting into the area are:

- Workplace Travel Planning focusing on employers in Ringaskiddy;
- improved cycle facilities from Carrigaline to Ringaskiddy;
- improved links to Cobh via a coordinated ferry/bus service that could attract passengers using the Cobh rail line; and
- other public transport measures targeting commuters who originate their trip along the N28 corridor.

5.6.3 To model the impact of these measures, assumed car travel reductions of 5% and 10% were applied to the appropriate origin-destination movements in the demand matrices for the 2010 Dunkettle model. For example, only trips between Carrigaline and Ringaskiddy were reduced to account for the Carrigaline-Ringaskiddy cycling improvements. The traffic destined for zones that correspond to the employers shown above were also reduced to account for the impact of Workplace Travel Planning, assuming a 5% and 10% reduction in car trips could be achieved.

5.6.4 Analysis of the results is presented in Figure 5.7 below. Figure 5.8 shows the traffic flow reductions resulting from the various mobility management measures above for a forecast year 2016. The blue bars indicate the 2016 traffic volumes on the N28 according to the Dunkettle Traffic Model. The red bars indicate the traffic when a 5% reduction is applied according to each of the measures listed above in 5.6.2. The green bars indicate the same but with a 10% reduction. All volumes shown are southbound / eastbound (which is the direction of dominant traffic flow in the AM peak between Carrigaline and Ringaskiddy).

5.6.5 The results show that a reduction in traffic volumes on the N28 can be achieved if various demand management / mobility management plans are put in place. These have the effect of reducing the number of commuter trips on the route and free up capacity for strategic port traffic and other freight traffic.

5.7 Overall Assessment of Port Access Corridor Conditions

5.7.1 There are a number of significant improvements planned that will greatly enhance the efficiency and reliability of the N28 section of the Port Access Corridor, in addition to the planned upgrade of the Dunkettle Interchange. As shown in Figure 5.2, traffic volumes have been falling at Dunkettle. These conditions are favourable to the expansion of port activities at Ringaskiddy, particularly in the context of recent updates to national and regional policy referred to previously.

5.7.2 The future level of traffic growth on the corridor can be influenced by the implementation of mobility management of commuter trips towards the large employers in Ringaskiddy. Traffic modelling was used to estimate the effect of a 5% impact and a 10% impact according to various demand management strategies. The result indicate that the section of the N28 between Carrigaline and Ringaskiddy would benefit the most in terms of car trip reduction in the AM peak, with total hourly peak volumes estimated to drop by about 15%.

5.7.3 Cork County Council have undertaken a detailed assessment of the proposed upgrades to the Shannon Park and Shanbally junctions in May 2011 which have been used in assessing the traffic impact of the port development on these junctions. The assessment of those junctions shows that in the future congestion does not occur when the upgrades are in place. In addition the assessment of the Bloomfield interchange is based on the analysis taken from the recent Dunkettle and DLUTS models prepared independently by the NRA and Cork County Council which is presented in Section 5.5 of this report and indicates that delay is quite low at Bloomfield.

Figure 5.7 N28 Junctions for Mobility Management Results

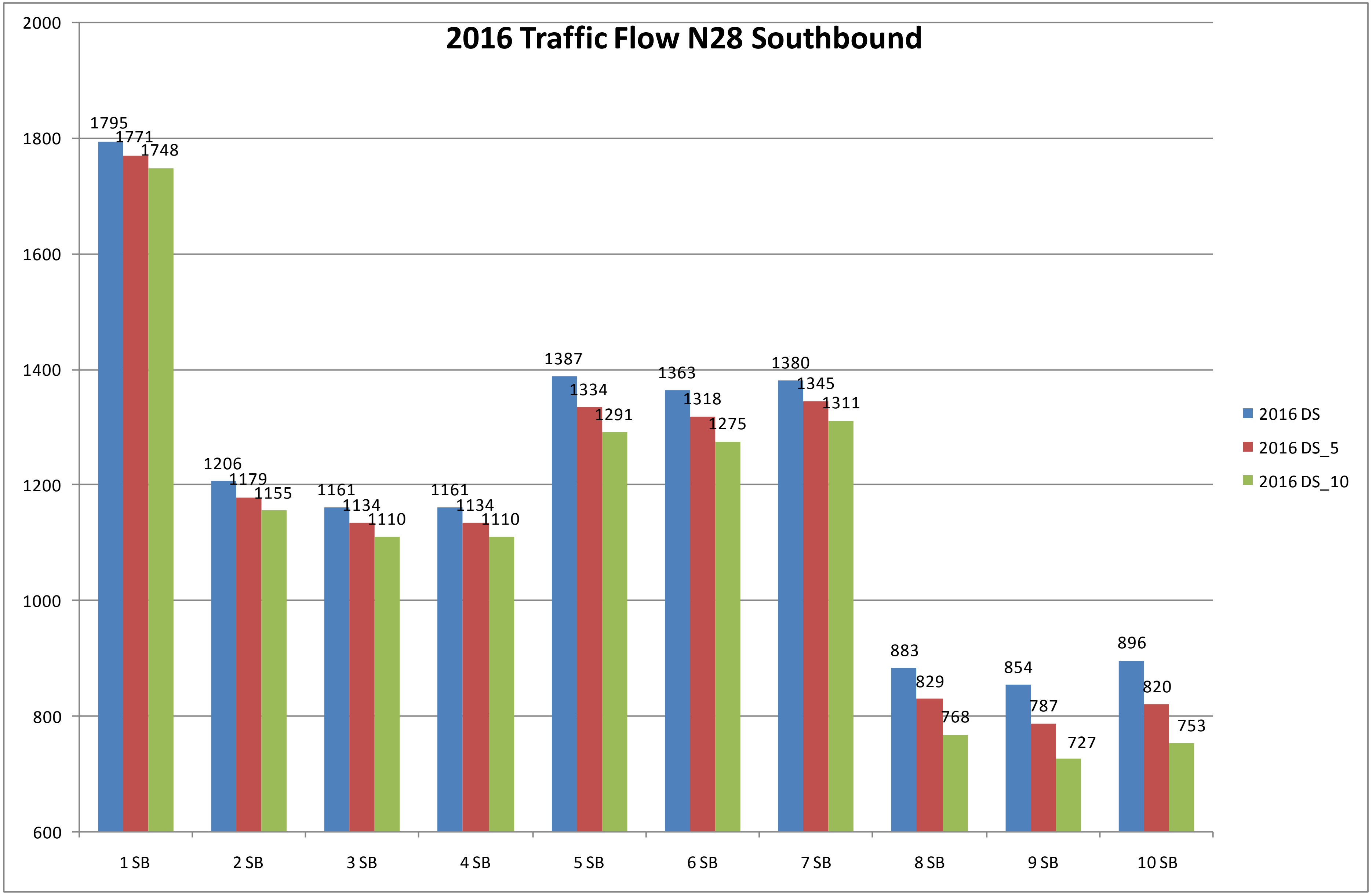

Figure 5.8 2016 Traffic Flow N28 Southbound

6 Port Traffic Assessment

6.1 Introduction

6.1.1 This chapter presents an overview of current Ringaskiddy traffic in the context of the strategic road network. Following this, the future expected level of trip generation from Ringaskiddy is presented. This is then placed in the context of the future road network to show that the network has the capacity to allow for growth.

6.2 Daily Profile of Port Traffic

6.2.1 The Port of Cork carries out its operations at a number of locations around Cork Harbour and the traffic flows related to its main activities are summarised in Figure 6.1 below. The current estimated traffic demand generated by all Port of Cork activities across all its principal locations around Cork Harbour, have a combined total of 4936 vehicle movements per day (AADT) of which some 27% or 1332 are HGV movements.

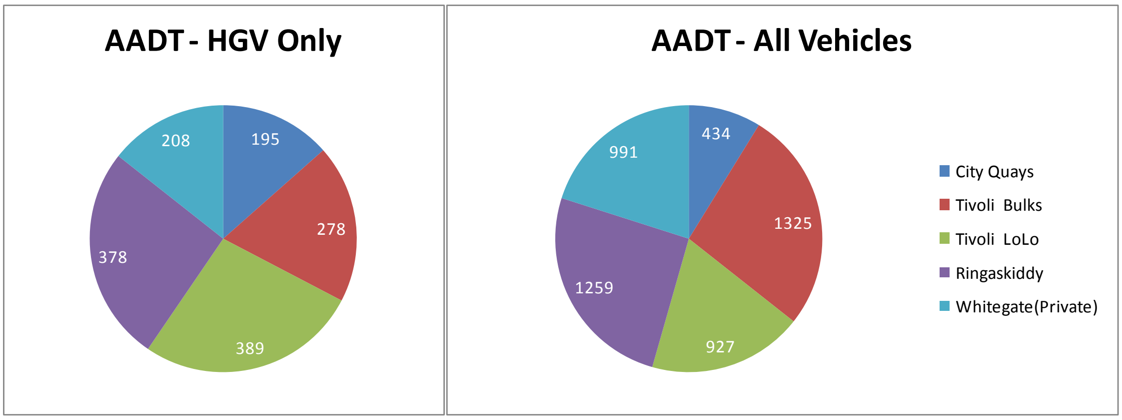

Figure 6.1 Traffic Totals All Port of Cork Sites

6.2.1 The Port of Cork currently generates traffic flows from its existing operations at Ringaskiddy as follows:

Table 6.1 Ringaskiddy Existing Traffic Levels

	Port of Cork Traffic
AADT (est)	1259
% HGV	30.4
HGV Nos.	383

Source: Independent Traffic Surveys April/May 2012

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6.2.2 The traffic generated by the Port of Cork varies depending on levels of activities by customers including shipping related movements and by employees and related service providers. The Port of Cork facilities at Ringaskiddy currently operate from 7am to 7pm, 5.5 days per week all year round.

6.2.3 Based on the current pattern of arrival and departures of HGVs carrying Unitised Cargo (Containers) from the existing Container Terminal at Tivoli, approximately 8% of HGVs movements occur during the morning and evening peak hours.

6.2.4 Figures 6.2 and 6.3 below show the average number of HGVs using the Tivoli container terminal and the Ringaskiddy site respectively, for weekdays recorded over a two week period in May 2012. It can be seen in both cases that port traffic is reasonably steady during the day. However, there is a peak in the evening at Tivoli that is not observed at Ringaskiddy. This data was used to calculate the peak hour estimates of port traffic later in this report.

6.2.5 The proportion of HGV traffic is greater in Tivoli (between 40 and 50% from 8am to 5pm) than in Ringaskiddy (between 30 and 40% from 8am to 5pm). In addition approximately 95% of the traffic is currently between 7am and 7pm.

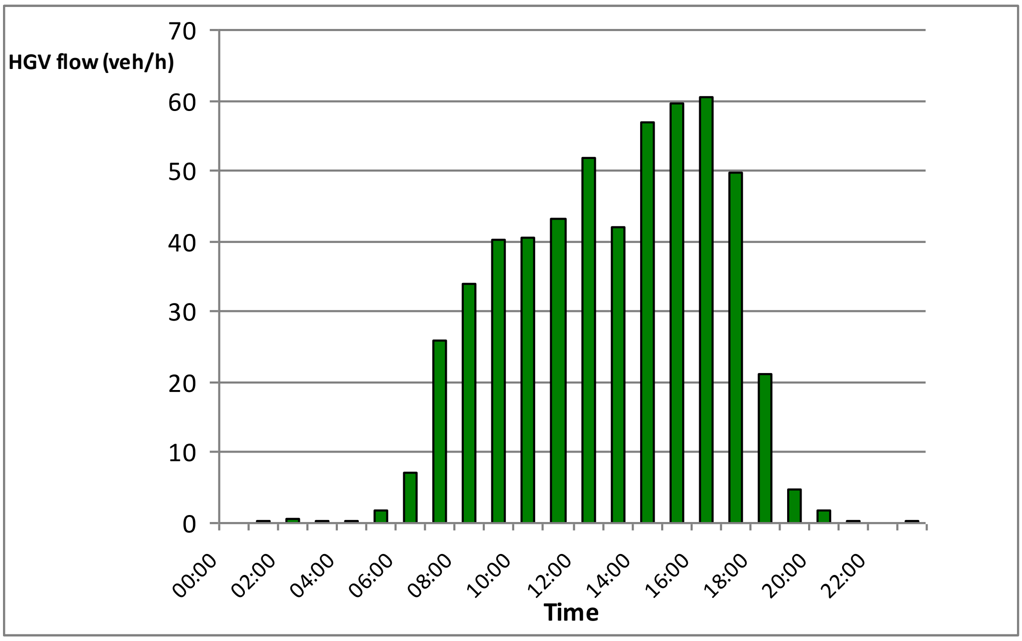

Figure 6.2 Tivoli Average Daily HGV Traffic Profile

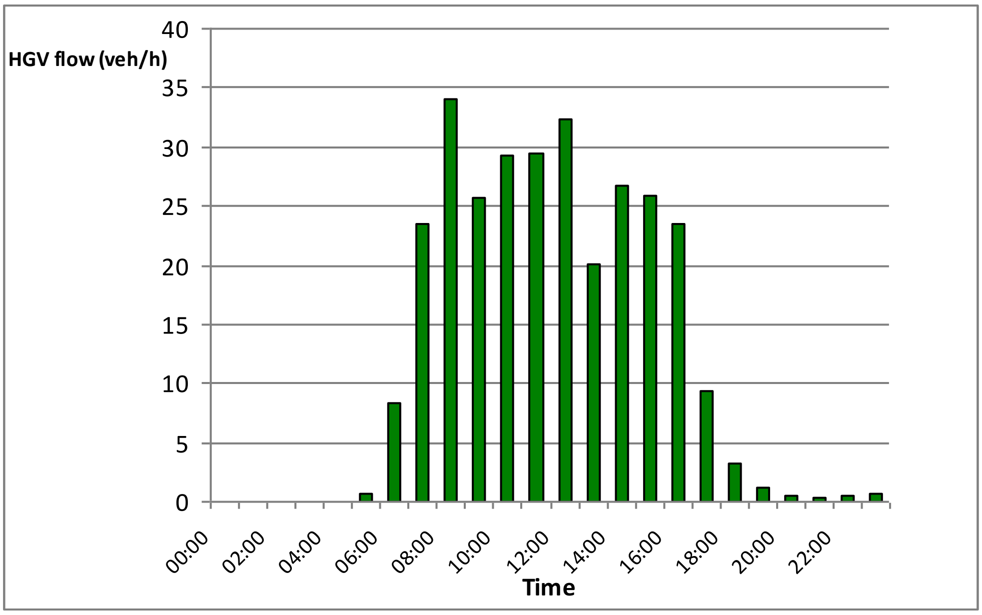

Figure 6.3 Ringaskiddy Average Daily HGV Traffic Profile

6.2.6 Table 6.2and Figure 6.4 below highlight the proportional contribution and impact of the Port Traffic using Ringaskiddy at various locations along the Port Access Corridor. The figures suggest that Ringaskiddy is not a significant contributor to traffic flow volumes on the Port Access Corridor. For example, the average daily total of 1,259 vehicles from Ringaskiddy results in approximately less than 1% of all daily traffic movements in the Jack Lynch Tunnel.

Table 6.2 Contribution of Existing Ringaskiddy Port Traffic on the Port Access Corridor

Route Section	Total AADT	PoC AADT	% Port of Cork Traffic
Port Entrance	1,259	1,259	100%
N28 West of Ringaskiddy	5,313	1,169	22%
N28 East of Shannonpark	9,831	1,169	12%
N28 North of Shannonpark	23,713	852	4%
N28 at Bloomfield Interchange	44,392	852	2%
N40 SRR at Jack Lynch Tunnel	56,411	564	1%

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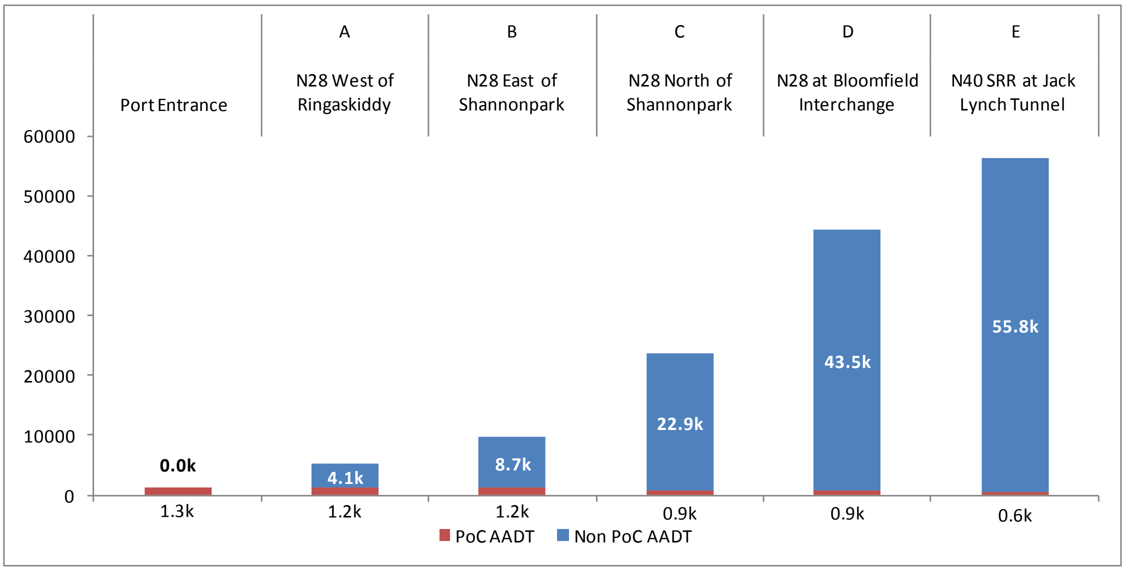

Figure 6.4 Contribution of Existing Ringaskiddy Port Traffic along the Port Access Corridor

6.2.7 The data shown above in Figure 6.4 demonstrates the very minor proportion of Port traffic along the route.

6.2.8 It is clear that the greatest improvement to capacity can be achieved by targeting the underlying commuter based traffic. The Port of Cork is committed to contributing more than its proportional share of this effort by undertaking and implementing its MMP proposals and by supporting the initiatives of its employer neighbours in the Ringaskiddy Strategic Employment zone and the efforts of the NTA and Cork CC through the N28 STS.

6.3 Estimated Future Port Traffic by Module

6.3.1 Table 6.3 below outlines the traffic generation assumptions for each module. The modules are described in Section 2.5 and Figure 2.2. Table 6.4 shows the resulting traffic generated for each scenario which are described in Table 2.2 (i.e., the cumulative amount due to modules being successively added).

6.3.2 Based on the NRA Dunkettle Traffic Model a cumulative growth rate of 15% over the period 2012 -2030 has been used for this traffic assessment. Adjusting this for the effect of the N28 Sustainable Travel Strategy the assumed growth rate is 14.25% cumulatively over the period 2012-2030.

6.3.3 Assumptions are also incorporated into the traffic generation numbers in Table 6.4 to represent the effect of Mobility Management on Ringaskiddy Port traffic. These assumptions are as follows.

- Future AADT reduced by 5% due to N28 MMP measures; no reduction to HGVs for general N28 MMP measures;
- No reduction in existing Port HGV overall daily traffic due to Port of Cork MMP;
- Future HGV traffic reduced at peak hour by 10% as per Port MMP at Ringaskiddy
- Existing non-HGV Port Traffic reduced by 30% as per Port of Cork MMP.

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Table 6.3 Ringaskiddy Traffic Generation Assumptions

Module	Description	AADT (est)	Daily HGVs	HGV % Vehicles	Additional Peak Vehicles	Additional Peak HGVs	AADT Assumptions	HGV Estimation Assumptions / Source	Peak Hour Assumptions
Existing Traffic		1,259	383	30.4%	0	0		Based on Independent Surveys in May 2012	
1	*New Road Access*	0	0		0	0		No Change to trip generation	
2	*Ringaskiddy East Phase 1a*	328	183	55.8%	33	18		HGVs based on Tivoli trip rates and profiles. Ancillary traffic based on Tivoli rates but with a 40% reduction due to relocation efficiencies and due to MMP measures	+
3	*Ringaskiddy East Phase 2*	815	455	55.8%	82	46		HGVs based on Tivoli trip rates and profiles, Ancillary traffic based on Tivoli rates but with a 40% reduction due relocation efficiencies and to MMP measures	
4	*Ringaskiddy East Phase 1b*	166	166	100.0%	83	83		HGV rates based on 2011 Profile at Ferry Terminal (4 ferries per week).No additional ancillary traffic assumed.	Assumed worst case that a ferry arrives and discharges in AM peak, based on 2011 Profile at Ferry Terminal
5	*Ringaskiddy West Extension*	140	54	38.6%	14	5	Existing Traffic at DWB increased by a further 25%. Incremental ancillary traffic reduced by 30% by MMP		
6	*Ringaskiddy West Landbank*	237	95	40.1%	24	10	Module 8 Traffic at DWB increased by a further 35%. Incremental ancillary traffic reduced by 30% by MMP		
7	*RoRo/Ferry Terminal approved growth*	161	27	16.8%	5	2	Existing traffic levels at Ferry Terminal increased by 40%. Incremental ancillary traffic reduced by 30% by MMP measures		

Module	Description	AADT (est)	Daily HGVs	HGV % Vehicles	Additional Peak Vehicles	Additional Peak HGVs	AADT Assumptions	HGV Estimation Assumptions / Source	Peak Hour Assumptions
8	*Deepwater Berth approved growth*	56	22	39.3%	6	5	Existing Traffic at DWB increased by 10% Incremental ancillary traffic reduced by 30% by MMP		
9	*Port-related development of Adjacent Lands*	340	51	15.0%	68	5	Assumed lands would generate 100 ancillary jobs. Travel to work would be 15% by alternative modes		80% of employees arrive in peak hour.

Table 6.4 Ringaskiddy Cumulative Traffic Generation

Scenario:	Existing	A	B	C	D	E	F	G	H
Modules Included:		1, 2	1, 2, 3	1, 2, 3, 4	1, 2, 3, 4, 5	1, 2, 3, 4, 5, 6	1, 2, 3, 4, 5, 6, 7	1, 2, 3, 4, 5, 6, 7, 8	1, 2, 3, 4, 5, 6, 7, 8, 9
Daily:		← SID Application →							
AADT (Vehicles)	1,259	1,587	2,402	2,568	2,708	2,945	3,106	3,162	3,502
Non HGV Traffic (Vehicles)	876	1,021	1,381	1,381	1,467	1,609	1,743	1,777	2,066
Daily HGVs	383	566	1,021	1,187	1,241	1,336	1,363	1,385	1,436
AM Peak Hour:									
AM Peak Total Vehicles	79	112	194	277	291	315	320	326	394
AM Peak Total HGVs	54	72	118	201	206	216	218	223	228
Peak Hour Percent of Total HGV	14%	13%	12%	17%	17%	16%	16%	16%	16%

6.4 Future Estimated Traffic Levels on Network

6.4.1 The data below in Table 6.5 represent the **2030 situation**. The future estimated traffic levels are based on **Scenario E**, which corresponds to all the modules included in the SID application.

6.4.2 Junction analysis at Shannonpark and Shanbally for Scenario E shows both junctions operate within the capacity threshold of 0.85 RFC, indicating that all SID modules (Scenario E) can be developed without compromising the operation of these junctions subject to hem being upgraded as proposed. Scenario E takes into account:

- New access road (no additional traffic generation is associated with this);
- The implementation of Phase 1a at Ringaskiddy East;
- The implementation of Phase 2 at Ringaskiddy East;
- The implementation of Phase 1b at Ringaskiddy East;
- The implementation of Ringaskiddy West Extension; and
- The implementation of Ringaskiddy West Land bank.

6.4.3 The vast majority of the volumes of HGVs indicated in the above figure will travel on the N28. The junction assessments at Shanbally and Shannonpark have confirmed that this level of additional traffic can be accommodated. To place the numbers in context Figure 6.6 below superimposes Port of Cork traffic onto the general non-Port traffic for both 2012 and 2030. The data show that the contribution of the Port to traffic at the Jack Lynch tunnel as 1% in 2012, rising to 2% in 2030.

Table 6.5 Port of Cork 2012 and 2030 AADT Traffic Estimates on N28

	Existing (2012) Estimates			2030 Estimates		
Route Section	**Existing AADT**	**Existing PoC AADT**	**% Port Vehicles**	**Future AADT**	**Future PoC AADT (Scenario E)**	**% Port Vehicles**
Port Entrance	1,259	1,259	100%	2,945	2,945	100%
N28 West of Ringaskiddy	5,313	1,169	22%	5,956	2,734	46%
N28 East of Shannonpark	9,831	1,169	12%	11,152	2,734	25%
N28 North of Shannonpark	23,713	852	4%	27,116	1,993	7%
N28 at Bloomfield Interchange	44,392	852	2%	50,897	1,993	4%
N40 SRR at Jack Lynch Tunnel	56,411	564	1%	64,719	1,319	2%

6.4.4 Figure 6.5 presents the estimated traffic flows for key points on the Port Access Corridor using the data presented above in Table 6.5.

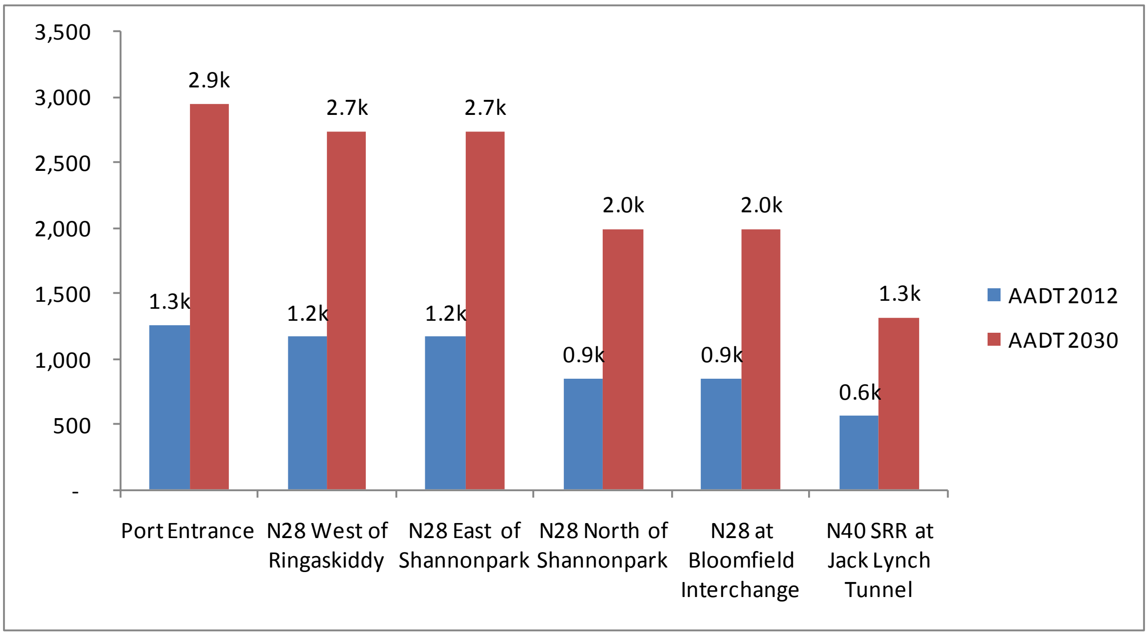

Figure 6.5 Present PoC AADT Vs 2030 PoC AADT Including Ringaskiddy Scenario E

6.4.5 Figure 6.6 below presents the **peak hour** traffic (general traffic and HGVs) generated by the port at Ringaskiddy, including assumptions on mobility management.

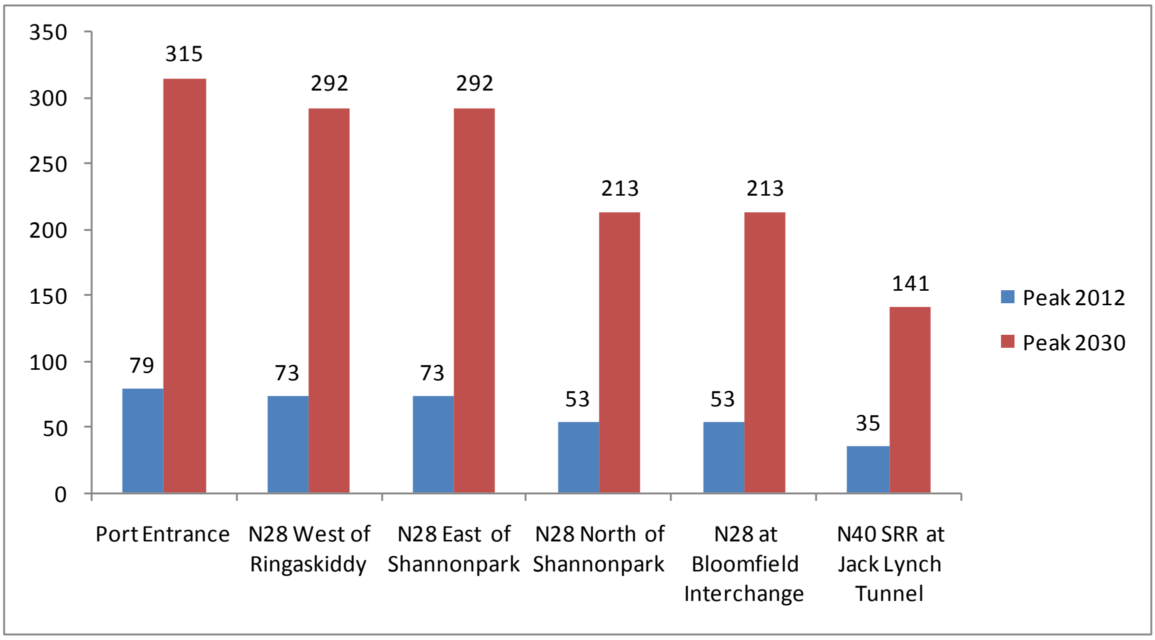

Figure 6.6 Present Vs Future Peak Hour Ringaskiddy Traffic

6.5 Analysis of Port of Cork Ringaskiddy Traffic Impact

6.5.1 The Port of Cork's MMP will identify the scope of measures that can be implemented to promote and improve sustainable travel practices including heavy goods traffic movement to and from the Port at Ringaskiddy. This traffic assessment has demonstrated that when this proposed development is fully operational the traffic from the Port will not have a significant impact on the volumes of traffic on the N28. The County Council's proposals for improving the junctions at Shanbally and Shannon Park will improve traffic flow on the N28 and will more than accommodate the additional traffic generated by the Port in the peak hours.

6.5.2 Even when taking into consideration future growth in traffic demand there is considerable available capacity on the N28 outside the peak hours suggesting that if a strong mobility management plan is put in place to reduce the growth of HGVs in the peaks then the port development at Ringaskiddy proposals will not have an adverse affect on the strategic road network.

6.5.3 If the current proposed development were not to proceed (i.e. in the context of a 'no-project scenario') Port activities would continue to grow at the existing port locations, albeit at a reduced rate. It is estimated that in a 'no-project' scenario the total traffic flow (AADT) in the period to 2032 would increase by from 1259 to 1549 HGV movements per day at Port of Cork's existing facilities at Ringaskiddy. This projected increase is in line with NRA traffic projections as set out in their Dunkettle Interchange Model which anticipates traffic growth on the N28 South of Bloomfield to be 15% by 2031. Accordingly a significant element of the future port traffic growth emanating from Ringaskiddy already has consent under the existing Harbour Works orders and is accounted for in the growth forecasts of traffic in the NRA Dunkettle Interchange traffic model.

6.5.4 The Port of Cork's overall projected growth in port operations has been revised downward in light of the recent economic downturn. The present forecast is for a 40% increase in tonnage over the period up to 2025 / 2030, increasing from 8.5mt in 2010 to 11.96 mt.. As indicated previously the proposed development at Ringaskiddy is smaller than the development of Ringaskiddy proposed in 2006 and will 52% have less additional traffic at Ringaskiddy than that forecasted for the 2006 development.

6.5.5 The expanded facilities at Ringaskiddy will facilitate the Port of Cork in moving container handling from Tivoli and the bulk goods handling from Tivoli and the City Quays in Cork City Harbour in due course.. This will result in a reduction in traffic and HGVs in the City Centre.

7 Conclusions and Recommendations

7.1 Overview

7.1.1 The total daily traffic generated by the Port of Cork at all its locations around Cork Harbour is only 1% of traffic through the Jack Lynch Tunnel, but the related trade through the Port is essential to the sustainable functioning of the regional economy and contributes €289m to the economy, linked to 325,000 full time equivalent jobs. The Ports ability to develop to serve this market is critical to the regional economy, economic growth and the generation of employment prospects.

7.1.2 The Port of Cork is a modest contributor (<3.6%) to traffic flow levels on the N28, Bloomfield Interchange (1.9%) and the Jack Lynch Tunnel (1.0%).

7.1.3 The future estimated traffic levels from the Port do not coincide with the peak commuter flows when mobility management is in place and if it is assumed that the Tivoli average departure profile is maintained when activities are relocated to Ringaskiddy.

7.2 Summary of Issues

- There is significant spare capacity on the existing N28 throughout the day even though there is some congestion at key junctions of Shanbally, Shannon Park and Bloomfield during the AM peak hour and to a lesser extent in the PM peak hour.
- Traffic flows on the N28 are dominated by commuter traffic.
- Off peak traffic is considerably less than the peak traffic flow.
- Traffic volumes on the N28 have reduced since 2008 as well as on other routes.
- The NRA and Cork County Council are preparing proposals to improve capacity at the junctions at Shanbally and Shannon Park on the N28.
- The NRA is also preparing plans for the free flow upgrade of Dunkettle Interchange, which will significantly increase its capacity and reduce peak hour congestion.

7.3 Conclusions

- The proposed development will not give rise to significant levels of additional traffic on the existing road network;
- The levels of additional traffic that will result from this development can be accommodated within the capacity of the existing road network;
- As port-related activities are relocated to Ringaskiddy there will be:- A reduction in HGV traffic in the City Centre, the Quays and the Tivoli area;
- Negligible change at the Dunkettle interchange or the Jack Lynch Tunnel;
- The proposed upgrades to the junctions on the N28 at Shannonpark and Shanbally will significantly improve traffic conditions on the N28 between Ringaskiddy and Bloomfield and thus cater for traffic levels up those estimated for Scenario E. It is recommended that further analysis is performed to consider the effects of area wide mobility management plans on the level of traffic at these critical junctions in the future and thus if further port development could be accommodated; and
- Analysis using the Dunkettle model and Douglas Land Use and Transport Study model show that delays are low on the various approaches and movements through Bloomfield interchange.

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APPENDIX 8.2 BASELINE REVIEW



Port of Cork Strategic Development **16/04/2014**

Reference number 300100/12




BASELINE REVIEW



PORT OF CORK STRATEGIC DEVELOPMENT

BASELINE REVIEW

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2	Author	Jessica Duggan	Principal Consultant	28/03/2014	Final
	Checked by	Ingrid Petrie	Senior Consultant	31/03/2014	
	Approved by	Ian Byrne	Director	16/04/2014	



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1. INTRODUCTION

1.1 Background

1.1.1 SYSTRA was appointed by Port of Cork in March 2013 to assist them with the preparation of a Strategic Infrastructure Development (SID) application to be submitted to An Bord Pleanála (ABP), for the provision of a new container terminal and the expansion and upgrading of Port facilities at Ringaskiddy. This proposed development would accommodate the relocation of port facilities from Tivoli and City Quays to Ringaskiddy. This Baseline Report describes the existing situation at Ringaskiddy, Tivoli and City Quays locations.

1.1.2 In 2007, the Port of Cork (PoC) submitted an SID application to ABP for a container terminal and multi-purpose berth at Ringaskiddy - Oyster Bank in order to cater for future expansion of the total handling capacity of the PoC facilities, as part of its Strategic Development Plan.

1.1.3 ABP refused the application in 2008 on two grounds. Firstly, it was considered that the traffic arising from the level of development proposed would generate adverse impacts on the strategic road network in and around Cork City, and specifically at the Bloomfield, Dunkettle and Kinsale Road Interchanges, and at the Jack Lynch Tunnel. The lack of a rail option/connection to transport freight from the site was the second reason for refusing the application.

1.1.4 Following the 2008 decision by ABP, the PoC undertook a fundamental review of its Strategic Development Plan and completely re-examined the future growth of its activities. As a consequence of this strategic review, which took full account of the ABP's reasons for refusal, proposals have now been developed for a smaller scale development at Ringaskiddy.

1.1.5 The Port expansion at Ringaskiddy is intended to complement a reduction of Port operations at the existing Tivoli and Cork Docklands, now being rebranded as Cork City Harbour sites, which cannot handle large vessels due to physical constraints. The Tivoli and Docklands riverside sites are very well located relative to Cork City Centre (Docklands being within 750m, and Tivoli, on the commuter Railway, being within 1.5km). As such, both sites have strong potential to be developed for urban renewal / non-industrial uses. These are mutually supportive objectives and are part of the Cork Area Strategic Plan (CASP) Strategy and the local Cork City Development Plan, which target future population and growth within the Cork Metropolitan area, with a strong reliance on the redevelopment of Cork City Harbour sites to achieve the projected growth. Furthermore, the removal of container handling facilities from the Cork City Harbour site at Tivoli would also have the benefit of reducing the number of HGVs which pass through the City Centre road network. The relocation of bulk goods handling facilities from City Quay areas and the containers from Tivoli to Ringaskiddy are thus a very important step in creating the space for sustainable development within Cork City, which currently has very limited development land available in such well-located City areas.

1.2 Preliminary Analysis

1.2.1 In response to the reasons for refusal of the Oyster Bank application, and the revision of their Strategic Plan, the PoC commissioned a preliminary Traffic Impact Assessment Report (February 2013) to investigate how port traffic would be affected by the revised proposed development at Ringaskiddy. The main objective of this report was to present the findings of the preliminary analysis of the traffic and transport impacts of the revised Ringaskiddy proposals. The key finding is that the future traffic generated by the PoC proposal at Ringaskiddy will not adversely impact the road network as a result of:

- The scale of development being proposed results in lower amounts of HGV traffic being generated on the road network than previously envisaged in the 2008 Oyster Bank application;
- The implementation of a Mobility Management Plan by the PoC. This will entail policy measures implemented by the PoC to suppress HGV movement out of the site during peak times when there is limited spare capacity on the network; and
- The changing policy context regarding how growth should be managed in future on the national network, particularly Smarter Travel objectives to prioritise strategic traffic growth (such as from key ports) over growth in unsustainable car travel. This new strategy is reflected in the Cork County Council N28 Corridor Sustainability Travel Strategy (N28 STS).

1.2.2 A separate report has been prepared to consider the potential of a rail connection and use of rail freight for Port traffic. This report prepared by Booz & Co has been submitted to ABP for its consideration. This report found that the only realistic way the Port of Cork's container market could theoretically be served by rail is via a rail-connected Distribution Centre and there are no reasonably expected circumstances under which a rail operation between Marino Point or Ringaskiddy and the Distribution Centre could be viable in socio-economic terms. With the downsizing of the proposed development (in this application), the case for rail is further weakened.

1.3 Report Overview

1.3.1 The focus of this Baseline Report is transport, specifically in terms of providing:

- Information on the travel patterns of PoC related traffic, including vehicles transporting goods to/from port sites and also employees, and understanding their needs and views;
- A detailed summary of current traffic conditions in the study area in terms of infrastructure for each transport mode, utilisation of that infrastructure and conditions experienced; and
- A review of national and regional guidelines and other transport studies relevant to the study area, specifically detailing the relative objectives and outcomes of each.

1.3.2 This Baseline Review will be used to inform the PoC Strategic Traffic Model development process. The model is an extension of the Dunkettle Transport Model, which is a variant of the CASP Model, and will investigate the extent and level of detail required to include the three PoC sites (Ringaskiddy, Tivoli and City Quays). The Baseline Review will assist in the development of a freight model component that will look at freight generation rates from each Port site in terms of vehicle numbers and distribution. Future trip generation is largely based on existing generation at the three sites.

1.3.3 The study area for the model is shown in Figure 1. It includes the three Port sites being considered, Ringaskiddy, Tivoli and City Quays. It also includes all relevant major connecting roads, including the N28, N40, Jack Lynch Tunnel and Dunkettle Interchange.

1.3.4 The Baseline Review will be used to inform the SID application documents, including the following Reports:

- Port of Cork Strategic Traffic Impact Assessment;
- Ringaskiddy, Tivoli and City Quays Traffic Impact Assessments;
- Port of Cork Strategic Mobility Management Plan; and
- Ringaskiddy, Tivoli and City Quays Mobility Management Plans.

1.3.5 The objective of the Mobility Management Plans is to minimise the impact of port generated traffic during peak hours on the strategic interchanges of the national road network around Cork City.

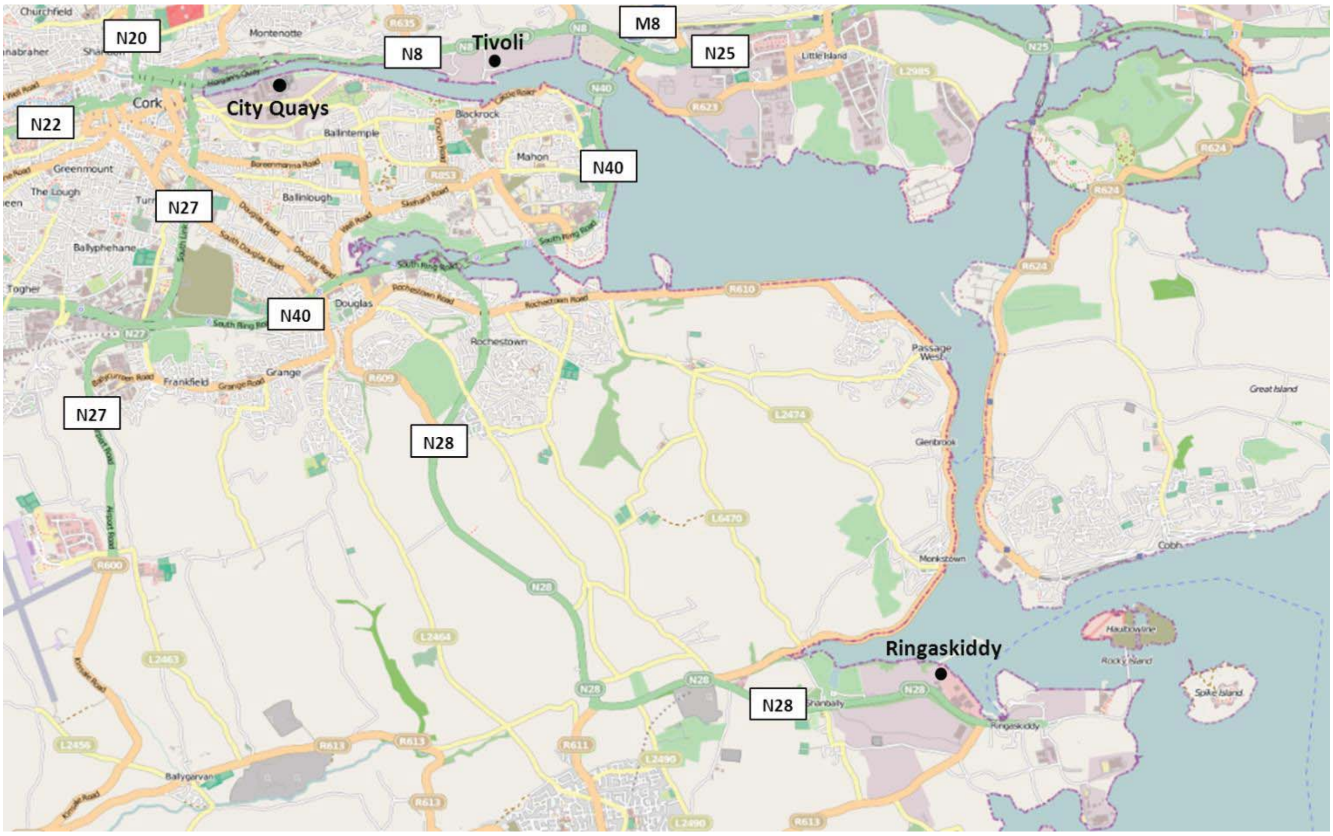

Figure 1. Study Area

1.4 Methodology for Developing Transport Baseline

Site Visits

1.4.1 To facilitate an understanding of the transport environment and the general traffic conditions experienced, a series of site visits were undertaken from 10th - 13th April 2013.

1.4.2 During the site visits, the following actions were undertaken:

- Detailed observations of current traffic management arrangements and how they affect each mode of transport;
- An examination of the conditions experienced by each road user type, i.e. pedestrians (including school children), cyclists, cars, buses, heavy goods vehicles and so on;
- An examination of travel behaviours of people travelling within the study area;
- Observations of local land uses and their influence on traffic and transport arrangements; and
- An extensive set of photographic records.

Traffic Surveys

1.4.3 In addition to the site visits detailed above, the following traffic survey information was utilised to develop an understanding of existing traffic conditions:

- Traffic surveys at Tivoli and Ringaskiddy ports, including turning counts at the Ferry Terminal, conducted in May 2012;
- Road Side Interviews at Tivoli and Ringaskiddy and observations at City Quays, conducted in May 2012;
- Journey Time surveys along the N28 between Shannon Park Roundabout and Ringaskiddy, conducted May 2012;
- Automatic Traffic Counter (ATC) surveys at Bloomfield Interchange and along the N28 between Shannon Park Roundabout and Ringaskiddy, conducted May 2012;
- ATC surveys along the N28 and other roads in the vicinity of Douglas/ Rochestown, conducted April 2012;
- Manual Classified Counter (MCC) surveys along roads in the vicinity of Douglas/ Rochestown, conducted April 2012;
- MCC surveys near Dunkettle and Cork City undertaken as part of the CASP model update in November 2012;
- National Roads Authority (NRA) traffic counters along the N25; and
- MCC surveys commissioned as part of this study, April 2013, at:
  - Cork Road / Church Road
  - Cork Road Bypass / Church Road

1.4.4 This data is primarily used to inform the development of the PoC Strategic Traffic Model and to provide further information on the current traffic conditions along the corridor.

Assessment of Census Data

1.4.5 Small Area Population Statistics (SAPS) from the CSO 2011 Census of population[1] were used to determine key demographic statistics such as population, car ownership, primary means of travel, etc. to be analysed at the local Electoral District (ED) level.

Key Stakeholder Consultation

1.4.6 Stakeholder consultation is a vital component for the development of PoC Strategic Traffic Model. Meetings were held with the National Transport Authority to devise the detailed methodologies for traffic modelling and consultation also included liaising with the NRA and Cork County Council to discuss the N28 widening, Part 8 schemes, PoC access at Ringaskiddy and so on.

1.4.7 Public consultation is an essential part of the preparation of the Environmental Impact Assessment of the proposed port development at Ringaskiddy. The first public consultation was held in Fota on 11th April 2013 and Carrigaline on 12th and 13th April

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[1] http://www.cso.ie/en/census/census2011smallareapopulationstatisticssaps/

2013. The second round of public consultation was held in Cobh on 6th February and Ringaskiddy on 7th and 8th February 2014.

1.5 Structure of Baseline Traffic Report

1.5.1 The remainder of this report is structured as follows:

Chapter 2 - Transportation Context

Chapter Two presents some of the key findings from Census data assessment, including a presentation of the current modal share for Ringaskiddy, Cork City and Cork County.

Chapter 3 - Review of Planning and Policy Documents

Chapter Three provides a summary of relevant planning and policy documents relating to transport issues along the Port Access corridor.

Chapter 4 - Existing Traffic Flows &Traffic Surveys Results

Chapter Four presents the results of the traffic surveys that were undertaken within the study area.

Chapter 5 - Summary Baseline Traffic Evaluation

Chapter Five evaluates the current traffic management arrangements and issues experienced within the study area, for all road users. The current public transport facilities in the study area are reviewed along with details of current cycle and pedestrian infrastructure. This chapter also outlines issues faced or caused by Heavy Goods Vehicles (HGV).

Chapter 6 - Existing Port Traffic

Chapter Six describes the existing traffic generation from each of the port sites (Ringaskiddy, Tivoli and City Quays).

Chapter 7 - Public and Key Stakeholder Consultation

Chapter Seven outlines the public and stakeholder consultation process carried out and details the responses received.

Chapter 8 - Reasons for Refusal

Chapter Eight discusses the ABP reasons for refusing the previous application.

Chapter 9 - Previous Planning Application

Chapter Nine highlights the differences between the previous application and the current application. It presents details from the previous SID application for the construction of a new container terminal expansion and upgrading of port facilities at Ringskiddy (including the relocation of port facilities from Tivoli and City Quays to Ringaskiddy).



2. TRANSPORTATION CONTEXT

2.1 Introduction

2.1.1 This chapter considers the Port Access Corridor (i.e. the N28, N40, N8 and N25) in a transportation context and considers the following aspects:

- Overview of the N28 Corridor and its Environs;
- Road Hierarchy; and
- Evaluation of Census Data.

2.2 Overview of the N28 Corridor and its Environs

Population

2.2.1 Figure 2 below shows the extent of the Port Access Corridor study area. The Port Access Corridor includes the N28, and sections of the N40, N8 and N25. Table 2.1 below shows the population of Ringaskiddy, Cork City and Cork County and how this has changed between the 2006 census and the 2011 census.

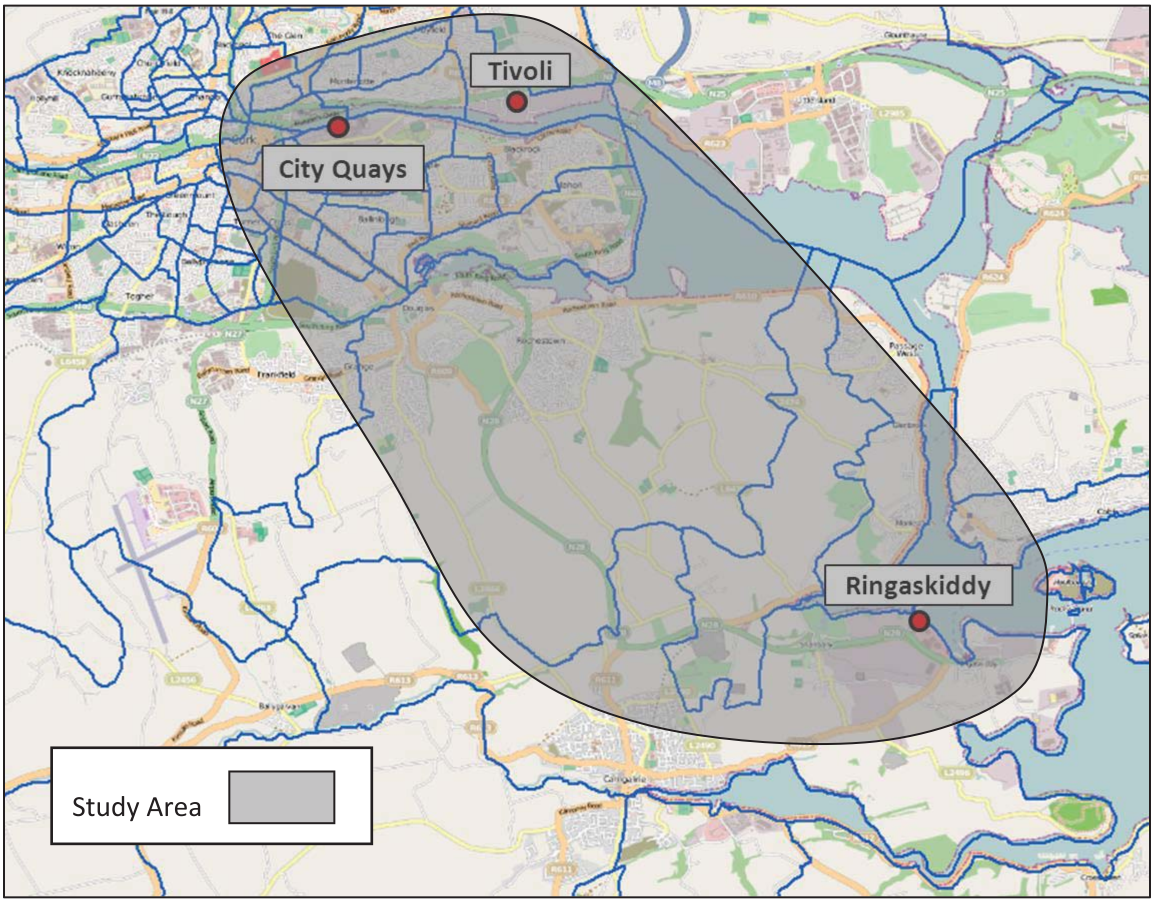

Figure 2. Study Area EDs

Table 2.1 Study Area Population

	2006 POPULATION	2011 POPULATION	% CHANGE
Ringaskiddy (SAPS)	Not available	1,575	n/a
Ringaskiddy, Carrigaline, Monkstown (EDs)	11,801	12,825	+8.7%
Cork County	361,877	399,802	+10.5%
Cork City	119,418	119,230	-0.1%

2.2.2 In the 2011 Census, published by the CSO, information is available at both Electorate Division (ED) and Small Area Population Statistics (SAPS) levels of detail. SAPS give more detail at a local level than do the ED levels. SAPS information was introduced in the 2011 census and therefore there is no corresponding information at SAPS level from the 2006 census.

2.2.3 In 2011, there were seven SAPS that made up Ringaskiddy (47072038, 47072039, 47072040, 47072041, 47072042, 47072002, 47261001). The total population for this area was 1575. The small areas breakdown was not available in 2006 and as such the population in 2006 can only be represented by the EDs that covered the general area.

2.2.4 In 2006 the population for the relevant EDs for Ringaskiddy (18082 Carrigaline and 18098 Monkstown Rural) stood at 11801. In 2011 the population for these two EDs stood at 12825, showing a population increase of 8.7%. It should be noted, however, that these EDs also cover areas outside of Ringaskiddy, such as Carrigaline, and therefore do not give a true reflection of the population change in Ringaskiddy itself. The population of Cork County also increased by about 10% in the same period, while the Cork City population remained largely constant over the five years from 2006 to 2011.

2.2.5 Analysis of Census 2011 figures shows that the Ringaskiddy area has a relatively young population. The largest demographic in the area is the 20-44 year old age group, which accounts for 36% of the population. Those aged 0-19 years account for 27%. The 45 to 64 age group accounts for 26% and those over 65 account for only 11% of the total population.

Land Use

2.2.6 The prime land use of Ringaskiddy is industry/employment with some residential, educational and recreational land uses. The land uses which represent key destinations for trips in the Ringaskiddy area are located outside Ringaskiddy village, which contains 11 large multi-national companies. There are approximately 7,800 people working in Ringaskiddy and Carrigaline.

2.2.7 In addition the large deep water harbour port facility is also located in Ringaskiddy which serves as a hub for international freight and passenger traffic including the weekly continental passenger ferry between Cork and Roscoff which arrives in Cork every Saturday.

2.3 Road Hierarchy

2.3.1 Figure 3 below illustrates the road hierarchy in the study area. A number of national primary roads pass through the study area, namely:

- N28 – Cork City to Ringaskiddy: provides connections from the wider national road network via the N40 to the major employers based in Ringaskiddy and Carrigaline and the national sea freight port and passenger terminal in Ringaskiddy;

- N40 – Cork South Ring Road: a major national distributor road allowing access to the wider national road network including the M8/N8 and the N25, via the Dunkettle interchange; the N27 via the Kinsale Rd Interchange; the N20 via the N27 and the City Centre; and the N22 and N71 via the Bandon Road Interchange.
- M8/ N8 – Cork City to Dublin;
- N20 – Cork City to Limerick City;
- N22 – Cork City to Tralee/ Killarney to the west;
- N25 – Cork City to Waterford/ Rosslare Europort to the east; and
- N27 – Cork City to Cork Airport.

2.3.2 There is one secondary route in the study area:

- N71 – Route between Cork City and Bandon and further south/south-west which can be accessed via the N40 South Ring Road or the N22.

2.3.3 There are also a number of regional and third class roads in the study area, including:

- R610 – Cork City through Douglas and Passage West;
- R618 – Iniscarra Road;
- R635 – North Ring Road; and
- R639 – the old N8 primary road.

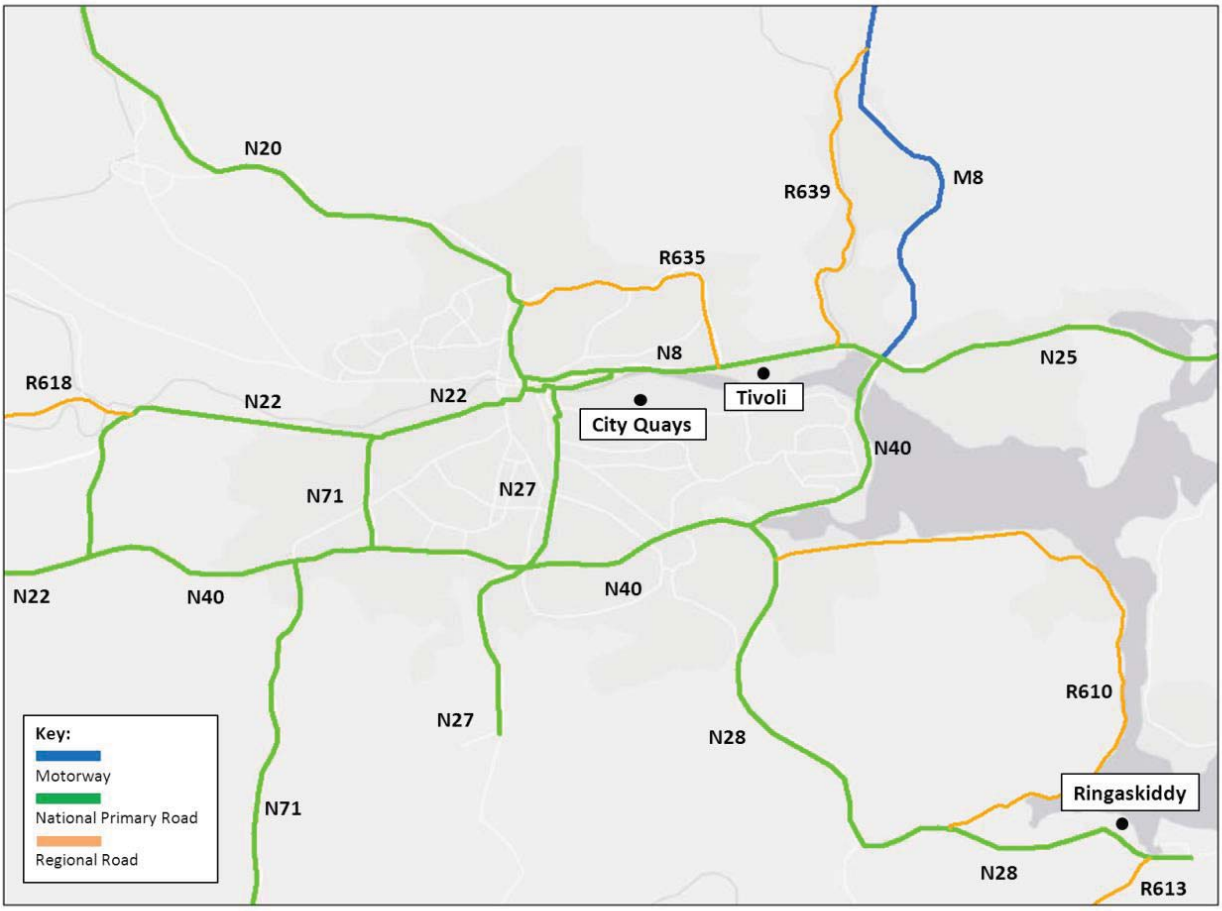

Figure 3. Study Area Road Hierarchy

2.4 Evaluation of Census Data

2.4.1 This section provides the essential demographic context to the study area. For example, who is living in the study area, their primary mode of transport, if they are working or going to school, the distance they travel and where they travel to. This information is an important element in understanding how the transportation system works and why it works in a particular way.

2.4.2 This review of the study area's characteristics has been facilitated by analysis of census data, notably through Small Area Population Statistics (SAPS).

Evaluation of Car Ownership

2.4.3 Car ownership is a key factor in travel pattern behaviour. The availability of a car is a critical input into deciding where to travel and how to travel. Car use is directly related to car ownership unless significant restrictions are enforced. For those who do not have access to a car, accessibility to education, employment and public facilities is restricted to walking or cycling distance, or to the areas covered by the public transport network.

2.4.4 The level of car ownership in Ringaskiddy is relatively high. Only 9% of households have no car; 34% have one car; and 57% have two or more cars. By comparison, 11% of households in Cork County have no car; 37% have one car and 52% have two or more cars. The rate of car ownership in Cork, and in particularly in Ringaskiddy, demonstrates the reliance on private car transport as the dominant transport mode.

2.4.5 This high level of car ownership is explained by the fact that the need for a car is greater in rural areas where development is more dispersed such that facilities are not within walking or cycling distances. Dispersed populations are also difficult to serve by public transport in a cost-efficient way. The private car is often the only feasible choice of transport in rural areas such as Ringaskiddy.

2.4.6 By comparison, in urban areas, there is generally a greater opportunity to access employment and education by walking, cycling and public transport. Therefore, the need for a car is greatly reduced and it is sometimes more cost-efficient not to own a car. Car parking within urban areas is also more restricted and can limit the number of cars per household. This is illustrated in Figure 4, which shows a much lower car ownership in Cork City than in the surrounding (more rural) EDs.

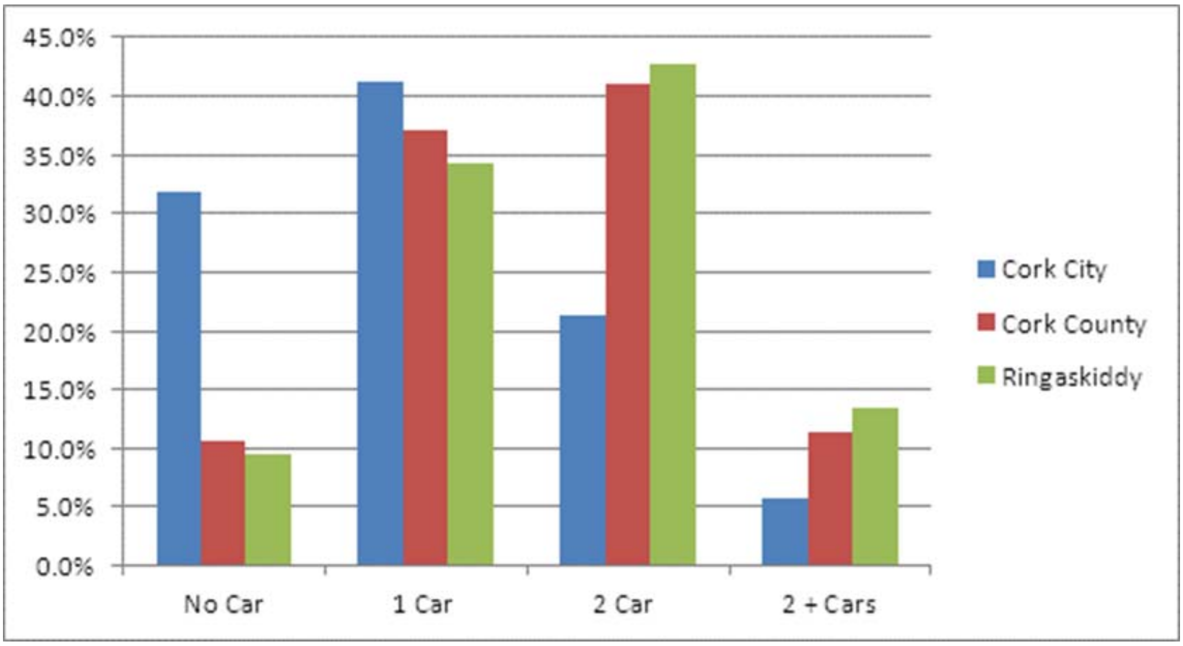

Figure 4. Percentage of Households with access to Car

Mode Share of travel to Work and Education

2.4.7 An analysis of 2011 Census data shows that the private car is by far the most commonly used mode of transport to work and education in the Ringaskiddy area. Table 2.2 shows that car accounts for 80% of all trips from the study area for work and education. This is well above the City (54%) but in line with County averages (80%). This analysis also shows that travel by more sustainable modes (i.e. walking, cycling and public transport) is much lower in Ringaskiddy than in Cork City and City County.

2.4.8 Table 2.2 shows that the percentage of people walking to work is well below the County (10.3%) and City averages (33.1%). It also shows that cycling is higher than the County (0.7%) averages and in line with the City (2.9%) averages. However the low population in Ringaskiddy must be taken into account because although the 2.4% that cycle to work from Ringaskiddy is in line with the City, it only represents 23 people. The percentage from Ringaskiddy that takes the bus (6.1%) is also lower than the County (8.0%) and City averages(9.3%). 0% travel by train which is in line with both the County (0.7%) and City averages(0.3%). 5.9% is represented by motorcycle/other in Ringaskiddy.

Table 2.2 Mode Share to Work and Education by Area

MODE	CORK CITY	CORK COUNTY	RINGASKIDDY
On Foot	33.1%	10.3%	5.8%
Bicycle	2.9%	0.7%	2.4%
Bus	9.3%	8.0%	6.1%
Train	0.3%	0.7%	0.0%
Car or Van Driver	37.8%	56.5%	56.3%
Car Passenger	16.5%	23.8%	23.4%
Motorcycle/Other			5.9%

Journey Time to Work and Education

2.4.9 The Small Area Population Statistics (SAPS) from the 2011 Census provides information on the normal journey time to work and education. It is worth noting that the values for journey time are those stated by respondents, and are, therefore, the perceived journey time. Table 2.3 provides details of the stated journey time for those living in Cork County, Cork City and Ringaskiddy.

2.4.10 Journey times to work and education in the county are relatively short, with the majority of trips (69%) taking under 30 minutes. Journey times are even shorter in Cork City with 81% of trips taking under 30 minutes. Journey times for residents in Ringaskiddy are in line with those experienced by residents of Cork County, where 65% of trips take 30 minutes or less.

Table 2.3 Perceived Journey Time by Area – 2011 Censtus results

JOURNEY TIME	CORK CITY	CORK COUNTY	RINGASKIDDY
Under 15 minutes	39.1%	36.8%	34.51%
15 to 30 minutes	42.4%	32.1%	30.33%
30 to 60 minutes	16.2%	25.7%	26.69%
over 60 minutes	2.3%	5.5%	8.47%

2.5 Results of SYSTRA workplace/education travel survey

2.5.1 As part of a separate study, in mid-2012 SYSTRA undertook an online survey of people who use the N28 to travel to work or education. Two public consultations were held in Ringaskiddy and Carrigaline to promote the survey and a link to the survey was circulated among all employees working in the Ringaskiddy / Carrigaline area. In total there were 1014 responses to the survey.

2.5.2 The objective of the survey was to engage with the N28 commuters and identify various improvements which might encourage N28 commuters to consider changing their current mode of commuter travel to include more sustainable travel modes such as car sharing, public transport, cycling, and walking as part of routine commute to work, or place of education, or to Cork City etc.

2.5.3 In total there were 1014 responses to the survey. The key insights gained from this survey include:

- Almost all respondents (99%) either own or have access to a car;
- Most respondents said the main mode of travel used was car driver;
- Those who travelled by car did so because it was more convenient and quicker than the alternatives;
- One third of those surveyed said they travel further than 20km and a similar proportion travel between 10km - 20km;
- Many respondents reported congestion at key junctions on the N28, partly caused by a high volume of cars arriving and departing at the same time;

- Almost all respondents stated that they parked in free staff parking at their place of work / education;
- A quarter of respondents said they would occasionally be a car passenger and that this is a mode available to them. This is encouraging as a quarter of respondents are already car sharing occasionally;
- Over half of respondents rated the public transport service serving Ringaskiddy as 'poor' or 'very poor', while a third rated it as 'adequate'. Indeed respondents frequently stated that there was no direct bus service serving their home to their destination and that using a bus to travel would involve an extra-long journey which they deemed unnecessary;
- Over a quarter of respondents said that a bicycle was available to them, however, only 9% said that they occasionally cycled;
- If improvements were made in the provision of cycle lanes and cycle infrastructure almost three quarters of respondents said they may consider cycling for all or part of their journey to work/education at least occasionally;
- With regard to pedestrian infrastructure, as many as 89% said that they thought it was 'poor' or 'very poor'; and
- In addition to this, many respondents said it was simply too far and therefore took too long to walk to their destination.

Overall Conclusion

- The survey shows that free parking may be a significant contributor to people driving to work in this area.
- The survey illustrates that many respondents consider the N28 to be heavily congested, impacting on their journey to work.
- 73% of respondents travel over 10km on their journey to work (36% travel 10-20km and 37% travel greater than 20km), therefore the propensity for people to walk and cycle to work is low. Consequently, it may only be possible to target, at most, 27% of people with reference to switching to walking and cycling modes particularly.
- 46% of journeys to work took between 15-30 minutes, while journeys from work generally took between 15-30 minutes (38%) or 30-45 minutes (27.5%). The implication of this is that it would be difficult for public transport to compete with car journey times of less than 30 minutes.
- Many respondents left for work before 08:00, with 30% of them leaving before 07:00. Public transport, walking and cycling may not be feasible for this group who already leave early in the morning to drive to work.
- The findings to the survey do show, however, that there is potential for a higher modal share for walking, cycling and public transport use if improvements were made. This, again, may only be the case for those who travel less than 10km on their journey to work.



3. REVIEW OF PLANNING AND POLICY DOCUMENTS

3.1 Introduction

3.1.1 As part of the Baseline Evaluation, all relevant national and regional guidelines and other transport studies have been reviewed in the context of this study. The following documents and studies are considered to have relevance to the study and therefore have been reviewed:

Policy Documents

- Cork Area Strategic Plan (2001-2020)
- National Spatial Strategy (2002-2020)
- National Development Plan (2007-2013)
- Cork County Development Plan (2009)
- South West Regional Planning Guidelines (2010-2022)
- Carrigaline Local Area Plan (2011)
- Douglas Land Use and Transport Strategy (2013)
- Spatial Planning and National Roads – Guidelines for Planning Authorities (2012)
- National Transport Authority - National Cycle Manual (2011)
- Design Manual for Urban Road and Streets (2013)

Infrastructure

- N28 Cork to Ringaskiddy Upgrade (2014)
- Dunkettle Interchange (2013)
- Proposed Green Route (2012)

Mobility Management and Traffic Impact Assessment

- Smarter Travel (2009)
- NRA Traffic and Transport Assessment Guidelines (2007)
- Traffic Management Guidelines (2003)
- NRA Traffic and Transport Assessment Guidelines (2007)
- RSA Accident Statistics
- N28 Corridor STS Transport Questionnaire (2012)
- N28 Corridor STS (2013)

Port Policy

- PoC Strategic Development Plan (2010)
- PoC Strategic Development Plan Review (2010)
- National Ports Policy Statement (2013)



3.2 Cork Area Strategic Plan (2001-2020)

3.2.1 The Cork Area Strategic Plan (CASP) provides a vision and strategy for the Land Use Planning and Transport development of the Cork City Region up to 2020. It was jointly sponsored by Cork City Council and Cork County Council and is a successor, in strategic planning terms, to the Cork LUTS initiative, dating from 1976, which pioneered the strategic land use and transport planning of the Cork region. In particular CASP incorporates the Government supported European-wide initiative to create a sustainable approach to social and economic development. This is encouraging planning authorities to take a more critical view of settlement patterns, development needs and infrastructure requirements through the preparation of strategic plans.

3.2.2 According to CASP, Cork has a high standard of road infrastructure but public transport has had little capital investment. This has encouraged dispersed development, which combined with the large forecast growth in population and the increase in incomes, results in higher rates of car ownership that will only exacerbate the trend of increased car based travel.

3.2.3 Green routes, featuring bus priority and improved provision for pedestrians and cyclists, have been recommended for key radial routes into Cork City. One of these is along the route corridor from Ringaskiddy to Cork City via Douglas and Carrigaline.

3.2.4 CASP was updated in 2008, to be in line with the National Climate Strategy 2007-2012. This updated strategy forecasts a significant enhancement in economic growth and provides for a greater population than originally envisaged. The CASP update states that upgrading the N28 road access to Ringaskiddy Port and its associated industrial zone is a critical project, which will facilitate other key strategic projects in the CASP Area, including the migration of Port activities from Cork City to Ringaskiddy and the release of the Docklands area of the city centre for redevelopment.

3.3 National Spatial Strategy (2002 – 2020)

3.3.1 The National Spatial Strategy (NSS 2002-2020) is a twenty year strategic planning framework designed to counterbalance disparities in regional development. Cork is classed as a "Gateway" under the NSS. As a Gateway, Cork has a strategic national location relative to its surrounding areas and provides national-scale social, economic infrastructure and support services to the southern region.

3.3.2 According to the NSS, of the regional cities Cork has the most immediate potential to be developed to the national level of scale required to complement Dublin. CASP sets a positive agenda for proceeding in this direction, given its emphasis on enhancing Cork's critical mass potential as a metropolitan public transport based business area, including a physically attractive and friendly city at its core.



3.3.3 In early 2013, the Government announced that the National Spatial Strategy (NSS) is to be abandoned and replaced by a new policy in about a year's time[2].

3.4 National Development Plan (2007-2013)

3.4.1 The National Development Plan (NDP) sets out the development strategy for the Country over a seven-year period, which is supported by quantified, multi-annual investment proposals in all sectors of the economy. It also seeks to promote social inclusion, gender equality and more balanced regional development. Economic infrastructure has been identified as a top priority within the NDP (2007-13), which includes transport infrastructure. Three broad transport investment priorities have been identified:

- Rail / Public Transport;
- Airports; and
- Ports.

3.4.2 The NDP plan states that Atlantic Gateways such as Cork and Limerick have the potential, through strengthening individual cities, to enhance connectivity and promote a collaborative approach through planning and development, to develop the second major metropolitan corridor on the island of Ireland which would complement and to counterbalance the strengthening Dublin-Belfast corridor. It states that investment in key projects such as the Atlantic Corridor (N20 / N25) will help unlock the potential of the Atlantic Gateways concept.

3.5 Cork County Development Plan (2009)

3.5.1 The Cork County Development Plan (CCDP) is a six year plan that sets out Cork County Council's strategy for the proper planning and sustainable development of the County. The plan looks forward to the horizon year of 2020 so that it is aligned with national and regional planning policies and also so that it can provide an adequate framework for the County's Electoral Area Local Area Plans.

3.5.2 The key aims that underpin the strategy were first developed in the County Development Plan 2003 and the updated plan (2009) sought to maintain and enhance their implementation into the future, in order to achieve:

- Enhanced quality of life for all, based on high quality residential, working and recreational environments and sustainable transportation patterns;
- Sustainable patterns of growth in urban and rural areas that are well balanced throughout the County, reflecting the need to reduce energy consumption and emissions and taking account of the need to plan for the effects of climate change, together with efficient provision of social and physical infrastructure;

[2] http://www.irishtimes.com/news/government-scraps-spatial-strategy-1.1254981

- Sustainable and balanced economic investment, in jobs and services, to sustain the future population of the County together with wise management of the County's environmental, heritage and cultural assets; and
- Responsible guardianship of the County so that it can be handed on to future generations in a healthy state.

3.5.3 The policy and objectives of this plan for the Cork Metropolitan Strategic Planning Area in the County are based on the following planning and sustainability goals:

- To recognise the importance of the role to be played by Metropolitan Cork in the development of the Cork 'Gateway' as a key part of the Atlantic Gateways Initiative. In tandem with the development of Cork City, to promote its development as an integrated planning unit to function as a single market area for homes and jobs where there is equality of access for all, through an integrated transport system, to the educational and cultural facilities worthy of a modern and vibrant European City.
- To maintain the principles of the Metropolitan Cork Greenbelt to protect the setting of the City and the Metropolitan Towns and to provide easy access to the countryside and facilities for sports and recreation.
- In the Cork Harbour area generally, to protect and enhance the area's natural and built heritage and establish an appropriate balance between competing land-uses, to maximise the area's overall contribution to Metropolitan Cork.
- To assist in the redevelopment of the Cork City Docklands by providing for the relocation and development of industrial uses and major port facilities, primarily to Ringaskiddy, where deep-water berths can be developed and modern road infrastructure is planned to facilitate freight transport.
- To recognise the long-term importance of Cork International Airport and to maintain and enhance the infrastructure and other resources likely to be required for its future development.
- To develop the Cork City Environs so that they complement the City as a whole. In the South, priority should be given to consolidating the rapid growth that has occurred in recent years by the provision of services, social infrastructure and recreation facilities to meet the needs of the population.
- To maximise new development, for both jobs and housing, in the Metropolitan Towns served by the Blarney - Middleton/Cobh rail route (including the proposed new settlement at Monard) and to enhance the capacity of these towns to provide services and facilities to meet the needs of their population.
- To provide an enhanced public transport network linking the City, its environs, the Metropolitan towns and the major centres of employment.

3.5.4 It is also an objective of the 2009 Cork County Development Plan (CCDP) to seek the support of the NRA in the implementation of the N28 (Cork - Ringaskiddy) upgrade.

3.5.5 The 2009 CCDP noted that the decision by ABP in 2008 relating to a proposed container terminal at Ringaskiddy identified concerns regarding traffic impact at key locations on the N28 road network and the lack of potential for the future transport of freight by rail in the Ringaskiddy area. The plan states that the maintenance of modern port facilities

  

and the need to release port-related land in the Docklands and at Tivoli for mixed-use development formats are both critical to the overall strategy for the sustainable development of the CASP area and to the achievement of the target populations for the City.

3.5.6 The CCDP indicates that while Ringaskiddy remains the preferred location for the relocation of port activities, Cork County Council is committed to engage with the PoC and other relevant stakeholders, to seek a resolution to the difficulties raised by ABP and, if necessary, give consideration to possible alternative locations.

3.6 South West Regional Planning Guidelines (2010-2022)

3.6.1 The South West Regional Authority prepared the Regional Planning Guidelines for the South West Region to act as a regional tier in the hierarchy of plans and policies that inform local plans such as the Development Plan.

3.6.2 The task of the Guidelines is to provide a broad canvas to steer the sustainable growth and prosperity of the Region and its people. The Plan contains statements and analysis of key economic objectives, together with a set of planning guidelines to be incorporated within the development plans of the local authorities in the region.

3.6.3 The Guidelines cover the South West Region, which incorporates County Cork together with County Kerry. Development priorities that have been identified for the Greater Cork Area in these guidelines are:

- Realignment and reinforcement of spatial planning and land use policies;
- Plan for an increase in the population and employment of the Cork Gateway;
- Refocusing of economic and investment strategy;
- Front-loading of infrastructure and implementation of an integrated transport strategy; and
- Priority infrastructure investments for the Cork Docklands.

3.6.4 The Guidelines also recognise that the PoC needs additional capacity and has identified a number of issues and priorities for infrastructural provisions and up-grades related to the Port, Ringaskiddy and the N28. These include:

- Integral to both the expansion of the PoC and the planned redevelopment of the City Docklands is the relocation of port activities and related uses from the City Docklands and Tivoli to new sustainable locations in the harbour;
- It is important to the development of the region's economy that the PoC can increase its tonnage in line with the future economic growth of the region and its own strategic development plan will guide this approach;
- Prioritise the upgrading of the N28, to facilitate ease of access to the Port and industrial development in Ringaskiddy. Provision for public transport priorities should be built into this scheme;
- Promote the development of a lower harbour, wastewater treatment scheme, to facilitate the development of lands in Ringaskiddy; and

- It is an objective to support the sustainable expansion of the PoC in line with the targeted economic growth of the region. It will be important for the PoC to relocate its activities from the City to another suitable, sustainable, location within Cork Harbour. Once the PoC has resolved the issues of transport facilities to serve the port in the future, the local authorities will examine the potential of possible locations and, where appropriate, protect the most suitable for future port development in their development and local area plans.

3.7 Carrigaline Local Area Plan (2011)

3.7.1 The Carrigaline Electoral Area lies within the CASP area and is entirely contained within the County Metropolitan Strategic Planning Area as defined in the County Development Plan 2009. The Electoral Area is located to the south of Cork City and also includes the Cork City South Environs (Ringaskiddy, Carrigaline, Douglas, Grange, Frankfield, Donnybrook, Maryborough, Rochestown, Doughcloyne and Togher).

3.7.2 The Local Area Plan (LAP) provides an easily understood but detailed planning framework for sustainable development responding to the needs of communities within the Electoral Area. It aims to deliver quality outcomes, based on consensus, that have been informed by meaningful and effective public participation. The plan sets out proposals for the delivery of the physical, social and environmental infrastructure necessary to sustain the communities of the area into the future.

3.7.3 The N28 National Primary route links Ringaskiddy to Cork City and onwards to the wider regional area. It is proposed to improve the existing N28 between the Bloomfield interchange with the N25 South Ring Road and Ringaskiddy. The improved road will have a greater capacity particularly for freight vehicles making journeys to and from the port at Ringaskiddy and this will substantially improve the standard of the existing N28.

3.7.4 The development of this road scheme is being promoted by Cork County Council and is funded by the National Roads Authority (however this project has since been put on hold). The Carrigaline LAP noted that it is critical that the N28 project be finalised as quickly as possible in order to bring certainty and assurance of commitment to existing and future investment in the Ringaskiddy area. This planned upgrade represents an important catalyst for the economic development of Cork and the South-West region.

3.7.5 Public Transport opportunities in the Electoral Area are solely focused on public bus operators, with an hourly service operating between Cork City and the main towns of Carrigaline, Passage West and Ringaskiddy and the key village of Crosshaven. The South Environs is served by a City bus service, with buses available at regular intervals. The travel to work patterns which have emerged from the 2006 census have shown that Carrigaline is the most car dependent in the country and efforts to improve the situation through various traffic management schemes will be made. It is important that provision is made for good walking and cycling facilities within all of the settlements.

3.7.6 The LAP defines Ringaskiddy as a Strategic Employment Centre, within the County Metropolitan Strategic Planning Area and has developed into one of the most significant employment areas in the Country. The aim is to encourage the development of Ringaskiddy as a major location for port development and large-scale stand-alone industry, taking account of the need to enhance public transport (including the provision of a high quality green route) and protect the environment of the existing residential community, to continue the sustainable development of Ringaskiddy.

3.7.7 The LAP adds that this Strategic Employment Centre includes two small villages, Shanbally and Ringaskiddy, and there are a number of residential and amenity uses that would benefit from protection from the impact of nearby large scale development. There is, however, very limited expansion potential for residential uses because of the importance of the area for future industrial and port development.

3.7.8 According to the LAP, outside of the Greater Dublin Area, Ringaskiddy has the largest direct investment employment centre in Ireland. Many of the top world leading pharmaceutical companies are located there. In 2009, over 7,800 people were employed in the Ringaskiddy-Carrigaline area. There are 400 acres of IDA industrial zoned land available.

3.7.9 As stated in the LAP, the PoC's deep water berth at Ringaskiddy is of huge importance to the region both from a commercial and a tourism perspective. Facilities at the deepwater berth can handle a range of cargo types, including roll-on roll-off, lift-on lift-off and dry bulk. Swansea-Cork Ferries operate a sailing to the UK out of Ringaskiddy, while Brittany Ferries sail out of Ringaskiddy to Roscoff in France.

3.7.10 The LAP notes that there are plans to expand the existing National Maritime College in Ringaskiddy eastwards to provide a maritime campus adjacent to the college, accommodating the Maritime and Energy Cluster Ireland (MERC). It is intended this will include facilities for UCC's Coastal and Marine Resources Centre (CMRC) and Hydraulics and Maritime Research Centre (HMRC), as well as maritime IT, incubator and marine business accommodation. Renewable ocean energy is seen as one of the niche areas the campus will initially focus on.

3.7.11 The CASP Update combined Ringaskiddy and Carrigaline into a single employment area. The future jobs requirement for 2020, as set out in both the CASP Update and the Cork County Development Plan 2009, is 10,316 which is an increase of 2,500 jobs or 32%.

3.7.12 While it is the Council's intention to develop Ringaskiddy as a Strategic Employment Centre within Metropolitan Cork, there is a need to protect the amenity afforded to the existing communities of Ringaskiddy village and Shanbally. Balancing these two requirements is a challenge which will require much consideration. While Cork County Council will continue to promote the employment role of Ringaskiddy, greater recognition will be given to the needs of the established resident community.

3.8 Douglas Land Use and Transport Strategy (2013)

3.8.1 The Douglas Land Use and Transport Strategy (DLUTS) and the Carrigaline LAP both envisage mode shift away from car use for commuters as per the objectives of Smarter

Travel. The indications from the DLUTS model and the proposed junction improvements are that there will be a modest reduction in traffic on the N28 and the N40 if and when the DLUTS proposals are implemented. The strategy is currently estimated to be implemented by 2022 but could be sooner depending on funding.

3.9 Spatial Planning and National Roads – Guidelines for Planning Authorities (2012)

3.9.1 These guidelines have been prepared by the Department of the Environment, Community and Local Government in the context of the delivery of the National Spatial Strategy and actions identified in *Smarter Travel, A Sustainable Transport Future, A New Transport Policy for Ireland 2009-2020*.

3.9.2 The guidelines set out planning policy considerations relating to development affecting national primary and secondary roads, including motorways and associated junctions, outside the 50-60 km/hr speed limit zones for cities, towns and villages. They have been developed by following a number of key principles and aim to facilitate a well-informed, integrated and consistent approach that affords maximum support for the goal of achieving and maintaining a safe and efficient network of national roads in the broader context of sustainable development strategies, thereby facilitating continued economic growth and development throughout the country. Also contained within these guidelines are key steps in undertaking an evidence-based approach for development frameworks and a land use and transport planning checklist.

3.9.3 This document states that national roads play a key role within Ireland's overall transport system and in the country's economic, social and physical development. The primary purpose of the national road network is to provide strategic transport links between the main centres of population and employment, including key international gateways such as the main ports and airports, and to provide access between all regions.

3.10 National Transport Authority - National Cycle Manual (2011)

3.10.1 The National Cycle Manual embraces the principles of Sustainable Safety to offer a safe traffic environment for all road users including cyclists. It offers guidance on how to integrate cycling into urban area design and transport networks. It aims to challenge planners and engineers to be more proactive in integrating bicycles into transport networks than before. The overall objective is to plan for and encourage many more people to choose and use the bicycle in Irish towns and cities.

3.11 Design Manual for Urban Road and Streets (2013)

3.11.1 The Design Manual for Urban Roads and Streets (DMURS) seeks to address street design within urban areas (i.e. cities, towns and villages) and sets out an integrated design approach. A further aim of this manual is to put well designed streets at the heart of sustainable communities. Well-designed streets can create connected physical, social and transport networks that promote real alternatives to car journeys.

3.11.2 The principles, approaches and standards set out in the DMURS apply to the design of all urban roads and streets (that is streets and roads with a speed limit of 60 km/h or less). The manual introduces a set of principles, approaches and standards necessary to achieve best practice in urban roads and street design.

3.12 N28 Cork to Ringaskiddy Upgrade

3.12.1 The N28 is the National Primary Road which links the N40 Cork Ring Road to Ringaskiddy. It is proposed to improve the existing N28 from the Bloomfield Interchange with the N40 South Ring Road to Ringaskiddy Village, upgrading it to a motorway/ dual carriageway. For the purposes of this assessment, the N28 Upgrade is not expected to be delivered before 2023.

3.12.2 The main objectives of the N28 Upgrade scheme are to provide priority access and increased capacity between the Port and other major employers at Ringaskiddy and the National Road Network and to bypass the villages of Shanbally and Ringaskiddy. The upgrade will provide for a safer National Road Network and improve national route access to the Ringaskiddy Strategic Employment Centre for economic development. The need for the N28 Upgrade has been highlighted in numerous national studies including the National Development Plan (2007-2013).

3.12.3 As illustrated in Figure 6, it is anticipated that the N28 Upgrade route would follow a completely new offline section of road between east of Ringaskiddy Village and north of Shannon Park Roundabout through extensive tracts of land zoned for industrial development and passing through the northern section of the Fernhill Golf Club, south of the Raffeen Bridge.

3.12.4 Currently the NRA are exploring different options regarding this upgrade. Consultants have been appointed to prepare an Environmental Impact Statement (EIS) and bring the scheme through the statutory consent processes. One option is that the N28 Upgrade would terminate east of Ringaskiddy village whereas another option is that the N28 Upgrade terminates at the R613, rejoining the existing N28 west of Ringaskiddy village.

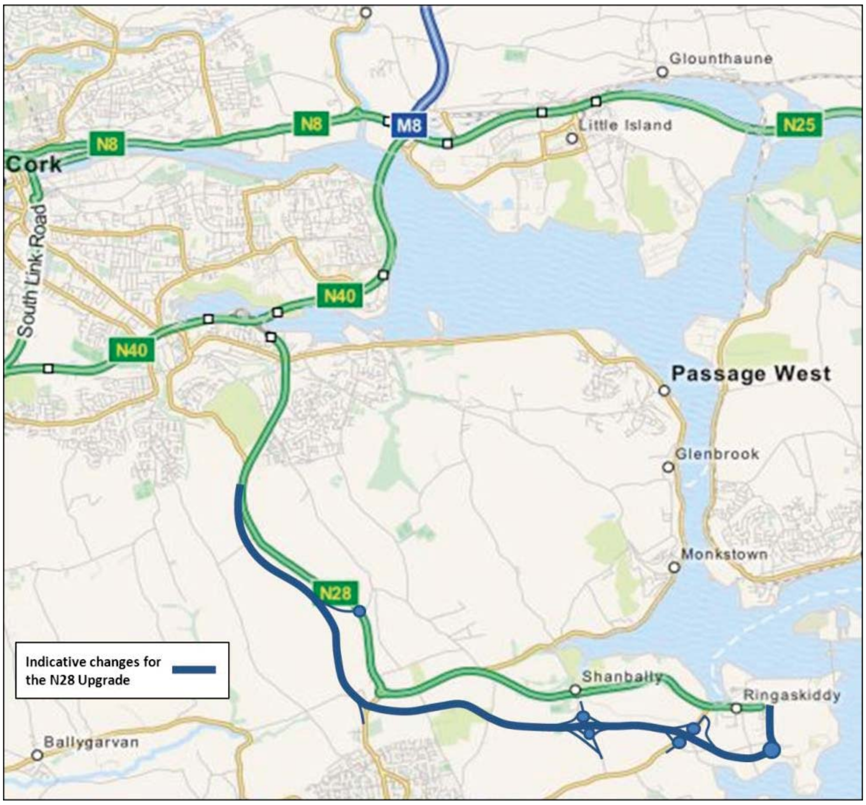

Figure 5. Indicative Route of N28 Upgrade

3.13 Dunkettle Interchange (2013)

3.13.1 An application for the Dunkettle Interchange Improvement Motorway Scheme was made by the National Roads Authority (NRA) to ABP for Approval on 19th July 2012. The oral hearing took place on the 14th and 15th December, 2012 and on 9th January 2013.

3.13.2 The existing interchange forms the junction of the N8, the N25 and the Jack Lynch Tunnel and suffers from significant congestion leading to long delays and queuing. The current interchange arrangement has free flow for the traffic going in an east - west direction but forces North - South traffic and turning traffic to use a traffic signal controlled roundabout. It is proposed to upgrade the interchange to achieve free flow for key movements and to include measures to remove locally generated traffic from the interchange.

3.13.3 In April 2013, ABP indicated their intention to approve the Dunkettle Interchange Improvement Motorway Scheme and the corresponding CPO such that the proposed lands could be acquired by compulsory acquisition.

3.14 Proposed Green Route (2012)

3.14.1 In July 2012, consultants on behalf of Cork County Council, completed a Feasibility Study on the development of an 8km greenway (shared walking and cycling route) between Passage West and Carrigaline, including a branch to Ringaskiddy. This will link the Rochestown to Passage West and Carrigaline to Crosshaven routes and thereby provide a continuous dedicated walking and cycling route from Rochestown to Crosshaven, while also making important links with transport connections at the Carrigaloe cross river ferry (and hence onwards to Cobh) and the international passenger ferry terminal at Ringaskiddy.

3.14.2 The Greenway will serve as a high quality amenity for walkers and cyclists of all ages while also improving facilities for accessing local employment and schools, thereby promoting sustainable travel options.

3.14.3 The proposed route is generally along the coast from Rochestown through Passage West and Monkstown. The route crosses the N28 close to Raffeen. From here the route runs through Ballyhemiken, entering Carrigaline near the Fernhill Golf and Country Club. Potential route options are being considered to Ringaskiddy, via the N28 and L6473.

3.14.4 Cork County Council are now actively pursuing the implementation of Phase 1 of the route.

3.15 Smarter Travel (2009)

3.15.1 Smarter Travel – A Sustainable Transport Future was published in 2009 and its aim is to help achieve a sustainable transport future by 2020. This report looks at the existing unsustainable travel patterns and outlines ways in which more sustainable patterns of travel can be established. It also recognises the importance of ports and has set out a number of key actions in relation to port and freight activity, including:

- Organise a forum to bring all interested parties together, to explore in greater depth the issues relating to the movement of goods including
  - the realistic potential for rail freight
  - scheduling of deliveries from the ports and urban areas to avoid peak use;
- Review port policy with a view to maximising efficiency in the movement of goods; and
- Undertake further investigation to see how the issue of freight transport and the reduction of emissions can be addressed.

3.15.2 The NTA have prepared numerous guidance documents to assist employers in preparing a Workplace Travel Plan (WTP). A Workplace Travel Plan is described as a package of measures aimed at supporting sustainable travel for work-related journeys. It comprises actions to promote walking, cycling, public transport, car sharing, the use of technology instead of travel, and flexible working practices.

3.15.3 The NTA are available to assist employers in developing a Workplace Travel Plan for their business. On request, the NTA facilitators meet with employers to discuss mobility management options such as car sharing, walking, cycling, public transport, etc.

3.15.4 The NTA have been actively encouraging employers in the Ringaskiddy area to implement such WTPs and avail themselves of the services provided by the NTA facilitators. In conjunction with Cork County Councils N28 Sustainable Travel Strategy (N28 STS), the NTA have assigned two facilitators to liaise and support the employers in the Ringaskiddy area. To date it is understood that three employers are participating in the WTP program in Ringaskiddy: the National Maritime College and the Navy, Port of Cork and Depuy (a biomedical company with over 1000 employees).

3.15.5 Results from 25 Smarter Travel Workplace Partner employers (throughout Ireland) with WTP in place for a minimum of one year show that:

- 19 of the 25 organisations (76%) achieved a reduction in car driver trips;
- The average reduction in car driver trips was 18%;
- Seven organisations achieved more than a 20% reduction in car driver trips; and
- Cycling increased in 20 out of 24 organisations, with an average increase of 156%.

3.15.6 A number of mobility management measures were identified that can optimise road operations at the port, thereby making the most productive use of road infrastructure and operational resources. These measures, which are used at other port / freight locations, are summarised below:

- Port of Sydney:
  - Extended operating hours for the port and the logistics companies;
  - High efficiency containers;
  - Road enhancements;
  - Higher mass limits;
  - Mechanisms that support better truck scheduling and utilisation; and
  - Expanding Sydney road freight corridors.
- Port of Melbourne:
  - Regional and local area terminals;
  - High productivity freight vehicles;
  - Empty container parks;
  - Information communication technologies;
  - Road improvements; and
  - Stevedore systems and port practices.
- Felixstowe:
  - PARIS computer system which optimises transport planning at the port.
- Rotterdam:

    - Live information system;
    - Road development;
    - Internal traffic management company;
    - Cash payments to encourage road users not to use certain roads (A15); and
    - Purpose built inland distribution terminal locations.

- Port of Dublin:

    - Vessel traffic management systems and trained operators.

- TELLUS Project:

    - Fleet management by GPS;
    - Inner City Logistics Centre;
    - E-commerce logistics;
    - Incentives for improving the load factor in inner city freight transport; and
    - Consumer driven goods management from a mobility centre base.

- Other ports:

    - Los Angeles uses a 'PierPass' charging regime to discourage truck movements at the port during peak periods; and
    - The Port of Antwerp has collaboration with hinterland hubs.

3.15.7 Other mobility management literature was reviewed which details further many of the options stated above as well as mobility management practices and implementation.

3.16 NRA Project Appraisal Guidelines (2011)

3.16.1 The Project Appraisal Guidelines provide a comprehensive guidance document to scheme promoters on the methods to be used in scheme modelling and appraisal. Traffic growth is predicted for two periods: 2006 – 2025 and 2026 – 2040. For each period, there are low, medium and high growth assumptions.

3.16.2 NRA medium growth rates are assumed for the PoC Strategic Model, as per the Dunkettle Model. The traffic growth assumed will be sense checked against traffic generation of all committed developments which are likely to be built within these time periods and are included within this growth, e.g. development in Ringaskiddy and Cork Docklands.

3.17 Traffic Management Guidelines (2003)

3.17.1 The purpose of the Traffic Management Guidelines manual is to provide guidance on a variety of issues including traffic planning, traffic calming and management, incorporation of speed restraint measures in new residential designs and the provision of suitably designed facilities for public transport users and for vulnerable road users such as cyclists, motorcyclists and pedestrians (including those with mobility/sensory impairments). It also focuses on how these issues must be examined and implemented in the context of overall transportation and land use policies.

3.17.2 The thresholds above which a Transport Assessment is automatically required, which are relevant to this study, are:

- Traffic to and from the development exceeds 10% of the traffic flow on the adjoining road;
- Traffic to and from the development exceeds 5% of the traffic flow on the adjoining road where congestion exists or the location is sensitive;
- Industrial development in excess of 5,000m^2; and
- Distribution and warehousing in excess of 10,000m^2.

3.17.3 The principal types of junctions include priority junctions (stop or yield), roundabouts, traffic signal control junctions or grade separated junctions. Priority junctions have the advantage that they cause little delay for major road traffic. They are the most common form of junction and work best where the traffic flow on minor roads is relatively low in relation to the major road flow. For them to operate safely there needs to be:

- Adequate gaps in major road traffic for vehicles to enter and leave minor roads safely;
- Specific facilities for significant numbers of turning vehicles such as turning lanes and adequate width for the swept path of long vehicles;
- Low speeds and adequate sight distances; and
- Specific facilities (such as crossings) for cyclists, pedestrians and mobility impaired road users.

3.17.4 Traffic signals and roundabouts (including mini-roundabouts) should be considered as an alternative to priority junctions when there are substantial delays to minor road traffic or where there are accident problems relating to vehicle turning movements.

3.17.5 The choice between signals or roundabouts for any given location in an urban area depends on a number of factors:

- Traffic signals can offer the facilities to give particular types of vehicle (such as buses) and vulnerable road users' priority. They generally have a lower land take requirement than normal roundabouts and are often cheaper and easier to implement in urban areas;
- Roundabouts can present safety problems for pedestrians and cyclists unless the roundabout has been designed for these users (see Cycle manual);
- Roundabouts tend to be better for isolated junctions where there are significant proportions of turning vehicles (particularly right turns), and traffic flows are evenly balanced with few pedestrians or cyclists;
- Properly maintained, signalised junctions retain higher capacity than roundabouts, and are safer for vulnerable road users;
- Co-ordinated traffic signal systems can be disrupted if roundabouts are located within the control area of the signals;

- Mini-roundabouts should be regarded as a remedial measure to treat specific problems on existing roads, rather than a general traffic management solution. Alternative junction types are preferred in new developments;
- Mini-roundabouts can help to reduce speeds and create a better balance of flow at tight urban junctions. They are often used as part of a traffic calming scheme. They should only be used at locations where approach speeds are low. Specific facilities should be provided for pedestrians and cyclists; and
- Grade separation should only be considered for the higher levels of traffic flow on Primary distributor roads. Crossing facilities for cyclists and pedestrians must be provided for.

3.18 NRA Traffic and Transport Assessment Guidelines (2007)

3.18.1 The purpose of this document is to set down best practice guidance for the preparation of Traffic and Transport Assessments (TTA) and to explain the relevance of TTA in the planning process. Due to the strategic role of national roads and the need to ensure that the carrying capacity, efficiency and safety of the network is maintained, the management of development may in certain circumstances require tighter control than that required by the Traffic Management Guidelines (detailed above). Where applications affect national routes (including those which impact on interchanges or urban areas with no bypasses) a TTA should be requested if the following thresholds (which are relevant to this study) are exceeded:

- 100 trips in / out combined in the peak hours for the proposed development;
- Development traffic exceeds 10% of turning movements at junctions with, and on, National Roads;
- Development traffic exceeds 5% of turning movements at junctions with National Roads if location has potential to become congested or sensitive;
- Industry 5,000m^2 Gross Floor Area;
- Distribution and warehousing 10,000m^2 Gross Floor Area; or
- 100 on-site parking spaces.

3.18.2 In some cases the impact of traffic volumes may not be significant and the thresholds for a TTA may not be exceeded. However, the type and volume of generated traffic on national roads may be of a nature to raise concerns about effects on road safety and road structure. It is recommended that if the proposed development meets two or more of these criteria, then a TTA should be requested:

- The character and total number of trips in / out combined per day are such that as to cause concern;
- The site is not consistent with national guidance or local plan policy or accessibility criteria contained in the Development Plan;
- The development is part of incremental development that will have significant transport implications;
- The development may generate traffic at peak times in a congested area or near a junction with a main traffic route;

- The development may generate traffic, particularly heavy vehicles in a residential area;
- There is significant concern over the development's effect on road safety;
- The development is in tourist areas with potential for congestion; or
- The planning authority considers the proposal will result in a material change in trips or raises significant transport implications.

3.19 RSA Accident Statistics

3.19.1 The Road Safety Authority produces annual road safety statistics. The statistics of note to this study are:

- In 2011, there were two fatal accidents on the N28. One was a pedestrian during the daytime, between Shanbally and Shannon Park. The other was between a bus and a pedestrian at night, between Carrs Hill and Bloomfield;
- In 2010, there were two fatal accidents on the N28, north of Shannon Park; one on the N40 and two within Carrigaline. Of the two on the N28, both were during the night, one involved a single car, the other involved two vehicles. A pedestrian-car collision occurred on the N40 during the night. One of the fatal accidents in Carrigaline was also during the night, single vehicle only. The other accident in Carrigaline involved a pedestrian and a car during the day time.
- In 2009, there were no fatal accidents in the study area. There was one serious accident on the N28, north of Shannon Park, involving a car. This occurred during the day time.
- A number of minor accidents have been recorded along the N28 between Ringaskiddy and Shannon Park. Two of these involved cars during the day (2007, 2010), two more involved cars during the evening (2005, 2008) and one during the night (2010). One involved a motorcycle during the day (2011) and one involved a heavy goods vehicle during the day (2011).
- Other heavy goods vehicle accidents include a minor accident during the daytime at Bloomfield (2007) and one minor accident approaching the Jack Lynch Tunnel during the daytime (2008). Three minor (2007, 2011) and one serious accident (2005) occurred along the N8 between Dunkettle and the City.

3.20 N28 Corridor Sustainable Transport strategy (2013)

3.20.1 Cork County Council in association with the National Transport Authority is currently preparing a Sustainable Transport Strategy (STS) for the N28 Corridor which will involve the management of commuter travel to Ringaskiddy through the delivery of sustainable travel options and the adoption of sustainable travel initiatives including WTP and area-wide Mobility Management Plans which will be developed /updated in partnership with the local employers and representatives of the community.

3.20.2 Sustainable modes of travel include walking, cycling, public transport and car sharing. Sustainable Transport can lead to a reduction in car based commuter travel and more efficient use of transport infrastructure. It can reduce the amount of space required for parking, can reduce overall travel costs and improve the quality of life of commuters and communities. The promotion of Sustainable Transport options can lead to a reduction in carbon emissions and fossil fuel consumption, and a healthier lifestyle.

3.20.3 The N28 STS is intended to be a long term management approach and implementation framework for managing travel in an area which encourages, supports and facilitates the greater use of sustainable travel choices among commuters, particularly single occupancy car users. The increased use of sustainable travel modes is achieved through promotional initiatives and the provision of comparatively low cost infrastructure improvements, which raise awareness of the choices of travel modes available and make it easier for commuters to make these choices, change their travel behaviour and benefit from sustainable travel options.

3.20.4 The Cork County Development Plan has identified the Ringaskiddy Strategic Industrial Area as one of the key manufacturing based employment areas in the County. The sustainability and expansion of these employment activities is critical to the economic viability of the greater Cork region. In order to achieve the medium to long term planning objectives for the Ringaskiddy Strategic Industrial Area it is important to ensure that the transport network serving the area is sustainable, well managed and can accommodate the current and future needs of the local employers.

3.21 PoC Strategic Development Plan (2010)

Overview

3.21.1 The PoC Strategic Development Plan review (2010) was undertaken as a result of the ABP refusal of the SID application for a port facility development at Ringaskiddy and in response to changes in planning and transportation policies at National, Regional and Local levels. The review examines the future development of the PoC with respect to its cargo handling capacity in terms of achieving a sustainable balance economically, socially and environmentally.

3.21.2 The PoC is a key component of and catalyst for economic activity in the region, and also contributes significantly to the overall competitiveness of the Cork Gateway and its hinterland. The PoC commissioned the Centre for Policy Studies, University College Cork, to assess the contribution made by the PoC to the Irish economy in 2007. Some of the findings from this study are as follows:

- The PoC is one of two major national multi-modal ports in the Republic and the second largest in terms of turnover. Turnover in 2007 was approximately €25 million and approximately 10.5 million tonnes of freight;
- The total contributions of all activities at the PoC for 2007 include expenditure on goods and services of €289.7 million and 1,796 FTE jobs;
- The direct contributions of all activities related to the PoC for 2007 include expenditure on locally produced goods and services of €166.2 million and 674 FTE jobs;
- 325,000 FTE jobs are related to trade through the Port; and

- In 2007 Goods Received by the Port was worth €6,645 million, while Goods Forwarded were worth €17,763 million.

3.21.3 RPS were also commissioned to review the PoC's Strategic Development Plan (2002). This review was a key outcome from the peer review of the decision of ABP to refuse permission for the proposed container ferry at Ringaskiddy.

3.21.4 This PoC Strategic Development Plan Review (2010) incorporated a full review of all relevant EU, National, Regional and Local policy documents, analysis of existing traffic conditions and of Port operations and a site assessment and feasibility study of the various sites considered for the relocated port.

3.21.5 The findings of this review can be summarised as follows:

- Three sites were shortlisted as possible locations for the relocated PoC (Marino Point, Whitegate and Ringaskiddy);
- Existing ADT's on each of the roads serving these sites (N28, R624, R630) show that demand exceeds supply on all of these roads;
- The N28, R624 and R630 would need significant upgrading to alleviate existing capacity problems before any additional port traffic could be accommodated;
- A substantial proportion of Port Traffic has origin / destination in the city area;
- All site location scenarios included create additional congestion and delays at strategic junctions; and
- Dunkettle Interchange is a critical junction for all scenarios.

3.22 National Ports Policy Statement (2013)

3.22.1 The Department of Transport, Tourism and Sport published the National Ports Policy Statement (NPPS) in 2013. The policy introduces clear categorisation of the ports sector into Ports of National Significance (Tier 1), Ports of National Significance (Tier 2) and Ports of Regional Significance. PoC has been identified as a Port of National Significance (Tier 1).

3.22.2 The National Ports Policy statement highlights that the Port of Cork is only one of two ports nationally, (the other being Dublin), capable of handling traffic across all five principal traffic modes (LoLo, RoRo, Break Bulk, Dry Bulk and Liquid Bulk), and that PoC handles approximately 19% of all seaborne trade in the State.

3.22.3 The NPPS acknowledges that:

> "PoC's Strategic Development Plan Review, published in 2010, outlined the company's intention over time to relocate commercial trade to the lower harbour area at Ringaskiddy. The Government endorses the core principles underpinning the company's Strategic Development Plan Review, and the continued commercial development of the PoC Company is a key strategic objective of the National Ports Policy."

3.22.4 Key points arising from the NPPS in relation to this baseline review include:

- It is the Governments position that those ports considered to be of national significance must be capable of providing the type of port facilities and the required capacity to ensure continued access to both regional and global markets for our trading economy;
- Port master-planning is in line with international best practice and it is consistent with policy to improve integrated planning for all modes of transport. National Ports Policy recognises strongly the desirability of this process for the long term planning of all Ports of National Significance (Tier 1 & 2).
- The interconnections between the national primary road network and the commercial port network will continue to be of primary importance. This is recognised in the recently adopted Spatial Planning and National Roads – Guidelines for Planning Authorities. These state that "the primary purpose of the national road network is to provide strategic transport links between the main centres of population and employment, including key international gateways such as the main ports and airports" (Department of Environment, Community and Local Government, 2012).
- Efficient hinterland connections are critically important to any port's ability to facilitate large volumes of traffic. To inform considerations of future national primary road network development, the National Roads Authority shall consult on a regular basis with the Department's Maritime Transport Division, as well as individual Ports of National Significance (Tier 1 & 2), on future network developments (Note this provision of the NPPS can be related specifically to the current status of the N28); and
- It is important that the port network have the potential to offer multi-modal distribution networks as part of its response to future changes in freight distribution that may arise. However, it must be acknowledged that, even with an increase in rail freight to Irish Ports, most freight will continue to be carried by road.



4. EXISTING TRAFFIC MOVEMENT

4.1 Introduction

4.1.1 An extensive set of survey information was reviewed and assessed in order to get a clear understanding of existing traffic movement and conditions on the road network within the study area. The road network can be separated into four categories, these are:

- Motorways - providing connections between major cities;
- National Roads - providing connection between major cities and towns;
- Regional Roads - providing connection between Cork and surrounding towns; and
- Local Roads - providing connection between towns and local areas.

4.1.2 In addition to the traffic survey information gathered to assess the PoC relocation to Ringaskiddy, traffic survey information gathered in the process of developing the Douglas Land Use and Transport Strategy (DLUTS 2012) and the CASP Update has also been made available by Cork County Council for use in this study.

4.1.3 The following surveys were used:

- Traffic surveys at Tivoli and Ringaskiddy ports, including turning counts at the Ferry Terminal, conducted in May 2012;
- Road Side Interviews at Tivoli and Ringaskiddy and observations at City Quays, conducted in May 2012;
- Journey Time surveys along the N28 between Shannon Park Roundabout and Ringaskiddy, conducted May 2012;
- Automatic Traffic Counter (ATC) surveys at Bloomfield Interchange and along the N28 between Shannon Park Roundabout and Ringaskiddy, conducted May 2012;
- ATC surveys along the N28 and other roads in the vicinity of Douglas/ Rochestown, conducted April 2012;
- Manual Classified Counter (MCC) surveys along roads in the vicinity of Douglas/ Rochestown, conducted April 2012;
- MCC surveys near Dunkettle and Cork City undertaken as part of the update of the CASP traffic model in November 2012;
- PoC Employee Survey (2012);
- NRA traffic counters along the N25; and
- MCC surveys commissioned as part of this study, April 2013, at:
  - Cork Road / Church Road roundabout
  - Fernhill Road / Church Road

4.1.4 Survey locations for each of the above surveys are illustrated in Figure 7.

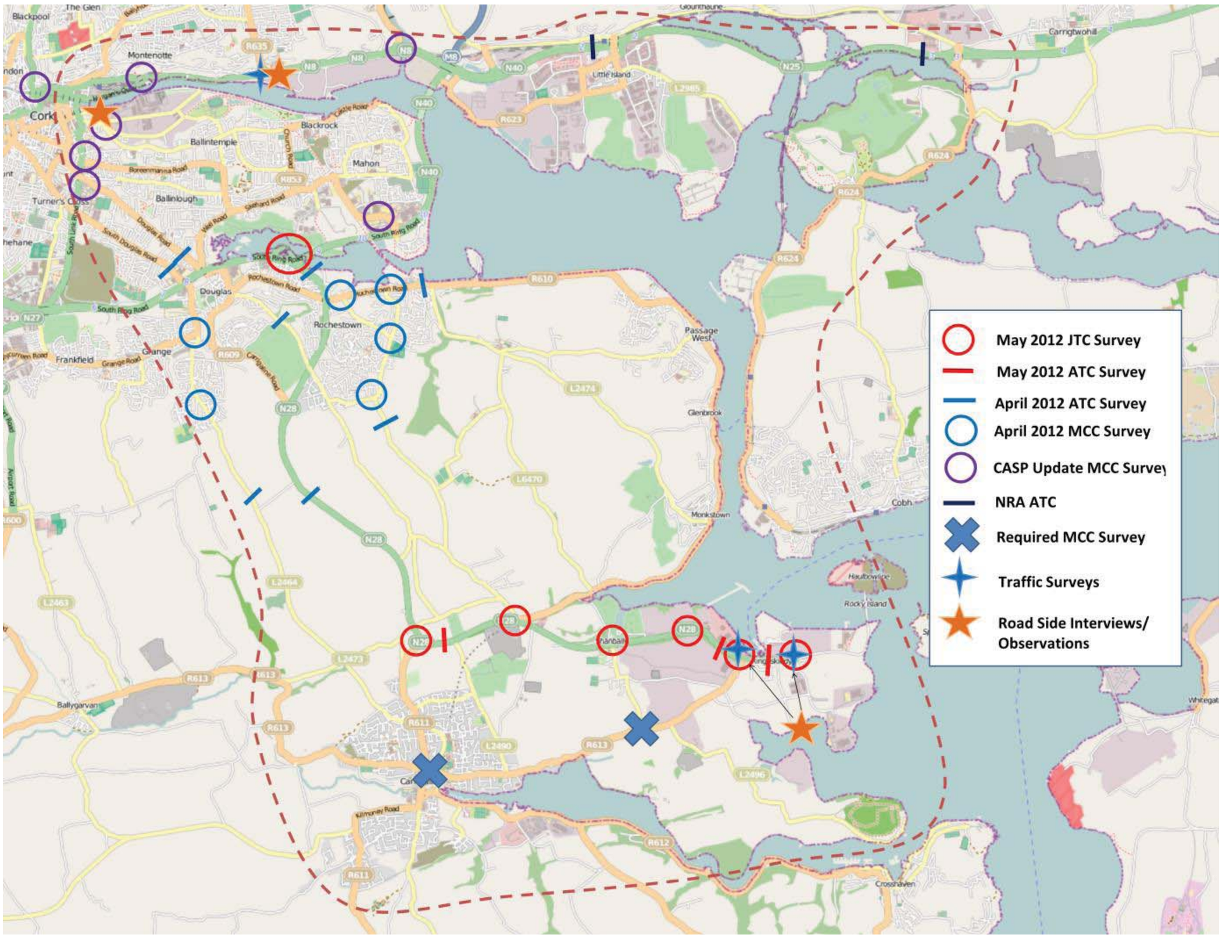

Figure 6. Traffic Survey Locations

4.2 Traffic Surveys at Tivoli and Ringaskiddy Ports

4.2.1 Traffic surveys were conducted at Tivoli and Ringaskiddy ports, including turning counts at the Ferry Terminal in May 2012. These traffic surveys are further discussed in Chapters Five and Six.

4.3 Road Side Interviews

Evaluation of Key Movement Desire Lines

4.3.1 Road Side Interview surveys were undertaken at both Tivoli and Ringaskiddy in 2012. The results of these surveys are summarised below. They are of key importance as it is assumed that the profile and distribution of Port traffic will remain consistent, even with the move from Tivoli / City Quays to Ringaskiddy.



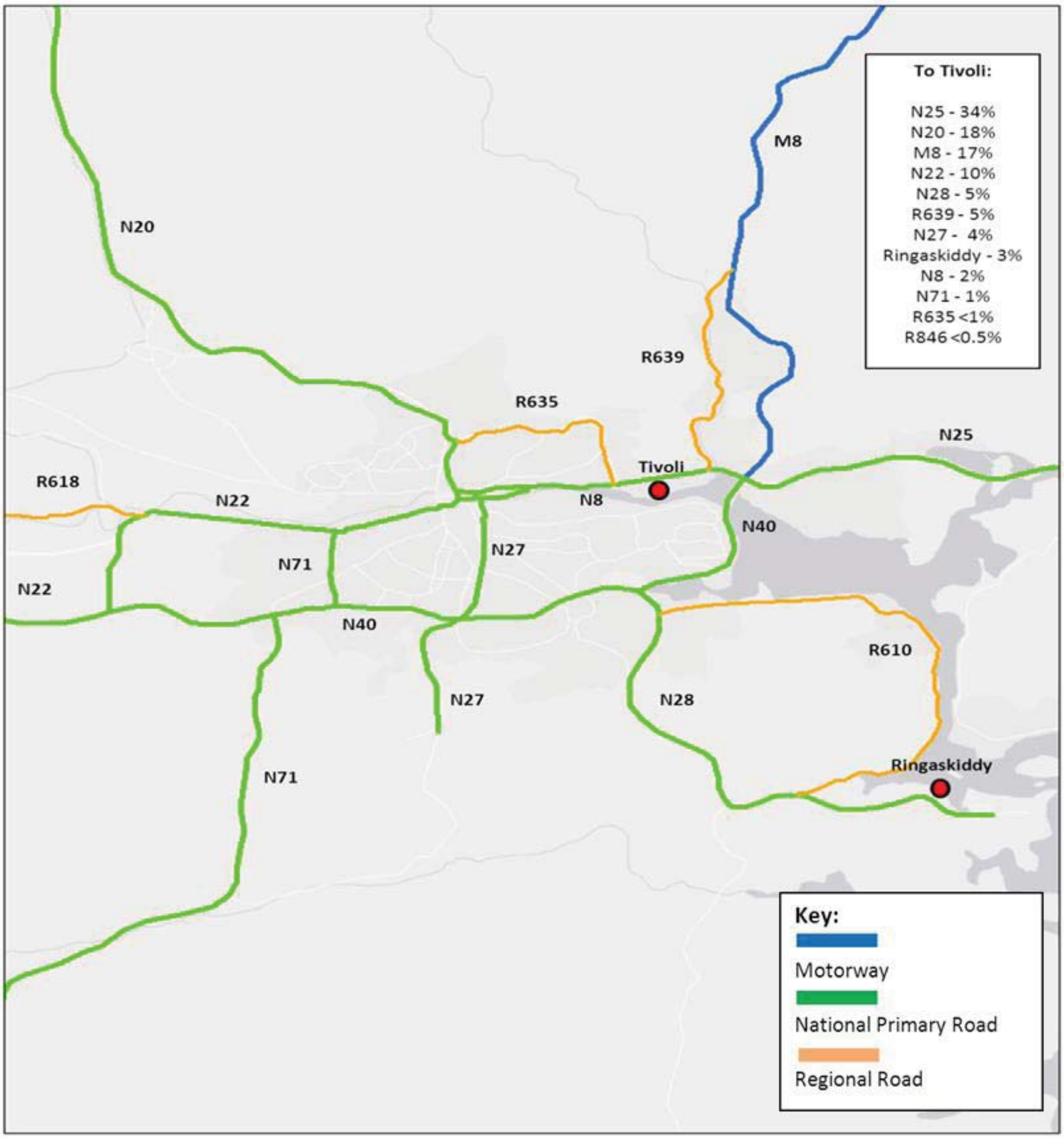

Figure 7. Key Movement Desire Lines to Tivoli

4.3.2 Results of the analysis of Haulier movements out of Tivoli:

- The N25 accounts for 34% of all movements ***towards*** Tivoli. The N25 provides a link from Little Island and Waterford, with the majority of this traffic originating in Little Island.
- The N20 accounts for 18% of all movements. Limerick City is the main producer of haulier trips along the N20.

- The M8 accounts for a further 17%. Clonmel produces the most trips along the M8 although there are a significant number of low trip generators along the M8 in Tipperary and further afield.
- The N22 accounts for 10% of haulier trips with Killarney producing the majority of trips.
- The N28 which accounts for 5% does not include trips from Ringaskiddy, which account for 3%.

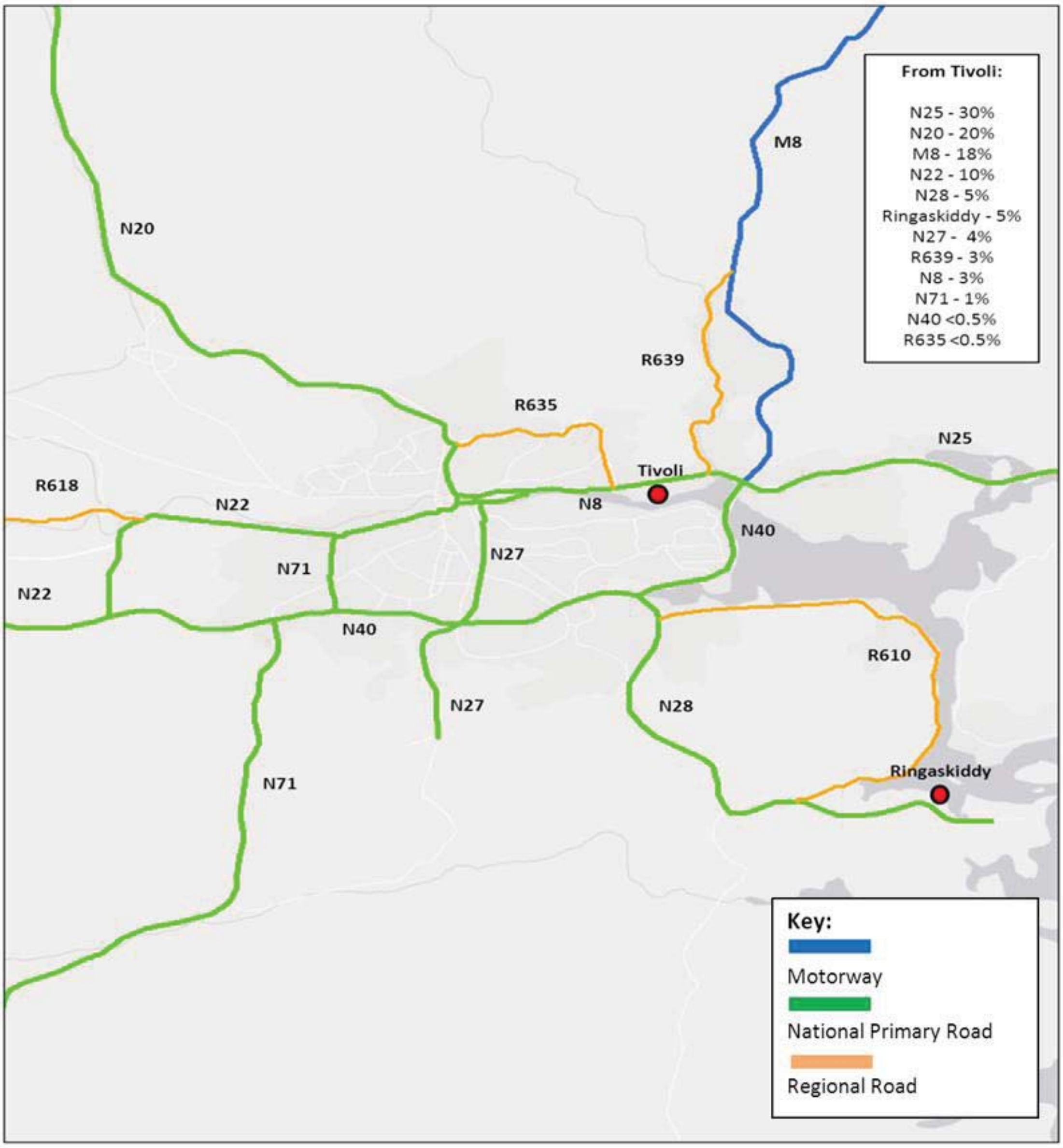

Figure 8. Key Movement Desire Lines from Tivoli

- The main desire line ***from*** Tivoli is along the N25, which accounts for 30% of all haulier movements from the port. The primary movement along this desire line is towards Little Island.
- The N20 accounts for 20% each of all movements and the primary movement is towards Limerick City.
- The M8 accounts for 18% of movement out of Tivoli and Dublin City is the primary movement.
- The N22 accounts for 10% of movements but this is made up of a number of destinations.
- The N28 accounts for 5% of trips out of Tivoli while Ringaskiddy accounts for an additional 5% of all haulier movements.



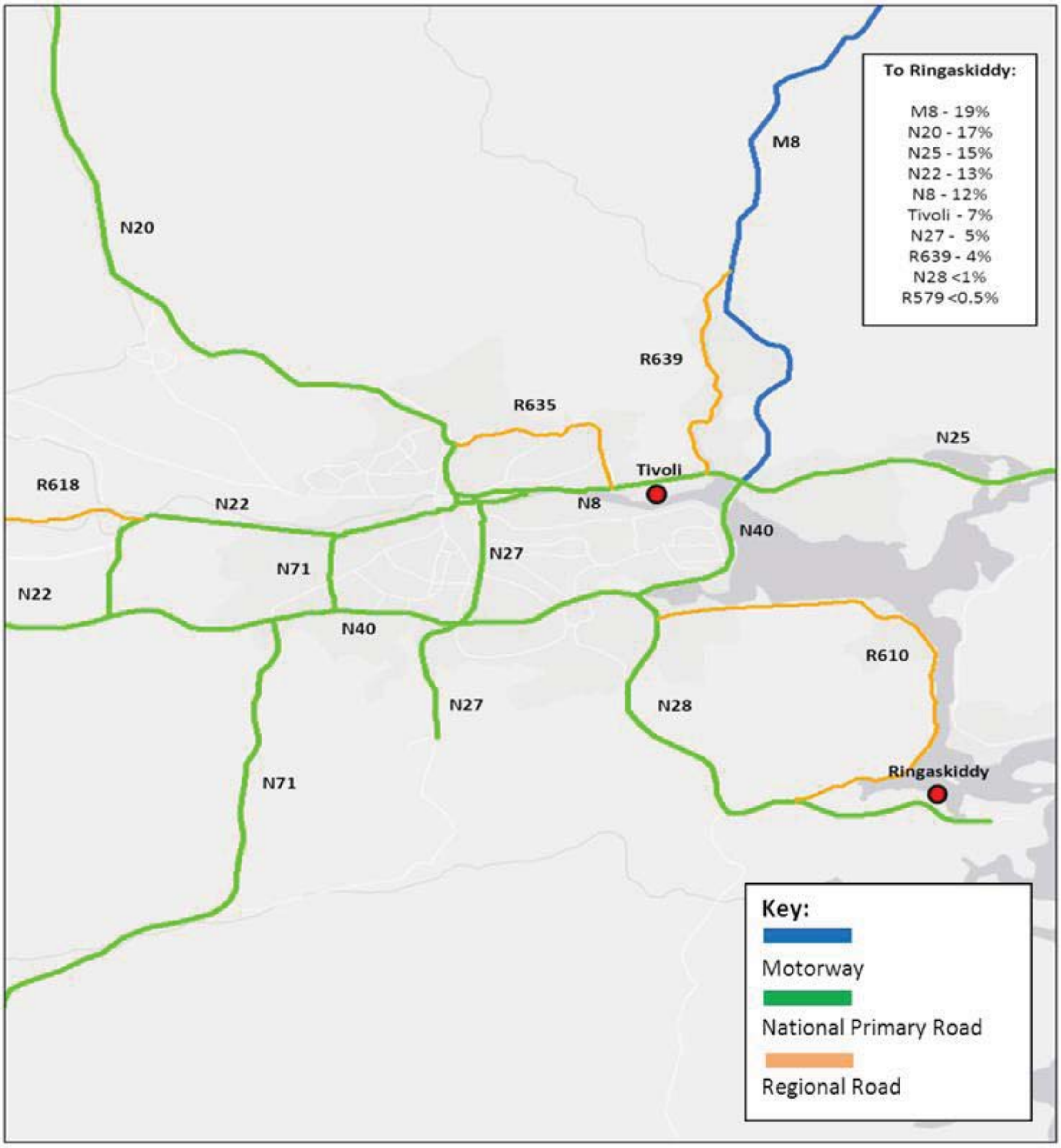

Figure 9. Key Movement Desire Lines to Ringaskiddy

4.3.3 Results of the analysis of Haulier movements out of Ringaskiddy:

- With very little exception, all movement ***towards*** Ringaskiddy is facilitated by the N40 and the N28.
- The prime origin of movements towards Ringaskiddy is along the M8, which accounts for 19% of all movements. This is made up by a number of origins; Dublin is the most significant.

- The N20 sees 17% of all movements. Mallow and Limerick produce most of the trips along the N20.
- The N25 sees 15% of all movements and Carrigtwohill produces most of the trips along the N25.
- 7% of all trips towards Ringaskiddy come from Tivoli.
- Trips generated by the N28 alone account for less than 1% of all trips, Carrigaline is the most significant trip generator along this section of the route.

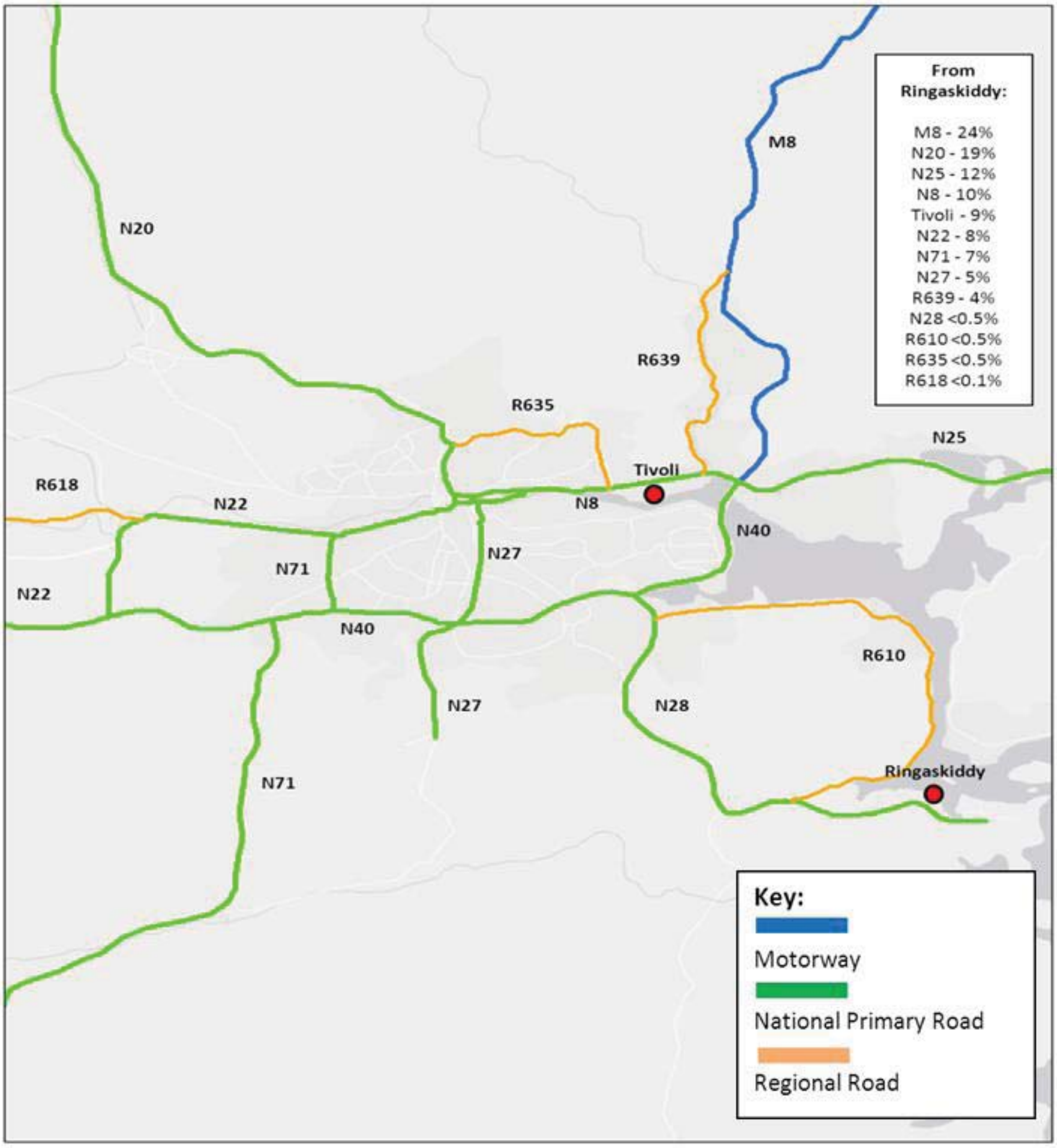

Figure 10. Key Movement Desire Lines from Ringaskiddy



- The prime desire line ***from*** Ringaskiddy is along the M8 with 24% of movements, mainly to Dublin. Kilkenny and Thurles also account for a significant portion of this movement.
- The N20 accounts for 19% of movement from the port with Limerick and Lombarsdtown, near Mallow, the main cause of movement along the N20.
- The N25 accounts for 12%, primarily to Carrigtwohill.
- Tivoli accounts for 9% of the movements out of Ringaskiddy.

4.3.4 Further detail of is provided in desire line maps included in Appendix A.

4.4 Journey Time Surveys

4.4.1 The journey surveys along the N28 were conducted on the 15th of May. The journey time survey routes are shown below in Figure 12. The journey time surveys were taken in both directions for the four routes. Journey times are used to validate modelled journey times against observed, to ensure the model is giving reliable results.

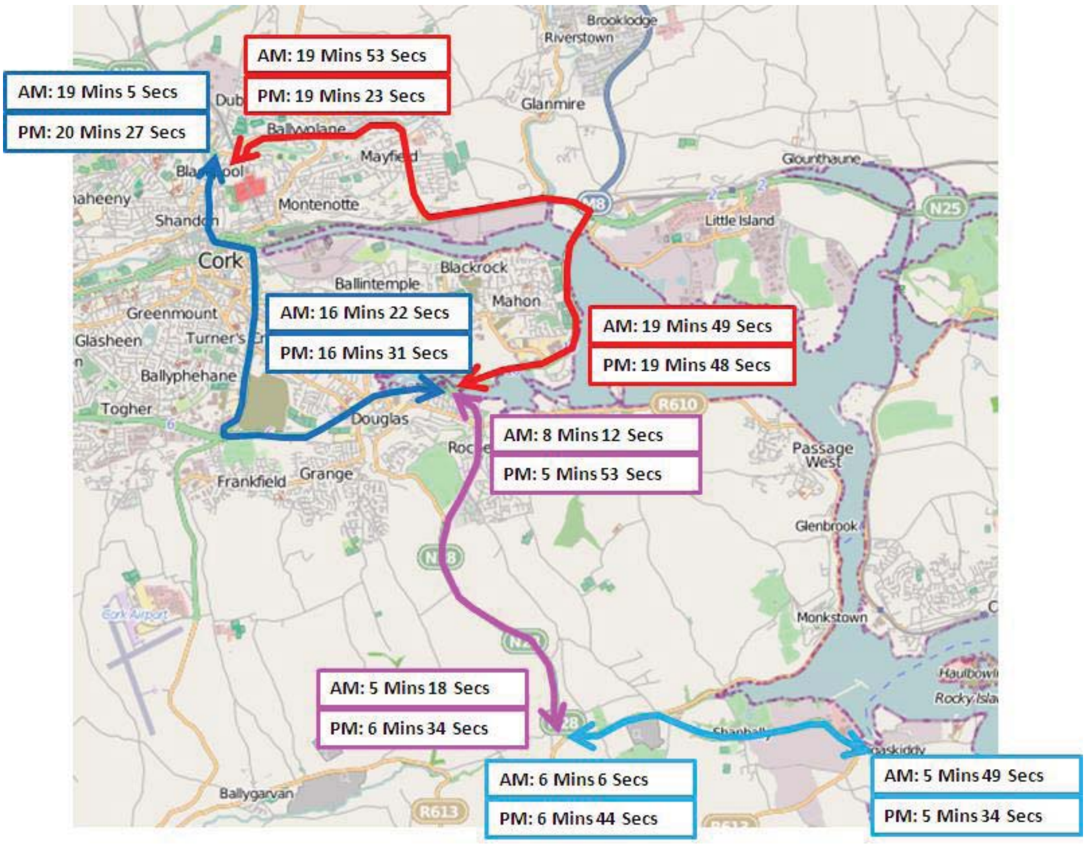

Figure 11. Journey Time Survey Routes with Average Journey Times

4.5 PoC Employee Survey

4.5.1 PoC conducted a survey on our behalf in May 2013 to determine where their staff travel from. 116 people responded to the survey. The results were quite dispersed, therefore some nearby areas were amalgamated. The highest number of employees, 25, came from Cobh which represents 22% of those that responded. 7% of employees (8 respondents) come from Cork City and another 7% come from Carrigaline.

4.6 Automated Traffic Counter (ATC Surveys)

4.6.1 Automated Traffic Counts (ATCs) were analysed at six locations along the N28 Corridor. Figure 13 to Figure 16 illustrates the results of the ATC surveys for the AM peaks. The AM peak times varied at each location and are detailed with each count. The time is shown in brackets along with the count of vehicles. The time shown in the beginning of the peak hour, e.g. AM (08:00) indicates the AM Peak hour between 08:00 and 09:00. In most cases, the AM peak hour is between 08:00 and 09:00hrs. At one location, the AM peak hour is from 10:00 to 11:00hrs. The PM peak hour varies at each junction, between 15:00 and 18:00hrs.

AM Peak ATC Flows

4.6.2 Significant traffic flows are noted on the slip road from the N28 onto the South Ring Road westbound at Survey Location D (1,542 vehicles) and southbound at Survey Location B (1,385 vehicles), as shown in Figure 13. Significant traffic flows are also noted eastbound after the Shannon Park Roundabout at ATC Survey Location E, with a count of 1,035, as shown in Figure 14.

4.6.3 The largest traffic flows during the AM Peak (08:00 - 09:00) were recorded on the national roads which border Douglas Village. The largest count is seen on the N28 at ATC Survey Location G1, with 2,487 and 1,549 travelling northbound and southbound respectively, as shown in Figure 16. Other large counts can be seen on the N28 northbound at ATC Survey Location G2 as shown in Figure 4.10 with a count of 1,309 and

4.6.4 These counts show that the primary movement of traffic in the AM peak is onto the South Ring Road in both directions or southbound on the N28 towards the Shannon Park Roundabout. A large proportion of this southbound traffic uses the N28 eastbound towards Ringaskiddy, resulting in the capacity-related issues described later in this report.

PM Peak ATC Flows

4.6.5 Significant traffic flows during the PM Peak were registered on the slip roads back onto the N28 at ATC Survey Locations A (1,378 vehicles) and C (1,263 vehicles) in Figure 13 These slip roads experience different PM peak hours; 18:00-19:00hrs for A and 17:00-18:00hrs for C.

4.6.6 These counts, as would be expected, show that the primary movement of traffic in the PM peak is a reversal of the AM peak. There is heavy traffic in both directions on the N28 but there is a greater flow in the southbound direction at the Shannon Park Roundabout and through Carrigaline.

4.6.7 The largest flow during the PM peak is at ATC Survey Location G1, southbound on the N28 after the slip roads have joined, (i.e. south of Bloomfield and Rochestown Road) with a count of 2,323 vehicles, as shown in Figure 16. There is also a large flow in the northbound direction at this point, with a count of 1,607 vehicles. The PM peak at this location is 17:00-18:00hrs.

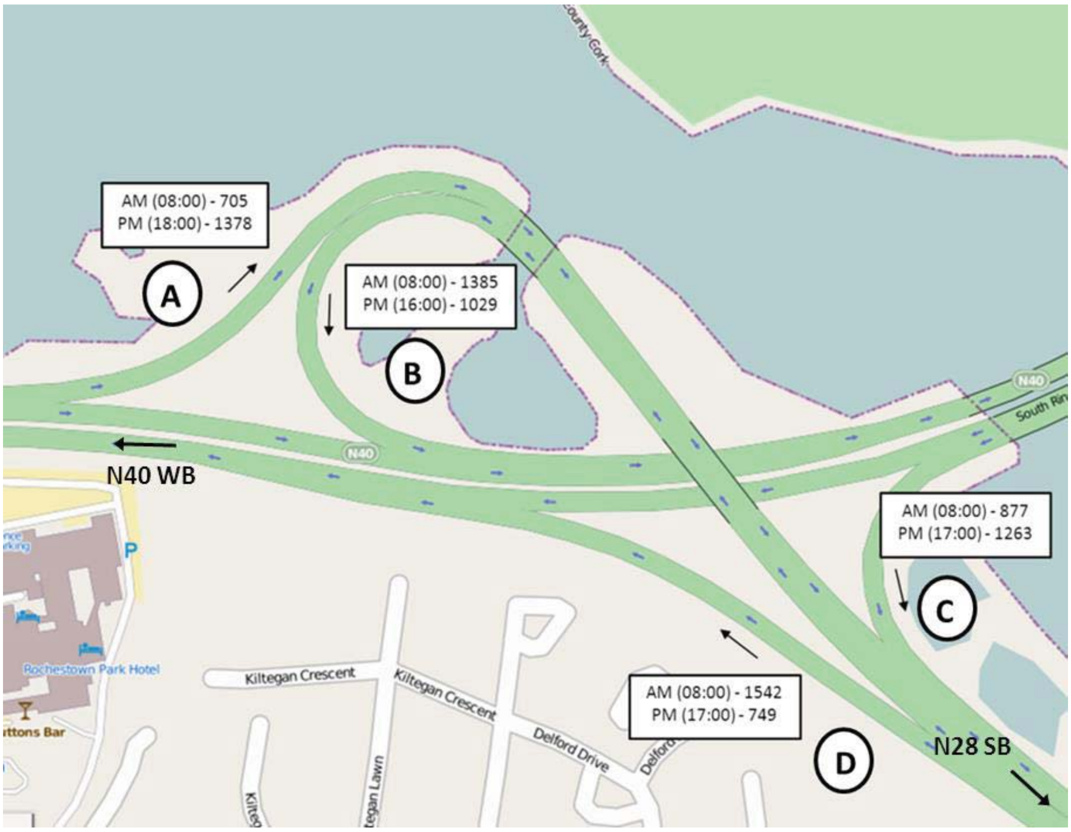

Figure 12. ATC Survey Results for the Bloomfield Interchange

Figure 13. ATC Survey Results for the Shannon Park Roundabout

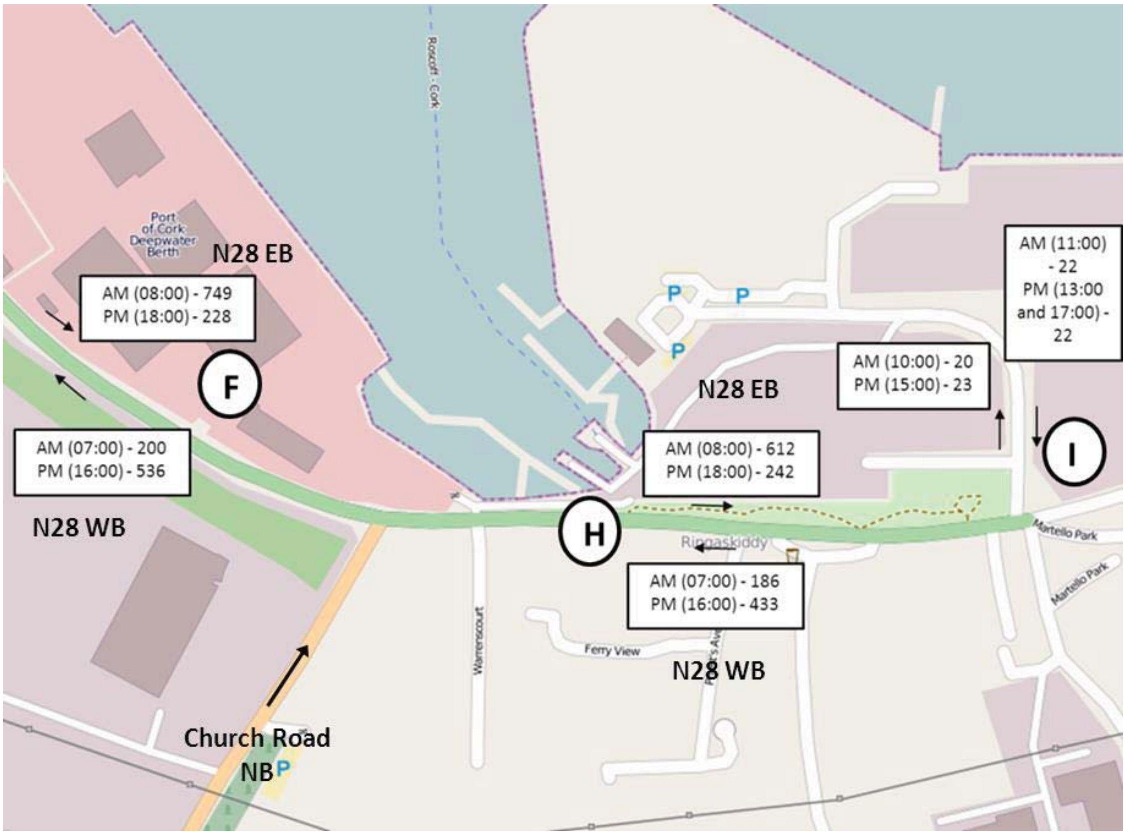

Figure 14. ATC Survey Results for Ringaskiddy Village

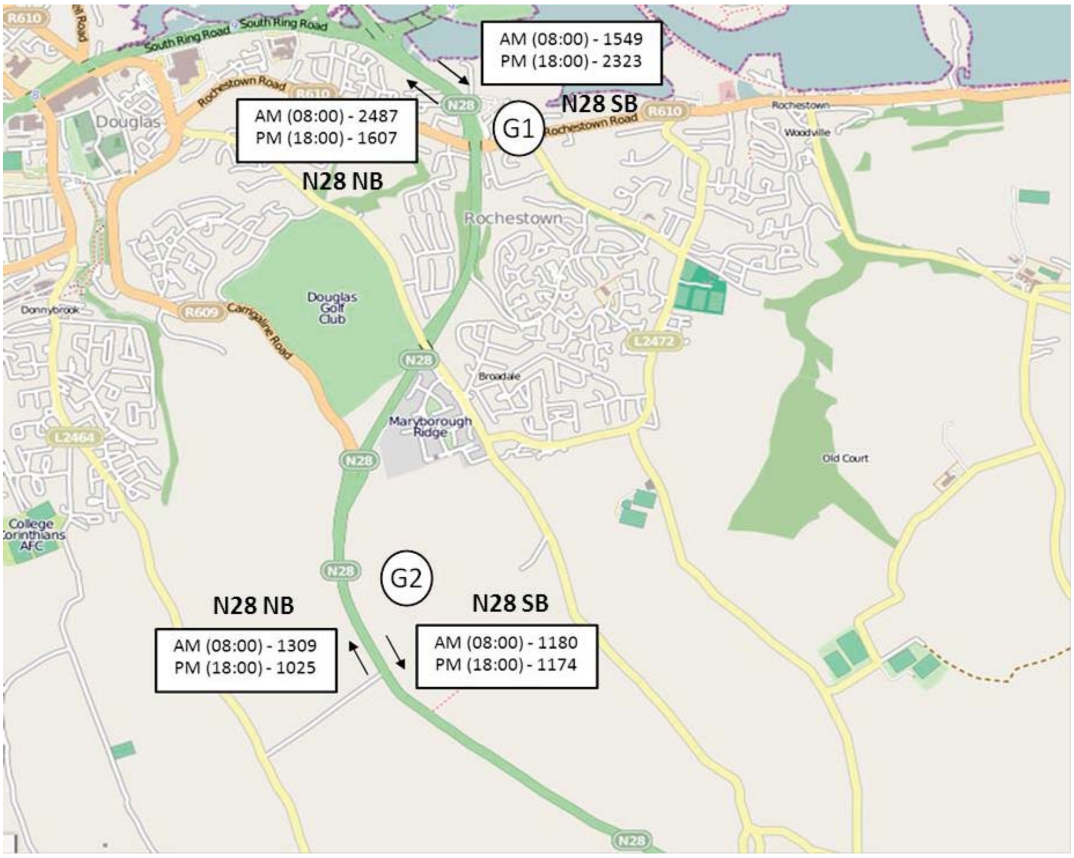

Figure 15. ATC Results for the N28 Corridor

4.7 Classified Junction Turning Count Surveys

4.7.1 Manual Classified Count surveys (MCC) at seven junctions for the AM and PM peak periods (07:00-10:00 and 16:00-19:00) were analysed. These counts were classified for light vehicles (LVs) (which includes cars) and Heavy Good Vehicles (HGVs).

AM Traffic Flows

4.7.2 AM peak traffic flows at Shannon Park Roundabout are highest between 07:30-08:30hrs. During this time, the heaviest traffic flow is travelling southbound on the N28, where a total of 1,335 LVs were counted. During the same period, 1,243 LVs were noted travelling northbound from the Shannon Park Roundabout and 1,191 cars and LVs were counted moving eastbound on the N28. This heavy eastbound movement continued towards Ringaskiddy. 1,239 LVs were recorded on the approach from Carrigaline (Cork Road).



4.7.3 It is interesting to note that approximately 80% of traffic approaching the roundabout from Carrigaline travels northbound on the N28. Similarly, approximately 80% of traffic travelling southbound on the N28 turns left towards Ringaskiddy.

4.7.4 Other significant traffic flows were recorded on the North Ring Road which extends from the Silversprings Overpass / Tivoli Port access to the N20 Cork Mallow road. 700 LVs were surveyed travelling from the North Ring Road onto the slip road for the N8 at Silversprings Hotel during the AM peak. The majority of this traffic (95%) comes from the North Ring Road southbound.

PM Traffic Flows

4.7.5 During the PM peak (17:00-18:00hrs), the heaviest traffic flow (1,220 vehicles) was observed on the N28 southbound, moving towards Shannon Park Roundabout. The next largest traffic flows are also seen at this roundabout, on **the N28 northbound** and on the Cork Road (between the Shannon Park Roundabout and Carrigaline), with counts of 1,150 and 1,154 vehicles respectively.

4.7.6 85% of the flow on the Cork Road, travelling southbound away from the roundabout, comes directly from the N28 southbound approach (i.e. from Cork City direction – turning right at the RB heading into Carrigaline). Of the 1,150 LVs travelling northbound on the N28, approximately 50% approach from the Cork Road and 50% from Ringaskiddy. Of the 1,220 LVs approaching the roundabout from the N28 southbound, 80% of them turn onto the N28 eastbound (i.e. turn left at the RB heading towards Ringaskiddy)

4.7.7 The survey also highlighted significant HGV movements at this roundabout with 25 HGVs heading northbound on the N28. Of these HGVs, 56% of these came from Ringaskiddy and 44% came from the Carrigaline direction.

4.8 MCC Surveys at Junctions along Church Road

4.8.1 MCC surveys were commissioned as part of this study at two junctions along Church Road in April 2013. The junctions surveyed were the roundabout with the Cork road and the T-junction at Fernhill Road. There are counts for each arm at the two junctions.

5. SUMMARY BASELINE TRAFFIC EVALUATION

5.1 Introduction

5.1.1 This chapter provides a detailed summary of current traffic conditions in the study area in terms of infrastructure for each transport mode, utilisation of that infrastructure and conditions experienced.

5.2 Methodology

5.2.1 To facilitate an understanding of these traffic conditions, an extensive site visit was undertaken on the following dates:

- Wednesday 10th April 2013 – evening peak;
- Thursday 11th April 2013 – morning peak; and
- Friday 12th April 2013 – morning peak.

5.2.2 During these site visits, detailed observations on current traffic management arrangements for each road user classification, conditions experienced by each road user, observations of local land uses and photographic records were taken.

5.3 General Traffic Conditions

5.3.1 The following key points relating to general traffic management arrangements were noted:

- The N28 experiences congestion in the AM and PM peaks at different sections along the route. The sections with most notable congestion were at Carrs Hill, the Maryborough Hill merge, Shannon Park Roundabout and Shanbally Roundabout. Traffic queues form at these sections in both directions at different times during both the AM and PM peaks.
- There is a high volume of traffic spread over the peaks. Traffic delays are most significant through Shanbally towards Ringaskiddy during the early morning peak. Traffic delays are also significant at the Shannon Park Roundabout from Carrigaline and also on the N28 north of Shannon Park during the morning peak. In the evening peak, traffic delays occur at Shannon Park Roundabout from Ringaskiddy and also along the N28 southbound.
- There are capacity and operational issues at Dunkettle Interchange. Queuing was noted during the site visits in both the AM and PM peak in all directions. The capacity at the Dunkettle Interchange is not sufficient during the peak to withstand the volume of traffic. Traffic flowed well during the off-peak, with green time sufficient in clearing queues that had built up while waiting.

5.4 Road Network Description and Issues

5.4.1 Traffic management arrangements (e.g. no. of lanes, lane widths) and related conditions observed (levels of queuing, congestion, ambient traffic speeds etc.) at the junctions are described in this section of the report. The locations of the key roads in the study area analysed during site visits are illustrated in Figure 17 overleaf.

5.4.2 This Transport Network Review of the area between Tivoli, City Quays and Ringaskiddy is based upon observations made on-site. We are satisfied that these represent typical / average day-to-day operation of the transport network on the major roads linking the port sites.

M8 between Cork and Dublin

5.4.3 The M8 is a major inter urban connector which joins two of the main cities in the country; Dublin and Cork. The M8 begins at Aghaboe, Co Laois where it ties into the M7 which connects Limerick to Dublin, and the M8 continues towards Cork. The M8 extends approximately 150km and terminates at the Dunkettle Interchange. The N8 was upgraded to motorway in 2010.

  

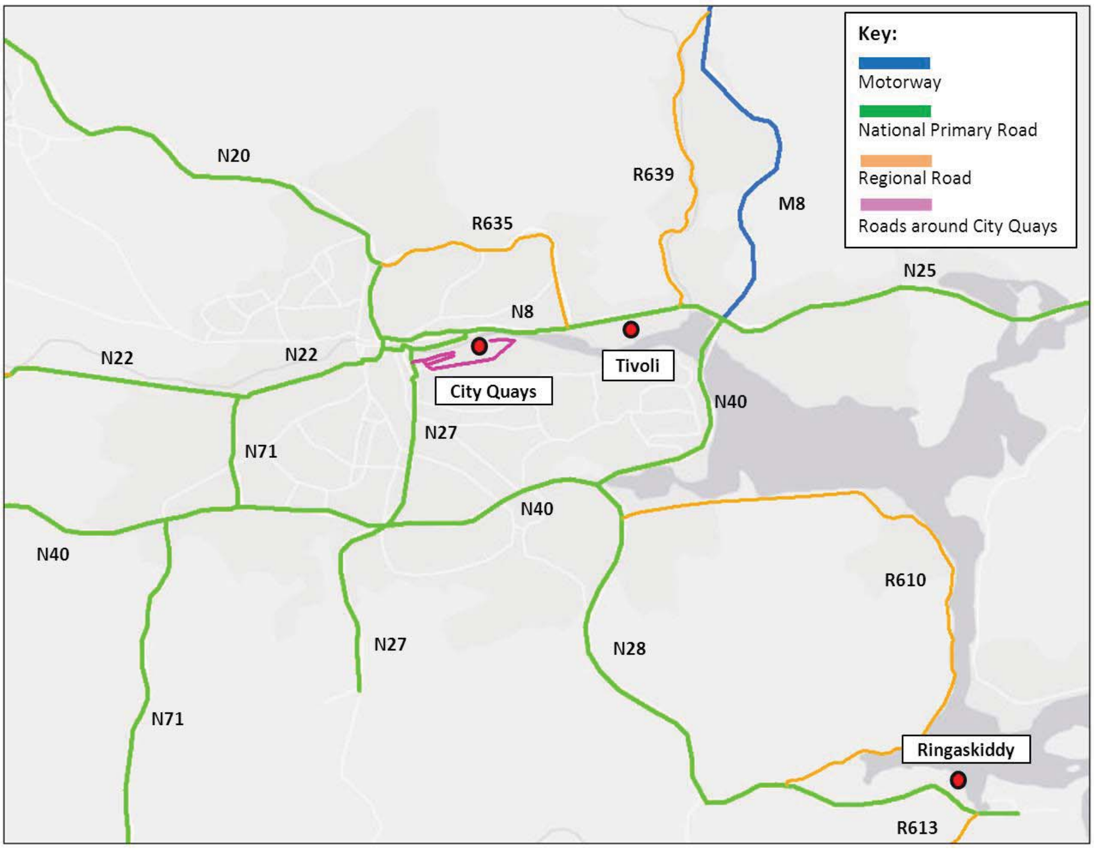

Figure 16. Key Road Networks Analysed During Site Visit

5.5 National Roads

N8 between Dunkettle Interchange and Cork City

5.5.1 The N8 is a major national distributor which connects the Dunkettle Interchange to Cork City centre and the PoC facilities at Tivoli and City Quays. The N8 is both single carriageway and dual carriageway in sections between the City and the Dunkettle Interchange. The road narrows towards the city centre. Traffic from both ports has to travel on this road to reach most of the other national distributors in the area such as the N20, N25, N27, N40, N71 and the M8. Parts of the N8 are one way in the City centre, near the quays and where it crosses the River Lee.

5.5.2 There are capacity and operational issues at Dunkettle Interchange. Queuing was noted during the site visits in both the AM and PM peak in all directions. The capacity at the interchange is not sufficient during the peak to withstand the volume of traffic. Traffic flowed well during the off-peak with green time sufficient in clearing queues that had built up while waiting.

N20 between Cork City and Limerick City

5.5.3 The N20 is a major national distributor which connects Cork City and Limerick. A short section of this route has been upgraded to motorway and is known as the M20 between the Rosbrien Interchange and Limerick city. The majority of the connection is a single carriageway which varies in width.

N22 between Cork City and Tralee

5.5.4 The N22 is a major national distributor which connects Cork City and Tralee. It goes through towns such as Killarney and Macroom. The N22, which links counties Cork and Kerry, has been upgraded substantially in recent years particularly in County Kerry and some sections on the outskirts of both Cork and Tralee of it are of Dual Carriageway standard, although some sections are still single carriageway. ABP has approved a Dual Carriageway bypass of Macroom but the project is currently on hold. The N22 connects with the N40 South Ring Road at the Bandon Road Interchange to the west of Cork City.

N25 between Cork City and Rosslare Europort

5.5.5 This is a major national distributor which connects Cork City to Rosslare Europort, via Waterford City. The N25 is single and dual carriageway in sections between the two cities and forms part of the Atlantic Corridor, a project which will eventually provide a dual carriageway connection between Waterford and Letterkenny, however at time of writing much of this proposed road development has been suspended due to the economic downturn.

N27 South Link Road between Cork City Centre and Cork International Airport

5.5.6 This is a major national distributor, as it connects the City Centre with the M40 and onwards to Cork International Airport, as well as major employers near the airport with the wider labour market in Cork County and the City Centre. It is a dual carriageway with bus lanes and speed limits ranging from 100 kph to 60 kph.

5.5.7 The N27 extends from South to North along the western boundary of the study area. Traffic on the N27 experiences delays during peak periods at the Kinsale Roundabout and the signalised crossroads with Forge Hill and the Ballycurreen Road. South of the Ballycurreen Road junction, traffic is relatively free flowing south bound and suffers minimal delays. Some delays are experienced during peak periods on the northbound approach to the junction.

N28 between Ringaskiddy/ Shannon Park Roundabout and the N40

5.5.8 This is a major national distributor which connects the wider national road network with Ringaskiddy, including the major employers and the national sea freight and passenger services at the PoC terminal. The N28 is a single carriage generally with a one metre hard strip, however some sections are narrower and wider than others. A major junction on the route is the Shannon Park roundabout. Traffic from Carrigaline and Ringaskiddy must travel through the Shannon Park Roundabout to get onto the northern section of N28 and traffic heading from Cork City / Douglas towards Ringaskiddy also travels through Shannon Park Roundabout.

5.5.9 Congestion occurs at various sections along the N28 as a result of merging lanes at Maryborough Hill and reduced lane width at Carrs Hill. Congestion also occurs at the Shannon Park Roundabout when traffic flow is heavy in both directions throughout the morning and evening peaks. There are also considerable delays at Shanbally Roundabout during the AM peak travelling towards Ringaskiddy.

PICTURE 1

Heavy traffic on the N28 approaching Maryborough Hill

PICTURE 2

Constant flow of traffic at Shannon Park Roundabout

Figure 17. Traffic Delays on the N28

N40 Southern Ring Road

5.5.10 The Southern Ring Road is a major national distributor road allowing access to the wider national network including the M8 to Dublin (to the north) and the N22 to Killarney (to the west). As a result of this, it is subject to relatively heavily traffic during peak periods. The Southern Ring Road is a two-lane dual carriageway with hard shoulders and a speed limit of 100 kph.

5.5.11 Traffic on the N40, in the vicinity of the study area, is generally free flowing until it reaches the Kinsale Roundabout at the junction with the N27 (west of the study area). Traffic travelling onto the N27, via the slip road, can experience significant delays at this signalised roundabout during peak periods but since this junction is grade separated the through traffic on the N40 is unaffected crossing this junction. Both eastbound and westbound traffic on the N40 also experiences delays accessing the Mahon Point Interchange to the east of the study area.

5.5.12 Capacity and operational issues exist in tandem with the Dunkettle Interchange. It was observed during site visits that the Jack Lynch Tunnel experienced tailbacks past the tunnel towards the Mahon Interchange on approach to the Dunkettle Interchange in both peaks. Traffic was moving at approximately 5-10kph which subsequently had a knock-on effect on traffic moving towards the Mahon Interchange. The speed limit at the Jack Lynch Tunnel is 80kph.

5.5.13 Traffic on the N40 can enter the N28 Bloomfield Interchange to the east of the Douglas Village. Westbound traffic travelling to Douglas also uses this exit and then takes the slip road from the N28 onto the Rochestown Road. Alternatively westbound traffic can exit at the Kinsale Roundabout and enter the study area via the Frankfield Road or the N27 to the west of Douglas Village. Similarly, eastbound traffic on the M40 can access Douglas via the slip road onto the South Douglas Road or alternatively use the slip road onto the main Douglas road. Queues can occur on each of these slip roads during peak hours, which can occasionally extend onto the N40.

PICTURE 1

Jack Lynch Tunnel southbound

PICTURE 2

N40 - Bloomfield Interchange northbound

Figure 18. Traffic Delays on the N40

N71 Road

5.5.14 The N71 is a national secondary road providing a link between Cork City and West Cork (Skibbereen/ Bantry) and West County Kerry (Kenmare). The route is predominantly single carriageway with improvements in the sections near Cork and some limited sections of dual carriageway nearing the city.

5.5.15 Delays can occur at peak hour on the N71 where it passes through the village of Innashannon approximately half-way between Cork City and Bandon.

5.6 Regional Roads

R610 Rochestown Road / Strand Road

5.6.1 The Rochestown Road / Strand Road is a regional distributor road which connects Rochestown with the wider district and national road network. It is single carriageway. It approaches the N28 from the south and is the primary route for people living in Passage West and Rochestown to connect to the N40 via the Bloomfield Interchange (N28 northbound only) junction. Traffic from Rochestown / Passage west heading to Ringaskiddy / Carrigaline will generally travel along the R610 and connect to the N28 at Rafeen junction east of Shannon Park Roundabout.

PICTURE 1

Rochestown Road between N28 and Fingerpost Roundabout

PICTURE 2

Westbound traffic on Rochestown Road, immediately east of the N28 junction at Bloomfield

Figure 19. Rochestown Road

R613 Church Road

5.6.2 Church Road is a regional road connecting Carrigaline to the N28, at Ringaskiddy. It is a single carriage approximately 5km long and extends from Carrigaline and runs parallel to, but to the south of, the section of the N28 east of Shannonpark roundabout.

5.6.3 Church Road approaches the N28 from the south. Many of the major employers in the Ringaskiddy area are located off this route such as GlaxoSmithKline (GSK), Novartis and Johnson & Johnson. There are two distinct sections of road along Church Road. The section of the road from St. Bernadette Place to the N28 is far superior to the section from St. Bernadette Place west towards Carrigaline. The speed limit of the section nearer Ringaskiddy is 80kph where this section of road is considerably wider than the section nearer Carrigaline. Parts of the Carrigaline section of road are sub-standard, extremely narrow and barely wide enough for two vehicles coming in opposing directions.

5.6.4 Considerable levels of traffic use both the St. Bernadette Place route (south of Shanbally Roundabout) and Church Road from Carrigaline. There is little to no congestion experienced on this route.

5.6.5 Ringaskiddy Lower Harbour National School is located in Loughbeg, off the R613 (Church Road) and west of Ringaskiddy Main Street. A one-way system is operated in the area for school pick up and drop off. Figure 21 shows the difference between the two sections of Church Road, Picture 1 shows the wider 80kph section and Picture 2 shows the 50kph narrower section. The change occurs close to the turn off for GSK.

PICTURE 1

R613 approaching the N28

PICTURE 2

Change of road quality near Bernadette Place

Figure 20. Church Road

R635 North Ring Road

5.6.6 The R635 known also as the North Ring Road is a regional road which takes traffic off the N8 approaching the city centre and offers an alternative route onto the N20. Parts of the route are dual carriageway and 2+1 (climbing lane northbound from the Silversprings overpass road but it is mostly a single carriageway with reasonably wide roads.

R639

5.6.7 The R639 was part of the old N8 and runs parallel to the M8 through towns such as Fermoy, Mitchelstown and Cahir as far as Durrow in County Laois. When the M8 was opened, parts of the old N8 were re-designated as the R639. It is a reasonably wide single carriageway with a hard shoulder for the most part. Some sections are quite narrow with very little hard shoulder while other sections of the R639 are 2+1 road.

5.7 Local Roads

L2545

5.7.1 The L2545 is a local road which is a linear continuation of the N28 road (which terminates at the entrance to the Port east of Ringaskiddy village) and which provides access from the N28 to the National Maritime College of Ireland (NMCI) and the Haulbowline Naval Base on Haulbowline Island. It is a single carriageway stretch approximately 2km in length that joins with the N28 at the crossroads with Shamrock Place, the N28 and the PoC entrance at the eastern end of Ringaskiddy village.

5.7.2 The L2545 approaches the N28/Ringaskiddy Main Street from the east. Congestion is generally not an issue although there is a steady stream of vehicles including heavy goods vehicles in and out of the area at peak times. The local residents have expressed concern about the absence of a pedestrian crossing of the N28 at Ringaskiddy village for the safety of pedestrians. Figure 22 shows the single lane carriageway and the Bus Éireann stop located adjacent the NMCI.

PICTURE 1

L2545 eastbound

PICTURE 2

Bus Éireann stop on the L2545

Figure 21. L2545

L2490

5.7.3 The L2490 is a local road approximately 2km in length which joins the N28 to the R613, just east of Carrigaline. There are a number of access routes to estates off the L2490, as well as access to the Fernhill Golf Club.

5.7.4 There is a steady stream of traffic from the N28 at peak times, as drivers avoid driving through Carrigaline village. The road is extremely narrow in sections, barely wide enough for two opposing vehicles to pass, and parts are in poor condition. Figure 23, Picture 1, shows its junction with the R613 / Church Road. Picture 2 shows one of the narrow sections along the route.

PICTURE 1	PICTURE 2
	
L2490 T-junction with Church Road	Narrow section of L2490

Figure 22. L2490

L2492

5.7.5 The L2492 is a local road, approximately 1.4km in length, which joins the N28 at Shanbally Roundabout to the R613 at Coolmore Cross. Shanbally National School is located along this route as well as a number of estates and housing areas.

5.7.6 There is a steady flow of traffic in the peak times in both directions, likely to be a result of shift changes. This route provides access to some of the major employers in the Ringaskiddy area such as GSK, Novartis and Johnson & Johnson. Although there are a considerable number of vehicles on the route, traffic moves well at both ends of the L2492 at Shanbally Roundabout and the junction at Church Road. There are some delays at the Shanbally Roundabout during the morning peak (approx. 08:45hrs) when the Shanbally National School opens.

PICTURE 1

L2492 and Church Road junction

PICTURE 2

L2492

Figure 23. L2492

5.8 Junction Evaluation

5.8.1 Junctions represent the major point of conflict between road users, with intra modal (e.g. general traffic to general traffic) and inter modal (e.g. general traffic/ pedestrian/ cyclist) conflict occurring. In terms of the efficient operation of an urban traffic management system, the layout and operation/ management of junctions is essential to ensure that a fair balance is achieved between the competing needs of each transport mode. Given the conflict between road users that exists at junctions, the traffic management arrangements in place determine how well the junction will perform from a safety perspective.

5.9 Key Junction Arrangements

5.9.1 The issues observed in the study area can be separated into the following three categories:

- Operational Issue - relates to a junction or an area where the operation is the main issue, this could include conflict between different modes or uses;
- Capacity Issue - relates mainly to a junction or an area where capacity is the main issue, this could be caused by operational issues, but mainly relates to demand exceeding capacity (i.e. vehicular demand passing wishing to pass through a junction or road exceeds to capacity available, this often leads to queuing and congestion), and includes confined / restricted road widths; and
- Pedestrian and Cyclist Issue - relates to a junction or an area where pedestrian and cycle facilities are the main issue, particularly where they are not catered for by the design of the road or junction. These issues are usually due to junction arrangements, pavement widths or crossing facilities.

5.9.2 Figure 25 below illustrates examples of some of the issues experienced in the area.

EXAMPLE OF ISSUES

- Picture 1 shows an example of traffic congestion at the Shannon Park Roundabout on the approach from Ringaskiddy in the PM peak.
- Picture 2 shows an example of traffic congestion at the Shannon Park Roundabout on the northern arm (from Cork City) in the PM peak.
- Picture 3 shows congestion on the N28 during the AM, where traffic queues from the junction with the R610 to the Shanbally Roundabout.
- Picture 4 shows high levels of free flowing traffic at Shanbally Roundabout travelling towards Ringaskiddy during the AM peak.

Picture 1

Picture 2

Picture 3

Picture 4

Figure 24. Examples of the issues on the N28



5.9.3 Observations were made at each of the following junctions and their locations are illustrated in Figure 26 below:

- Jct 1. Dunkettle Interchange;
- Jct 2. Jack Lynch Tunnel;
- Jct 3. Mahon Interchange;
- Jct 4. Bloomfield Interchange;
- Jct 5. N28/Rochestown Road (R610);
- Jct 6. N28/Maryborough Hill;
- Jct 7. N28/Carrigaline Road (R609);
- Jct 8. N28/Carrs Hill
- Jct 9. N28/L6477;
- Jct 10. Shannon Park Junction;
- Jct 11. N28/L2490;
- Jct 12. N28/R610;
- Jct 13. Shanbally Roundabout;
- Jct 14. Entrances to Pfizer;
- Jct 15. N28/Church Road (R613);
- Jct 16. N28/Shamrock Place
- Jct 17. Church Road (R613)/L2492;
- Jct 18. Church Road (R613)/L2490;
- Jct 19. Signalised Junction at R613/R612;
- Jct 20. Signalised Junction at R612/R611; and
- Jct 21. Ballea Road/Church Road (R613)/Cork Road (R611) roundabout
- Jct 22. Tivoli access at N8/R635 (North Ring Road)
- Jct 23. Entrance to City Quay Port on Albert Quay

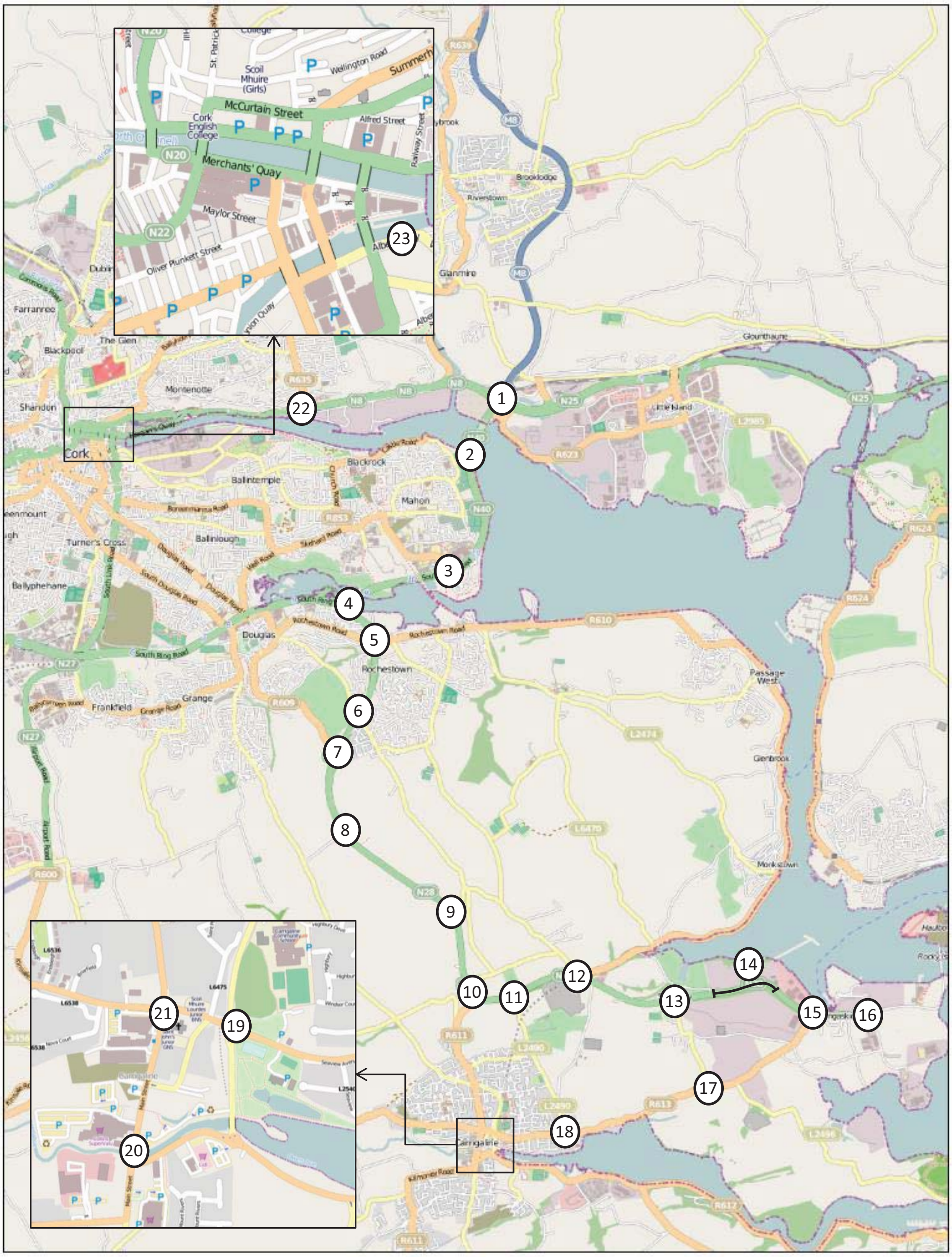

Figure 25. Study Area Junction Map

5.10 Road Network Evaluation - Key Junction Arrangements

5.10.1 Table 5.1 summarises the issues which have been identified and details them as Operational, Capacity or Pedestrian and Cyclist issues. Figure 26 above maps out each junction identified in Table 5.1.

5.10.2 Appendix B provides further details of the issues at specific junctions.

Table 5.1 Summary of junction locations and issues identified

LOCATION	OPERATIONAL ISSUES	TRAFFIC CAPACITY	PED & CYCLIST FACILITIES
1. Dunkettle Interchange	✓	Queuing during peaks in all directions	X
2. Jack Lynch Tunnel	✓	Queuing during peaks in all directions	X
3. Mahon Interchange	X	No capacity issues observed	X
4. Bloomfield Interchange	X	No capacity issues observed	X
5. N28/ Rochestown Rd	X	Some capacity issues observed	X
6. N28/ Maryborough Hill	✓	Capacity issues during peak	X
7. N28/ Carrigaline Rd	X	No capacity issues observed	X
8. N28/ Carrs Hill	X	Capacity issues observed during peaks	X
9. N28/ L6477	X	No capacity issues observed	v
10. Shannon Park	✓	Capacity issues observed	X
11. N28/ L2490	X	No capacity issues observed	X

12. N28/ R610	X	No capacity issues observed	X
13. Shanbally	X	Capacity issues observed, especially during AM peak	Footpaths provided in village, along with some pedestrian refuges. No cyclist facilities.
14. Pfizer	X	No capacity issues observed	Pedestrian footpath along northern side of road, between Shanbally and Ringaskiddy. No cyclist facilities.
15. N28/ R613	X	Some queuing observed	Pedestrian footpath along northern side of road, between Shanbally and Ringaskiddy. No cyclist facilities.
16. N28/ Shamrock Place	X	No capacity issues observed	Pedestrian footpath along eastern side of road, linking to Ringaskiddy. No cyclist facilities.
17. R613/ L2492	X	Some queuing observed	X
18. R613/ L2490	X	Some queuing observed	Pedestrian footpath on one side of road, for section from south. No cyclist facilities.
19. R613/ R612	X	Some queuing observed, but cleared during green times	Pedestrian facilities including signalised crossings. No cyclist facilities
20. R612/ R611	✓	Queuing was observed	Pedestrian facilities including signalised crossings. No cyclist facilities
21. Ballea Rd/ R613/ R611	X	Queuing was observed	Pedestrian footpaths. No cyclist facilities
22. Access to Tivoli	X	No capacity issues observed	Pedestrian footpaths. No cyclist facilities
23. Access to City Quays	X	No capacity issues observed	No formal facilities

5.11 Pedestrian & Cycling Facilities and Conditions

Introduction

5.11.1 Pedestrian facilities (such as footpaths, adequate crossing points, etc.) which play a large part in determining the levels of pedestrian activity are of good quality at City Quays, but poor at Tivoli and Ringaskiddy. Other factors which determine pedestrian activity are traffic speeds and volumes and the presence of heavy goods vehicles (HGV) as these can adversely affect the pedestrian environment.

5.11.2 City Quays is located very close to Cork city centre which means that pedestrian access is good, with footpaths on both sides of the roads for the most part near City Quays. The access routes coming from the south are well served by footpaths. Other access routes could be improved with better crossing facilities. There are no pedestrian crossing facilities from the N27 on Albert Quay. There is a footpath on only one side of the road which means pedestrians have to cross over without any facilities.

5.11.3 Pedestrian access to Tivoli is provided, but is of a sub-standard quality. Access to the port is the same for both pedestrians and vehicles; via the off ramp from the N8 or across the Silversprings Overpass (the fly-over bridge over the N8) from the R635, the North Ring Road. Footpaths are sufficiently wide on the bridge but there is no pedestrian crossing to get from the bridge across the off ramp. There is a stairs that provides access to the port entrance from the bridge which is in close proximity to the road and the main port access for HGVs and other vehicles.

5.11.4 In general, pedestrian facilities are poor along the N28 and very low levels of pedestrian activity were observed. Some of the N28 has facilities for pedestrians, notably between Shanbally village and Ringaskiddy village. However, there are also narrow parts along the route, e.g. at Carrs Hill, where the width is only sufficient for two vehicles. The N28 is a primary route and as such caters for vehicles more than pedestrians. There is little on the N28 to encourage pedestrians to use it.

5.11.5 As in most parts of the Country, levels of cycling are low within the study area. The road network represents a poor cycling environment, and as a result, very little cycle activity was observed. The high volumes of traffic, including HGVs, and narrow road widths along sections represent a major barrier to cycle use along the N28. As a result, low levels of cycling activity were observed in the area. There is no provision for cyclists at either City Quays or Tivoli. Provision for cyclists will improve at Ringaskiddy under the Cork County Development Plan, whereby an off-road cycle route is proposed linking Passage West – Carrigaline – Ringaskiddy.

PEDESTRIAN & CYCLING FACILITIES

- Few roads along the Port Access Corridor facilitate pedestrian and cyclist movements
- There are no cycle lanes
- Footpaths are located on roads adjoining Tivoli entrance
- No pedestrian facilities are provided along the N28, except for in Shanbally and Ringaskiddy, and between the two
- Pedestrian facilities are located within Carrigaline village
- There is a footpath on a section of Church Road, between Ringaskiddy and the turn-off for GSK
- There is a footpath on one side of Shamrock Road between Ringaskiddy and De Puy, GSK, etc
- Walking and cycling is very dangerous on the narrow section of Church Road, nearer Carrigaline

Picture 1: Pedestrian Environment at Tivoli

Picture 2: Pedestrian Environment at City Quays

Picture 3: Pedestrian facilities at Ringaskiddy

Picture 4: Lack of cycling facilities near Ringaskiddy

Figure 26. Pedestrian and Cycling facilities/conditions within study area

5.12 Bus Operating Arrangements and Conditions

5.12.1 At present, the Ringaskiddy area is served by one Bus Éireann Regional Route (223). This route is detailed in Table 5.2 and shown in Figure 29 below. Although the service is quite frequent, the route varies throughout the day. For example, Route 223 (to Ringaskiddy) on occasions turns right at Shanbally and continues to Ringaskiddy along Church Road, whereas at other times it stays on the N28 past Pfizer and into Ringaskiddy, as per the route shown.

5.12.2 There is a relatively low amount of PT use in Ringaskiddy, with 6% of people travelling to work by bus when compared to Cork City (10%), Cork County (9%) and state averages (16%). It is worth noting, as explained in Section 2.4, that the percentages are a reflection of the movements of those that live in Ringaskiddy alone where there are very few people.

Table 5.2 Bus routes serving Ringaskiddy

BUS ROUTES	SCHEDULED AM PEAK FREQUENCY (MAX ONE DIRECTIONAL FLOW 07:00 – 10:00)	ROUTE DETAILS (FROM, VIA, TO)
BÉ Route 223	3 SB, 5 NB	City – Douglas - Ringaskiddy

5.12.3 City Quays is well serviced by Bus Éireann Intercity, Regional and town services. Many of the routes into Cork City Centre terminate at Parnell Place which is approximately 500 metres from the entrance on Albert Quay. Kent Railway Station is also within walking distance from Custom House Street, approximately 600-700 metres.

  

Table 5.3 Bus routes servicing City Quays/Custom House Street

BUS ROUTES	SCHEDULED AM PEAK FREQUENCY (MAX ONE-WAY 07:00 – 10:00)	ROUTE DETAILS (FROM, VIA, TO)
BÉ # 215	8 EB, 9 WB	Cloughroe – City Centre – Mahon Point
BÉ # 221	3 NB, 3 SB	Cork – Riverstown – Knockraha
BÉ # 222	10 NB, 7 SB	Cork – Crosshaven – Fountainstown
BÉ # 223	5 NB, 3 SB	City – Douglas – Ringaskiddy
BÉ # 226	9 NB, 8 SB	Kent Station – Parnell Place – Cork Airport
BÉ # 232	6 EB, 6 WB	Cork - Ballincollig
BÉ # 233	7 EB, 6 WB	Cork - Macroom
BÉ # 235	2 EB	Cork – Rylane – Stuake
BÉ # 236	2 EB, 1 WB	Cork – Bantry – Castletownbere
BÉ # 237	4 EB, 2 WB	Cork – Skibbereen – Goleen
BÉ # 239	4 EB, 2 WB	Cork – Bandon
BÉ # 240	2 EB, 2 WB	Cork – Cloyne – Ballycotton
BÉ # 241	2 EB, 3 WB	Cork – Midelton – Whitegate – Trabolgan
BÉ # 243	1 NB, 1 SB	Cork – Mallow – Buttevant – Newmarket
BÉ # 245	2 NB, 4 SB	Mitchelstown – Fermoy – Cork
BÉ # 248	1 NB, 1 SB	Cork – Carrignavar – Glenville
BÉ # 249	3 NB, 5 SB	Cork – Airport – Kinsale
BÉ # 260	1 EB, 5 WB	Cork – Youghal – Ardmore
BÉ # 261	2 EB, 2 WB	Cork – Carrigtwohill – Midleton – Ballinacurra

5.12.4 There are a number of BÉ Regional services that run outside Tivoli Industrial Estate; 221, 240, 241, 245, 246, 260 and 261. Some intercity services also run outside the industrial estate; 7 and 8. Details of these services are shown in Table 5.3.

Bus Facilities and Conditions

5.12.5 There are few bus stops along the N28, except for in Shanbally and Ringaskiddy villages. There are also bus stops in Carrigaline village. The bus stops in Shanbally are located close to the village centre, school, church, etc. Footpaths within the village facilitate movements to and from these stops, as shown in Figure 28 (Photo 1).

5.12.6 There are a few bus stops located in Ringaskiddy, at both ends of the village. As with Shanbally, footpaths facilitate movements to/from these stops, as shown in Figure 28 (Photo 2). The major employers in Ringaskiddy, Lough Beg and the Ringaskiddy end of Church Road are all connected to these bus stops by at least one footpath, but distances to employers can be up to 2km. Employers further afield, e.g. GSK, are not connected.

5.12.7 City Quays is located near the Bus Éireann terminal at Parnell Place and there are also a number of other BÉ stops in the vicinity.

5.12.8 There are no bus stops located near Tivoli although there are two disused BÉ bus stops located near the entrance on the N8. The nearest stop is located a considerable distance from the entrance, approximately 1200 metres from the pedestrian entrance. Bus Éireann routes 221, 240, 245, 246 and 260 stop at this bus stop.

Figure 27. Bus facilities in Shanbally and Ringaskiddy

PICTURE 1

Bus stop in Shanbally

PICTURE 2

Bus stop in Ringaskiddy



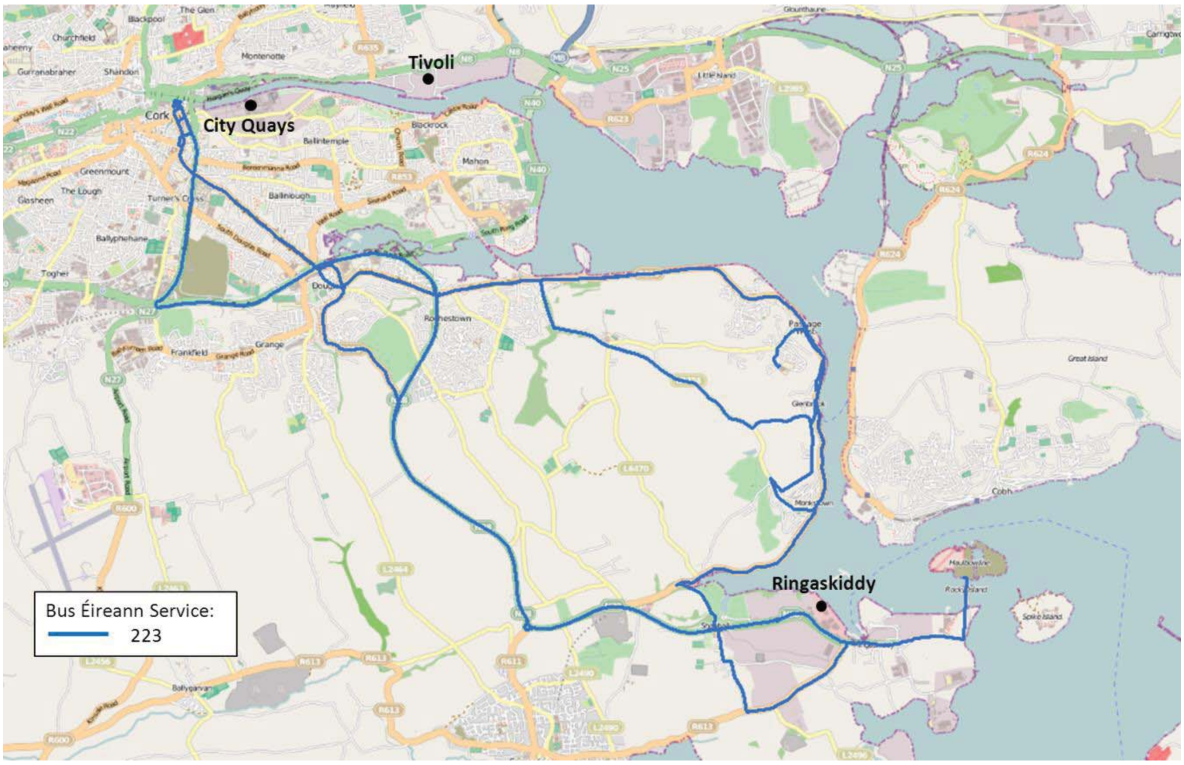

Figure 28. Bus Éireann routes serving Ringaskiddy

5.13 Train Services

5.13.1 Kent Station is located within walking distance for City Quays. It serves the Cork-Dublin Heuston, Cork-Tralee and Mallow-Cork-Cobh/Midleton lines. There is a regular hourly service between Cork and Dublin. Eight services a day facilitate travel between Cork and Tralee. There are regular commuter services between Cork and Midleton / Cobh (alternative services every 15 minutes – less regular outside peaks). Of these services, approximately one an hour originates in Mallow.

5.13.2 The Commuter train service from Cork to Midleton and Cobh runs through the Tivoli estate and port facility but there is no stop along this section of track. The first stop after Kent station is at Dunkettle Little Island.

5.14 Heavy Goods Vehicles

5.14.1 Currently, the N28 is well used by HGVs. Many of these are destined for the PoC, located in Ringaskiddy, or indeed the major pharmaceutical companies located in Ringaskiddy also. The volume of HGVs in both peaks is highest at the North Ring Road /

N8 junction, closely followed by the Shannon Park Roundabout. HGVs numbers reduce along the N28 towards Ringaskiddy.

5.14.2 There are climbing lanes on the N28 from Ringaskiddy village to facilitate slower HGV traffic moving up the hill towards Shanbally.

5.14.3 A summary of the surveyed peak volumes of HGVs at particular locations in the study area are as follows:

- North Ring Road / N8:
  - AM Peak 15 min: 40 HGVs 07:45-08:00
  - PM Peak 15 min: 38 HGVs 16:30-16:45
- N28 / Church Road / PoC Access
  - AM Peak 15 min: 24 HGVs 08:45-09:00
  - PM Peak 15 min: 15 HGVs 16:00-16:15
- N28 / Ringaskiddy Terminal / Shamrock Place
  - AM Peak 15 min: 9 HGVs 09:15-09:30
  - PM Peak 15 min: 5 HGVs 16:30-16:45
- Church Road / Fernhill Road
  - AM Peak 15 min: 4 HGVs 08:30-08:45
  - PM Peak 15 min: 2 HGVs 16:30-16:45

5.14.4 The counts were done in April in 2012. The HGV numbers represent the number of HGVs in all directions at the locations mentioned.



6. EXISTING PORT TRAFFIC

6.1 Introduction

6.1.1 This chapter presents an overview of current PoC traffic in the context of the strategic road network.

6.2 Daily Profile of Port Traffic

6.2.1 The PoC carries out its operations at a number of locations around Cork Harbour and the traffic flows related to its main activities are summarised in Figure 29 below. The current estimated traffic demand generated by PoC activities at Tivoli and Ringaskiddy have a combined total of 4,174 vehicle movements per day (AADT), of which some 27% or 1,108 are HGV movements.

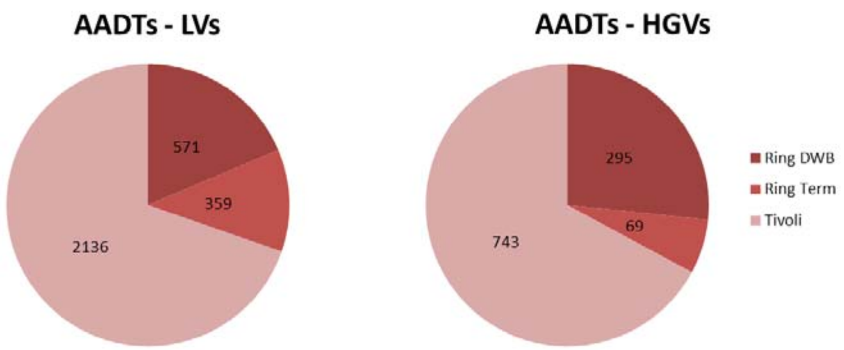

Figure 29. Traffic totals of all of the Tivoli and Ringaskiddy sites

6.2.2 The PoC currently generates traffic flows from its existing operations at Ringaskiddy as follows:

Table 6.1 Ringaskiddy – Existing PoC traffic levels

	POC TRAFFIC
AADT	1295
% HGV	28%
HGV Nos.	365

Source: Independent Traffic Surveys April/May 2012

6.2.3 The traffic generated by the PoC varies depending on levels of activities by customers including shipping related movements and by employees and related service providers. The PoC facilities at Ringaskiddy currently operate from 7am to 7pm, 5 days per week, and a half day on Saturday, all year round.

6.2.4 Based on the current pattern of arrival and departures of HGVs carrying Unitised Cargo (Containers) from the existing Container Terminal at Tivoli, approximately 13% of HGVs movements occur during the morning and evening peak hours.

6.2.5 Figures 30 to 32 below show the average number of HGVs using the Tivoli container terminal, the Ringaskiddy DWB and Ringaskiddy Terminal respectively for weekdays recorded over a two week period in May 2012. It can be seen that port traffic is reasonably steady during the day. There is a peak in the morning/afternoon period for two hours (11:00 – 13:00) at Tivoli and again in the evening period for three hours (14:00 – 17:00). Similarly, there is a morning and evening peak at Ringaskiddy but both peaks are for a period of one hour; 10:00 and 14:00.

6.2.6 Figure 30 gives the ATC counts taken outside the Tivoli entrance between the 14th and 27th of May in 2012. The numbers are based on an average weekday at the site.

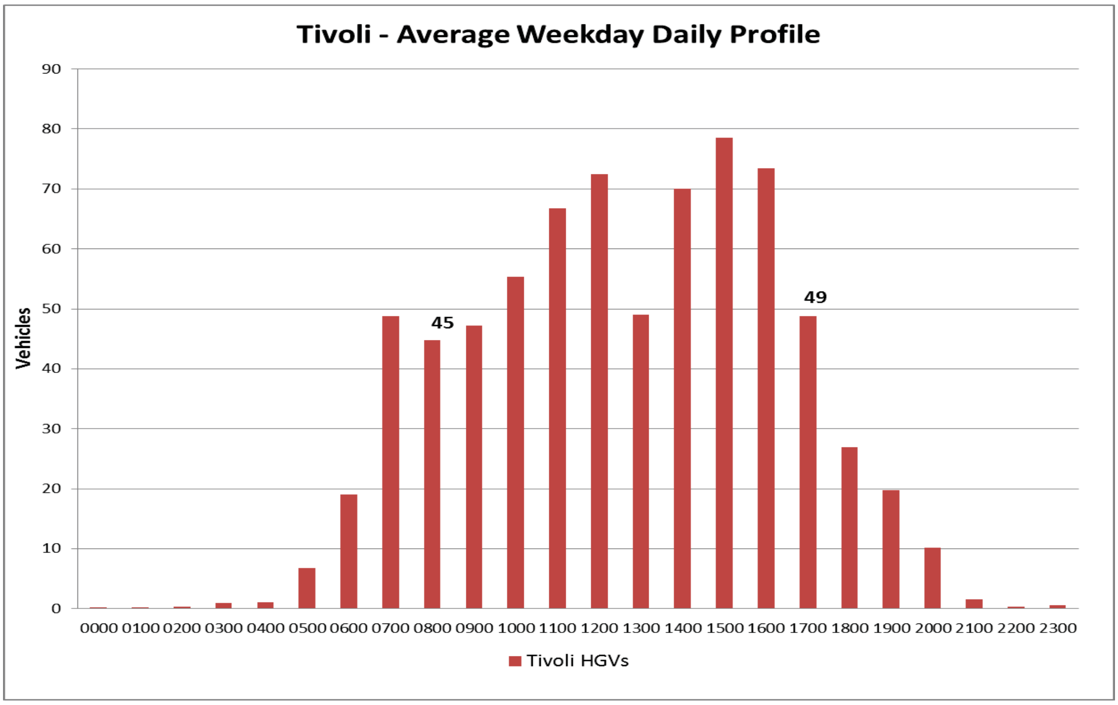

Figure 30. Tivoli average daily HGV traffic profile

6.2.7 Figure 31 gives the ATC counts taken outside the Ringaskiddy DWB entrance between the 14th and 27th of May in 2012. The numbers are based on an average weekday at the site.

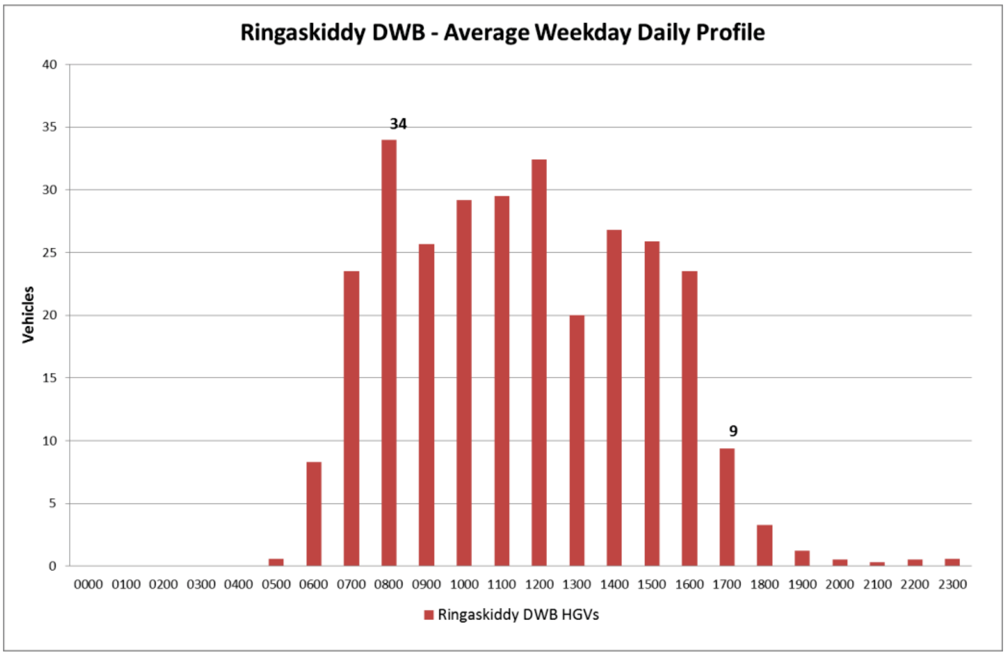

Figure 31. Ringaskiddy DWB average daily HGV traffic profile

6.2.8 Figure 32 gives the ATC counts taken outside the Ringaskiddy Terminal entrance between the 14th and 27th of May in 2012. The numbers are based on an average weekday at the site.

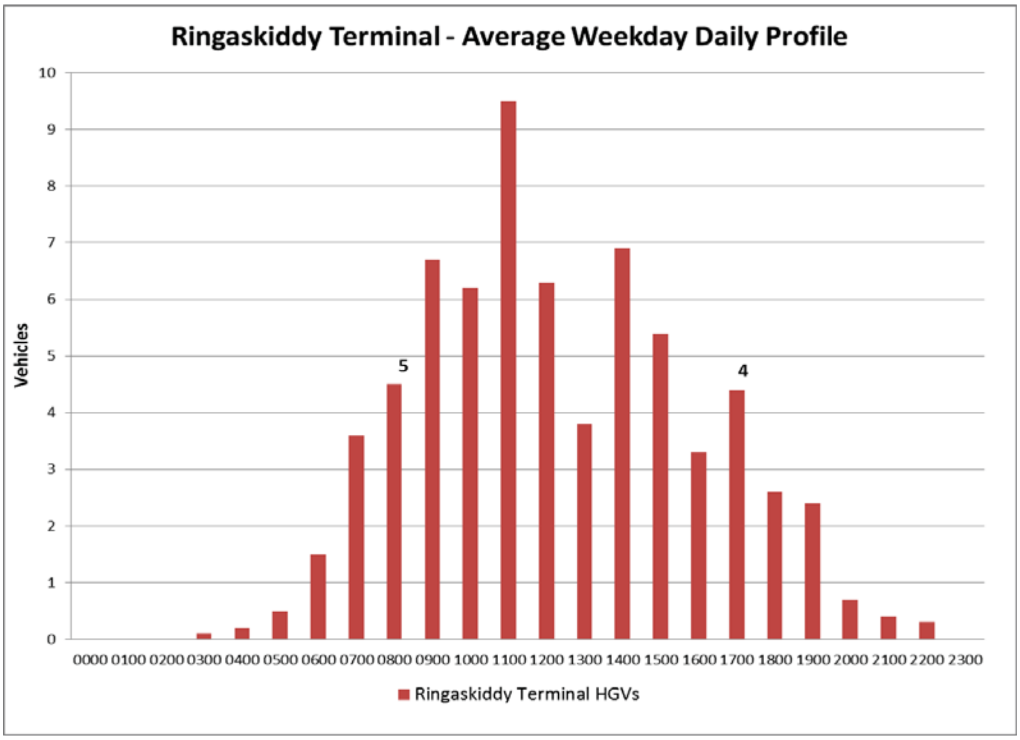

Figure 32. Ringaskiddy Terminal average daily HGV traffic profile



7. CONSULTATION

7.1 Introduction

7.1.1 This chapter discusses the consultation undertaken as part of this study, including public consultation and consultation with key stakeholders such as Cork County Council, the NRA and Port of Cork hauliers.

7.2 Public Consultation

7.2.1 Public consultation is an essential part of the preparation of the Environmental Impact Assessment of the proposed port development at Ringaskiddy. The first public consultation was held in Fota on 11th April 2013 and Carrigaline on 12th and 13th April 2013. The second round of public consultation is planned for early September 2013.

7.3 Key Stakeholder Consultation

7.3.1 Meetings were held between Port of Cork, Cork County Council and the NRA to discuss the proposed new Ringaskiddy port access and also the N28 Sustainable Travel Strategy, the proposed junction upgrades at Shannon Park and Shanbally, the upgrade planned for the Dunkettle Interchange, etc. Furthermore, consultation was undertaken with all of the hauliers which currently use each of the Port of Cork sites (Ringaskiddy, Tivoli and City Quays).

8. PREVIOUS PLANNING APPLICATION REFUSAL

8.1 Introduction

8.1.1 This chapter outlines the principal issues associated with the PoC submission to ABP for a container terminal and multi-purpose berth at Ringaskiddy in 2007 (Oyster Bank). The key differences between the Oyster Bank application and current proposals in relation to traffic and transport in the PoC Strategy are outlined, illustrating that the previous reasons for ABP's refusal are no longer valid.

8.2 2007 PoC SID Application

8.2.1 In 2007, the PoC submitted a Strategic Infrastructure Development (SID) application to ABP for a container terminal and multi-purpose berth at Ringaskiddy – Oyster Bank in order to cater for future expansion of the total handling capacity of the PoC facilities, as part of its Strategic Development Plan.

8.2.2 In 2008 ABP refused permission to the PoC for their port development at Ringaskiddy – the Oyster Bank application - on the grounds that the development would:

> (a) result in much of the port related traffic traversing the city road network which would adversely impact the carrying capacity of the strategic road network in and around Cork city and in particular the carrying capacity of the strategic interchanges at Bloomfield, Dunkettle and Kinsale Road and the Jack Lynch Tunnel which it is necessary to preserve; the proposed development would exacerbate serious traffic congestion at these strategic interchanges; and
>
> (b) be unable to make use of rail freight carrying facilities in the future and would, therefore, represent a retrograde step in terms of sustainable transport planning (noting reference to the potential for rail freight in the Regional Planning Guidelines for the South West Region 2004-2020 and the Cork Area Strategic Plan 2001-2020).

8.2.3 The principal traffic issues associated with the planned development as per the Inspector's Report are outlined in Table 8.1 below.

Table 8.1 Summary of ABP Refusal

ISSUE	BRIEF DESCRIPTION
Prematurity of development pending the upgrade of the N28	The upgrade of the N28 is critical for further large scale port development at Oyster Bank having particular regard to the fact that existing roundabouts on the N28, namely Shannon Park and Shanbally, experience significant congestion.
Impact on the wider road network	The issue was raised that the development and increased activity at Ringaskiddy will add to the congestion at the Jack Lynch tunnel and Dunkettle roundabout.
Lack of Rail access	An issue was raised regarding the lack of rail access to the new development at Ringaskiddy
Cumulative Trip Generation from other Developments	Concerns were expressed that the EIS did not properly anticipate or evaluate the cumulative impacts of traffic resulting from other existing or planned developments in the Ringaskiddy area.

9. RINGASKIDDY STRATEGY REVIEW – KEY DIFFERENCES WITH 2007 APPLICATION

9.1 Smaller scale development

9.1.1 Following the 2008 decision by ABP, the PoC undertook a fundamental review of its Strategic Development Plan and completely re-examined from first principles the future growth of its port activities. As a consequence of this strategic review, which took full account of ABP's reasons for refusal, and significantly revised economic growth forecasts, proposals have been developed for a much smaller scale development at Ringaskiddy.

9.2 Development of Cork City Harbour- relocation of port facilities

9.2.1 The Port expansion at Ringaskiddy is intended to complement a reduction of Port operations at the existing Tivoli and Cork Docklands sites, now being rebranded as Cork City Harbour, which cannot handle large vessels due to physical constraints.

9.2.2 The Tivoli and Docklands riverside sites are very well located relative to Cork City Centre (Docklands being within 750m and Tivoli, on the commuter Railway, being within 1.5km). As such, both sites have strong potential to be developed for urban renewal / non-industrial use. These are mutually supportive objectives and are part of the CASP Strategy and the local Cork City Development Plan, which target future population and growth within the Cork Metropolitan area, with a strong reliance on the redevelopment of Cork City Harbour to achieve the projected growth.

9.2.3 Furthermore, the removal of bulk cargo and container handling facilities from these sites would also have the benefit of reducing the number of HGVs which pass through the City Centre road network. The relocation of bulk goods handling facilities from City Quay areas and the containers from Tivoli to Ringaskiddy are thus a very important step in creating the space for sustainable development within Cork City, which currently has very limited development land available in well located City areas.

9.3 Key Differences

9.3.1 The key differences between the Oyster Bank application and current proposals in relation to traffic and transport in the PoC Strategy review are as follows:

- lower traffic generation;
- accompaniment of a Mobility Management Plan;
- significantly changed national and regional policy context; and
- lower forecast growth in traffic levels on the strategic network.

9.3.2 These are each described in turn in the subsequent sections.

Lower Traffic Generation

9.3.3 It was estimated that the Oyster Bank proposal would generate 7,284 vehicle movements per day. By comparison, for the current Ringaskiddy proposal it is estimated that, at full capacity, it would generate a total of 5,103 vehicle movements per day. In addition, the current proposal will result in a reduction of 1,207 vehicles between Tivoli and City Quays.

Mobility Management Planning

9.3.4 As part of this study, a Mobility Management Plan will be developed to minimise the impact of port generated traffic on the strategic interchanges of the National Road network around Cork City, during peak hours, which would take account of the revised Port Strategic Plan proposals.

9.3.5 The use of demand management is another important difference pertaining to the PoC's strategy review. A Mobility Management Plan will be produced that will outline policies for limiting the amount of HGVs generated by the port when critical points in the network are at their busiest during peak times. The plan will also include objectives on vehicle routing, and outline measures to limit port traffic on ancillary (non-national) routes.

9.3.6 Measures put forward in the plan will include ways of suppressing HGV movement from the site when there is limited spare capacity on the network at peak commuting times. These measures will further decrease the risk of port related traffic from Ringaskiddy adversely impacting sensitive points in the network during peak times. These measures will complement an area-wide Mobility Management Plan for Ringaskiddy which will be implemented by Cork County Council as part of the N28 Corridor Sustainable Travel Strategy and is expected to include similar undertakings concerning commuter travel among the approximate 7,000 employees and students within the major employers and educational facilities in the area as part of the Smarter Travel Workplace Programme.

Policy Context

9.3.7 Transport policy in relation to the use of strategic road infrastructure has changed since the Oyster Bank application. The sections below outline those policies which are relevant to the planned application at Ringaskiddy, all of which are discussed earlier in Chapter 3.

Smarter Travel

9.3.8 Smarter Travel is government policy which has come into effect in 2009 since the Oyster Bank application. This policy seeks to reduce the share of travel demand growth which is car dependant. Its main objective is to promote a significant modal shift from private transport to public transport and sustainable transport modes for commuters over the period up to 2020. Controlling development so that it is sustainable/ public transport oriented is an objective of this policy and a mechanism by which this can be achieved.

9.3.9 Smarter Travel Policy recognises the role of the strategic national road network in providing for the efficient movement of interurban traffic and specifically mentions port traffic. Therefore, using the strategic road network for port traffic is consistent with the Smarter Travel Policy objectives. Capacity headroom can be used for strategic economic activity (i.e. HGVs from the port) according to the policy, while the management of commuter trips will reduce the use of this infrastructure by cars and contribute to provision of additional capacity headroom which is particularly relevant to the N28.

N28 Corridor Sustainable Travel Strategy

9.3.10 A recent survey of employees in the Ringaskiddy area undertaken as part of the N28 Corridor Sustainable Travel Strategy revealed that 96% of respondents generally travelled by car to work, with 2% regularly travelling as a car passenger and 1% travelling by Bus. However, 25% of respondents said that they occasionally travel as a passenger and have the opportunity to car share. Similarly, 9% of respondents occasionally travel by bus and 13% stated that bus was available to them as a mode. The on-line survey included a large representative sample of 1014 respondents and the results highlighted the potential for modal shift among these N28 commuters.

9.3.11 The NTA have reported[3] an average nationwide reduction of 18% in single occupancy car based commuter trips through their Smarter Travel Workplaces Programme through incentivising car share schemes for large employers and the promotion of alternative travel modes. However, given the current provision of public transport and other modes in the Ringaskiddy area, it is considered that a more modest proposed medium-term target of 10% is achievable and would significantly benefit the available capacity on the N28 corridor at peak times. The Cork County Council N28 Corridor Sustainable Travel Strategy initiative will seek to reduce N28 commuter trips by at least 5% over the first five years and by 10% over 10 years.

9.3.12 As part of the N28 Corridor STS initiative a number of major employers in the area have signed up to the NTA Smarter Travel Workplaces Programme. Furthermore, Cork County Council have established a technical group who will implement the management and monitoring processes required to support the achievement of these reduced commuter trip targets in partnership with these key employer stakeholders, including the PoC. An N28 Corridor Travel Model is being prepared which will test the benefit of the various mode shift travel proposals and these forecasts will be validated and monitored by means of an on-going programme of monitoring on the N28 corridor. It is also intended that all significant new development within the Ringaskiddy area will be required (by way of variation to the County Development Plan) to prepare and implement mobility management plans as part of their development proposals and their traffic impact will be tested using the N28 Corridor Travel Model.

9.3.13 In addition to the N28 demand management processes, Cork County Council have proposed to extend the existing Mahon to Passage West Cycle Route, to Carrigaline with

[3] "Your Step by Step Guide to Travel Plans" (Travel Planning Guidance for Employers) available from the NTA website: www.nationaltransport.ie)

an extension eastwards to Ringaskiddy village as part of the Cork Cycle Strategy. It is estimated that 17% of commuter trips to Ringaskiddy originate in Carrigaline, a distance of approximately 7km, representing a cycle time of approximately 25 minutes between these locations.

Douglas Land Use and Transport Strategy and Carrigaline LAP

9.3.14 The Douglas Land Use and Transport Strategy is currently being prepared by Cork County Council. Among its objectives are targets to reduce car dependency for commuting from Douglas and achieve a mode shift towards walking, cycling, and public transport.

9.3.15 Similar objectives are contained in the Carrigaline LAP, and it will also be included in the objectives of Phase 2 of the N28 Corridor Sustainable Travel Strategy. Carrigaline is a significant contributor to car trips on the N28 especially during peak times and has a very high rate of car use for this journey purpose.

9.3.16 The combined effects of the strategies for Douglas, Carrigaline and Ringaskiddy will be to restrain traffic growth on the N28 and maintain capacity on the infrastructure for strategic traffic such as the freight from the Port and the major ("pharma-chem" and medical devices) manufacturing facilities at Ringaskiddy.

National Ports Policy

9.3.17 The National Ports Policy indicates that Cork is one of three Tier 1 Irish core ports in the Connecting Europe Network. The Ringaskiddy site is the primary deep water facility in Cork at present, and expansion of its deep water facilities is essential for the commercial viability and development of the port. The expansion of the deep water facility at Ringaskiddy is in alignment with this national policy objective, will maintain the competitive advantage of the region and meet the needs of Ireland for the foreseeable future. This national policy focus on the strategic deep water role of PoC at Ringaskiddy supersedes the ports policy context at the time of the Oyster Bank application.

Strategic Infrastructure Upgrades

9.3.18 A number of significant upgrades to strategic infrastructure are currently proposed. This includes upgrades on the N28 at the Shannon Park and Shanbally junctions. The NRA also have advanced proposals to upgrade Dunkettle Interchange to free-flow and thus remove one of the main bottlenecks cited in the 2008 decision to refuse by ABP. The proposed upgrade of the Dunkettle Interchange which was recently approved by ABP will be a major enhancement to the road network.

Traffic Levels on Strategic Road Network

9.3.19 From a sustainable transport perspective there are a number of very important differences relating to the strategic road network between the current situation and the assumptions made at the time of the assessment of the Oyster Bank application. Lower existing traffic levels, a reduced development scenario for Ringaskiddy Port, the implementation of a port Mobility Management plan and the implementation of a



strategy for transport on the N28 are the principal differences. These factors significantly improve the feasibility of the proposed development. The following bullets outline the key changes since the previous application:

- The original proposals for the upgrade of the N28 to dual-carriageway from Bloomfield to Ringaskiddy, to which the Oyster Bank application was linked in terms of growth potential, have been postponed indefinitely due to cutbacks in the national roads programme arising from the economic downturn.;
- There have been reductions in traffic levels on the national road network in the Cork region since 2008 which reflect the economic downturn and national trends. The AADT has fallen by over 6% since 2008 on the N25 at Little Island and by over 12% on the N8 at Dunkettle. As such the strategic road network has more capacity currently available to handle future growth than it did in 2008;
- In line with the current economic downturn, the NRA has revised the traffic growth forecasts for the future and these reduced growth rates are incorporated in the NRA National Traffic model. This model was the basis of the traffic growth forecasts presented to ABP by the NRA for the Dunkettle Interchange SID application in November 2012. The growth scenario on which the Dunkettle Interchange infrastructure development was based was the Medium Growth Scenario. It is intended that PoC will use these traffic forecasts and this model as the basis of their traffic assessment for the Ringaskiddy application. This will provide consistency for ABP and address their concerns in relation to traffic impact on the National road network around Cork City; and
- Smarter Travel policy has objectives to prioritise strategic traffic growth on national routes (which includes Port traffic) over commuter traffic growth. Therefore it is reasonable to aspire to utilise the headroom available for traffic growth on the relevant parts of the Cork road network for port expansion within a managed transport context.
- The National Ports Policy Statement published recently reinforces the strategic role of this national Ports infrastructure and the strategic context of the traffic using the port facilities. It highlights the obligation of government and national agencies to ensure that access to these strategic port facilities is safeguarded and upgraded to facilitate the development and improvement of the national ports.

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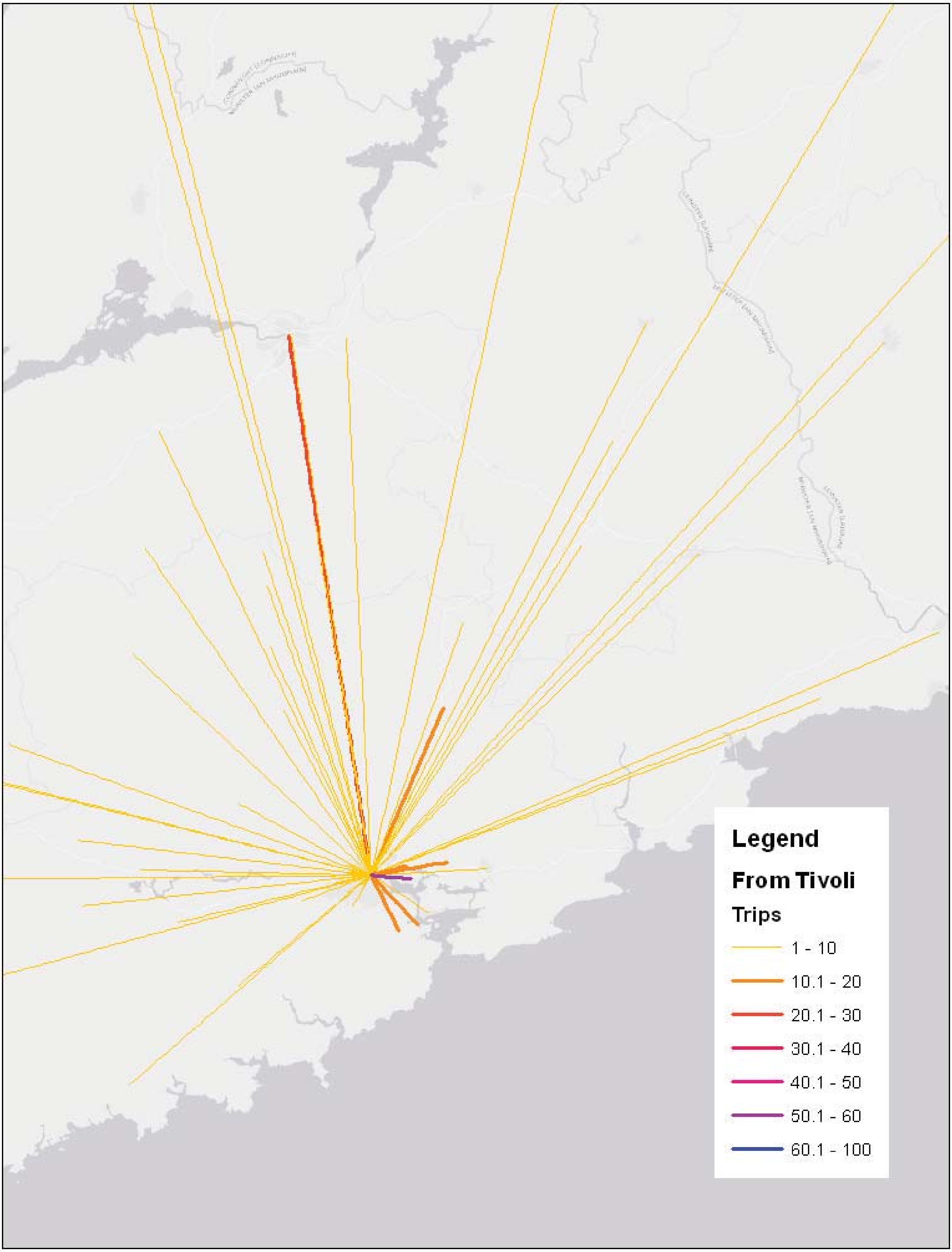
Appendix A – Desire Line Maps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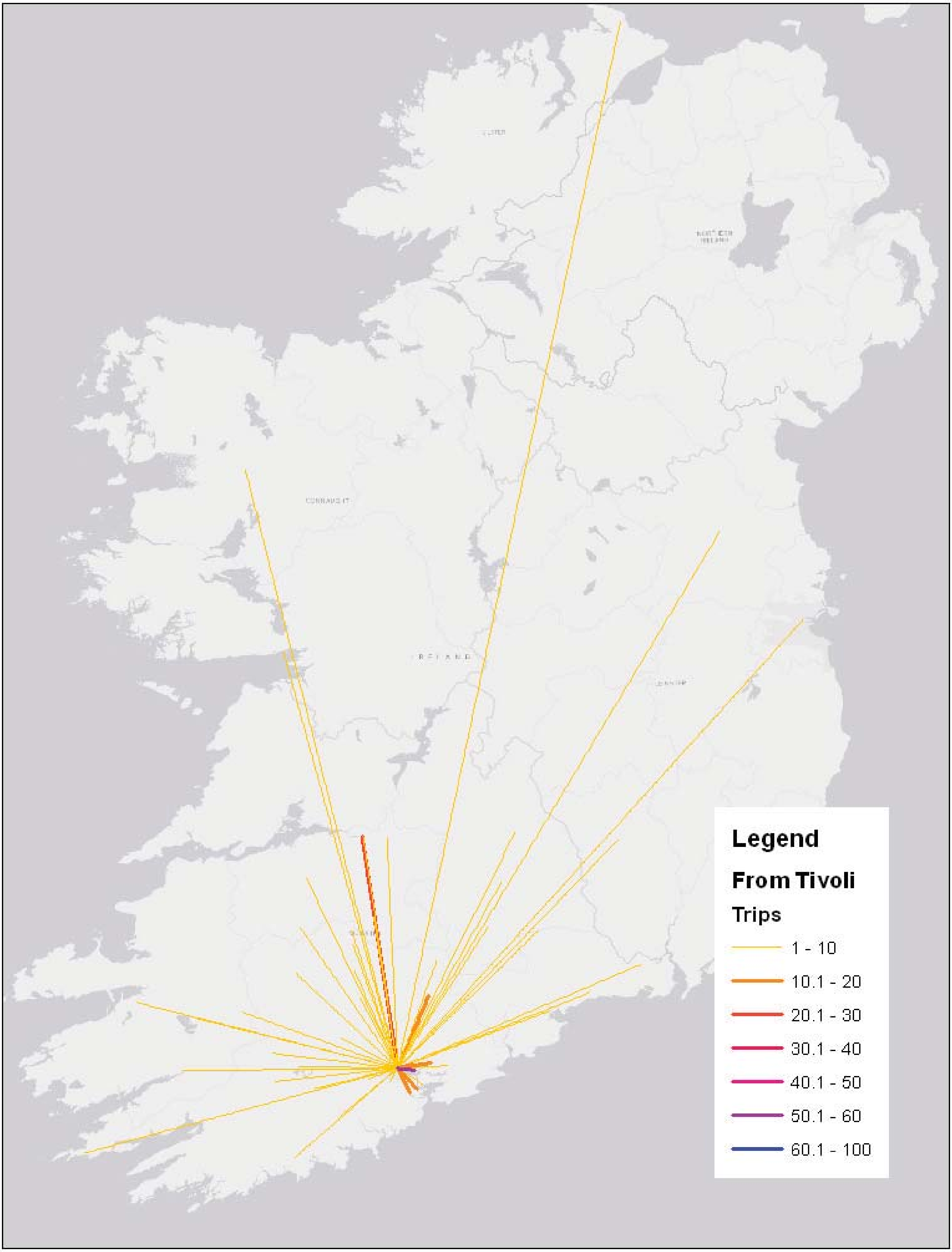
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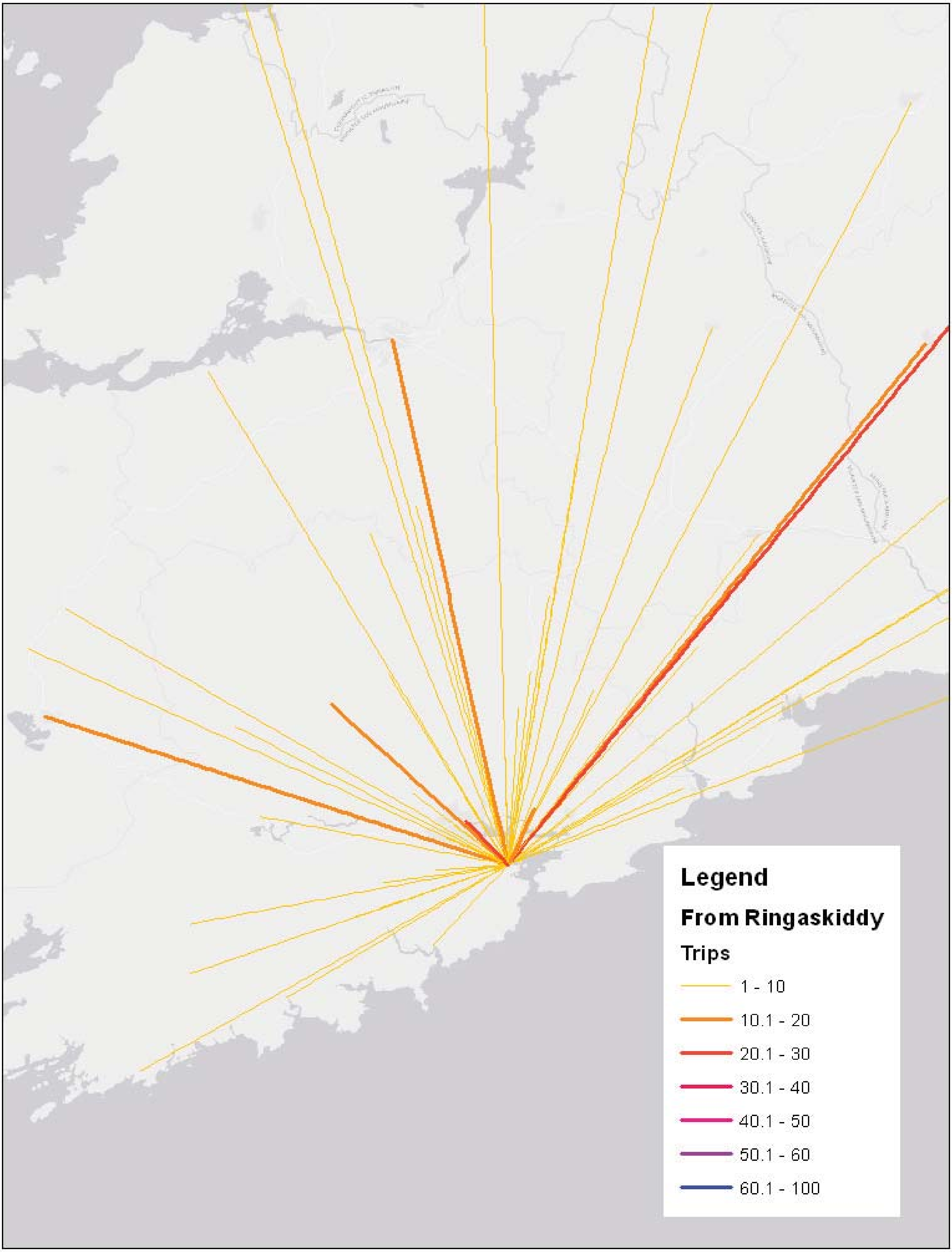
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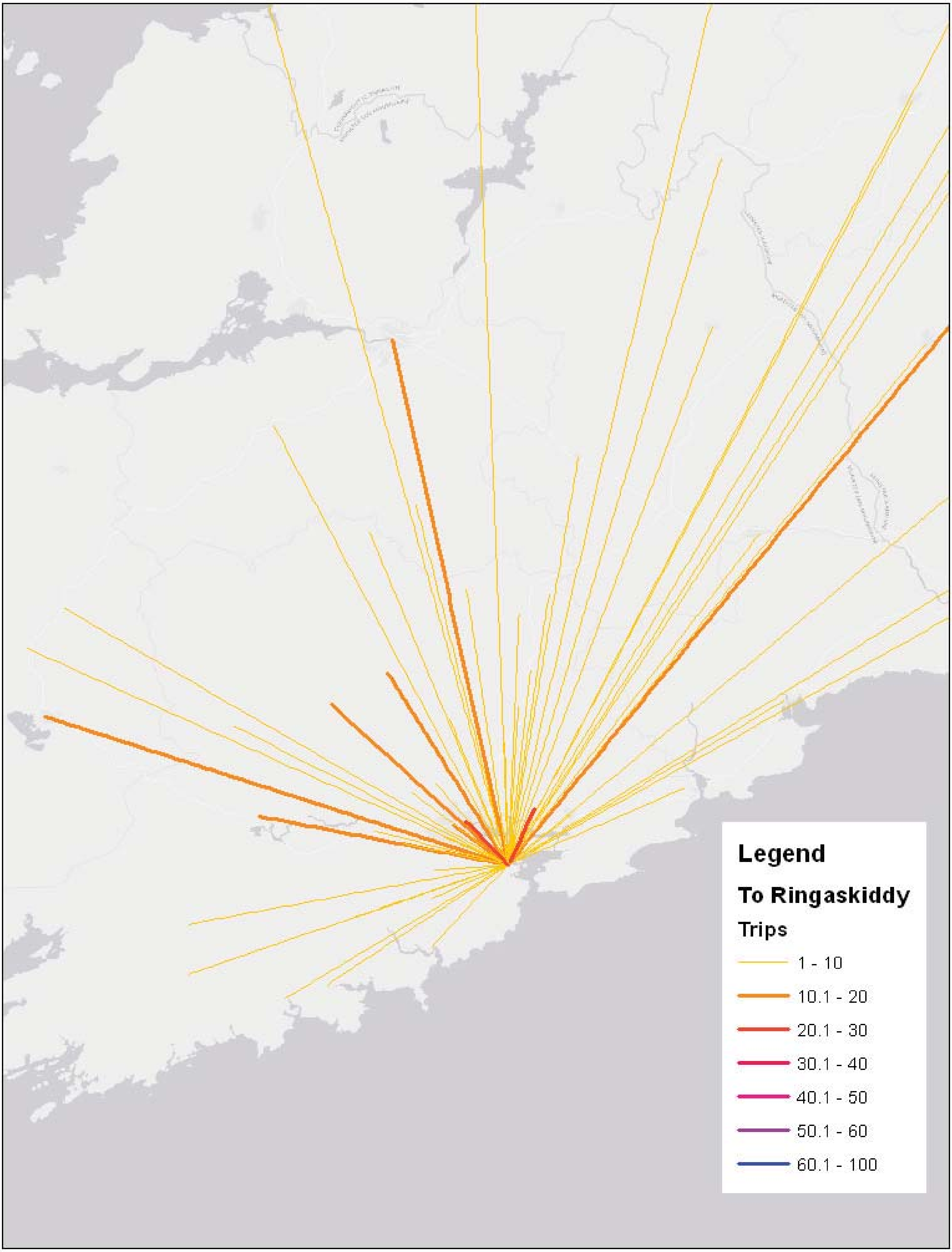
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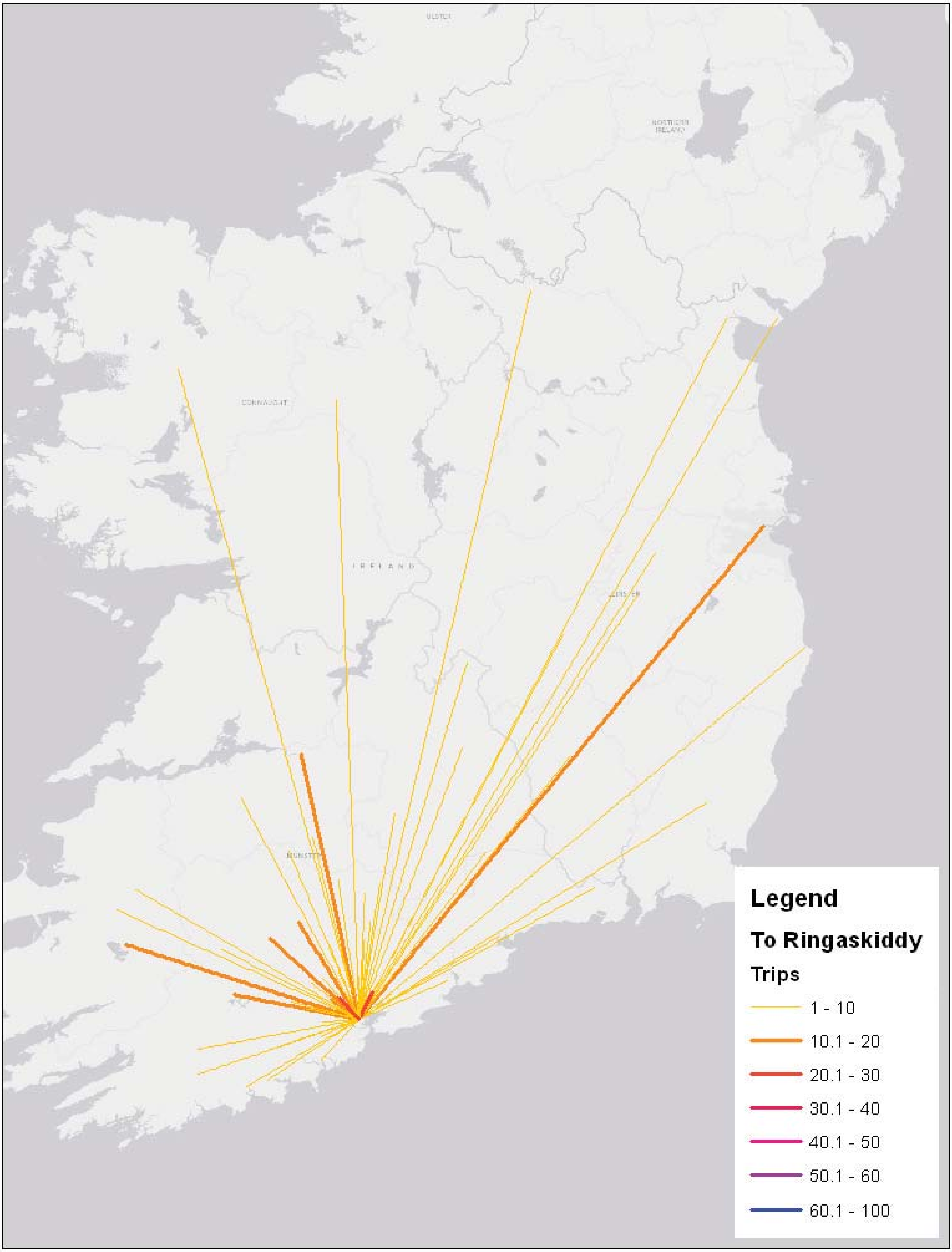
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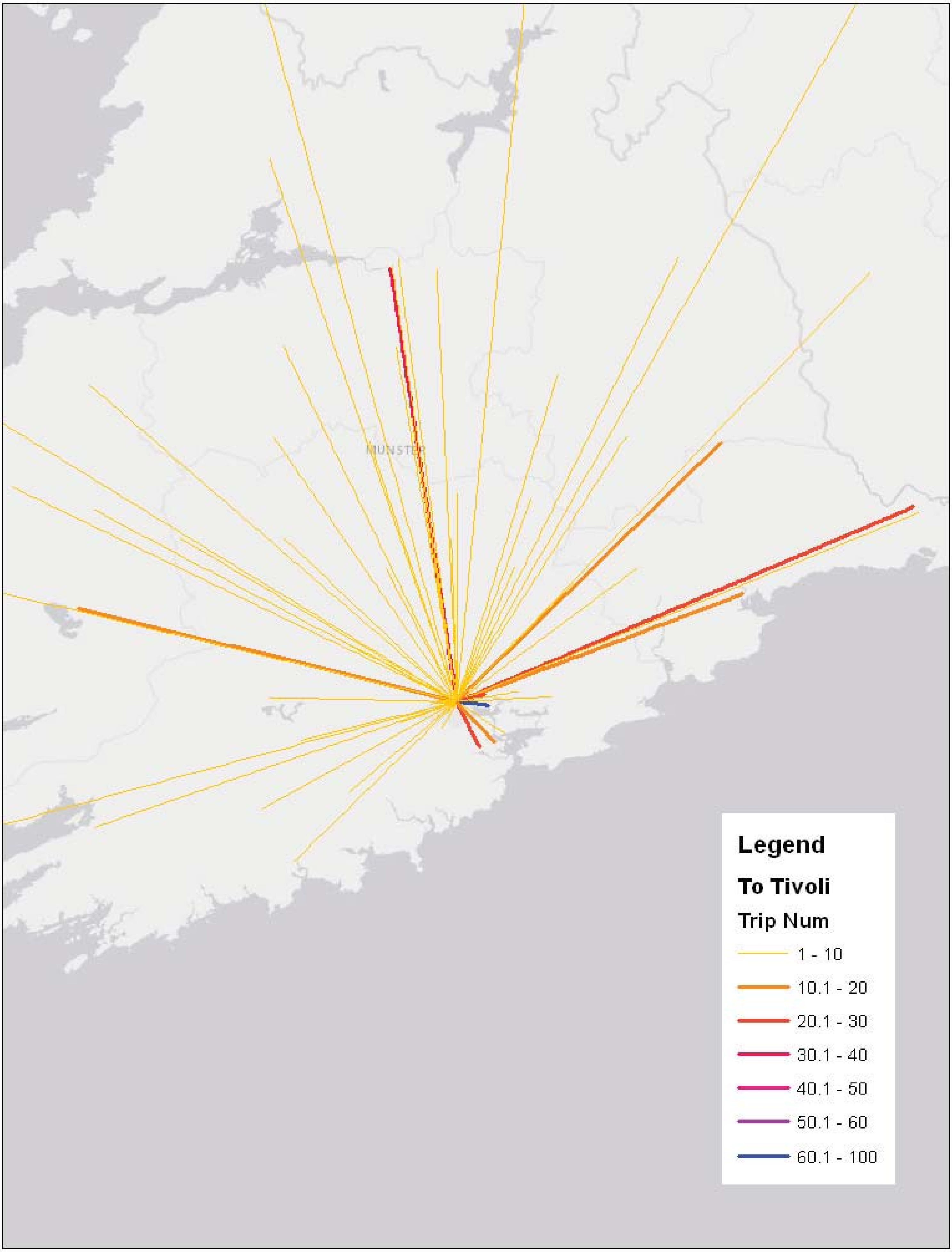
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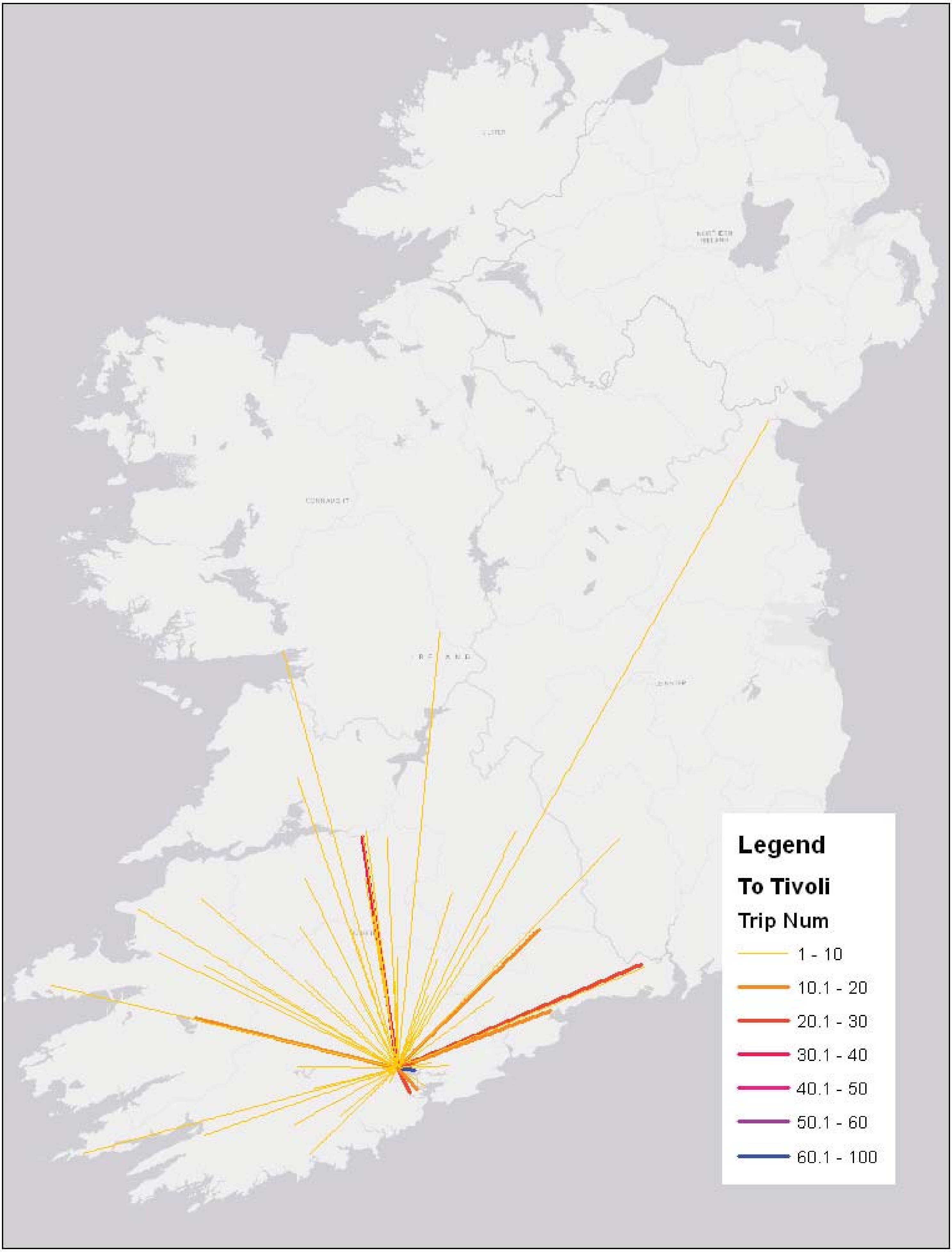
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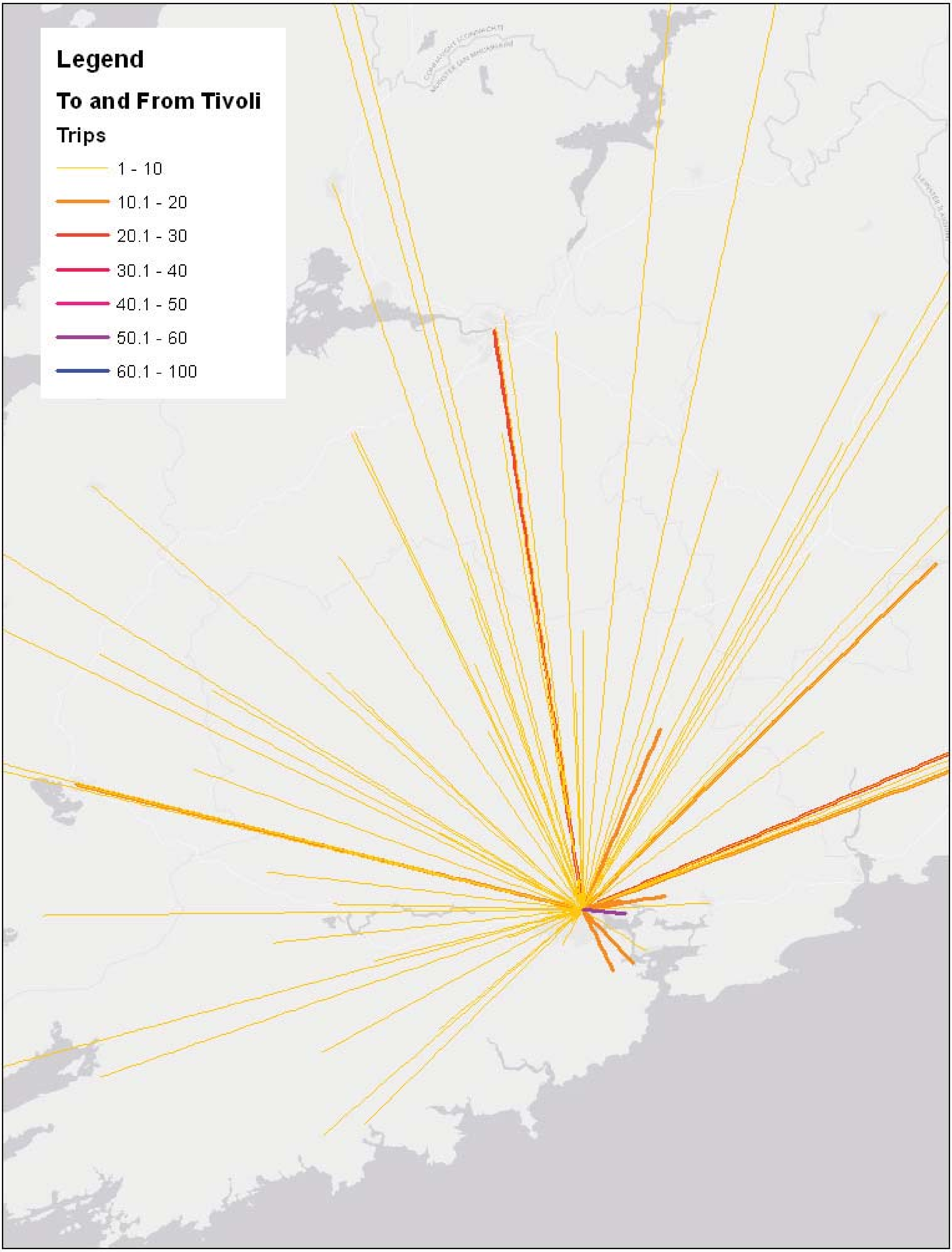
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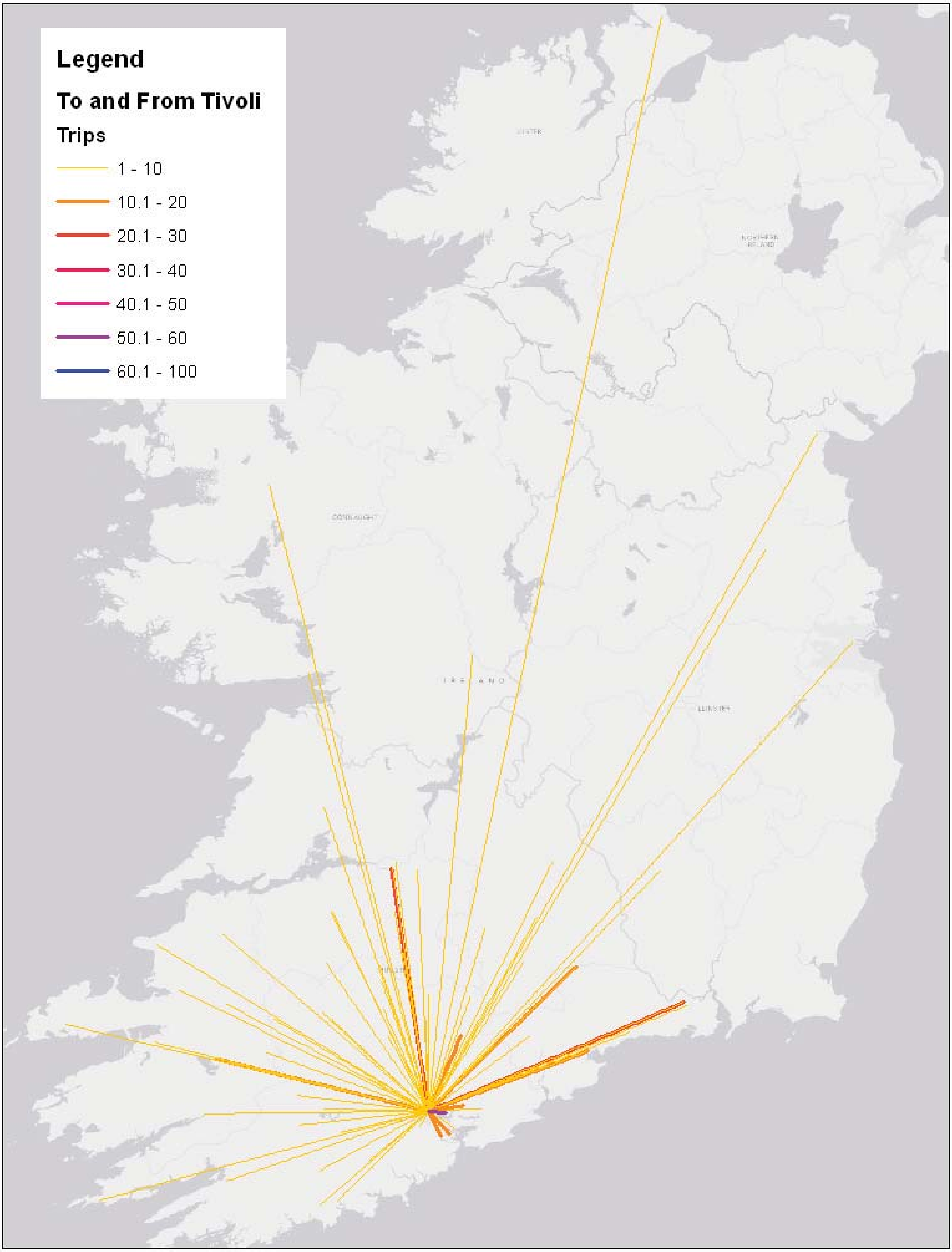
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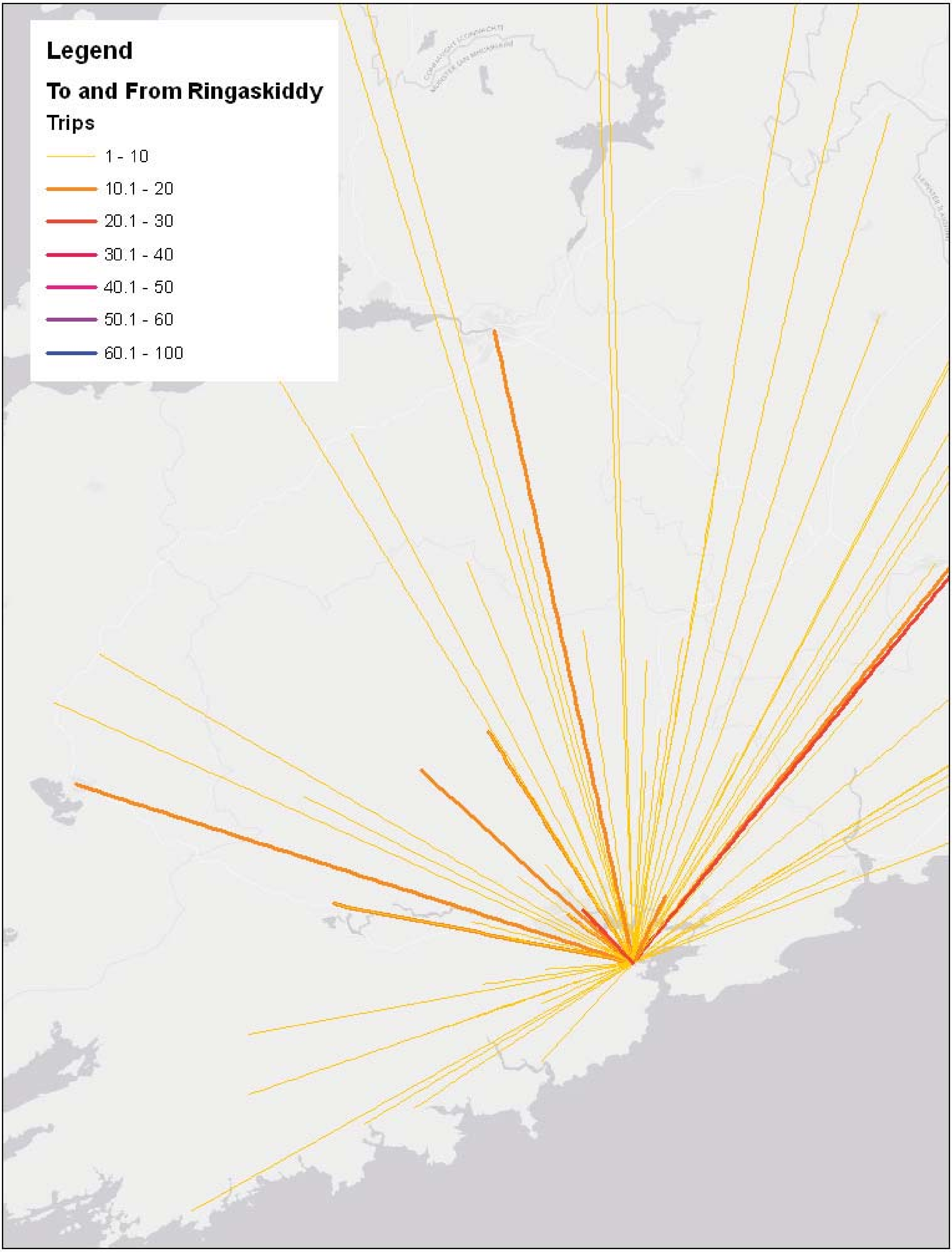
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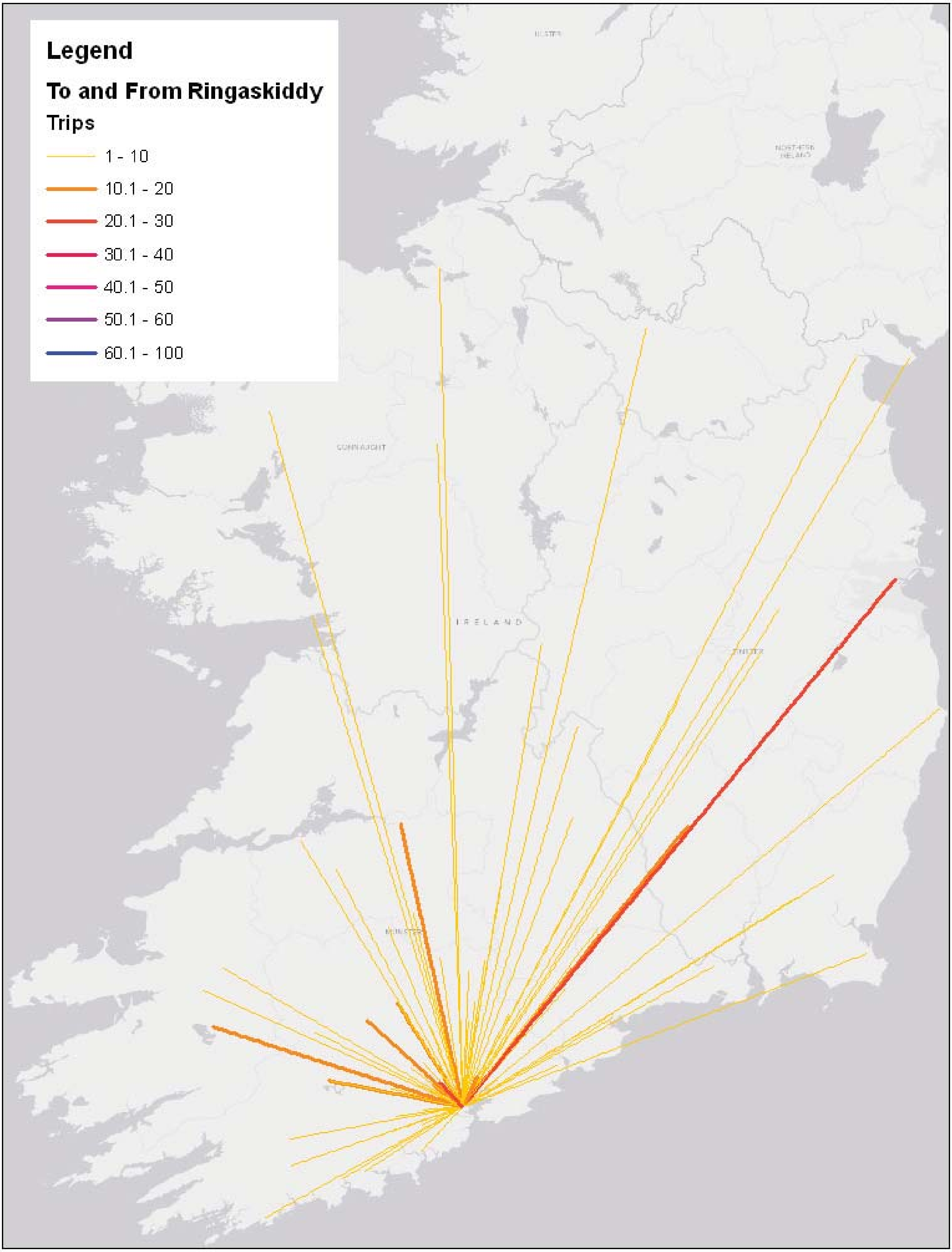
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Report Appendix B

1. JUNCTION EVALUATION

1.1.1 Junctions represent the major point of conflict between road users, with intra modal (e.g. general traffic to general traffic) and inter modal (e.g. general traffic/ pedestrian/ cyclist) conflict occurring. In terms of the efficient operation of an urban traffic management system, the layout and operation/ management of junctions is essential to ensure that a fair balance is achieved between the competing needs of each transport mode. Given the conflict between road users that exists at junctions, the traffic management arrangements in place determine how well the junction will perform from a safety perspective.

1.1.2 This appendix provides details of 23 junctions which were evaluated during site visits. The junctions reviewed are listed below and their locations are illustrated in Figure 2.

- Jct 1. Dunkettle Interchange;
- Jct 2. Jack Lynch Tunnel;
- Jct 3. Mahon Interchange;
- Jct 4. Bloomfield Interchange;
- Jct 5. N28/Rochestown Road (R610);
- Jct 6. N28/Maryborough Hill;
- Jct 7. N28/Carrigaline Road (R609);
- Jct 8. N28/Carrs Hill
- Jct 9. N28/L6477;
- Jct 10. Shannon Park Junction;
- Jct 11. N28/L2490;
- Jct 12. N28/R610;
- Jct 13. Shanbally Roundabout;
- Jct 14. Entrances to Pfizer;
- Jct 15. N28/Church Road (R613);
- Jct 16. N28/Shamrock Place
- Jct 17. Church Road (R613)/L2492;
- Jct 18. Church Road (R613)/L2490;
- Jct 19. Signalised Junction at R613/R612;
- Jct 20. Signalised Junction at R612/R611; and
- Jct 21. Ballea Road/Church Road (R613)/Cork Road (R611) roundabout
- Jct 22. Tivoli Access at N8/R635 (North Ring Road)
- Jct 23. Entrance to City Quay Port on Albert Quay

1.1.3 Figures 2 – 24 describe the conditions and issues at each junction separately.

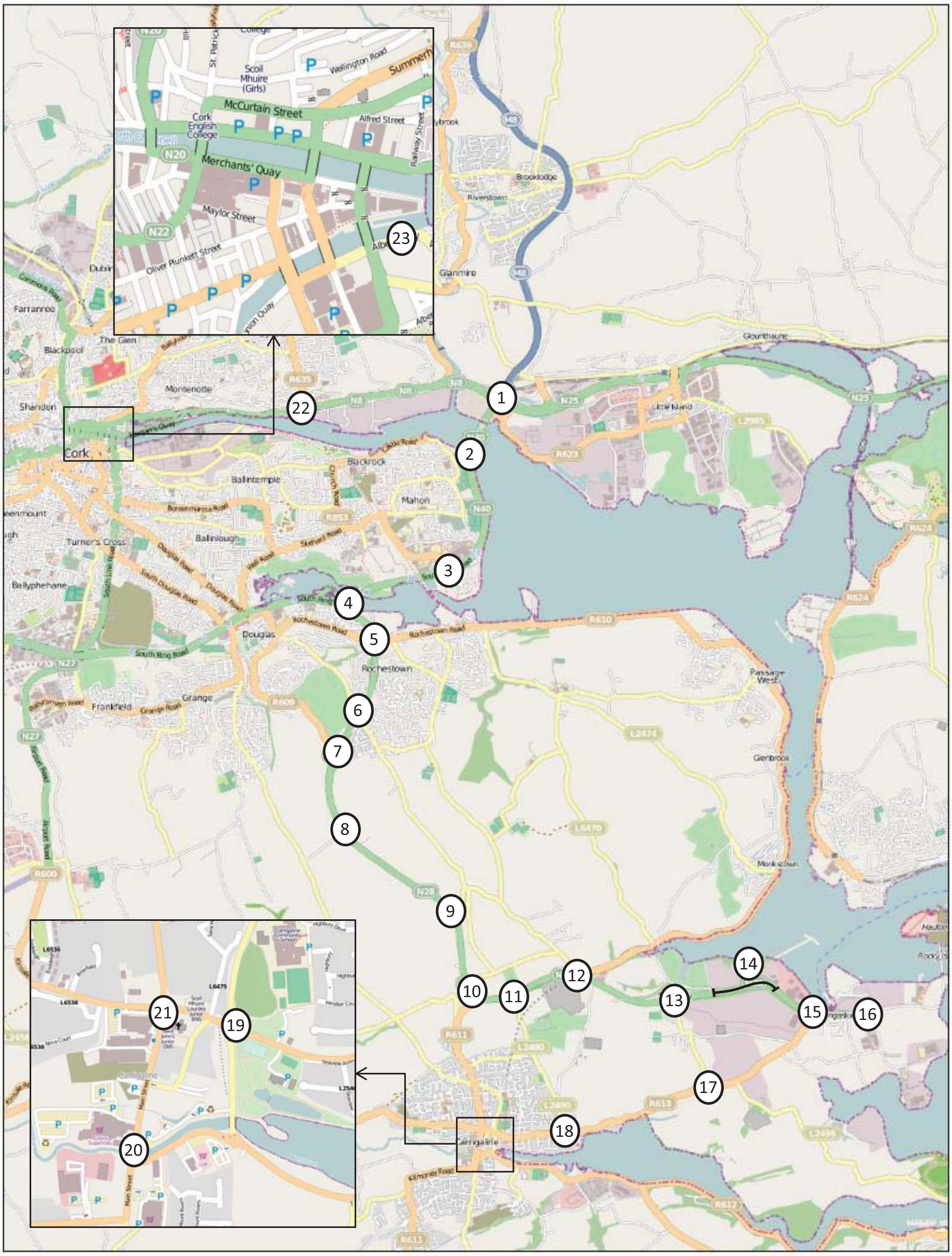


Figure 1. Study Area Junction Location Map

Figure 2. Junction 1 – Dunkettle Interchange

DUNKETTLE INTERCHANGE

- Capacity and operational issues exist
- Queuing was noted during the site visits in both the AM and PM peak in all directions. The capacity at the interchange is not sufficient during the peak to withstand the volume of traffic. Traffic flowed well during the off peak with green time sufficient in clearing queues that had built up while waiting

Picuture 1: Dunkettle Interchange on N25 East turnoff

Picture 2: Dunkettle Interchange Jack Lynch Tunnel turnoff

Figure 3. Junction 2 – Jack Lynch Tunnel

JACK LYNCH TUNNEL

- Capacity and operational issues exist in tandem with the Dunkettle Interchange
- It was observed during site visits that the Jack Lynch Tunnel experienced tailbacks past the tunnel towards the Mahon Interchange on approach to the Dunkettle Interchange in both peaks. Traffic was moving at approximately 5-10kph which subsequently had a knock-on effect on traffic moving towards the Mahon Interchange
- Speed limit 80kph

Picuture 1: Jack Lynch Tunnel southbound

Picture 2: Jack Lynch Tunnel northbound

Figure 4. Junction 3 – Mahon Interchange

MAHON INTERCHANGE

- No observed operational or capacity issues
- It was observed during both peaks that traffic moved well on the Mahon Interchange. The green times given at signalised junctions seemed sufficient to clear any waiting queues
- Speed limit 100kph

Picuture 1: Mahon Interchange southbound

Picture 2: Mahon Interchange northbound

Figure 5. Junction 4 – Bloomfield Interchange

BLOOMFIELD INTERCHANGE

- N28 joins with the South Ring Road (N40) at the Bloomfield Interchange
- During the site visits, it was observed that although traffic was heavy in the area, especially during the peaks, the flow of traffic moved well. No major delays were experienced during the AM and PM peaks in either direction
- Speed limit on N40 100kph
- Speed limit on N28 60kph

Picuture 1: Bloomfield Interchange southbound

Picture 2: Bloomfield Interchange northbound

Figure 6. Junction 5 – N28/ Rochestown Road (R610)

N28/ ROCHESTOWN ROAD (R610)

- This is an on and off ramp junction for the N28. Rochestown Road merges with the N28 in the northbound direction and the off ramp in is the southbound direction
- No operational issues
- Some capacity issues in the peak as heavy traffic from Rochestown Road merges with northbound traffic on the N28. It was observed as moving relatively well when site visits were undertaken
- Speed limit 60kph

Figure 7. Junction 6 – N28/ Maryborough Hill

N28/ MARYBOROUGH HILL

- Maryborough Hill merges with a single lane on the N28 in the northbound direction. The southbound direction flows freely without any interference from Maryborough Hill with two lanes
- Experiences capacity issues in the peak as heavy traffic merges with the northbound traffic causing drivers to reduce speed. The reduction in speed has a knock-on effect and traffic tails back for approximately 400 - 500m from the junction. Traffic moves slowly but continuously and clears up after the junction. Southbound flows freely
- The merge lane is only approximately 150m in length. The Rochestown Road junction is quite close and does not allow for the merge lane to be extended which would allow traffic to merge easier without such a dramatic reduction in speed on the N28
- Speed limit: 100kph

Picuture 1: Congestion approaching Maryborough Hill in the AM peak

Picture 2: Maryborugh Hill merging with the N28

Figure 8. Junction 7 – N28/ Carrigaline Road (R609)

N28/ CARRIGALINE ROAD (R609)

- This is a free flowing on and off ramp from the N28 onto Carrigaline Road (R609). The N28 northbound continues as a single lane with one lane turning off. One lane merges with the N28 southbound which has a single lane. There is no turnoff in the southbound direction and no merge in the northbound direction
- No capacity issues
- Speed limit: 100kph Speed limit: 100kph

Picuture 1: Carrigaline Road merging with the N28 southbound

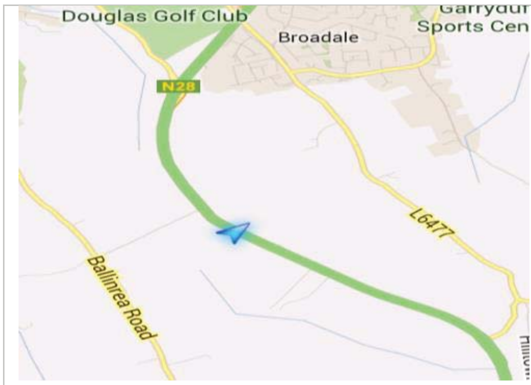
Picture 2: The off ramp on the N28 northbound for Carrigaline Road

Figure 9. Junction 8 – N28/Carrs Hill

N28/ CARRS HILL

- This is a section of the N28 known as Carrs Hill, located between the Carrigaline Road on and off ramp and the T-junction with the L6477. The location is shown in Picture 2
- Experiences capacity issues in the peak in the northbound direction as drivers slow down as a result of the reduction in lanes. The area narrows quite dramatically from two lanes northbound to one. It was observed on site visits to the area that drivers slowing down had a knock-on effect further back. Traffic moved continuously and eventually cleared once the lanes became wider
- Speed limit 100kph

Picuture 1: Congestion in the AM at Carrs Hill in the northbound direction and heavy flow on the southbound



Picture 2: Location of photo

Figure 10. Junction 9 – N28/ L6477

N28/ L6477

- T-priority junction
- No operational or capacity issues
- Speed limit on N28 100kph
- Speed limit on L6477 60kph

Picuture 1: Approach to Junction 9 in northbound direction on the N28

Picture 2: Approach to Junction 9 in southbound direction on the N28

Figure 11. Junction 10 – Shannon Park Roundabout

SHANNON PARK ROUNDABOUT

- Shannon Park is a large three arm roundabout connecting the Cork Road (R611) to the N28
- Experiences capacity and operational issues
- There is a constant flow of traffic at Shannon Park Roundabout during both peaks. It was observed during site visits that although traffic flow was heavy throughout, major congestion was only experienced in the evening peak. Between 16:00 and 17:00, traffic was heavy but moving and the majority was moving predominantly from the eastern arm to the northern arm. There were significant levels of traffic on the other arms. There were times when queues were approximately 20-25 vehicles long but tended to clear quickly. Generally, the junction was free flowing within this time.
- Between 17:00 and 18:00 however there was severe congestion on the eastern/Ringaskiddy arm. Picture 1 shows the traffic tailing back from Shannon Park on the eastern arm for approximately 500m past the turn off for the L2490. While considerable numbers turned off from the N28 onto the L2490 to avoid Carrigaline village, some drivers used the Shannon Park Roundabout to turn towards Carrigaline. Those drivers used the hard shoulder to approach the roundabout and then turn left. The majority of congested traffic was therefore northbound traffic
- Picture 2 shows traffic approaching Shannon Park Roundabout from the north during the morning peak. The junction was observed as being busy during the morning peak without being congested. There was a constant flow throughout this period without major congestion approaching the roundabout on any arm

Picuture 1: Tailback on Ringaskiddy arm approaching the roundabout and cars using the hard shoulder to turn towrds Carrigaline

Picture 2: Heavy traffic and some queuing on the northern arm at the roundabout in the AM

Figure 12. Junction 11 – N28/ L2490

N28/ L2490

- T-priority junction
- No capacity or operational issues
- There is a steady stream of traffic on this road during both peaks predominantly from the N28 as drivers look to avoid Carrigaline village
- Speed limit on N28 80kph
- Speed limit on L2490 60kph

Picuture 1: Approach to Junction 11 on the eastbound approach on the N28

Picture 2: Junction 11 approach on the L2490

Figure 13. Junction 12 – N28/ R610

N28/ R610

- T - priority junction
- No capacity or operational issues
- During the peak there can be queues of up to 10 cars trying to get on to the N28. They generally clear quite quickly as there is a short merging lane onto the N28
- Speed limit on N28 100kph
- Speed limit on R610 60kph

Picuture 1: Junction 12 approach on N28 eastbound

Picture 2: Junction 12 approach on the R610

Figure 14.

Figure 15. Junction 13 – Shanbally Roundabout

SHANBALLY ROUNDABOUT

- Shanbally Roundabout is a small three arm roundabout connecting the L2492 to the N28
- It does not experience any operational issues
- During site visits, congestion issues were observed, mainly during morning peaks (in particular just before 08:00 and at 08:45 at school opening). There was a constant heavy traffic flow during both peaks. The entry treatment approaching the village, in particular reduction in speed limit, had an effect on traffic congestion. Also the number of vehicles turning right towards Church Road, and turning right from Church Road, sometimes added to congestion
- Picture 1 shows Shanbally Roundabout and the constant stream of traffic coming from Shannon Park Roundabout
- Picture 2 shows traffic queuing back from the Shanabally Roundabout in the morning peak past the turnoff for the R610. Although the road was congested, traffic moved continuously
- The location of the school at the roundabout and its associated drop-off causes significant congestion for a short period during the morning peak, as shown in Picture 3
- Pedestrian facilities, including footpaths and pedestrian refuges, are shown in Picture 4

Picuture 1: Heavy but free flowing traffic at Shanbally Roundabout in the AM

Picture 2: Tailback of traffic as a result of the change in speed approaching the Shanbally Roundabout

Picture 3: Congestion at Shanbally Roundabout during school drop-off period

Picture 4: Pedestrian facilities, including footpaths and pedestrian refuges

Figure 16. Junction 14 – Pfizer Entrances

PFIZER ENTRANCES

- There are four entrances into Pfizer Biologics; two are for employees, one for visitors and one entrance was closed at the time of the survey
- No operational or capacity issues at any junction or entrance
- The main entrance is a three arm roundabout that runs smoothly. During the site visits no congestion or queuing was observed. The other open entrances, both priority T-junctions were also observed as being queue free

Picuture 1: Main Entrance

Picture 2: Other employee entrance

Figure 17. Junction 15 – N28/ Church Road (R613)/ POC Entrance

N28/ CHURCH ROAD (R613)/ PORT OF CORK ENTRANCE

- This junction is a staggered crossroads along the N28 with Church Road first and then Port of Cork access after, when coming from Shanbally
- No operational issues
- There is some queuing during the peak which clears quickly
- Speed limit along N28 60kph

Picuture 1: Approach to staggered crossroads on the N28 westbound

Picture 2: Approach to staggered crossroads on the N28 eastbound

Figure 18. Junction 16 – Church Road (R613)/ L2492

N28/SHAMROCK PLACE/L2545/RINGASKIDDY FERRY TERMINAL ENTRANCE

- Cross roads
- No operational issues
- There is little to no queuing during the peaks. Some of the major employers use the Shamrock Place arm to access their sites such as DePuy and Hovione.
- Haulbowline Naval Base and the National Maritime College of Ireland are located down the L2545
- Speed limit on Shamrock Place is is 50kph
- Speed limit on L2545 50kph

Picuture 1: Junction 16 looking towards L2492

Picture 2: Junction 16 approach from L2492

Figure 19. Junction 17 – Church Road (R613)/ L2492

CHURCH ROAD (R613)/ L2492

- T - priority junction
- No operational issues
- There is some queuing during peaks, as many of the major employers are accessed along Church Road. Queuing clears quickly. The L2492 is one of the major routes used by drivers to access some of the major employers on Church Road such as GSK and Novartis
- Speed limit on Church Road (R613) 60kph
- Speed limit on L2492 50kph

Picuture 1: Junction 16 looking towards L2492

Picture 2: Junction 16 approach from L2492

Figure 20. Junction 18 – Church Road (R613)/L2490

CHURCH ROAD (R613)/ L2490

- T - priority junction
- No operational issues
- During the PM peak there is a reasonably heavy flow and subsequent queuing as drivers looks to avoid Carrigaline village and the Shannon Park Roundabout. The queuing clears quickly
- Speed limit on Church Road (R613) 50kph
- Speed limit on L2490 50kph

Picuture 1: Junction 17 looking at Rock Road/ L2490

Figure 21. Junction 19 – Signalised Junction at Church Road (R613)/ R612

CHURCH ROAD (R613)/ L2490

- Signalised crossroads
- It was observed during site visits that there were capacity issues with this junction during the peak. There were significant queues on all arms with the southern arm having tailback as far as the LIDL roundabout. However, all queueing clears during green times.
- Speed limit 50kph

Picuture 1: Traffic building on the south arm of the signalised crossroads

Picture 2: Junction 18 on the east arm

Figure 22. Junction 20 – Signalised Junction at R612/ R611

SIGNALISED JUNCTION R612/ R611

- Signalised T junction
- Operational and capacity issues exist
- A set of pedestrian lights which are located in close proximity to the junction cause northbound traffic to become congested. This can be seen in Picture 1. This congestion continues through the village
- Speed limit 50kph

Picuture 1: The set of pedestrian lights, with traffic queuing back into the signalised junction, preventing the junction clearing and causing congestion

Picture 2: Junction 19 on the R612 approach

Figure 23. Junction 21 – Ballea Road/ Church Road (R613)/ Cork Road (R611) Roundabout

BALLEA ROAD/ CHURCH ROAD (R613)/ CORK ROAD (611) ROUNDABOUT

- Small four arm roundabout where Ballea Road and Church Road (R613) meet the Cork Road (R612)
- Capacity issues. The roundabout becomes congested at peak times, as shown in Picture 1 and 2. The congestion in the village adds to congestion at this roundabout
- The roundabout operates efficiently during off peak
- Speed limit 50kph

Picuture 1: Heavy traffic flow at the roundabout heading in the direction of the village in the PM

Picture 2: Congestion on the arm leading back towards the village in the PM

Figure 24. Junction 22 – Tivoli Access at N8/R635

TIVOLI ACCESS AT N8/R635

- Access to Tivoli Estate from North Ring Road overbridge
- Ramp access runs parallel to N8
- Pedestrian footpaths and signals provided

Picuture 1: Ramp entrance to Tivoli Port – view from N8 (west of Tivoli)

Picture 2: Tivoli Entrance from North Ring Road overbridge

Figure 25. Junction 23 – Entrance to City Quay Port on Albert Quay

ENTRANCE TO CITY QUAY PORT ON ALBERT QUAY

- Access to City Quay Port from Albert Quay, at junction with Victoria Road
- Informal access – no designated footpaths
- Parking provided on site

Picuture 1: Access to City Quay Port looking towards Albert Quay

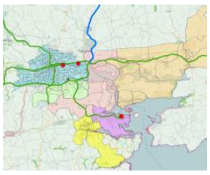
Picture 2: Parking provided at City Quay Port

APPENDIX 8.3 POC STRATEGIC TRAFFIC MODEL

Port of Cork Strategic Development 02/04/2014

Reference number 300100/12






POC STRATEGIC TRAFFIC MODEL

SYSTRA



PORT OF CORK STRATEGIC DEVELOPMENT

POC STRATEGIC TRAFFIC MODEL

IDENTIFICATION TABLE	
Client/Project owner	Port of Cork
Project	Port of Cork Strategic Development
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Reference number	300100/12
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Language	
Number of pages	40

APPROVAL

Version	Name		Position	Date	Modifications
1	Author	David Conlon	Consultant	09/09/2013	Draft Final
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2	Author	David Conlon	Consultant	28/03/2014	Final
	Checked by	Ingrid Petrie	Senior Consultant	31/03/2014	
	Approved by	Ian Byrne	Director	02/04/2014	

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1. BACKGROUND

1.1 Introduction

1.1.1 SYSTRA was appointed by Port of Cork (PoC) in March 2013 to assist them with the preparation of a Strategic Infrastructure Development (SID) application to be submitted to An Bord Pleanála (ABP), for the provision of a new container terminal and the expansion and upgrading of Port facilities at Ringaskiddy. This proposed development would accommodate the relocation of Port facilities from Tivoli and City Quays to Ringaskiddy.

1.1.2 In 2007, the PoC submitted an SID application to ABP for a container terminal and multi-purpose berth at Ringaskiddy - Oyster Bank in order to cater for future expansion of the total handling capacity of the POC facilities, as part of its Strategic Development Plan.

1.1.3 ABP refused the application in 2008 on two grounds. Firstly, it was considered that the traffic arising from the level of development proposed would generate adverse impacts on the strategic road network in and around Cork City, and specifically at the Bloomfield, Dunkettle and Kinsale Road Interchanges, and at the Jack Lynch Tunnel. The lack of a rail option/connection to transport freight from the site was the second reason for refusing the application.

1.1.4 Following the 2008 decision by ABP, the PoC undertook a fundamental review of its Strategic Development Plan and completely re-examined the future growth of its activities. As a consequence of this strategic review, which took full account of the ABP's reasons for refusal, proposals have now been developed for a smaller scale development at Ringaskiddy.

1.1.5 The Port expansion at Ringaskiddy is intended to complement a reduction of Port operations at the existing Tivoli and Cork Docklands, now being rebranded as Cork City Harbour sites, which cannot handle large vessels due to physical constraints. The Tivoli and Docklands riverside sites are very well located relative to Cork City Centre (Docklands being within 750m, and Tivoli, on the commuter Railway, being within 1.5km). As such, both sites have strong potential to be developed for urban renewal / non-industrial uses. These are mutually supportive objectives and are part of the Cork Area Strategic Plan (CASP) Strategy and the local Cork City Development Plan, which target future population and growth within the Cork Metropolitan area, with a strong reliance on the redevelopment of Cork City Harbour sites to achieve the projected growth. Furthermore, the removal of container handling facilities from the Cork City Harbour site at Tivoli would also have the benefit of reducing the number of HGVs which pass through the City Centre road network. The relocation of handling facilities for bulk goods from City Quay areas and for containers from Tivoli to Ringaskiddy are thus a very important step in creating the space for sustainable development within Cork City, which currently has very limited development land available in such well-located City areas.

1.1.6 The study area is shown below in Figure 1.

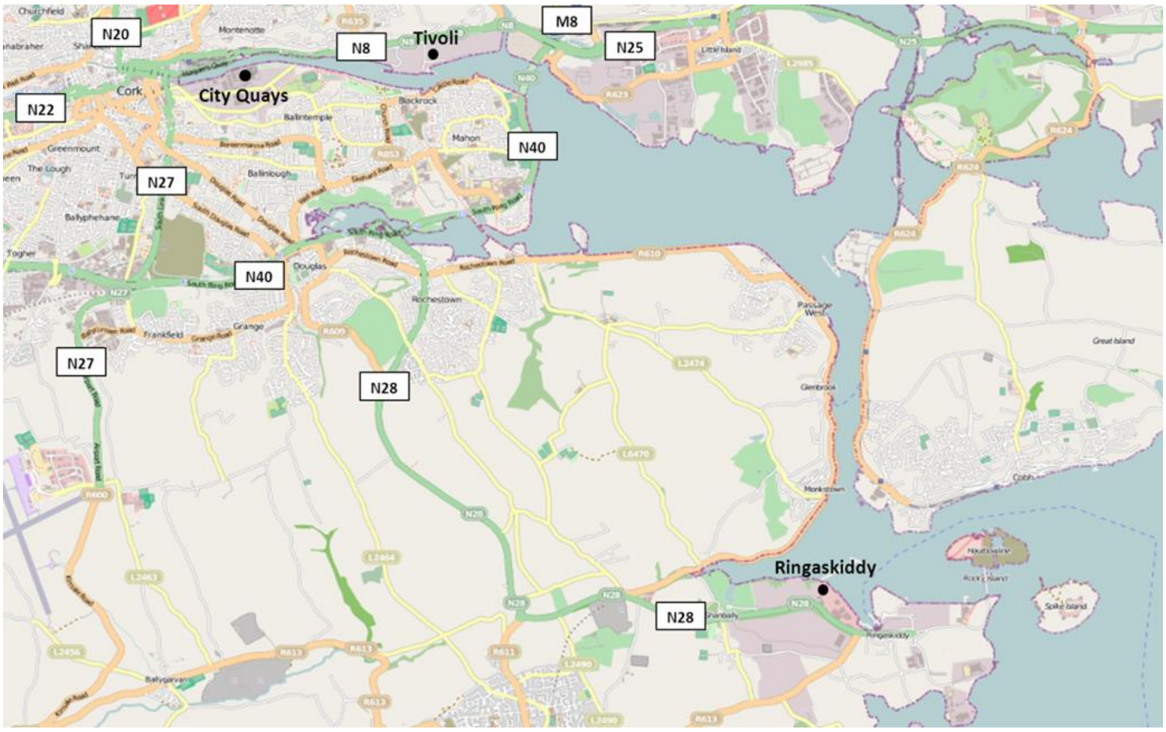

Figure 1. Map of the Study Area

1.2 Report Overview

1.2.1 In this report we describe the model development process used for the base year PoC Strategic Traffic Model, including a detailed description of the calibration process and validation statistics. Also described is the type of traffic modelling software used and the methodology used to develop the base year model. The final chapters of this report will describe the initial tests undertaken with the model and modelling results.

1.2.2 At this stage a definition of what is actually meant by Calibration and by Validation should be given, as follows.

> **Calibration** involves the correction of network and demand errors to reduce discrepancy between measured data and modelled outputs. For the purposes of forecasting it is assumed that the parameters changed during calibration remain constant over time.
>
> **Validation** tests the ability of the model to predict observed travel behaviour. Validation involves testing independent count and journey time data against flows obtained from the calibrated model.

1.2.3 The following sources on traffic model calibration/validation guidance have been used to inform the model development process and model robustness and reporting:

- Highway Capacity Manual 2000 (US);

- DMRB Volume 12 Section 2 Part 1 (UK);
- National Roads Authority Project Appraisal Guidelines, Appendix 3, Traffic Modelling;
- National Transport Authority validation criteria; and
- SATURN manual validation guidelines.

1.3 Report Structure

Chapter 2 – PoC Strategic Traffic Model Description

Chapter Two provides a high level overview of the modelling software platform employed and model dimensions such as the study area, time periods and vehicle types modelled within the PoC Strategic Access Corridor model.

Chapter 3 – Model Development

In Chapter Three the PoC Strategic Traffic Model development process is described in detail. We describe the survey data used to calibrate the model and how the road network in the area is redefined to the appropriate level of detail required by the transport assessment.

Chapter 4 – Demand Data Development

Chapter Four describes the use of Census data in developing suitable trip matrices.

Chapter 5 - Model Calibration Process and Results

Chapter Five outlines the calibration process adopted and the accuracy achieved. The calibration methods employed to ensure the PoC Strategic Traffic model is 'fit for purpose' are presented.

Chapter 6 - Validation

Chapter Six presents the validation statistics which demonstrate that the model is a suitable and robust tool for use in the transport assessment of the PoC Strategic Access Corridor area. The validation uses independent count and journey time data sets.

Chapter 7 – Summary and Conclusions

Finally, Chapter Seven provides a summary of the key points of this modelling report.

2. POC STRATEGIC TRAFFIC MODEL DESCRIPTION

2.1 Introduction

2.1.1 This Chapter describes the PoC Strategic Traffic Model with reference to the various aspects below:

- Modelling software platform used;
- Extent of the model area;
- Time periods modelled;
- Vehicle types modelled; and
- The appropriateness of this model for the analysis required by the Transport Study.

2.2 Model Software Platform: SATURN

2.2.1 The model software used is the SATURN (Simulation Assignment of Traffic to Urban Road Networks) suite of transportation modelling programs.

2.2.2 SATURN has 6 basic functions:

1) As a combined traffic simulation and assignment model for the analysis of road-investment schemes, ranging from traffic management schemes over relatively localised networks (typically of the order of 100 to 200 nodes) through to major infrastructure improvements where models with over 1000 junctions are not infrequent;

2) As a "conventional" traffic assignment model for the analysis of much larger networks (e.g., up to 6000 links in the standard PC version, 37500 in the largest);

3) As a simulation model of individual junctions;

4) As a network editor, data base and analysis system;

5) As a matrix manipulation package for the production of, for example, trip matrices; and

6) As a trip matrix demand model covering the basic elements of trip distribution, modal split, etc.

2.3 Determination of modelled time periods

2.3.1 The standard model time period for traffic simulation and assignment models is one hour, as per the guidelines listed in Section 1.2.3 above. As such, two peak-hour models were developed for the full CASP area:

AM Morning peak period:	**08:00 to 09:00;**
PM Evening peak period:	**17:00 to 18:00;**

2.3.2 The trip demand matrices for these time periods, representing a base year of 2012, were developed for the PoC Strategic Traffic Model using large amounts of survey data collected in 2012 (as described in Chapter Three of this report). The demand matrices are segregated into two vehicle types (or user classes), as follows:

User Class One - Light Vehicles (LVs). All cars, 4 wheel drive, utility and light vans; and

User class Two - Heavy Goods Vehicles (HGV's). This user class is comprised of articulated / rigid trucks and buses with two/three or more axles.

2.4 PoC Strategic Traffic Model Study Area

2.4.1 Figure 2 below illustrates the Electoral Divisions (ED) which make up the PoC Strategic Traffic Model study area. The area taken into consideration for the construction of the model expands well beyond the study area and takes into account movements originating both within Cork County and City. Chapter Four explains in detail the extent of the model network and how the origin-destination matrix was developed.

Figure 2. Study Area EDs

2.5 Appropriateness of the model for Strategic Assessment

2.5.1 For any model it is important to demonstrate that it is an appropriate tool for assessing the full range of traffic impact assessment types it is designed for. It is planned that the PoC Strategic Traffic Model will be used to assess the impact of both local and strategic interventions. It is therefore crucial that the traffic model incorporates the level of detail required for localised analysis and that it demonstrates the anticipated responses to interventions upon their realisation.

2.5.2 This modelling report will demonstrate that the model is an appropriate tool for assessing the Port of Cork Strategic Development:

- Detailing that the model calibration achieved is of an acceptable standard; and
- Validating the calibrated model against independent counts and measured journey times.

2.5.3 Within the context of the range of analysis required of the model, it must be understood that there is no one source that establishes the validation requirements of a general-purpose model. Each such model must be considered within the context for which it will be used and validated accordingly, without sacrificing any of the desirable responses listed above in return for the perfect reproduction of observed volumes on link flows

3. NETWORK DEVELOPMENT

3.1 Introduction

3.1.1 The goal in developing the PoC Strategic Traffic Model was to develop a traffic model that accurately reflects current traffic conditions in the study area for the 2012 base year, and to a sufficient level of detail to allow assessments to be made on both local and strategic interventions. To achieve this goal the model must be defined in terms of road network and trip demand representation.

3.1.2 Accurate survey information that describes the road network and traffic observations are crucial inputs to the calibration and validation process. At the outset of the calibration process the following data inputs were obtained:

- **Road Network Data:** Initial base network data was gathered using digital mapping systems such as Google Earth to obtain a high level view of the network. Following this, detailed data was gathered from site visits. Junction layout details, such as permitted or banned turns, junction priority, and signal phase timings, were collected for all junctions within the simulation network of the model.
- **Survey Data:** Comprehensive survey data gathered for other projects within the study area, such as the Douglas Land Use and Transportation Study (DLUTS) and the CASP model upgrade, were used in conjunction with commissioned counts in the study area in order to fully understand traffic conditions as they currently exist.
- **Site Visits:** To facilitate an understanding of the transport environment and the general traffic conditions experienced, a series of site visits was undertaken from 10th - 13th April 2013. During the site visits, the following actions were undertaken:

  - detailed observations of current traffic management arrangements and how they affect each mode of transport;
  - an examination of the conditions experienced by each road user type, i.e. pedestrians (including school children), cyclists, cars, buses, heavy goods vehicles and so on;
  - an examination of travel behaviours of people travelling within the study area;
  - observations of local land uses and their influence on traffic and transport arrangements; and
  - an extensive set of photographic records.

3.1.3 In addition to the site visits detailed above, the following traffic survey information was utilised to develop an understanding of existing traffic conditions:

- Traffic surveys at Tivoli and Ringaskiddy ports, including turning counts at the Ferry Terminal, conducted in May 2012;
- Road Side Interviews at Tivoli and Ringaskiddy and observations at City Quays, conducted in May 2012;

- Journey Time surveys along the N28 between Shannon Park Roundabout and Ringaskiddy, conducted May 2012;
- Automatic Traffic Counter (ATC) surveys at Bloomfield Interchange and along the N28 between Shannon Park Roundabout and Ringaskiddy, conducted May 2012;
- ATC surveys along the N28 and other roads in the vicinity of Douglas/ Rochestown, conducted April 2012;
- Manual Classified Counter (MCC) surveys along roads in the vicinity of Douglas/ Rochestown, conducted April 2012;
- MCC surveys near Dunkettle and Cork City undertaken as part of the CASP model update in November 2012;
- NRA traffic counters along the N25; and
- MCC surveys commissioned as part of this study, April 2013, at:

  - Cork Road / Church Road
  - Cork Road Bypass / Church Road

3.1.4 This data is primarily used to inform the development of the POC Strategic Access Corridor Traffic Model and to provide further information on the current traffic conditions along the corridor.

3.1.5 The survey locations are illustrated in Figure 3 below. Turning counts were taken at key junctions and give us an exact knowledge of movements within a specified junction.

3.1.6 The locations of ATC (Automated Traffic Count) surveys provide a record of traffic on the N28 along with vehicles entering and exiting at key locations. Incorporating this information enables an accurate representation of traffic flows along the N28, N40 and N8.

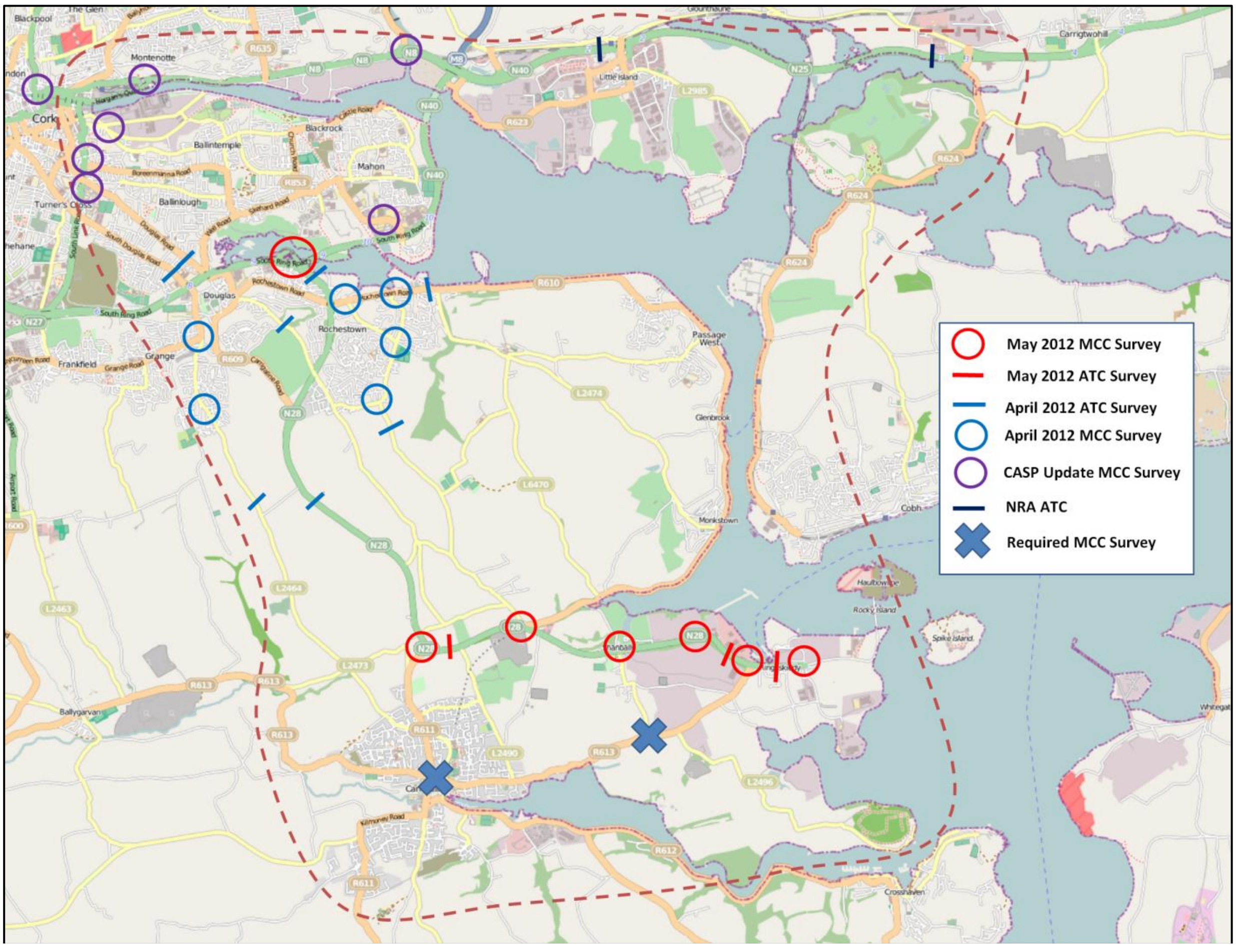

Figure 3. Traffic Survey Locations

3.1.7 The journey time surveys were conducted on the 15th of May 2012 and the routes surveyed are shown below in Figure 4. The journey time surveys were taken in both directions for the four routes. The results of the surveys are used to validate modelled journey times against observed journey times to ensure the model is outputting reliable results.

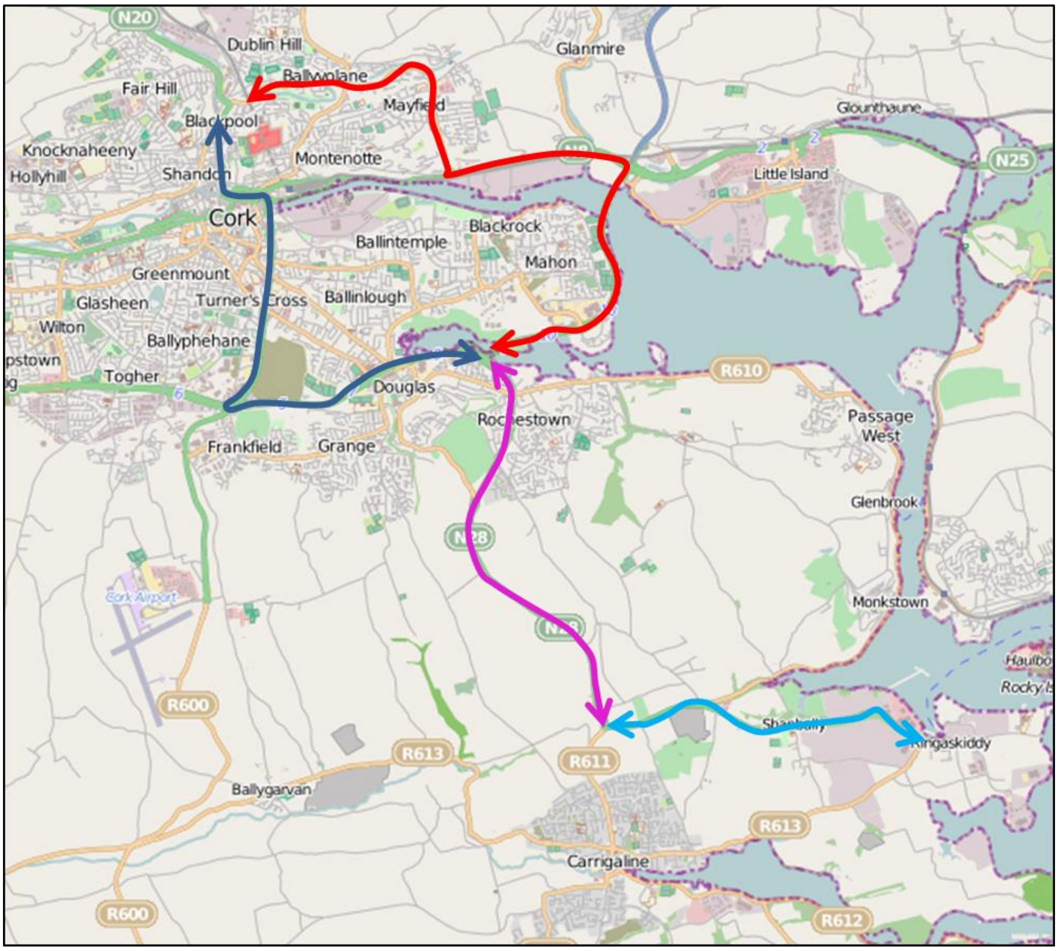

Figure 4. Journey Time Survey Routes with Average Journey Times

3.2 Highway Network Development

3.2.1 The Cork Area Strategic Plan (CASP) SATURN network, which was upgraded in 2010 for the Dunkettle interchange study, was used as a base for developing the highway network. All the inputs, as listed above in Section 3.1, were then used to enhance the network to ensure it represented, as accurately as possible, the existing Road Network.

3.2.2 The model network and area covered for the PoC Strategic Traffic Model are illustrated in Figures 5 to 7 below.

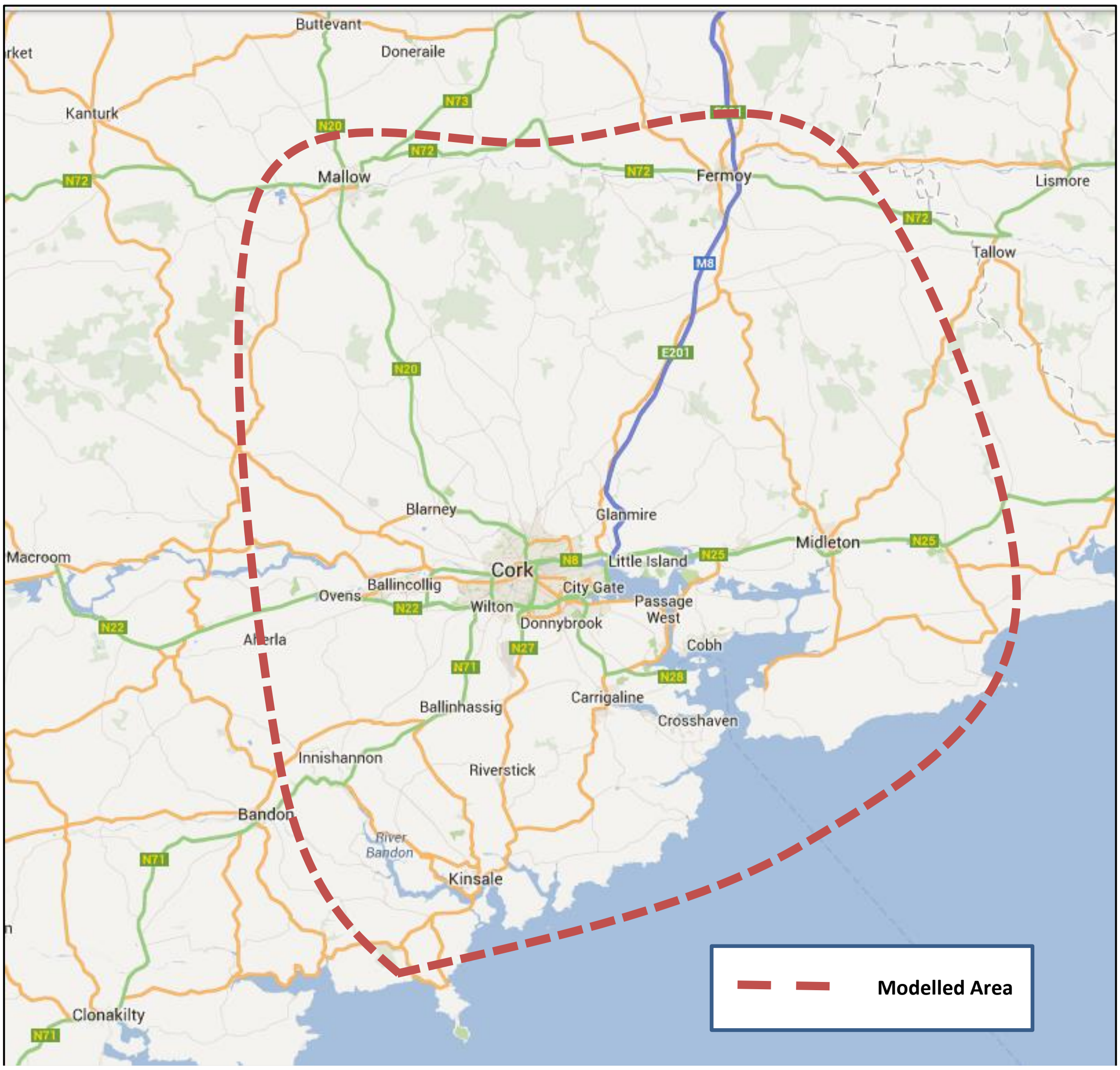

Figure 5. PoC Strategic Access Corridor Model Full Area Coverage

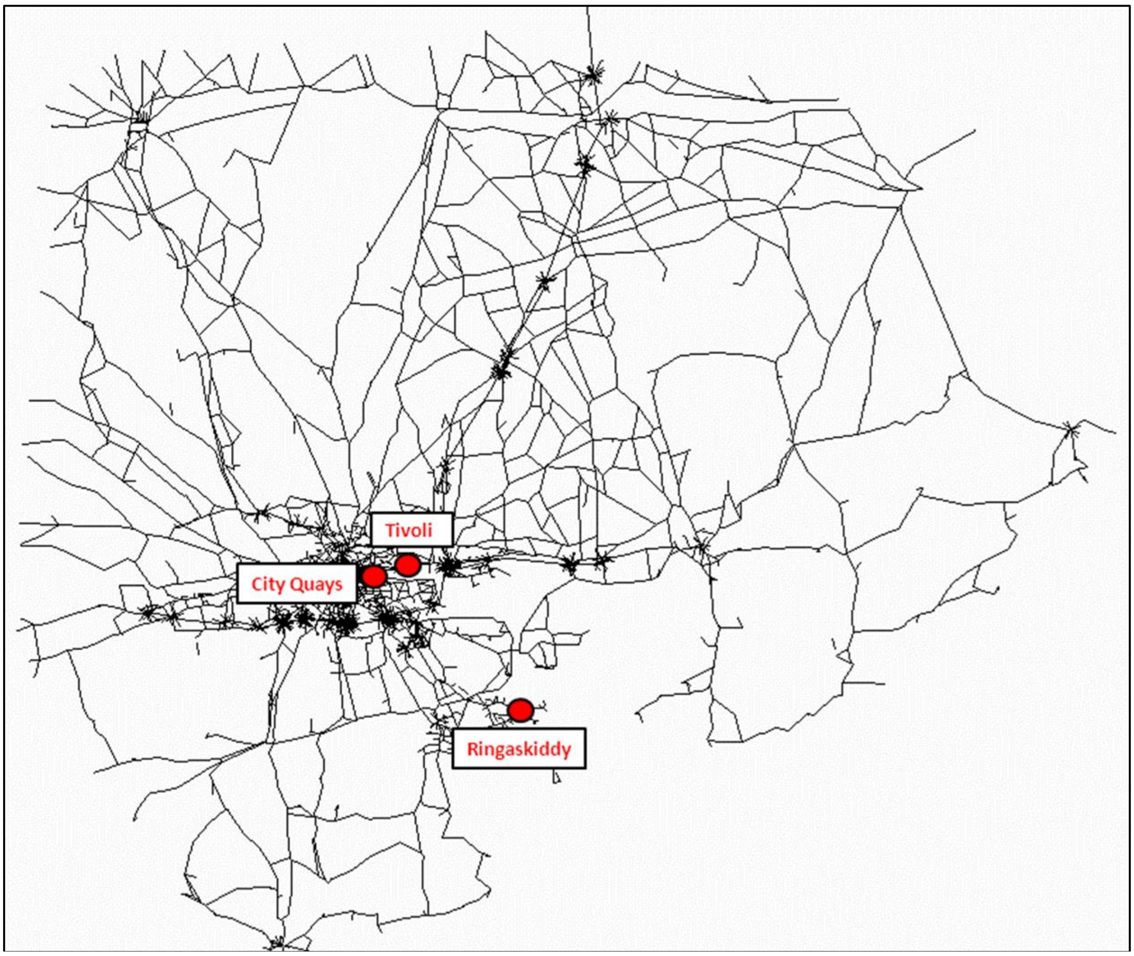

Figure 6. PoC Strategic Traffic Model Network

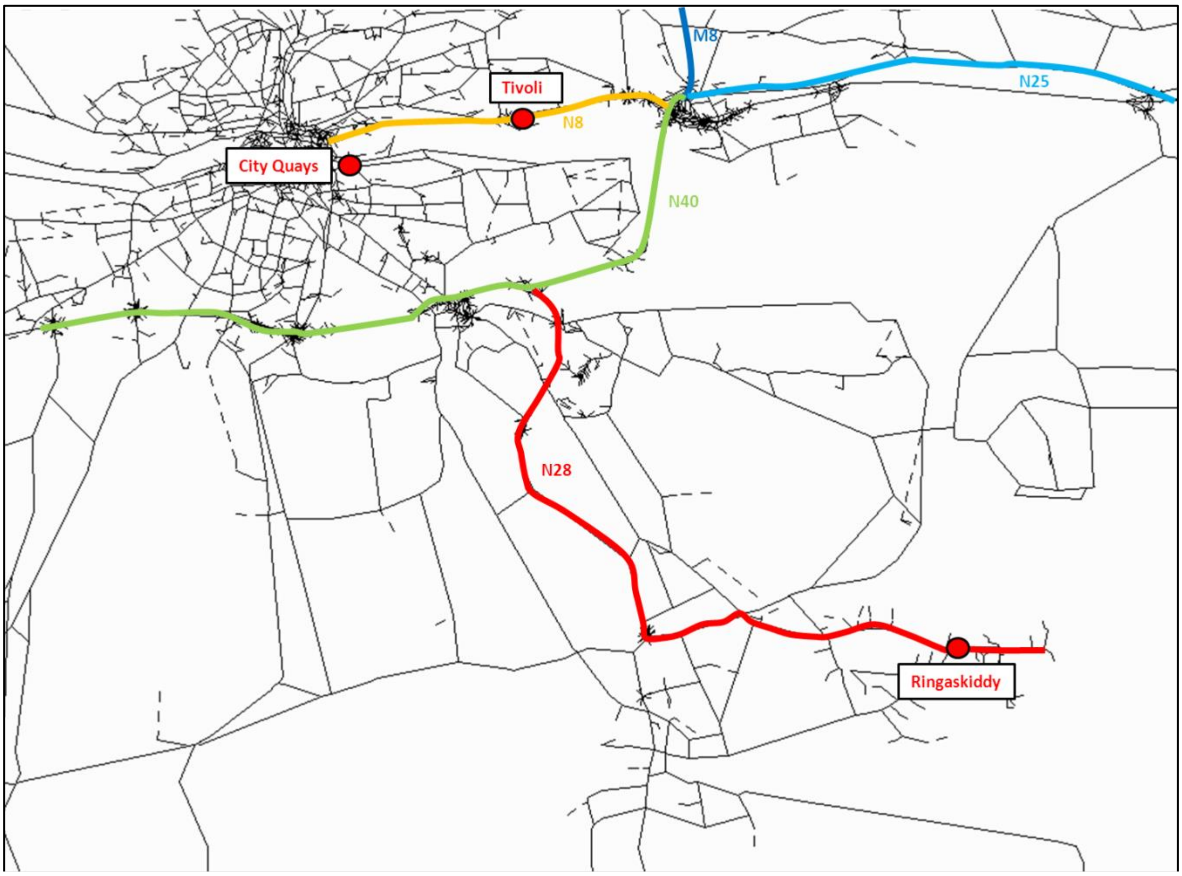

Figure 7. Study Area Model Network

3.2.3 As can be seen above, a very detailed highway network has been developed for the PoC Strategic Access Corridor. To ensure full network coverage and route choice all roads in the modelled area have been taken into account, from the national primary routes to minor residential streets.

3.2.4 A detailed zoning system has been put in place to connect to the network. Major trip production / attraction zones such as housing estates, shopping centres, schools, car parks and employment locations have all been designated as individual zones to provide detail in trip distribution between zones and destination choice.

3.2.5 Combined, the detailed network and zoning systems interact to provide a high level of detail, choice and accuracy in the model.

4. TRIP MATRIX DEVELOPMENT

4.1 Introduction

4.1.1 As with the network development, The Cork Area Strategic Plan (CASP) SATURN demand matrix, which was also upgraded in 2010 for the Dunkettle interchange study, was used as a base for developing the PoC Strategic Traffic Model demand Matrix. The 2010 CASP Dunkettle Model Matrix was combined with information from Site visits, Surveys and 2011 Census data to generate prior matrices for the PoC Strategic Traffic Model.

4.2 Zonal Aggregation and Disaggregation

4.2.1 Improvements to the network are not valuable unless accompanied by a finer representation of trip demand through the use of smaller zone sizes in the study area. Large zones within the study area were broken up based on the identification of different land uses within the zone. Each land use is then given its own distinct zone to represent a proportion of trips from the disaggregated zone.

4.2.2 As this study is particularly interested in the trips generated in the Ringaskiddy area, each of the different employers, schools, housing estates, etc. was allocated its own zone. This involved the disaggregation of the two zones which represented Ringaskiddy in the CASP Dunkettle Model into a total of 31 zones. Similarly, the zones representing Carrigaline were disaggregated to give a finer level of detail.

4.3 Pinpoint Zone Allocation

4.3.1 As mentioned in the previous section, a detailed disaggregation of zones in the study area was undertaken to ensure a comprehensive zonal system for the model. The allocation of trips to the correct zones was as equally important as the zone disaggregation.

4.3.2 In order to allocate trips to zones, the geo-coded locations of each employment destination were superimposed over a zone map of Ringaskiddy. Using land use and employment / population data for the area we were able to accurately identify the primary employment (attraction) and residential (production) zones for which to allocate large numbers of trips during the calibration stages.

4.4 Port Traffic

4.4.1 Particular attention was paid to traffic generated by the Port of Cork sites in Ringaskiddy, Tivoli and City Quays. Ringaskiddy Port was assigned two zones in the model, one representing the deep water berth and associated traffic and one representing the ferry terminal. Tivoli and City Quays were both represented by their own specific zones.

4.4.2 To ensure that an accurate level of base year traffic was allocated to the Port sites, the number of trips to and from these zones in the base year was based on a series of

Automatic Traffic Counters (ATC's) and Manual Classified Counts (MCC) which were carried out over a period of two weeks in November 2012, as described in Section 3.

4.5 PM Trip Matrix Development

4.5.1 As the majority of trips in the PM peak are usually the reverse of AM peak trips (i.e. work to home versus home to work), the PM peak demand matrix was derived by transposing the AM demand matrix. This is a standard modelling technique for developing PM matrices and converts all I-J trips in the AM matrix to J-I trips in the PM matrix and vice versa. This transposed matrix was then further refined using PM peak count information in a matrix estimation process.

4.5.2 Further details on the matrix estimation process are explained in the following chapter of this report.

4.6 Summary

4.6.1 The construction of the base year prior matrices was simplified and enhanced through use of Census data to accurately reflect the population and employment in each of the model zones. These matrices were further refined using a series of traffic count data, for the study area, in a matrix estimation process which is described further in the following chapter.

5. MODEL CALIBRATION PROCESS AND RESULTS

5.1 Calibration Process

5.1.1 Calibration is intended to improve agreement in the model between observed and modelled traffic characteristics.

5.1.2 Generally, the components of the model that may be adjusted on the demand side are the trip distribution and trip production and generation rates. This adjustment usually involves trip matrix estimation.

5.1.3 On the supply side (network), modelled junction and link characteristics may be altered if sufficient new information is available to justify changes to the existing network.

5.1.4 Other aspects of the calibration are also detailed in this chapter, such as model convergence results, which determine the stability of modelled flows with respect to successive assignment iterations.

Initial Calibration Steps

5.1.5 As an initial calibration step, all modelled movements with a corresponding turning counts were examined to determine if the count exceeded modelled capacity. Remedial steps were then taken to permit realistic flows in the model.

5.1.6 Similarly the capacity and speeds of modelled links were also checked to ensure they were broadly in line with survey information.

5.1.7 As the PoC Strategic Traffic Model was coded based on a calibrated model, and used information gathered during extensive site visits in the area, it was felt that the network coded was an accurate and up-to date representation of the existing road network, and so, did not need to be altered significantly during the calibration process. As a result of this, the most significant calibration adjustments taken were on the demand side, i.e. adjustments to trip distribution and trip production / generation. If required however, the following model parameters could be adjusted if there is clear reason for doing so:

Network Adjustment Possibilities

- Junction type (Priority, Signalised, Roundabout);
- Road lengths;
- Signal timings;
- Link free flow travel speed;
- The number of approach lanes at each junction arm;
- Traffic lane width per junction approach, and the lane discipline adopted (including prohibited turns);
- Saturation flow through junctions;
- Assumed road capacities;
- Link based flow-delay relationships;

- Any other traffic management measures that may impact on capacity, such as bus lanes, traffic calming, parking controls and cycle-lanes.
- Zone co-ordinates; and
- Zone loading points (connections to the network).

5.2 Trip Demand Adjustment (Matrix Estimation)

5.2.1 The prior matrix is adjusted only after all options for improving the network are exhausted. Any matrix adjustment must significantly improve the match between observed and modelled flows, and not introduce more trips into a zone than could realistically be expected. Controls are placed on zones to ensure that the trip demand generated by zones is sensible and in line with census population and employment statistics.

AM Matrix

5.2.2 Trip demand is adjusted according to count data, so that there is an improved agreement between counts and modelled flows. For the AM time period the AM prior matrix (described above in Chapter Four) is fed into a SATURN programme called ME2. ME2 then adjusts origin-destination patterns to produce a trip demand matrix that better replicates traffic counts when assigned to the network. When this replication is satisfactory the matrix is said to be calibrated.

PM Matrix

5.2.3 For the PM time period a transposed AM matrix was used as the prior matrix in the ME2 Process. As with the AM matrix, ME2 then adjusted origin-destination patterns to produce a trip demand matrix that better replicated PM count data when assigned to the network. Again controls were put in place to ensure that trip demand generated was sensible and that a representative number of trips were made to the shopping centres and streets in the Study Area. A number of iterations of the ME2 process were completed until the replication was satisfactory and meets guideline standards.

5.3 Matrix Adjustment Constraints

5.3.1 The algorithm driving the ME2 estimation process tends to favour reducing long trips above chains of short trips (especially when counts are spread over the entire area), which may not fully reflect reality.

5.3.2 Constraints are therefore placed on the adjustment process to protect the number of movements and the distribution of the through trips contained within the original car trip matrix. By restricting the reduction of such long through trips, the matrix adjustment algorithm is forced to create or re-distribute short trips.

5.3.3 Detailed constraints were developed using Census data and land use information. By applying standard trip rates to the land uses in each model zone it was possible to determine a range of the likely amount of trips that will originate or end in each zone.

This likely range of trips was then applied as a zone constraint during the Matrix Estimation process.

5.4 Traffic Flow Accuracy Measure: GEH

5.4.1 The GEH statistic is a measure that is used to assess the accuracy of modelled data. It considers both absolute and proportional differences in flows. Thus for high levels of flow a low GEH may only be achieved if the percentage difference in flow is small. For lower flows, a low GEH may be achieved even if the percentage difference is relatively large. GEH is formulated as:

$$\mathrm{GEH} = \sqrt{\frac{(\mathrm{observed} - \mathrm{modelled})^2}{0.5 \times (\mathrm{observed} + \mathrm{modelled})}}$$

The reason for introducing such a statistic is the inability of either the absolute difference or the relative difference to cope over a wide range of flows. For example an absolute difference of 100 pcu/h may be considered a big difference if the flows are of the order of 100 pcu/h, but would be totally unimportant for flows of the order of several thousand pcu/h. Equally a 10% error in 100 pcu/h would not be important, whereas a 10% error in, say, 3000 pcu/h might mean the difference between building an extra road lane or not.

5.4.2 In general the GEH parameter is less sensitive to the above statistical biases since a modeller would probably feel that an error of 20 in 100 would be roughly as bad as an error of 90 in 2,000, and both would have a GEH statistic of roughly 2.

5.4.3 As a rule of thumb in comparing assigned volumes with observed flows, a GEH parameter of 5 or less would be an acceptable fit, while GEH parameters greater than 10 would require closer attention.

5.4.4 Two primary guideline documents, the British Design Manual for Roads and Bridges (DMRB) Volume 12a and the NRA Project Appraisal Guidelines Appendix 3, were used as a basis for assessing the appropriateness of the highway model for traffic appraisal. The DMRB Volume 12a guidelines are a widely accepted standard in Ireland with the NRA basing their guidelines on this document that provides extremely robust validation criteria to which certain types of highway models should adhere.

DMRB Guidance on GEH Distribution

5.4.5 DMRB sets a guideline that 85% of links (when measured in vehicles per hour) should have GEH less than 5. In addition, it is commonplace to establish that 90% of assessment links have a GEH of less than 10 and that 100% of validation links have a GEH less than 20.

5.5 Link Count Calibration

5.5.1 For the calibration process, the corresponding model junction was identified for each turning movement count survey site. Each individual turning movement was used in the calibration, forcing the ME2 estimation process to derive a trip matrix that would fit each surveyed turning movement.

5.5.2 The locations for the turning movement and ATC counts are outlined above in Figure 3. As illustrated in the map, a large proportion of the study area is covered by counts, which allows for a high degree of control in the matrix estimation.

5.6 Model Fit to Counts (Prior to Calibration)

5.6.1 An initial test was performed to determine how well the existing disaggregated demand matrices assigned to the DTM replicated observed traffic volumes. Table 5.1 below details the model fit prior to undertaking the calibration process for each of the time periods modelled.

Table 5.1 Count Validation Statistics (Pre-Calibration)

GEH	AM	PM
GEH < 5	36%	59%
GEH < 10	69%	83%
GEH < 20	98%	100%
Overall Average GEH	7.5	5.5

5.6.2 The percentage of total traffic at all count locations with a GEH less than 5 is low at 36% in the AM and 59% in the PM; this falls far short of DMRB guidelines.

5.6.3 The remaining course of action to improve the fit between model flows and assigned volumes was therefore to perform controlled adjustments to the prior matrix using matrix estimation techniques (as described above in Section 5.2).

5.7 GEH Statistics for Calibrated Model

5.7.1 Table 5.2 below summarises the GEH calibration results for the model after the matrix estimation process, for each of the two modelled time periods.

Table 5.2 Count Validation Statistics (Post-Calibration)

GEH	AM	PM
GEH < 5	89%	90%

GEH < 10	97%	98%
GEH < 20	100%	100%
Overall Average GEH	2.5	2.0

5.7.2 The figures demonstrate that an excellent calibration has been achieved in the model for the morning and evening peak periods, with both time periods having an overall GEH of over eighty five percent, falling well within DMRB Standards.

5.8 Linear Regression of Counts and Modelled Flows

5.8.1 DRMB recommends a further check on flow validation: to fit a linear regression line through the origin with observed flow as the independent variable and modelled flow as the dependent variable. The slope and R2 measure of goodness of fit pre-calibration and post-calibration are presented in Table 5.3 and Table 5.4.

5.8.2 DMRB guidance is that the slope of the regression line is in the range 0.9 to 1.1 and that R2 is greater than 0.85.

Table 5.3 Pre-Calibration Count Regression Analysis

MEASURE OF FIT	AM	PM
Slope	0.77	0.92
R^2	0.78	0.95

Table 5.4 Post-Calibration Count Regression Analysis

MEASURE OF FIT	AM	PM
Slope	0.98	1.00
R^2	0.99	0.99

5.8.3 Both slope and R^2 criteria are met in the post-calibration regression analysis.

5.8.4 The following charts show the correspondence between count and modelled flow data sets, with the best fit linear match plotted on each graph. The two graphs shown are for the prior and post calibration data sets, to show how the relationship between observed and modelled flows is improved by calibration.

5.8.5 Figures 8 to 11 illustrate the fit achieved between the modelled and measured link flow for the pre-calibration and post-calibration trip matrices for each of the time periods modelled. The data points are distributed closely to the y = x straight line without any significant outliers. This uniformity is reflected in the R^2 values detailed in Table 5.4 above.

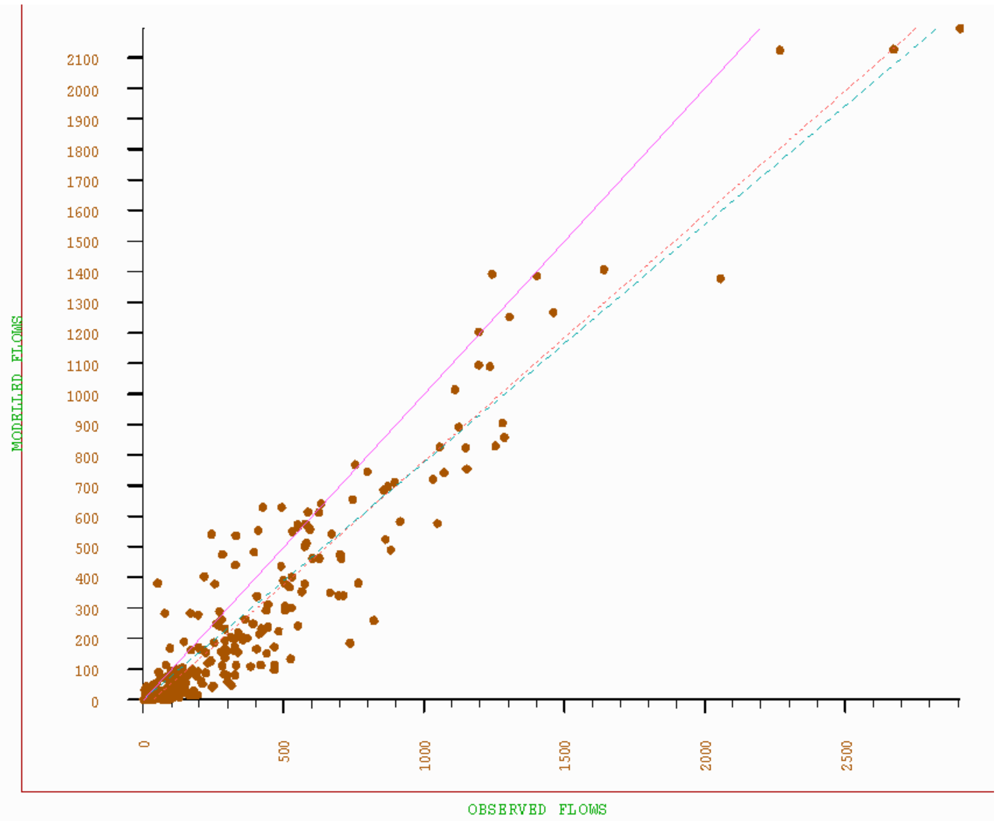

Figure 8. Pre-Calibration Fit of Observed Vs Modelled AM-Peak Flows

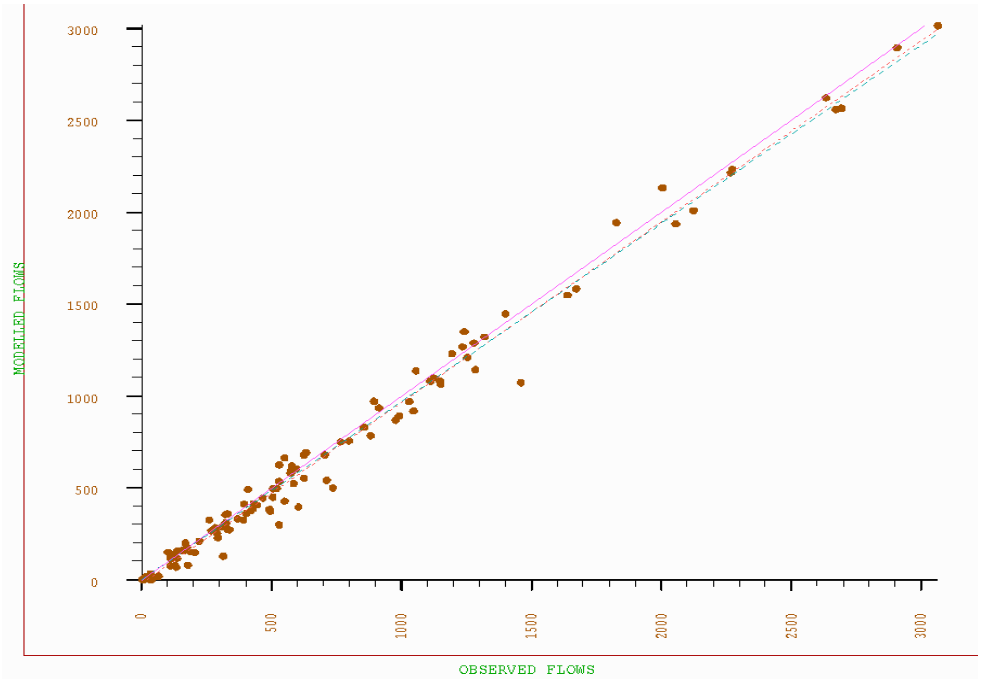

Figure 9. Post-Calibration Fit of Observed Vs Modelled AM-Peak Flows

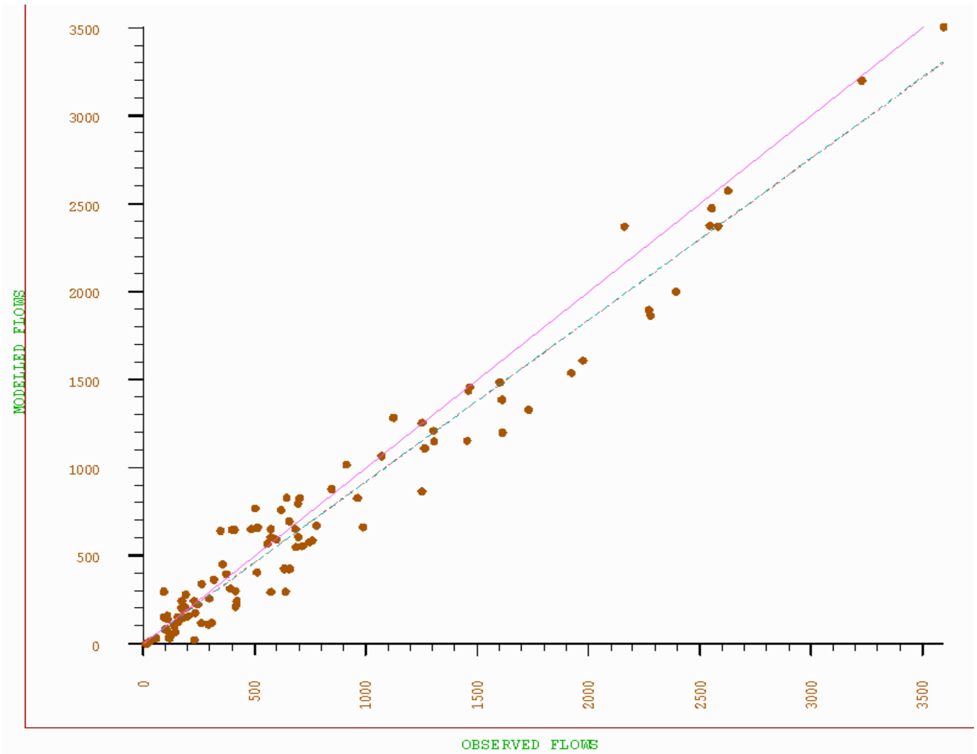

Figure 10. Pre-Calibration Fit of Observed Vs Modelled PM-Peak Flows

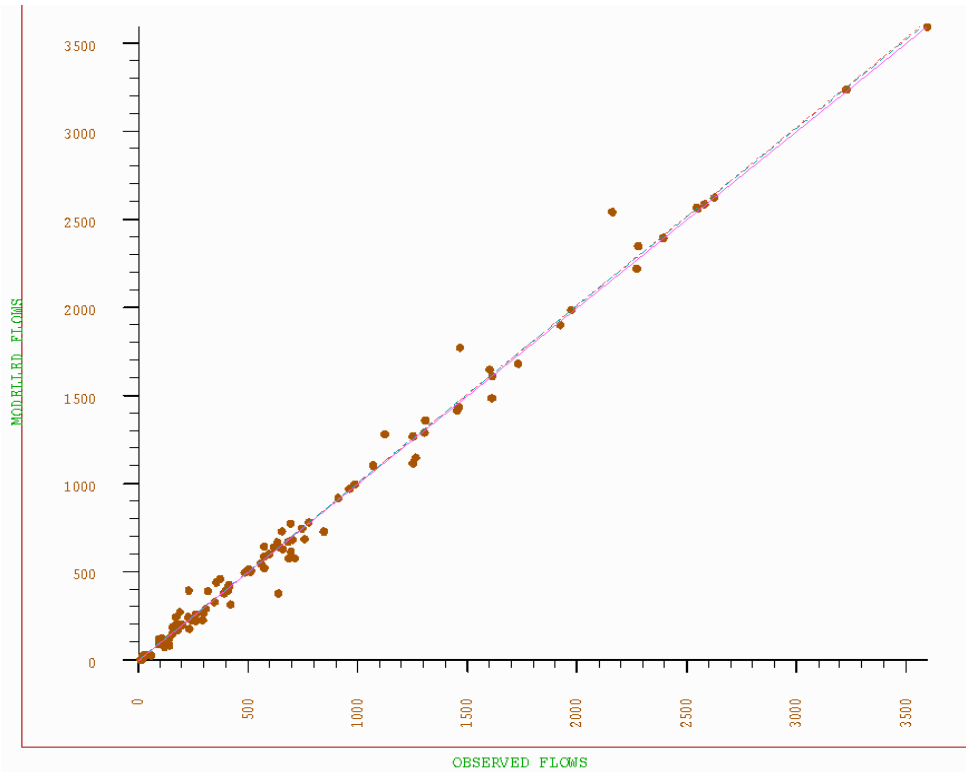

Figure 11. Post-Calibration Fit of Observed Vs Modelled PM-Peak Flows

5.9 Model Convergence

5.9.1 The parameter used by Saturn to monitor the rate of convergence is the percentage of link flows which vary by less than a specified percentage between loop n and loop n-1.

5.9.2 The values used in each assignment during calibration are that 98% of links should differ by less than 5% between subsequent iterations.

5.9.3 This convergence criterion is achieved for all assignments carried out in calibrating the model.

5.10 Trip Length Distribution

5.10.1 A further calibration step is to compare trip length distributions for the prior and post calibrated matrices to ensure they have not been distorted in any way by the ME2 process.

5.10.2 Trip length distribution is compared below for the Light Vehicle matrix for the AM and PM peak periods. The number of trips made is shown on the y-axis. Distance bands are shown on the x-axis. The data shows that there is little difference evident in terms of how trip distribution was adjusted by the overall matrix adjustment process.

5.10.3 The trip length distribution of the prior (red line) and post-calibration (blue line) matrices for both the AM and PM peak period are shown below in Figures 12 and 13. The data shows that the ME2 process has added some trips to the matrix. These trips represent other non-work related trips which would have been absent from the initial prior matrix and so it is considered that the Matrix estimation has worked correctly in this instance and 'in-filled' missing trips that were absent from the original prior matrix.

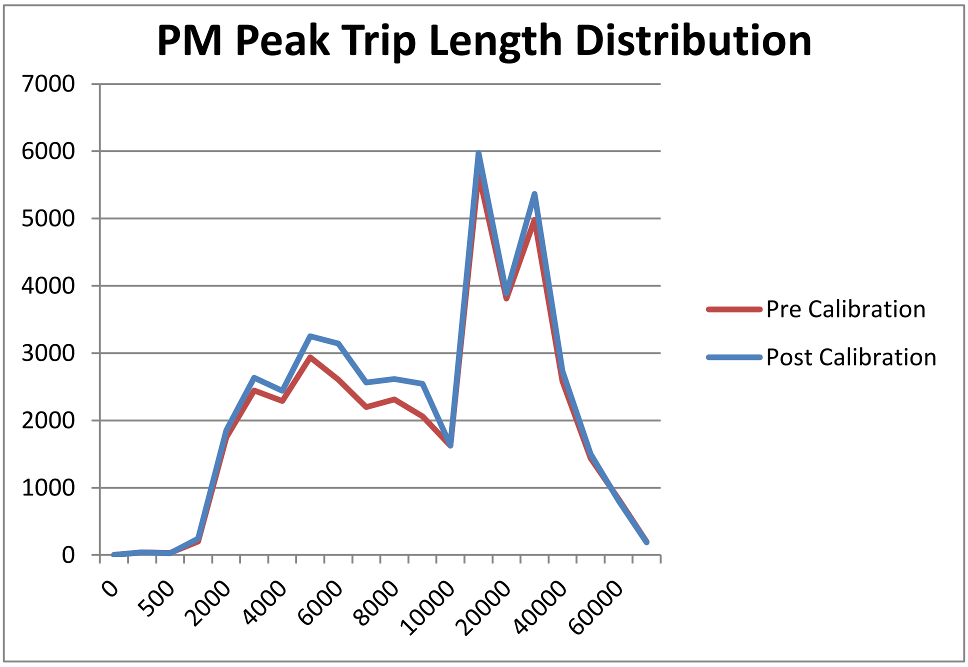

Figure 12. LV trip length distribution in AM Peak

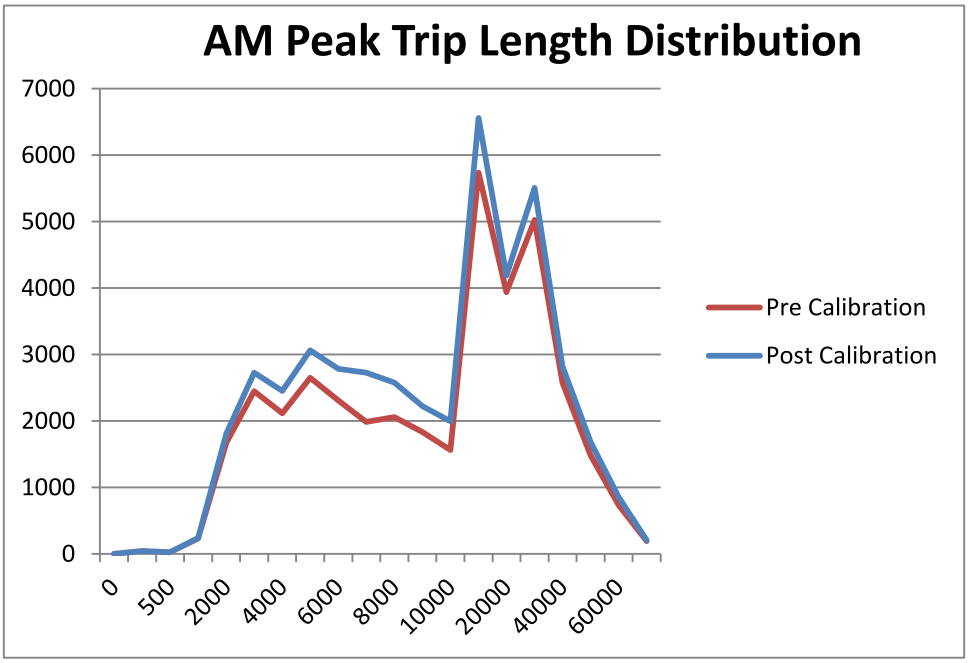

Figure 13. LV trip length distribution in PM Peak

5.11 Summary of Calibration Actions

5.11.1 To improve the agreement between the observed and modelled traffic characteristics, a number of calibration steps were taken for the PoC Strategic Traffic Model.

The first and most significant of these was to carry out a matrix estimation for each of the modelled period matrices to ensure origin-destination patterns in the model were consistent with those observed during traffic count surveys.

Following on from the matrix estimation process, a link count calibration was carried out. During this stage, modelled flows for each time period were compared with actual flows. The results of these comparisons (outlined in Table 5.4) show an excellent calibration between modelled and observed flows with all time periods falling well within DMRB and NRA Project Appraisal guidelines.

Further calibration checks carried out on the PoC Strategic Access Corridor Traffic Model include linear regression analysis and trip length distribution analysis. All of which demonstrated that the model is very stable and meets all DMRB criteria for model calibration.

6. VALIDATION

6.1 Introduction

6.1.1 This section sets out additional comparative measures by which the robustness of the calibrated model may be judged. The following model performance characteristics are detailed:

- Comparison of modelled traffic flows to each individual survey location; and
- Comparison of modelled journey times to observed journey times

6.2 Individual Survey Location Validation

6.2.1 Modelled flows were compared with 97 AM and 97 PM link flows. These junctions were chosen to provide a wide geographical spread of validation locations around the modelled area of interest.

6.2.2 DMRB presents additional guidelines for traffic flow validation. These guidelines are that 85% of modelled links should satisfy the following criteria when comparing with observed data:

- flows within 100 for links with flow less than 700 vehicles per hour;
- flows within 15% for links with flow between 700 and 2,700 vehicles per hour; and
- flows within 400 for links with flow over 2,700 vehicles per hour.

6.2.3 The results in Table 6.1 below were obtained when testing all individual link counts throughout the model under the three criteria set out above.

Table 6.1 Turning Count Validation - % Links Satisfying Alternative DMRB Criteria

DMRB CONDITION	AM	PM
Flow < 700; modelled within 100	90%	89%
700 < Flow < 2750; modelled within 15%	89%	94%
2750 < Flow; modelled within 400	100%	100%

6.2.4 All of the alternative DMRB criteria are entirely satisfied for the post-calibration trip matrix.

6.3 Journey Time Validation

6.3.1 Travel time surveys were obtained by SYSTRA as part of this study. Survey times were taken along four routes in both directions. Along each route, the journey time was taken at a series of different survey points in order to properly observe the journey time along stages of the route.

6.3.2 The journey time survey routes are illustrated in Figure 14 below and were as follows:

Light Blue Route: N28 Shannonpark Roundabout to N28/Ferry Terminal

Pink Route: N28 Shannonpark to N28 Bloomfield Interchange

Blue Route: N28 Bloomfield Interchange to N20/North Ring Road

Red Route: N20/Blackpool shopping centre to N28 Bloomfield Interchange

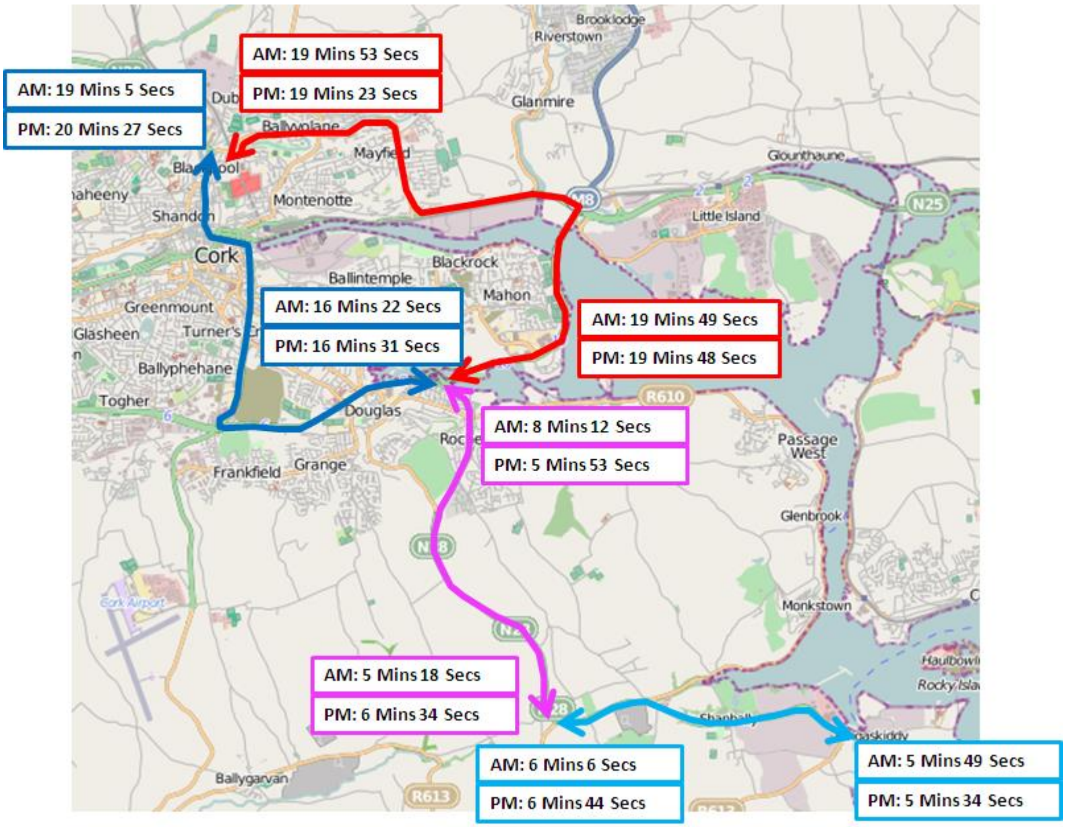

Figure 14. Journey Time Survey Routes

AM Journey Times

6.3.3 Table 6.2 below summarises the journey travel times against the model times for these four routes in the AM peak modelled periods.

Table 6.2 Observed Vs Modelled Journey Times during the AM Peak

ROUTE	OBSERVED TIME (SECONDS)	MODELLED TIME (SECONDS)	% DIFFERENCE
Light Blue Route WB	367	325	11%
Light Blue Route EB	346	415	20%
Pink Route SB	308	348	12%
Pink Route NB	532	462	13%
Blue Route SB	995	1037	4%
Blue Route NB	1265	1005	20%
Red Route SB	1256	1131	9%
Red Route NB	1299	1144	12%
Routes Combined	6368	5964	6%

6.3.4 The DMRB guidelines advise that modelled journey times should be within 15% of the observed time. Seven out of nine of the routes surveyed in the AM peak satisfy these criteria.

6.3.5 The first of the routes which does not meet the DMRB criteria is the Light Blue Route eastbound which has a modelled time 20% greater than the observed journey time, indicating that modelled flows on this route are slower than those observed during the journey time surveys. However, during a number of site visits to the area significant levels of queuing were observed eastbound through Shanbally Village which are not represented in the original journey time surveys. Therefore it was concluded that the extra delay in the model was realistic and representative of the delay that occurs on this section of the N28 during the AM peak.

6.3.6 The second route to fall outside the DMRB guidelines was the Blue Route northbound. Closer analysis of this route (shown below in Figures 15 and 16) showed an excellent correlation between observed and modelled journey times on the section of the route covering the N40 and N27. The difference between observed and modelled journey times on this section was only 4%. The journey times on the section of the route which passes through Cork City Centre are faster in the model than those observed. However, as this model focuses on the PoC Strategic Access Corridor, it was decided that results on the section not corresponding directly to the study area were not as significant as those inside the study area, so these differences are considered to be acceptable.

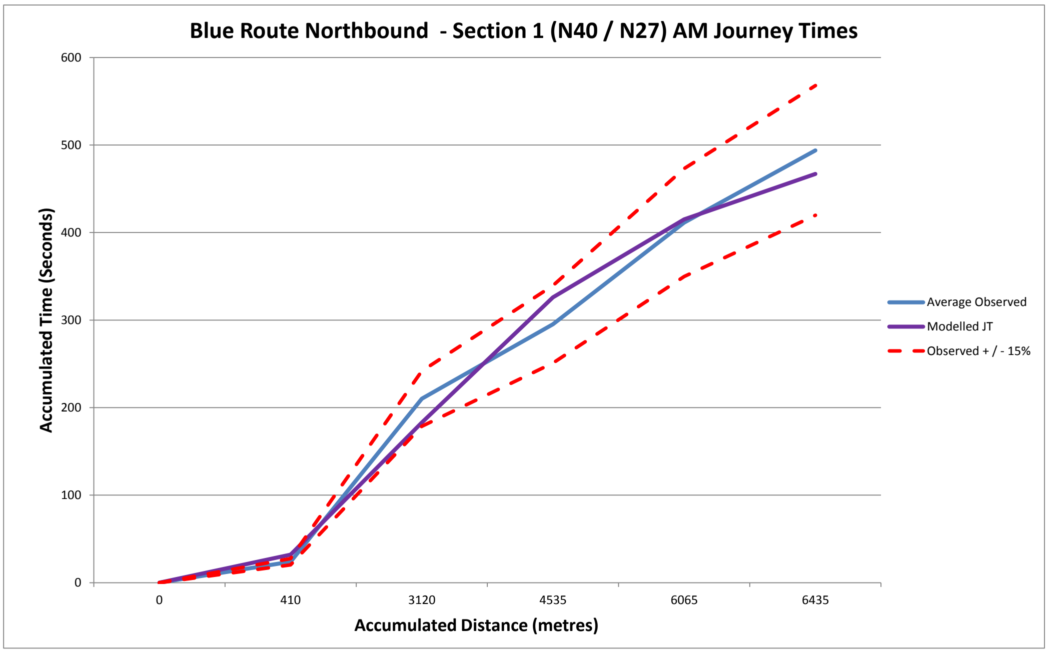

Figure 15. Blue Route NB – Section 1 Journey Times

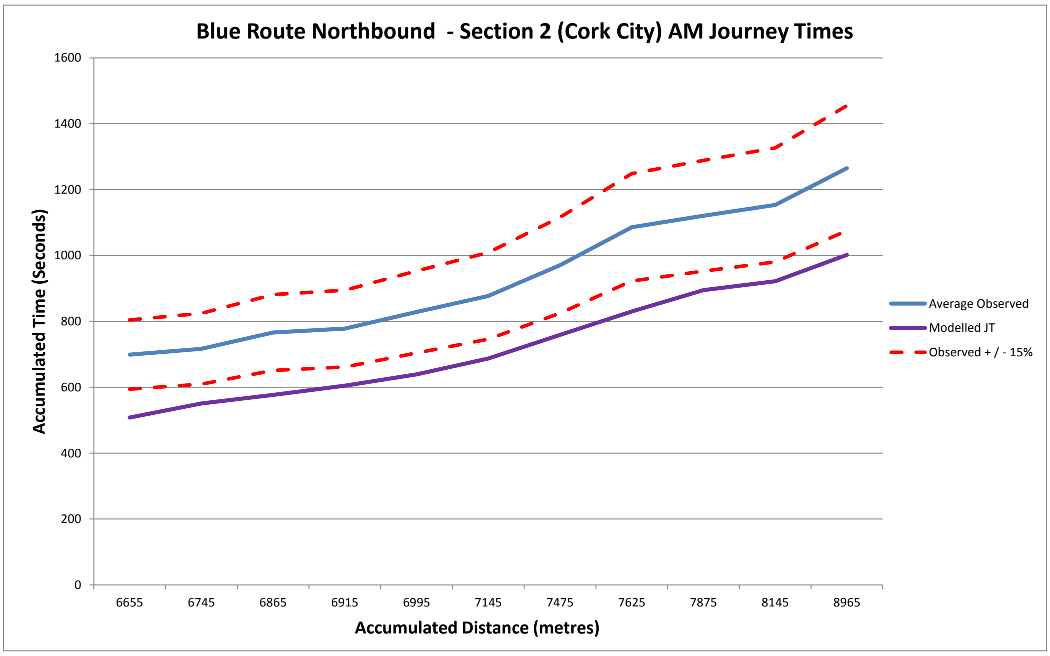

Figure 16. Blue Route NB – Section 2 Journey Times

PM Journey Times

6.3.7 Table 6.3 below summarises the journey travel times against the model times for the same routes for the PM peak modelled period.

Table 6.3 Observed Vs Modelled Journey Times during the PM Peak

ROUTE	OBSERVED TIME (SECONDS)	MODELLED TIME (SECONDS)	% DIFFERENCE
Light Blue Route WB	395	354	10%
Light Blue Route EB	335	319	4%
Pink Route SB	380	337	11%
Pink Route NB	352	358	1%
Blue Route SB	1012	1099	8%
Blue Route NB	1221	984	19%
Red Route SB	1249	1052	15%
Red Route NB	1218	1068	12%
Routes Combined	6162	5571	9%

6.3.8 The DMRB guidelines have been met for eight out of nine of the routes surveyed in the PM peak. The one route which just misses out on reaching the DMRB criteria is the Blue Route northbound. Similar to the AM peak there is a good level of correlation between the observed and modelled flows on the section of this route which is within the study area (7% difference between modelled and observed in this case).

7. CONCLUSIONS

7.1 Overview

7.1.1 This report documents the development, calibration, and validation of the PoC Strategic Traffic Model for a base year of 2012.

7.1.2 Two one-hour models were calibrated and validated. These are the AM peak period from 08:00 to 09:00 and the PM peak period from 17:00 to 18:00.

7.1.3 Traffic flow calibration and validation indicates that the correlation between modelled and observed flows is excellent for the PoC Strategic Traffic Model area for all periods modelled.

7.1.4 The traffic flow validation of 97 AM and 97 PM individual link flows is acceptable using both the standard guidelines and the alternative criteria outlined by the DMRB. The regression analysis also indicates that there is no strong bias in the modelled flows.

7.1.5 The resulting conclusion is that the highway assignment model is fit for purpose. It represents AM and PM peak period base year traffic conditions well, as demonstrated statistically in Chapters Five and Six. It provides a robust basis for assessing impacts on the road network with the introduction of large scale developments for the following reasons:

> The model realistically represents journey times;
>
> The study area is covered by a large number of counts for both calibration and validation; and
>
> Regression analysis indicates a high correlation between modelled and observed flows and no strong biases.

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APPENDIX 8.4 2024 BASELINE REPORT

Port of Cork Strategic Development

28/01/2025

Reference number IE01T24B02

BASELINE REVIEW

PORT OF CORK STRATEGIC DEVELOPMENT

BASELINE REVIEW

IDENTIFICATION TABLE	
Client/Project owner	Port of Cork
Project	Port of Cork Strategic Development
Study	Baseline Review
Type of document	Baseline Report
Date	28/01/2025
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Version	Name		Position	Date	Modifications
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	Checked by	Clifford Kileen	Associate Director	18/12/2024	
	Approved by	Clifford Kileen	Associate Director	20/12/2024	
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	Reviewed by	Amin Rezaei	Principal Consultant	27/01/2025	
	Checked by	Clifford Kileen	Associate Director	28/01/2025	

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1. INTRODUCTION

1.1 Background

The Port of Cork Company (PoCC) was granted a 10-year Strategic Infrastructure Development (SID) permission by An Bord Pleanála on 28th May 2015 for the redevelopment of the port at Ringaskiddy (Planning reference PA0035). Much of the work permitted under the permission has been completed and the Ringaskiddy Container Terminal commenced operations in 2022. However, some elements of the permitted project remain to be developed. The planning permission expires on the 20th of October 2025, and it will not be possible to complete all the remaining elements of the permission within the lifetime of the current permission.

As it will not be possible to extend the duration of permission of the SID, PoCC intend to apply for a 10-year permission to construct the remaining elements of the permitted development. The remaining redevelopment works include the extension to its deep-water berth at Ringaskiddy West, provision of a second Cork Container Terminal at Ringaskiddy East, provision of the roll-on / roll-off ramp and ancillary works. The remaining elements of the permission will require an EIA and AA.

SYSTRA have been appointed by PoCC to assist with the preparation of the updated Strategic Infrastructure Development (SID) application to be submitted to An Bord Pleanála (ABP), in relation to Traffic and Transportation. This Baseline Report describes the existing situation at Ringskiddy, Tivoli, and City Quays locations.

1.2 Need for the Project

Since 2014, PoCC has been working to progressively shift its services and facilities from Cork City Centre to the Lower Harbour, driven by the growing size of vessels and the increasing difficulty of accommodating them at the City Docks and Tivoli Docks. This relocation is also in response to the global demand for reliable, safe, and high-performing port facilities situated in deeper waters near primary shipping routes.

Commercial growth projections indicate a pressing need to provide for future expansion in the short, medium, and long term. The Port of Cork Masterplan 2050 predicts that the Cork Container Terminal (CCT) will reach capacity by 2025, necessitating continued operations at Tivoli Docks until the Lower Harbour facilities are fully expanded. Additionally, the population of Cork City, currently over 210,000, is expected to grow by 105,000 to 125,000 by 2040, which will further increase the volume of goods transiting through the Port of Cork. Therefore, the expansion of the Ringaskiddy Port facilities is crucial to accommodate this growth and ensure the Port of Cork remains a vital link in global trade networks.

The Port of Cork Masterplan projections anticipate that additional commodities and cargoes will be moved from the City Docks to Ringaskiddy, by 2030. This is subject to the delivery of the planned deep water berth extension of 231m, required to handle an additional 2 million tonnes of dry bulks and project cargoes per year. The Port of Cork Masterplan 2050 anticipates that an additional 7.8ha of off-site landside storage will be needed to facilitate this operational capacity.

1.3 Overview of the Current Report

The current study conducts new assessments to describe the existing traffic situation in 2024 at Ringaskiddy and its connecting roads to the Cork City Quay locations, with a special focus on the N28 traffic. It aims to provide greater insight into the traffic issues in these areas in light of the recent traffic survey conducted this year.

The focus of this Baseline Report is to provide:

- Information on the travel patterns of PoC-related traffic, including vehicles transporting goods to and from port sites, as well as employees, and understanding their needs and views;
- A summary of current traffic conditions in the study area, in terms of infrastructure for each transport mode, utilisation of the infrastructure, and conditions experienced; and
- A review of national and regional guidelines, along with other transport studies relevant to the study area, specifically detailing the relative objectives and outcomes of each.

The study area for this investigation encompasses the three port sites: Ringaskiddy, Tivoli, and City Quays. It also includes all relevant major connecting roads, such as the N28, N40, Jack Lynch Tunnel, and Dunkettle Interchange. **Figure 1** below illustrates the extent of the study area.

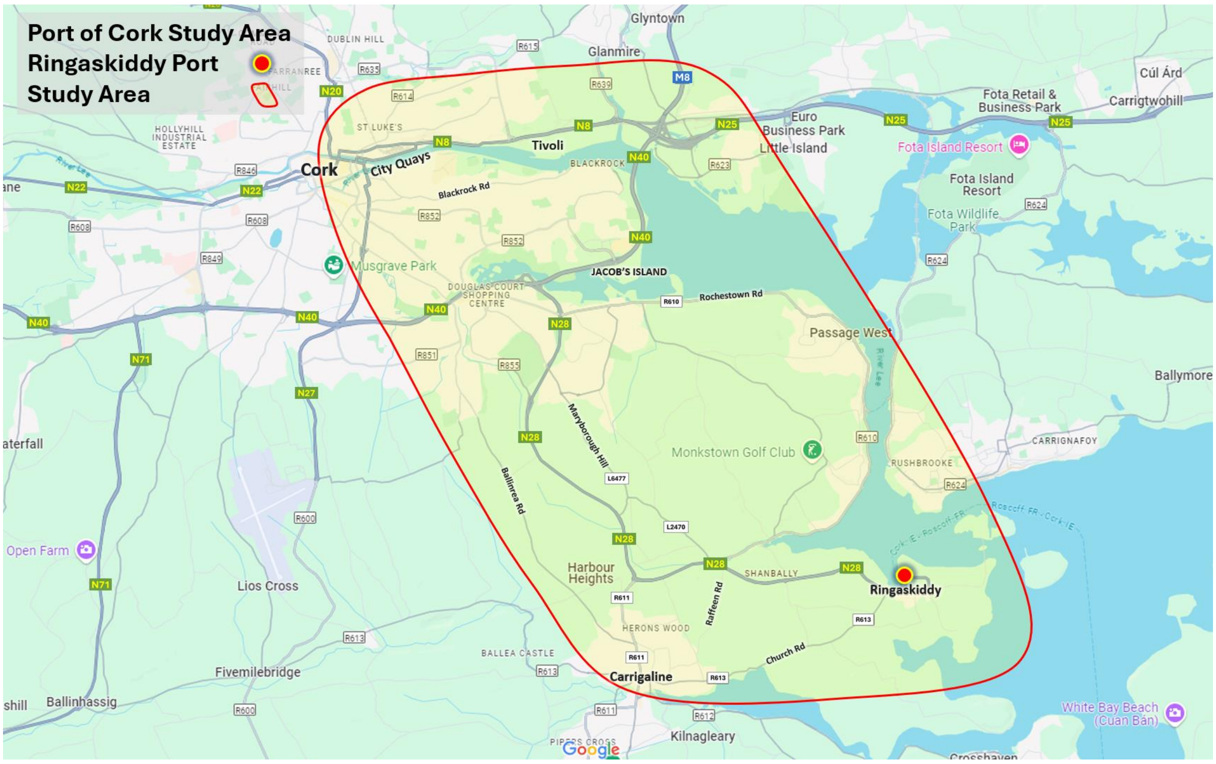


Figure 1. Study Area

1.4 Methodology for Developing Transport Baseline

1.4.1 Site Visits

In order to facilitate an understanding of the transport environment and the general traffic conditions experienced, a series of site visits were undertaken in October and November 2024.

During the site visits, the following actions were undertaken:

- Detailed observations of current traffic management arrangements and their effects on each mode of transport;
- An examination of the conditions experienced by each type of road user, including pedestrians (such as school children), cyclists, cars, buses, and heavy goods vehicles;
- An analysis of travel behaviours of people [travelling] within the study area;
- Observations of local land uses and their influence on traffic and transport arrangements; and
- The compilation of an extensive set of photographic records.

1.4.2 Traffic Surveys

In addition to the site visits detailed above, a series of traffic surveys were conducted in November 2024. These surveys were aimed at developing an understanding of the existing traffic conditions in the study area, which will later be used in the development of the PoC Strategic Traffic Model.

The traffic surveys undertaken for this study include the following:

- Junction Turning Counts (JTCs) at 33 junction locations along the N28, Ringaskiddy, Carrigaline, and key junctions near the city quays, as well as those that directly impact traffic to these areas;
- Automatic Traffic Counts (ATCs) at 10 link locations where traffic data is not captured by the defined JTCs, including some link locations deemed important for monitoring traffic, such as Ballinrea Road.
- Journey Time (JT) surveys on the national roads within the study area, divided into four sections. These sections cover the N28 from Ringaskiddy to the N40 (Douglas Flyover); from there to Blackpool via the N27-N20; from Blackpool to the Dunkettle Interchange via the N8; and finally, the JT survey concludes back at the Douglas Flyover, completing the loop.

Chapter 4 of this report provides detailed information on the traffic surveys, including location maps for each, and discusses the existing traffic movements.

1.5 Structure of Baseline Traffic Report

The remainder of this report is structured as follows:

- Chapter Two presents some of the key findings from the assessment of Census data, including population, age distribution, car ownership, mode share of travel, and journey time to work and education.
- Chapter Three provides a summary of relevant planning and policy documents related to transport issues along the port access corridor at local, regional, and national levels.
- Chapter Four discusses the traffic movements within the study area. This includes the results of the 2024 traffic surveys conducted on the key links and junctions within the study area, along with an assessment of the traffic movements to and from Ringaskiddy port.
- Chapter Five evaluates the traffic management arrangements related to the road network in the study area and identifies the main issues that may require attention. This review covers motorways, national roads, local roads, and an evaluation of the key junctions that manage traffic to and from Ringaskiddy port.

2. TRANSPORTATION CONTEXT

2.1 Context

This chapter considers the Port Access Corridor (i.e. the N28, N40, N8 and N25) in a transportation context and considers the following aspects:

- Overview of the N28 Corridor and its Environs; and
- Evaluation of Census Data.

2.2 Overview of the N28 Corridor and Its Environs

2.2.1 Land Use

The primary land use of Ringaskiddy is industrial and employment-related, with some residential, educational, and recreational land uses. The land uses which represent key destinations for trips in the Ringaskiddy area are located outside Ringaskiddy village, which is home to numerous large multinational companies.

In addition, the large deep-water harbour port facility is located in Ringaskiddy which serves as a hub for international freight and passenger traffic, including the weekly continental passenger ferry between Cork and Roscoff, which arrives in Cork every Saturday.

2.2.2 Road Hierarchy

The roads in the Ringaskiddy study area include Motorway and National Primary Roads, National Secondary Roads, and Regional Roads. **Figure 2** below illustrates the road hierarchy in the study area.

The national primary roads pass through the study area are as follows:

- N28 – Cork City to Ringaskiddy: This route offers connections from the wider national road network via the N40 to the major employers based in Ringaskiddy and Carrigaline, as well as to the national sea freight port and passenger terminal in Ringaskiddy;
- N40 – Cork South Ring Road: This major national distributor road allows access to the wider national road network, including the M8/N8 and the N25, via the Dunkettle interchange; the N27 via the Kinsale Road Interchange; the N20 via the N27 and the City Centre; and the N22 and N71 via the Bandon Road Interchange.
- M8/ N8 – Cork City to Dublin;
- N20 – Cork City to Limerick City;
- N22 – Cork City to Tralee/ Killarney to the west;
- N25 – Cork City to Waterford/ Rosslare Europort to the east; and
- N27 – Cork City to Cork Airport.

There is one National Secondary route in the study area, which is:

- N71 – Route between Cork City and Bandon, extending further south and south-west which can be accessed via the N40 South Ring Road or the N22.

The following are the regional and third-class roads in the study area:

- R610 – Cork City through Douglas and Passage West;
- R618 – Iniscarra Road;
- R635 – North Ring Road; and
- R639 – the old N8 primary road.

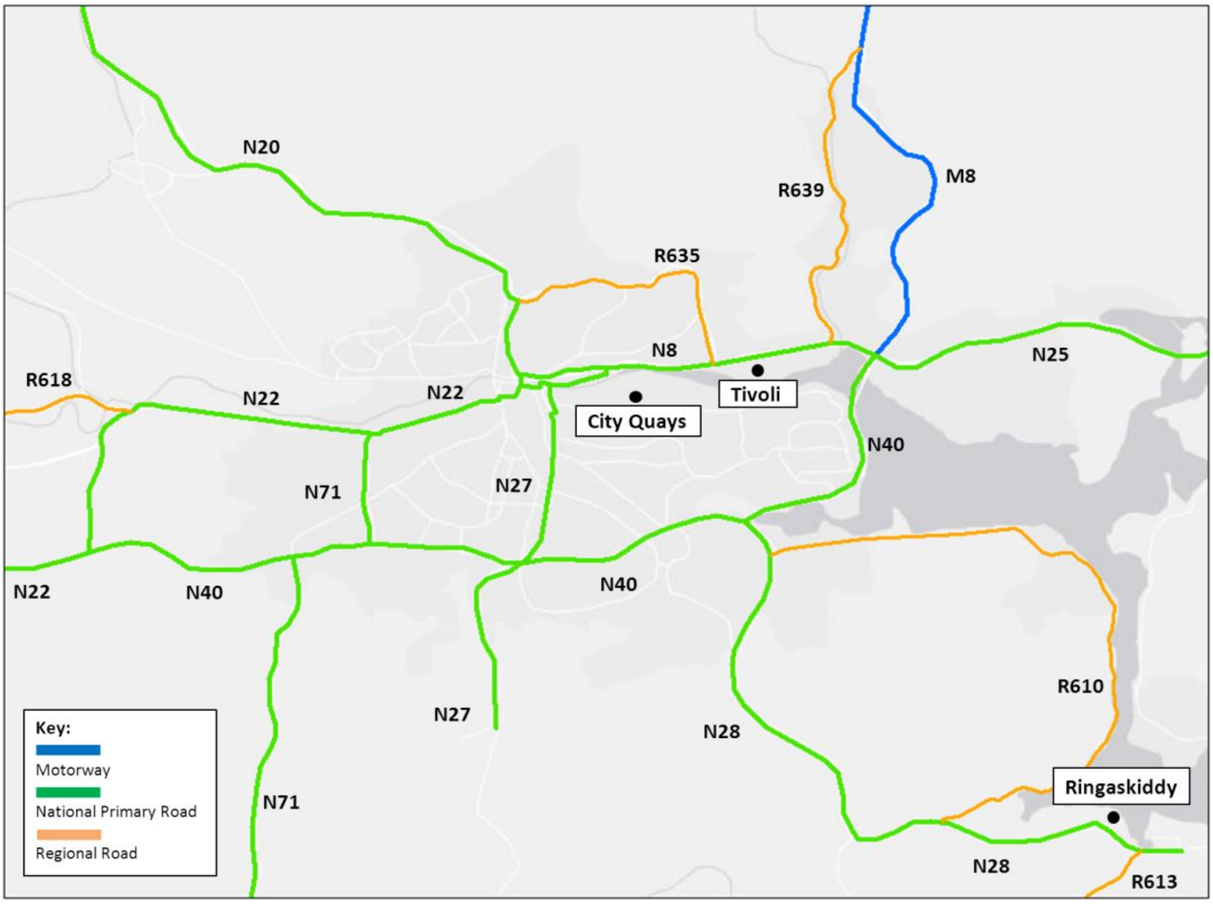


Figure 2. Road Hierarchy

2.3 Evaluation of 2022 Census Data

2.3.1 Context

This section provides the essential demographic context to the study area. It includes information about population, age and gender, car ownership, mode of transport, and journey time to work or education.

The data in this section is provided by the Central Statistics Office of Ireland (CSO), which offers information for this area through Small Area Population Statistics (SAPS) and Electoral Divisions (EDs)[1].

[1] SAPS provide more detailed information at a local level than the EDs.

This information is a crucial element in understanding how the transportation system operates in the study area and why it functions in a particular manner.

Figure 3 below shows the extent of the port access corridor study area that has been considered for the evaluation of the census data.

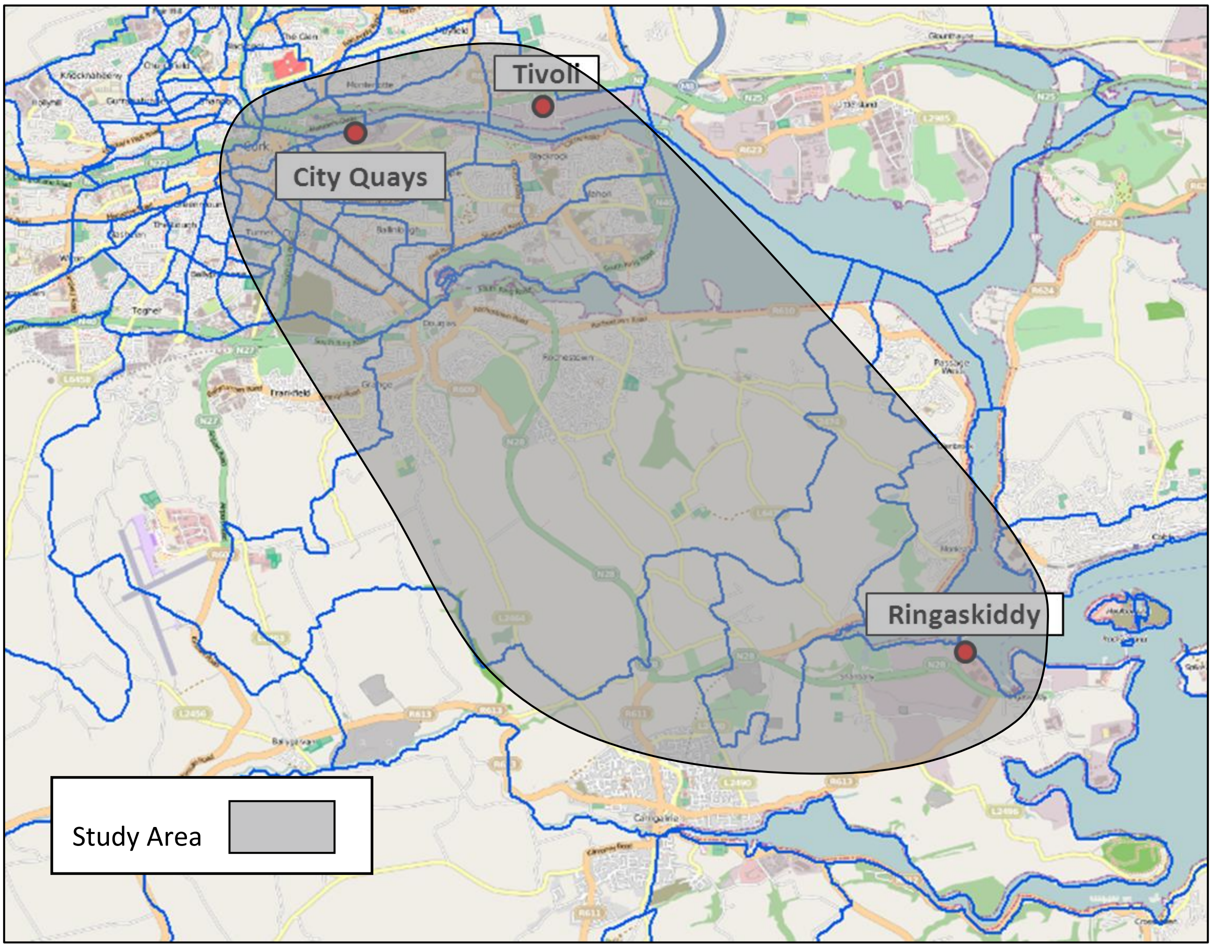


Figure 3. Study Area (EDs)

The remainder of this section will discuss the demographics in the following subsections:

- Population;
- Age Distribution;
- Car Ownership;
- Mode of travel (to Work and Education); and
- Journey Time (to Work and Education).

2.3.2 Population

Table 2.1 below shows the population of Ringaskiddy, Cork City, and Cork County based on the 2022 census, as well as the figures from the 2016 census.

The 2022 Census data identifies six SAPS for Ringaskiddy: 47072038, 47072039, 47072040, 47072041/2042, 47072002, and 47261001.

According to the CSO records shown in **Table 2.1** , the total population of the Ringaskiddy area, as calculated through SAPS, was 1,702 in 2022. This represents a 3.21% increase from the 2016 population record of 1,649.

In 2022, the population of the Ringaskiddy EDs: Carrigaline and Monkstown, was 14,511, representing a 9.90% increase from the 2016 figure of 13,204. It should be noted, however, that these EDs also cover areas outside of Ringaskiddy, such as Carrigaline, and therefore do not accurately reflect the population change in Ringaskiddy itself.

The 2022 census data for Cork City and County indicates that the County experienced a population decrease of 13.67%, declining from 417,211 in 2016 to 360,152 in 2022. In contrast, Cork City's population increased by 78.26%, rising from 125,657 in 2016 to 224,004 in 2022. This growth may be attributed to the overall population increase in the region, as well as the expansion of the Cork City area in 2019, which now encompasses a portion of the county's population.

Table 2.1 Study Area Population

Area	2016 POPULATION	2022 POPULATION	% CHANGE
Ringaskiddy SAPS	1,649	1,702	3.21%
Ringaskiddy EDs: Carrigaline, and Monkstown	13,204	14,511	9.90%
Cork County	417,211	360,152	-13.67%
Cork City	125,657	224,004	78.26%

2.3.3 Age Distribution

Understanding the age distribution of a population in a given area is crucial for evaluating travel behaviour patterns. For instance, if the age distribution indicates a predominantly young population, much of the traffic is likely directed towards schools, colleges, or workplaces.

Figure 4 below shows the number of males and females in each age bracket in the Ringaskiddy area, as well as the total number in each age bracket. The total population in the area is 1,702, comprising 837 males and 865 females, according to the 2022 Census data.

Figure 5 also illustrates the percentage of the population, both male and female, in each age group relative to the total population in Ringaskiddy. This figure indicates that the age distribution is relatively even across most age ranges below 65, with the largest populations observed in the 9-14 age range, followed by the 40-44, 45-49, and 35-39 age brackets. The chart shows a low percentage of the population, around 10% of the total, to be above the age of 70.

The metrics in this section could suggest that the area is relatively young, home to many families in active age ranges, and thus experiences relatively busy work and school traffic.

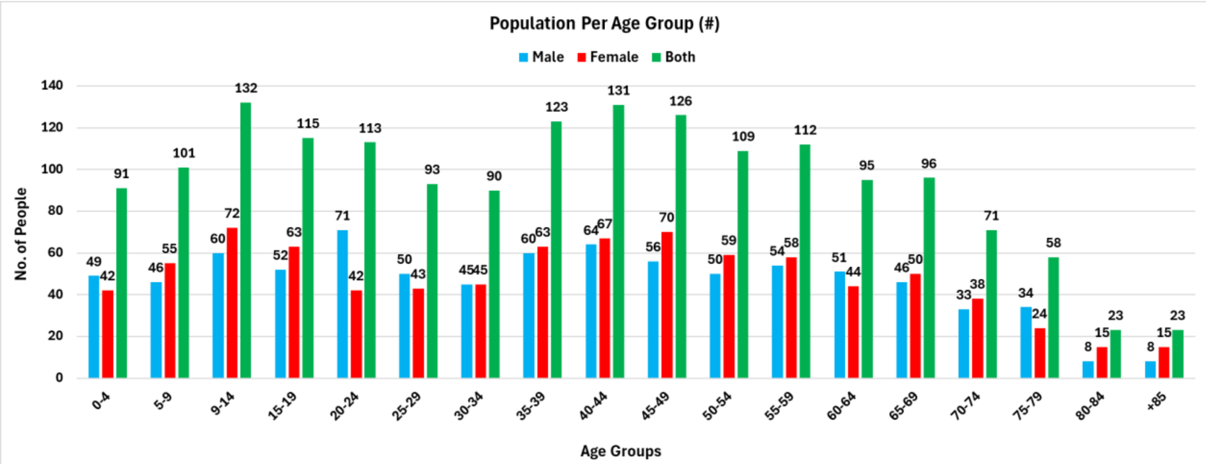


Figure 4. **Age Groups by Gender (Counts)**

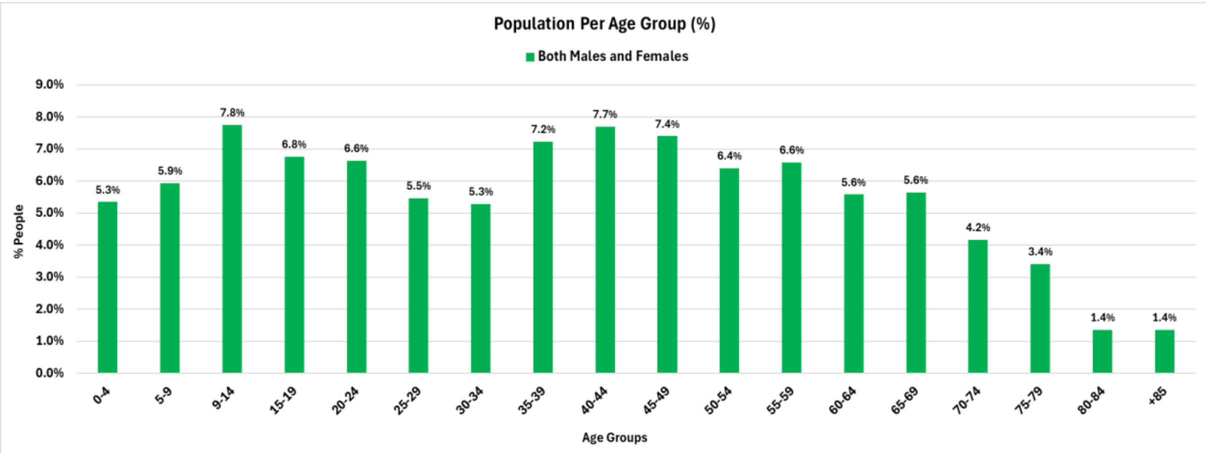


Figure 5. **Age Groups by Gender (Percentage)**

2.3.4 Car Ownership

Car ownership is another key factor in understanding travel pattern behaviour. The availability of a car is a critical consideration when choosing a travel destination and mode of travel. For those without access to a car, accessibility to education, employment, and public facilities is limited to walking or cycling distances, or to areas served by the public transport network.

Figure 6 below demonstrates the percentage of car ownership per household in Ringaskiddy, Cork City, and County Cork. This data represents the percentage of households in each of these regions that have no car, one car, two cars, three cars, and more than four cars per household.

The data in **Figure 6** shows that the level of car ownership in all three regions is relatively high, with over 34.5% and 30.6% of households in all three regions having at least one and two cars, respectively.

Car ownership in Ringaskiddy is relatively high, with 42.4% of households having two cars and 34.5% having one car. Only 6.9% of households have no car. The remaining households have three or more cars. This may indicate a reliance on private car transport as the dominant mode of transport in Ringaskiddy due to various reasons, including but not limited to the inadequate availability and frequency of public transport services, and long distances to the city centre for walking and cycling. The highest percentage of households (11.6%) with three or more cars may also indicate the availability of free car parking spaces, in addition to the households' financial capability to afford three or more cars.

A similar pattern to Ringaskiddy can be seen in County Cork, with slightly lower percentages for households with at least one car or more, and a slightly higher percentage (8.5%) of households with no car at all.

The car ownership pattern in Cork City differs somewhat from those in Ringaskiddy and County Cork. The highest car ownership is among households with one car, which is higher than in the other two regions. However, unlike the other regions, Cork City also has the highest percentage (19.8%) of households with no car. This can be attributed to various factors, including but not limited to the availability of car parking spaces in the city, the high cost of parking where applicable, proximity to the city centre accessible by walking and cycling, and better coverage of public transport services that reduces the need for owning a car.

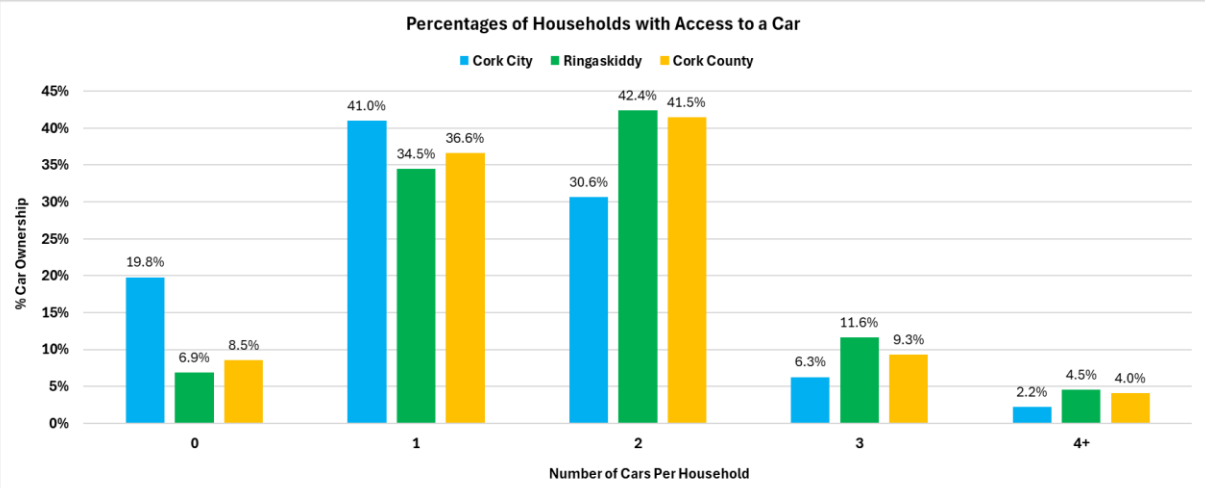


Figure 6. Percentage of Households with access to Car

Looking at the results in this section, the high level of car ownership can be attributed to the need for cars in rural areas, where development is more dispersed, making facilities inaccessible by walking or cycling. Dispersed populations are also challenging to serve with cost-efficient public transport. Consequently, private transport is often the only feasible mode of transport in rural areas such as Ringaskiddy.

In urban areas, there is generally a greater opportunity to access employment and education by walking, cycling, and public transport. Therefore, the need for a car is significantly reduced, and it is sometimes more cost-efficient not to own a car. Car parking within urban areas is also more restricted, which can limit the number of cars per household. This is illustrated in Figure 4, which shows much lower car ownership in Cork City compared to the surrounding, more rural, areas.

2.3.5 Mode Share of Travel to Work and Education

Table 2.2 below presents the percentage of mode share for commuting work and education by area for Cork City, Cork County, and Ringaskiddy, based on the 2022 census data.

The values in Table 2.2 indicate that private car usage (as a driver) is by far the most commonly used mode of transport for work and education in all three areas, with Ringaskiddy showing the highest share at 46.3%. This is followed by the use of car/taxi (as a passenger), with Ringaskiddy again being the main adopter of this mode.

Table 2.2 shows that the percentage of people using walking as a mode of transport in Ringaskiddy is 7.2%, which is below the County average of 8.9% and significantly lower than the Cork City average of 17.0%. It also shows that cycling has a relatively low uptake overall, with Cork City (2.2%) having a slightly higher rate than both the County (0.6%) and Ringaskiddy (0.7%).

The above collectively indicates the dependency of households in Ringaskiddy on private transport and taxi, while travel by sustainable modes (i.e. walking, cycling, and public transport such as buses and trains) is lower in Ringaskiddy than in Cork City and City County.

It is imperative to note that while the aim of this investigation is to examine the occupancy share of each mode of transport, the assessments should take into account the lower population in Ringaskiddy compared to Cork City and County when interpreting the results.

Table 2.2 Mode Share to Work and Education by Area

Mode	Cork City	Cork County	Ringaskiddy
Walking	17.0%	8.90%	7.20%
Cycling	2.20%	0.60%	0.70%
PT (Bus, minibus, or coach)	8.30%	7.20%	5.30%
PT (Train)	0.30%	0.70%	0.40%
Private Car (as a Driver)	33.90%	40.80%	46.30%
Car/Taxi (as a Passenger)	18.90%	23.60%	25.30%
Van	2.50%	5.10%	4.70%
Other (incl. lorry)	0.20%	0.50%	0.50%
Work from home	8.10%	7.80%	6.20%
Not stated	8.30%	4.70%	3.30%
Total Number of People*	155,873	257,139	1,219

**The total population in this table includes only those aged 5 years and over who travel to work, school, or college.*

2.3.6 Journey Time to Work and Education

Table 2.3 provides information on the typical journey times to work and education for residents of Cork County, Cork City, and Ringaskiddy. These journey times are reported by respondents and, therefore, represent perceived journey durations.

The JT values in **Table 2.3** show that the majority of trips take between 15 and 30 minutes, followed by trips lasting less than 15 minutes. This pattern is evident across all three regions, with Ringaskiddy and Cork City having the highest share of JTs between 15 and 30 minutes. A similar share of travel can be observed for JTs exceeding 30 minutes across all three regions.

Cork City has a 38% share of trips occurring between 15 and 30 minutes, followed by 27% of trips lasting less than 15 minutes. This is relatively normal due to the high volume of trips and congestion in the city centre.

With regard to trips in Ringaskiddy, a total of 67% of all trips occur in under 30 minutes: 33% are below 15 minutes, and 34% are between 15 and 30 minutes. This may indicate that the majority of trips in Ringaskiddy are local, either within Ringaskiddy or to and from Carrigaline.

Table 2.3 Perceived Journey Time by Area – 2022 Census results

Journey Time (min)	Cork City	Cork County	Ringaskiddy
Below 15	27%	33%	33%
15 to 30	38%	26%	34%
30 to 45	17%	19%	20%
45 to 60	3%	7%	4%
60 to 90	2%	6%	3%
Above 90	1%	2%	1%
Not Stated	11%	8%	6%

3. REVIEW OF PLANNING AND POLICY GUIDELINES

3.1 Introduction

As part of the Baseline Evaluation, all relevant national, regional and local policy guidelines, along with other transport studies, have been reviewed in the context of this study. The following documents and studies are deemed relevant to the study and have therefore been reviewed:

- National Context:
  - National Planning Framework; Ireland 2040;
  - National Development Plan 2021-2030;
  - National Marine Planning Framework;
  - National Ports Policy 2013;
  - National Investment Framework for Transport in Ireland;
  - Climate Action Plan 2024;
  - National Sustainable Mobility Policy 2022; and
  - Trans-European Transport Network.
- Regional Context:
  - Regional Spatial & Economic Strategy for the Southern Region. Southern Regional Assembly; and
  - Cork Metropolitan Area Spatial Plan.
- Local Context:
  - Cork County Development Plan 2022-2028;
  - Cork City Development Plan 2022-2028;
  - Port of Cork Masterplan 2050;
  - Cork Metropolitan Area Transport Strategy 2040; and
  - National Cycle Design Manual.
- Local Improvement Schemes:
  - M28 Cork to Ringaskiddy Upgrade; and
  - Ringaskiddy Urban Realm and Active Travel Scheme.

3.2 National Context

3.2.1 National Planning Framework (NPF) – Project Ireland 2040

The NPF heavily emphasises the importance of Ireland's ports in relation to the country's economic growth. In the context of this development, the expansion of the Port of Cork at Ringaskiddy would allow strategic development sites at the City Docks and Tivoli to be redeveloped into sustainable, mixed-use areas. The redevelopment of these two areas is key to the overall City's regeneration and the extension of port facilities at Ringaskiddy will facilitate this.

The Framework highlights in its National Strategic Outcome 6: 'High Quality International Connectivity' the importance of our airport and port connections to the UK and EU. It states that the National Ports Policy along with the national hierarchal tiering of ports recognises the global trend of increased consolidation of resources which leads to optimum efficiencies of scale. As a Tier 1 port, the Port of Cork is highlighted numerous times in the Framework and in this particular strategic objective, improving access to Ringaskiddy Port is outlined as a critically important infrastructure development for the long-term sustainable development of our ports on a national level. This development evidently answers to both national and European policies while catering for both the current and future needs of Cork's economy.

3.2.2 National Development Plan (NDP)

The NDP states that strengthening access routes to Ireland's ports through investment in the enhancement of the road and rail network to improve journey times is and remains a government priority. The plan outlines the strategic importance of developing the port's facilities at Ringaskiddy. It states that the project will alleviate the physical constraints, such as the depth of water, of current operations at City Quays and Tivoli, allowing the Port to increase capacity and throughout, diversify customers, cater to the trend of increasing vessel sizes and free the City Quays and Tivoli properties for development and/or divestment. The proposed expansion of port facilities at Ringaskiddy answers directly to this part of the NDP.

3.2.3 National Marine Planning Framework

The National Marine Planning Framework was published in 2021 and set out to produce a strategic framework for managing how we want to use, protect and enjoy our seas. It dedicates a chapter to the importance of 'Ports, Harbours and Shipping' and outlines in this a critical challenge for the coming decades. It is expected that freight volumes are likely to increase over the coming years and decades which poses a difficult challenge to the ports in Ireland. The National Marine Planning Framework outlines that the allocation of sufficient space for future growth at our long-term port locations is crucial to addressing this challenge. The proposed expansion of port facilities at Ringaskiddy directly addresses this challenge and acts as a long-term strategic response to it.

3.2.4 National Ports Policy 2013

The Port of Cork is outlined as being a Tier 1 port in the National Ports Policy (NPP). This means that it is identified as a critical asset in Ireland's national and regional infrastructure framework. There are just three Irish ports included in the European Union's Trans-European Transport Network (TEN-T) as part of the North Sea Mediterranean Corridor and the Port of Cork is one of them. The NPP outlines the government's position on the country's ports performance stating that the ports considered to be of national significance must provide the facilities and capacity which ensure continued access to regional and global markets for our trading economy.

The NPP also outlines the Port of Cork as being particularly important as it is capable of handling the Ireland iShip Index[1] and is one of only two ports in Ireland that can manage this. The policy actively supports the Port of Cork's Strategic Development Plan and in particular, the expansion of facilities at Ringaskiddy. The proposed expansion at Ringaskiddy directly aligns with the NPP's strategic vision for the Port of Cork as such.

[1] "The iShip Index is a quarterly weighted indicator which gauges the health of the Irish maritime industry and the wider economy. Created by the Irish Maritime Development Office, the index is comprised of five separate indices, representing the main maritime traffic categories moving through ports in the State: Lo/Lo, Ro/Ro, Dry Bulk, Liquid Bulk & Break Bulk." Retrieved from the Irish Maritime Development Office: https://www.imdo.ie/Home/site-area/statistics/iship-index/iship-index

3.2.5 Climate Action Plan

The Climate Action Plan (CAP) is a strategic framework in response to Ireland's climate targets and ambitions. The plan outlines a detailed strategy on how the country is to reach climate neutrality by 2050 at the latest. One of the objectives underlined in this plan is to re-evaluate the policy framework for the decarbonisation of ports as part of the overall review of National Ports Policy. The plan also emphasises the need for an overall improvement in rail connectivity to ports in the country.

3.2.6 Trans-European Transport Network (TEN-T)

The Ten-T network is a network of roads, rail lines, ports and airports which span across Europe and aim to create a better-connected Europe. The core Ten-T network requires a certain standard of infrastructure to be delivered at each of its transport corridors. This standard is set out in the Ten-T Regulation which outlines a number of high priority 'European Transport Corridors', and Ireland are included in two of these; the Atlantic Corridor and the North Sea-Rhine-Mediterranean Corridor.

Reaching the standards that the EU have set for our port facilities is a task of national importance. One of the standards outlined in the Regulations is outlined as;

> *"The planning, development and operation of the trans-European transport network should enable sustainable forms of transport, provide for improved multimodal and interoperable transport solutions and for an enhanced intermodal integration of the entire logistic chain, thereby contributing to a smooth functioning of the internal market by creating the arteries that are necessary for smooth passenger and freight transport flows across the Union, and by establishing seamless transport connections with neighbouring countries." (5)*

In addition to this, it is noted within the Regulations that Ireland does not have any rail connections with any neighbouring countries, and considerations have been made for this. There is a strong emphasis on the development of maritime ports and their importance to the Ten-T network in that they have the potential to make a *"substantial contribution to the decarbonisation of transport"* by carrying more passengers and freight by sea. The Regulations state that;

> *"The new overarching concept of the European Maritime Space should be promoted by creating or upgrading short-sea shipping routes and by developing maritime ports and their hinterland connections as to provide an efficient and sustainable integration with other modes of transport." (55)*

The proposed development at Ringaskiddy answers directly to the Ten-T's regulations and is a step towards achieving the necessary European standards in Ireland. As one of Ireland's three Tier 1 ports, this development would be of significance on a European scale in this context.

3.3 Regional Context

3.3.1 Southern Assembly; Regional Spatial & Economic Strategy for the Southern Region.

The Regional Spatial and Economic Strategy (RSES) states as one of its objectives the plan to invest in the actions outlined in the National Ports Policy. The document highlights a strong understanding of the importance of ports for our international connectivity and how their efficiency impacts the region.

RSES states that investing in the sustainable development of improved access to ports across the region is a key objective within its strategy. The proposed development at Ringaskiddy answers directly to this strategy in that it will create a more efficient, successful port facility for the region with a higher capacity as required, as well as developing a more accessible port on a national and international scale.

3.3.2 Cork Metropolitan Area Strategic Plan (MASP)

The Cork MASP highlights the importance of seeking investment for infrastructure led growth in the Cork Docklands and Tivoli areas in order to provide high quality, mixed use sustainable urban areas within the core of the city centre. The proposed development at Ringaskiddy is the enabler for such regeneration in the Cork Docklands and Tivoli areas as it removes the port operations from these sites and allows for such transformative developments to begin an unhindered development phase.

The plan outlines the importance of the Port of Cork as a strategic asset and highlights the importance of investment in Tier 1 port activity. The proposed Ringaskiddy port expansion will directly answer to this by vastly improving efficiency in connectivity and capacity at the Port of Cork, further strengthening one of Ireland’s Tier 1 ports.

3.4 Local Context

3.4.1 Cork County Development Plan

Ringaskiddy is identified as a strategic employment location in the Cork County Development Plan (CDP). The plan is clear on its view that the strategic relocation of Port of Cork facilities to Ringaskiddy is vital to the future success of not just the Cork Harbour area and the Port of Cork, but also of the Southwest region as a whole.

The CDP outlines in **Objective TM 12-15 A** the plan’s goal of:

> *“Ensuring that the strategic port facilities at Ringaskiddy, Whitegate and Marino Point have appropriate road transport capacity to facilitate their sustainable development in future years.”*

The upgrades to the M28 road from Cork at the Bloomfield Interchange to Ringaskiddy are part of the proposed development and answer directly to the targets of the CDP. There has been extensive preparatory works completed on the M28 and this project aims to significantly increase container trade.

The CDP promotes the Port of Cork as being crucial to the future growth of the economy in the region as well as being a significant employment location. It outlines its understanding of the future growth in shipping trends that the port will have to cater for and expresses the need for a larger capacity at Ringaskiddy to respond to this challenge. The CDP also highlights the positive impact this development will have on Cork City Centre as it will free up the space on the City Docks and Tivoli to make room for sustainable, urban, mixed-use developments on the waterfronts of these two sites. **Policy Section 8.7.17** supports the proposed development and sets out to enhance the efficiency of port operations in Ringaskiddy through the accommodation of larger ships. This is possible through the larger water berth in Ringaskiddy in comparison to the city’s facilities as it is a seaport rather than the city’s river port.

343ha of land in Ringaskiddy is zoned for industrial use as of the CDP 2022. Along with the proposed concentration of port operations in the area, the CDP is outlining its intention to further promote Ringaskiddy as a main employment area in the county, likely leading to an intensification of traffic in the area in the coming years. Ringaskiddy is one of the areas highlighted in the BusConnects plan and so the development of a high-quality road network connecting the area is becoming more crucial to the development of the port and the zoned industrial land.

Under the CDP's **Freight and Ports** section (**12.17**) it is outlined that the plan aims to:

- Secure the appropriate infrastructure for the effective movement of goods, especially to and from the region's ports; and
- Facilitate the planned development of port infrastructure to enhance the region's sustainability and general economic competitiveness.

The plan necessitates the completion of these objectives and emphasizes the impact of Brexit on the demand for improved freight and port facilities and services.

The County Council emphasizes further support for the proposed development in **Section 1.7.26 of Volume 4** stating:

> *"The Plan supports the Port of Cork's proposals to expand its facilities in Ringaskiddy so that port centred operations and logistics can become more efficient through the accommodation of larger ships and so that port traffic can directly access the National Road Network without passing through the city centre."*

The County and City Councils' overarching aims align here in that both see the removal of port traffic from the city centre as a priority for the sustainable development of their respective Local Authority areas. Not only would this development see the abovementioned efficiency of port operations achieved, but it would also achieve a reduction in traffic congestion in the city centre and the freeing up of brownfield sites in the strategic development areas of Tivoli and City Docks.

3.4.2 Cork City Development Plan

The Cork City Development Plan (CCDP) 2022-2028 recognises the Port of Cork as being a port of national significance which drives economic development in the Cork region. The plan actively supports the relocation of port facilities from the City Docks and Tivoli to Ringaskiddy so that sustainable urban quarters on the City Docks and Tivoli waterfronts can be developed. The plan emphasizes the significance of these developments in reaching Cork's population and housing targets within the duration of this plan. The CCDP also outlines the Local Authority's commitment to supporting the Port of Cork's role as a nationally important strategic asset during its relocation to Ringaskiddy.

3.4.3 Port of Cork Masterplan 2050

In conjunction with the National Ports Policy, a masterplan was created to act as a strategic framework to guide development at the Port of Cork to the year 2050. The masterplan outlines the vision for how the port will become solely a seaport, moving all port activities from the river port in the City Centre, to the sea port at Ringaskiddy.

3.4.4 Cork Metropolitan Area Transport Strategy (CMATS)

CMATS was developed with the objective of creating a coordinated land use and transportation strategy for the Cork Metropolitan Area. It sets out a framework for the planning and delivery of transport infrastructure and services to support the CMA's development in the period up to 2040. The strategy discusses the importance of freight, delivery and servicing to the area in that the efficient movement of goods and services is vital to the area's economic competitiveness. The strategy highlights this by stating that 65% of our GDP is based on the export of goods and services whereas the EU-25 average is 30%. The relocation of port facilities to Ringaskiddy will dramatically increase the efficiency of imports and exports through the port of Cork.

The strategy looks at the proposed development through a transport lens and hence highlights how the relocation of port facilities to Ringaskiddy would free up a number of strategic brownfield sites which would allow for sustainable development along Cork's future sustainable travel and light rail corridor.

3.4.5 National Cycle Design Manual

The Cycle Design Manual offers advice on delivering cycle infrastructure in Ireland and draws on the experience of delivering such infrastructure over the past decade as well as learning from international best practise and recognises the need to deliver this infrastructure for all ages and abilities.

3.5 Local Improvement Schemes

3.5.1 M28 Cork to Ringaskiddy Upgrade

Figure 7 below shows the indicative route of the N28 upgrade. This upgrade consists of 12.5km of road connecting Cork at the Bloomfield interchange to Ringaskiddy that is to undergo improvements as part of the overall development of a successful relocation of port facilities to Ringaskiddy. As part of the TEN-T core network, the Port of Cork is required to be served by a high-quality road network and this upgrade is to make sure the port at Ringaskiddy meets the requirements of this network. This improvement would see the existing N28 from the Bloomfield Interchange to Ringaskiddy upgraded to a motorway/dual carriageway. Preparatory works have already taken place and the project is now at the tender stage.

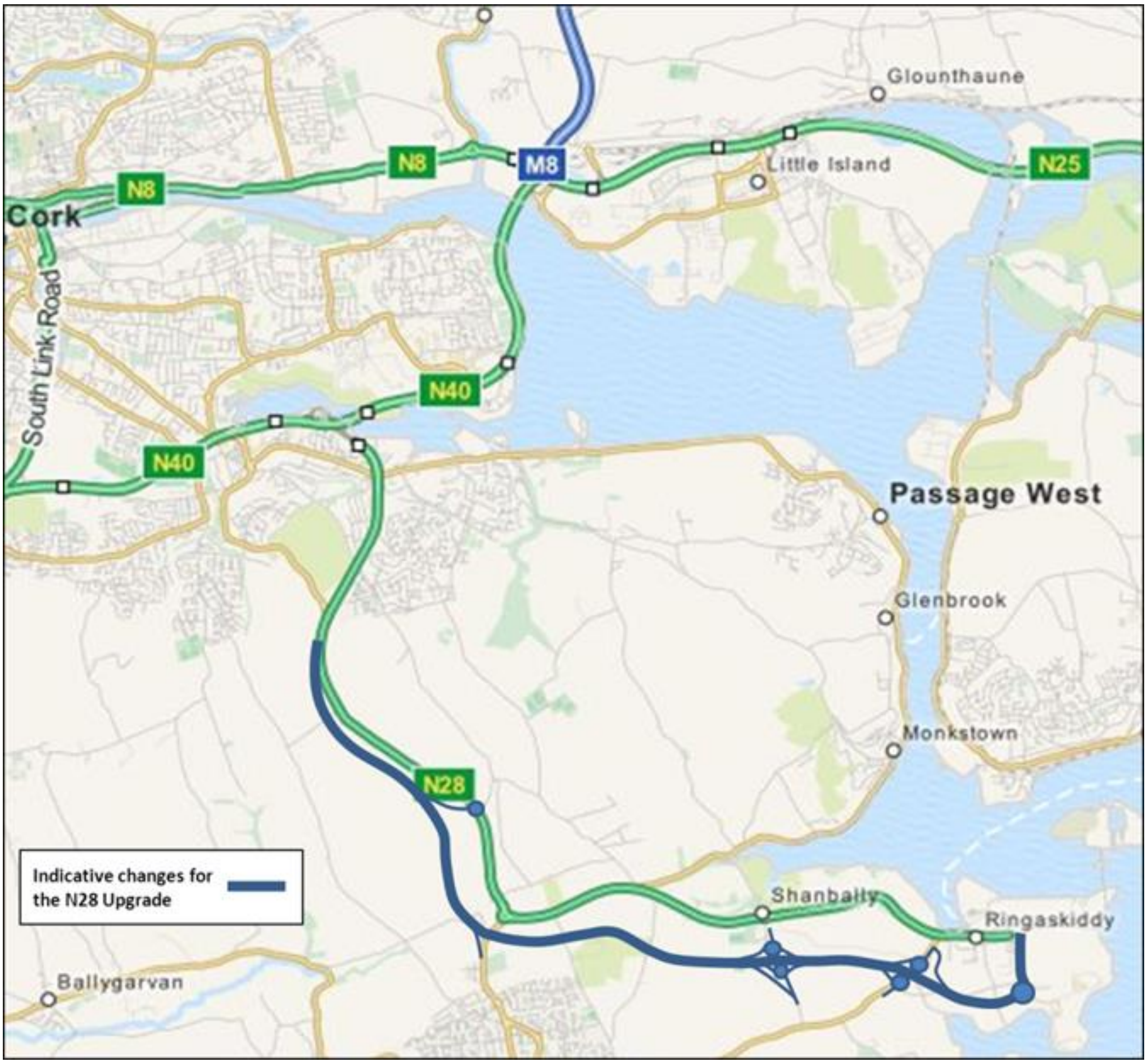


Figure 7. Indicative Route of the N28 Upgrade

3.5.2 Ringaskiddy Urban Realm and Active Travel Scheme

Works have recently commenced in Ringaskiddy to provide an enhanced public realm in the village centre as well as a new active travel route along the existing N28, from the Port of Cork entrance to the car park at Gobby Beach. This will see the development of improved pedestrian crossing facilities in the village centre as well as widened footpaths and the provision of cycle infrastructure to promote active travel in the area and reduce car dependency.

4. TRAFFIC MOVEMENTS

4.1 Context

An extensive set of survey information was reviewed and assessed to gain a clear understanding of existing traffic movement and conditions on the road network within the study area. The road network evaluated in the traffic surveys can be categorised into four types:

- Motorways – providing connections between major cities;
- National Roads – providing connection between major cities and towns;
- Regional Roads – providing connection between Cork and surrounding towns; and
- Local Roads – providing connection between towns and local areas.

Figure 8 below illustrates the study area for Ringaskiddy traffic surveys as follows:

- Junction Turning Counts (JTC) at 33 locations;
- Automatic Traffic Counts (ATC) at 10 locations; and
- Vehicle Journey Time Surveys on four routes.

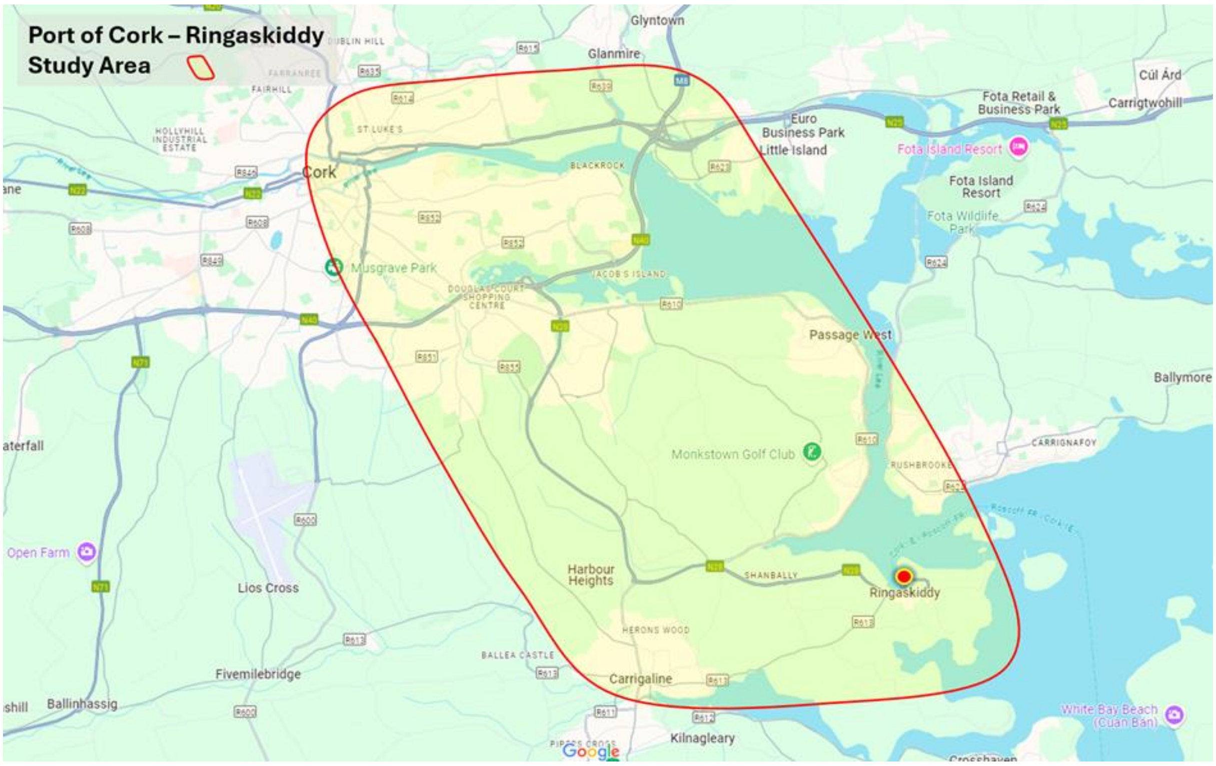


Figure 8. Traffic Survey Locations

The peak hours were identified primarily to assess the impact of traffic movements to and from Ringaskiddy Port on the N28. Based on an initial assessment of traffic patterns in the Ringaskiddy area, discussed in the following sections, these peak hours were identified as 06:45 to 07:45 for the AM peak and 15:15 to 16:15 for the PM peak. The assessments in this chapter will be conducted for these peak hours. More information on the assessment of traffic data is presented in the remainder of this chapter.Figure 9

4.2 Annual Average Daily Traffic (AADT)

4.2.1 Before conducting the surveys outlined in the following sections of this chapter, the AADT data provided by TII was evaluated. This data presents the average amounts of traffic which pass through the labelled sites in both directions on an annual basis.

4.2.2 Within the study area, there are 10 AADT sites which provide a general picture of the current traffic situation in the area. All AADT figures presented in **Table 4.1** are the 2024 figures except for site no.9 at Dunkettle which is showing the 2022 data. This is because there was no AADT data collected during 2023 and 2024 during the redevelopment of the interchange. Their locations are presented in **Figure 9** below.

Table 4.1 AADT and %HGV

Location ID	AADT	%HGV
1	10,710	9%
2	25,690	5%
3	48,341	3.30%
4	87,496	3%
5	71,805	3.60%
6	73,983	4.20%
7	69,833	4.60%
8	31,952	4.60%
9*	37,115	5.30%
10	56,899	4.70%

* 2022 Data

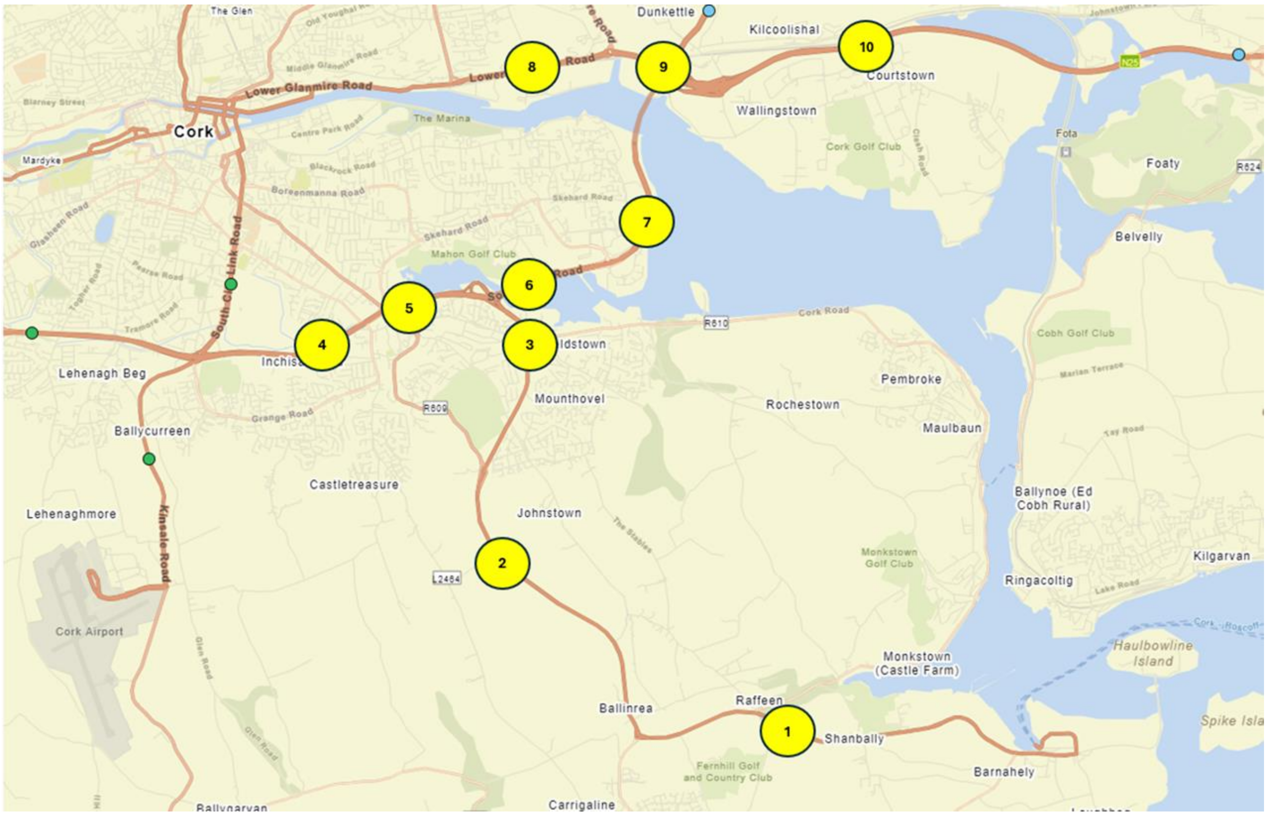


Figure 9. **AADT Location Map**

4.3 Automatic Traffic Counts (ATC)

4.3.1 Survey Specification

The locations of required Automatic Traffic Counts (ATC) are shown in **Figure 10**, and coordinates of these sites can be found in **Table 4.2.**

All ATC sites were surveyed for a continuous 7-day period, with data summarised in 15-minute intervals. Vehicle flows were categorised into the following vehicle classifications:

- Motorcycles;
- Cars;
- Buses;
- LGV;
- OGV1; and
- OGV2.

Table 4.2 ATC Locations

Site No	Site Description	Coordinates
1	N28 Ringaskiddy Road (town centre)	51.830388834022, -8.32061913371795
2	N28 Ringaskiddy Road (after port entrance)	51.8323228763646, -8.33225493231386
3	N28 (South of Shannonpark Roundabout)	51.8322112992563, -8.38810676557418
4	Ballinrea Road	51.8506425669079, -8.42762835735681
5	N28 – Carr's Hilll	51.8508408448289, -8.41595243531747
6	Moneygourney Road	51.8593226040746, -8.39987296536125
7	R610 Rochestown Road	51.8770430183845, -8.39302815668291
8	Maryborough Hill	51.872147530619, -8.42109199764987
9	N25 to N40 (after the merge, the tunnel)	51.9034254660563, -8.38568680305698
10	L6477 Maryborough Hill	51.8582666947758, -8.40749662692191

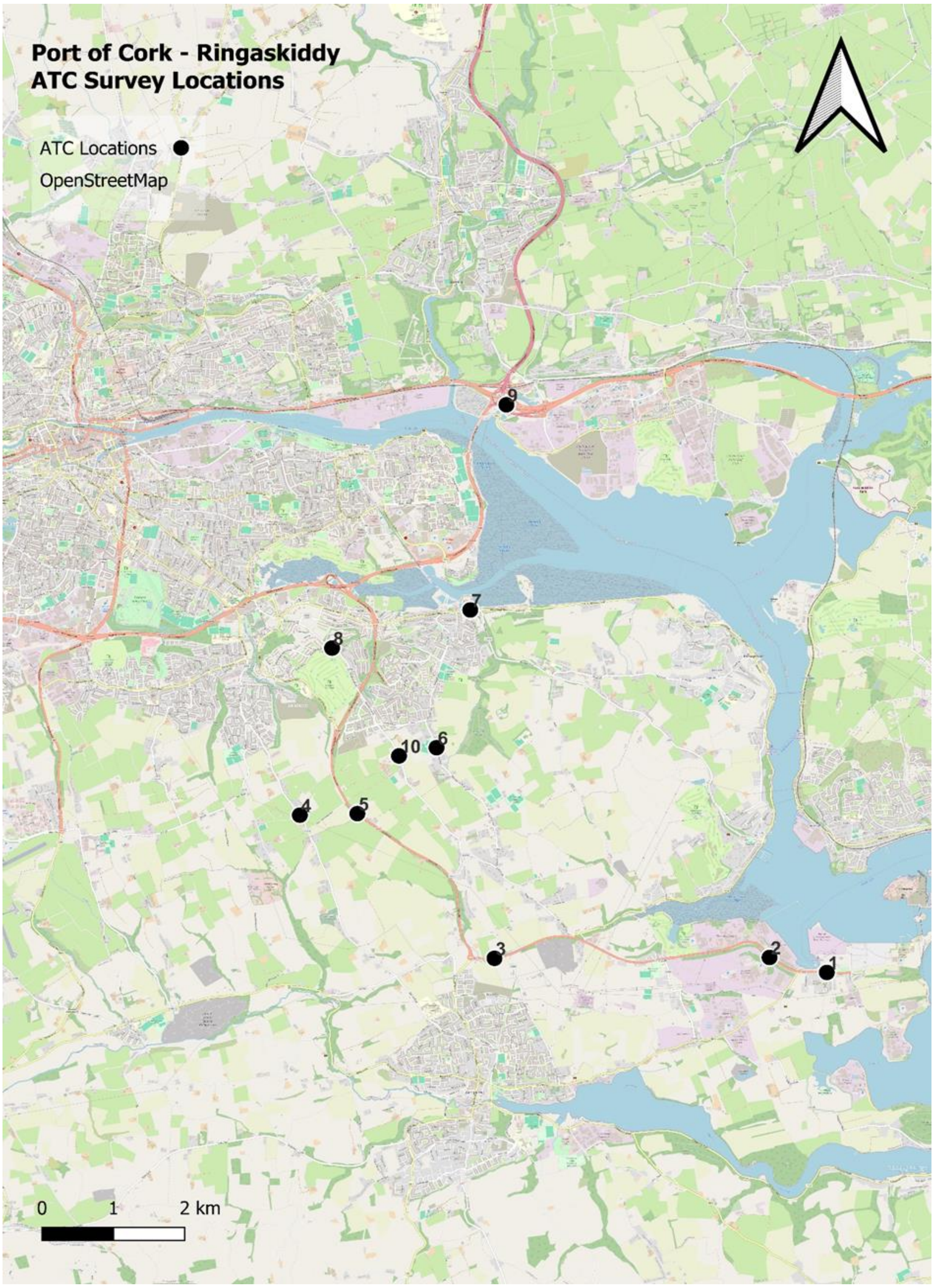


Figure 10. ATC Location Map

4.3.2 Survey Data Analysis (TBW)

This section briefly discusses the key observations from the ATC traffic survey.

4.3.2.1 Overview of ATC Data

The ATC section of the traffic survey was conducted using 10 ATC sites. These were spread out across the study area at significant points in order to identify the existing trends and issues with regard to traffic in the surrounding road network.

Table 4.3 below presents the numbers recorded in the traffic survey in both the AM Peak (06:45 to 07:45) and the PM Peak (15:15 to 16:15). The table shows the number of vehicles which were seen to be travelling westbound (towards Cork City) and eastbound (towards Ringaskiddy) during each peak period.

Note: *ATC 2, which is represented in the table below, presents data which was collected on Thursday 7th, Friday 8th and Monday 11th of October 2024 whilst the remaining sites were recorded on the 5th, 6th and 7th (Tuesday, Wednesday and Thursday). This is because the tubes were damaged during the first three days of the traffic survey and consequently these dates were unavailable for processing results.*

Table 4.3 Overview of the ATC Survey Outputs

ATC	Average Peak Flows (Tuesday, Wednesday, and Thursday)			
	AM Peak		PM Peak	
	WB / NB	SB / EB	WB / NB	SB / EB
1	181	399	378	142
2	293	559	510	208
3	555	962	905	436
4	197	285	217	193
5	1,132	1,152	1,117	1,017
6	62	192	98	51
7	586	319	546	588
8	196	378	291	458
9	1,761	0	1,758	0
10	165	245	294	134

4.3.2.2 AM Peak ATC Flows

As shown in **Table 4.3**, significant traffic flows are noted on the slip road from the N25 onto the N40 at ATC 9, with 1,761 vehicles recorded during the AM peak. Significant traffic flows are also observed on Carrs Hill (N28) at ATC 5; during the AM peak, 1,132 vehicles were recorded travelling westbound and 1,152 travelling eastbound.

The largest traffic flows during the AM Peak (06:45-07:45) were recorded on the national roads mentioned above, but another significant flow was also recorded on the N28 Ringaskiddy Road during the peak periods at ATC 3. This ATC was located just east of the Shannonpark Roundabout on the N28. During the AM peak, 555 vehicles were recorded travelling westbound towards the roundabout, while 962 vehicles were travelling eastbound towards Ringaskiddy from the roundabout.

These counts show that the primary movement of traffic in the AM peak is happening along the N28 and from the N25 onto the N40.

4.3.2.3 PM Peak ATC Flows

Significant traffic flows during the PM Peak were registered in the same areas as in the AM. Notably during the PM Peak, there was a high volume of traffic recorded travelling in both directions on the R610 Rochestown Road at ATC 7. This road connects Douglas, Rochestown, Passage West and Monkstown to Ringaskiddy and to the N28. The ATC site was located on the Rochestown Road near Harty's Quay. The PM peak saw 546 vehicles travelling westbound towards Douglas and the N28 and 588 vehicles travelling eastbound towards Passage West.

These counts show the importance of the R610 as a distributor road alongside the N28. They also show the expected reversal of flows in the AM and PM peak, which is a common trend in the representation of work traffic.

Heavy flows were recorded on Carrs Hill at ATC 5 in the PM peak also. This was to be expected as it is representative of a reversal of the trends recorded during the AM Peak. 1,117 vehicles were recorded travelling westbound while 1,017 travelled eastbound on the N28 Carrs Hill during the PM Peak.

The Ringaskiddy Road just east of Shannonpark Roundabout at ATC 3 also experienced high volumes of traffic during the PM peak. Coinciding with the trend observed in ATC 5, the PM Peak is representative of the reversal of trends observed during the AM Peak. There were 905 vehicles travelling westbound towards the roundabout, while 436 travelled eastbound towards Ringaskiddy.

The largest flow during the PM peak is at ATC 9 (1,758 vehicles) westbound on the N25 slip road to the N40. This ATC was located on a one-way road and hence only recorded vehicles travelling westbound.

4.4 Junction Turning Counts (JTC)

4.4.1 Survey Specification

A Junction Turning Count (JTC) survey provides classified turning movements at a junction. Data capture is conducted via video camera, followed by post-production analysis to determine each turning movement.

Figure 11 shows the location of the required JTCs, and the survey coordinates can be found in **Table 4.4**.

The JTC traffic data were recorded for all approaches and in every direction during the 06:00 – 20:00 period on a neutral Tuesday and summarised in 15-minute intervals. Vehicle flows were then classified into:

- Cars;
- Buses;
- Light Goods Vehicles (LGVs);
- Other Goods Vehicles 1 (OGV1); and
- Other Goods Vehicles 2 (OGV2).

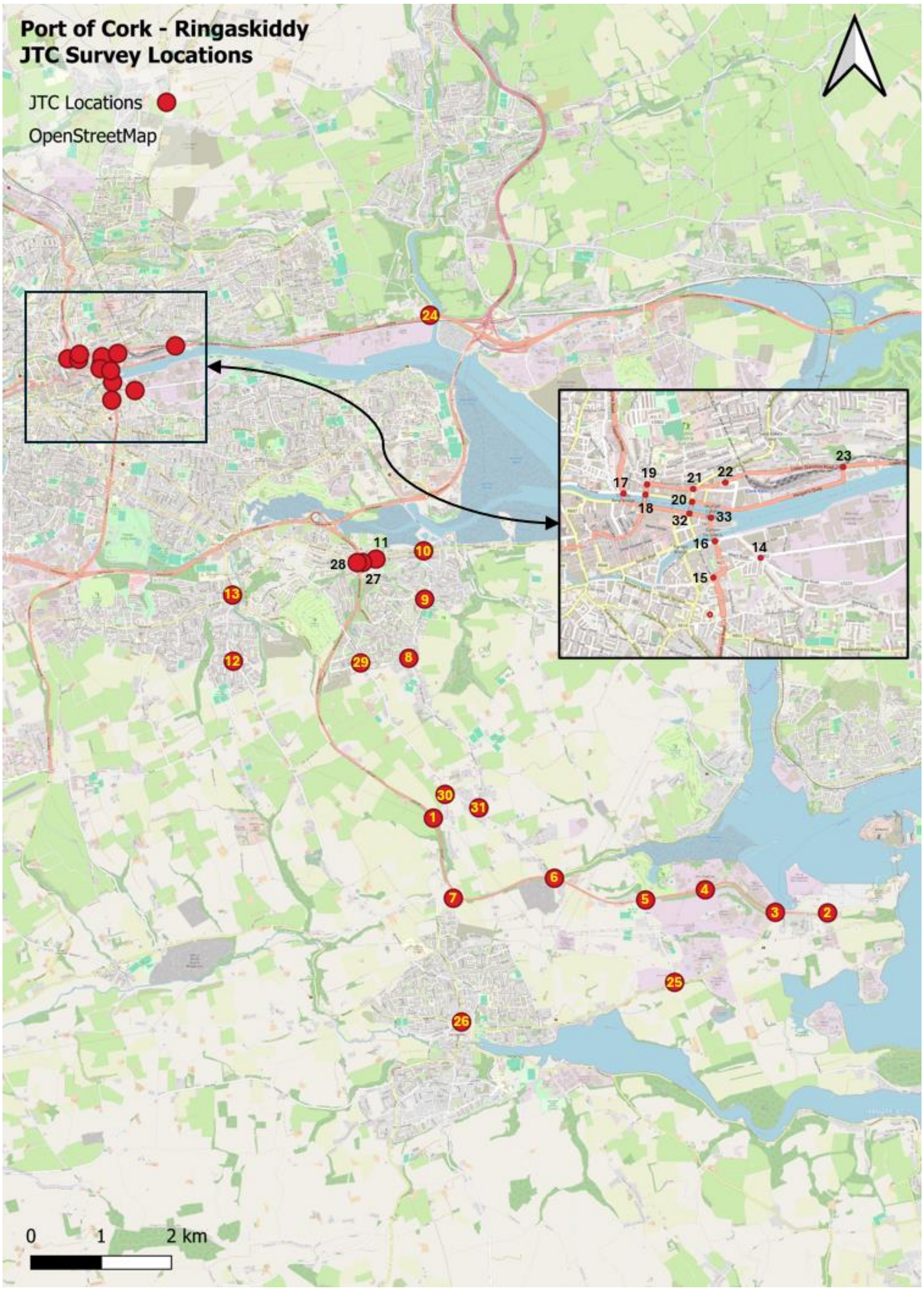


Figure 11. JTC Location Map

Table 4.4 JTC Locations

Site No	Site Description	Coordinates
1	L6477/Carr's Hill	51.842545, -8.397163
2	N28/L2545/Martello Park/Shamrock Place/Ringaskiddy Road	51.830451, -8.315744
3	Access to Port of Cork/Ringaskiddy Road/R613	51.830523, -8.326498
4	Ringaskiddy Road/Access to Pfizer Industrial Estate	51.833407, -8.340957
5	Ringaskiddy Road/Marian Terrace	51.832102, -8.353282
6	R610/Ringaskiddy Road	51.834850, -8.372086
7	Shannonpark Roundabout	51.832319, -8.392963
8	L2472 Garryduff Road/Moneygourney Road	51.862922, -8.402187
9	L2472/Clarkes Hill	51.870435, -8.398890
10	Rochestown Road/Coach Hill	51.876612, -8.399094
11	Clarkes Hill/Rochestown Road	51.875539, -8.409001
12	Donnybrook Hill/Scairt Hill	51.862525, -8.438408
13	Donnybrook Hill/Grange Road	51.870824, -8.438557
14	Centre Park Road/Victoria Road/Hibernian Buildings/Albert Road	51.896984, -8.458631
15	Albert Street/S City Link Road/Old Station Road/Eglinton Street	51.895802, -8.463468
16	Albert Quay/Albert Street/E Albert Quay/Eamon de Valera Bridge	51.898079, -8.463286
17	Camden Quay/Christy Ring Bridge/Carroll's Quay	51.901057, -8.472528
18	Bridge Street/St Patrick's Quay/St Patrick's Bridge/Camden Place	51.900991, -8.470289
19	St Patrick's Hill/MacCurtain Street/Bridge Street/Coburg Street	51.901604, -8.470153
20	Brian Boru Street/St Patrick's Quay/Brian Boru Bridge	51.900541, -8.465596
21	Summerhill N/Alfred Street/Brian Boru Street/MacCurtain Street	51.901323, -8.465471
22	Lower Glanmire Road/Railway Street	51.901730, -8.462265
23	Lower Glanmire Road/Water Street	51.902698, -8.450321
24	Glanmire Road/E Cork Pkwy/Lower Glanmire Road (Dunkettle Rdbt)	51.906596, -8.397831
25	R613/Coolmore Lodges/Church Road/St Bernadette Place	51.821560, -8.347305
26	Cork Road/Church Road/Ballea Road	51.816544, -8.391260
27	Woodbrook/Rochestown Road/Mount Ovel/Carr's Hill	51.875129, -8.411716
28	Carr's Hill/Rochestown Road	51.875118, -8.412819
29	L2472 Garryduff Road/Maryborough Hill/Applewood	51.862328, -8.412115
30	L2470/L6477/Maryborough Hill	51.845609, -8.394635
31	L2470/Ballyorban Road	51.843843, -8.387678
32	Brian Boru Bridge/Anderson's Quay/Clontarf Street/Merchant's Quay	51.899782, -8.465851
33	Michael Collins Bridge/Custom House Quay/Custom House Street/Anderson's Quay	51.899545, -8.463655

4.4.2 Survey Data Analysis

4.4.2.1 Overview of Junctions Traffic

This section briefly discusses the key observations from the JTC traffic survey. To achieve this, the total traffic movements at each junction studied within the study area are presented in **Table 4.5** for both AM and PM peak hours.

The total traffic flows in **Table 4.5** indicate that JTC site 24 (Dunkettle Roundabout) and JTC site 7 (Shannonpark Roundabout) carry the highest volume of traffic within the study area, excluding Dunkettle Interchange, during both AM and PM peak hours. These roundabouts are located close to the Ports of Tivoli and Ringaskiddy, hence they carry a significant amount of traffic to and from the ports.

Dunkettle Roundabout, on the N8, experiences 3,823 and 3,782 vehicles during its AM and PM peak hours, respectively. The volumes for Shannonpark Roundabout are 2,784 and 2,776 for AM and PM peak hours, respectively.

Table 4.5 Overview of the JTC Survey Outputs

JTC	Total Traffic Movement at Each Junction	
	AM Peak (06:45 - 07:45)	PM Peak (15:15 - 16:15)
1	2,452	2,360
2	446	493
3	1,028	906
4	1,374	1,043
5	1,668	1,387
6	1,335	1,560
7	2,784	2,776
8	376	461
9	392	552
10	1,065	1,284
11	1,433	1,608
12	653	753
13	991	1,621
14	669	1,013
15	2,677	3,153
16	2,264	2,270
17	1,606	1,845
18	836	1,017
19	382	495
20	1,482	1,630
21	1,047	1,161
22	675	962
23	1,496	1,525
24	3,823	3,782
25	902	596
26	1,317	1,994
27	1,632	2,119
28	1,418	2,041
29	652	850
30	440	519
31	452	356
32	1,425	1,543
33	1,940	2,104

4.4.2.2 AM Traffic Flows

As outlined earlier in this note, the primary focus of this investigation is to assess the impact of traffic movements to and from Ringaskiddy Port on the N28. For this purpose, and with regard to the total traffic flow in **Table 4.5**, it was deemed necessary to investigate the traffic flow at Shannonpark Roundabout in more detail. This is illustrated in **Figure 12** below.

Overall, it can be seen that the roundabout receives a significant amount of traffic from all directions. The N28 movements (in Arm A) carry the highest amount of traffic, with 1,222 vehicles entering the roundabout from the north and 1,357 leaving the roundabout towards the north (Bloomfield). A total of 944 vehicles travel towards Ringaskiddy (Arm B), and 539 come from this area. The traffic coming from Carrigaline (Arm C) is also significant, with 1,021 vehicles during the AM peak hour. All of this, in addition to the above, shows the important role of the N28 in catering to the main traffic in the study area.

Figure 12. **Shannonpark Roundabout AM Total Peak Flows**

4.4.2.3 PM Traffic Flows

Figure 13 below presents the traffic movements at the Shannonpark Roundabout. Similar to the traffic trend during the AM peak hour, the roundabout receives a significant amount of traffic from all directions. The N28 movements (Arm A) carry the highest volume, with 1,079 vehicles entering the roundabout from the north and 1,363 leaving towards the north (Bloomfield). As observed in the AM peak flows, this highlights the crucial role of the N28 in accommodating the main traffic in the study area.

A total of 462 vehicles travel towards Ringaskiddy (Arm B), which is lower than the AM peak traffic for this movement (944), while 896 vehicles come from this area (which is higher than its AM peak flow of 539 vehicles). This indicates higher traffic movement towards the Ringaskiddy port in the AM and more traffic from it during the PM.

Traffic coming from Carrigaline (Arm C) is also more significant in its westbound direction (950 vehicles) than eastbound (800 vehicles), further indicating a higher volume of outbound flows from the Ringaskiddy area compared to inbound flows.

Figure 13. **Shannonpark Roundabout PM Total Peak Flows**

4.5 Vehicle Journey Time Surveys

4.5.1 Survey Specification

Vehicle Journey Time Surveys were conducted for four routes in both directions, as indicated in **Figure 14** below. Journey times were recorded from 06:00 to 20:00 over five days (Monday to Friday). The data for each route were divided into sections at key junctions along the routes shown in **Figure 14**.

For a more accurate data assessment, five readings per direction per hour were taken during the following periods: AM peak period (07:00 to 10:00) and PM peak period (16:00 to 19:00). Outside of these hours, a minimum of three readings per direction were considered.

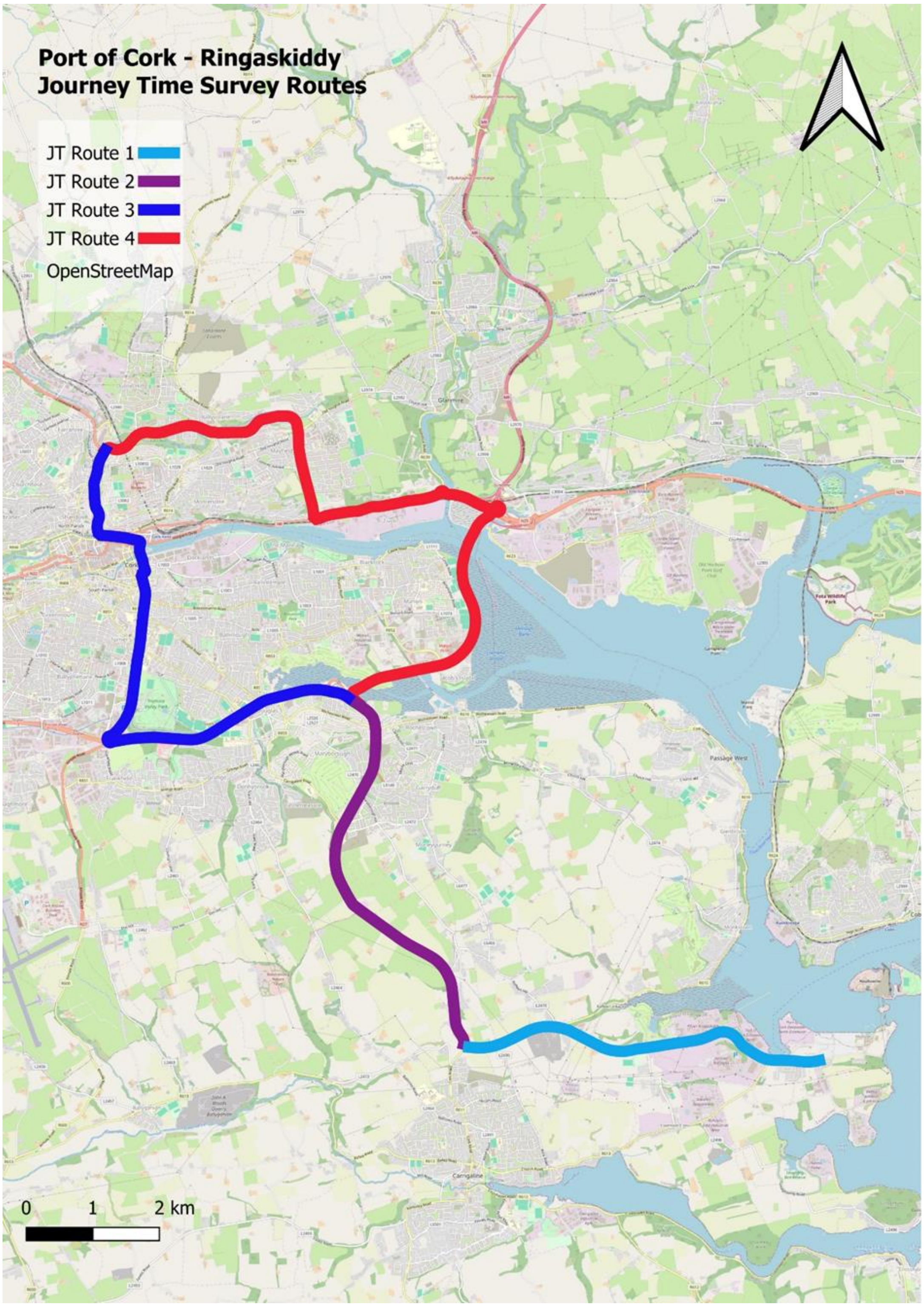


Figure 14. Journey Time Route Map

4.5.2 Survey Data Analysis

Figure 15 illustrates the journey time profiles for the four sections outlined in the previous section. This data was recorded every 10 minutes from 06:00 to 20:00, clearly representing the variation in journey times throughout the day.

The [time] duration for each data point on the horizontal axis in **Figure 15** is presented in **Table 4.6**. For example, the journey times corresponding to data point 1 on the horizontal axis are recorded between 06:00 and 06:10.

As shown in **Figure 15**, the road sections on the north side of the study area (Bloomfield – Blackpool, Dunkettle) experience longer journey times throughout the day compared to the sections along the N28 (Ringaskiddy – Shannonpark – Bloomfield). This will be investigated in detail during the future modelling process.

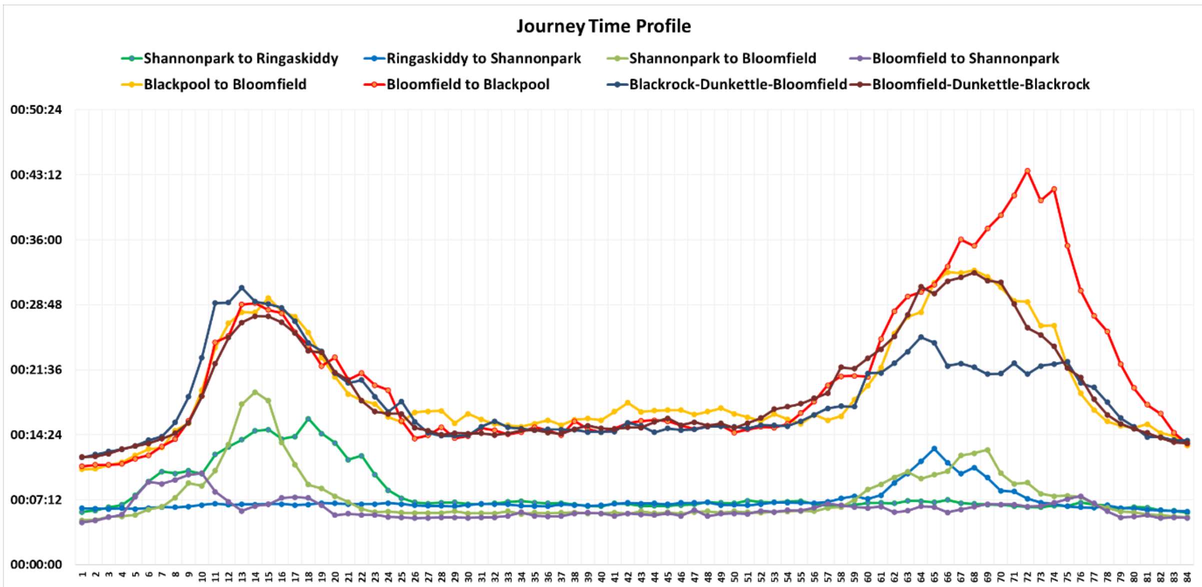
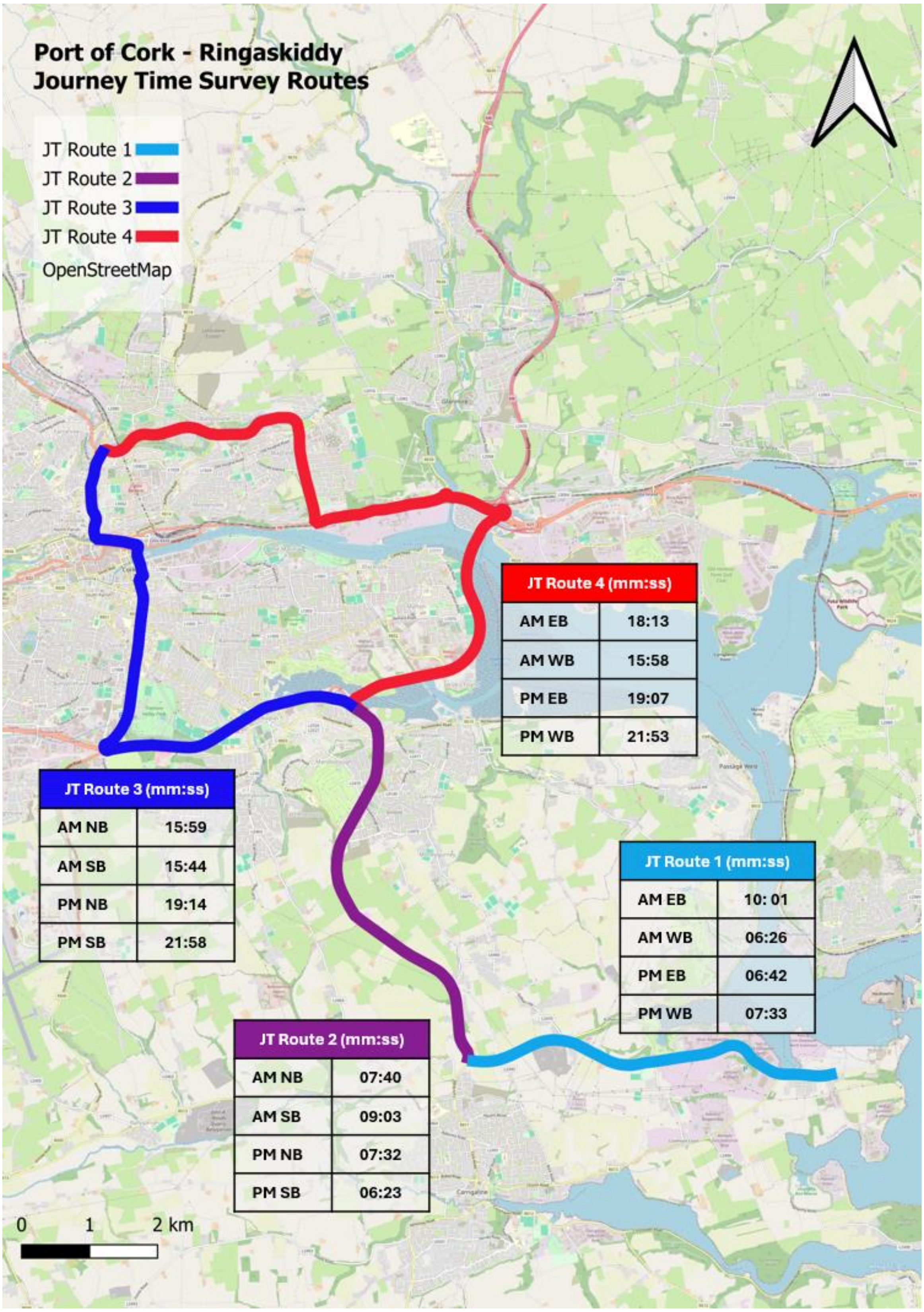


Figure 15. Journey Time Profile

Table 4.6 JT Data Point (Relevant to Figure 10)

JT Point	Time	JT Point	Time	JT Point	Time	JT Point	Time
1	06:00	22	09:30	43	13:00	64	16:30
2	06:10	23	09:40	44	13:10	65	16:40
3	06:20	24	09:50	45	13:20	66	16:50
4	06:30	25	10:00	46	13:30	67	17:00
5	06:40	26	10:10	47	13:40	68	17:10
6	06:50	27	10:20	48	13:50	69	17:20
7	07:00	28	10:30	49	14:00	70	17:30
8	07:10	29	10:40	50	14:10	71	17:40
9	07:20	30	10:50	51	14:20	72	17:50
10	07:30	31	11:00	52	14:30	73	18:00
11	07:40	32	11:10	53	14:40	74	18:10
12	07:50	33	11:20	54	14:50	75	18:20
13	08:00	34	11:30	55	15:00	76	18:30
14	08:10	35	11:40	56	15:10	77	18:40
15	08:20	36	11:50	57	15:20	78	18:50
16	08:30	37	12:00	58	15:30	79	19:00
17	08:40	38	12:10	59	15:40	80	19:10
18	08:50	39	12:20	60	15:50	81	19:20
19	09:00	40	12:30	61	16:00	82	19:30
20	09:10	41	12:40	62	16:10	83	19:40
21	09:20	42	12:50	63	16:20	84	19:50

Figure 15 and **Table 4.6** presented the JT profile throughout the day. However, as discussed earlier in this report, the peak hours were identified primarily to assess the impact of traffic movements to and from Ringaskiddy Port on the N28. Based on traffic patterns in the Ringaskiddy area, these peak hours were identified as 06:45 to 07:45 for the AM peak and 15:15 to 16:15 for the PM peak. Consequently, the JTs on the four sections have been analysed according to these peak hours, as shown in **Figure 16** below.



JT Route 4 (mm:ss)	
AM EB	18:13
AM WB	15:58
PM EB	19:07
PM WB	21:53

JT Route 3 (mm:ss)	
AM NB	15:59
AM SB	15:44
PM NB	19:14
PM SB	21:58

JT Route 1 (mm:ss)	
AM EB	10: 01
AM WB	06:26
PM EB	06:42
PM WB	07:33

JT Route 2 (mm:ss)	
AM NB	07:40
AM SB	09:03
PM NB	07:32
PM SB	06:23

Figure 16. Section by Section Journey Times

4.6 Traffic Movements at Ringaskiddy Port

4.6.1 Context

This section presents the total traffic entering and leaving Ringaskiddy Port between 06:00 and 20:00, as well as the distribution of traffic between Light Vehicles (LVs) and Heavy Vehicles (HVs). It further demonstrates the hourly traffic profile, which represents the distribution of traffic within the specified time frame, recorded at 15-minute intervals. These data are generated from the JTC survey conducted in November 2024.

4.6.2 Traffic From Ringaskiddy Port (Port Exit)

Figure 17 below illustrates the total traffic leaving Ringaskiddy Port between 06:00 and 20:00, as well as the distribution of traffic between LVs and HVs. Figure 20 further demonstrates the hourly traffic profile, which essentially represents the distribution of traffic within the specified time frame.

As shown in **Figure 17**, a total of 3,607 vehicles leave the Ringaskiddy Port between 06:00 and 20:00, of which 2,535 are HVs, accounting for 70.3% of all traffic.

The hourly traffic profile in **Figure 18** illustrates the distribution of these 3,607 vehicles, including both LVs and HVs. This profile indicates a sharp rise in the number of HVs leaving the port between 07:15 and 08:15, with approximately 60 HVs per hour. This number decreases slightly until 10:00 to 11:00, reaching 72 HVs per hour, which is higher than the early morning traffic at the port. This trend continues until 13:00, after which it gradually declines to 51 HVs per hour between 17:15 and 18:15. Subsequently, there is a significant drop to 3 HVs per hour between 19:00 and 20:00.

The LV traffic leaving the port is generally low during the day. This traffic flow is primarily associated with port employees and vans arriving for work in the morning and departing in the evening. The data supports this observation, showing a gradual increase in LV flows from 3 vehicles in the early morning to 35 vehicles between 16:45 and 17:45. The highest volume of LVs exit the port between 18:00 and 19:30.

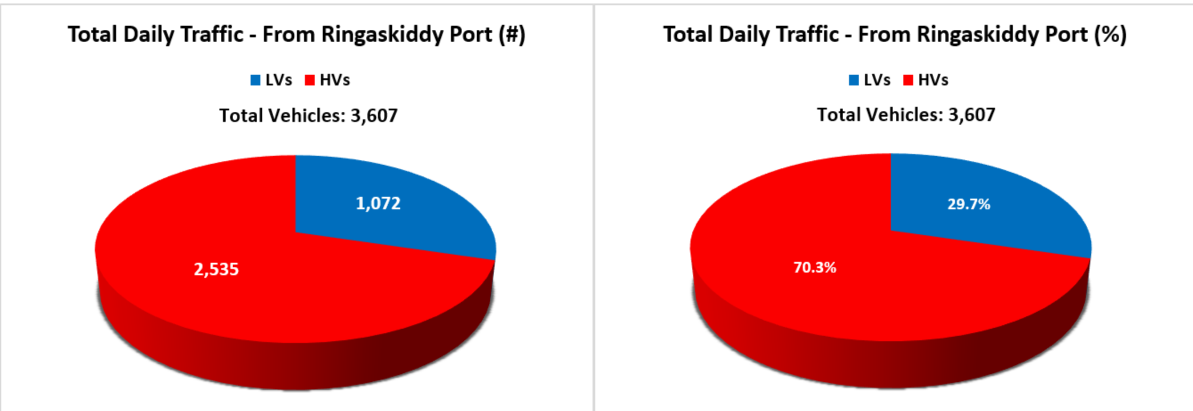


Figure 17. **Share of Daily Traffic – From Ringaskiddy Port (Port Exit)**

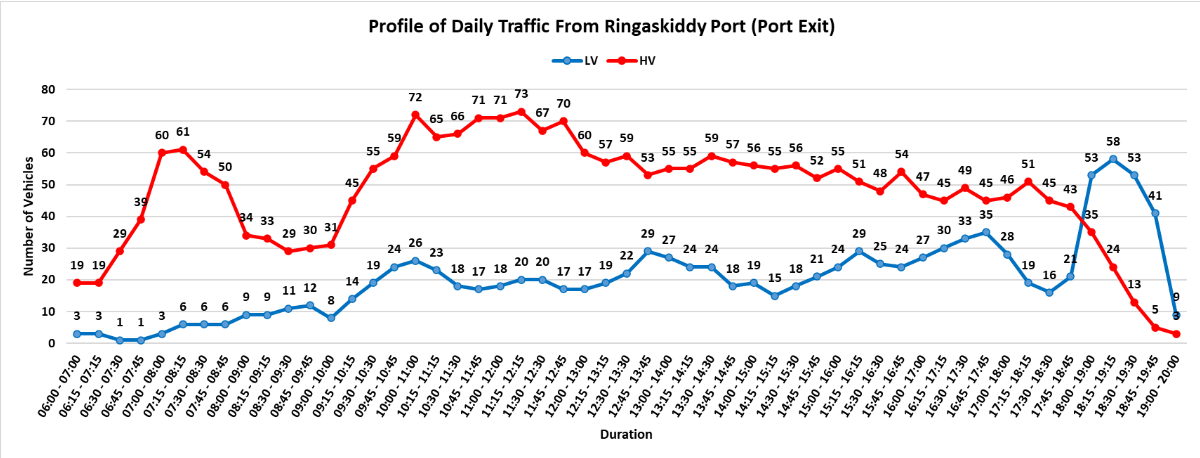


Figure 18. **Daily Traffic – From Ringaskiddy Port (Port Exit)**

4.6.3 Traffic Entering Ringaskiddy Port (Port Entrance)

Figure 19 below illustrates the total traffic entering Ringaskiddy Port between 06:00 and 20:00, as well as the distribution of LVs and HVs. **Figure 20** also demonstrates the hourly traffic profile recorded at 15-minute intervals.

As shown in **Figure 19**, a total of 3,423 vehicles enter Ringaskiddy Port between 06:00 and 20:00 on a typical day, of which 2,462 are HVs, accounting for 71.9% of all traffic. This is consistent with the share of HVs leaving the port, as shown earlier in **Figure 17**.

The hourly traffic profile in **Figure 20** illustrates two peak periods for the HV traffic entering the port. The first occurs between 09:15 and 10:30, and the second between 14:15 and 15:30, with 97 and 78 HVs per hour, respectively. The early morning period has a smaller peak, with 62 HVs per hour occurring between 06:30 and 07:30, after which this traffic flow decreases until 09:15, as outlined above. This is likely due to many HVs entering and leaving the port earlier in the morning to avoid the morning peak congestion on the N28, after which they have more freedom, in terms of road space, to travel through the N28.

The LV traffic entering the port is generally low during the day. The LV traffic profile begins with its highest volume, 58 vehicles, between 06:15 and 07:15, and then gradually decreases throughout the day. This is reasonable because these flows are predominantly related to employees, and delivery vans, who enter the port in the morning and leave the port between 18:00 and 19:30 in the evening, as shown earlier in **Figure 18**.

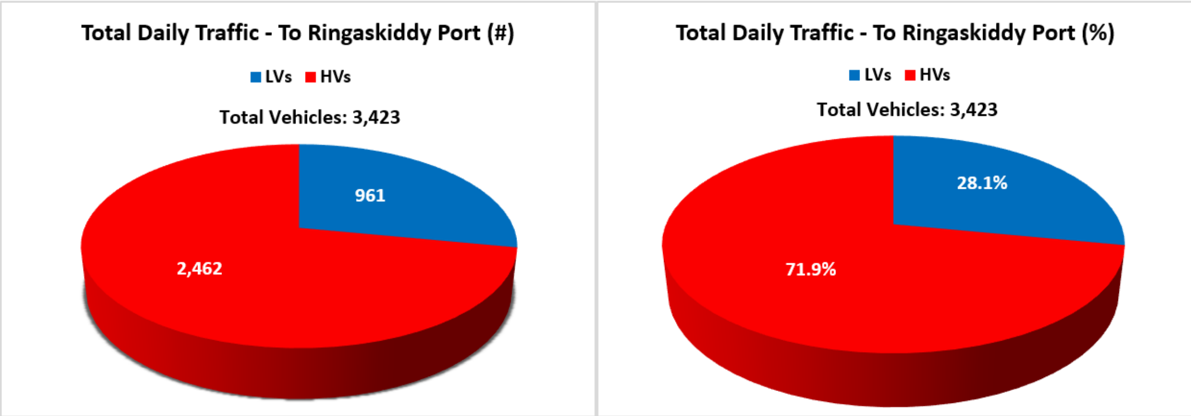


Figure 19. Share of Daily Traffic – To Ringaskiddy Port (Port Entrance)

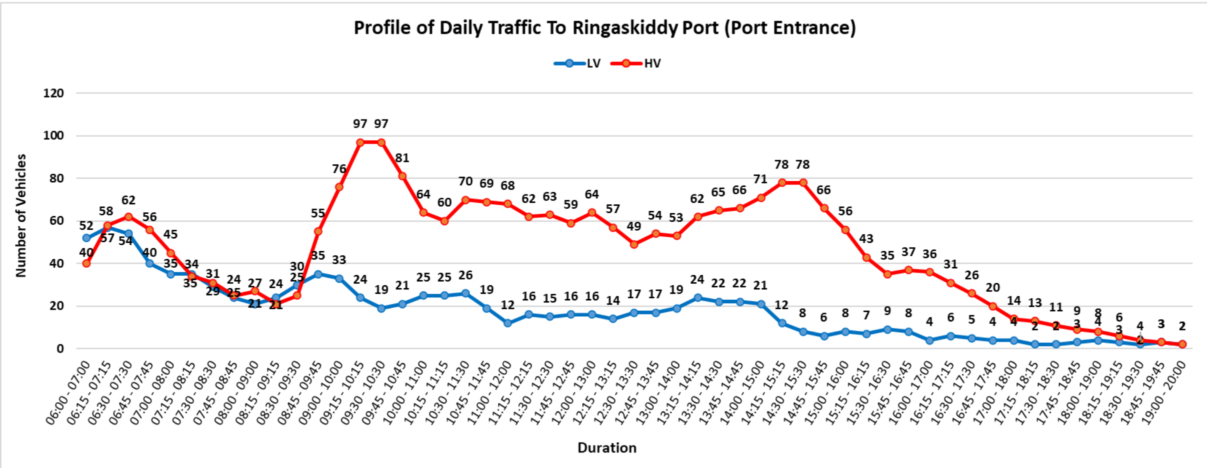


Figure 20. Profile of Daily Traffic to Ringaskiddy Port (Port Entrance)

5. NETWORK-WIDE TRAFFIC EVALUATION

5.1 Context

This chapter undertakes an assessment of the traffic conditions in the study area, focusing on the infrastructure for each transport mode, the utilisation of that infrastructure, and the conditions experienced. These assessments are based on the data collected and processed in the previous chapters, including census data and traffic survey data, supplemented by site visits.

During site visits, detailed observations were made regarding the current traffic management arrangements for each road user class, the conditions experienced by each, observations of local land uses, and photographic records were also taken.

This Transport Network Review of the area is based on observations made on-site that represent the typical day-to-day operation of the transport network on the major roads linking the port sites.

5.2 General Traffic Conditions

The following key points relating to general traffic management arrangements were noted:

- The N28 experiences congestion during the AM and PM peaks at various sections along the route. The most notable congestion occurs at Carrs Hill, the Maryborough Hill merge, Shannon Park Roundabout, and Shanbally Roundabout. Traffic queues form at these sections in both directions at different times during both the AM and PM peaks.
- There is a high volume of traffic spread over the peak periods. Traffic delays are most significant through Shanbally towards Ringaskiddy during the early morning peak. Delays are also significant at the Shannon Park Roundabout from Carrigaline and on the N28 north of Shannon Park during the morning peak. In the evening peak, traffic delays occur at Shannon Park Roundabout from Ringaskiddy and along the N28 southbound.
- There seem to be some operational issues near Dunkettle Interchange. Queuing was noted during site visits in both the AM and PM peaks in a number of directions. Notably slow-moving traffic was observed in the PM peak travelling eastbound on the N40 between Mahon and the Jack Lynch Tunnel. This traffic moved steadily at a slow pace up to the tunnel and cleared quickly after the tunnel, allowing for free-flowing traffic at the merge onto the N25. The AM peak trips from the N25 travelling southbound through the tunnel showed a similar situation. This congestion seemed to mainly originate at the merge of the off-slip road from Little Island with the N25. However, after the tunnel, traffic began to free-flow on the N40 westbound.
- The N40 is currently impacted by significant congestion and unreliable service levels during peak times. These issues are especially noticeable at the points where the N40 merges with on-slip roads from major junctions and interchanges along the route, such as Mahon Point and Bloomfield, among others. The influx of traffic from these slip roads creates shockwaves due to abrupt speed reductions in the main flow on the N40 near the merging areas, along with weaving and lane-changing manoeuvres.
- Recent site visits and traffic flow observations revealed numerous accidents at these merging points. These incidents have led to congestion, long queues on the N40, and tailbacks extending upstream on the on-slip roads. A typical example of this problem occurs in the northbound direction of the N28 towards the Bloomfield interchange.

5.3 Motorway Road Network

The M8 is a major inter-urban connector that joins two of the main cities in the country: Dublin and Cork. The M8 begins at Aghaboe, Co Laois, where it connects to the M7, which links Limerick to Dublin, and continues towards Cork. The M8 extends to approximately 150km and terminates at the Dunkettle Interchange. *The N8 was upgraded to motorway in 2010.*

5.4 National Roads

5.4.1 N8 between Dunkettle Interchange and Cork City

The N8 is a major national distributor that connects the Dunkettle Interchange to Cork city centre and the Port of Cork facilities at Tivoli and City Quays. The N8 comprises both single and dual carriageway sections between Cork city and the Dunkettle Interchange, where the road narrows towards the city centre. Traffic from both ports must travel on this road to reach most of the other national distributors in the area, such as the N20, N25, N27, N40, N71, and the M8. Parts of the N8 are one-way in the city centre, near the quays, and where it crosses the River Lee.

The Dunkettle Interchange has undergone major construction works prior to 2024 resulting in a new free-flow arrangement. The interchange connects the M8, N25, N40, and N8, and provides access to the Jack Lynch Tunnel. While the upgrade has been successful in creating a free-flowing traffic situation, it still experiences congestion at peak times. On the N25 westbound approach to the Jack Lynch Tunnel, there is congestion at the merge of the off-slip road from Little Island with the N25. These are shown in **Figure 21** below.

DUNKETTLE INTERCHANGE

- Capacity and operational issues exist
- High demand has caused capacity issues, but there is an operational issue on the westbound approach to the Jack Lynch Tunnel off the N25.

Picture 1: congestion on the westbound approach to Jack Lynch tunnel during the AM peak.

Picture 2: operational issue consisting of 3 lanes merging into 1 on the westbound approach to Jack Lynch tunnel. (AM Peak).

Figure 21. Traffic Delays on the N25 (at the merge with Little Island Offslip)

5.4.2 N20 between Cork City and Limerick City

The N20 is a major national distributor which connects Cork City and Limerick. A short section of this route has been upgraded to motorway and is known as the M20 between the Rosbrien Interchange and Limerick City. The majority of the connection is a single carriageway which varies in width, with a number of locations where a 2+1 type arrangement is present and dedicated overtaking lanes are provided.

5.4.3 N22 between Cork City and Tralee

The N22 is a major national distributor which connects Cork City and Tralee. It passes through towns such as Killarney. The N22, which links counties Cork and Kerry, has been upgraded substantially in recent years particularly in County Kerry and some sections on the outskirts of both Cork and Tralee are of Dual Carriageway standard, although some sections are still single carriageway. There has been a dual carriageway bypass of Macroom developed in recent years which has increased traffic efficiency significantly along the N22. The N22 connects with the N40 South Ring Road at the Bandon Road Interchange to the west of Cork City.

5.4.4 N25 between Cork City and Rosslare Europort

This is a major national distributor which connects Cork City to Rosslare Europort, via Waterford City. The N25 is single and dual carriageway in sections between the two cities and forms part of the Atlantic Corridor.

5.4.5 N27 South Link Road between Cork City Centre and Cork International Airport

This is a major national distributor route, as it connects the City Centre with the N40 and onwards to Cork International Airport, as well as major employers near the airport with the wider labour market in Cork County and the City Centre. It is a dual carriageway with bus lanes and speed limits ranging from 100 kph to 60 kph.

The N27 extends from South to North along the western boundary of the study area. Traffic on the N27 experiences delays during peak periods at the Kinsale Roundabout and the signalised crossroads with Forge Hill and the Ballycurreen Road. South of the Ballycurreen Road junction, traffic is relatively free flowing south bound and suffers minimal delays. Some delays are experienced during peak periods on the northbound approach to the junction.

5.4.6 N28 between Ringaskiddy/ Shannon Park Roundabout and the N40

This is a major national distributor route which connects the wider national road network with Ringaskiddy, including the major employers and the national sea freight and passenger services at the PoC terminal. The N28 is a single carriage generally with a one metre hard strip, however road width varies along the route. A major junction on the route is the Shannon Park roundabout. Traffic from Carrigaline and Ringaskiddy must travel through the Shannon Park Roundabout to get onto the northern section of the N28 and traffic heading from Cork City / Douglas towards Ringaskiddy also travels through Shannon Park Roundabout.

Congestion occurs at various sections along the N28 as a result of merging lanes at Maryborough Hill and reduced lane width at Carrs Hill. Congestion also occurs at the Shannon Park Roundabout when traffic flow is heavy in both directions throughout the morning and evening peaks. These are shown in **Figure 22** below. There are also considerable delays at Shanbally Roundabout during the AM peak travelling towards Ringaskiddy.

PICTURE 1	PICTURE 2
 A) Heavy traffic on the N28 in both directions near Maryborough Hill.	 B) Constant flow of traffic at Shannon Park Roundabout from Carrigaline.

Figure 22. **Traffic Delays on the N28**

5.4.7 N40 Southern Ring Road

The Southern Ring Road, commonly known as the N40 road, is a major national distributor road allowing access to the wider national network including the M8 to Dublin (to the north) and the N22 to Killarney (to the west). As a result of this, it is subject to heavy traffic during peak periods. The Southern Ring Road is typically a two-lane dual carriageway (with some sections where there are additional lanes due to merging and weaving and to allow more efficient transitions between adjacent junctions) with hard shoulders and a speed limit of 100 kph.

The N40 currently experiences significant congestion and unreliable levels of service during peak periods. The congestion and delays are particularly prominent at the merges of the N40 with the on-slip roads from key junctions and interchanges along the route, including, but not limited to, Mahon Point, Bloomfield, Douglas, and others. The traffic flow from these slip roads causes shockwaves due to sudden speed reductions in the main flow on the N40 near the merging points, as well as weaving movements and lane change operations.

Site visits and observations of traffic flow over the past few months have shown numerous accidents at the merging points, resulting in congestion, long queues on the N40, and tailbacks upstream on the on-slip roads. A common example of this incident is the northbound direction of the N28 towards the Bloomfield interchange.

Traffic on the N40 can enter the N28 via the Bloomfield Interchange to the east of Douglas Village. Westbound traffic travelling to Douglas also uses this exit and then takes the slip road from the N28 onto the Rochestown Road. Alternatively westbound traffic can exit at the Kinsale Roundabout and enter the study area via the Frankfield Road or the N27 to the west of Douglas Village. Similarly, eastbound traffic on the N40 can access Douglas via the slip road onto the South Douglas Road or alternatively use the slip road onto the main Douglas Road. Queues can occur on each of these slip roads during peak hours, which can occasionally extend onto the N40.

Figure 23 below shows an example of traffic movement on the N40 EB at the merge with Mahon point and N40 WB traffic at Bloomfield interchange.

PICTURE 1	PICTURE 2
 N40 EB – Mahon Point Merge	 N40 WB - Bloomfield Interchange

Figure 23. Traffic Delays on the 40

5.4.8 N71

The N71 is a national secondary road providing a link between Cork City and West Cork (Skibbereen/ Bantry) and West County Kerry (Kenmare). The route is predominantly single-carriageway with some limited sections of dual-carriageway nearing the city.

Delays can occur at peak hours on the N71 where it passes through the village of Innishannon approximately halfway between Cork City and Bandon.

5.5 Regional Roads

5.5.1 R610 Rochestown Road / Strand Road

The Rochestown Road / Strand Road is a single-carriageway, regional distributor road which connects Rochestown with the wider district and national road network. It approaches the N28 from the south and is the primary route for people living in Passage West and Rochestown to connect to the N40 via the Bloomfield Interchange (N28 northbound only) junction. Traffic from Rochestown / Passage West heading to Ringaskiddy / Carrigaline will generally travel along the R610 and connect to the N28 at Rafeen junction east of Shannonpark Roundabout. **Figure 24** below illustrates the traffic on Rochestown road.

PICTURE 1	PICTURE 2
 Rochestown Road between N28 and Fingerpost Roundabout	Westbound traffic on Rochestown Road,  Immediately east of the N28 junction at Bloomfield

Figure 24. Rochestown Road

5.5.2 R613 Church Road

Church Road is a regional road connecting Carrigaline to the N28, at Ringaskiddy. It is a single carriage approximately 5km long and extends from Carrigaline and runs parallel to, but to the south of, the section of the N28 east of Shannonpark roundabout.

Church Road approaches the N28 from the south. Many of the major employers in the Ringaskiddy area are located off this route such as GlaxoSmithKline (GSK), Novartis and Johnson & Johnson. There are two distinct sections of road along Church Road. The section of the road from St. Bernadette Place to the N28 is far superior to the section from St. Bernadette Place west towards Carrigaline. The speed limit of the section nearer Ringaskiddy is 80kph where this section of road is considerably wider than the section nearer Carrigaline. Parts of the road nearer to Carrigaline are sub-standard, extremely narrow and barely wide enough for two vehicles coming in opposing directions to pass one another.

Considerable levels of traffic use both the St. Bernadette Place route (south of Shanbally Roundabout) and Church Road from Carrigaline. There is little to no congestion experienced on this route.

Ringaskiddy Lower Harbour National School is located in Loughbeg, off the R613 (Church Road) and west of Ringaskiddy Main Street. A one-way system is operated in the area for school pick-up and drop-off. **Figure 25** below shows the difference between the two sections of Church Road, Picture 1 shows the wider 80kph section and Picture 2 shows the 50kph narrower section. The change occurs close to the turn off onto Bernadette Place.

PICTURE 1	PICTURE 2
	
R613 approaching the N28	Change of road quality near Bernadette Place

Figure 25. Church Road

5.5.3 R635 North Ring Road

The R635 known also as the North Ring Road is a regional road which takes traffic off the N8 approaching the city centre and offers an alternative route onto the N20. Parts of the route are dual carriageway and 2+1 (climbing lane northbound from the Silversprings overpass road) but it is mostly a single carriageway with reasonably wide roads. The road also provides the main connection to the Tivoli Docks site.

5.5.4 R639

The R639 was part of the old N8 and runs parallel to the M8 through towns such as Fermoy, Mitchelstown and Cahir as far as Durrow in County Laois. When the M8 was opened, parts of the old N8 were re-designated as the R639. It is a reasonably wide single carriageway with a hard shoulder for the most part. Some sections are quite narrow with very few sections with hard shoulders while other sections of the R639 are 2+1 roads.

5.6 Local Roads

5.6.1 L2545

The L2545 is a local road which is a linear continuation of the N28 road (which terminates at the entrance to the Port east of Ringaskiddy village) and provides access from the N28 to the National Maritime College of Ireland (NMCI) and the Haulbowline Naval Base on Haulbowline Island. It is a single carriageway stretch approximately 2km in length that joins with the N28 at the crossroads with Shamrock Place, the N28 and the PoC entrance at the eastern end of Ringaskiddy village.

The L2545 approaches the N28/Ringaskiddy Main Street from the east. Congestion is generally not an issue although there is a steady stream of vehicles including heavy goods vehicles in and out of the area at peak times. There is a lack of pedestrian crossings in Ringaskiddy village on the N28 however there are some traffic islands in a number of locations which provide a safer crossing situation for pedestrians. Despite this, the pedestrian crossing facilities are sub-standard in this area. **Figure 26** shows the single-lane carriageway and the Bus Éireann stop located adjacent to the NMCI.

PICTURE 1	PICTURE 2
 L2545 eastbound	 Bus stop outside the NMCI

Figure 26. L2545

5.6.2 L2490

The L2490 is a local road approximately 2km in length which joins the N28 to the R613, just east of Carrigaline. There are a number of access routes to estates off the L2490, as well as access to the Fernhill Golf Club.

There is a steady stream of traffic from the N28 at peak times, as drivers avoid driving through Carrigaline village. The road is extremely narrow in sections, barely wide enough for two opposing vehicles to pass, and parts are in poor condition.

5.6.3 L2492

The L2492 is a local road, shown in **Figure 27**, approximately 1.4km in length, which joins the N28 at Shanbally Roundabout to the R613 at Coolmore Cross. Shanbally National School is located along this route as well as a number of estates and housing areas.

There is a steady flow of traffic during peak times in both directions, likely to be a result of shift changes. This route provides access to some of the major employers in the Ringaskiddy area such as GSK, Novartis and Johnson & Johnson. Although there are a considerable number of vehicles on the route, traffic moves well at both ends of the L2492 at Shanbally Roundabout and the junction at Church Road. There are some delays at the Shanbally Roundabout during the morning peak (approx. 08:45hrs) when the Shanbally National School opens.

PICTURE 1	PICTURE 2
	
L2492 and Church Road junction	L2492

Figure 27. L2492

5.7 Junction Evaluation

5.7.1 Context

Junctions represent the major point of conflict between road users, with intra modal (e.g. general traffic to general traffic) and inter modal (e.g. general traffic/ pedestrian/ cyclist) conflict occurring. In terms of the efficient operation of an urban traffic management system, the layout and operation/ management of junctions is essential to ensure that a fair balance is achieved between the competing needs of each transport mode. Given the conflict between road users that exists at junctions, the traffic management arrangements in place determine how well the junction will perform from a safety perspective.

5.7.2 Junction Arrangements

The issues observed in the study area can be separated into the following three categories:

- Operational Issue - relates to a junction or an area where the operation is the main issue, this could include conflict between different modes or uses;
- Capacity Issue - relates mainly to a junction or an area where capacity is the main issue, this could be caused by operational issues, but mainly relates to demand exceeding capacity (i.e. vehicular demand wishing to pass through a junction or road exceeds the available capacity which often leads to queuing and congestion), and includes confined / restricted road widths; and
- Pedestrian and Cyclist Issue - relates to a junction or an area where pedestrian and cycle facilities are the main issue, particularly where they are not catered for by the design of the road or junction. These issues are usually due to junction arrangements, pavement widths or crossing facilities.

Figure 28 below illustrates examples of some of the issues experienced in the area.

EXAMPLE OF ISSUES

- Picture 1 shows an example of traffic congestion at the Shannon Park Roundabout on the approach from Carrigaline in the PM peak.
- Picture 2 shows an example of traffic congestion at the Shannon Park Roundabout on the southern exit towards Carrigaline during the PM peak. The merging lane congestion was seen to back up onto the roundabout.
- Picture 3 shows congestion on the N28 during the AM peak on Carrs Hill. Northbound traffic is experiencing congestion issues while southbound traffic is slow moving on account of the end of the merging lane.
- Picture 4 shows congestion on the N28 northbound during the AM peak as vehicles join the slow-moving traffic from Maryborough Hill.

Picture 1

Picture 2

Picture 3

Picture 4

Figure 28. **Examples of the issues on the N28**

5.7.3 Junction Operational Issues

Table 5.1 summarises the issues which have been identified and details them as Operational, Capacity or Pedestrian and Cyclist issues. **Appendix A** provides further details of the issues at specific junctions.

Table 5.1 Summary of Junction Locations and Issues Identified

LOCATION	Operational issues	Traffic capacity	Peds & Cyclist Facilities
1. Dunkettle Interchange	✓	Queuing during peaks in all directions	X
2. Jack Lynch Tunnel	✓	Queuing during peaks in all directions	X
3. Mahon Interchange	X	No capacity issues observed	X
4. Bloomfield Interchange	X	No capacity issues observed	X
5. N28/ Rochestown Rd	X	Some capacity issues observed	X
6. N28/ Maryborough Hill	✓	Capacity issues during peak	X
7. N28/ Carrigaline Rd	X	No capacity issues observed	X
8. N28/ Carrs Hill	X	Capacity issues observed during peaks	X
9. N28/ L6477	X	No capacity issues observed	X
10. Shannon Park	✓	Capacity issues observed	Pedestrian footpath provided. No cycle facilities.
11. N28/ L2490	X	No capacity issues observed	X
12. N28/ R610	X	No capacity issues observed	Pedestrian/cycleway on both sides of the road. One crossing island to assist pedestrian crossings.
13. Shanbally	X	Capacity issues observed, especially during AM peak	Footpaths provided in village, along with some pedestrian refuges. No cyclist facilities.
14. Pfizer	X	No capacity issues observed	Pedestrian footpath along northern side of road, between Shanbally and Ringaskiddy. No cyclist facilities.
15. N28/ R613	X	Some queuing observed during peak which clears quickly.	Pedestrian footpath along northern side of road, between Shanbally and Ringaskiddy. No cyclist facilities.
16. N28/ Shamrock Place	X	No capacity issues observed	Pedestrian footpaths provided in all directions. No cyclist facilities.
17. R613/ L2492	X	Some queuing observed	X
18. R613/ L2490	X	Some queuing observed	Pedestrian footpaths provided. No cyclist facilities.
19. R613/ R612	X	Some queuing observed, but cleared during green times	Pedestrian facilities including signalised crossings. No cyclist facilities.
20. R612/ R611	✓	Queuing was observed	Pedestrian facilities including signalised crossings. No cyclist facilities
21. Ballea Rd/ R613/ R611	X	Queuing was observed	Pedestrian footpaths and crossing islands. No cyclist facilities.
22. Access to Tivoli	X	No capacity issues observed	Pedestrian footpaths. No cyclist facilities
23. Access to City Quays	X	No capacity issues observed	No formal facilities

5.8 Pedestrian & Cycling Facilities and Conditions

Pedestrian facilities (such as footpaths, adequate crossing points, etc.) which play a large part in determining the levels of pedestrian activity in an area, are of good quality at City Quays, but poor at Tivoli and Ringaskiddy. Other factors which impact pedestrian activity are traffic speeds and volumes and the presence of heavy goods vehicles (HGV) as these can adversely affect the pedestrian environment.

The City Quays are located very close to Cork city centre which means that pedestrian access is good, with footpaths on both sides of the road for the most part near the Quays. The access routes coming from the south are well-served by footpaths. Other access routes could be improved with better crossing facilities. There is a signalised pedestrian crossing facility from the N27 on Albert Quay. There is an official footpath on only one side of the road towards the Quay however there are designated cycle lanes on both sides of the road. The cycle lane is used by both pedestrians and cyclists on the side of the road without an official footpath.

Pedestrian access to Tivoli is provided but is of a sub-standard quality. Access to the port is the same for both pedestrians and vehicles; via the off-ramp from the N8 or across the Silversprings Overpass (the fly-over bridge over the N8) from the R635, the North Ring Road. Footpaths are sufficiently wide on the bridge but there is no pedestrian crossing to get from the bridge across the off-ramp. There is a staircase that provides access to the port entrance from the bridge which is in close proximity to the road and the main port access for HGVs and other vehicles.

In general, pedestrian facilities are poor along the N28 and very low levels of pedestrian activity were observed. Some of the N28 has facilities for pedestrians, notably between Shanbally village and Ringaskiddy village. However, there are also narrow parts along the route, e.g. at Carr's Hill, where the width is only sufficient for two vehicles. The N28 is a primary route and as such caters for vehicles more than pedestrians. There is little on the N28 to encourage pedestrians to use it.

As in most parts of the Country, levels of cycling are low within the study area. The road network represents a poor cycling environment; as a result, very little cycling activity was observed. The high volumes of traffic, including HGVs, and narrow road widths along sections represent a major barrier to cycle use along the N28. As a result, low levels of cycling activity were observed in the area. There is no provision for cyclists at Tivoli but there is a strong network of cycle facilities at the City Quays. Provision for cyclists will improve at Ringaskiddy under the Cork County Development Plan, whereby the construction of a Greenway linking Passage West to Carrigaline has the potential to create a link between these two towns and Ringaskiddy. As well as this, the Ringaskiddy Urban Realm and Active Travel Scheme will make active travel a more attractive option for people in the area.

Figure 29 below shows a number of images of pedestrian and cycling facilities/conditions within the study area.

PEDESTRIAN & CYCLING FACILITIES

- Few roads along the Port Access Corridor facilitate pedestrian and cyclist movements
- There are no cycle lanes except in certain City Quay areas.
- Footpaths are located on roads adjoining Tivoli entrance
- No pedestrian facilities are provided along the N28, except for in Shanbally and Ringaskiddy, and between the two
- Pedestrian facilities are located within Carrigaline village
- There is a footpath on a section of Church Road, between Ringaskiddy and the turn-off for GSK
- There is a footpath on one side of Shamrock Road between Ringaskiddy and De Puy, Johnson & Johnson, etc
- Walking and cycling is very dangerous on the narrow section of Church Road, nearer Carrigaline

Picture 1: Pedestrian Environment at Tivoli

Picture 2: Pedestrian Environment at City Quays

Picture 3: Pedestrian facilities at Ringaskiddy

Picture 4: Lack of cycling facilities near Ringaskiddy. Note; cyclist seen here using footpath.

Figure 29. Pedestrian and Cycling facilities/conditions within the study area

5.9 Public Transport Services

5.9.1 Bus Service Operations

5.9.1.1 Service Arrangements

At present, the Ringaskiddy area is served by a number of Bus Éireann routes. These routes are detailed in **Table 5.2** below. The 223 and 223X services are relatively frequent, while the others are hourly services.

There is a relatively low amount of PT use in Ringaskiddy, with 5.7% of people travelling to work by bus or train when compared to the Cork City (8.6%) and Cork County (7.9%) averages. It is worth noting, as explained in Section 2.4, that the percentages reflect the movements of those who live in Ringaskiddy alone where there are very few people.

Table 5.2 Bus routes serving Ringaskiddy

BUS ROUTES	Frequency	Route Details (from, via, to)
BÉ Route 223	20mins (19NB & 19SB)	South Mall – Ringaskiddy – Haulbowline
BÉ Route 223X	30 mins – early morning only (2SB & 1NB)	South Mall - Ringaskiddy – Haulbowline
BÉ Route 225	1hr (16SB & 18NB)	Kent Station – Cork Airport - Haulbowline
BÉ Route 225L	1hr (13WB & 13EB)	Carrigaline Primary Care Centre – Pfizer, Ringaskiddy – Haulbowline

City Quays is well serviced by Bus Éireann Intercity, Regional and town services, presented in **Table 5.3**. Many of the routes into Cork City Centre terminate at Parnell Place which is approximately 500 metres from the entrance on Albert Quay. Kent Railway Station is also within walking distance from Custom House Street, approximately 600-700 metres.

Table 5.3 Bus routes servicing City Quays/Custom House Street

BUS ROUTES	FREQUENCY	ROUTE DETAILS (FROM, VIA, TO)
BÉ # 215	30mins (35EB & 38WB)	Cloughroe – City Centre – Mahon Point
BÉ # 214	20mins (56EB & 49WB)	Cork – Riverstown – Knockraha
BÉ # 220	40mins (24-hour service)	Carrigaline – Douglas – Ballincollig
BÉ # 223	1hr (21SB & 19NB)	City – Douglas – Ringaskiddy
BÉ # 226	1hr (19SB & 20NB)	Kent Station – Cork Airport – Kinsale
BÉ # 208	Every 15mins from 06:45 to 23:45	Curraheen – City Centre – Lotabeg
BÉ # 233	Changes throughout the day. (14WB & 11EB)	Cork - Macroom
BÉ # 235	1 service daily	Cork – Rylane – Stuake
BÉ # 236	90mins during AM (6WB & 4EB)	Cork – Bantry – Castletownbere
BÉ # 237	4WB & 2EB	Cork – Skibbereen – Goleen
BÉ # 239	35mins during AM, less frequent throughout the day. (7SB & 1NB)	Cork – Bandon
BÉ # 240	2 AM Peak services from Ballycotton, 1 from Cork. 3 other services throughout the day (4EB & 3WB)	Cork – Cloyne – Ballycotton
BÉ # 241	2 AM peak services and 2 evening peak services. (4EB & 4WB)	Cork – Midelton – Whitegate – Trabolgan
BÉ # 243	3NB & 3SB	Cork – Charleville – Doneraile – Newmarket
BÉ # 245	1hr (24NB & 6SB)	Mitchelstown – Fermoy – Cork
BÉ # 248	3NB & 2SB	Cork – Carrignavar – Glenville
BÉ # 260	2 AM Peak connections from Cork (6EB & 3WB)	Cork – Youghal – Ardmore
BÉ # 261	Changes throughout the day. Contains one AM peak service in either direction. (15EB & 16WB)	Cork – Carrigtwohill – Midleton – Ballinacurra

5.9.1.2 Facilities and Conditions

There are few bus stops along the N28, except for in Shanbally and Ringaskiddy villages. There are also bus stops in Carrigaline village. The bus stops in Shanbally are located close to the village centre, school, church, etc. Footpaths within the village facilitate movements to and from these stops, as shown in **Figure 30** (Photo 1).

There are a few bus stops located in Ringaskiddy, at both ends of the village. As with Shanbally, footpaths facilitate movements to/from these stops, as shown in **Figure 30** (Picture 2). The major employers in Ringaskiddy, Lough Beg and the Ringaskiddy end of Church Road are all connected to these bus stops by at least one footpath, but distances to employers can be up to 2km. Employers further afield, e.g. GSK, are not connected with pedestrian facilities, but the hourly 225 BÉ route connects Ringaskiddy with Cork Airport and Airport Business Park.

City Quays is located near the Bus Éireann terminal at Parnell Place and there are also a number of other BÉ stops in the vicinity. There also is one bus stop close to Tivoli on the Lower Glanmire Road eastbound. The 214, 260, 245, 241, 240 and 261 BÉ services stop here. **Figure 38** shows the Bus Éireann routes serving Ringaskiddy.

Bus stop in Shanbally

Bus stop in Ringaskiddy

Figure 30. **Bus facilities in Shanbally and Ringaskiddy**

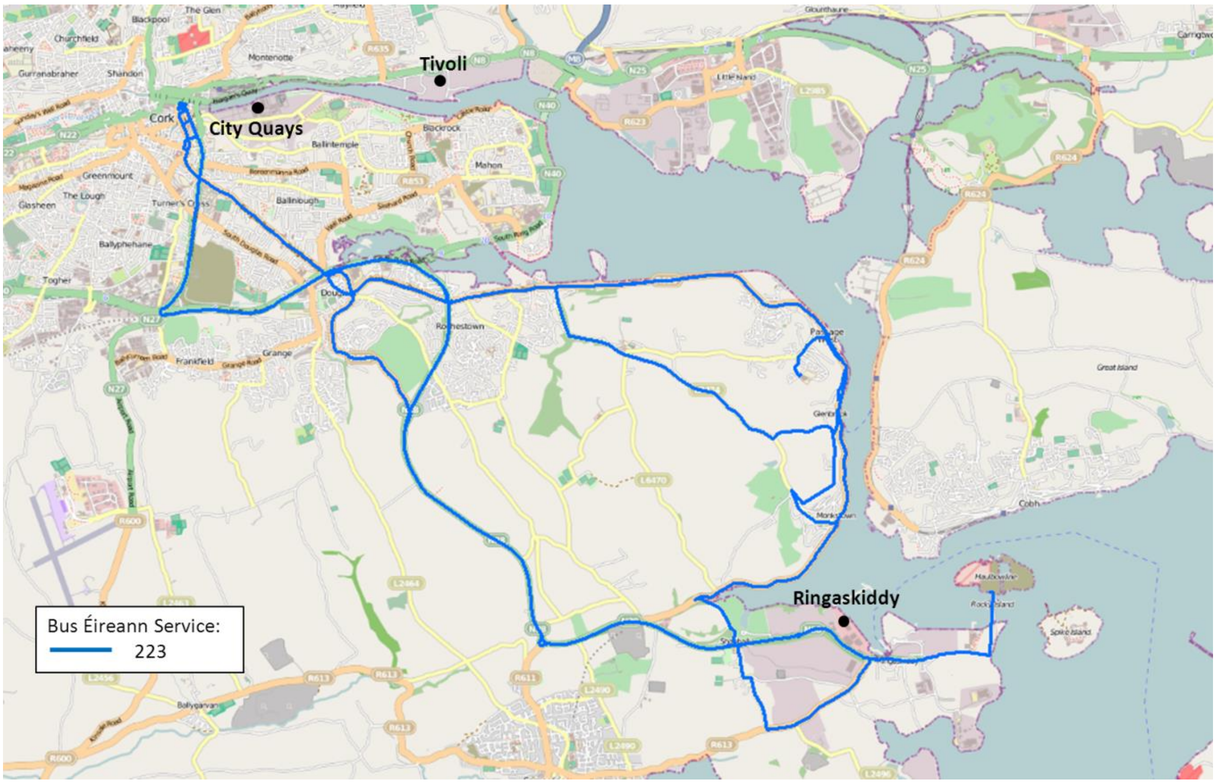


Figure 31. **Bus Éireann routes serving Ringaskiddy**

5.9.1.3 Cork BusConnects Network

The NTA's Bus Connects project for Cork will see a new bus network implemented on a phased basis from the beginning of 2025. The new system will provide more bus services with higher frequencies and promises to allow for greater access to residential and employment areas.

There is an emphasis within this project around the route which begins in Ballincollig, travels through the city centre and finishes in Mahon Point. This route is being prepared for future use as a light rail network. BusConnects will act as a phasing tool to prepare the route for rapid transit, by constructing a priority bus route throughout as much of this route as possible.

As a long-term plan, the BusConnects scheme promises to connect areas which were not well-connected previously. Among the areas outlined for new coverage are Little Island, Cobh, Carrigaline, Ringaskiddy, Upper Glanmire, Ballincollig, Kerry Pike, Carrigtwohill and Blarney.

5.9.2 Train Services

Kent Station is located within walking distance from City Quays. It serves the Cork-Dublin Heuston, Cork-Tralee and Mallow-Cork-Cobh/Midleton lines. There is a regular hourly service between Cork and Dublin. Eight services a day facilitate travel between Cork and Tralee. There are regular commuter services between Cork and Midleton / Cobh (alternative services every 15 minutes – less regular outside peaks). Of these services, approximately one an hour originates in Mallow.

The Commuter train service from Cork to Midleton and Cobh runs through the Tivoli estate and port facility but there is no stop along this section of track. The first stop after Kent station is at Dunkettle Little Island.

6. SUMMARY AND KEY OBSERVATIONS

This Port of Cork Strategic Development Baseline Review report provides an analysis of the current and potential traffic conditions related to the relocation of port facilities from Tivoli and City Quays to Ringaskiddy. The following are the key observations from this baseline review assessment:

- The N28 is a critical corridor connecting Cork City to Ringaskiddy, serving as a major route for freight and passenger traffic. The report highlights significant congestion during peak hours, particularly at Carr’s Hill, Maryborough Hill merge, Shannonpark Roundabout, and Shanbally Roundabout.
- Traffic surveys indicate that the N28 experiences heavy traffic flows, with significant volumes recorded during both AM and PM peaks. The Shannonpark Roundabout is identified as a key junction with high traffic volumes, underscoring its importance in managing traffic to and from Ringaskiddy.
- The relocation of port facilities is expected to increase traffic on the N28, as it will become the primary route for heavy goods vehicles accessing the port. The report notes that 70.3% of traffic leaving Ringaskiddy Port consists of HGVs.
- The baseline review identified operational and capacity issues at several junctions along the N28, which exacerbate congestion. These include merging lanes and restricted road widths that lead to queuing and delays.
- Pedestrian and cycling facilities along the N28 are limited, with low levels of pedestrian activity observed. This baseline review suggests that improvements in these areas could enhance safety and accessibility.
- Public transport services in Ringaskiddy are relatively infrequent compared to Cork City, with low usage rates. This baseline review suggests that enhancing public transport connectivity could alleviate some traffic pressures on the N28.
- The proposed M28 upgrade aims to address some of the traffic issues in the study area that may also help improve road capacity and connectivity between Cork City and Ringaskiddy. This upgrade is part of a broader strategy to ensure that the port meets European standards for transport infrastructure.

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APPENDIX A - JUNCTION EVALUATION

Junctions represent the major point of conflict between road users, with intra-modal (e.g. general traffic to general traffic) and inter-modal (e.g. general traffic/ pedestrian/ cyclist) conflict occurring. In terms of the efficient operation of an urban traffic management system, the layout and operation/ management of junctions is essential to ensure that a fair balance is achieved between the competing needs of each transport mode. Given the conflict between road users that exists at junctions, the traffic management arrangements in place determine how well the junction will perform from a safety perspective.

This appendix provides details of 23 junctions which were evaluated during site visits. The junctions reviewed are listed below and their locations are illustrated in **Figure 32**.

- Jct 1. Dunkettle Interchange;
- Jct 2. Jack Lynch Tunnel;
- Jct 3. Mahon Interchange;
- Jct 4. Bloomfield Interchange;
- Jct 5. N28/Rochestown Road (R610);
- Jct 6. N28/Maryborough Hill;
- Jct 7. N28/Carrigaline Road (R609);
- Jct 8. N28/Carrs Hill
- Jct 9. N28/L6477;
- Jct 10. Shannon Park Junction;
- Jct 11. N28/L2490;
- Jct 12. N28/R610;
- Jct 13. Shanbally Roundabout;
- Jct 14. Entrances to Pfizer;
- Jct 15. N28/Church Road (R613);
- Jct 16. N28/Shamrock Place
- Jct 17. Church Road (R613)/L2492;
- Jct 18. Church Road (R613)/L2490;
- Jct 19. Signalised Junction at R613/R612;
- Jct 20. Signalised Junction at R612/R611; and
- Jct 21. Ballea Road/Church Road (R613)/Cork Road (R611) roundabout
- Jct 22. Tivoli Access at N8/R635 (North Ring Road)
- Jct 23. Entrance to City Quay Port on Albert Quay

Figure 33 to **Figure 55** below describe the conditions and issues at each junction separately.

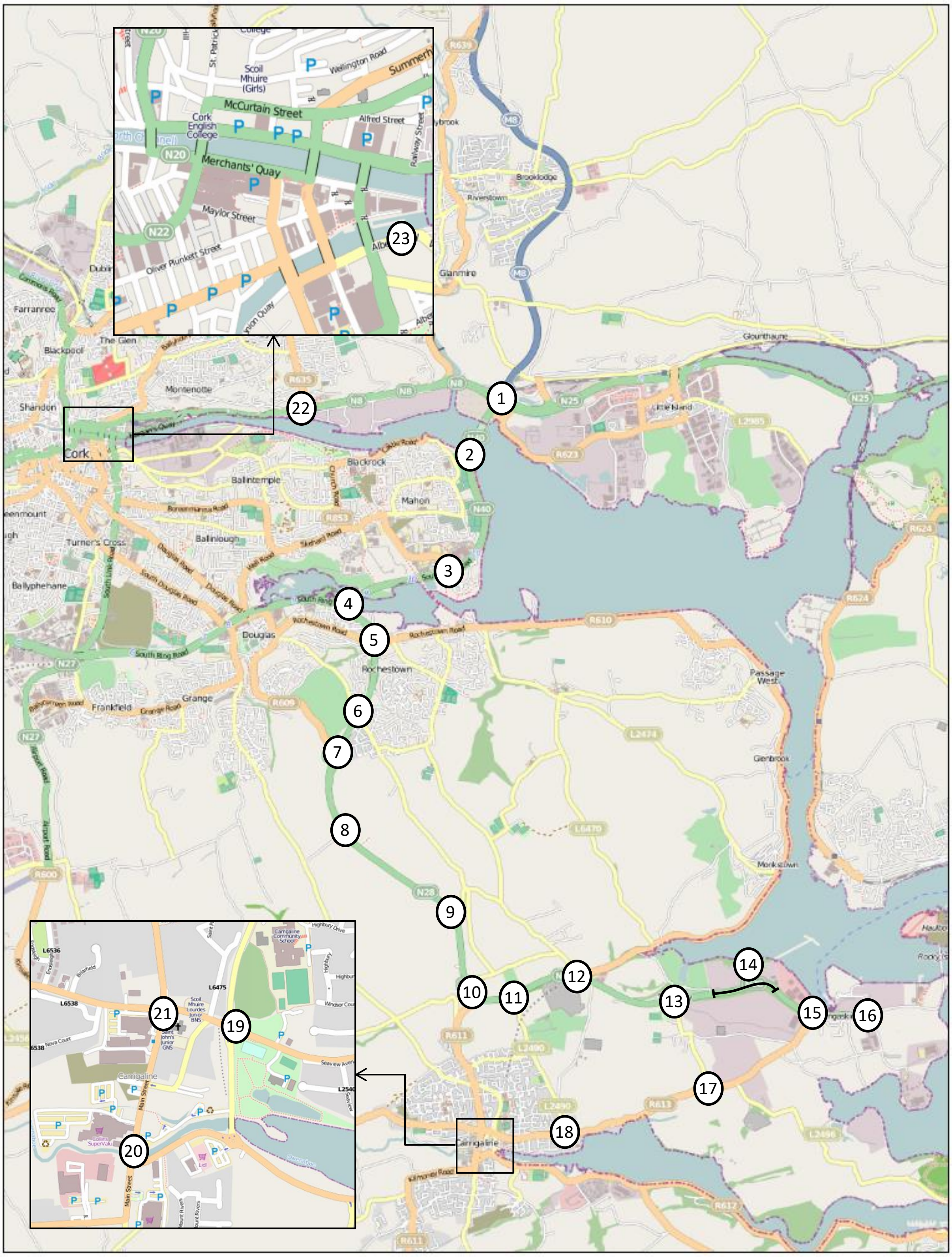


Figure 32. Study Area Junction Location Map

Figure 33. Junction 1 – Dunkettle Interchange

DUNKETTLE INTERCHANGE

- Capacity and operational issues exist
- High demand has caused the capacity issues, but there is a hazardous operational issue on the westbound approach to the Jack Lynch Tunnel off the N25.

Picture 1: congestion on westbound approach to Jack Lynch tunnel during AM peak.

Picture 2: operational issue consisting of 3 lanes merging into 1 on westbound approach to Jack Lynch tunnel. (AM Peak).

Figure 34. Junction 2 – Jack Lynch Tunnel

JACK LYNCH TUNNEL

- Capacity and operational issues exist in tandem with the Dunkettle Interchange.
- It was observed during site visits that the Jack Lynch Tunnel experienced tailbacks past the tunnel towards the Mahon Interchange on approach to the Dunkettle Interchange in both peaks. Traffic was moving at approximately 5-10kph which subsequently had a knock-on effect on traffic moving towards the Mahon Interchange. There were tailbacks observed during the AM peak on the N25 westbound on approach to the tunnel.
- Traffic was slow-moving towards the Jack Lynch tunnel but began to flow smoothly after exiting the tunnel, as traffic split off between the exits to the N8, M8 and N25.

Picture 1: slow-moving traffic on the N40 eastbound merge after the Rochestown Interchange

Picture 2: free-flowing traffic after Jack Lynch tunnel northbound.

Figure 35. Junction 3 – Mahon Interchange

MAHON INTERCHANGE

- No observed operational or capacity issues
- It was observed during both peaks that traffic moved well on the Mahon Interchange. The green times given at signalised junctions seemed sufficient to clear any waiting queues
- Speed limit 100kph

Picture 1: Mahon Interchange southbound

Picture 2: Mahon Interchange northbound

Figure 36. Junction 4 – Bloomfield Interchange

BLOOMFIELD INTERCHANGE

- N28 joins with the South Ring Road (N40) at the Bloomfield Interchange
- During the site visits, it was observed that although traffic was heavy in the area, especially during the peaks, the flow of traffic moved well. No major delays were experienced during the AM and PM peaks in either direction
- Speed limit on N40 100kph
- Speed limit on N28 60kph


Picture 1: Bloomfield Interchange southbound


Picture 2: Bloomfield Interchange northbound

Figure 37. Junction 5 – N28/ Rochestown Road (R610)

N28/ ROCHESTOWN ROAD (R610)

- This is an on and off ramp junction for the N28. Rochestown Road merges with the N28 in the northbound direction and the off ramp in the southbound direction.
- No operational issues
- Some capacity issues in the peak as heavy traffic from Rochestown Road merges with northbound traffic on the N28. It was observed as moving relatively well when site visits were undertaken
- Speed limit 60kph

Figure 38. Junction 6 – N28/ Maryborough Hill

N28/ MARYBOROUGH HILL

- Maryborough Hill merges with a single lane on the N28 in the northbound direction. The southbound direction flows freely without any interference from Maryborough Hill with two lanes.
- Experiences capacity issues in the peak as heavy traffic merges with the northbound traffic causing drivers to reduce speed. The reduction in speed has a knock-on effect and traffic tails back for approximately 400 - 500m from the junction. Traffic moves slowly but continuously and clears up after the junction. Southbound flows freely
- The merge lane is only approximately 150m in length. The Rochestown Road junction is quite close and does not allow for the merge lane to be extended which would allow traffic to merge easier without such a significant reduction in speed on the N28.
- Speed limit: 100kph

Picture 1: Congestion on N28 northbound in the AM Peak as cars join the slow-moving traffic from Maryborough Hill (AM peak).

Picture 2: traffic building up on approach to Maryborough Hill junction on N28 northbound. (AM peak).

Figure 39. Junction 7 – N28/ Carrigaline Road (R609)

N28/ CARRIGALINE ROAD (R609)

- This is a free flowing on and off ramp from the N28 onto Carrigaline Road (R609). The N28 northbound continues as a single lane with one lane turning off. One lane merges with the N28 southbound which has a single lane. There is no turnoff in the southbound direction and no merge in the northbound direction
- During the site visits there was notable congestion in the southbound direction during the AM peak and the northbound direction during the PM peak.
- Speed limit: 100kph Speed limit: 100kph

Picture 1: N28 southbound during AM peak; on the left is the merging traffic from Carrigaline Road and on the right is the northbound exit off the N28 onto the Carrigaline Road. Note: southbound congestion.

Picture 2: N28 northbound during PM peak. The left side is the Carrigaline Road exit and the right side is the southbound entrance onto the N28 from the Carrigaline Road. Note: northbound congestion.

Figure 40. **Junction 8 – N28/Carrs Hill**

N28/ CARRS HILL

- This is a section of the N28 known as Carrs Hill, located between the Rochestown Interchange and the Shannonpark Roundabout. The stretch of road is approximately 6.2km long and acts as the main connection for vehicles leaving the N40 travelling towards Carrigaline and Ringaskiddy.
- A key section of Carrs Hill near the Carrigaline Road experiences some slow-moving traffic in the southbound direction as cars reduce speed to allow for a reduced number of lanes. Two lanes become one in the southbound direction which slows traffic. Just beyond this point is the merging traffic from the Carrigaline Road already discussed above which further slows traffic. Picture 1 below shows the two lanes merging into one as the traffic begins to build in that area.
- In the northbound direction in the AM peak there is a capacity issue. The demand is very high as vehicles from Carrigaline and Ringaskiddy travel towards the N40.
- Experiences capacity issues in the peak in the northbound direction as drivers slow down as a result of the reduction in lanes. The area narrows quite dramatically from two lanes northbound down to one. It was observed on site visits to the area that drivers slowing down had a knock-on effect further back. Traffic moved continuously and eventually cleared once the lanes became wider.
- Speed limit 100kph

Picture 1: two lanes merge into one on Carrs Hill (southbound) during the AM peak. This was the initial cause of slow-moving traffic travelling southbound during the AM peak on Carrs Hill. Note: travelling northbound on the other side of the road shows a heavy queue.

Picture 2: Northbound congestion during the PM peak on Carrs Hill at the Carrigaline Road slip.

Figure 41. Junction 9 – N28/ L6477

N28/ L6477

- T-priority junction
- No operational or capacity issues
- Speed limit on N28 100kph
- Speed limit on L6477 60kph

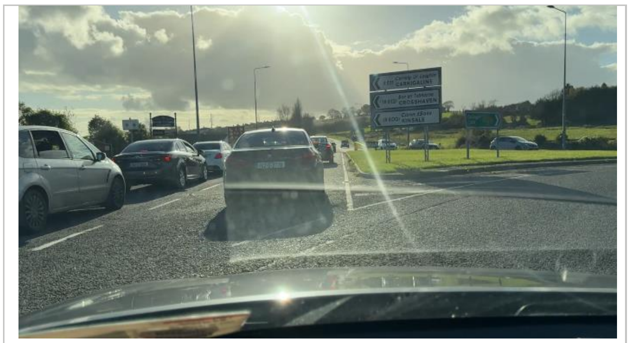
 Picture 1: Approach to L6477 Junction in northbound direction on the N28 (PM Peak).	 Picture 2: Approach to L6477 Junction in southbound direction on the N28 (AM Peak). Note: slow-moving traffic in the southbound direction during the AM peak did not pose any issues to the operation of the junction.

Figure 42. Junction 10 – Shannon Park Roundabout

SHANNON PARK ROUNDABOUT

- Shannon Park is a large three arm roundabout connecting the Cork Road (R611) to the N28
- Experiences capacity and operational issues
- There is a constant flow of traffic at Shannon Park Roundabout during both peaks. It was observed during site visits that although traffic flow was heavy throughout, major congestion was only experienced in the evening peak. Between 16:00 and 17:00, traffic was heavy but moving. The PM peak showed significant congestion on the R611 exit of the roundabout towards Carrigaline. Picture 2 below shows two lanes merging into one at this exit which results in a queue extending onto the roundabout and at times blocking traffic from the eastern arm from entering the roundabout.
- The AM Peak appeared considerably less congested as seen in Picture 4 below.

Picture 1: Queue from N28 entering the Shannonpark roundabout. (PM Peak)



Picture 2: Heavy traffic on the R611 southbound exit of the Shannonpark Roundabout. (PM Peak)

Picture 3: Queue forming during the PM peak from the Ringaskiddy approach to Shannonpark Roundabout.

Picture 4: Free-flowing traffic on Shannonpark roundabout during AM peak.

Picture 5: Congestion on Cork Road southbound past Shannonpark entrance. Insufficient pedestrian infrastructure observed on this route after the Shannonpark Roundabout.

Figure 43. **Junction 11 – N28/ L2490**

N28/ L2490

- T-priority junction
- No capacity or operational issues
- There is a steady stream of traffic on this road during both peaks predominantly from the N28 as drivers look to avoid Carrigaline village via Fernhill Road.
- Speed limit on N28 80kph
- Speed limit on L2490 60kph

Picture 1: Approach to Junction 11 on the eastbound approach on the N28. (AM Peak). Note: free flowing traffic.

Picture 2: Junction 11 approach on the L2490

Figure 44. Junction 12 – N28/ R610

N28/ R610

- T – priority junction
- No capacity or operational issues
- During the AM peak there was considerable eastbound queueing on the N28 passing the junction. Traffic appeared to flow swiftly past during the PM Peak.
- Speed limit on N28 100kph
- Speed limit on R610 60kph

Picture 1: Junction 12 approach on N28 eastbound (AM Peak). Note congestion passing the junction.

Picture 2: N28 westbound approach to R610 junction. (PM Peak). Note: free-flowing traffic.

Figure 45. Junction 13 – Shanbally Roundabout

SHANBALLY ROUNDABOUT

- Shanbally Roundabout is a small three arm roundabout connecting the L2492 to the N28
- It does not experience any operational issues
- During site visits, congestion issues were observed, mainly during morning peaks (in particular just before 08:00 and at 08:45 at school opening). There was a constant heavy traffic flow during both peaks. The entry treatment approaching the village, in particular reduction in speed limit, had an effect on traffic congestion. Also the number of vehicles turning right towards Church Road, and turning right from Church Road, sometimes added to congestion
- Picture 1 shows the westbound approach to Shanbally Roundabout during the PM peak. There were high traffic volumes at this time but traffic moved freely through the roundabout. The pedestrian footways were in good condition and were seen to be used by both pedestrians and cyclists, although they were not busy.
- Picture 2 shows eastbound traffic queuing back from the Shanabally Roundabout in the morning peak. The roundabout attracts heavy traffic volumes but the traffic moves reasonably quickly through the roundabout. As can be seen in Picture 2, there are sufficient pedestrian footways present on either side of the road and there is signage present regarding the speed limit in the area which caters for school traffic.

Picture 1: Approach to Shanbally Roundabout during the PM Peak. No congestion issues observed during this time. Note: narrow footpaths on either side of the road being used by both pedestrians and cyclists.

Picture 2: Tailback of traffic as a result of the change in speed approaching the Shanbally Roundabout. Heavy congestion was observed on approach to the roundabout was observed during the AM Peak. Sufficient pedestrian infrastructure is also present on approach to the roundabout and around it.

Figure 46. Junction 14 – Pfizer Entrances

PFIZER ENTRANCES

- There are two main entrances into Pfizer Biologics as pictured below. One is linked to a roundabout and contains sufficient pedestrian infrastructure around it. The other is accessed throufh a standard T-junction and this entrance also is equipped with a footpath.
- No operational or capacity issues at any junction or entrance. There was no queuing observed at either peak at either entrance.

Picture 1: Free-flowing traffic on eastbound approach to Pfizer main entrance during AM Peak. Note: sufficient pedestrian infrastructure observed on one side of the road on approach to the entrance.

Picture 2: Other employee entrance. No congestion issues observed during site visits at either peak.

Figure 47. Junction 15 – N28/ Church Road (R613)/ POC Entrance

N28/ CHURCH ROAD (R613)/ PORT OF CORK ENTRANCE

- This junction is a staggered crossroads along the N28 with Church Road first and then Port of Cork access after, when coming from Shanbally
- No operational issues
- There is some queuing during the peak which clears quickly
- Speed limit along N28 60kph

Picture 1: Church Road approach to N28/ PoC junction. Heavy but free-flowing traffic was observed in the PM peak.

Picture 2: Approach to staggered crossroads on the N28 eastbound

Figure 48. Junction 16 – Church Road (R613)/ L2492

N28/SHAMROCK PLACE/L2545/RINGASKIDDY FERRY TERMINAL ENTRANCE

- Cross roads
- No operational issues
- There is little to no queuing during the peaks. Some of the major employers use the Shamrock Place arm to access their sites such as DePuy and Hovione.
- Haulbowline Naval Base and the National Maritime College of Ireland are located down the L2545
- Speed limit on Shamrock Place is is 50kph
- Speed limit on L2545 50kph

Picture 1: Eastbound approach to Ferry Terminal entrance/ Shamrock Place junction on N28 during the AM Peak.

Picture 2: Ferry Terminal Exit onto N28

Figure 49. Junction 17 – Church Road (R613)/ L2492

CHURCH ROAD (R613)/ L2492

- T - priority junction
- No operational issues
- There is some queuing during peaks, as many of the major employers are accessed along Church Road. Queuing clears quickly. The L2492 is one of the major routes used by drivers to access some of the major employers on Church Road such as GSK and Novartis
- Speed limit on Church Road (R613) 60kph
- Speed limit on L2492 50kph

Picture 1: Junction 16 looking towards L2492

Picture 2: Junction 16 approach from L2492

Figure 50. Junction 18 – Church Road (R613)/L2490

CHURCH ROAD (R613)/ L2490

- T - priority junction
- No operational issues
- During the PM peak there is a reasonably heavy flow and subsequent queuing as drivers looks to avoid Carrigaline village and the Shannon Park Roundabout. The queuing clears quickly
- Speed limit on Church Road (R613) 50kph
- Speed limit on L2490 50kph

Junction 17 looking at Rock Road/ L2490

Figure 51. Junction 19 – Signalised Junction at Church Road (R613)/ R612

CHURCH ROAD (R613)/ CORK ROAD (R612)

- Signalised crossroads
- It was observed during site visits that there were capacity issues with this junction during the peak. There were significant queues on all arms with the southern arm having tailback as far as the LIDL roundabout. However, all queueing clears during green times.
- Speed limit 50kph

Picture 1: westbound approach to Church Road/Cork Road junction during the AM Peak. Sufficient pedestrian infrastructure observed in this area and traffic was heavy but flowed freely through the signalised junction.

Picture 2: eastbound approach to the signalised junction during the PM peak, no traffic congestion issues observed.

Figure 52. **Junction 20 – Signalised Junction at R612/ R611**

SIGNALISED JUNCTION R612/ R611

- Signalised T junction
- Operational and capacity issues exist
- A set of pedestrian lights which are located in close proximity to the junction cause northbound traffic to become congested. This can be seen in Picture 1. This congestion continues through the village
- Speed limit 50kph

Picture 1: The set of pedestrian lights, with traffic queuing back into the signalised junction, preventing the junction clearing and causing congestion

Picture 2: Junction 19 on the R612 approach

Figure 53. Junction 21 – Ballea Road/ Church Road (R613)/ Cork Road (R611) Roundabout

BALLEA ROAD/ CHURCH ROAD (R613)/ CORK ROAD (611) ROUNDABOUT

- Small four arm roundabout where Ballea Road and Church Road (R613) meet the Cork Road (R612)
- Capacity issues. The roundabout becomes congested at peak times, as shown in Picture 1 and 2. The congestion in the village adds to congestion at this roundabout
- The roundabout operates efficiently during off peak
- Speed limit 50kph

Picture 1: Heavy traffic flow at the roundabout heading in the direction of the village in the PM

Picture 2: Congestion on the arm leading back towards the village in the PM

Figure 54. Junction 22 – Tivoli Access at N8/R635

TIVOLI ACCESS AT N8/R635

- Access to Tivoli Estate from North Ring Road overbridge
- Ramp access runs parallel to N8
- Pedestrian footpaths and signals provided

Picture 1: Ramp entrance to Tivoli Port – view from N8 (west of Tivoli)

Picture 2: Tivoli Entrance from North Ring Road overbridge

Figure 55. Junction 23 – Entrance to City Quay Port on Albert Quay

ENTRANCE TO CITY QUAY PORT ON ALBERT QUAY

- Access to City Quay Port from Albert Quay, at junction with Victoria Road
- Informal access – no designated footpaths
- Parking provided on site

Picture 1: Access to City Quay Port looking towards Albert Quay

Picture 2: Parking provided left of yellow line at City Quay Port (Kennedy Quay Entrance)

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APPENDIX 8.5 AADT FLOWS FOR RINGASKIDDY PORT REDEVELOPMENT

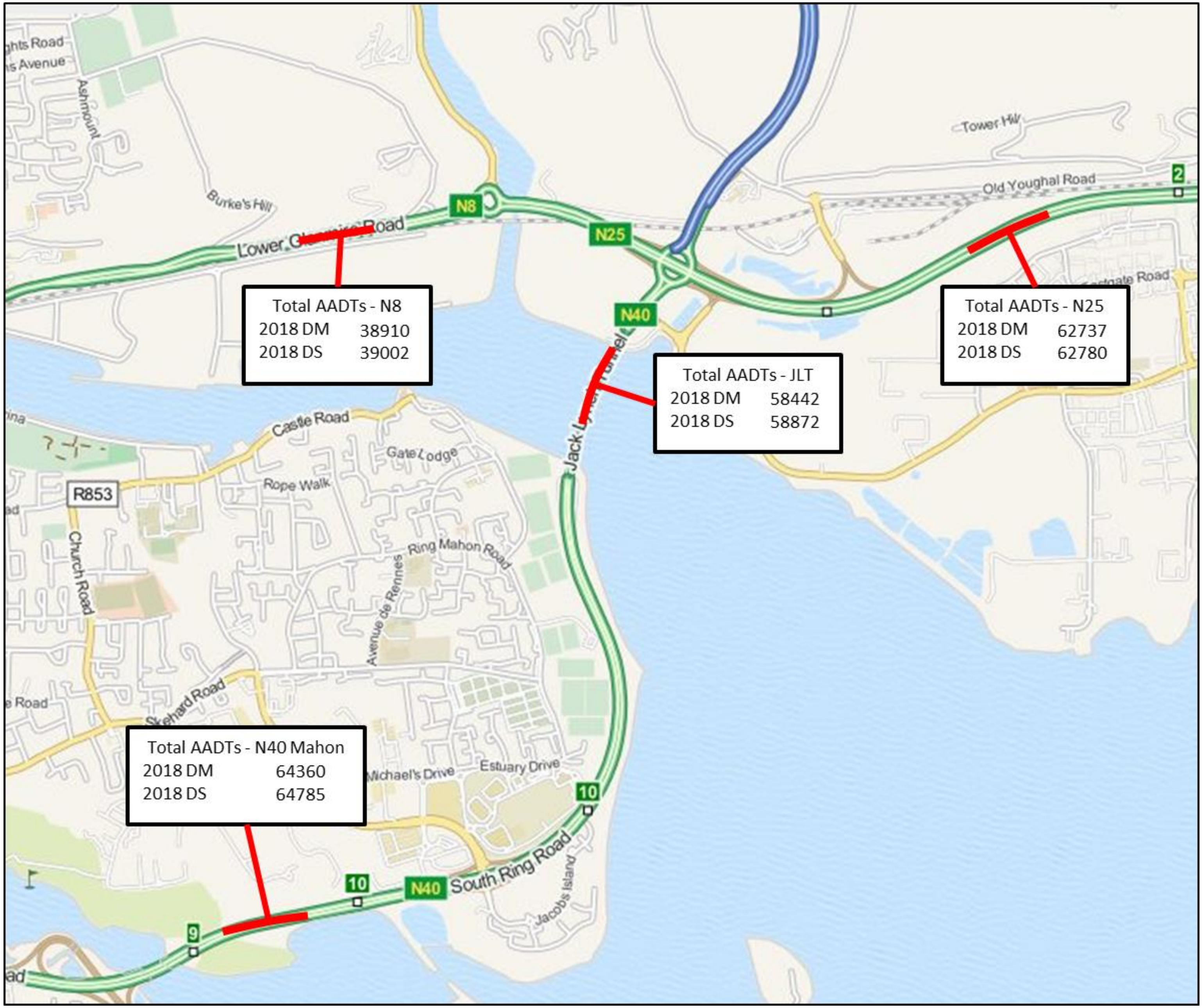


Figure 1: 2018 AADT Map 1

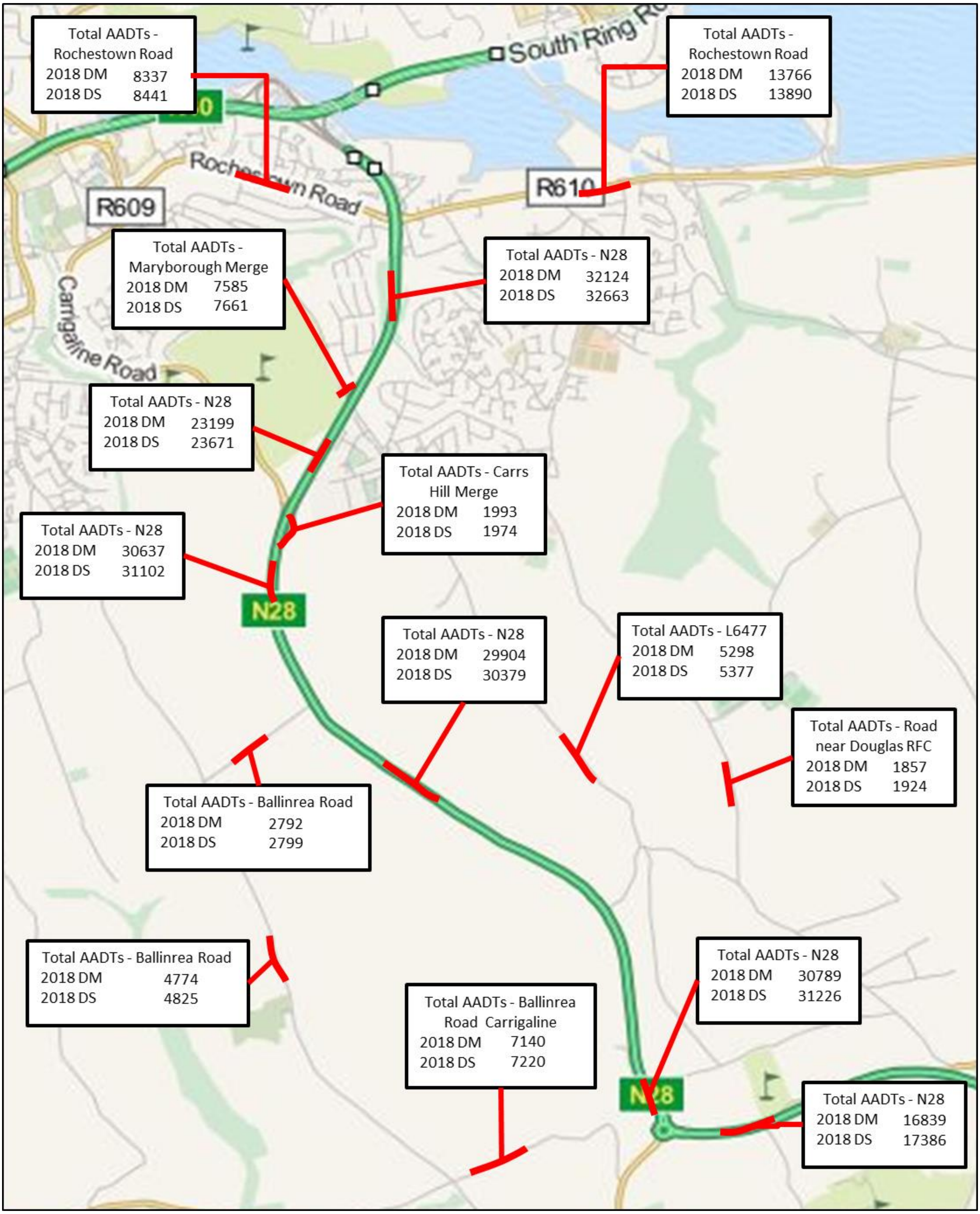


Figure 2: 2018 AADT Map 2

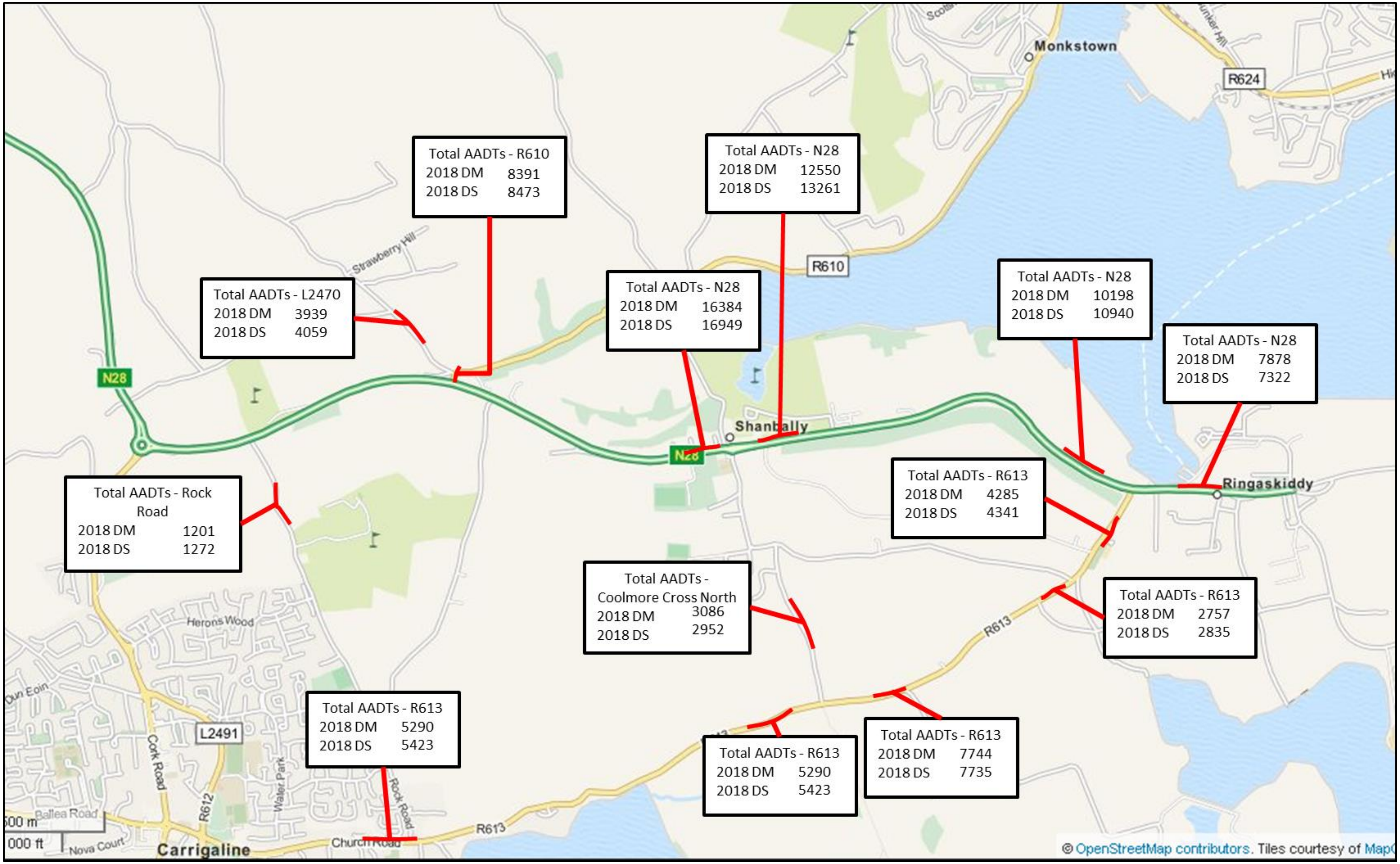


Figure 3: 2018 AADT Map 3

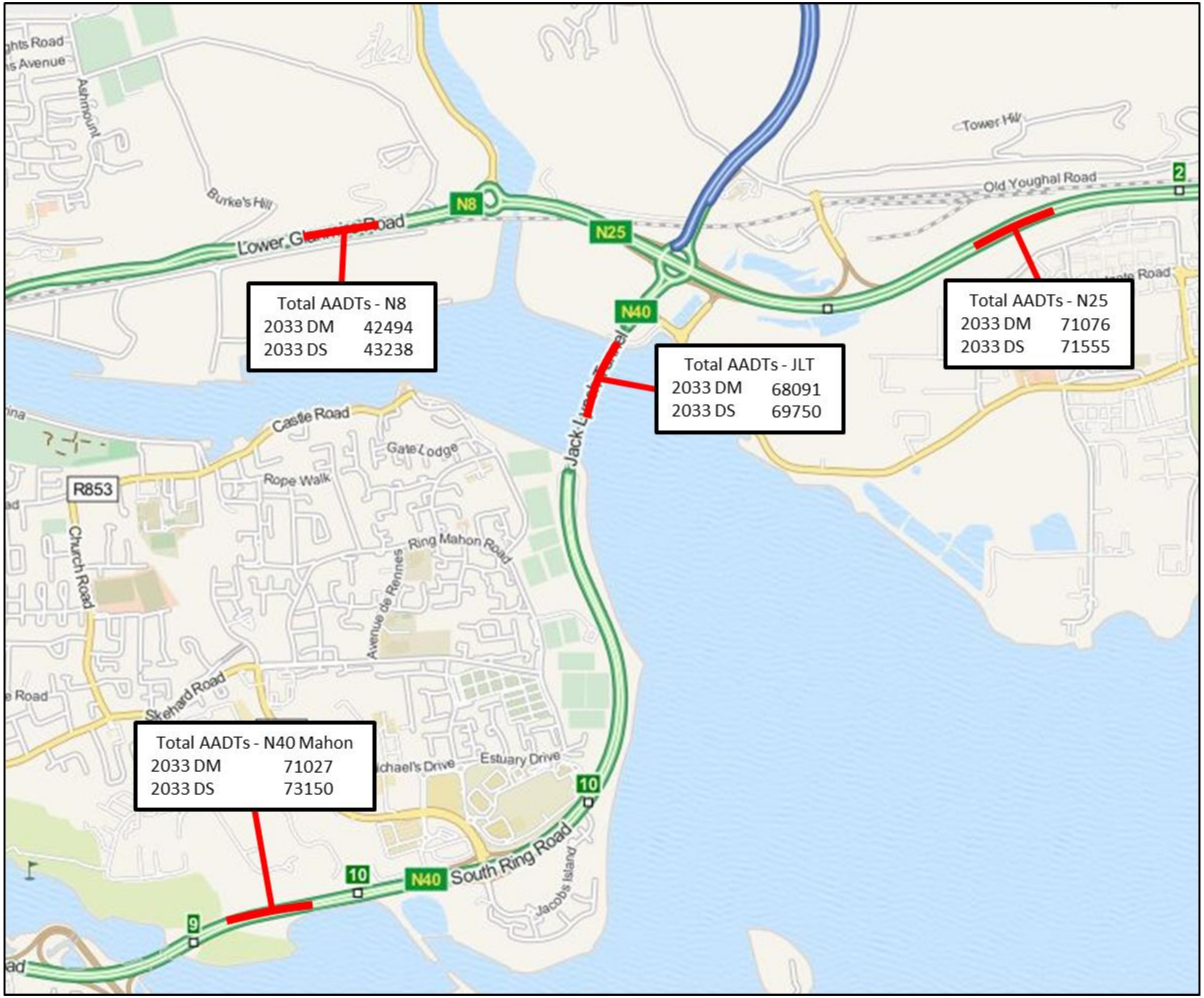


Figure 4: 2033 AADT Map 1

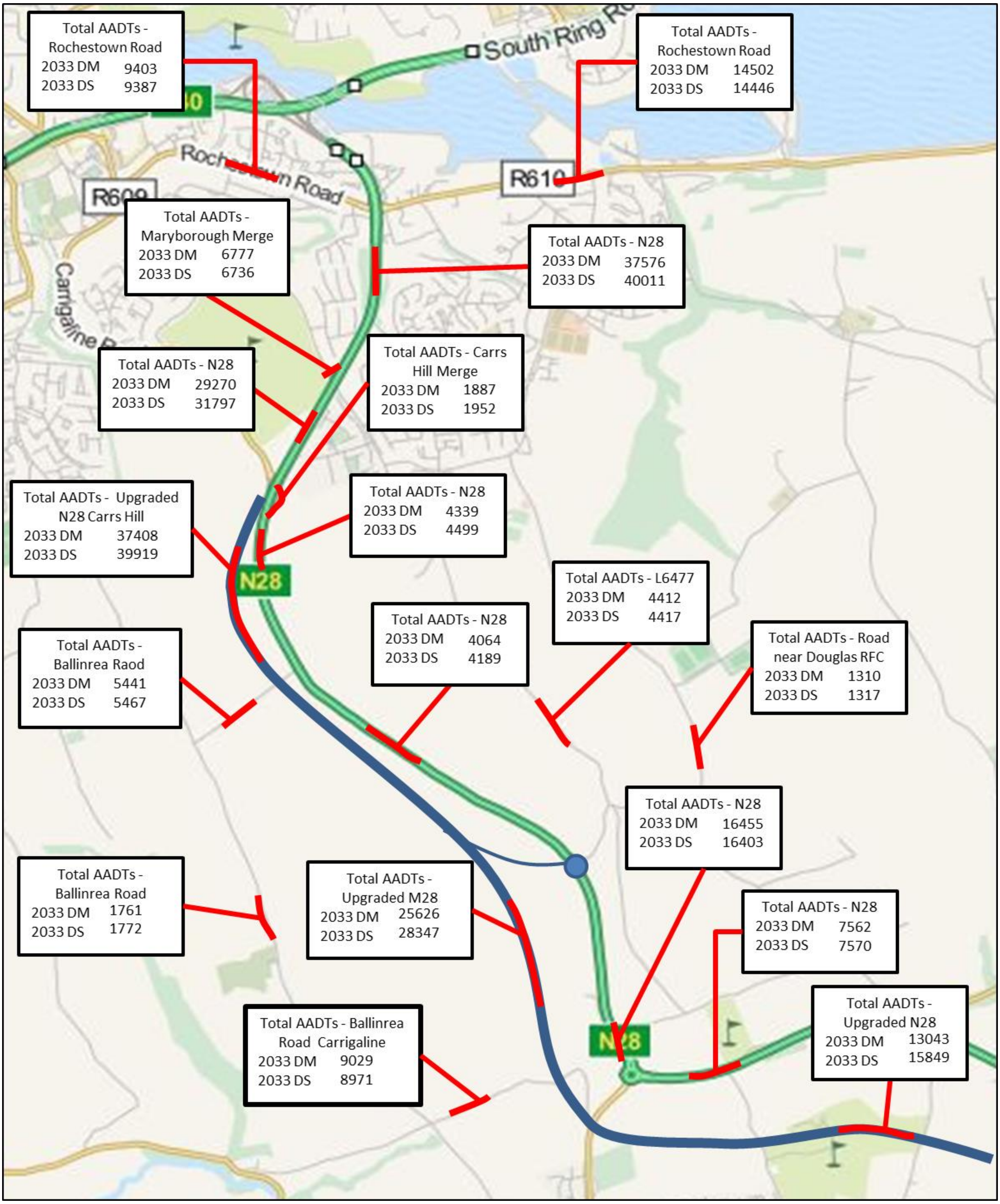


Figure 5: 2033 AADT Map 2

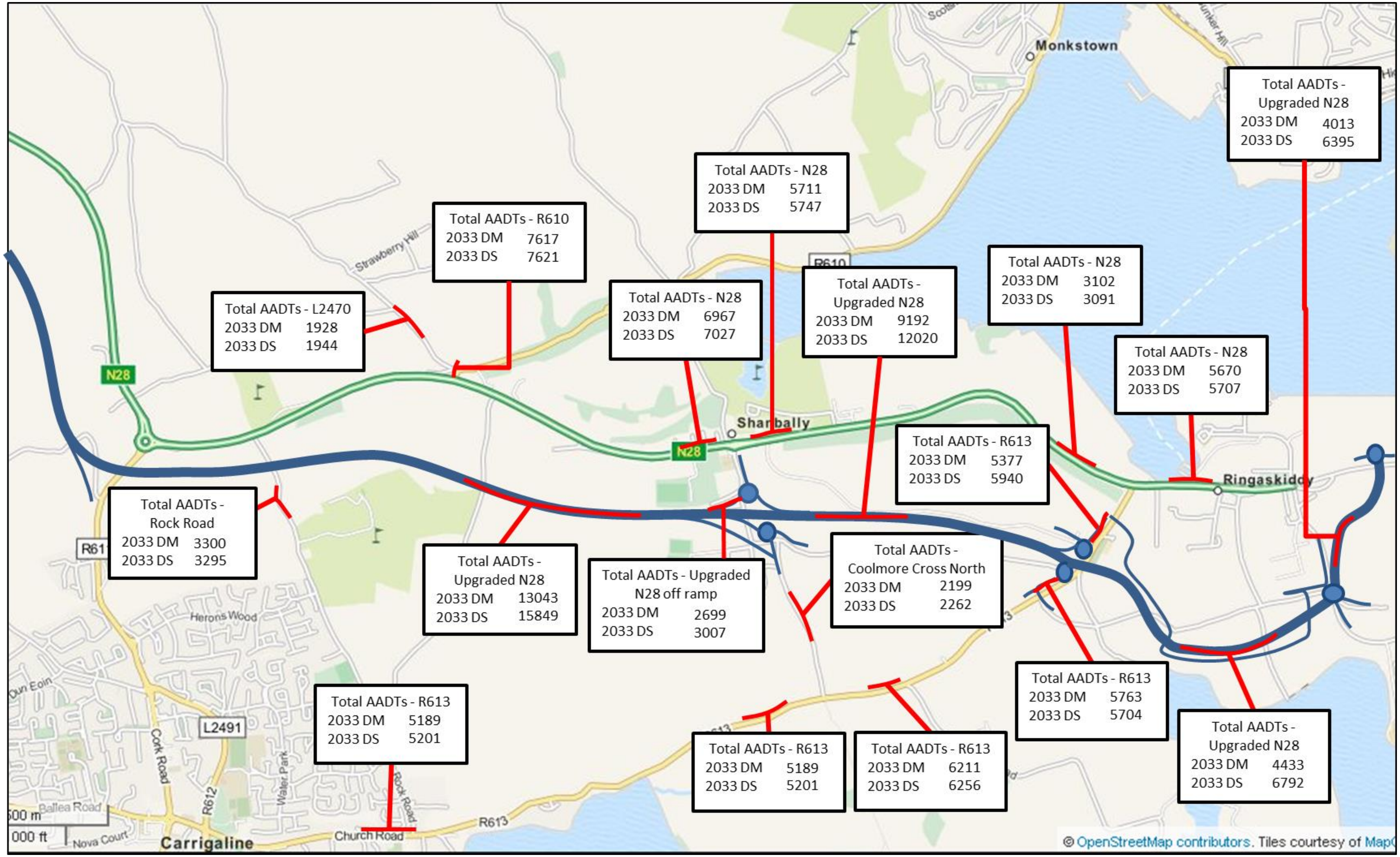


Figure 6: 2033 AADT Map 3

APPENDIX 8.6 BACKGROUND TRAFFIC GROWTH FORECASTS

BACKGROUND TRAFFIC GROWTH FORECASTS

The traffic forecasts for the Port of Cork Strategic Traffic Model (PoCSTM) were developed in accordance with the NRA Project Appraisal Guidelines (PAG) Unit 5.4, and use growth forecasts from the National Traffic Model (NTM). The NTM forecasts are based on updated national government population projections, economic growth forecasts, forecast car ownership levels and also take account of national transport policies.

With specific reference to population growth, the projections in the NTM are based on the Central Statistics Office (CSO) population forecasts published in April 2008. The CSO population forecasts are based on the 2006 census results and assume various fertility and mortality rates, along with assumptions on migration patterns.

In January 2009 the Department of the Environment, Heritage and Local Government (DEHLG) updated their 2007 population projections to take account of the CSO figures. The Cork County Development Plan population targets are consistent with the DEHLG projections.

The PoCSTM background traffic growth has been based on the Dunkettle Traffic Model which used the CASP Update 2008 to distribute the NTM growth to the locations allocated for development in the CASP Update model, and hence is consistent with the Cork City and Cork County Development Plans. To illustrate the relationship between the NTM and CASP Update population forecasts, Table 1 presents a comparison of the CASP Update 2020 forecasts with the NTM low, medium and high forecasts for 2025. (Note these are the only comparable forecast year figures available for the published documentation).

Table 1: CASP Update and NTM Population Forecasts

	CASP Update 2008 forecasts	NTM forecasts		
	CASP 2020	Low 2025	Medium 2025	High 2025
Cork City	150,000	124,545	124,553	135,181
Remainder CASP Region	338,000	267,437	291,730	361,675
Total CASP Region	488,000	391,982	416,283	496,856

The table shows that there is a difference between the two population forecasts in terms of the distribution within the CASP Region, with the city area forecasts in CASP being higher than NTM across the three scenarios. This is because the CASP forecasts were based on higher growth rates reflecting the growth projections made around the late nineties and CASP assumed that the Cork Docklands development would be well underway by 2020 accommodating much of the population growth within the city area. This is somewhat balanced by the population forecasts for the Total CASP Region, with the NTM high growth scenario exceeding the CASP forecast. For the region as a whole, the NTM high growth forecast for 2025 exceeds the CASP Update forecast for 2020, and confirms that the NTM forecasts of population through the assessment of the high growth scenario takes account of the region specific forecasts. It should also be noted, as mentioned above, that the CASP forecasts prepared in 1999 were based on the 1996 population census whereas the NTM forecast was based on the 2006 census.

Given the recent economic decline and stagnation in the construction sector, it is considered unlikely that the forecasts set out in the CASP Update or NTM High growth Scenario will be achieved in the short to medium term. Therefore, the background traffic growth in the PoCSTM assumes NTM medium growth forecasts and is considered to allow for all committed and likely future development in the area.

APPENDIX 8.7 TRIP GENERATION AND DISTRIBUTION

TRIP GENERATION AND DISTRIBUTION FOR PROPOSED REDEVELOPMENT

Relocation of City Quays and Tivoli Ports

The proposed redevelopment at Ringaskiddy is intended to complement and accommodate a reduction in Port operations at the existing Tivoli and City Quays sites, which cannot handle large vessels due to physical constraints on the waterside (river navigation depth and width). These sites (Tivoli and City Quays) are to be developed as part of the "Cork City Harbour" initiative.

The Tivoli and Docklands riverside sites are very well located relative to Cork City Centre (City Quays being within 750m and Tivoli, on the commuter railway, being within 1.5km). As such, both sites have strong potential to be developed for urban renewal/ non-industrial uses.

The proposed redevelopment and the Cork City Harbour development are mutually supportive objectives and are part of the CASP and the local Cork City Development Plan, which target future population and growth within the Cork metropolitan area, with a strong reliance on the redevelopment of the Cork City Harbour sites to achieve the projected growth.

Furthermore, the removal of container handling facilities from Tivoli and the relocation of bulk goods handling facilities from City Quays would also benefit the City environment by reducing the number of HGVs which pass through the City Centre road network. Thus, the proposed relocation of operations to Ringaskiddy from Tivoli and City Quays is a very important step in creating the space for sustainable development within Cork City, which currently has very limited development land available in such well-located City areas.

This relocation will result in some 50 Port of Cork employees and 25 employees from ancillary operations and related industries (line agents etc.), being relocated to Ringaskiddy from Tivoli and City Quays.

Future Trade Growth at Port of Cork

The proposed Ringaskiddy redevelopment is planned as follows:

- **Phase 1**: Ringaskiddy East including multi-purpose and container berths (to cater for additional LoLo and trade cars)
- **Phase 2**: Ringaskiddy West comprising the extension to the existing DWB (to cater for additional bulk)
- **Phase 3**: Ringaskiddy East comprising additional quay wall and other works (to cater for additional RoRo)

Phase 3, the new RoRo facility, will not be operational until after the N28 Upgrade is complete which is assumed to be 2023.

Projected trade outputs in tonnage (bulk cargo) or units (LoLo, RoRo, Trade Cars, passengers or vehicles) are detailed in Table 1. These trade output forecasts are based on the revised forecasts included in the Port Strategic Plan (2010) as endorsed by the National Ports Policy Statement (2013). Table 1 shows the trade forecasts assuming 'no development' at Ringaskiddy versus 'with development' occurring at Ringaskiddy. The development values shown represent the 'Upper Development' scenario, which represents a 'worst case' for traffic impact.

The bulk trade throughput is transported via Ringaskiddy, Tivoli, City Quays, Whitegate and other Port of Cork operations. However, only goods transported via Ringaskiddy, Tivoli and City Quays which will be impacted by the proposed Ringaskiddy Port redevelopment are considered in the traffic assessment, and therefore have been specified separately in Table 1.

Existing passengers and cars/ caravans related to ferry arrivals and departures were not included in the transport assessment as the traffic modelling represents an average weekday and a ferry currently only operates on Saturdays. It is assumed that this situation will not change in the future.

Table 1: Levels of Trade Anticipated (Upper Development Scenario)

Trade	Unit	Location	Actual	No Development		With Development	
			2012	2018	2033	2018	2033
Bulks	Tonnes	All Port of Cork	7,142,980	6,953,150	7,022,377	7,462,511	7,996,531
		Ringaskiddy DWB	785,728	764,847	772,461	1,156,689	1,999,133
		Tivoli	428,579	417,189	421,343	111,938	0
		City Quays	571,438	556,252	561,790	559,688	319,861
		Whitegate and other	5,357,235	5,214,863	5,266,783	5,634,196	5,677,537
LoLo	TEUs	All Port of Cork	166,225	192,305	60,000	192,305	322,846
		Ringaskiddy Terminal	11,636	13,461	4,200	96,153	322,846
		Tivoli	154,589	178,844	55,800	96,153	0
Trade Cars	No.	All Port of Cork	27,238	51,325	74,515	51,325	79,189
		Ringaskiddy Terminal	26,148	49,272	71,534	51,325	79,189
		Tivoli	1,090	2,053	2,981	0	0
RoRo	Units		831	10,850	10,850	10,850	30,000
		RINGASKIDDY Terminal (Accom)		850	850	850	10,000
		RINGASKIDDY Terminal (Unaccom)		10,000	10,000	10,000	20,000
Passengers	No.	Ringaskiddy Terminal	70,397	80,000	80,000	80,000	80,000
Cars/ Caravans	No.	Ringaskiddy Terminal	21,131	21,000	21,000	21,000	21,000

Future Port of Cork Traffic Generation

The future traffic generated by the proposed redevelopment was calculated by converting the projected level of trade (Table 1) into HGVs and LVs per hour over a typical day. This was done by using conversion factors which are explained below. Existing traffic survey information was used to determine the distribution of the future traffic onto the road network.

Future Traffic Generation Conversion Factors

Comparing the average weekday ATC total at Ringaskiddy DWB and the annual tonnage currently going into the DWB, a conversion factor was produced to assign future annual tonnage to HGV trips per day. This ratio of 0.000376 was used to convert annual tonnage into HGVs/ day and calculate the daily volume of HGVs associated with bulk activities at Ringaskiddy DWB and City Quays in all future year scenarios.

A number of assumptions were made relating to the quantity of HGVs that would be generated per LoLo, RoRo and Trade Cars unit. These conversion rates are shown in Table 2. It is assumed that each LoLo TEU equates to 0.6 HGV, based on international practice[1]. Assuming a round trip for each LoLo TEU, there would be 1.2 HGV trips for each TEU.

RoRo can either be accompanied or unaccompanied. Accompanied RoRo drives directly between the ship and the adjoining road network. However, unaccompanied RoRo must be delivered or collected and therefore the RoRo trailer may be stored on site while waiting to be transported. For accompanied RoRo, it is assumed that one RoRo unit equals one HGV trip, whereby the truck either arrives or leaves by ship. It is also assumed that these vehicles drive directly off the ship onto the road network on the day that the ship arrives. For unaccompanied RoRo, it is assumed that one RoRo unit equals two HGV trips as the truck cab arrives or leaves without a trailer on one leg of the journey. However, these HGV trips can be spread throughout the week as unaccompanied RoRo trailers can be stored. For the purposes of this assessment, it is assumed that all additional RoRo (above existing levels) is unaccompanied until the N28 Upgrade, following which RoRo will be both accompanied and unaccompanied.

Finally, it is assumed that nine trade cars are carried per HGV and that every HGV arrives to the port empty (there is a return trip).

It is assumed that these HGVs are spread evenly over 260 days of year (52 weeks x 5 days). The Port is in fact open a half day on Saturday but this has not been included and therefore weekday average HGVs are conservatively estimated. RoRo HGVs are treated differently and it is assumed that they are transported once a week. No allowances have been made for the potentially linking trips, i.e. being laden on both legs of the journey.

Table 2: HGV Conversion Rates

Good Type	Conversion to HGV
Bulk	0.000376 times tonnage
LoLo	1.2 HGV per unit
Unaccompanied RoRo	2 HGV per unit
Accompanied RoRo	1 HGV per unit
Trade Cars	4.5 cars per HGV

For bulk, LoLo and RoRo, seasonality factors were used to replicate the peak month for each. For bulk and RoRo the peak months are May and August, however, for LoLo, the peak month is October.

[1] Port de Rotterdam – traffic statistics 2011

It is assumed that the same volumes of cars and LVs will continue at each Port, except for those directly related to employees/ tenants which are assumed will move from Tivoli and City Quays to Ringaskiddy in the future situation. It is assumed that all employees at Tivoli (68 people) and City Quays (7 people) will relocate to Ringaskiddy Terminal and DWB respectively. It is assumed that for all of these employees/ tenants, there will be one LV trip into Ringaskiddy Port during the AM peak and one LV trip out of the Port during the PM peak. No other LV traffic flows will be affected.

Future Traffic Distribution

As stated in the NRA Traffic & Transport Assessment Guidelines, trip distribution is the estimated directional distribution of the estimated traffic at each junction in the study area. In order to determine the future traffic distribution, the following methodology was undertaken.

Future daily traffic profiles at Ringaskiddy, Tivoli and City Quays ports were based on ATC counts taken at Tivoli and Ringaskiddy ports in May 2012. These ATC counts are detailed further below.

The split between arrivals and departures was based on JTC surveys undertaken at Tivoli and Ringaskiddy. Future traffic flows at Ringaskiddy Terminal are based on surveys from Tivoli.

The distribution of future Port traffic is based on O-D surveys undertaken at Tivoli and Ringaskiddy Ports in 2012. Table 3, below, shows the most frequently used roads for travelling to and from the Ports of Tivoli and Ringaskiddy. Anecdotal evidence suggests that currently hauliers driving to/ from Killarney, avoid Macroom and instead drive via Mallow. This has been replicated in the traffic modelling.

Table 3: Top Three Roads

	Top 3 busiest routes to/from the Port		
To Tivoli	N25 – 34%	N20 – 18%	N8/M8 – 17%
From Tivoli	N25 – 30%	N20 – 20%	N8/M8 – 18%
To Ringaskiddy	N8/M8 – 19%	N20 – 17%	N25 – 15%
From Ringaskiddy	M8 – 24%	N20 – 19%	N25 – 12%

Future Traffic Generation

Assuming all of the above, the predicted traffic generated by the Port in the future, for all three Port of Cork sites, is shown in Table 4.

Table 4: Do Something Traffic Generation*

	HGVs				LVs			
	2018 AM	2018 PM	2033 AM	2033 PM	2018 AM	2018 PM	2033 AM	2033 PM
Ringaskiddy Terminal								
Daily Average	1031		2923		593		593	
Peak Hour Total	62	68	393	408	112	113	112	113
Peak Hour In	31	30	312	79	99	20	99	20
Peak Hour Out	31	38	81	329	14	94	14	94
Ringaskiddy DWB								
Daily Average	521		901		692		692	
Peak Hour Total	60	17	104	29	57	50	57	50
Peak Hour In	28	6	48	10	48	7	48	7
Peak Hour Out	32	11	56	19	9	43	9	43
Tivoli								
Daily Average	540		0		1296		1296	
Peak Hour Total	33	35	0	0	47	49	47	49
Peak Hour In	15	17	0	0	30	21	30	21
Peak Hour Out	18	18	0	0	17	28	17	28
City Quays								
Daily Average	303		173		591		591	
Peak Hour Total	35	10	20	6	37	30	37	30
Peak Hour In	16	3	9	2	28	6	28	25
Peak Hour Out	19	6	11	4	8	25	8	6
Total Daily Traffic	2395		3997		3172		2747	
Ringaskiddy Terminal & DWB Traffic	1552		3824		1285		1285	
Tivoli & City Quays Traffic	843		173		1887		1887	
Total Peak Hour	190	130	517	443	253	242	253	242

* Upper development scenario assumed

2018 Do Something Forecast traffic generation

It is forecast that by 2018, there will be 2,395 HGVs generated by the port on the network, on an average weekday. 1,552 HGVs will use the N28 (to/ from Ringaskiddy) and 843 will use the N8 (to/ from Tivoli). Between the years 2012 and 2018 there will be a daily increase of 1097 HGVs travelling to and from Ringaskiddy port facilities.

In 2018, there will be a total of 190 Port related HGVs on the network in the AM peak. Of these, 62 relate to Ringaskiddy Terminal and 60 relate to Ringaskiddy DWB. This is an increase of 46 HGVs on the road network during the AM peak period compared to 2012.

2033 Do Something Forecast traffic generation

It is forecast that by 2033, there will be 3,997 HGVs generated by the port on the network, on an average weekday. 3,824 HGVs will use the N28 (to/ from Ringaskiddy) and 173 will use the N8 (to/ from Tivoli).

Between the years 2012 and 2033 there will be an overall increase of 3,369 HGVs travelling to and from Ringaskiddy port facilities. The daily total of car trips generated by the Port of Cork will remain the same between 2018 and 2033 as it is not anticipated that any additional staff will be employed, rather port staff will transfer from Tivoli and City Quays to Ringaskiddy.

In 2033, there will be a total of 517 Port related HGVs on the network in the AM peak. Of these, 393 relate to Ringaskiddy Terminal and 104 relate to Ringaskiddy DWB. This is an increase of 373 HGVs the road network during the AM peak period compared to 2012.

Trip generation and distribution summary

Trip generation and distribution totals are provided in Figures 1 to 6 below for HGVs and LVs for the AM Peak and for daily traffic. These figures show that by 2033, Port of Cork traffic volumes going through Jack Lynch Tunnel are 2,025 HGVs a day and 752 LVs a day compared to 2012 daily volumes of 273 HGVs and 621 LVs. The total Port generated vehicles per average weekday in 2033 equate to 3% of the total AADT using the Jack Lynch Tunnel (approx. 67,500 vehicles). This corresponds to 268 HGVs and 92 LVs in the AM peak hour in 2033 compared to 2012 peak hour volumes of 26 HGVs and 37 LVs. This equates to an increase of 242 HGVs and 55 LVs above 2012 levels.

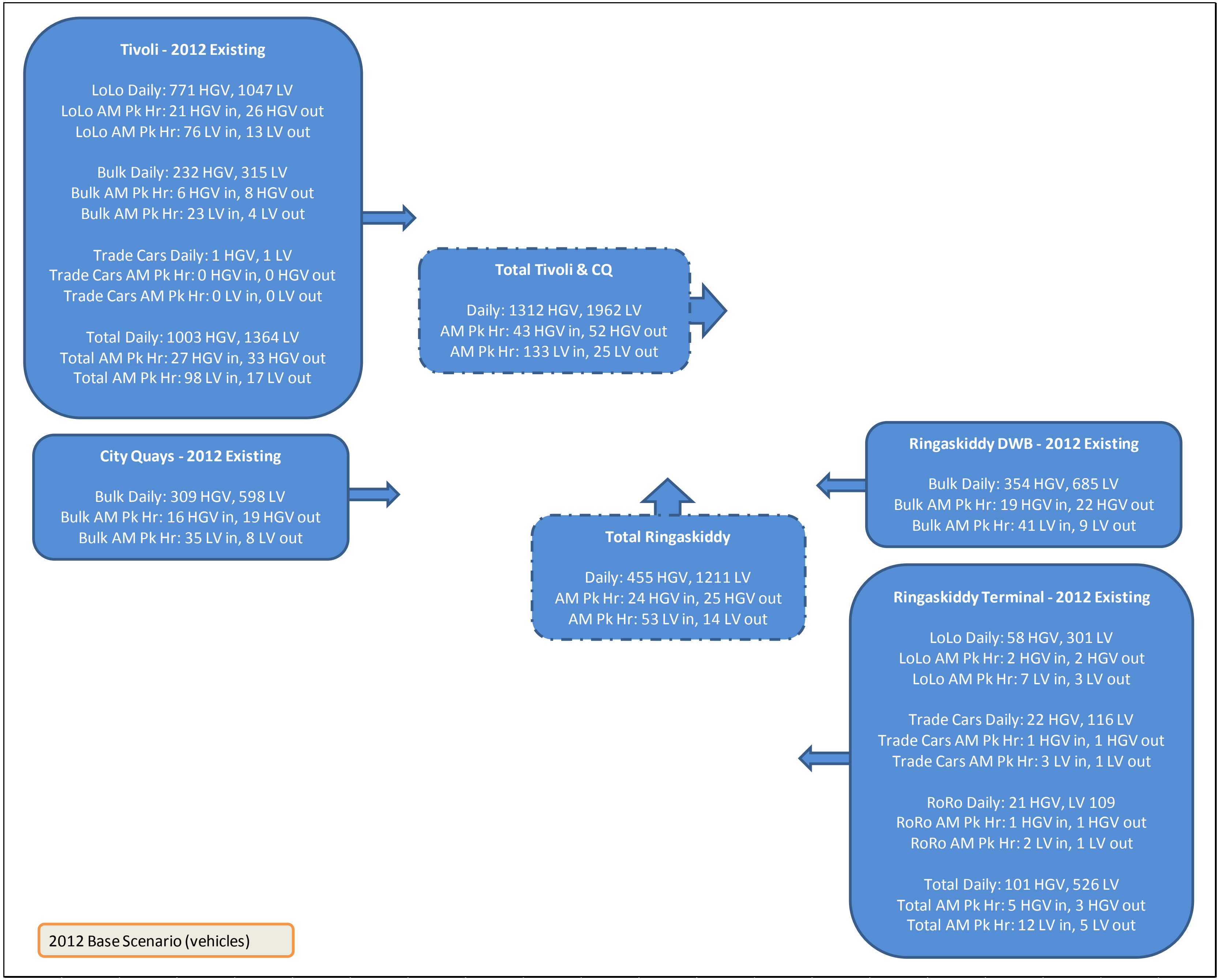


Figure 1: 2012 Traffic Generation (Daily & AM Peak)

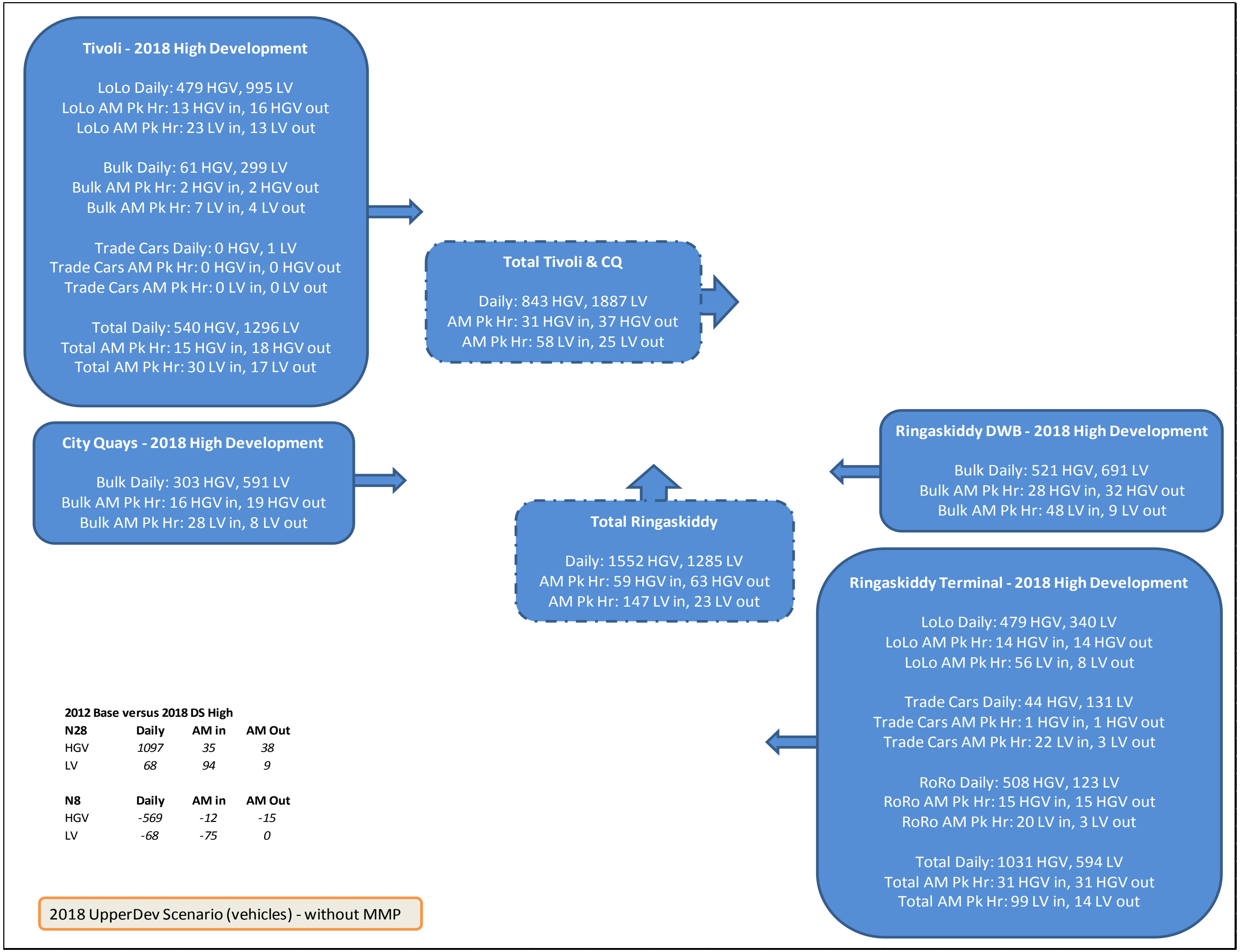


Figure 2: 2018 Do Something Traffic Generation (Daily & AM Peak)

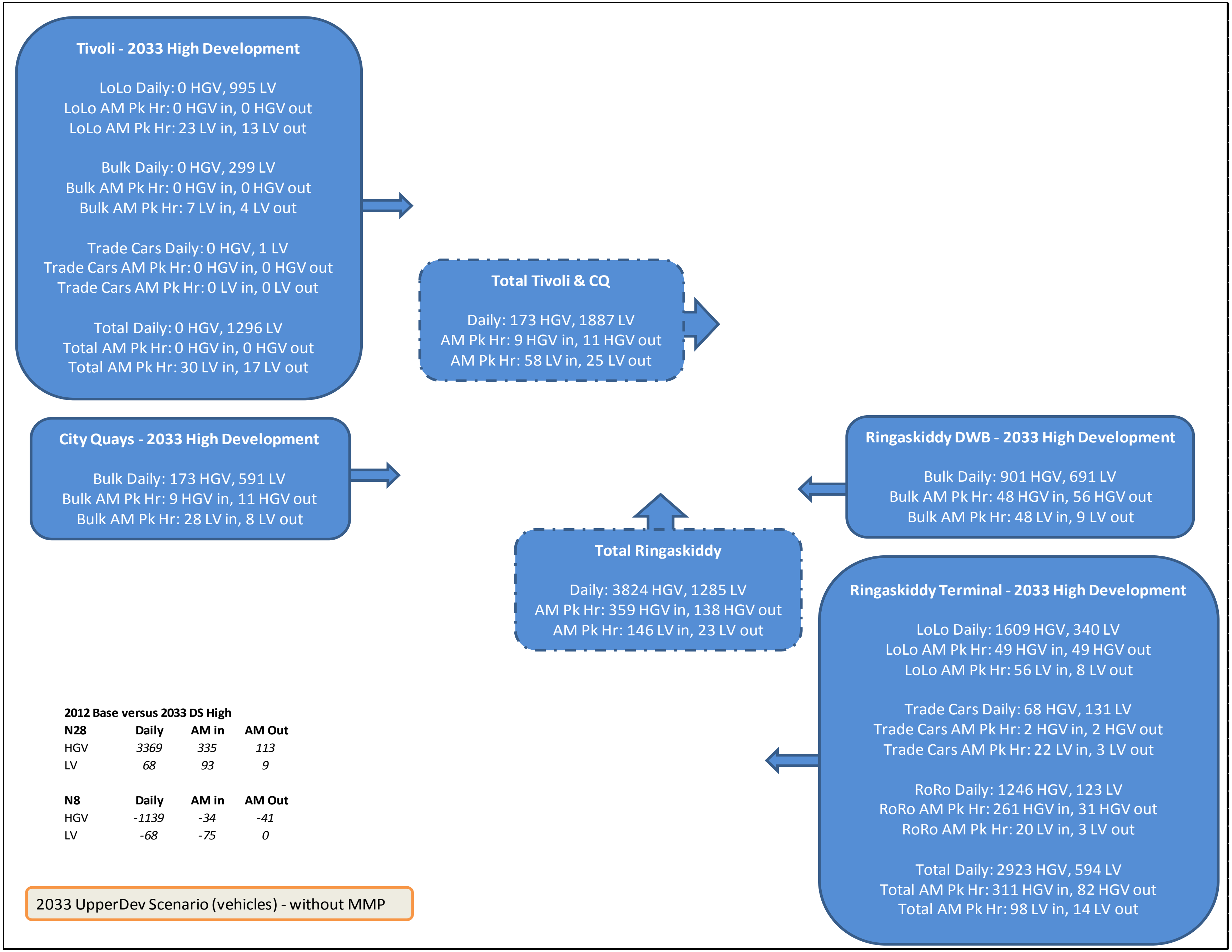
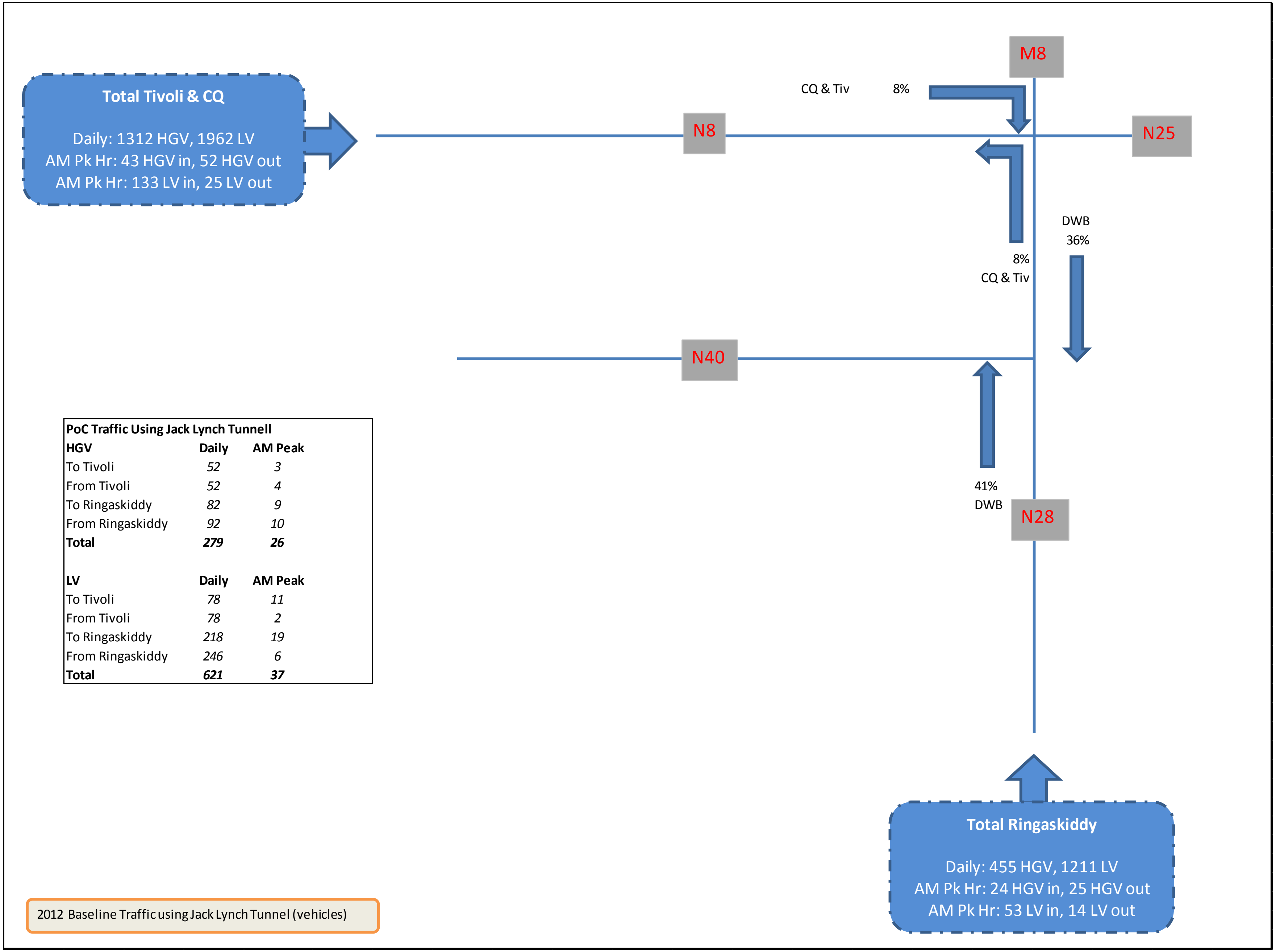


Figure 3: 2033 Do Something Traffic Generation (Daily & AM Peak)

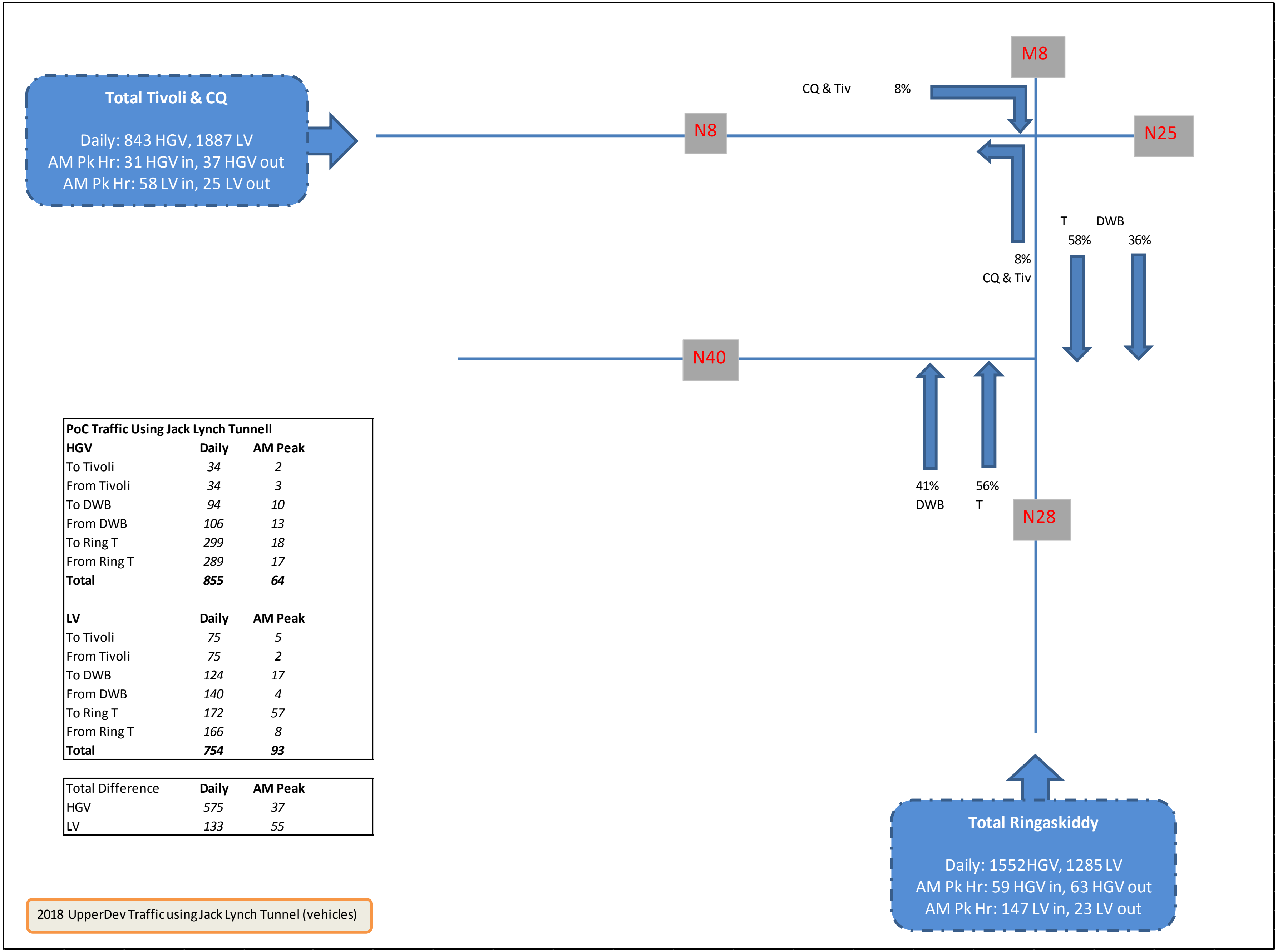


PoC Traffic Using Jack Lynch Tunnell

HGV	**Daily**	**AM Peak**
To Tivoli	*52*	*3*
From Tivoli	*52*	*4*
To Ringaskiddy	*82*	*9*
From Ringaskiddy	*92*	*10*
Total	***279***	***26***

LV	**Daily**	**AM Peak**
To Tivoli	*78*	*11*
From Tivoli	*78*	*2*
To Ringaskiddy	*218*	*19*
From Ringaskiddy	*246*	*6*
Total	***621***	***37***

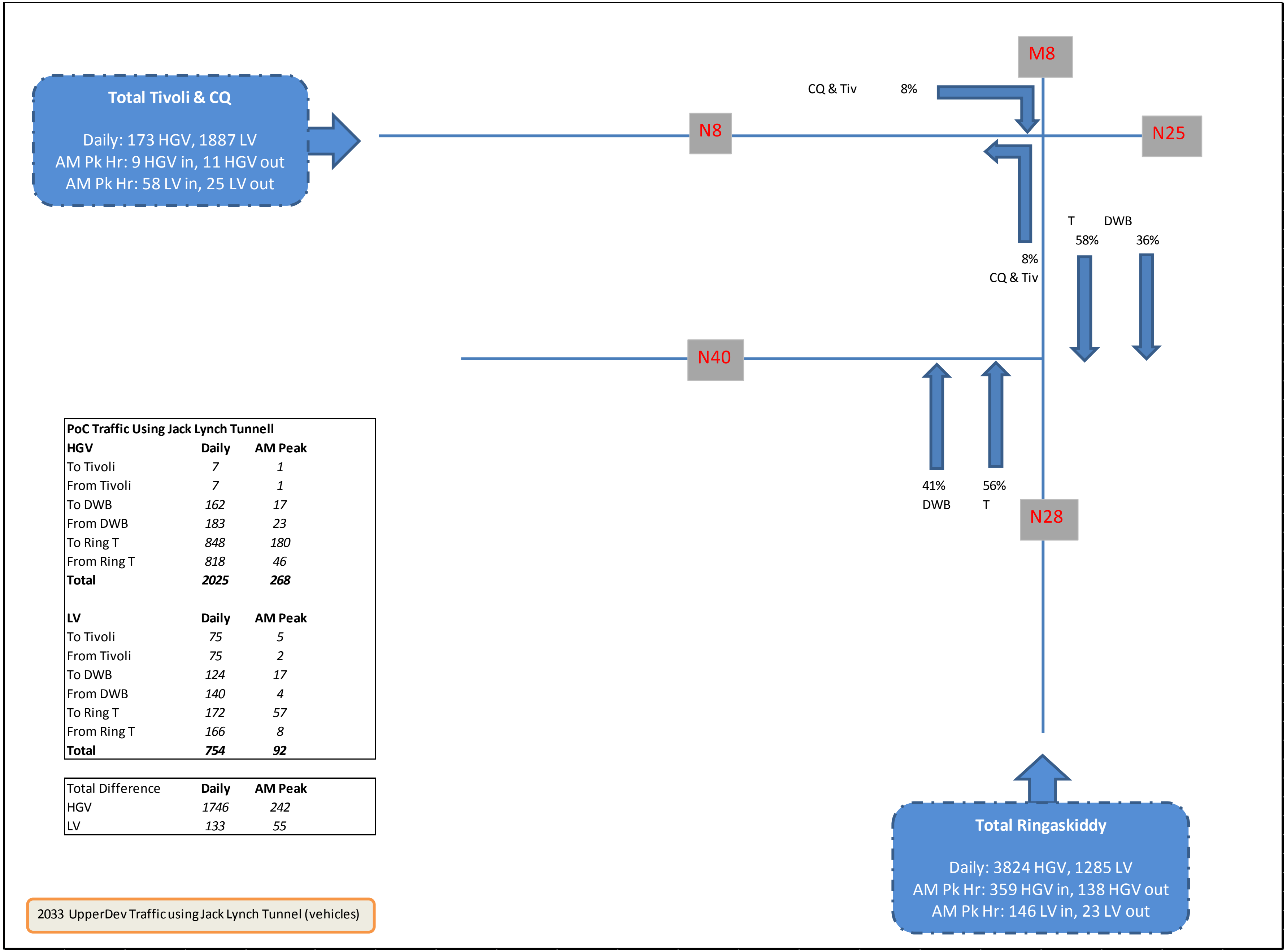
Figure 4: 2012 Port Traffic using Jack Lynch Tunnel (Daily & AM Peak)



PoC Traffic Using Jack Lynch Tunnell		
HGV	**Daily**	**AM Peak**
To Tivoli	*34*	*2*
From Tivoli	*34*	*3*
To DWB	*94*	*10*
From DWB	*106*	*13*
To Ring T	*299*	*18*
From Ring T	*289*	*17*
Total	***855***	***64***
LV	**Daily**	**AM Peak**
To Tivoli	*75*	*5*
From Tivoli	*75*	*2*
To DWB	*124*	*17*
From DWB	*140*	*4*
To Ring T	*172*	*57*
From Ring T	*166*	*8*
Total	***754***	***93***

Total Difference	**Daily**	**AM Peak**
HGV	*575*	*37*
LV	*133*	*55*

Figure 5: 2018 Do Something Port Traffic using Jack Lynch Tunnel (Daily & AM Peak)



PoC Traffic Using Jack Lynch Tunnell		
HGV	**Daily**	**AM Peak**
To Tivoli	*7*	*1*
From Tivoli	*7*	*1*
To DWB	*162*	*17*
From DWB	*183*	*23*
To Ring T	*848*	*180*
From Ring T	*818*	*46*
Total	***2025***	***268***
LV	**Daily**	**AM Peak**
To Tivoli	*75*	*5*
From Tivoli	*75*	*2*
To DWB	*124*	*17*
From DWB	*140*	*4*
To Ring T	*172*	*57*
From Ring T	*166*	*8*
Total	***754***	***92***

Total Difference	**Daily**	**AM Peak**
HGV	*1746*	*242*
LV	*133*	*55*

Figure 6: 2033 Do Something Port Traffic using Jack Lynch Tunnel (Daily & AM Peak)

APPENDIX 8.8 CORE SCENARIO MODELLING RESULTS

CORE SCENARIO MODELLING RESULTS

JOURNEY TIME RESULTS

Table 1: AM Peak Journey Time Results (seconds)

AM	2018			2033		
Route	DS-DM (seconds)	% Diff	Impact	DS-DM (seconds)	% Diff	Impact
Orange (N-S)	54	5.14%	Negligible	78	11.10%	Minor
Orange (S-N)	9	0.88%	Negligible	-12	-1.49%	Negligible
Red (N-S)	59	4.76%	Negligible	115	12.49%	Minor
Red (S-N)	15	1.33%	Negligible	77	8.06%	Minor

Table 2: PM Peak Journey Time Results (seconds)

PM	2018			2033		
Route	DS-DM (seconds)	% Diff	Impact	DS-DM (seconds)	% Diff	Impact
Orange (N-S)	8	0.80%	Negligible	15	2%	Negligible
Orange (S-N)	74	7.71%	Minor	65	10%	Minor
Red (N-S)	7	0.72%	Negligible	136	17%	Moderate
Red (S-N)	83	6.97%	Minor	181	18%	Moderate

VOLUME OVER CAPACITY RESULTS

Table 3: AM Peak Volume over Capacity Results – Shanbally

		2018			2033		
		DM	DS	Impact	DM	DS	Impact
N28 Westbound	RFC (%)	23%	25%	Negligible	9%	9%	Negligible
	MMQ (vehs)	0.3	0.3		1	1	
Marian Terrace	RFC (%)	16%	16%	Negligible	4%	4%	Negligible
	MMQ (vehs)	0.2	0.2		0	0	
N28 Eastbound	RFC (%)	91%	91%	Negligible	36%	38%	Negligible
	MMQ (vehs)	9	9		1	1	

Table 4: AM Peak Volume over Capacity Results – Shannonpark

		2018			2033		
		DM	DS	Impact	DM	DS	Impact
N28 Ringaskiddy	RFC (%)	42.10%	42.00%	Negligible	33.80%	33.10%	Negligible
	MMQ (vehs)	0.7	0.7		0.5	0.5	
R611 Carrigaline	RFC (%)	70.90%	69.40%	Negligible	12.60%	12.50%	Negligible
	MMQ (vehs)	2.4	2.2		0.1	0.1	
N28 Cork	RFC (%)	60.80%	63.10%	Negligible	36.60%	34.50%	Negligible
	MMQ (vehs)	1.5	1.7		0.6	0.5	

Table 5: PM Peak Volume over Capacity Results – Shanbally

		2018			2033		
		DM	DS	Impact	DM	DS	Impact
N28 West	RFC (%)	60%	67%	Negligible	31.1%	34.0%	Negligible
	MMQ (vehs)	1.5	2		1	1	
N28 East	RFC (%)	36.00%	39.40%	Negligible	13.1%	15.8%	Negligible
	MMQ (vehs)	0.6	0.6		1	1	
Marian Terrace	RFC (%)	16.20%	18.60%	Negligible	2.4%	2.4%	Negligible

Table 6: PM Peak Volume over Capacity Results – Shannonpark

		2018			2033		
		DM	DS	Impact	DM	DS	Impact
N28 Ringaskiddy	RFC (%)	49.00%	49.00%	Negligible	31.80%	32.10%	Negligible
	MMQ (vehs)	1	1		0.5	0.5	
R611 Carrigaline	RFC (%)	51.50%	51.60%	Negligible	23.50%	23.30%	Negligible
	MMQ (vehs)	1.1	1.1		0.3	0.3	
N28 Cork	RFC (%)	57.30%	57.80%	Negligible	58.40%	57.80%	Negligible
	MMQ (vehs)	1.3	1.4		1.4	1.4	

TRAFFIC RE-ROUTING RESULTS

Table 7: 2018 Traffic Re-distributions

	2018 – Do Something	
Junction	**AM**	**PM**
Carrs Hill	86 pcus*	38 pcus*
Shannonpark	41 pcus*	46 pcus*
Shanbally	55 pcus*	0 pcus*

Table 8: 2033 Traffic Re-distributions

	2033 – Do Something	
Junction	**AM**	**PM**
Carrs Hill	0 pcus*	0 pcus*
Shannonpark	0 pcus*	0 pcus*
Shanbally	0 pcus*	0 pcus*

*pcu = Passenger Car Units

APPENDIX 8.9 CONSTRUCTION SCENARIO MODELLING RESULTS

CONSTRUCTION SCENARIO MODELLING RESULTS

JOURNEY TIME RESULTS

Table 1: Construction Peak Hour Journey Time Results

	AM			PM		
Route	DS-DM (seconds)	% Diff	Impact	DS-DM (seconds)	% Diff	Impact
Yellow (N-S)	29	2.89%	Negligible	8	0.82%	Negligible
Yellow (S-N)	-4	-0.40%	Negligible	7	0.74%	Negligible
Green (N-S)	27	2.28%	Negligible	8	0.83%	Negligible
Green (S-N)	0	0.00%	Negligible	8	0.68%	Negligible

VOLUME OVER CAPACITY RESULTS

Table 2: 2017 Construction Peak Volume over Capacity Results – Shanbally

		2017 AM			2017 PM		
		DM	DS	Impact	DM	DS	Impact
N28 Westbound	RFC (%)	19.90%	22.20%	Negligible	57.60%	57.60%	Negligible
	MMQ (vehs)	0.2	0.3		1.3	1.3	
Marian Terrace	RFC (%)	15.50%	15.60%	Negligible	35.00%	35.00%	Negligible
	MMQ (vehs)	0.2	0.2		0.5	0.5	
N28 Eastbound	RFC (%)	92%	92%	Minor	14.40%	14.40%	Negligible
	MMQ (vehs)	10	10		0.2	0.2	

Table 3: 2017 Construction Peak Volume over Capacity Results – Shannonpark

		2017 AM			2017 PM		
		DM	DS	Impact	DM	DS	Impact
N28 Ringaskiddy	RFC (%)	40.3%	40.4%	Negligible	50.3%	49.7%	Negligible
	MMQ (vehs)	0.7	0.7		1.0	1.0	

R611 Carrigaline	RFC (%)	72.5%	70.2%	Negligible	51.3%	51.3%	Negligible
	MMQ (vehs)	2.6	2.3		1.0	1.0	
N28 Cork	RFC (%)	59.7%	60.0%	Negligible	56.3%	56.8%	Negligible
	MMQ (vehs)	1.5	1.5		1.3	1.3	

TRAFFIC RE-ROUTING RESULTS

Table 4:

	2017 – Do Construction	
Junction	**AM**	**PM**
Carrs Hill	44 pcus*	38 pcus*
Shannonpark	24 pcus*	33 pcus*
Shanbally	36 pcus*	5 pcus*

*pcu = Passenger Car Units

APPENDIX 8.10 CORE SCENARIO MITIGATION MODELLING RESULTS

CORE SCENARIO MITIGATION MODELLING RESULTS

JOURNEY TIME RESULTS

Table 1: 2018 existing infrastructure with Do something with Mobility Management Plan (DS MMP)

	AM			PM		
Route	DS MMP-DM (seconds)	% Diff	Impact	DS MMP-DM (seconds)	% Diff	Impact
Yellow (N-S)	38	3.62%	Negligible	-13	-1.31%	Negligible
Yellow (S-N)	11	1.08%	Negligible	37	3.85%	Negligible
Green (N-S)	47	3.79%	Negligible	-17	-1.75%	Negligible
Green (S-N)	13	1.15%	Negligible	43	3.61%	Negligible

VOLUME OVER CAPACITY RESULTS

Table 2: Shannbally Roundabout 2018 Existing Infrastructure, P1-P3 development, with MMP, DS

2018 Mitigation	Peak	AM			PM		
	Scenario	DM	DS MMP	Impacts	DM	DS MMP	Impacts
N28 Westbound	RFC	22.70%	21.70%	Negligible	60.10%	64.50%	Negligible
	Queue	0.3	0.3		1.5	1.8	
Marian Terrace	RFC	15.70%	15.10%	Negligible	36.00%	38.00%	Negligible
	Queue	0.2	0.2		0.6	0.6	
N28 Eastbound	RFC	91%	91%	Minor	16.20%	16.60%	Negligible
	Queue	9	9		0.2	0.2	

Table 3: Shannon Park Roundabout 2018 Existing Infrastructure, P1-P3 development, with MMP, DS

2018 Mitigation	Peak	AM			PM		
	Scenario	DM	DS MMP	Impact s	DM	DS MMP	Impact s
N28 Ringa- -skiddy	RFC	42.10%	41.30%	Negligible	49.00%	49.70%	Negligible
	Queue	0.7	0.7		1	1	
R611 Carrigaline	RFC	70.90%	70.30%	Negligible	51.50%	51.60%	Negligible
	Queue	2.4	2.3		1.1	1.1	
N28 Cork	RFC	60.80%	62.40%	Negligible	57.30%	57.40%	Negligible
	Queue	1.5	1.6		1.3	1.3	

TRAFFIC RE-ROUTING RESULTS

Table 4: 2018 Mitigation Traffic Re-distributions

	2018 – Mitigation	
Junction	**AM**	**PM**
Carrs Hill	0 pcus*	0 pcus*
Shannonpark	0 pcus*	0 pcus*
Shanbally	0 pcus*	0 pcus*

*pcu = Passenger Car Units

APPENDIX 8.11 CONSTRUCTION MITIGATION SCENARIO MODELLING RESULTS

CONSTRUCTION MITIGATION SCENARIO MODELLING RESULTS

JOURNEY TIME RESULTS

Table 1: Construction Mitigation Journey Times

	AM			**PM**		
Route	DM-DS Mitigation (seconds)	% Diff	Impact	DS-DS Mitigation (seconds)	% Diff	Impact
Yellow (N-S)	0	0%	Negligible	0	0%	Negligible
Yellow (S-N)	0	0%	Negligible	0	0%	Negligible
Green (N-S)	0	0%	Negligible	0	0%	Negligible
Green (S-N)	0	0%	Negligible	0	0%	Negligible

VOLUME OVER CAPACITY RESULTS

Table 2: 2017 Construction Mitigation Peak Volume over Capacity Results – Shanbally

		2017 AM			2017 PM		
		DM	DS	Impact	DM	DS	Impact
N28 Westbound	RFC (%)	19.90%	19.90%	Negligible	57.60%	57.60%	Negligible
	MMQ (vehs)	0.2	0.2		1.3	1.3	
Marian Terrace	RFC (%)	15.50%	15.50%	Negligible	35.00%	35.00%	Negligible
	MMQ (vehs)	0.2	0.2		0.5	0.5	
N28 Eastbound	RFC (%)	92%	92%	Negligible	14.40%	14.40%	Negligible
	MMQ (vehs)	10	10		0.2	0.2	

Table 3: 2017 Construction Mitigation Peak Volume over Capacity Results – Shannonpark

		2017 AM			2017 PM		
		DM	DS	Impact	DM	DS	Impact
N28 Ringaskiddy	RFC (%)	40.3%	40.3%	Negligible	50.3%	50.3%	Negligible
	MMQ (vehs)	0.7	0.7		1.0	1.0	
R611 Carrigaline	RFC (%)	72.5%	72.5%	Negligible	51.3%	51.3%	Negligible
	MMQ (vehs)	2.6	2.6		1.0	1.0	
N28 Cork	RFC (%)	59.7%	59.7%	Negligible	56.3%	56.3%	Negligible
	MMQ (vehs)	1.5	1.5		1.3	1.3	

TRAFFIC RE-ROUTING RESULTS

Table 4: 2017 Construction Mitigation Traffic Re-Distributions

	2017 – Do Something (Construction) Mitigation	
Junction	**AM**	**PM**
Carrs Hill	0 pcus*	0 pcus*
Shannonpark	0 pcus*	0 pcus*
Shanbally	0 pcus*	0 pcus*

*pcu = Passenger Car Units

APPENDIX 8.12 SENSITIVITY SCENARIOS MODELLING RESULTS

SENSITIVITY SCENARIOS MODELLING RESULTS

JOURNEY TIME RESULTS

Table 1: 2023 existing infrastructure

	AM			**PM**		
Route	DS-DM (seconds)	% Diff	Impact	DS-DM (seconds)	% Diff	Impact
Yellow (N-S)	93	8.43%	Minor	13	1.25%	Negligible
Yellow (S-N)	8	0.76%	Negligible	80	8.11%	Minor
Green (N-S)	101	7.77%	Minor	9	0.91%	Negligible
Green (S-N)	1	0.09%	Negligible	91	7.40%	Minor

Table 2: 2033 existing infrastructure

	AM			**PM**		
Route	DS-DM (seconds)	% Diff	Impact	DS-DM (seconds)	% Diff	Impact
Yellow (N-S)	188	13.81%	Moderate	59	5.13%	Negligible
Yellow (S-N)	56	4.99%	Negligible	217	20.32%	Major
Green (N-S)	194	12.34%	Moderate	111	11.01%	Minor
Green (S-N)	72	5.91%	Minor	239	17.78%	Major

Table 3: 2023 with full N28 upgrade

	AM			**PM**		
Route	DS-DM (seconds)	% Diff	Impact	DS-DM (seconds)	% Diff	Impact
Yellow (N-S)	35	5.02%	Negligible	5	0.56%	Negligible
Yellow (S-N)	2	0.26%	Negligible	24	3.62%	Negligible
Green (N-S)	60	6.85%	Minor	9	1.15%	Negligible
Green (S-N)	39	4.39%	Negligible	62	6.65%	Minor

Table 4: 2023 with N28 upgrade to R613

	AM			PM		
Route	DS-DM (seconds)	% Diff	Impact	DS-DM (seconds)	% Diff	Impact
Yellow (N-S)	20	3.19%	Negligible	0	0.00%	Negligible
Yellow (S-N)	3	0.44%	Negligible	21	3.60%	Negligible
Green (N-S)	46	5.71%	Negligible	4	0.56%	Negligible
Green (S-N)	25	3.12%	Negligible	55	6.47%	Negligible

Table 5: 2033 with N28 upgrade to R613

	AM			PM		
Route	DS-DM (seconds)	% Diff	Impact	DS-DM (seconds)	% Diff	Impact
Yellow (N-S)	65	10.27%	Minor	4	0.45%	Negligible
Yellow (S-N)	22	3.02%	Negligible	57	9.71%	Negligible
Green (N-S)	102	12.03%	Minor	116	15.87%	Moderate
Green (S-N)	64	7.39%	Minor	150	17.28%	Moderate

VOLUME OVER CAPACITY RESULTS

Table 6: Shanbally Roundabout 2023 - Existing Infrastructure – V/C Results

Approach	Peak	AM			PM		
	Scenario	DM	DS	Impact	DM	DS	Impact
N28 Westbound	RFC	23.00%	26.00%	Negligible	62.60%	69.10%	Negligible
	Queue	0.3	0.4		1.7	2.2	
Marian Terrace	RFC	16.10%	16.00%	Negligible	39.30%	42.50%	Negligible
	Queue	0.2	0.2		0.6	0.7	
N28 Eastbound	RFC	91.00%	91%	Positive	16.80%	19.50%	Negligible
	Queue	9	9		0.2	0.2	

Table 7: Shannonpark Roundabout 2023- Existing Infrastructure- V/C Results

Approach	Peak	AM			PM		
	Scenario	DM	DS	Impact	DM	DS	Impact
N28 Ringa--skiddy	RFC	42.20%	44.20%	Negligible	47.40%	47.10%	Negligible
	Queue	0.7	0.8		0.9	0.9	
R611 Carrigaline	RFC	70.30%	65.90%	Negligible	54.40%	54.70%	Negligible
	Queue	2.3	1.9		1.2	1.2	
N28 Cork	RFC	64.00%	66.40%	Negligible	59.70%	60.10%	Negligible
	Queue	1.8	2		1.5	1.5	

Table 8: Shanbally Roundabout 2033 – Existing Infrastructure – V/C Results

Approach	Peak	AM			PM		
	Scenario	DM	DS	Impacts	DM	DS	Impacts
N28 Westbound	RFC	24.30%	30.80%	Negligible	67.00%	78.80%	Moderate
	Queue	0.3	0.4		2	3.6	
Marian Terrace	RFC	18.50%	20.40%	Negligible	45.70%	47.40%	Negligible
	Queue	0.2	0.3		0.8	0.9	
N28 Eastbound	RFC	91.40%	91.50%	Positive	17.00%	25.40%	Negligible
	Queue	10	10		0.2	0.3	

Table 9: Shannonpark Roundabout 2033 – Existing Infrastructure – V/C Results

Approach	Peak	AM			PM		
	Scenario	DM	DS	Impacts	DM	DS	Impacts
N28 Ringa--skiddy	RFC	43.60%	44.90%	Negligible	37.20%	37.40%	Negligible
	Queue	0.8	0.8		0.6	0.6	
R611 Carrigaline	RFC	60.40%	60.60%	Negligible	59.30%	60.80%	Negligible
	Queue	1.5	1.5		1.5	1.5	
N28 Cork	RFC	64.20%	62.70%	Negligible	63.40%	62.60%	Negligible
	Queue	1.8	1.7		1.7	1.7	

Table 10: Shanbally Roundabout 2023 - Full N28 – V/C Results

Approach	Peak	AM			PM		
	Scenario	DM	DS	Impact	DM	DS	Impact
N28 Westbound	RFC	8.30%	8.30%	Negligible	24.10%	27.10%	Negligible
	Queue	0.1	0.1		0.3	0.4	
Marian Terrace	RFC	4.00%	4.00%	Negligible	11.20%	11.50%	Negligible
	Queue	0	0		0.1	0.1	
N28 Eastbound	RFC	34.60%	36.10%	Negligible	2.70%	2.70%	Negligible
	Queue	0.5	0.6		0	0	

Table 11: Shannonpark Roundabout 2023 - Full N28 – V/C Results

Approach	Peak	AM			PM		
	Scenario	DM	DS	Impact	DM	DS	Impact
N28 Westbound	RFC	8.30%	8.30%	Negligible	24.10%	27.10%	Negligible
	Queue	0.1	0.1		0.3	0.4	
Marian Terrace	RFC	4.00%	4.00%	Negligible	11.20%	11.50%	Negligible
	Queue	0	0		0.1	0.1	
N28 Eastbound	RFC	34.60%	36.10%	Negligible	2.70%	2.70%	Negligible
	Queue	0.5	0.6		0	0	

Table 12: Shanbally Roundabout 2023- with N28 upgrade to R613– V/C Results

Approach	Peak	AM			PM		
	Scenario	DM	DS	Impact	DM	DS	Impact
N28 Westbound	RFC	8.1%	8.10%	Negligible	27.40%	29.60%	Negligible
	Queue	0.1	0.1		0.4	0.4	
Marian Terrace	RFC	3.7%	3.70%	Negligible	11.50%	11.60%	Negligible
	Queue	0	0		0.1	0.1	
N28 Eastbound	RFC	34.3%	35.20%	Negligible	1.70%	1.80%	Negligible
	Queue	0.5	0.5		0	0	

Table 13: Shannonpark Roundabout 2023 - with N28 upgrade to R613– V/C Results

Approach	Peak	AM			PM		
	Scenario	DM	DS	Impact	DM	DS	Impact
N28 Westbound	RFC	8.10%	8.10%	Negligible	27.40%	29.60%	Negligible
	Queue	0.1	0.1		0.4	0.4	
Marian Terrace	RFC	3.70%	3.70%	Negligible	11.50%	11.60%	Negligible
	Queue	0	0		0.1	0.1	
N28 Eastbound	RFC	34.30%	35.20%	Negligible	1.70%	1.80%	Negligible
	Queue	0.5	0.5		0	0	

Table 14: Shanbally Roundabout 2033 - with N28 upgrade to R613- V/C Results

Approach	Peak	AM			PM		
	Scenario	DM	DS	Impacts	DM	DS	Impacts
N28 Westbound	RFC	9.20%	8.70%	Negligible	34.10%	34.90%	Negligible
	Queue	0.1	0.1		0.5	0.5	
Marian Terrace	RFC	4.00%	4.00%	Negligible	13.90%	16.30%	Negligible
	Queue	0	0		0.2	0.2	
N28 Eastbound	RFC	34.60%	35.90%	Negligible	1.80%	2.00%	Negligible
	Queue	0.5	0.6		0	0	

Table 15: Shannonpark Roundabout 2033 - with N28 upgrade to R613– V/C Results

Approach	Peak	AM			PM		
	Scenario	DM	DS	Impact	DM	DS	Impact
N28 Westbound	RFC	9.20%	8.70%	Negligible	34.10%	34.90%	Negligible
	Queue	0.1	0.1		0.5	0.5	
Marian Terrace	RFC	4.00%	4.00%	Negligible	13.90%	16.30%	Negligible
	Queue	0	0		0.2	0.2	
N28 Eastbound	RFC	34.60%	35.90%	Negligible	1.80%	2.00%	Negligible
	Queue	0.5	0.6		0	0	

TRAFFIC RE-ROUTING RESULTS

Table 16: 2023 - Existing Infrastructure - Traffic Re-distributions

	2023 – Existing Infrastructure- Do Something	
Junction	**AM**	**PM**
Carrs Hill	129 pcus*	46 pcus*
Shannonpark	98 pcus*	48 pcus*
Shanbally	65 pcus*	0 pcus*

Table 17: 2033 - Existing Infrastructure - Traffic Re-distributions

	2033 – Existing Infrastructure- Do Something	
Junction	**AM**	**PM**
Carrs Hill	155 pcus*	87 pcus*
Shannonpark	100 pcus*	117 pcus*
Shanbally	130 pcus*	0 pcus*

Table 18: 2023 – Full N28 Upgrade - Traffic Re-distributions

	2023 – Full N28 Upgrade - Do Something	
Junction	**AM**	**PM**
Carrs Hill	0 pcus*	0 pcus*
Shannonpark	0 pcus*	0 pcus*
Shanbally	0 pcus*	0 pcus*

Table 19: 2023 – N28 Upgrade to R613 - Traffic Re-distributions

	2023 – Reduced N28 Upgrade - Do Something	
Junction	**AM**	**PM**
Carrs Hill	0 pcus*	0 pcus*
Shannonpark	0 pcus*	0 pcus*
Shanbally	0 pcus*	0 pcus*

Table 20: 2033 – N28 Upgrade to R613 - Traffic Re-distributions

	2033 – Reduced N28 Upgrade - Do Something	
Junction	**AM**	**PM**
Carrs Hill	0 pcus*	0 pcus*
Shannonpark	0 pcus*	0 pcus*
Shanbally	0 pcus*	0 pcus*

*pcu = Passenger Car Units

APPENDIX 8.13 SENSITIVITY SCENARIOS MITIGATION MODELLING RESULTS

SENSITIVITY SCENARIOS MITIGATION MODELLING RESULTS

JOURNEY TIME RESULTS

Table 1: 2023 - Existing Infrastructure - with Mobility Management Plan

	AM			PM		
Route	DS MMP - DM (seconds)	% Diff	Impact	DS MMP- DM (seconds)	% Diff	Impact
Yellow (N-S)	42	3.81%	Negligible	13	1.25%	Negligible
Yellow (S-N)	9	0.85%	Negligible	40	4.05%	Negligible
Green (N-S)	47	3.62%	Negligible	17	1.72%	Negligible
Green (S-N)	10	0.86%	Negligible	46	3.74%	Negligible

Table 2: 2033 - Existing Infrastructure - with Mobility Management Plan

	AM			PM		
Route	DS MMP - DM seconds)	% Diff	Impact	DS MMP -DM (seconds)	% Diff	Impact
Yellow (N-S)	64	4.70%	Negligible	12	1.04%	Negligible
Yellow (S-N)	0	0.00%	Negligible	41	3.84%	Negligible
Green (N-S)	67	4.26%	Negligible	17	1.69%	Negligible
Green (S-N)	0	0.00%	Negligible	49	3.65%	Negligible

VOLUME OVER CAPACITY RESULTS

Table 3: Shanbally Roundabout 2023 - Existing Infrastructure - with Mobility Management Plan

Approach	Peak	AM			PM		
	Scenario	DM	DS MMP	Impacts	DM	DS MMP	Impacts
N28 Westbound	RFC	23.00%	22.30%	Negligible	62.60%	66.80%	Negligible
	Queue	0.3	0.3		1.7	2	
Marian Terrace	RFC	16.10%	15.30%	Negligible	39.30%	41.40%	Negligible
	Queue	0.2	0.2		0.6	0.7	
N28 Eastbound	RFC	91.00%	91.00%	Minor	16.80%	17.20%	Negligible
	Queue	9	9		0.2	0.2	

Table 4: Shannonpark Roundabout 2023 - Existing Infrastructure - with Mobility Management Plan

Approach	Peak	AM			PM		
	Scenario	DM	DS MMP	Impacts	DM	DS MMP	Impacts
N28 Ringa--skiddy	RFC	42.20%	42.20%	Negligible	47.40%	48.00%	Negligible
	Queue	0.7	0.7		0.9	0.9	
R611 Carrigaline	RFC	70.30%	71.30%	Negligible	54.40%	54.60%	Negligible
	Queue	2.3	2.5		1.2	1.2	
N28 Cork	RFC	64.00%	65.60%	Negligible	59.70%	59.60%	Negligible
	Queue	1.8	1.9		1.5	1.5	

Table 5: Shanbally Roundabout 2033 - Existing Infrastructure - with Mobility Management Plan

Approach	Peak	AM			PM		
	Scenario	DM	DS MMP	Impacts	DM	DS MMP	Impacts
N28 Westbound	RFC	24.30%	24.30%	Negligible	67.00%	72.10%	Moderate
	Queue	0.3	0.3		2	2.5	
Marian Terrace	RFC	18.50%	18.50%	Negligible	45.70%	48.80%	Negligible
	Queue	0.2	0.2		0.8	0.9	
N28 Eastbound	RFC	91.40%	91.60%	Minor	17.00%	17.70%	Negligible
	Queue	9.2	9.4		0.2	0.2	

Table 6: Shannonpark Roundabout 2033 - Existing Infrastructure - with Mobility Management Plan

Approach	Peak	AM			PM		
	Scenario	DM	DS MMP	Impacts	DM	DS MMP	Impacts
N28 Ringa--skiddy	RFC	43.60%	43.40%	Negligible	37.20%	38.10%	Negligible
	Queue	0.8	0.8		0.6	0.6	
R611 Carrigaline	RFC	60.40%	60.50%	Negligible	59.30%	59.10%	Negligible
	Queue	1.5	1.5		1.5	1.4	
N28 Cork	RFC	64.20%	64.40%	Negligible	63.40%	63.30%	Negligible
	Queue	1.8	1.8		1.7	1.7	

TRAFFIC RE-ROUTING RESULTS

Table 7: 2023 - Existing Infrastructure (With Mobility Management Plan) - Traffic Re-distributions

	2023 – Existing Infra - DS MMP	
Junction	**AM**	**PM**
Carrs Hill	0 pcus*	0 pcus*
Shannonpark	0 pcus*	0 pcus*
Shanbally	0 pcus*	0 pcus*

Table 8: 2033 - Existing Infrastructure (With Mobility Management Plan) - Traffic Re-distributions

	2033 – Existing Infra - DS MMP	
Junction	**AM**	**PM**
Carrs Hill	0 pcus*	0 pcus*
Shannonpark	0 pcus*	0 pcus*
Shanbally	0 pcus*	0 pcus*

* pcu = passenger car unit

APPENDIX 8.14 JUNCTION SELECTION REPORT

DOCUMENT CONTROL SHEET

Client	**Port of Cork**
Project Title	**Port of Cork Development**
Document Title	**Access Junction Modelling Report**
Document No.	**IBH0307/ Rev A**

Rev.	Status	Author(s)	Reviewed By	Approved By	Office of Origin	Issue Date
-						
		James Redmond	BD	BD	Belfast	March 2014
A	Final	James Redmond	BD	BD	Belfast	11th April 2014

Confidentiality statement:

The information disclosed in this proposal should be treated as being strictly private and confidential and you are requested to take all reasonable precautions to maintain its status as such. You are requested to use and apply the information solely for the purpose of evaluating this proposal and are asked not at any time to disclose or otherwise make available the information to any third party except for those officers, employees and professional advisers who are required by you in the course of such evaluation to receive and consider the information and who agree to be bound by these non-disclosure terms.

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1.0 INTRODUCTION

1.1 RPS has been appointed to undertake the access junction design and analysis for the proposed Port of Cork development in Ringskiddy. These accesses are described;

- Ringskiddy Deep Water Berth (DWB) – Proposed West Access
- Ringskiddy Terminal M28 / N28- Proposed East Access

1.2 To determine the optimum design for the proposed accesses a number of junction arrangements were designed and tested for capacity assessments. This report discusses the final proposed junction arrangements and the associated analysis.

1.3 Signalised junctions are being proposed for the East and West accesses, therefore, the industry recognised traffic modelling package LINSIG has been used in this junction assessment.

1.4 MVA consultancy provided AM and PM turning flow diagrams for the proposed scenarios. These flow diagrams were presented as Light Goods Vehicles (LGV's) and Heavy Goods Vehicles (HGV's).

1.5 For assessment purposes RPS has converted these traffic flows into Passenger Car Units (PCU). PCU is a unit of traffic volume, with 1 car = 1 PCU and 1 HGV = 2.3 PCU's.

1.6 As part of the junction assessment process RPS has liaised with the National Roads Authority (NRA) and Cork County Council (CCC). RPS has taken board all recommendations made by the NRA and CCC and these are reflected in the latest junction design layouts.

1.7 The following tables summarises the proposed AM & PM traffic scenarios that have been considered in the RPS junction analysis.

1.8 Table 1 describes the proposed West Access Junction scenario and Table 2 summarises the proposed East Access.

Table 1:1: Scenarios for Proposed West DWB access

AM & PM Assessment Years	Western Port Access – DWB S	Drawing Layout Reference
2023 & 2033	**Scenario 7 MMP DS DWB** – *This scenario considers that Phases 1 and 2 are operational; No new N28 is constructed and the MMP is in place.*	**IBM047/PL/0803**
2033	**Scenario 6 DS DWB -** *This scenario considers that Phases 1 to 3 are operational; The N28 is constructed to the R613 and no MMP is in place.*	**IBM047/PL/0851**
2033	**Scenario 4 DS DWB -** *This scenario considers that The N28 is fully constructed to the East and no MMP is in place*. Majority of Port traffic using the Eastern Access	**IBM047/PL/0803**

Table 1:2: Scenarios for Proposed East Terminal access

AM & PM Assessment Years	Western Port Access – DWB S	Drawing Layout Reference
2033	**Scenario 4 DS East Access** – *This scenario considers that The N28 is fully constructed to the East and no MMP is in place*. Majority of Port traffic using the Eastern Access	**IBM047/PL/0852**

2.0 JUNCTION MODELLING SUMMARY

2.1 This section summarises the modelling results for each of the scenarios outlined in Tables 1 and 2.

2.2 For ease of reference, the modelling results for the proposed access junctions and the associated scenarios are presented diagrammatically on a junction diagram layout.

2.3 Each approach arm on the layout contains the Traffic Flow Input (PCU), the Degree of Saturation (DoS) and the Queuing on approach.

2.4 The term Degree of Saturation (DoS) outlined in the modelling results is the parameter used by the LINSIG to measure the capacity of each approach road to a signalised junction. A DoS below 90% implies an approach road is operating satisfactorily within capacity; between 90% and 100%, DoS implies the approach road is operating within capacity but at less than optimal efficiency; above 100% DoS the approach road is deemed to be above capacity which leads to disproportionate queuing and delays corresponding to a modest increase in traffic.

Deep Water Berth (DWB) – Proposed West Access

2.5 This Deep Water Berth entrance is a four armed signalised junction. This layout has been modelled on a 200 second double cycle with an 'all red pedestrian phase' being called every other cycle.

2.6 Figures 2:1 to 2:4 summarises the modelling results for **Scenario 7 MMP DS DWB**. This scenario has been modelled for future design years 2023 and 2033.

Figure 2:1: AM Peak 2023 –Scenario 7 MMP, DS, DWB Modelling summary

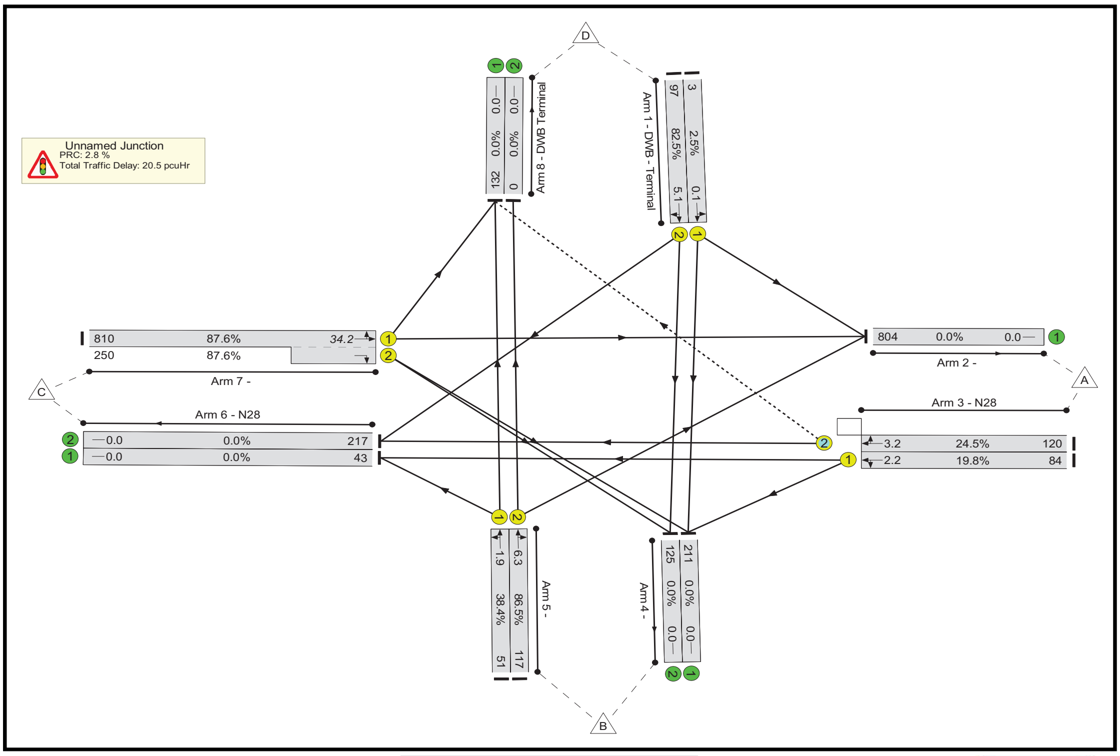


Figure 2:2: PM Peak 2023 –Scenario 7 MMP, DS, DWB Modelling summary

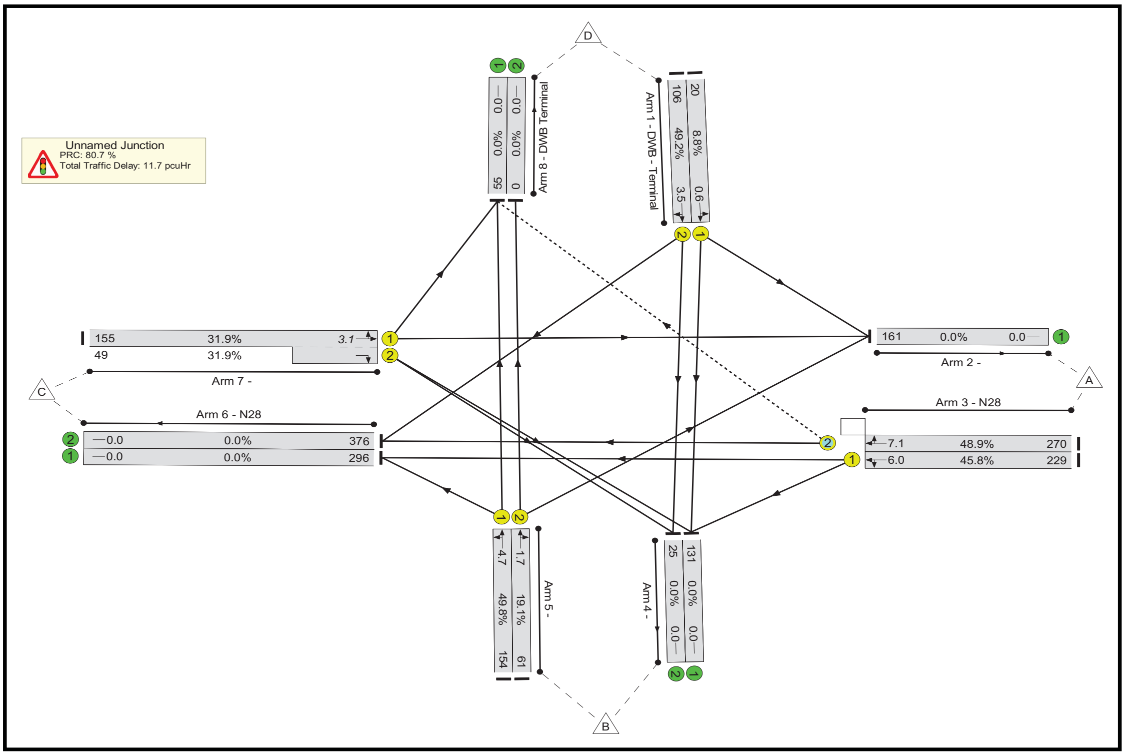


Figure 2:3: AM Peak 2033 –Scenario 7 MMP, DS, DWB Modelling summary

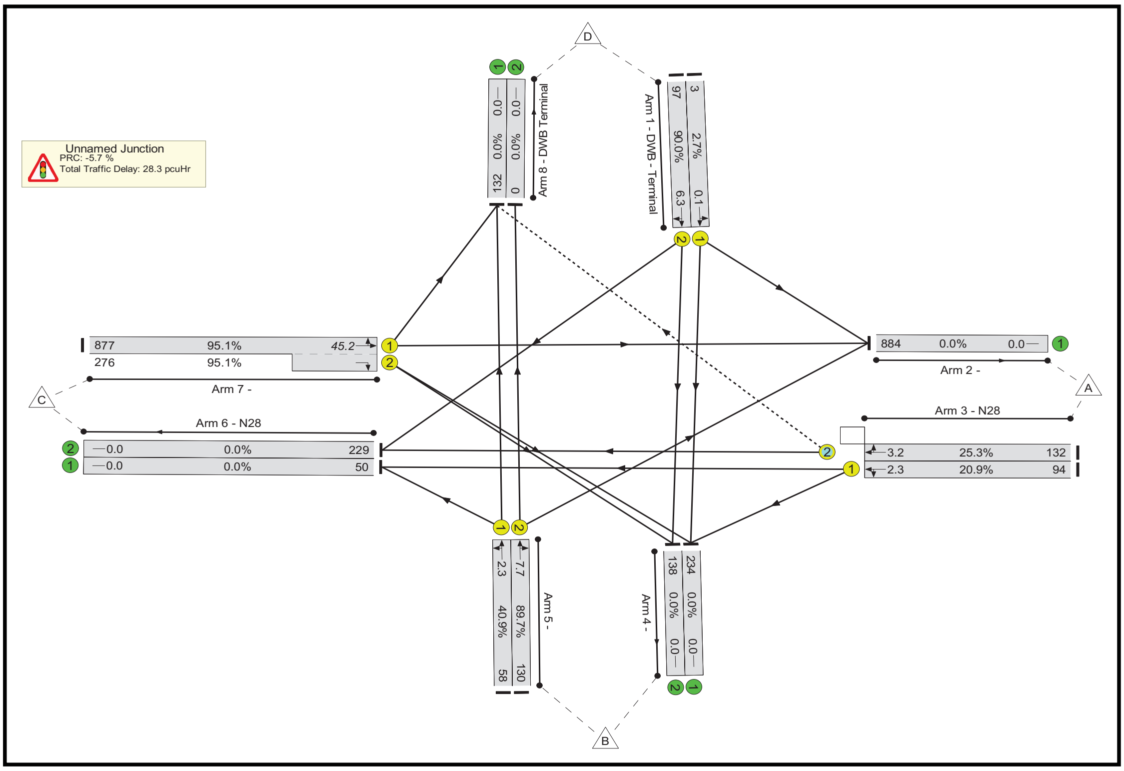
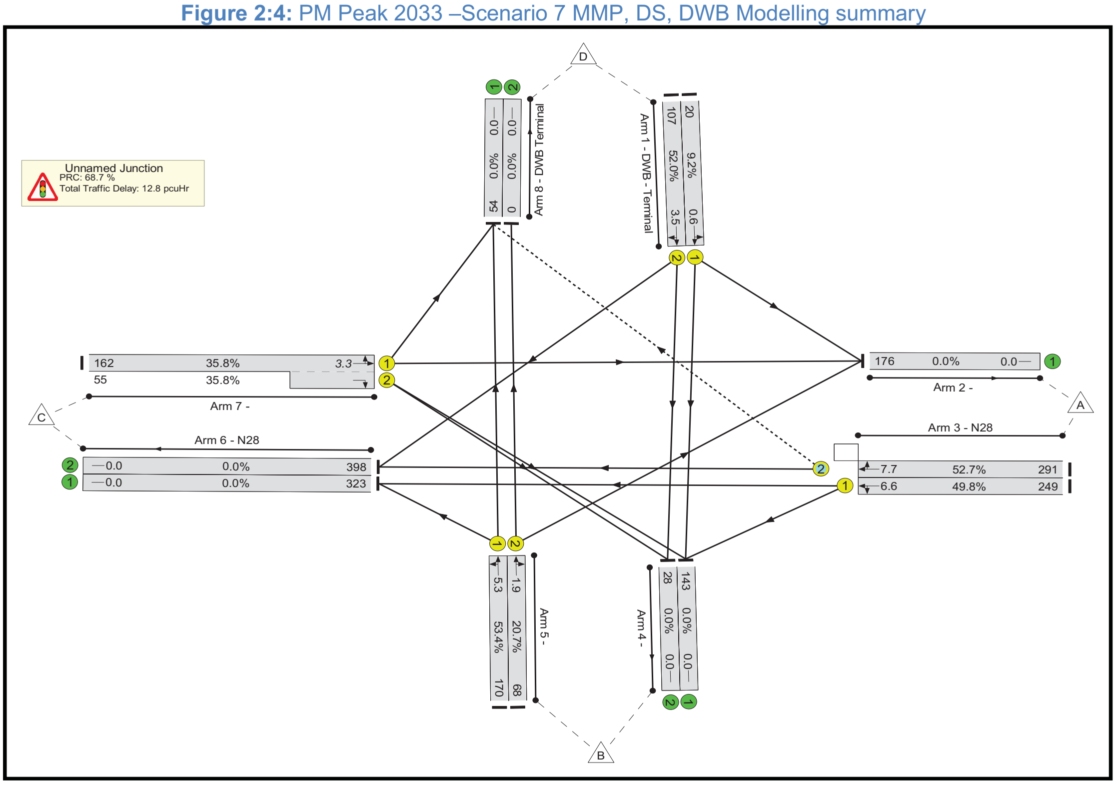


Figure 2:4: PM Peak 2033 –Scenario 7 MMP, DS, DWB Modelling summary



2.7 The modelling results summarised in Figures 2:1-2.2 for Scenario 7 predicts that the access junction and its design will operate within capacity (DoS < 90%) during the AM and PM peaks in future design year 2023. A maximum DoS of 87.6% has been calculated in the AM peak and a maximum DoS of 49.8% calculated in the PM peak.

2.8 In future design year 2033 the modelling results (Figures 2:3-2:4) for the access design predicts that the access junction is approaching capacity in the AM Peak (DoS > 90%). On the N28 Eastbound approach a DoS of 95.1% is calculated (Figure 2:3). In the PM peak Scenario 7 (Figure 2:4) the results indicate that the junction will continue to operate within capacity as the maximum DoS calculated is 53.4%.

2.9 Figures 2:5 to 2:6 summarises the modelling results for **Scenario 6 DS DWB**. This scenario has been modelled for future design year 2033 only.

Figure 2:5: AM Peak 2033 –Scenario 6, DS, DWB Modelling summary

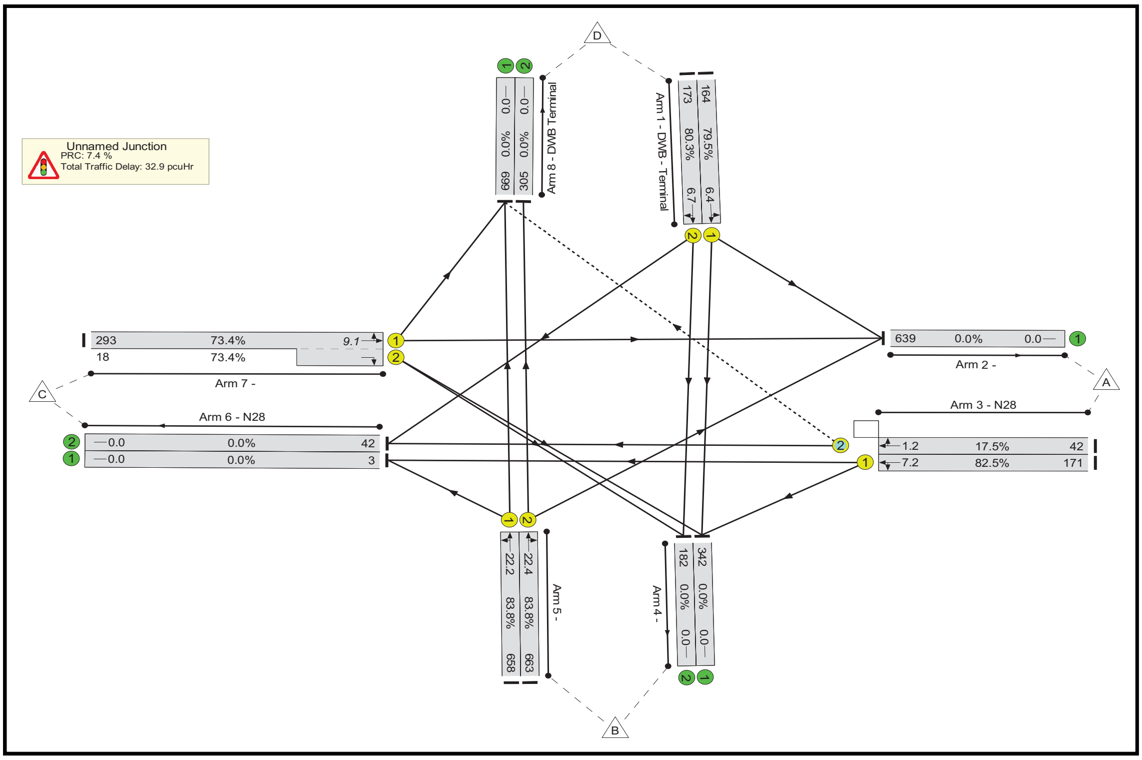
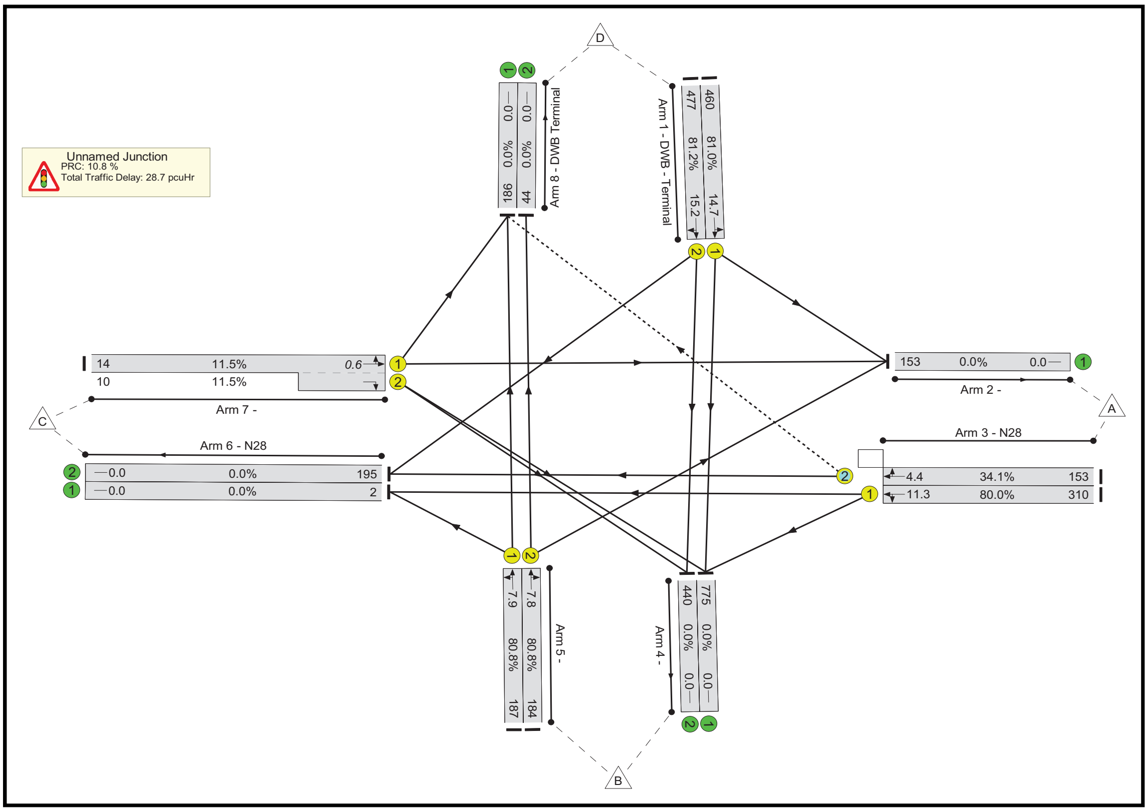


Figure 2:6: PM Peak 2033 –Scenario 6, DS, DWB Modelling summary



2.10 The 2033 modelling results for scenario 6 summarised in Figures 2:5 and 2:6 predicts that in the AM peak and PM peak the proposed signalised junction is operating within capacity with a maximum DoS calculated as 83.8% in the AM peak and 81.2% in the PM peak.

2.11 Comparing these results with the Scenario 7 results (Figures 2:3 and 2:4) the results indicate that the construction of the N28 to the R613 will help relieve pressure on the access junction. 2 lane approaches are required on the R613 and the internal site road in this scenario.

2.12 Figures 2:7 to 2:8 summarise the 2033 modelling results for Scenario **4 DS DWB**. This scenario has been modelled for future design year 2033 only.

Figure 2:7: AM Peak 2033 –Scenario 4, DS, DWB Modelling summary

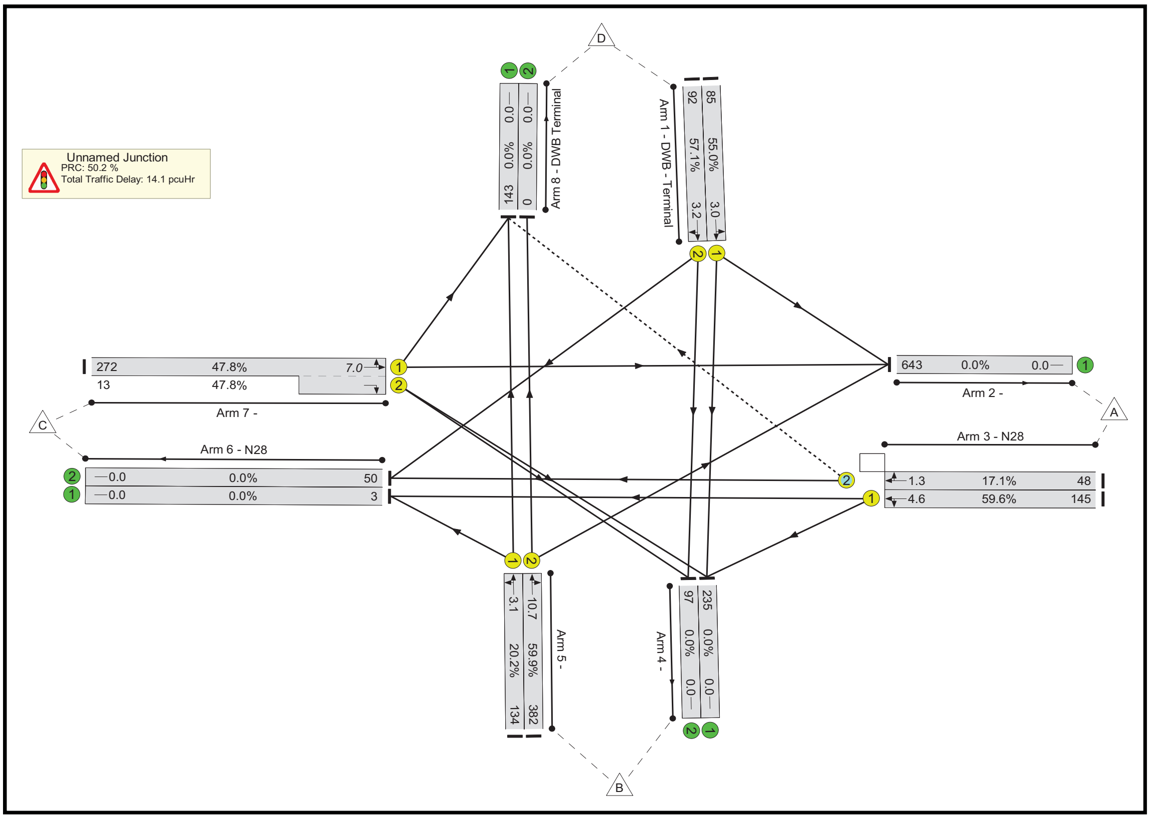
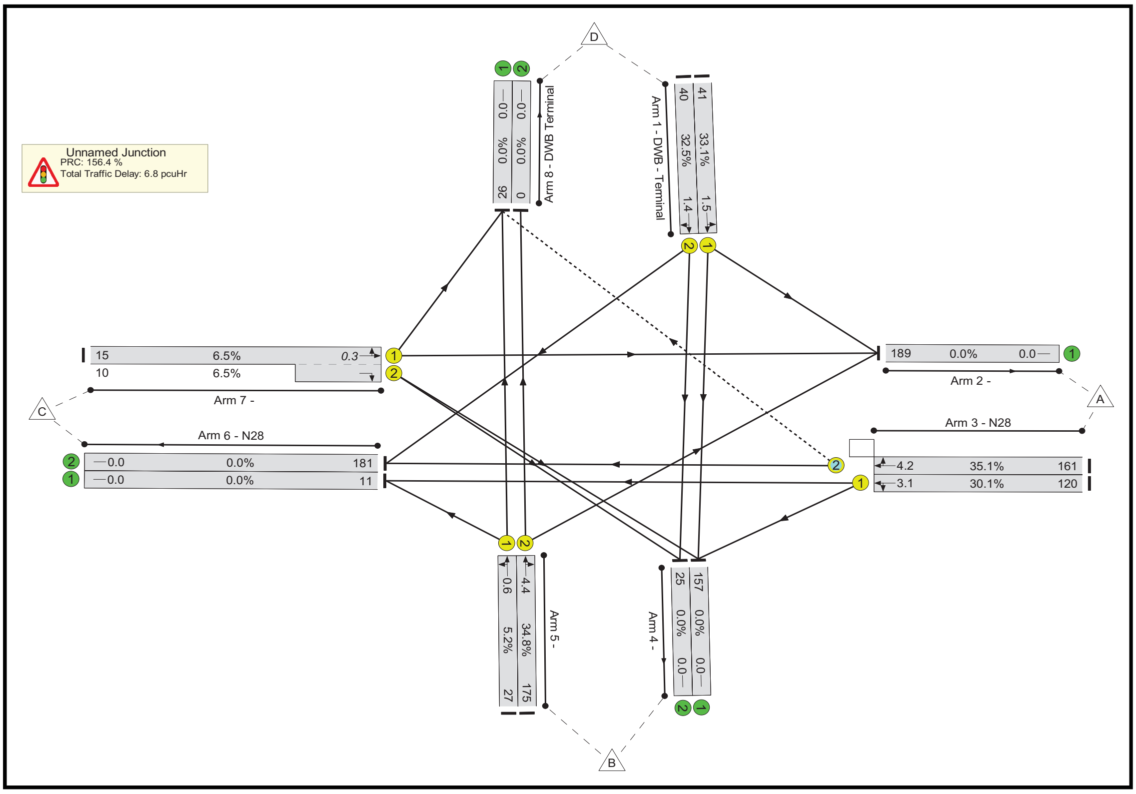


Figure 2:8: PM Peak 2033 –Scenario 4, DS, DWB Modelling summary



2.13 As would be expected, when the main Port operations in this scenario 4 are accessing from the East Access and new N28 fully constructed, the modelling results in 2033 (Figures 2:7 and 2:8) predicts that in the AM peak and PM peaks the proposed signalised junction is operating well within capacity with a maximum DoS calculated as 59.9% in the AM peak and 35.1% in the PM peak.

New N28 Terminal Access – Proposed Eastern Access

2.14 This proposed Eastern entrance is a four armed signalised junction. This layout (drawing reference IBM047/PL/0852**)** has also been modelled on a 200 second double cycle with an 'all red pedestrian phase' being called every other cycle.

2.15 The Eastern Terminal access is assessed in future design year 2033.

2.16 Figures 2:9 to 2:10 summarises the 2033 modelling results for Scenario 4 DS East Access.

Figure 2:9: AM Peak 2033 –Scenario 4, DS, East Access Modelling summary

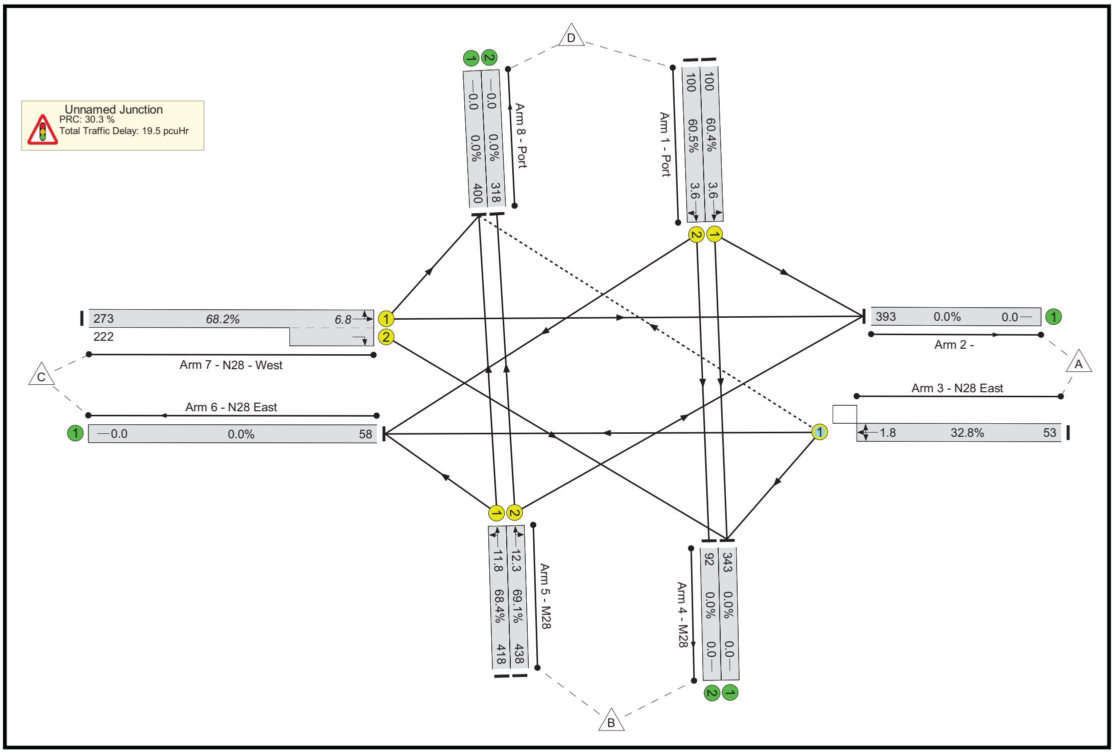
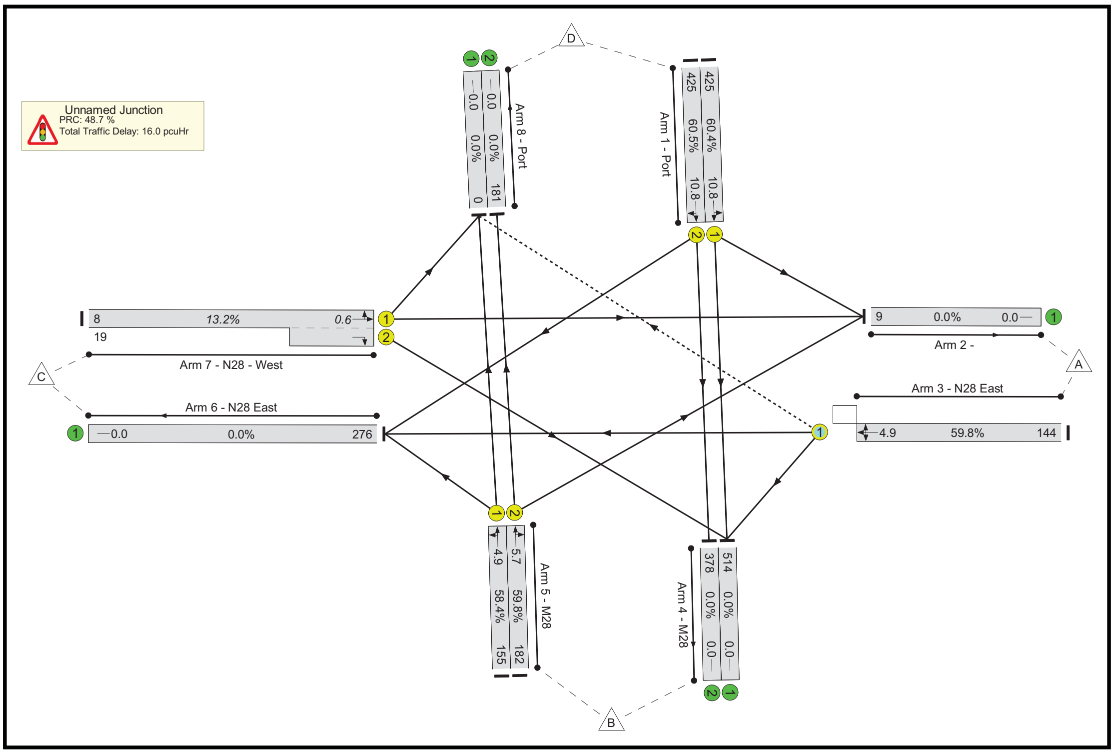


Figure 2:10: PM Peak 2033 –Scenario 4, DS, East Access Modelling summary



2.17 The 2033 modelling results for scenario 4 Eastern Access summarised in Figures 2:9 and 2:10 predicts that in the AM peak and PM peak the proposed signalised

Eastern Access junction will operate well within capacity with a maximum DoS calculated as 69.1% in the AM peak and 60.4% in the PM peak. These results demonstrate that the junction has been designed to cope with the predicted development traffic.

3.0 CONCLUSION

3.1. Table 3:1 and 3:2 below, summarise the modelling scenarios results and outcome for the proposed West Deep Water Berth and East Terminal access arrangements.

3.2. Based on the junction modelling analysis and taking cognisance of the discussions with NRA and CCC the optimum signalised layout for each scenario has been designed.

3.3. The detailed design drawing package (under separate cover) contains the layouts outlined in this report.

Table 3:1: Modelling Summary for Proposed West DWB access

AM & PM Assessment Years	Year OF Assessment	Maximum Degree of Saturation (DoS)	Operational Comment
Scenario 7 MMP DS DWB – *This scenario considers that Phases 1 and 2 are operational; No new N28 is constructed and the MMP is in place.*	**2023**	**AM** – 87.6% **PM** -49.8%	For **Scenario 7** and junction layout **IBM047/PL/0803** the modelling results indicate junction will operate within capacity in 2023 (DoS <90%) but approach capacity in 2033 **(DoS >90% < 100%).**
	2033	**AM** – 95.1% **PM** – 53.4%	
Scenario 6 DS DWB - *This scenario considers that Phases 1 to 3 are operational; The new N28 is constructed to the R613 and no MMP is in place.*	**2033**	**AM** – 83.8% **PM** -81.2%	For **Scenario 6** and junction layout **IBM047/PL/0851** the modelling results indicate junction will operate within capacity in 2033 (**DoS <90%).**
Scenario 4 DS DWB - *This scenario considers that The new N28 is fully constructed to the East and no MMP is in place*. Majority of Port traffic using the Eastern Access.	**2033**	**AM** -59.9% **PM** -35.1%	For **Scenario 4** and junction layout **IBM047/PL/0803** the modelling results indicate junction will operate well within capacity in 2033 (**DoS <90%).**

Table 3:2: Modelling Summary for Proposed East Terminal access

	Year OF Assessment	Maximum Degree of Saturation (DoS)	Operational Comment
Scenario 4 DS East Access – *This scenario considers that The N28 is fully constructed to the East and no MMP is in place*. Majority of Port traffic using the Eastern Access	**2033**	**AM** -69.1% **PM** -60.4%	For **Scenario 4** and junction layout **IBM047/PL/0852** the modelling results indicate junction will operate well within capacity in 2033 (**DoS <90%).**

APPENDIX 9.1 APPROPRIATE ASSESSMENT SCREENING AND NATURA IMPACT STATEMENT

Appropriate Assessment Screening and Natura Impact Statement

Port of Cork Ringaskiddy

Report No. M1099-AY-ENV-R-002

29 January 2025

Revision 01

Port of Cork Company

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Port of Cork Ringaskiddy

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Appropriate Assessment Screening and Natura Impact Statement

Report Number:

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Document Checking:

Date	Rev	Details of Issue	Prepared by	Checked by	Approved by
29/11/2024	00	Issued for Client Review	Meadhbh Stack & Joe Butler	Lynn Morrissey	Barry Sheridan
29/01/2025	01	Issued for Client Review	Meadhbh Stack & Joe Butler	Lynn Morrissey	Barry Sheridan

Disclaimer: Please note that this report is based on specific information, instructions, and information from our Client and should not be relied upon by third parties.

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Chapter A – Appropriate Assessment Screening

[1] Introduction

[1.1] Project Background

Ayesa has been commissioned to undertake an Appropriate Assessment Screening report for the redevelopment proposals at Ringaskiddy. POCC undertook significant redevelopment works at Ringaskiddy under the previously permitted Strategic Infrastructure Development application (ref: PA0035, as modified by PM0010, 304437-19 and 310847-21)[1]. The proposed redevelopment is located on or immediately adjacent to existing port lands in the vicinity of the existing port facilities at Ringaskiddy.

A large portion of the permitted works have been completed and are now operational. There is no provision in legislation that provides for an extension of duration of the original permission, given the requirement for both an EIA and an AA. Accordingly, this application is seeking permission for the elements of the work previously permitted but which are yet to be completed.

The current application, therefore, occurs in the context of a pre-existing major port redevelopment project which is now operational. This redevelopment has expanded the capacity of the deep-water port at Ringaskiddy for the purposes of relocation which will ultimately contribute to enabling the Port of Cork to relocate operations entirely from the Upper Harbour by 2050. Stage 1a of the historic redevelopment (PA0035) is now complete and the construction of the Cork Container Terminal (CCT1) at Ringaskiddy East was concluded in 2022. The current approved infrastructure gives the port sufficient operational capacity up to 2029 however a planning condition limits throughput at the Ringaskiddy Port facility to 322,846 TEU until such time as the M28 and Road schemes are complete. CCT1 currently caters for 75-80% of Port of Cork's container traffic, however this is projected to increase progressively towards 2030.

To cater for the projected increase in container traffic and dry bulks and cargoes, a further berth (CCT2) and deepwater berth extension (Ringaskiddy West) as well as extension of the CCT yard are now required and proposed herein to be added to the redevelopment under the current application.

[1.2] Project Setting

Cork Harbour is a mid-sized water body approximately 28km^2 in area, and takes in the areas of Ringaskiddy, Monkstown, Cobh, Rostellan and Whitegate in County Cork. The Port of Cork Ringaskiddy is located adjacent to the village of Ringaskiddy. Ringaskiddy village has a population of 570 people. Large industry and existing Port of Cork activities have a dominate role within the village. The location of the proposed redevelopment lies within Cork Harbour coastal water body (IE_SW_060_000) in the South-Western River Basin District (SWRBD). The harbour is fed by Lough Mahon (IE_SW_060_0750), Owenboy Estuary (IE_SW_060_1200) and North Channel Great Island (IE_SW_060_0300) transitional water bodies before feeding into the Outer Cork Harbour coastal water body (IE_SW_050_000).

The site location can be seen below in Figure 1.1.

[1] Hereafter referred to as the PA0035 permission.

Figure 1-1. Map of Site Location.

[1.3] Proposed Works

The proposed redevelopment will be contained on the site of the existing Ringaskiddy Port, where there is an existing Deepwater Berth (DWB) and ferry service which operates during day and nighttime periods and the Cork Container Terminal (CCT1). There is anticipated to be a significant baseline level of noise from Port related activities in the vicinity of the proposed redevelopment. In addition to this, there are numerous existing industrial facilities located in the general study area which is located in a busy industrialised area. Road traffic noise is the dominant noise source in the vicinity of the majority of the nearest noise sensitive properties to the existing Port at Ringaskiddy.

The works to assessed as part of this application are as follows:

Ringaskiddy East (Container Berth 2)

- Construction of an additional 200m Container Berth 2;
- Dredging of the seabed to a level of -13.0 m Chart Datum (CD);
- Installation of link-span comprising a floating pontoon and access bridge;
- Installation of container handling cranes;
- Lighting and Fencing.

Ringaskiddy West (Deepwater Berth Extension):

- A new 182m extension to the existing Deepwater Berth (DWB) which will comprise a filled quay structure (of approximately 231m) extending no further seaward than the edge of the existing DWB;
- Dredging works to varying levels to facilitate navigational access to the new facilities;
- Lighting.

Road Improvements:

- Improvements to internal road network at Ringaskiddy East to facilitate future access to the N28;
- Lighting and fencing.

The configuration of the layout for the above Ringaskiddy Port Redevelopment is shown in Appendix A.

[1.3.1] Key Activities

The key activities to be undertaken as part of the construction of the proposed development are as follows;

- Dredging works with trailing hopper suction dredger/backhoe dredging to facilitate navigational access to Ringaskiddy West and Ringaskiddy East Berth 2.
- Importation of fill material as required.
- Temporary storage of construction materials, oils and fuels.
- Piling of combi quay wall with tubular steel piles.
- Casting of concrete *in-situ.*
- Stormwater management.

The key activites to be undertaken as part of the operation of the proposed development are as follows:

- Maintenance dredging of navigational area.
- Road drainage (management of stormwater).
- Discharge of waste and bilge from vessels.
- Movements of vehicles and gantry cranes.

[1.4] Preparation of Report

Table 1-1: Ayesa Team

Title	Name	Role	Qualifications	Years' experience
Consultant Ecologist	Meadhbh Stack	Report Preparation	BSc (Ecology and Environmental Biology) QCIEEM	1
Senior Ecologist	Joe Butler	Survey, Report Preparation	BSc (Zoology) MSc (Wildlife Conservation & Management) QCIEEM	6
Senior Ecologist	Jeff Hean	Report Review	Ph.D in Zoology IES Member	10
Technical Director	Barry Sheridan	Report Review and Sign-off	MSc Environmental Management. IES Chartership	20+

[2] Appropriate Assessment Process

[2.1] Process

The AA process is a sequential process consisting of four potential stages. If it is determined that there will be no significant effect on a European Site at the first stage in the process, the process is effectively completed. The four stages are as follows:

- Stage 1 – Screening of the proposed plan or project for AA (current stage).
- Stage 2 – An AA of the proposed plan or project.
- Stage 3 – Assessment of alternative solutions; and
- Stage 4 – Imperative Reasons of Overriding Public Interest (IROPI)/ Derogation.

Stage 1 relates to Regulation 42 of the Birds and Natural Habitats Regulations; and Stage 2 relates to Article 6(3) of the Habitats Directive; and Stages 3 and 4 to Article 6(4) of the Habitats Directive.

[2.1.1] Stage 1: Screening (current stage)

Stage1 of the AA process is to assess if the plan or project is directly connected with or necessary to the management of Natura 2000 Site(s); or based on best scientific knowledge, if the plan or project, individually or in combination with other plans or projects, is likely to have a significant effect on a Natura 2000 site. This is done by examining the proposed plan or project and any Sites' conservation objectives that might be affected. If screening determines that there are likely to be significant effects, or the significance of effects is uncertain or unknown, then it will be recommended that a project is brought forward to full AA.

[2.1.2] Stage 2: Appropriate Assessment

Stage 2 of the AA process aims to identify any adverse impacts the plan or project might have on the integrity of relevant Natura 2000 Sites. As part of the assessment, a key consideration is 'in combination' effects with other plans or projects. Where adverse impacts are identified, mitigation measures can be proposed to avoid, reduce, or remedy any such negative impacts. The plan or project should then be amended accordingly, thereby avoiding the need to progress to Stage 3.

[2.1.3] Stage 3: Assessment of Alternative Solutions

If it is not possible during Stage 2 to reduce impacts to acceptable, non-significant levels by avoidance and/or mitigation, stage 3 of the process must be undertaken to objectively assess whether alternative solutions exist by which the objectives of the plan or project can be achieved. Explicitly, this means alternative solutions that do not negatively impact the integrity of a Natura 2000 Site. It should also be noted that EU guidance on this stage of the process states that 'other assessment criteria, such as economic criteria, cannot be seen as overruling ecological criteria' (EC, 2001). In other words, if alternative solutions exist that do not negatively impact Natura 2000 Sites; they should be adopted regardless of economic considerations.

[2.1.4] Stage 4: Imperative Reasons of Overriding Public Interest (IROPI)/ Derogation

Stage 4 of the AA process is undertaken when it has been determined that negative impacts on the integrity of a Natura 2000 Site will result from a plan or project but that no alternatives exist. At this stage of the AA process, the characteristics of the plan or project itself will determine whether the competent authority can allow the plan or project to progress. This is the determination of 'over-riding public interest'. It is important to note that in the case of Natura 2000 Sites that include in their qualifying features' priority' habitats or species, as defined in Annex I and II of the Directive, the demonstration of 'overriding public interest' is not sufficient and it must be demonstrated that the plan or project is necessary for 'human health or safety considerations'. Where plans or projects meet these criteria, they can be allowed, provided adequate compensatory measures are proposed. Stage 4 of the process defines and describes these compensation measures.

[2.2] Stage 1: AA Screening

This AA screening report has been completed in the following logical order:

- Definition of the zone of influence for the proposed works.
- Identification of the Natura 2000 Sites that are situated (in their entirety or partially) within the zone of influence of the proposed works.
- Identification of the most up-to-date Qualifying Interests (QIs) for each Natura 2000 Site occurring either wholly or partially within the zone of influence.
- Identification of the environmental conditions that maintain the QIs at the desired target of Favourable Conservation Status.
- Identification of the threats/impacts – actual or potential that could negatively impact the environmental conditions of the QIs within the Natura 2000 Sites.
- Highlighting the activities of the proposed works that could give rise to significant negative impacts; and
- Identification of other plans or projects, for which In-combination impacts would likely have significant effects.

The following issues have been considered:

- The nature and quality of habitats within the site of the proposed development.
- Information relating to the ecology of the Natura 2000 site.
- The status of Qualifying Interests of the Natura 2000 site (Annex I habitats and Annex II species of the EU Habitats Directive) and the relevant conservation status and objectives for these species.
- The key structural and functional relationships maintaining the integrity of the Natura 2000 site.
- The status of other annexed habitats and species occurring in proximity to the site of the proposed development; and

- The scale and nature of the aspects of the project in relation to the Natura 2000 site.

[2.3] Legislative Background and Guidance Documents

[2.3.1] International Legislation

The Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora, better known as the "Habitats Directive", provides legal protection for habitats and species of European importance. Articles 3 to 9 provide the legislative means to protect habitats and species of community interest by establishing and conserving an EU-wide network of sites known as Natura 2000. These are Special Areas of Conservation (SACs) designated under the Habitats Directive and Special Protection Areas (SPAs) designated under the Conservation of Wild Birds Directive (79/409/ECC) as codified by Directive 2009/147/EC.

Articles 6(3) and 6(4) of the Habitats Directive set out the decision-making tests for plans and projects likely to have a significant effect on or to adversely affect the integrity of European Sites (Annex 1.1). Article 6(3) establishes the requirement for AA screening.:

"Any plan or project not directly connected with or necessary to the management of the [European] site but likely to have a significant effect thereon, either individually or in combination with other plans or projects, shall be subjected to appropriate assessment of its implications for the site in view of the site's conservation objectives. In light of the conclusions of the assessment of the implications for the site and subject to the provisions of paragraph 4, the competent national authorities shall agree to the plan or project only after having ascertained that it will not adversely affect the integrity of the site concerned and, if appropriate, after having obtained the opinion of the general public."

Article 6(4) states:

"If, in spite of a negative assessment of the implications for the [European] site and in the absence of alternative solutions, a plan or project must nevertheless be carried out for imperative reasons of overriding public interest, including those of a social or economic nature, Member States shall take all compensatory measures necessary to ensure that the overall coherence of Natura 2000 sites is protected. It shall inform the Commission of the compensatory measures adopted."

[2.3.2] The Requirement for AA Screening

Section 42 (1) of S.I. No. 477 of 2011, the European Communities (Birds and Natural Habitats) Regulations 2011 states:

"A screening for Appropriate Assessment of a plan or project for which an application for consent is received, or which a public authority wishes to undertake or adopt, and which is not directly connected with or necessary to the management of the site as a European Site, shall be carried out by the public authority to assess, in view of best scientific knowledge and in view of the conservation objectives of the site, if that plan or project, individually or in combination with other plans or projects is likely to have a significant effect on the European site."

Where the screening process cannot exclude the possibility that a plan or project, individually or in combination with other plans or projects, could have a significant effect on a European site, there is a requirement under Article 42 (9) of these Regulations for the preparation of a Natura Impact Statement to inform the Appropriate Assessment process.

[2.3.3] Screening Determination

In accordance with Regulation 42(7) of the Birds and Natural Habitats Regulations 2011 (S.I. No. 477/2011) as amended:

"The public authority shall determine that an Appropriate Assessment of a plan or project is not required where the plan or project is not directly connected with or necessary to the management of the site as a European Site and if it can be excluded on the basis of objective scientific information following screening under this Regulation, that the plan or project, individually or in combination with other plans or projects, will have a significant effect on a European site."

Further, under Regulation 42(8):

"(a)Where, in relation to a plan or project for which an application for consent has been received, a public authority decides that an Appropriate Assessment is required, the public authority shall give notice of the determination, including reasons for the determination of the public authority, to the following—

i. the applicant,

ii. if appropriate, any person who made submissions or observations in relation to the application to the public authority, or

iii. if appropriate, any party to an appeal or referral.

(b) Where a public authority has determined that an Appropriate Assessment is required in respect of a proposed development it may direct in the notice issued under subparagraph (a) that a Natura Impact Statement is required."

[2.3.4] National Legislation

The Habitats Directive has been transposed into Irish law by Part XAB of the Planning and Development Act, 2000 - 2015 and the European Communities (Birds and Natural Habitats) Regulations 2011 (SI 477/2011) as amended.

[2.3.5] Guidance Documents on Appropriate Assessment

Where an AA is necessary, the AA requirements of Article 6(3) of the Habitats Directive 92/43/EEC (European Communities 2001) follow a sequential approach as outlined in the following guidance documents:

- Appropriate Assessment of Plans and Projects in Ireland – Guidance for Planning Authorities. Department of Environment, Heritage, and Local Government, 2010 revision.
- Appropriate Assessment under Article 6 of the Habitats Directive: Guidance for Planning Authorities. Circular NPWS 1/10 and PSSP 2/10.
- Assessment of Plans and Projects Significantly Affecting Natura 2000 Sites: Methodological Guidance on the provisions of Article 6(3) and 6(4) of the Habitats Directive 92/43/EEC (European Commission Environment Directorate-General, 2002).
- Managing Natura 2000 Sites: The provisions of Article 6 of the Habitat's Directive 92/43/EEC Commission Notice (European Commission Environment Directorate-General, 2018).

- Guidelines for Good Practice Appropriate Assessment of Plans Under Article 6(3) Habitats Directive (International Workshop on Assessment of Plans under the Habitats Directive, 2011).
- The Department of the Environment, Heritage, and Local Government guidance *"Appropriate Assessment of Plans and Projects in Ireland – guidance for Planning Authorities, 2009"* and the European Commission (2001) guidelines *"Assessment of plans and projects significantly affecting Natura 2000 sites - Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC".*
- Appropriate Assessment Screening for Development Management (OPR, March 2021)

[3] Methods

[3.1] Desktop Information Consulted for this Report

The desk study included review of the following sources of information:

- Article 17 Reports (NPWS, 2019)
- GIS spatial data for Article 17 Reports
- National Biodiversity Data Centre (NBDC) – 1km- and 2km-square species reports (accessed online on 13/09/2024)
- Botanical Society of the British Isles - www.bsbi.org.uk;
- Invasive Species Ireland - www.invasivespeciesireland.com;
- Bat Conservation Ireland - http://www.batconservationireland.org/;
- Chartered Institute of Ecology & Environmental Management (CIEEM) - www.cieem.net; and
- BirdWatch Ireland (BWI) - http://www.birdwatchireland.ie/.

[3.2] Cumulative and In-Combination Effects

Screening for Appropriate Assessment requires that the cumulative or in-combination effects of the proposed development, together with other plans or projects, are assessed. Cumulative impacts can be defined as a project/plan/programme likely to have a significant effect thereon, either individually or in combination with other plans or projects.

Per EC Article 6 Guidance Document (EC 2018), in order to ensure all impacts upon the site are identified, including those direct and indirect impacts that are a result of cumulative impacts, the following steps were completed:

- Identify all projects/ plans which might act in combination: Identify all possible sources of effects from the project or plan under consideration, together with all other sources in the existing environment and any other effects likely to arise from other proposed projects or plans.
- Impacts identification: Identify the types of impacts that are likely to affect aspects of the structure and functions of the site vulnerable to change.
- Define the boundaries for assessment: define boundaries for examination of cumulative effects that will differ for different types of impact and may include remote locations.
- Pathway identification: Identify potential cumulative pathways (e.g. via water, air etc.; accumulations of effects in time or space).
- Prediction: Prediction of magnitude/extent of identified likely cumulative effects.
- Assessment: Comment on whether or not the potential cumulative impacts are likely to be significant.

[3.3] Screening Assessment of European Sites

This chapter provides a Preliminary Screening Assessment to identify SACs and SPAs to be assessed fully in the Screening of Potential Impacts (Section 7).

As per the outcomes of the Judgement in Case C-721/21: Keegan Land Holdings vs. An Bord Pleanála, this screening assessment has been completed with consideration of "*Article 6(3) of Directive 92/43 must be interpreted as meaning that: in order to determine whether it is necessary to carry out an appropriate assessment of the implications of a plan or project for a site,* ***account may be taken of the features of that plan or project which involve the removal of contaminants and which therefore may have the effect of reducing the harmful effects of the plan or project on that site, where those features have been incorporated into that plan or project as standard features****, inherent in such a plan or project, irrespective of any effect on the site".*

[3.3.1] Establishing a Zone of influence (ZoI)

"The 'zone of influence' for a project is defined as "the area over which ecological features may be affected by biophysical changes because of the proposed project and associated activities. This is likely to extend beyond the project site, for example where there are ecological or hydrological links beyond the site boundaries" (CIEEM, 2019). Subsequently, the zone of influence (ZoI) will vary for different ecological features depending on their sensitivity to an environmental change (CIEEM, 2018).

Irish guidance (Department of Environment, Heritage and Local Government, 2010) states, "*for the zone of influence, a distance of 15 km is currently recommended in the case of plans derives from UK guidance* (Scott Wilson et al, 2006)". The guidance goes on to state that "***for projects, the distance could be much less than 15 km, and in some cases less than 100 m, but this must be evaluated on a case-by-case basis with reference to the nature, size and location of the project, the sensitivities of the ecological receptors, and the potential for in-combination effects***.". Additionally, a practice note issued by the Office of the Planning Regulator (OPR, 2021) further states that "*The zone of influence of a proposed development is the geographical area over which it could affect the receiving environment in a way that could have significant effects on the Qualifying Interests of a European site. This should be established case-by-case using the Source-Pathway-Receptor framework and not by arbitrary distances (such as 15 km)".*

A distance of 15 km is currently recommended in the case of plans, as a potential zone of influence, however for projects, the distance could be much less than 15km, and in some cases less than 100m (DEHLG, 2009). National Parks and Wildlife Service (NPWS) guidance (NPWS, 2009) advises that this must be evaluated on a case-by-case basis with reference to the nature, size and location of the project, the sensitivities of the ecological receptors, and the potential for in-combination effects. Where there is hydrological links beyond the site boundaries, particularly in the marine environment, zones of influence can be extensive and lead to effects well beyond the construction site (CIEEM, 2018). This is particularly relevant in the case of sediment and nutrient transport in marine habitats.

The key activities to be undertaken as part of the construction of the proposed development site include the following; dredging works with trailing hopper suction dredger/backhoe dredging to facilitate navigational access to Ringaskiddy West and Ringaskiddy East Berth 2, importation of fill material, piling of combi quay wall with tubular steel piles, casting of concrete *in-situ,* and stormwater management. Operational activities such as maintenance dreging of navigational area, road drainage (management of stormwater), discharge of waste and bilge from vessels, and the movement of vehicles and gantry cranes.Given the nature and location of the proposed development and works listed above, the Zone of Influence is defined as 15km.

[3.3.2] European Sites within the 15 km Zone of Influence

Within 15 km of the proposed development site (Table 3.1 and Figure 3.1) there is one Special Protection Area (SPA) and one Special Area of Conservation (SAC).

Table 3-1. Natura 2000 Sites within 15 km of the Ringaskiddy Port Redevelopment.

Type	Site Code	Site Name	County
SPA	004030	Cork Harbour SPA	Cork
SAC	001058	Great Island Channel	Cork

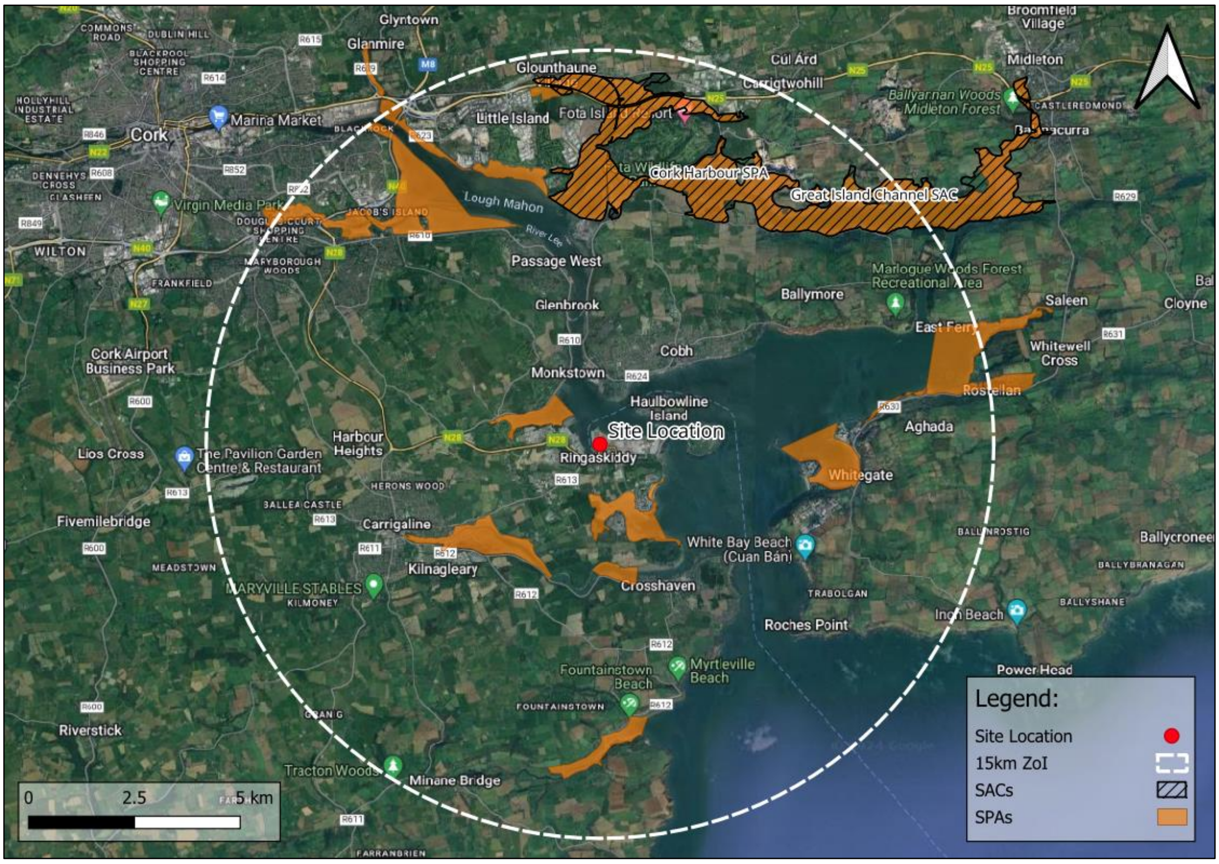

Figure 3-1. Natura 2000 Sites within 15 km of the Ringaskiddy Port Redevelopment.

Of the Natura 2000 sites within 15 km, connectivity via an aqueous pathways exist between the project scheme area and the Cork Harbour SPA and the Great Island Channel SAC.

[3.4] Source-Pathway-Receptor (SPR) Model

The likely effects of the proposed development on any European site have been assessed using a source-pathway-receptor model, where:

- A 'source' is defined as the individual element of the proposed works that has the potential for likely significant effects on a European site, its qualifying features and its conservation objectives.
- A 'pathway' is defined as the means or route by which a source can affect the ecological receptor.
- A 'receptor' is defined as the SCI of SPAs or QI of SACs for which conservation objectives have been set for the European sites being screened.

Further assessment is required when a source-pathway-receptor link between the proposed development and a European site exists, and a likely significant effect may exist. In accordance with EC Article 6 Guidance Document (EC, Assessment of plans and projects significantly affecting Natura 2000 sites. Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC, 2018), in order to ensure that all significant effects upon the site are identified, including those direct and indirect significant effects that are a result of cumulative significant effects, the following steps were completed:

- Identify all projects/ plans which might act in combination: Identify all possible sources of effects from the project or plan under consideration, together with all other sources in the existing environment and any other effects likely to arise from other proposed projects or plans.
- Identification of likely significant effects: Identify the types of significant effects that are likely to affect aspects of the structure and functions of the site vulnerable to change.
- Define the boundaries for assessment: define boundaries for examination of cumulative effects which will be different for different types of significant effects and may include remote locations.
- Pathway identification: Identify potential cumulative pathways (e.g., via water, air etc.; accumulations of effects in time or space).
- Prediction: Prediction of magnitude/extent of identified likely cumulative effects.
- Assessment: Comment on whether or not the potential cumulative significant effects are likely to be significant.

[3.5] Development Site Habitat Assessment Methods

An Ayesa Ecologist conducted a general assessment of the site. The site assessment aligned with the Heritage Council's Best Practice Guidance for Habitat Survey and Mapping (Smith *et al.,* 2011) and habitats were classified to level 3 of the Fossitt (2000) classification system. To illustrate the general habitat quality, photographs were taken using a digital camera. Grid references were recorded using a GPS handset. Site evaluation is based on the guidelines of the Chartered Institute of Ecology and Environmental Management (CIEEM 2019).

The site and immediate surroundings were inspected for invasive species, as listed in the Third Schedule of the Birds and Natural Habitats Regulations (S.I. No. 477/2011). Regulation 49 (2) states that "*any person who plants, disperses, allows or causes to disperse, spreads or otherwise causes to grow in any place any plant listed in the Third Schedule, shall be guilty of an offence*". The determination of the presence or absence of Annex I habitats was carried out in consultation with the habitat descriptions provided in the most recent Article 17 Reports (NPWS, The Status of EU Protected Habitats and Species In Ireland. Volume 1: Summary Overview., 2019). The Interpretation Manual of European Union Habitats (EUR 28, April 2013) was also consulted. In addition, the spatial

GIS data for the Article 17 Reports were examined to determine the distribution of these habitats (as known to the NPWS) within the study area[1]. Additionally, the existing watercourse was investigated for evidence of the presence of amphibians and otters.

All surveys were completed by qualified specialists and in accordance with relevant legislation, particularly the "Guidelines for Ecological Impact Assessment in the UK and Ireland" (CIEEM, 2018) through the additional recording of specific features indicating the presence, or likely presence, of protected species or other species of nature conservation significance.

[3.6] Assessment of Likelihood of Significant Effects

In assessing the likelihood of the occurrence of significant effects, the logic is as follows:

- The conditions necessary for a significant effect are considered.
- The likelihood of that effect is assessed, considering the process/emission magnitude, duration, timing and frequency, as well as the connectivity with the proposed project site and the sensitivity of the QI/SCI to the process/emission in question.

The below definitions are relevant at this Stage 1 Appropriate Assessment Screening stage:

- Likely Significant Effect - Where a plan or project is likely to undermine any of the site's conservation objectives.
- Possible Significant Effect - Where a plan or project has an indicated potential to undermine any of the site's conservation objectives but where doubt exists about the risk of a significant effect in the current context. Nevertheless, where doubt exists about the risk of a significant effect, use of the precautionary principle requires this effect to be considered appropriately within the Article 6 assessment process.

[4] Results

[4.1] Development Site Habitats

The following habitats were observed in / around the works site:

Habitats recorded in the study area are listed in Table 4.1 below. They are listed in the order that they appear in ‘A Guide to Habitats in Ireland’ (Fossitt, 2000) rather than in order of abundance.

Table 4.1. Habitats recorded within the study area.

Habitat Name	Habitat Code (as per Fossitt, 2000)
Spoil and bare ground	ED2
Recolonising bare ground	ED3
Buildings and artificial surfaces	BL3
Sea walls, piers, and jetties	CC1
Scrub	WS1
Treelines	WL2

[4.1.1] Fossitt, 2000 Habitats

[4.1.1.1] Spoil and bare ground (ED2)

Numerous areas of this habitat were identified along the boundary of the port. Areas of unpaved ground containing spoil/rubble that have not yet been colonised by plants fall into this category. The areas on which they were observed within the scheme area appeared to be heavily trampled on or driven over regularly. See Figure 4.1 below.

Figure 4-1. Spoil and bare ground (ED2) recorded onsite - 06/08/2024.

[4.1.1.2] Recolonising bare ground (ED3)

This classification was applied to any areas of bare ground; artificial surfaces of tarmac, concrete or hard core, that have been invaded or recolonised by herbaceous plants. The species assemblage comprised of the following; Gorse (*Ulex europaeus*), Spear thistle (*Cirsium vulgare*), Chamomile (*Chamaemelum nobile*), Pennyroyal (*Mentha pulegium*), Scarlet pimpernel (*Anagallis arvensis*), Broad-leaved dock (Rumex obtusifolius), Annual Meadow-grass (*Poa annua*), Yorkshire-fog (*Holcus lanatus*), Pineappleweed (*Matricaria discoidea*), and Horseweed (*Erigeron Canadensis*). See Figure 4.2 below.

Figure 4-2. Recolonising bare ground (ED3) recorded onsite - 06/08/2024.

[4.1.1.3] Buildings and artificial surfaces (BL3)

Given the largely urban nature of the development area, this habitat dominates the landscape. All roads, terminals, buildings, shipment containers, footpaths etc. fall into this category. See Figure 4.3 below.

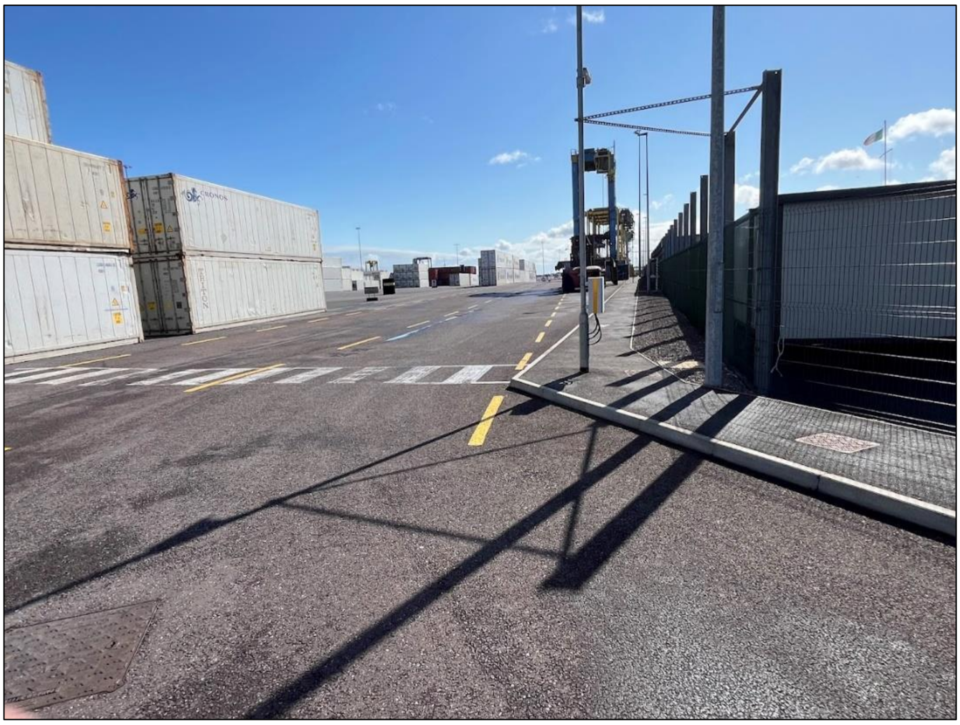

Figure 4-3. Buildings and artificial surfaces (BL3) recorded onsite - 06/08/2024.

[4.1.1.4] Sea walls, piers, and jetties (CC1)

This category is used for all coastal constructions that are partially or totally inundated by sea water at high tide, or subject to wetting by sea spray or wave splash. It includes sea walls, piers, jetties, slipways, causeways and other structures associated with ports and docks in urban or rural areas. Any other artificial structures that are exposed along the coast at low tide should also be included: coastal defences or groynes, wrecks, and pipes or pipelines (Fossitt, 2000). This classification was applied to areas of rock armour in the intertidal zone of the site boundary. See Figure 4.4 below.

Figure 4-4. Sea walls, piers, and jetties (CC1) recorded onsite - 06/08/2024.

[4.1.1.5] Scrub (WS1)

This broad category includes areas that are dominated by at least 50% cover of shrubs, stunted trees or brambles. The canopy height is generally less than 5 m, or 4 m in the case of wetland areas. Scrub frequently develops as a precursor to woodland and is often found in inaccessible locations, or on abandoned or marginal farmland (Fossitt, 2000). A limited area of Scrub habitat was recorded running adjacent to the rock armour on the boundary of the site. Species identified included but were not limited to Gorse (*Ulex europaeus*), Broom (*Cytisus scoparius*), Alder (*Alnus glutinosa*), Butterfly-bush (*Buddleja davidii*), Sycamore (*Acer pseudoplatanus*), and Grey willow (*Salix cinerea* subsp. *cinerea*). See Figure 4.5 below.

Figure 4-5. Scrub (WS1) recorded onsite - 06/08/2024.

[4.1.1.6] Treelines (WL1)

Considerable stretches of the development boundary fall under this habitat. The species assemblage of the Treelines on site comprised of Alder (*Alnus glutinosa*), Sycamore (*Acer pseudoplatanus*), the alien invasive species Butterfly-bush (*Buddleja davidii*) and Grey willow (*Salix cinerea* subsp. *cinerea*). See Figure 4.6 below.

Figure 4-6. Treelines (WL1) recorded onsite - 06/08/2024.

[4.1.2] Annex I Habitat

There were no listed Annex I habitats identified in the Ringaskiddy Port Redevelopment area.

[4.2] Alien Invasive Species

Under Section 49 (2) of S.I. No. 477 of 2011, the European Communities (Birds and Natural Habitats) Regulations 2011, it is an offence to allow or cause to disperse, any plant which is included in Part 1 of the Third Schedule of this S.I.

Butterfly-Bush (*Buddleja davidii*) was the only Alien Invasive Species recorded on Site. Winter Heliotrope is not listed as Third Schedule Species but is worth noting due to their highly invasive nature. Winter heliotrope can be seen below in Figure 4.7.

Figure 4-7. Butterfly-Bush (Buddleja davidii) individuals recorded on site - 06/08/2024.

[4.3] Hydrology

Figure 4.8 below shows all the hydrological pathways that surround the project site that flow into Cork Harbour.

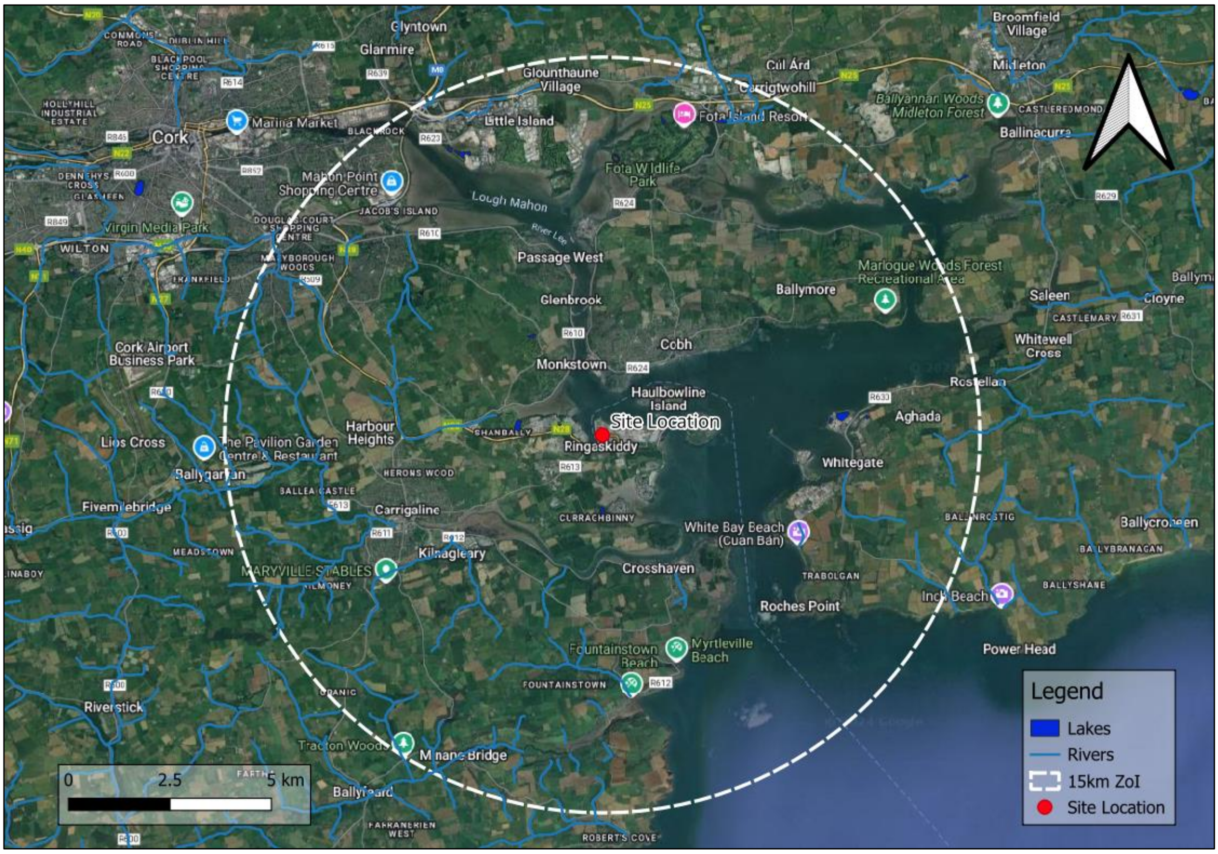

Figure 4-8. Hydrology of the development site and surrounding landscape

[5] Screening of likely impacts

[5.1] Sources of Likely Significant Effects

The following sections hereunder consider whether the construction phase of the proposed development works could cause 'likely significant effects' on the qualifying features of the Natura 2000 site(s), alone or in-combination with other plans/projects. The proposed development site does not overlap or encroach on the boundaries of any Natura 2000 sites or other protected habitats, but there is direct hydrological connectivity between the site and Natura 2000 sites nearby. It is therefore required to assess any potential negative impacts on habitats and/or SCI species for which the Natura 2000 sites are designated.

[5.1.1] Sources

[5.1.1.1] Transport of Water Bourne Contaminants

The distance travelled by water-borne contaminants is influenced by a number of factors, some of which are listed below:

- Magnitude of contaminant release;
- Particle size of sediment;
- Flow velocity;
- Morphology of the receiving waterbody – rocks, vegetation, meanders etc. provide opportunities for the attenuation of contaminants, and may also create localised areas of low flow, such that some sediment can fall out of suspension; and
- Solubility of contaminant.

[5.1.1.2] Sediment

As previously shown in this report, the proposed works are located directly adjacent to Cork Harbour. During the construction phase of the project there is a possibility that sediment could be washed off the site via storm water run-off or direct sediment spills into the adjacent harbour waters. Given the tidal nature of Cork Harbour, this sediment could then be transported into upper areas of the harbour towards Great Island Channel SAC as well as other protected sections of Cork Harbour that are designated for protection under Cork Harbour SPA.

[5.1.1.3] Hydrocarbons & Toxic Contaminants

Unlike suspended sediment, which (depending on particle size) can drop out of solution in areas of reduced flow velocities, petroleum-range hydrocarbons are largely insoluble in water and will float on the surface, thereby allowing for greater potential for downstream transport. Hydrocarbons may sorb onto soil particles on the bankside or riverbed, which can lead to delayed leaching into the environment and localised effects on soil-dwelling organisms.

[5.1.1.4] Noise and Vibration

As heavy machinery will be required for the completion of works, there is potential for the production of harmful noise impacts. As previously mentioned, the project site is located directly adjacent to Cork Harbour, which contains various wintering and breeding bird species that are sensitive to noise impacts (particularly sudden loud noises which can cause birds to fledge from nesting or foraging grounds).

[5.2] Pathways

The proposed works site does not overlap any Natura 2000 sites. However, the works area is located directly adjacent to Cork Harbour, which contains several areas that are designated for protection under Cork Harbour SPA (Natura 2000 Site). The nearest of these designated areas is 50 metres west of the proposed works. There is a clear hydrological link between the project site and Cork Harbour SPA. This could potentially result in this Natura 2000 Site becoming negatively impacted on by the proposed project activities via sediment and/or hydrocarbon run-off.

Great Island Channel SAC is located approximately 5 km north of the proposed site near the inner sections of Cork Harbour. This Natura 2000 site is also hydrologically connected to the project site. Given the tidal nature of the harbour, Great Island Channel SAC could potentially be impacted on by any sediment and/or hydrocarbon run-off that may could occur from the proposed works.

Cork Harbour SPA also contains various different bird species, many of which are SCIs (Species of Conservation Interest) for this Natura 2000 Site. These birds may be susceptible to noise emissions from the proposed works. Noise emissions from the works could deter these birds away from typically foraging, roosting or nesting areas of the harbour where they typically thrive.

[5.3] Receptors

The potential and likelihood of impacts from the proposed development works to nearby Natura 2000 sites is assessed below. Habitats and species detailed in Natura 2000 sites identified as sites that are likely to receive impacts from the proposed development are provided in the sections hereunder. Additionally, any sensitive/protected species/habitats within the immediate vicinity of the proposed works have also been considered.

The aim of this AA Screening and NIS is to assess potential impacts on QIs and SCIs of Natura 2000 Sites from the proposed works that are located within the ZoI.

Any other sensitive/protected species and habitats within the immediate vicinity of the proposed works have been considered in the biodiversity chapters of the EIAR for this project.

[6] Screening of Likely Significant Effects to European Sites

[6.1.1] Special Protection Areas (SPA)

[6.1.1.1] Cork Harbour SPA 004030

The Site Synopsis and Conservation Objectives for the site are available on https://www.npws.ie/protected-sites/spa/004030. proposed development is shown in Figure 5-1. This SPA is of high conservation value for the following QI habitats and/or Species of Conservation Interest (SCI).

Significant effects to the below SCIs (Table 6.1) may include habitat loss, population decreases or significant decrease in the range, timing or intensity of habitat use by species, other than that occurring from natural patterns of variation.

Increased sediment load from the development site could alter the conditions of habitats at Cork Harbour SPA and therefore has potential to result in significant effects to the SCI species that utilise those habitats.

The contamination of aquatic habitats common in the SPA (e.g., estuaries and mudflats) with petrochemicals from construction and operational vehicles may lead to the accumulation of toxic compounds in prey items (e.g., fish, invertebrates, molluscs and aquatic plants) and thus bioaccumulation in the bird species of Special Conservation Interest at the SPA. Bioaccumulation of toxic compounds may cause morbidity or mortality of individuals.

A number of activities can result in disturbance, including visual and noise. This is more frequently associated with construction activities but could also be associated with some aspects of the operational phase (e.g. structure maintenance, public access). Disturbance can cause sensitive species, such as birds, to deviate from their normal, preferred behaviour, resulting in stress, increased energy expenditure and, in some cases, species mortality.

Table 6-1. Likelihood of significant effects to the SCIs of Cork Harbour SPA

Special Conservation Interests [004030]	Comments	Significant Effect Likely
Species		
Little Grebe (*Tachybaptus ruficollis*) [A004]	• Forages in sheltered coasts and estuaries for insects, larvae and small fish. Consumption of prey items contaminated with petrochemicals could lead to morbidity or mortality of individuals. • An influx of sediment could negatively alter the conditions of the habitats that this species thrives in. • Non-breeding resident in Ireland. • Noise emissions can cause birds to deviate from their normal, preferred behaviour, resulting in stress, increased energy expenditure and, in some cases, species mortality.	Possible
Great Crested Grebe (*Podiceps cristatus*) [A005]	• Occasionally forages in estuaries and on the shoreline for fish, but also small crustaceans, small frogs and newts. Consumption of prey items contaminated with petrochemicals could lead to morbidity or mortality of individuals.	Possible

Special Conservation Interests [004030]	Comments	Significant Effect Likely
	• An influx of sediment could negatively alter the conditions of the habitats that this species thrives in. • Non-breeding resident at Cork Harbour SPA. • Noise emissions can cause birds to deviate from their normal, preferred behaviour, resulting in stress, increased energy expenditure and, in some cases, species mortality.	
Cormorant (*Phalacrocorax carbo*) [A017]	• Often forages on rocky shores, coastal lagoons and estuaries for fish. Consumption of prey items contaminated with petrochemicals could lead to morbidity or mortality of individuals. • An influx of sediment could negatively alter the conditions of the habitats that this species thrives in. • Non-breeding resident in Ireland. • Noise emissions can cause birds to deviate from their normal, preferred behaviour, resulting in stress, increased energy expenditure and, in some cases, species mortality.	Possible
Grey Heron (*Ardea cinerea*) [A028]	• Forages in any watery habitat shallow enough for wading. Consumption of prey items contaminated with petrochemicals could lead to morbidity or mortality of individuals. • An influx of sediment could negatively alter the conditions of the habitats that this species thrives in. • Non-breeding resident in Ireland. • Noise emissions can cause birds to deviate from their normal, preferred behaviour, resulting in stress, increased energy expenditure and, in some cases, species mortality.	Possible
Shelduck (*Tadorna tadorna*) [A048]	• Commonly forages in coastal areas for invertebrates, small shellfish and aquatic snails. Consumption of prey items contaminated with petrochemicals could lead to morbidity or mortality of individuals. • An influx of sediment could negatively alter the conditions of the habitats that this species thrives in. • Non-breeding resident in Ireland. • Noise emissions can cause birds to deviate from their normal, preferred behaviour, resulting in stress, increased energy expenditure and, in some cases, species mortality.	Possible
Wigeon (*Anas penelope*) [A050]	• Typically forages aquatic plants, grasses, roots in wetland and marine habitats. Consumption of prey items contaminated with petrochemicals could lead to morbidity or mortality of individuals. • An influx of sediment could negatively alter the conditions of the habitats that this species thrives in. • Non-breeding resident at Cork Harbour SPA. • Noise emissions can cause birds to deviate from their normal, preferred behaviour, resulting in stress, increased energy expenditure and, in some cases, species mortality.	Possible
Teal (*Anas crecca*) [A052]	• In winter, typically forages seeds and small invertebrates in brackish waters and even in sheltered inlets and lagoons along the seashore. Consumption of prey items contaminated with petrochemicals could lead to morbidity or mortality of individuals. • An influx of sediment could negatively alter the conditions of the habitats that this species thrives in. • Non-breeding resident at Cork Harbour SPA. • Noise emissions can cause birds to deviate from their normal, preferred behaviour, resulting in stress, increased energy expenditure and, in some cases, species mortality.	Possible

Special Conservation Interests [004030]	Comments	Significant Effect Likely
Pintail (*Anas acuta*) [A054]	• During winter, often forages in sheltered estuaries and coastal lagoons, primarily on plant material including seeds and rhizomes of aquatic plants. Consumption of prey items contaminated with petrochemicals could lead to morbidity or mortality of individuals. • An influx of sediment could negatively alter the conditions of the habitats that this species thrives in. • Non-breeding resident at Cork Harbour SPA. • Noise emissions can cause birds to deviate from their normal, preferred behaviour, resulting in stress, increased energy expenditure and, in some cases, species mortality.	Possible
Shoveler (*Anas clypeata*) [A056]	• Forages for small insects and plant matter in wetlands habitats. Consumption of prey items contaminated with petrochemicals could lead to morbidity or mortality of individuals. • An influx of sediment could negatively alter the conditions of the habitats that this species thrives in. • Non-breeding resident at Cork Harbour SPA. • Noise emissions can cause birds to deviate from their normal, preferred behaviour, resulting in stress, increased energy expenditure and, in some cases, species mortality.	Possible
Red-breasted Merganser (*Mergus serrator*) [A069]	• Commonly forages for fish in coastal waters. Consumption of prey items contaminated with petrochemicals could lead to morbidity or mortality of individuals. • An influx of sediment could negatively alter the conditions of the habitats that this species thrives in. • Non-breeding resident at Cork Harbour SPA. • Noise emissions can cause birds to deviate from their normal, preferred behaviour, resulting in stress, increased energy expenditure and, in some cases, species mortality.	Possible
Oystercatcher (*Haematopus ostralegus)* [A130]	• Often forages for mussels and cockles in estuaries and rocky shores. Consumption of prey items contaminated with petrochemicals could lead to morbidity or mortality of individuals. • Increased sedimentation could lead to reduced shellfish recruitment and thus reduced prey availability (Wilbur and Clarke 2001). • Non-breeding resident in Ireland. • Noise emissions can cause birds to deviate from their normal, preferred behaviour, resulting in stress, increased energy expenditure and, in some cases, species mortality.	Possible
Golden Plover (*Pluvialis apricaria*) [A140]	• During migration often forages in estuaries for worms, beetles and insects. Consumption of prey items contaminated with petrochemicals could lead to morbidity or mortality of individuals. • An influx of sediment could negatively alter the conditions of the habitats that this species thrives in. • Non-breeding resident at Cork Harbour SPA. • Noise emissions can cause birds to deviate from their normal, preferred behaviour, resulting in stress, increased energy expenditure and, in some cases, species mortality.	Possible
Grey Plover (*Pluvialis squatarola*) [A141]	• Often forages for shellfish and worms on beaches and tidal flats. Shellfish and worms. Consumption of prey items contaminated with petrochemicals could lead to morbidity or mortality of individuals. • An influx of sediment could negatively alter the conditions of the habitats that this species thrives in.	Possible

Special Conservation Interests [004030]	Comments	Significant Effect Likely
	• Non-breeding resident at Cork Harbour SPA. • Noise emissions can cause birds to deviate from their normal, preferred behaviour, resulting in stress, increased energy expenditure and, in some cases, species mortality.	
Lapwing (*Vanellus vanellus*) [A142]	• Often forage in wetlands and intertidal habitats for worms and insects. Consumption of prey items contaminated with petrochemicals could lead to morbidity or mortality of individuals. • An influx of sediment could negatively alter the conditions of the habitats that this species thrives in. • Non-breeding resident at Cork Harbour SPA. • Noise emissions can cause birds to deviate from their normal, preferred behaviour, resulting in stress, increased energy expenditure and, in some cases, species mortality.	Possible
Dunlin (*Calidris alpina*) [A149]	• Primarily forages in coastal habitats for molluscs, worms and crustaceans. Consumption of prey items contaminated with petrochemicals could lead to morbidity or mortality of individuals. • An influx of sediment could negatively alter the conditions of the habitats that this species thrives in. • Non-breeding resident at Cork Harbour SPA. • Noise emissions can cause birds to deviate from their normal, preferred behaviour, resulting in stress, increased energy expenditure and, in some cases, species mortality.	Possible
Black-tailed Godwit (*Limosa limosa)* [A156]	• Often forages in muddy estuaries in winter for invertebrates, but also aquatic plants. Consumption of prey items contaminated with petrochemicals could lead to morbidity or mortality of individuals. • An influx of sediment could negatively alter the conditions of the habitats that this species thrives in. • Non-breeding resident at Cork Harbour SPA. • Noise emissions can cause birds to deviate from their normal, preferred behaviour, resulting in stress, increased energy expenditure and, in some cases, species mortality.	Possible
Curlew (*Numenius arquata*) [A160]	• Typically forages for worms, shellfish and shrimps in estuaries, mudflats. Consumption of prey items contaminated with petrochemicals could lead to morbidity or mortality of individuals. • An influx of sediment could negatively alter the conditions of the habitats that this species thrives in. • Non-breeding resident at Cork Harbour SPA. • Noise emissions can cause birds to deviate from their normal, preferred behaviour, resulting in stress, increased energy expenditure and, in some cases, species mortality.	Possible
Redshank (*Tringa totanus*) [A162]	• Forages for insects, earthworms, molluscs and crustaceans in mudflats. Consumption of prey items contaminated with petrochemicals could lead to morbidity or mortality of individuals. • An influx of sediment could negatively alter the conditions of the habitats that this species thrives in. • Non-breeding resident at Cork Harbour SPA. • Noise emissions can cause birds to deviate from their normal, preferred behaviour, resulting in stress, increased energy expenditure and, in some cases, species mortality.	Possible
Black-headed Gull (*Chroicocephalus*	• Typically forages intertidal habitats for worms, insects, fish and carrion. Consumption of prey items contaminated with	Possible

Special Conservation Interests [004030]	Comments	Significant Effect Likely
ridibundus) [A179]	petrochemicals could lead to morbidity or mortality of individuals. • An influx of sediment could negatively alter the conditions of the habitats that this species thrives in. • Non-breeding resident at Cork Harbour SPA. • Noise emissions can cause birds to deviate from their normal, preferred behaviour, resulting in stress, increased energy expenditure and, in some cases, species mortality.	
Common Gull (*Larus canus*) [A182]	• Typically forages intertidal habitats for worms, insects, fish and carrion. Consumption of prey items contaminated with petrochemicals could lead to morbidity or mortality of individuals. • An influx of sediment could negatively alter the conditions of the habitats that this species thrives in. • Non-breeding resident at Cork Harbour SPA. • Noise emissions can cause birds to deviate from their normal, preferred behaviour, resulting in stress, increased energy expenditure and, in some cases, species mortality.	Possible
Lesser Black-backed Gull (*Larus fuscus*) [A183]	• Opportunistic feeders who forage a variety of food (fish, insects, crustaceans, worms, starfish, molluscs, seeds, berries, small mammals, eggs, small birds, chicks, scraps, offal, and carrion) in marine and wetland habitats. Consumption of prey items contaminated with petrochemicals could lead to morbidity or mortality of individuals. • An influx of sediment could negatively alter the conditions of the habitats that this species thrives in. • Non-breeding resident in Ireland. • Noise emissions can cause birds to deviate from their normal, preferred behaviour, resulting in stress, increased energy expenditure and, in some cases, species mortality.	Possible
Common Tern (*Sterna hirundo*) [A193]	• Typically feed far from nest sites in marine habitats however may sometimes forage large rivers or coastal areas for fish. Consumption of prey items contaminated with petrochemicals could lead to morbidity or mortality of individuals. • An influx of sediment could negatively alter the conditions of the habitats that this species thrives in. • Nationally important breeding population at Cork Harbour SPA. However, breeding primarily occurs on artificial structures, (e.g., mooring 'dolphins'), which are concentrated around the port at Ringaskiddy (RPS, 2014). Therefore, there is unlikely to be any disturbance to breeding sites from construction works. • Noise emissions can cause birds to deviate from their normal, preferred behaviour, resulting in stress, increased energy expenditure and, in some cases, species mortality.	Possible
Habitats		
Wetland and Waterbirds [A999]	• An influx of sediment or petrochemicals from the site could negatively alter the conditions of the wetland habitats within this site. • Noise emissions can cause birds to deviate from their normal, preferred behaviour, resulting in stress, increased energy expenditure and, in some cases, species mortality.	Possible

Based on the above information, it is concluded that the proposed project has the potential, without mitigation, to cause significant effects to Cork Harbour SPA.

[6.1.2] Special Area of Conservation (SAC)

[6.1.2.1] Great Island Channel SAC 001058

The Site Synopsis and Conservation Objectives for the site are available at https://www.npws.ie/protected-sites/sac/001058. The location of this SAC in the vicinity of the proposed development is shown in Figure 3.1. This SAC is of high conservation value for the following QI habitats and/or Species of Conservation Interest (SCI).

Significant effects to the below QIs at Great Island Channel SAC (Table 6.2) may include habitat loss, disruption of the natural community composition/distribution, or alterations to the physical or vegetive structure.

Increased sediment load from the development site could negatively alter the conditions of mudflats, sandflats or Atlantic salt meadows. Petrochemical contamination from construction/operational vehicles may cause morbidity or mortality of species important to the community complex in these habitats (i.e., macroinvertebrates in mud/sandflats and aquatic plant species in Atlantic salt meadows). Thus, the community distribution in both habitats and the physical and vegetative structure of the Atlantic salt meadows may be negatively impacted by the development.

Table 6.2 comments on the likelihood of significant effects to QIs of the Great Island Channel SAC and gives a rationale for each case.

Table 6-2. Likelihood of significant effects to the QIs of Great Island Channel SAC

Special Conservation Interests [001058]	Comments	Significant Effect Likely
Habitats		
Mudflats and sandflats not covered by seawater at low tide [1140]	• An influx of sediment from the project site could negatively alter the condition of these mudflats and sandflats. • Contamination by petrochemicals or heavy sedimentation may cause morbidity or mortality of polychaete/oligochaete community complex, the sustenance of which is identified as a conservation objective of the SAC.	Possible
Atlantic salt meadows (Glauco-Puccinellietalia maritimae) [1330]	• Contamination by oils or petrochemicals may lead to plant morbidity or death and thus the vegetation structure and composition may be negatively affected. • Increased sediment deposition may lead to an increase in the area available for colonisation by saltmarsh vegetation.	Possible

Based on the above information, it is concluded that the proposed project has the potential, without mitigation, to cause significant effects to Great Island Channel SAC.

[6.2] Cumulative and In-Combination Significant Effects

It is a requirement of Appropriate Assessment that the cumulative or in-combination effects of the proposed development together with other plans or projects are assessed. Cumulative impacts can be defined as a project/plan/program likely to have a significant effect on a European Site, either individually or in combination with other plans or projects. Considering the information presented in section 6, any project/plan/program which may generate sediment, contaminants, or noise and vibration emissions that may have the potential to have cumulative impacts from the proposed works to cause significant effects to European sites are considered here.

The following sources were consulted in order to determine if there were any other plans or projects in the area which could result in cumulative impacts:

- Cork County Development Plan, 2022-2028 https://www.corkcoco.ie/en/cork-county-development-plan-2022-2028

  Volume 4 – South Cork
- Cork County Council - Planning Enquiry System https://corkcocoeur.maps.arcgis.com/apps/webappviewer/index.html?id=254568bc8931492eb72ab5446c411cb9
- DHPLG EIA Portal https://www.housing.gov.ie/planning/environmental-assessment/environmental-impact-assessment-eia/eia-portal

In order to take account of in-combination effects, plans, and projects that are completed, approved but uncompleted, or proposed (but not yet approved) should be considered in this context (EC, 2021a). A search of the National Planning Application Database (NPAD) (DoHPLG, February 2024) and general web searches for major infrastructure projects and plans within 2 km of the Proposed Development in the last three years has been undertaken to identify other plans and projects that may result in cumulative effects.

Table 6-3. Review of planning applications within 2 km of the development

Application Number	Description	Potential for In-Combination
N/A	Cork County Development Plan 2022-2028 A Natura Impact Report was prepared (Cork County Council, 2022) in support of the Cork County Development Plan 2022-2028. The report assessed potential impacts arising from the Cork County Development Plan 2022-2028. No impacts were identified on any of the European sites identified within the ZoI or the vicinity of the Proposed Development. As such, no incombination effects are anticipated between the Proposed Development and the Cork County Development Plan 2022-2028 or the supporting NIS	No potential for in-combination effects. The Plan was subject to Stage 1 and Stage 2 AA. It was concluded that, with the implementation of mitigation measures, the Plan is not foreseen to give rise to any significant effects on designated European sites, alone or in-combination with other plans or projects. Therefore, with the mitigation measures of the Plan implemented, and the absence of significant effects predicted from the Proposed Works, there is no potential for incombination effects between the Proposed Works and this Plan.
N/A	Port of Cork Masterplan Under the National Ports Policy, Irish ports are advised to produce port masterplans in line with international best practice	Any individual projects that emerge in the course of implementing the Masterplan will be assessed at the time of design and construction. In

	for all Irish ports. The purpose of the Port of Cork Masterplan 2050 (“Masterplan”) is to provide a vision of how the PoCC can continue to adapt and grow. This masterplan builds upon the previous Strategic Development Plan adopted by the PoCC in 2010. It provides an integrated framework to strategically plan for the short, medium, and long-term; to coordinate port planning: to assist local authorities in the preparation of their own local and regional plans; to evaluate future development proposals and to facilitate the green energy sector.	relation to such projects, the PoCC will follow, and comply with, all the normative planning, marine, environmental, and consent requirements. If there are no projects arising from the plan that could be delivered within the same timeframe as the Proposed Development then there is no potential for in-combination effects.
318802 (Previously submitted as PA0045) An Bord Pleanála / Cork County Council	Indaver Ireland Limited Proposed development of a resource recovery centre (including waste-to-energy facility)	No potential for in-combination effects. The Natura Impact Statement for this development concluded it is unlikely to cause any significant negative effects on any Natura 2000 sites
217291 Cork County Council	The removal of 8 no. car parking spaces permitted under Cork County Council planning application 11/5487, and their replacement with the construction of an open-air outdoor enclosure comprising of a concrete base, timber panel security fence and access gateways, fixed to the existing in-situ concrete wall, and all associated development. The enclosure will house a test rig, consisting of pipe work,3 no. water tanks, and electronic equipment, mounted on a steel framed platform (a skid) to facilitate transport by road and ease of installation and allow for the removal of the rig once testing is complete after approximately 3 years.	No potential for in-combination effects. The planner’s report for this development concluded it is unlikely to cause any significant negative effects on any Natura 2000 sites.
224356 Cork County Council	A new vehicular entrance off the L2545, the temporary use of lands (for a period of 10 years) for open storage of port related cargo, and all ancillary works including road / kerbside re-alignment and security fencing	No potential for in-combination effects. The AA screening report for this development concluded it is unlikely to cause any significant negative effects on any Natura 2000 sites
224577	Removal of external inclined conveyer system to warehouse as permitted under Cork County planning Ref. 06/13900 and replacement with vertical elevator and associated pit and a horizontal enclosed conveyor with supporting bridge structure and all associated site works.	No potential for in-combination effects. The AA screening report for this development concluded it is unlikely to cause any significant negative effects on any Natura 2000 sites.

235531	Removal of three car parking spaces and the erection of a research container unit.	No potential for in-combination effects. The planner's report for this development concluded it is unlikely to cause any significant negative effects on any Natura 2000 sites.
236365	Permission for the relocation and erection of a small micro generation research wind turbine at the north - eastern corner of the site. The wind turbine will be used to provide power to the Beaufort Building and for the educational purposes. The project involves: 1) construction of a concrete foundation for the turbine (measuring 12.25m2), 2) erection of the tower and turbine (metal lattice tower and turbine with tip height of 19.1m) and 3) associated site works, fencing and utility connections.	No potential for in-combination effects. The AA screening report for this development concluded it is unlikely to cause any significant negative effects on any Natura 2000 sites.

[7] Screening Statement

The Screening exercise was completed in compliance with the relevant EC and national legislation and associated guidance. Article 42 (7) of the European Communities (Birds and Natural Habitats) Regulations 2011 states that: *“The public authority shall determine that an Appropriate Assessment of a plan or project is not required […] if it can be excluded on the basis of objective scientific information following screening under this Regulation, that the plan or project, individually or in combination with other plans or projects, will have a significant effect on a European site.”*

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The potential impacts from the construction and post-construction stages of the project site have been considered in the context of the European Sites potentially affected and their Qualifying Interests/Special Conservation Interests.

Cork Harbour SPA and Great Island Channel SAC are at risk of indirect negative impacts by way of surface water contamination and noise disturbance. Mitigation cannot be accounted for at the screening stage of Appropriate Assessment to avoid these impacts. It has been concluded that the potential for significant effects to Cork Harbour SPA and Great Island Channel SAC cannot be ruled out and thus a Natura Impact Statement must be completed to progress this application.

Chapter B – Natura Impact Assessment (NIS)

[8] Introduction

Chapter A of this Report detailed the Appropriate Assessment (AA) Screening review.

This chapter (Chapter B) reports the detailed methodology followed for the Appropriate Assessment process for addressing possible impacts of the proposed Ringaskiddy Port development to Cork Harbour SPA and Great Island Channel SAC.

[8.1] Methodology for Stage 2: Appropriate Assessment (NIS)

In addition to the methodology employed at Stage 1 of the AA Screening process, further information on current site conditions was consulted to assess the impacts of the proposed scheme on the QI's and SCIs of Cork Harbour SPA and Great Island Channel SAC respectively. See Section 2.1 for the Appropriate Assessment stage process.

[9] Appropriate Assessment for Great Island Channel SAC and Cork Harbour SPA

[9.1] Introduction

This chapter describes the qualifying habitats and species found within Great Island Channel SAC and Cork Harbour SPA, and their relationship with the proposed site and works.

A detailed description of the potential impacts associated with the works is provided. Where required, mitigation measures have been proposed (see Section 7). The potential impacts which could occur to habitats and species as a result of the proposed works include:

- Loss of qualifying habitat or species within the SPA or SAC due to the release of sediments into watercourses within the proposed development site during the works.
- Loss of qualifying habitat or species within the SPA or SAC due to the release of other pollutants, such as oils and petrochemicals, into watercourses within the proposed development site during the works.

[9.2] Description of Potential Impacts

[9.2.1] Construction Phase

As described in the screening report, the proposed works are located at the Port of Cork Ringaskiddy. Therefore there is a clear hydrological pathway between the works and Cork Harbour (Cork Harbour SPA) and Great Island Channel (SAC).

The most likely risks during the construction phase are associated with the non-containment of stormwater runoff from the construction site. Contaminated runoff has the potential to enter the nearby stream and discharge directly into the SAC and SPA. The following stormwater-contamination events are considered plausible in this context:

- Exposure of loose, excavated topsoil to rainwater. Runoff would potentially have a high sediment and nutrient load.
- Disturbance of sediment along the stream bank and within the stream
- Spillage of petroleum fuels or oils, which could be transported offsite by runoff.

The physiological effects of exposure to, and ingestion of significant concentrations of hydrocarbons on fish has been well-documented; these include delayed maturation, embryo malformation and suppressed gene expression (Holth, 2009). Reduction in fish numbers would reduce food availability for the Eurasian otter (*L. lutra*), but consumption of contaminated prey would of course also represent a risk of ill-health.

Hydrocarbons that come into contact with a plant would be expected to have a negative impact on that plant, potentially resulting in its death. Sedimentation would be expected to increase turbidity in the watercourse, reducing light availability to aquatic flora.

[9.2.2] Zone of Potential Impact

The aquatic zone of potentially highest impact is from the location of the proposed development to 5km downstream (Escauriaza et al., 2017). Nonetheless, potential impacts on protected habitats and species in the entire Cork Harbour area are considered for this project. The Zone of potential impact in this case is considered to be the footprint of the project site itself, and a 15 km radius.

[9.3] Great Island Channel SAC

Table 9.1 below shows the connectivity between the project site and the QIs of Great Island Channel SAC:

Table 9-1. Connectivity between the Project Site and Great Island Channel SAC

SAC 001058 Qualifying Interest	Definitely or Probably Present and /or Direct connectivity to development site	Possibly Present and/or Indirect connectivity to development site	Not Present and/or no connectivity to development site
Habitats			
1140 Mudflats and sandflats not covered by seawater at low tide		X	
1330 Atlantic salt meadows *(Glauco-Puccinellietalia maritimae)*		X	

Potential impacts on the following habitats which are known to be present, or are possibly present within the zone of potential impact are considered in this appropriate assessment:

- 1140 Mudflats and sandflats not covered by seawater at low tide
- 1330 Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)

The locations of the above QI habitats within Great Island Channel SAC are shown in the maps in Figure 9.1. Mudflats and Sandflats (1140) account for a substantial proportion of the area coverage of the SAC. Figure 9.2 shows saltmarsh distribution in relation to the project site. This information was gathered from the National Parks and Wildlife Service Article 17 data (NPWS, 2019).

[9.3.1] Mudflats and Sandflats not covered by seawater at low tide

Tidal mudflats and sandflats habitat is comprised of the intertidal section of the coastline where sands and muds dominate. They are dynamic ecosystems, dependent on the balance of natural accretion and erosion. The fundamental building block of this habitat is sediment ranging from around 1µm to 2mm. The finer silt and clay sediments are dominant in mudflats and the larger sand fractions are associated with areas exposed to significant wave energy. A range of physical pressures operate in these habitats including dynamic fluctuations in salinity, temperature, and immersion. The fine sediment of intertidal mudflats is usually deposited in estuaries. These sediments are often rich in nutrients but the depth of suitable habitat for fauna is limited by the access of oxygen-rich seawater to buried mud. Where conditions are suitable, the sediment can form into stable mixed sediment flats. In areas exposed to large waves with little riverine influence the habitat is mostly composed of larger sand grains. The most frequent biological community of mudflats and sandflats is the Mud to Fine sand community, which is characterised by molluscs (*Macomangulus tenuis, Peringia ulvae*), crustaceans (*Crangon crangon, Corophium volutator*), polychaetes (e.g. *Hediste diversicolor*) and oligochaetes (*Tubificoides benedii*). The next most prevalent community type is the Fine sand to sand community, characterised by molluscs (e.g. *Macomangulus tenuis*), crustaceans (*Bathyporeia* pilosa, Pontocrates spp.*) and polychaetes (e.g. *Nephtys cirrosa, Scolelepis spp.*). The largest proportion of the remainder is made up of the Muddy sands/sandy muds community. The Overall tatus of the habitat is Inadequate and deteriorating, the change in trend from improving to deteriorating due to a genuine decline in the habitat since 2013. This was caused partly by pollution from agricultural, forestry and wastewater sources, as well as impacts associated with marine aquaculture, particularly the Pacific oyster (*Magallana gigas*).

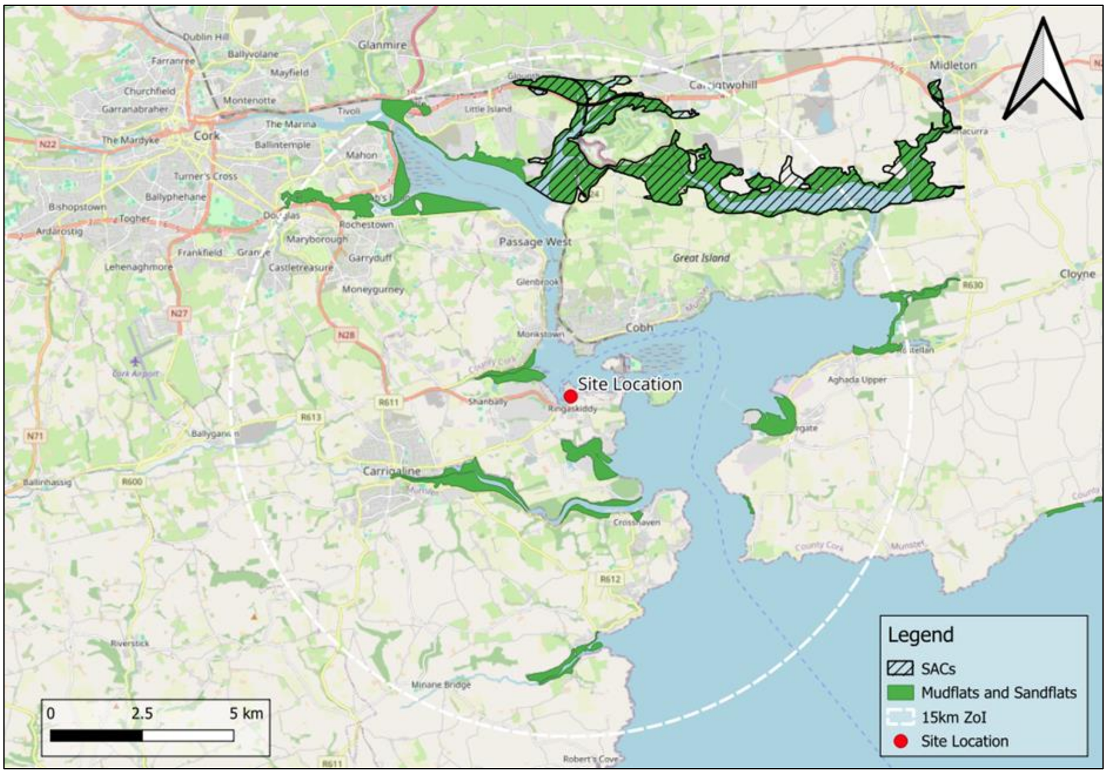

Figure 9-1. Distribution of mudflats and sandflats.

[9.3.2] Atlantic Salt Meadows

Atlantic salt meadows generally occupy the widest part of the saltmarsh gradient. They also contain a distinctive topography with an intricate network of creeks and salt pans occurring on medium and large-sized saltmarshes. Atlantic salt meadows contain several distinctive zones that are related to elevation and submergence frequency. The lowest part along the tidal zone is generally dominated by common saltmarsh-grass (*Puccinellia maritima*) with species like glassworts (*Salicornia spp.*), annual sea-blite (*Suaeda maritima*) and lax-flowered sea-lavender (*Limonium humile*) also important. The invasive common cord-grass (*Spartina anglica*) can be locally abundant in this habitat. The mid-marsh zones are generally characterised by thrift (*Armeria maritima*) and/or sea plantain (*Plantago maritima*). This zone is generally transitional to an upper saltmarsh herbaceous community with red fescue (*Festuca rubra*), saltmarsh rush (*Juncus gerardii*) and creeping bent (*Agrostis stolonifera*). This habitat is also important for other wildlife including wintering waders and wildfowl. Atlantic salt meadows are distributed around most of the coastline of Ireland. The intricate topography of the Irish coastline with many inlets has created an abundance of sites that are sheltered and allow muddy sediments to accumulate, leading to the development of saltmarsh. The Overall Status is assessed as Inadequate, due mainly to pressures from agriculture, including ecologically unsuitable grazing regimes and land reclamation, and the invasive non-native species common cord-grass (*Spartina anglica*). This assessment is unchanged since the 2013 AA Screening/NIS report for the Port Redevelopment. However, the overall deteriorating trend represents a genuine decline since 2013 due to losses in area (NPWS, 2019).

Figure 9-2. Distribution of Atlantic Salt Meadows

[9.3.3] Conservation Objectives

Table 9.1 provides a list of the conservation objectives for this site and provides comments as to the nature of any potential significant effects on them. The processes associated with the proposed development most likely to cause significant effects are the transport of sediment and other contaminants from the site via surface water run-off and noise emissions.

Table 9-2. Conservation Objectives – Great Island Channel SAC

Conservation Objectives - Attributes	Targets	Comments
1140 Mudflats and sandflats not covered by seawater at low tide		
Habitat Area	The permanent habitat area is stable or increasing, subject to natural processes.	The transport of sediment or contaminants is unlikely to negatively affect the area coverage of a mudflat/sandflat habitat. However, it could alter the conditions of this habitat.
Community Distribution	Conserve the following community type in a natural condition: Mixed sediment to sandy mud with polychaetes and oligochaetes community complex.	The transport of contaminants offsite may negatively affect the health of the fauna associated with this community complex.
1330 Atlantic salt meadows *(Glauco-Puccinellietalia maritimae)*		
Habitat Area	Area stable or increasing, subject to natural processes, including erosion and succession.	Increased sediment deposition may lead to an increase in the area available for colonisation. However, contamination by oils or petrochemicals may lead to plant morbidity or death. In saltmarshes, vegetation is most often exposed at low tide but submerged at high tide. A pathway, therefore, exists for these plants to come into direct contact with contaminated water.
Habitat Distribution	No decline or change in habitat distribution, subject to natural processes.	As above.
Physical Structure: Sediment Supply	Maintain/restore natural circulation of sediments and organic matter, without any physical obstructions.	Sediment loading from the proposed development would not be considered as 'natural' circulation.
Physical Structure: Creeks and Pans	Maintain/restore creek and pan structure, subject to natural processes, including erosion and succession.	As per 'Habitat Area' above – increased sedimentation may lead to physical alterations in habitat morphology. It is unclear whether this effect would be significantly negative.
Physical Structure: Flooding Regime	Maintain a natural tidal regime.	This target is tied to the physical morphology of the habitat. See above comment.
Vegetation Structure: Zonation	Maintain range of coastal habitats including transitional zones, subject to natural processes including erosion and succession.	Contamination by oils or petrochemicals may lead to plant morbidity or death.
Vegetation Structure: Vegetation Height	Maintain structural variation within sward	As above

Conservation Objectives - Attributes	Targets	Comments
Vegetation Structure: Vegetation Cover	Maintain more than 90% area outside creeks vegetated	As above
Vegetation Composition: Typical Species and Subcommunities	Maintain range of subcommunities with typical species listed in SMP (McCorry and Ryle, 2009)	As above
Vegetation Structure: Negative Indicator Species - *Spartina anglica*	No significant expansion of common cordgrass (*Spartina anglica),* with an annual spread of less than 1% where it is known to occur.	Increased sedimentation may lead to increased opportunity for the spread of *Spartina.*

[9.4] Cork Harbour SPA

This SPA is of high conservation value for the SCI species and habitats listed in Table 9.3 below. The likely presence of each SCI habitat and species within or adjacent to the proposed site as well as the assessment of connectivity are summarised.

It should be noted that the proposed works are located adjacent to Cork Harbour, so much of the bird species listed below will be susceptible to potential impacts from the site.

Table 9-3. SCI Habitats and Species of Cork Harbour SPA and their Relationship with the Proposed Development Site

SPA 4030 Special Conservation Interest	Definitely or Probably Present and /or Direct connectivity to development site	Possibly Present and/or Indirect connectivity to development site	Not Present and/or no connectivity to development site
Species			
Little Grebe (*Tachybaptus ruficollis*) [A004]		X	
Great Crested Grebe (*Podiceps cristatus*) [A005]		X	
Cormorant (*Phalacrocorax carbo*) [A017]		X	
Grey Heron (*Ardea cinerea*) [A028]		X	
Shelduck (*Tadorna tadorna*) [A048]		X	
Wigeon (*Anas penelope*) [A050]		X	
Teal (*Anas crecca*) [A052]		X	
Pintail (*Anas acuta*) [A054]		X	
Shoveler (*Anas clypeata*) [A056]		X	
Red-breasted Merganser (*Mergus serrator*) [A069]		X	
Oystercatcher (*Haematopus ostralegus*) [A130]		X	
Golden Plover (*Pluvialis apricaria*) [A140]		X	
Grey Plover (*Pluvialis squatarola*) [A141]		X	
Lapwing (*Vanellus vanellus*) [A142]		X	
Dunlin (*Calidris alpina*) [A149]		X	
Black-tailed Godwit (*Limosa limosa*) [A156]		X	
Bar-tailed Godwit (*Limosa lapponica*) [A157]		X	
Curlew (*Numenius arquata*) [A160]		X	
Redshank (*Tringa totanus*) [A162]		X	
Black-headed Gull (*Chroicocephalus ridibundus*) [A179]		X	
Common Gull (*Larus canus*) [A182]		X	
Lesser Black-backed Gull (*Larus fuscus*) [A183]		X	
Common Tern (*Sterna hirundo*) [A193]		X	
Habitats			
Wetland and Waterbirds [A999]		X	

The Appropriate Assessment, therefore, needs to consider potential impacts to all of the above-listed SCIs in light of their Conservation Objectives.

[9.4.1] Conservation Objectives

The processes associated with the proposed development most likely to cause significant effects are the transport of sediment and other contaminants from the site via surface water run-off and noise emissions.

The mobilisation of sediment from the development site has the theoretical potential to alter the structural conditions of the supporting habitat of the SCI species. Increased sedimentation in Cork Harbour will negatively alter the conditions of SCI habitats which can cause significant effects on the SCI species. The release of contaminants (oils/petrochemicals) may lead to the accumulation of toxic compounds in prey items, which could lead to a reduction in prey availability. Contaminated prey items, if ingested, may cause morbidity or death of the SCI species.

The conservation objectives for all bird species listed as SCIs of Cork Harbour SPA include:

- Population Trend: Long term population stable or increasing
- Distribution: No significant decrease in the range, timing or intensity of use of areas by little grebe, other than that occurring from natural patterns of variation
- Breeding population abundance: No significant decline
- Prey biomass available: No significant decline
- Barriers to connectivity: No significant decline
- Habitat Area: The permanent area occupied by the wetland habitat should be stable and not significantly less than the area of 2,587 hectares, other than that occurring from natural patterns of variation.

[10] Potential Impacts

This section examines the potential sources of impact that could potentially result in adverse effects on the biodiversity and protected habitats and species that occur within the zone of influence of the proposed scheme. These potential sources of impact could arise during both the construction and operational phases but require complete source > pathway > receptor changes for adverse impacts to arise.

[10.1] Physical Damage

Physical damage includes degradation to, and modification of, protected habitats. It can occur in working areas and along access routes where construction works are undertaken, and it may be temporary or permanent. The construction works have the potential to encroach on several different habitats such as areas of scrub and treelines and well as embankments which could facilitate otter activity.

[10.2] Disturbance (noise/visual)

A number of activities can result in disturbance, including visual and noise. This is more frequently associated with construction activities but could also be associated with some aspects of the operational phase (e.g. structure maintenance, public access). Disturbance can cause sensitive species, such as birds, to deviate from their normal, preferred behaviour, resulting in stress, increased energy expenditure and, in some cases, species mortality.

[10.3] Changes in Water Quality

A number of activities can impact upon water quality, in particular nutrient status and turbidity levels. For example, inundation of contaminated/nutrient enriched land and sediment mobilisation can all impact on water quality. This can adversely impact on habitats and also species, for example by impacting upon macroinvertebrate communities.

[10.4] Pollution

Certain activities, in particular construction works, may lead to the release of pollutants into water, air or the ground. This can impact upon habitats directly and also the species they support.

[10.5] Invasive Species

Invasive species have legal implications if left untreated. They can spread rapidly over suitable habitat including wetlands across Cork Harbour.

[11] Predicted Impacts

[11.1]Construction Phase Impacts

The key construction phase impacts assessed are:

- Habitat loss/disturbance;
- Species loss (Flora);
- Disturbance to faunal species; and
- Reduction in water quality.

Potential direct and indirect impacts are discussed in detail below. Where potentially significant adverse impacts are identified, avoidance and mitigation measures are proposed to offset these impacts.

[11.2] Description of Potential Impacts (Unmitigated)

[11.2.1] Effects on Natura 2000 Sites

The proposed development is hydrologically connected to two Natura 2000 sites. This could aid the transport of any sediment and/or hydrocarbons that may be washed off the project site in the direction of these Natura 2000 Sites. The proposed site is also connected to these Natura 2000 Sites through air pathways which can transmit noise emissions from the site. If left unmitigated the health and condition of some qualifying habitats and species of these sites could be detrimentally impacted on.

[11.3] General Impacts on Key Ecological Receptors

[11.3.1] Habitat Loss

The proposed development will inevitably lead to some habitat loss in order to facilitate the construction of flood defences. However, it should be noted that most of this habitat consists of bare ground/recolonising bare ground. Although there is some risk to surrounding areas of scrub and treelines, these are small in scale and the majority of these woody habitats are not located in the direct footprint for proposed development.

[11.3.2] Habitat Fragmentation

Any loss of linear woodland (areas of treelines and/or scrub) will result in habitat fragmentation which could lead to the displacement of wildlife from the area and the fracture of an ecological corridor which will inhibit the movement of species through the area and into more natural refuges along the corridor.

[11.3.3] Habitat Degradation

The construction and operation of the proposed development could lead to habitat degradation. The potential impacts include the pollution of Cork Harbour, and the conversion of wooded habitat (treelines & scrub) to built land.

Water quality impacts arising from both the construction and the operation of the proposed development have the potential to affect habitats and species directly and indirectly. Accidental pollution events could result in sediment and pollutants entering Cork Harbour. Increased storm water overflow incidences could also result in increased pollutants entering Cork Harbour.

[11.3.4] Disturbance

Construction of the proposed development will result in temporary noise, vibration, lighting and visual disturbance and will affect species both within and outside the construction footprint.

[11.3.5] Direct Mortality

Direct mortality is possible as a result of site clearance, tree felling and vegetation removal. Birds are particularly vulnerable during the nesting season (March-August inclusive) when works could lead to the loss of nests.

[11.3.6] Indirect Mortality

The physiological effects of exposure to, and ingestion of significant concentrations of hydrocarbons on fish has been well-documented; these include delayed maturation, embryo malformation and suppressed gene expression (Holth, 2009). Many bird species that are SCIs of Cork Harbour SPA have diets consisting of fish. Consumption of contaminated prey can represent a risk of ill-health and could potentially result in mortality.

[12] Mitigation Measures

[12.1]Construction Phase

[12.2] Design Mitigation

This section describes the mitigation measures that have been incorporated at the design stage. A number of measures which follow generic best practice are proposed to mitigate the impacts of the proposed works on the ecological environment at the Site:

[12.2.1] General

- All Site construction will be undertaken in accordance with the CIRIA (2015) Environmental Good Practice on Site (Charles and Edwards 2015);
- Mitigation described in this report will be followed during site construction and operation phases;
- There shall be no water abstraction from or discharges to Shannon River or Abbey River from the construction activities on the site;
- A site-specific CEMP) will be written by the contractor prior to site works commencing. This CEMP will incorporate the mitigation measures listed here.

[12.2.2] Site Compound

The site compound shall be located within the site boundary.

- The compound will be sited as far from any water course (>50m) as possible in order to minimise any potential impacts.
- Only plant and materials necessary for the construction of the works will be permitted to be stored at the compound location.

[12.3] Specific Mitigation

[12.3.1] Surface Water Protection

Temporal impacts due to increased levels of turbidity/sedimentation and accidental spillages cannot be ruled out. Mitigation measures will be required to manage the potential impacts:

- Monitoring of the water quality during the operational phases must take place.
    - The monitoring must be in accordance with an EPA issued licence needed to undertake the proposed works.

  - The monitoring must include sampling and testing of the waters to show compliance with the EPA licence.
  - The licence must not be surrendered until the EPA are satisfied there is no environmental liability with the proposed project.

- To minimise exacerbated adverse effects, the prevailing weather conditions and time of year is to be taken into account when the site development manager is planning the removal of vegetation, soil, existing concrete, and/or general construction works.

- Fuels, lubricants and hydraulic fluids for equipment used on the construction site, as well as any solvents and oils, will be carefully handled to avoid spillage, properly secured against unauthorised access or vandalism, provided with spill containment and stored >10m from watercourses;

- Fuelling and lubrication of equipment will not be carried out within 10m of watercourses where this is possible, and shall only be undertaken in designated bunded areas;

- Any spillage of fuels, lubricants or hydraulic oils must be immediately contained, and the contaminated soil removed from the site and dispatched to a suitably authorised waste facility.

- Refuelling must be carried out using 110% capacity double bunded mobile bowsers. The refuelling bowser must be operated by trained personnel. The bowser must have spill containment equipment which the operators must be fully trained in using.

- Plant nappies or absorbent mats to be place under refuelling point during all refuelling to absorb drips.

- Mobile bowsers, tanks and drums should be stored in secure, impermeable storage area, away from drains and open water.

- To reduce the potential for oil leaks, only vehicles and machinery will be allowed onto the site that are mechanically sound. An up-to-date service record must be required from the main contractor.

- Should there be an oil leak or spill, the leak or spill must be contained immediately using oil spill kits; the nearby dirty water drain outlet must be blocked with an oil absorbent boom until the fuel/oil spill has been cleaned up and all oil and any contaminated material removed from the area. This contaminated material must be properly disposed of in a licensed facility.

- The site Environmental representative must be immediately informed of the oil leak/spill and must assess the cause and the management of the clean-up of the leak or spill. They must inspect nearby drains for the presence of oil and initiate the cleanup if necessary.

- Immediate action must be facilitated by easy access to oil spill kits. An oil spill kit that includes absorbing pads and socks must be kept at the site compound and also in site vehicles and machinery.

- Correct action in the event of a leak or spill must be facilitated by training all vehicle/machinery operators in the use of the spill kits and the correct containment and

It is considered that, with the implementation of the proposed mitigation measures outlined above, there will be no significant risk to any nearby SACs or SPAs. With appropriate measures in place to address the risks arising from silt/turbidity or accidental spills, potential impacts to nearby European Sites can be avoided entirely.

[12.3.2] Noise and Vibration

The following mitigation measures are recommended as standard practice and should be adhered to for the duration of the construction works:

- During the works, best practice noise reduction measures described in British Standard 5228-12009+A1:2009, Code of Practice for Noise and Vibration Control on Construction and Open Sites must be incorporated into the Construction and Environmental Management Plan.
- For mobile plant items such as cranes, HGV's, excavators and loaders, maintaining enclosure panels closed during operation can reduce noise levels over normal operation.
- Mobile plant will be switched off when not in use and not left idling.
- For steady continuous noise, such as that generated by diesel engines, noise reduction can be achieved by fitting a more effective exhaust silencer system.
- Acoustic screens are required to be erected in certain locations for the duration of the redevelopment works. These screens shall be carefully positioned to be as effective as possible. In general, the barrier shall have no gaps or openings in the joins of the barrier material. The barrier material shall have a minimum mass per unit area of 7 kg/m2 and minimum recommended height of 2.4m.
- No machinery should be left running outside of the agreed operation hours, which must limit any noise emissions from the site in the late evenings and early mornings when mammal (i.e., otter) activity is at a higher level.

[12.3.3] Birds

[12.3.3.1] Avoidance of the Bird Breeding Season

To limit the potential impact of construction on breeding birds, removal of woody vegetation should be restricted to the non-breeding season (September to February, inclusive). Where the construction programme does not allow this, an ecologist should undertake a breeding bird check immediately prior to vegetation clearance. Where no breeding birds are present, clearance may proceed without requiring a derogation licence from the NPWS. However, given that breeding birds and the nests of all bird species are protected under the Wildlife Acts, a licence would be required from the NPWS to permit the destruction of nest sites and disturbance to breeding birds during the breeding season (1st of March to the 31st of August).

If the applicant intends to carry out clearance works during the bird breeding season, guidance should be sought from the NPWS with regard to compliance with Section 40 (1) and Section 40 (2) (e) of the Wildlife Acts (see below):

40. *(1) (a) It shall be an offence for a person to cut, grub, burn or otherwise destroy, during the period beginning on the 1st day of March and ending on* *the 31st day of August in any year, any vegetation growing on any land not then cultivated.*

(1) (b) It shall be an offence for a person to cut, grub, burn or otherwise destroy any vegetation growing in any hedge or ditch during the period mentioned in paragraph (a) of this subsection.

***40.** (2) Subsection (1) of this section shall not apply in relation to—*

(e) the clearance of vegetation in the course of road or other construction works or in the development or preparation of sites on which any building or other structure is intended to be provided.

[12.3.3.2] General Site Management During Construction to Avoid Contamination of Receiving Waters

Surface water protective measures outlined in Section 16.11.1.2.1 of the specific mitigation measures will be adhered to for the protection of watercourses used by waterbirds. This will help avoid the contamination of mudflats, sandflats, and water bodies where birds forage in the harbour.

[12.3.3.3] Noise Control

The piling phase of the construction process will lead to sudden loud noises which can be startling to surrounding bird species. However when piling is not being undertaken, sudden loud noises (or impulsive noises) should be avoided where practicable when construction activity is underway. This will help limit the potential for nearby birds to become startled and displaced from their habitat, especially species of birds that are resident to Ireland and are located in the country all year round, not just during the breeding season.

Noise emission measures outlined in Section 16.11.1.2.2 of the specific mitigation measures will be adhered to for the protection of surrounding waterbirds. This will help avoid significant negative impacts to surrounding bird species from potential noise emissions from the site.

[12.3.3.4] Minimising Impacts on Potential Bird Nesting Habitat

Treelines and areas of scrub offer birds suitable nesting habitat locations. These areas should be protected and remain untouched during construction. The proposed works will be carried out with the aim of avoiding as much damage to this potential bird nesting habitat as possible.

Any trees or scrub in the way of the development layout are to be removed in such a manner not to cause damage to those trees to be retained. Root protection areas will be marked out around the trees to be retained. No machinery will enter these areas.

[12.3.4] Alien Invasive Species

To avoid the spread of Invasive Plant Species to and from the redevelopment the following mitigations must be implemented:

- Construction machinery is to be visually inspected and power-washed prior to arrival at the site in order to avoid importation of invasive species;

- All excavation/access areas are to be pre-checked for invasive species and no machinery is to enter these fenced-off locations, unless instructed by the Client or its Representatives and appropriate management measures are put in place.

Throughout the period of the works, in order to comply with national legislation that prohibits any 'polluting matter' to enter 'waters', *e.g.* Fisheries (Consolidation) Act 1959, Environmental Protection Agency Acts 1992 and 2003, and Local Government (Water Pollution) Acts 1977 and 1990, standard operational procedures, both published and unpublished, will be implemented and adhered to. The adherence to these environmental protection measures would be implemented on-site irrespective of the presence of a designated European Site.

[12.3.5] Operation Phase

The project site will be typical of ongoing Port operations during the operational phase. As part of the Port of Cork Environmental Management System (EMS), they are required to monitor surface water, ground water, noise and dust emissions from the site to ensure that they meet EPA (Environmental Protection Agency) standards. This will continue during the operational phase and will ensure that surrounding receptors will not be negatively impacted on.

[12.4] Monitoring

[12.4.1] Construction and pre-construction Phase

[12.4.1.1] Ecological Clerks of Work (ECoW)

A species protection plan should be designed by a professional ecologist to ensure that works related to this proposal take into account any protected bird species present on site and the nearby surroundings. An Ecological Clerk of Works (ECoW) should be employed to monitor the works under license, and to inform the team through Ecological Toolbox Talks during the proposed works and tree felling activities.

A pre-construction survey of the scheme will be undertaken by an experienced Ecological Clerk of Works (ECoW), who shall walk the entire length of the scheme alongside the Site Manager / Site Engineer in order to highlight locations where environmental mitigation (as described below) is required prior to construction works commencing on the site. A minimum of 1 no. ECoW visit shall be conducted per week during the course of the construction works at this site during the construction phase. The ECoW shall be present on-site during commencement of works. As such the following points must be adhered to for this scheme:

- An Ecological Clerk of Works (ECoW) will be involved as required during the construction period for this scheme, in order to ensure that the required mitigation is implemented.

- Once planning permission has been secured, pre-construction ecology surveys will be carried out within the proposed scheme area well in advance (ideally 3-4 months prior to construction works) in order to ensure that sufficient updated information is available to inform derogation licence applications as required.

- The ECoW and the Appointed Contractor will walk the proposed scheme together prior to work commencing on the site, in order to discuss the ecological constraints, to highlight all required mitigation and to demarcate exclusion zones appropriately.

[12.4.2] Operation Phase

[12.4.2.1] Post-Construction Monitoring

Depending on the type of contract, post-construction monitoring requirements should be stipulated in the Employer's Requirements or Maintenance Requirements for the local authorities.

Upon completion of construction, monitoring should be carried out to determine the success of the measures employed. Monitoring should be continued for at least one year after construction work ceases. Any remedial works must be undertaken by qualified Ecologist.

[13] Conclusion

This Appropriate Assessment Natura Impact Statement has been completed in compliance with the relevant European and national guidelines. The potential impacts during the proposed works have been considered in the context of the European Sites potentially affected, their Qualifying Interests, Special Conservation Interests and Conservation Objectives.

Robust and effective mitigation measures have been proposed for the avoidance of any impacts surrounding water quality, noise emissions and invasive species.

Considering the mitigation measures proposed, and based on the best scientific knowledge available, it is concluded that there will be no significant adverse impacts on the integrity of Cork Harbour SPA or Great Island Channel SAC as a result of the proposed development.

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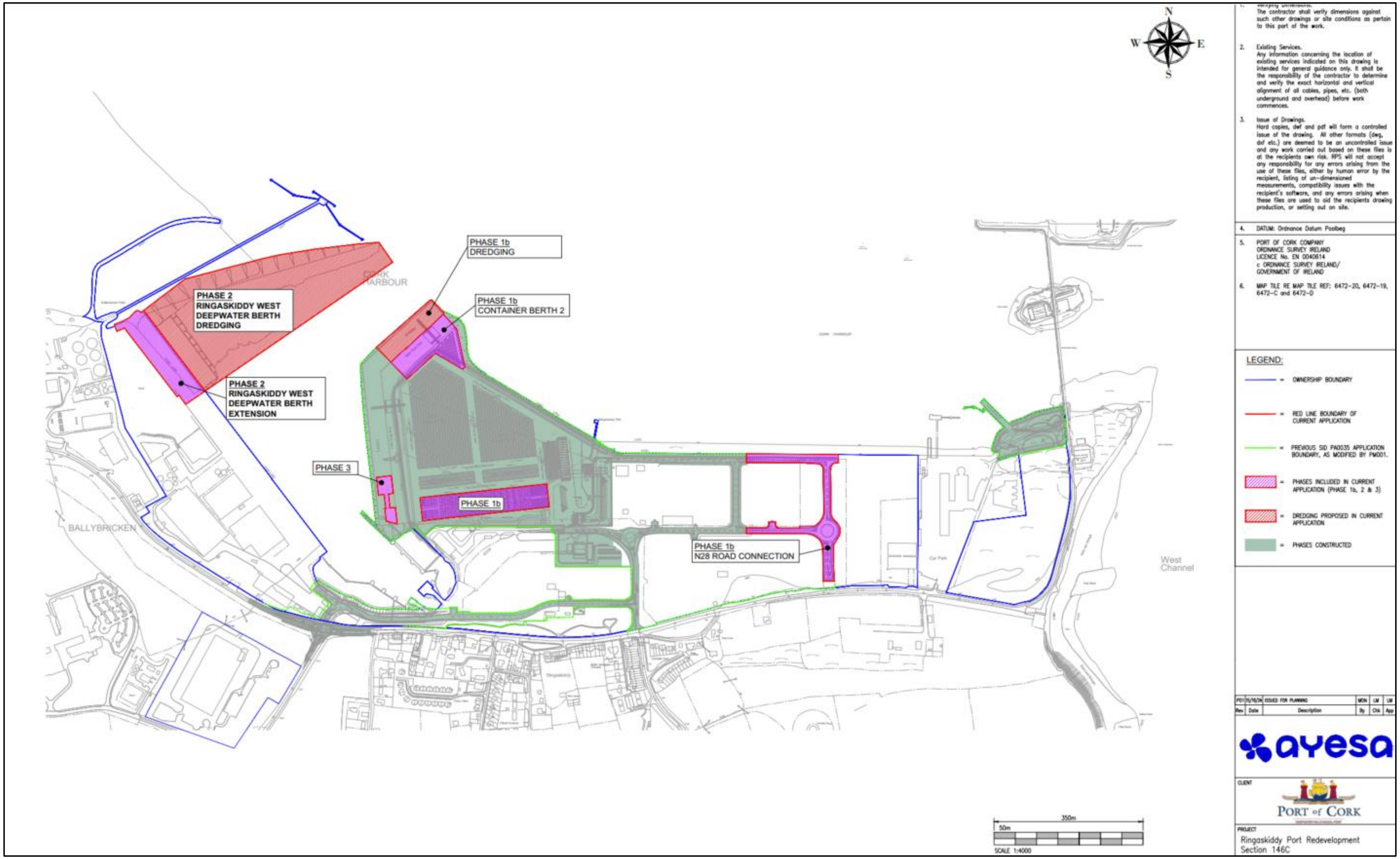
Appendix A – Proposed Works Ringaskiddy Port



The contractor shall verify dimensions against such other drawings or site conditions as pertain to this part of the work.
2. Existing Services.
Any information concerning the location of existing services indicated on this drawing is intended for general guidance only. It shall be the responsibility of the contractor to determine and verify the exact horizontal and vertical alignment of all cables, pipes, etc. (both underground and overhead) before work commences.
3. Issue of Drawings.
Hard copies, dwf and pdf will form a controlled issue of the drawing. All other formats (dwg, dxf etc.) are deemed to be an uncontrolled issue and any work carried out based on these files is at the recipients own risk. RPS will not accept any responsibility for any errors arising from the use of these files, either by human error by the recipient, listing of un-dimensioned measurements, compatibility issues with the recipient's software, and any errors arising when these files are used to aid the recipients drawing production, or setting out on site.
4. DATUM: Ordnance Datum Poolbeg
5. PORT OF CORK COMPANY
ORDNANCE SURVEY IRELAND
LICENCE No. EN 0040614
c ORDNANCE SURVEY IRELAND/
GOVERNMENT OF IRELAND
6. MAP TILE RE MAP TILE REF: 6472-20, 6472-19, 6472-C and 6472-D
LEGEND:
= OWNERSHIP BOUNDARY
= RED LINE BOUNDARY OF CURRENT APPLICATION
= PREVIOUS SID PA0035 APPLICATION BOUNDARY, AS MODIFIED BY PM001.
= PHASES INCLUDED IN CURRENT APPLICATION (PHASE 1b, 2 & 3)
= DREDGING PROPOSED IN CURRENT APPLICATION
= PHASES CONSTRUCTED
N
E
S
W
PHASE 1b
DREDGING
PHASE 1b
CONTAINER BERTH 2
PHASE 2
RINGASKIDDY WEST
DEEPWATER BERTH
DREDGING
PHASE 2
RINGASKIDDY WEST
DEEPWATER BERTH
EXTENSION
CORK
HARBOUR
PHASE 3
PHASE 1b
PHASE 1b
N28 ROAD CONNECTION
BALLYBRICKEN
West
Channel
350m
50m
SCALE 1:4000
P01 | 15/10/24 | ISSUED FOR PLANNING | MON | LM | LM
Rev | Date | Description | By | Chk | App
ayesa
CLIENT
PORT of CORK
PROJECT
Ringaskiddy Port Redevelopment
Section 146C

Appendix B – Bird Survey 2024 – Cork Harbour SPA

FLYNN FURNEY

ENVIRONMENTAL CONSULTANTS

Port of Cork Bird Surveys 2023/2024

Ringaskiddy Wintering & Breeding Wetland Bird Survey Report.

Document Details

Client: Port of Cork Company

Scheme Name: Port of Cork Bird Surveys

Document Title: 2023/2024 Ringaskiddy Wintering and Breeding Wetland Bird Survey Report

Prepared by: Jack Coffey **Flynn Furney Environmental Consultants**

Rev	Status	Date	Author(s)	Approved by
01	DRAFT	01/10/2024	JC	

Contents

1. INTRODUCTION

This report presents the findings of a wetland bird survey conducted by Ronan Ó' Driscoll during the 2023/24 wintering season. The objectives of the study were as follows:

1. To examine the usage of the marine, intertidal and terrestrial areas adjacent to the Ringaskiddy Port Redevelopment footprint, by waterbirds during the 2023/24 overwintering season;
2. To identify locations of key importance to foraging and roosting waterbirds during the 2023/24 wintering season; and
3. To provide sufficient information to assess the potential impact of the proposed development on the wintering Special Conservation Interests (SCIs) of Cork Harbour Special Protection Area (SPA) and to inform a forthcoming Environmental Impact Assessment (EIA) and Appropriate Assessment (AA).

1.1 Cork Harbour SPA

Cork Harbour SPA (Site Code: IE0004030) qualifies for designation under The Birds Directive (Directive 2009/147/EC) by regularly supporting over 20,000 waterbirds.

The Birds Directive pays particular attention to wetlands, and as these form part of this SPA, the site and its associated waterbirds are in their own right a Special Conservation Interest (SCI) - Wetlands & Waterbirds [A999].

Table 1: Cork Harbour SPA [IE0004030] SCIs

Cork Harbour SPA SCIs.		**Season**	**Qualifying Population**[1]
A004	Little Grebe (*Tachybaptus ruficollis*)	Wintering	68 individuals
A005	Great Crested Grebe (*Podiceps cristatus*)	Wintering	218 individuals
A017	Cormorant (*Phalacrocorax carbo*)	Wintering	620 individuals
A028	Grey Heron (*Ardea cinerea*)	Wintering	47 individuals
A048	Shelduck (*Tadorna tadorna*)	Wintering	1426 individuals
A050	Wigeon (*Anas Penelope*)	Wintering	1,750 individuals
A052	Teal (*Anas crecca*)	Wintering	807 individuals
A056	Pintail (*Anas acuta*)	Wintering	84 individuals
A065	Shoveler (*Anas cylpeata*)	Wintering	135 individuals

A069	Red-breasted Merganser (*Mergus serrator*)	Wintering	90 individuals
A130	Oystercatcher (*Haematopus ostralegus*)	Wintering	791 individuals
A140*	Golden Plover (*Pluvialis apricaria*)	Wintering	805 individuals
A141	Grey Plover (*Pluvialis squatarola*)	Wintering	66 individuals
A142	Lapwing (*Vanellus vanellusi)*	Wintering	3,614 individuals
A149*	Dunlin (*Calidris alpina*)	Wintering	4,936 individuals
A156	Black-tailed Godwit (*Limosa limosa*)	Wintering	412 individuals
A157*	Bar-tailed Godwit (*Limosa lapponica*)	Wintering	45 individuals
[A160	Curlew (*Numenius arquata*)	Wintering	1,345 individuals
A162	Redshank (*Tringa tetanus*)	Wintering	1,614 individuals
A179	Black-headed Gull (*Larus ridibundus*)	Wintering	948 individuals
A182	Common Gull (*Larus canus*)	Wintering	2,630 individuals
A183	Lesser Black-backed Gull (*Larus fuscus*)	Wintering	Wintering 261 individuals
A193*	Common Tern (*Sterna hirundo*)	Breeding	69 pairs
A999	Wetlands & Waterbirds	N/A	N/A
Key to Table 1As obtained from Standard Natura Data Form. *Species listed on Annex I of The Birds Directive.			

Numerous species present supported by the Cork Harbour SPA are considered **nationally important** wintering populations, including the following:
Little Grebe (*Tachybaptus ruficollis*), Great Crested Grebe (*Podiceps cristatus*), Cormorant (*Phalacrocorax carbo*), Grey Heron (*Ardea cinerea*), Shelduck (*Tadorna tadorna*), Wigeon (*Anas penelops*), Teal (*Anas crecca*), Pintail (*Anas acuta*), Shoveler (*Anas clypeata*), Red-breasted Merganser (*Mergus serrator*), Oystercatcher (*Haematopus*), Golden Plover (*Pluvialis apricaria*), Grey Plover (*Pluvialis squatarola*), Lapwing (*Vanellus vanellus*), Dunlin (*Calidris alpina*), Bar-tailed Godwit (*Limosa laponica*), Curlew (*Numenius Arquata*), Black-headed Gull (*Larus ridibundus*), Common Gull (*Larus canus*) and Lesser Black-backed Gull (*Larus fuscus*). The site also qualifies for designation by regularly supporting a **nationally important** breeding population of Common Tern (*Sterna hirundo*).

2. METHODOLOGY

The survey methodology was based on that used by the British Trust for Ornithology's (BTO) Wetland Bird Survey (WeBS) and the Irish Wetland Bird Survey (I-WeBS).

These surveys were conducted from three vantage points: Monkstown, Ringaskiddy and Rocky Island. See **Figure 1, Appendix 1**.

The Wintering Bird Survey was conducted monthly from October 2023 to March 2024.
The Breeding Bird Surveys were conducted monthly May 2024 to August 2024.

All surveys were performed by Ronan O'Driscoll.

1. High Tide Waterbird Counts were undertaken within two hours either side of high tide, to record the distribution, numbers and behaviours of waterbirds the survey area during high tide conditions; and

2. Low Tide Waterbird Counts were undertaken within two hours either side of low tide, to record the distribution, numbers and behaviours of waterbirds within the survey area during low tide conditions.

3. In May 2024, a further count area (Count Area 4) was added at Rocky Island, facing east towards Spike Island.

4. Within each count area, all waterbirds seen were recorded and dominant behaviours noted as either feeding (F) or engaged in other activity such as roosting, resting, washing or preening (R). Birds moving through the area only are indicated with (M). Note, gulls were not recorded in the Breeding Bird Survey (May-August).

5. Birds flying over were ignored unless they subsequently went onto land within the survey area.

6. Equipment used: 20-60 zoom scope, 7X42 binoculars, tripod.

Note: "Waterbirds" are defined here as all swans and geese, ducks, divers, grebes, herons and rails, waders, gulls and terns.

2.1 Survey Timeline

Table 2: Survey dates, tide times and count areas included for each survey.

Survey	Date	Tide Time	Count Areas Surveyed
Wintering	26/10/2023	High 16:25	1,2,3
Wintering	27/10/2023	Low 11:20	1,2,3
Wintering	28/10/2023	Low 12:04	1,2,3
Wintering	29/10/2023	High 17:30	1,2,3
Wintering	30/10/2023	High 18:16	1,2,3
Wintering	21/11/2023	High11:38	1,2,3
Wintering	25/11/2023	Low 9:55	1,2,3
Wintering	15/12/2023	Low 13:12	1,2,3
Wintering	22/12/2023	High 13:23	1,2,3
Wintering	13/01/2024	Low 13:06	1,2,3
Wintering	22/01/2024	High 15:00	1,2,3
Wintering	07/02/2024	High 15:27	1,2,3
Wintering	09/02/2024	Low 11:24	1,2,3
Wintering	26/03/2024	Low 12:28	1,2,3
Wintering	27/03/2024	High 18:49	1,2,3
Wintering	28/05/2024	High 9:26	1,2,3
Wintering	28/05/2024	Low15:58	1,2,3
Breeding	24/06/2024	Low 14:18	1,2,3,4
Breeding	26/06/2024	High 9:21	1,2,3,4
Breeding	19/07/2024	Low 10:59	1,2,3,4
Breeding	19/07/2024	High 16:53	1,2,3,4
Breeding	20/08/2024	High 19:12	1,2,3,4
Breeding	22/08/2024	Low 14:43	1,2,3,4

3. RESULTS

Species	October 2023 - Wintering					
	1. Ringskiddy Port		2. Rocky Island		3. Monkstown Creek	
	HIGH	LOW	HIGH	LOW	HIGH	LOW
Bar tailed Godwit						
Black Guillemot						
Black-headed Gull	72 R	39 R	37 R	16 R		46 R
Black-tailed Godwit					41 R	
Brent Goose						
Common Gull	4 R	5 R	5 R	2 R		3 R
Common Tern						
Cormorant	43 R	29 R	12 R	7 R	334 R	65 R
Curlew		2 F		4 R	1 F	31 F
Dunlin				25 F		
Great Black-backed Gull	8 R	4 R	1 R	5 R	1 R	1 R
Great Crested Grebe					1R	
Greenshank	1 R	1 F		3 F	9 R	3 F
Grey Heron	2 R	7 F	2 R	5 F	17 R	30 R
Herring Gull	13 R	28 R	3 R	11 R	5 R	3 R
Lapwing						
Lesser Black-backed Gull	1 R	8 R			5 R	3 R
Little Egret	1 F	2 F	1 F	1 F	6 R	4 F
Mallard	4 R	28 R			17 R	5 R
Mediterranean Gull						1 R
Mute Swan	1 R	7 R		1 R	1 R	
Oystercatcher		8 F	1 F	19 F	7R	7 F
Red-breasted Merganser						
Redshank	2 F	2 F		3 F	5 F	68 F
Sandwich Tern						
Shag	2 R	2 R	6 R	8 R		
Shelduck						
Snipe						
Teal					23 R	53 R
Turnstone	3 F			4 F	2 F	
Whimbrel						
Other						
Common Sandpiper	1 R	1 F	1 F			
Ringed Plover				20 F		

Species	November 2023 - Wintering					
	1. Ringskiddy Port		2. Rocky Island		3. Monkstown Creek	
	HIGH	LOW	HIGH	LOW	HIGH	LOW
Bar tailed Godwit						
Black Guillemot			1 F			
Black-headed Gull	92 R	126 R	8 R	19 F	28 R	41 F
Black-tailed Godwit					5 R	33 F
Brent Goose						
Common Gull		2 R		3 F	2 R	
Common Tern						
Cormorant	85 R	19 R	1 F	6 F	91 R	15 R
Curlew	1 R	2 F		3 F	12 R	21 F
Dunlin	9 R					97 F
Great Black-backed Gull	5 R	1 R	2 R	3 F	2 R	
Great Crested Grebe					1 F	1 F
Greenshank	2 R	1 R		2 F	2 F	4 F
Grey Heron	2 F	7 R	1 R	6 F	5 R	9 F
Herring Gull	1 R	8 F		9 F	3 R	
Lapwing						5 R
Lesser Black-backed Gull	1 R	2 R			2 R	1 R
Little Egret	1 R					3 F
Mallard	8 R	46 R			67 R	5 R
Mediterranean Gull						
Mute Swan	7 R	6 R	2 R			
Oystercatcher		7 F		29 F	14 R	12 F
Red-breasted Merganser				2 R		
Redshank	17 R	4 F		5 F	3 F	57 F
Sandwich Tern						
Shag		1 R	6 R	2 R	2 R	
Shelduck	1 R				7 R	15 F
Snipe	8 R			2 F		5 F
Teal					56 R	78 R
Turnstone					11 F	
Whimbrel						
Common Sandpiper	1 R	1 R	1 R	2 F		
Ringed Plover				1 F		
Great Northern Diver					1 F	

Wigeon					1 F	

Species	December 2023 - Wintering					
	1. Ringskiddy Port		2. Rocky Island		3. Monkstown Creek	
	HIGH	LOW	HIGH	LOW	HIGH	LOW
Bar tailed Godwit						2 F
Black Guillemot						
Black-headed Gull	193 R	258 F	1 R	2 R	17 R	119 F
Black-tailed Godwit		20 F			58 R	38 F
Brent Goose		19 F		9 F	5 F	
Common Gull					1 R	3 F
Common Tern						
Cormorant	2 R	62 R	2 F	3 F	169 R	31 R
Curlew		2 F		1 F	8 F	13 F
Dunlin						56 F
Great Black-backed Gull	5 R	2 R	2 R	2 R	1 R	3 R
Great Crested Grebe						
Greenshank		1 F	1 F	1 R	4 F	2 F
Grey Heron		5 F	1 R	4 R	21 R	7 F
Herring Gull	36 R	26 F		15 R	4 R	6 F
Lapwing						
Lesser Black-backed Gull	2 R	2 R		1 R	2 R	3 F
Little Egret			1 R	1 F	1 F	
Mallard	3 R	67 R			79 R	23 R
Mediterranean Gull						
Mute Swan	6 R	5 R	2 F	2 R		
Oystercatcher		7 F	1 F	3 F	2 F	8 R
Red-breasted Merganser					3 F	1 R
Redshank		2 F			2 F	64 F
Sandwich Tern						
Shag	1 F	1 R	1 F	5 R	6 R	
Shelduck	3 R	3 F			17 R	15 F
Snipe						
Teal		1 R			91 R	63 F
Turnstone					7 F	
Whimbrel						
Other						

Species	January 2024 - Wintering					
	1. Ringskiddy Port		2. Rocky Island		3. Monkstown Creek	
	HIGH	LOW	HIGH	LOW	HIGH	LOW
Bar tailed Godwit						
Black Guillemot			3 F		2 F	
Black-headed Gull	197 R	322 R	1 R	36 R	67 R	24 F
Black-tailed Godwit		35 F				112 F
Brent Goose						
Common Gull		28 R	1 R	67 F		26 R
Common Tern						
Cormorant	5 F	29 F	2 F	2 F	426 R	37 R
Curlew		3 F		4 F	6 F	13 F
Dunlin						23 F
Great Black-backed Gull	3 R	5 R	2 R	4 R	2 R	2 R
Great Crested Grebe						
Greenshank	3 R	2 F	1 F	2 F	3 F	2 F
Grey Heron	2 R	5 F		5 F	11 R	17 R
Herring Gull	41 R	53 R	4 R	24 F	2 R	9 F
Lapwing						
Lesser Black-backed Gull	4 R	6 R		2 R	3 F	4 R
Little Egret		2 F			1 F	1 F
Mallard	2 R	87 R			29 F	6 F
Mediterranean Gull		2 R				
Mute Swan		4 R				
Oystercatcher		7 F		29 F		3 F
Red-breasted Merganser						
Redshank	1 R	3 F		2 F	7 F	62 F
Sandwich Tern						
Shag			2 F	2 F		
Shelduck		10 F			26 F	27 F
Snipe						
Teal					53 F	109 F
Turnstone					6 F	5 F
Whimbrel						
Other						
Great Northern Diver			1 F			
Common Sandpiper				1 F		

Species	February 2024 - Wintering					
	1. Ringskiddy Port		2. Rocky Island		3. Monkstown Creek	
	HIGH	LOW	HIGH	LOW	HIGH	LOW
Bar tailed Godwit						4 F
Black Guillemot						
Black-headed Gull	243 R	82 R	9 R	5 R	49 R	139 R
Black-tailed Godwit					27 R	127 F
Brent Goose		34 F				
Common Gull	61 R	29 R	2 R	13 R	1 R	102 R
Common Tern						
Cormorant	109 R	86 R	4 F	3 F	407 R	11 R
Curlew		4 F		2 F	8 R	16 F
Dunlin						
Great Black-backed Gull	4 R	3 R	3 R	1 R	5 R	
Great Crested Grebe						
Greenshank		1 F	1 F		3 F	5 F
Grey Heron	2 R	4 R			23 R	8 R
Herring Gull	51 R	23 R	3 R	11 R	39 R	9 R
Lapwing				12 R		
Lesser Black-backed Gull	18 R	5 R	1 R		2 R	5 F
Little Egret						
Mallard	3 R	19 R			38 R	6 F
Mediterranean Gull	1 R				1 R	
Mute Swan	2 F	3 F				1 F
Oystercatcher		2 F	3 R	3 F		2 F
Red-breasted Merganser						
Redshank		1 F	5 F		3 F	64 F
Sandwich Tern						
Shag	1 R		1 R	4 R		
Shelduck					12 R	12 F
Snipe						
Teal					98 R	144 F
Turnstone						2 F
Whimbrel	1 F					
Other						
Common Sandpiper	1 R			1 R		
Ringed Plover						

Species	March 2024 - Wintering					
	1. Ringskiddy Port		2. Rocky Island		3. Monkstown Creek	
	HIGH	LOW	HIGH	LOW	HIGH	LOW
Bar tailed Godwit						
Black Guillemot						
Black-headed Gull	1 R	1 F				7 F
Black-tailed Godwit		26 F			97 R	550+ F
Brent Goose	2 R				2 F	
Common Gull	41 R	7 F				19 F
Common Tern						
Cormorant	2 F	3 F	1 F		69 R	13 R
Curlew		2 F				8 F
Dunlin						
Great Black-backed Gull	3 R		2 R			2 R
Great Crested Grebe						
Greenshank					1 R	5 F
Grey Heron	2 R	3 F	1 R		6 R	8 R
Herring Gull	5 R	12 F			2 R	
Lapwing						
Lesser Black-backed Gull		1 F				1 R
Little Egret					2 R	
Mallard	19 R	13 R			7 R	
Mediterranean Gull						
Mute Swan						
Oystercatcher		5 F				6 F
Red-breasted Merganser						
Redshank						31 F
Sandwich Tern						
Shag	2 R		1 R			
Shelduck		1 F			5 R	2 R
Snipe						
Teal					13 R	9 R
Turnstone						
Whimbrel						
Other						
Common Sandpiper	1 R	1 R				
Sandwich Tern	1 R					

Species	May 2024 - Breeding							
	1. Ringskiddy Port		2. Rocky Island		3. Monkstown Creek		4. Spike Island	
	HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW
Bar tailed Godwit								
Black Guillemot							2 F	
Black-headed Gull								
Black-tailed Godwit								
Brent Goose								
Common Gull								
Common Tern	16 R	19 R	4 F	5 F	5 F	12 F	5 F	3 F
Cormorant	10 R	3 R	2 F	1 F	2 F	9 R	2 F	
Curlew								
Dunlin								
Great Black-backed Gull								
Great Crested Grebe								
Greenshank								
Grey Heron	1 R	5 F	1 R	2 F	1 R	3 F	1 R	1 R
Herring Gull								
Lapwing								
Lesser Black-backed Gull								
Little Egret						1 F		
Mallard	4 R	29 R	2 F	2 F	11 R	2 R		3 F
Mediterranean Gull								
Mute Swan		1 R						
Oystercatcher		2 F	4 M			8 F	4 R	4 R
Red-breasted Merganser								
Redshank								
Sandwich Tern								
Shag				1 R	1 R	2 R	1 F	
Shelduck					2 R	5 F		
Snipe								
Teal								
Turnstone								
Whimbrel								
Other								
Ringed Plover				2 F			3 F	

Species	June 2024 - Breeding							
	1. Ringskiddy Port		2. Rocky Island		3. Monkstown Creek		4. Spike Island	
	HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW
Bar tailed Godwit								
Black Guillemot								
Black-headed Gull								
Black-tailed Godwit								
Brent Goose								
Common Gull								
Common Tern	15 F	13 F	3 F	8 F	6 F	11 F	2 F	5 F
Cormorant	5 R	9 R	1 F	2 F	7 R	13 R	10 R	6 R
Curlew					5 F	12 F	2 M	1 F
Dunlin								
Great Black-backed Gull								
Great Crested Grebe								
Greenshank						4 F	1 R	
Grey Heron	2 R	2 F	1 R	2 F	11 R	9 F		2 F
Herring Gull								
Lapwing								
Lesser Black-backed Gull								
Little Egret					1 F	1 F		
Mallard		1 R			9 R			
Mediterranean Gull								
Mute Swan	3 F	1 R	6 R		2 F			
Oystercatcher		3 F		4 F		7 F	7 R	2 F
Red-breasted Merganser								
Redshank								
Sandwich Tern								
Shag			2 R	3 R			1 R	
Shelduck					7 R	7 F	2 R	
Snipe								
Teal								
Turnstone				2 F				
Whimbrel								
Other								
Ringed Plover				2 F				
Sandwich Tern						1 R		

Species	July 2024 - Breeding							
	1. Ringskiddy Port		2. Rocky Island		3. Monkstown Creek		4. Spike Island	
	HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW
Bar tailed Godwit								
Black Guillemot								
Black-headed Gull								
Black-tailed Godwit						1 F		
Brent Goose								
Common Gull								
Common Tern	26 R	21 R	4 F	12	6 F	8 F		2 M
Cormorant	23 R	15 R	1 R		36 R	12 R	1 F	7 R
Curlew		1 F		2		8 F		2 F
Dunlin								
Great Black-backed Gull								
Great Crested Grebe								
Greenshank		1 F				1 F		
Grey Heron	2 R	6 F		3	11 R	11 R		1 F
Herring Gull								
Lapwing								
Lesser Black-backed Gull								
Little Egret		1 F			5 R	3 R		1 F
Mallard	28 R	11 F			2 F	1 F		
Mediterranean Gull								
Mute Swan		2 R				1 F		
Oystercatcher		9 F		3	17 R	9 F	2 R	6 F
Red-breasted Merganser								
Redshank					1 F			
Sandwich Tern								
Shag	1 R			1	2 R			
Shelduck								
Snipe								
Teal								
Turnstone								
Whimbrel								
Other								
Common Sandpiper		2 R		1				
Ringed Plover				2				

Species	August 2024 - Breeding							
	1. Ringskiddy Port		2. Rocky Island		3. Monkstown Creek		4. Spike Island	
	HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW
Bar tailed Godwit								
Black Guillemot								
Black-headed Gull								
Black-tailed Godwit				8 F		4 F		
Brent Goose								
Common Gull								
Common Tern						6 F	1 F	
Cormorant	2 F	16 R	3 F	3 F	148 R	43 R	2 R	17 R
Curlew	1 R	1 F		6 F		7 F		5 F
Dunlin								
Great Black-backed Gull								
Great Crested Grebe								
Greenshank	4 R					7 F	1 F	
Grey Heron	1 R	6 F	1 R	5 F	2 R	5 R		3 F
Herring Gull								
Lapwing								
Lesser Black-backed Gull								
Little Egret	1 R			1 F	7 R			
Mallard	14 R	2 F			19 R	4 F		
Mediterranean Gull								
Mute Swan								
Oystercatcher	25 R	29 F		42 F	2 R	4 F	1 M	27 F
Red-breasted Merganser								
Redshank						51 F		
Sandwich Tern		1 M				2 F	3 F	
Shag	1 F	2 F		2 R		3 R	4 R	3 F
Shelduck								
Snipe								
Teal								
Turnstone								
Whimbrel							1 F	
Other								
Gannet			1 M					
Ringed Plover				33 F				

4. ANALYSIS OF RESULTS BY SPECIES

4.1 Cormorant

In October 2023 Cormorants were present at all counting sites, and a large number, 334, were recorded at Monkstown Creek. High numbers of cormorants were recorded in November, December and January, with 426 individuals recorded at Monkstown creek in January. By February 2024, Cormorants were still recorded at every site, with 407 present at Monkstown Creek.

By March 2024 Cormorant numbers began to drop, with only 1 individual and Rocky Island at high tide and none at low tide. 69 cormorants were recorded at Monkstown at high tide.

Numbers from May to August 2024 were low; they highest recording in May 2024 was 10 individuals counted at Ringaskiddy Port at high tide.

August saw an increase in cormorants recorded with a high of 148 at Monkstown Creek at high tide.

Cormorants utilised trees in Raffeen Golf Course and the trees to the east at Ballintaggart Cormorants were also observed to use the jetty and stonewall for roosting before dark.

4.2 Grey Heron

30 grey herons were recorded roosting at low tide at Monkstown in October 2023.

One month later, in November 2023, only 7 feeding grey herons were recorded.

However, in December 2023, a high of 21 roosting grey herons was recorded at Monkstown at high tide.

By January 2024, 17 individuals were found roosting at Monkstown Creek at Monkstown at low tide.

In February 2024, numbers of grey herons were recorded at 23 roosting individuals.

By March 2024, grey heron numbers dropped off to a high of only 23 roosting at Monkstown at low tide.

Numbers of grey herons throughout the breeding season (May-August) remained low, with only a few instances of recording above 10 at any site.

4.3 Shelduck

No recordings of shelduck were made during October 2023.

November 2023 featured a high of 15 shelduck feeding at Monkstown at low tide. None were recorded at Rocky Island and only one individual was recorded at Ringaskiddy Port at high tide.

In December 2023, 17 and 15 shelduck were counted at Monkstown Creek, at high and low tide respectively. Yet again, none were recorded at Rocky Island and only 3 individuals at Ringaskiddy and both high and low tide.

Numbers increased to a peak of 27 feeding shelduck at Monkstown at low tide. None were recorded at Rocky Island.

In February 2024, 12 shelduck were recorded feeding at both high and low tide at Monkstown Creek. No other shelduck were recorded at either Rocky Island or Ringaskiddy Port.

Numbers dropped to a high of only 5 individuals in March 2024 feeding at high tide at Monkstown Creek.

Shelduck numbers stayed consistent in May and June.

Shelduck recordings decreased to 0 in July and August 2024.

4.4 Lapwing

No lapwing recordings were made in October 2023. 5 individuals were counted roosting at Monkstown Creek at low tide in November.

No lapwings were recorded in December or January.

In February at Rocky Island, a peak of 12 lapwing were counted roosting at low tide.

No lapwing were recorded in March 2024.

No lapwing were recorded during the breeding season May-August.

4.5 Dunlin

In October 25 feeding dunlin recorded at Rocky Island low tide.

in November, numbers increased to 97 feeding at Monkstown low tide.

In December, recordings of Dunlin dropped to 56 feeding at Monkstown low tide.

By January, a decrease to 23 feeding at Monkstown low tide.

A further decrease to 0 recordings in February and March.

0 recordings were made in the breeding season May-August.

4.6 Black-tailed Godwit

October, a high of 41 roosting Black-tailed godwits were recorded at Monkstown Creek during high tide.

In November, 33 were counted feeding at low tide at Monkstown creek.

By December, total records had increased. 20 feeding at Ringaskiddy Port, low tide. 58 roosting at Monkstown Creek high tide, 38 feeding at Monkstown Creek low tide.

January, 35 feeding Ringaskiddy Port low tide.112 recorded feeding Monkstown low tide.

February, 127 feeding at Monkstown low tide.

In March, 27 were counted roosting at Monkstown Creek at high tide. A peak of 550+ feeding black-tailed godwits were recorded at Monkstown Creek low tide.

For the breeding season, May-August, black-tailed godwits were mostly absent.

4.7 Curlew

October, 31 feeding curlew at Monkstown Creek at low tide.

November, a high count of 21 feeding at Monkstown low tide was made.

By December, a there was a decrease to a high of 13 feeding Monkstown low tide.

In January, records were similar;13 feeding at Monkstown Creek, low tide.

In February, counts were quite consistent, with 16 feeding at Monkstown Creek, low tide.

By March, counts has decreased to a high of 8 feeding at Monkstown Creek low tide, almost completely absent elsewhere.

May – No sightings of curlew.

June, a modest increase to a high of 12 feeding at Monkstown Creek low tide.

July – high of 8 feeding at Monkstown Creek low tide.

Aug – a modest increase to 7 feeding at Monkstown low tide, 6 feeding at Rocky Island low tide and 5 feeding at Spike Island, low tide.

4.8 Redshank

In October, a high of 68 redshank were recorded feeding at Monkstown Creek at low tide.

November, high of 57 feeding at Monkstown Creek low tide. 17 recorded roosting at Ringaskiddy Port, high tide.

December, 64 redshank feeding at Monkstown Creek low tide. Mostly absent elsewhere.

January, 62 feeding at Monkstown Creek low tide.

February, counts remain consistent with 64 recorded feeding at Monkstown Creek low tide.

March, a decrease to 31 feeding at Monkstown creek low tide. Completely absent elsewhere.

May, a large decrease to 0 recordings.

June, 0 recordings

July, 1 curlew feeding at Monkstown creek high.

August, a large increase to 51 feeding at Monkstown low tide.

4.9 Oystercatcher

October, 19 oystercatchers feeding at Rocky Island low tide. 7 to 8 individuals at other locations.

November 29 feeding at Rocky Island low tide. 14 roosting at Monkstown Creek high tide. 12 feeding at Monkstown Creek low tide.

December, a decrease in numbers recorded. 7 feeding at Ringaskiddy low tide. 8 roosting at Monkstown Creek low tide.

January, 29 oystercatchers recorded feeding at Rocky Island low tide.

February, a decrease, low numbers recorded of 2-3 individuals.

March 5 feeding at Ringaskiddy Port, low tide. 6 feeding at Monkstown Creek low tide. Absent elsewhere.

May, a high count of 8 feeding at Monkstown Creek low tide.

June, 7 recorded feeding at Monkstown Creek low tide. 7 roosting at Spike Island high tide.

July, slight increase to 17 roosting at Monkstown Creek high tide. 2 to 9 individuals recorded at other sites.

August, increase to 25 roosting high tide, 29 feeding low tide at Ringaskiddy Port. 42 feeding at Rocky Island low tide. 27 feeding at Spike Island low tide.

4.10 Teal

October, 23 roosting at Monkstown Creek high tide. 53 roosting at Monkstown Creek low tide.

November, slight increase to 56 roosting Monkstown high tide. 78 roosting Monkstown low tide.

December, further slight increase to 91 roosting at Monkstown high tide. 63 feeding Monkstown low tide.

January, numbers almost consistent at 53 feeding at Monkstown high tide. 109 feeding at Monkstown low tide.

February, further slight increase to 98 roosting at Monkstown high tide. 144 feeding Monkstown low tide.

March, large decrease to 13 roosting at Monkstown high tide. 9 roosting at Monkstown low tide.

Further decrease to no recordings in May, June, July or August.

4.11 Mallard

October, a high of 28 mallard roosting at Ringskiddy Port, low tide. 17 roosting at Monkstown high tide.

November, increase to 46 roosting at Ringaskiddy Port low tide. 67 roosting at Monkstown Creek high tide.

December, slight increase to 91 roosting at Monkstown high tide. 63 feeding at Monkstown low tide. Absent elsewhere.

January, slight decrease to 87 roosting at Ringaskiddy Port low tide. Absent from Rocky Island. 29 feeding at Monkstown high tide.

February, decrease to 19 roosting at Ringaskiddy Port low tide. Absent from Rocky Island. 38 roosting at Monkstown Creek high tide.

March, further decrease to 19 roosting at Ringaskiddy Port high tide. 13 roosting at Ringaskiddy Port low tide. 0 recorded at Monkstown Creek at high tide, 6 feeding at Monkstown Creek low tide.

May 29 roosting at Ringaskiddy Port low tide. 11 roosting at Monkstown high tide.

June 9 roosting at Monkstown Creek high tide. Absent elsewhere.

July 28 roosting at Ringaskiddy Port high tide. 11 feeding at Ringaskiddy Port low tide. Mostly absent elsewhere.

August 14 roosting at Ringaskiddy Port high tide. 19 roosting at Monkstown Creek high tide.

4.12 Brent Goose

October, no recordings.

November, no recordings,

December increase to 19 brent goose recorded feeding at Ringaskiddy low tide. 9 feeding at Rocky Island low tide. 5 feeding at Monkstown Creek high tide.

Jan, decrease to 0 recordings.

February, increase to 34 feeding Ringaskiddy low tide. Absent elsewhere.

March, decrease to 2 roosting at Ringaskiddy Port. 2 feeding at Monkstown.

May to August, decrease to zero recordings.

Brent goose utilised the jetty and stonewall to roost during the day, Monkstown Creek woods for roosting at night.

4.13 Common Tern

October – March, zero recordings.

May, increase to 16 roosting at Ringaskiddy Port high tide. 19 roosting Ringaskiddy Port low tide. 12 feeding at Monkstown Creek low tide. 3-5 individuals recorded elsewhere.

June, recordings steady; 15 feeding at Ringaskiddy Port high tide. 13 feeding at Ringaskiddy Port low tide. 11 feeding at Monktown Creek low tide. 2-8 individuals elsewhere.

July, steady; 26 roosting at Ringaskiddy Port high tide. 21 roosting at Ringaskiddy Port low tide. 12 feeding at Rocky Island. 8 feeding at Monkstown Creek low tide.

August, decrease to just 6 feeding at Monkstown Creek low tide, absent elsewhere.

4. ANALYSIS OF RESULTS IN THE CONTEXT OF CORK HARBOUR AS A WHOLE

This section examines the relative importance of the study area and of specific count areas in the context of Cork Harbour as a whole. As a major wetland Cork Harbour covered by the Irish Wetland Bird Survey (I-WeBS), a joint survey scheme between BirdWatch Ireland (BWI) and the National Parks and Wildlife Service (NPWS), which aims to monitor wintering waterbirds in Ireland. The survey runs from September to March each winter, with over 800 wetland sites surveyed including estuaries, coastlines, bays, rivers, turloughs, lakes, streams and flooded fields. A request was therefore made to BWI to obtain the most recent 5-year peak mean waterbird counts obtained from Cork Harbour, **Appendix 1, table 4.**

Table 3 presents the combined peak counts of species recorded during the survey against the most recent 5-year peak mean for each species within Cork Harbour.

Table 3.

Species	IWeBS 5-year mean (2016-21) Cork Harbour	Max. Count for Study Area	Peak Count in Study Area as percentage of Cork Harbour 5-year mean
Bar tailed Godwit	297	4	1.35%
Black Guillemot	N/A	3	N/A
Black-headed Gull	3711	322	8.68%
Black-tailed Godwit	2782	550+	19.78% +
Brent Goose	62	34	54.84%
Common Gull	218	102	46.79%
Common Tern	3	26	866%
Cormorant	256	426	166.4%
Curlew	942	31	3.3%
Dunlin	2738	97	3.54%
Great Black-backed Gull	131	8	6.1%
Great Crested Grebe	129	1	0.78%
Greenshank	97	9	9.28%
Grey Heron	101	30	29.7
Herring Gull	171	53	30.99%
Lapwing	1114	12	1.08%
Lesser Black-backed Gull	164	18	10.98%
Little Egret	120	7	5.83%
Mallard	341	87	25.51%
Mediterranean Gull	130	2	1.54%
Mute Swan	48	7	14.58%
Oystercatcher	1136	42	3.7%
Red-breasted Merganser	58	3	5.17%

Redshank	1517	68	4.48%
Sandwich Tern	71	3	4.23%
Shag	8	8	100%
Shelduck	773	27	3.49%
Snipe	69	8	11.59%
Teal	1384	144	10.4%
Turnstone	95	11	11.58%
Whimbrel	4	1	25%
Other			
Gannet	0	1	N/A
Ringed Plover	38	33	86.84%
Common Sandpiper	2	2	100%
Great Northern Diver	9	1	11.11%
Wigeon	1342	1	0.075%

APPENDIX

Most Recent 5-year I-WeBS Data - Cork Harbour.

Table 4.

Species	1% national	1% international	2016 /2017	2017 /2018	2018 /2019	2019 /2020	2020 /2021	Mean	Peak Months
Unidentified duck						1*		0	Jan, Feb, Dec
Unidentified tern								0	Sep
Hybrid shelduck			1					0	Nov
Mute Swan	90	100	55	55	44	47	40	48	Dec
Whooper Swan	150	340			2			0	Oct
Pink-footed Goose					1	1		0	Mar
Canada Goose			7*	5	4	6		4	Nov
Barnacle Goose	160	810						0	Jan, Feb, Dec
Light-bellied Brent Goose	350	400	102*	35	16	151	4	62	Jan
Shelduck	100	2500	715*	953	924*	670	601	773	Feb
Wigeon	560	14000	1498	1848	1242*	1141	980	1342	Jan
Gadwall	20	1200	11*	13	12	9*	1*	9	Jan, Feb
Teal	360	5000	1142*	1340	1791	1316	1329	1384	Jan
Mallard	280	53000	338	305	386*	425*	253*	341	Sep
Pintail	20	600	36*	1	51*	20	26	27	Dec
Shoveler	20	650	23*	29	20	12	4*	18	Jan, Feb
Pochard	110	2000						0	Jan
Tufted Duck	270	8900	13*	14*	43*	36*	15	24	Feb, Mar
Scaup	25	3100						0	Oct, Nov
Long-tailed Duck			1			1		0	Jan
Eider	55	9800						0	Feb, Nov
Common Scoter	110	7500		1	2	4		1	Nov
Goldeneye	40	11400	1*	3	4	5		3	Feb

Red-breasted Merganser	25	860	68*	77	62	60	24	58	Dec
Red-throated Diver	20	3000			1	1		0	Jan, Nov
Black-throated Diver					1*			0	Mar
Great Northern Diver	20	50	2*	18	11	12		9	Jan
Little Grebe	20	4700	89	86	78*	116	6	75	Nov, Dec
Great Crested Grebe	30	6300	159	174	62	249		129	Jan
Slavonian Grebe					1	1*		0	Nov
Cormorant	110	1200	427*	300	189*	337	26	256	Sep, Nov
Shag			8	12	12	5	3	8	Dec
Little Egret	20	1100	147*	61*	120*	125*	145*	120	Sep
Grey Heron	25	5000	92*	115	99*	96*	102	101	Sep
Water Rail			3*	2*	2*	2	1	2	Feb
Moorhen			29*	13*	16*	22*	15*	19	Sep
Coot	190	15500	4*	3*	1*	4*		2	Mar, Sep
Oystercatcher	610	8200	1397	1074	1239*	956*	1014*	1136	Sep
Ringed Plover	120	540	43	31*	27*	28*	62*	38	Sep
Golden Plover	920	9300	144*	1450	2650*	27*	36*	861	Nov
Grey Plover	30	2000	7*	10	22	10	9	12	Jan
Lapwing	850	72300	919	1350	1384	1058	857	1114	Dec
Knot	160	5300	24	83	78*	67*	26	56	Feb
Little Stint			1*					0	Sep, Nov
Curlew Sandpiper			2*					0	Oct
Dunlin	460	13300	763	3166	3965	4248	1550	2738	Dec
Ruff								0	Nov
Snipe			62*	98	133	23	31	69	Dec
Black-tailed Godwit	200	1100	2146*	3074	2559*	3153*	2976*	2782	Sep
Bar-tailed Godwit	170	1500	172*	241	430*	490	154	297	Jan
Whimbrel			6*	1*	5*	5*	2	4	Sep
Curlew	350	7600	993	849*	1142*	1078*	650*	942	Sep
Spotted Redshank			2*	2	1	1*		1	Feb, Mar, Nov

Redshank	240	2400	1521*	1653	1493	1528*	1392	1517	Oct
Greenshank	20	3300	125*	87	103	100*	72*	97	Oct
Green Sandpiper			2	1*		1*		1	Sep, Dec
Common Sandpiper			2	2	2*	2*		2	Sep
Turnstone	95	1400	80	84	85	124*	100	95	Nov
Kingfisher			1*	2*	1*	2*	1*	1	Sep
Black-headed Gull			3586*	3011*	3955*	3649*	4356*	3711	Sep
Common Gull			283	203	252*	243	111	218	Nov
Lesser Black-backed Gull			106*	217*	220	122	153*	164	Sep, Nov
Herring Gull			152*	149	127*	176*	249*	171	Sep
Great Black-backed Gull			154*	92*	179*	134*	94*	131	Sep
Mediterranean Gull			114*	91	152	56*	237*	130	Sep
Sandwich Tern			3*	40*	199*	110*	5*	71	Sep
Common Tern					15*			3	Sep
Arctic Tern								0	Apr
Ruddy Shelduck			1					0	Jan
American Wigeon								0	Dec
Green-winged Teal								0	Mar
Surf Scoter								0	Nov
Black-necked Grebe							1	0	Feb, Dec
Wilson's Phalarope								0	Sep
Kittiwake			1*					0	Sep
Little Gull								0	Oct
Ring-billed Gull			3*		2	1*		1	Mar
Glaucous Gull			1*					0	Mar
Yellow-legged Gull				1*	1*	3*	1*	1	Sep
Glossy Ibis								0	Feb
Cattle Egret			9*		4	2*		3	Mar, Oct, Dec
Great White Pelican					2*		2*	1	Oct

Figure 1: Count Areas Used in the Study

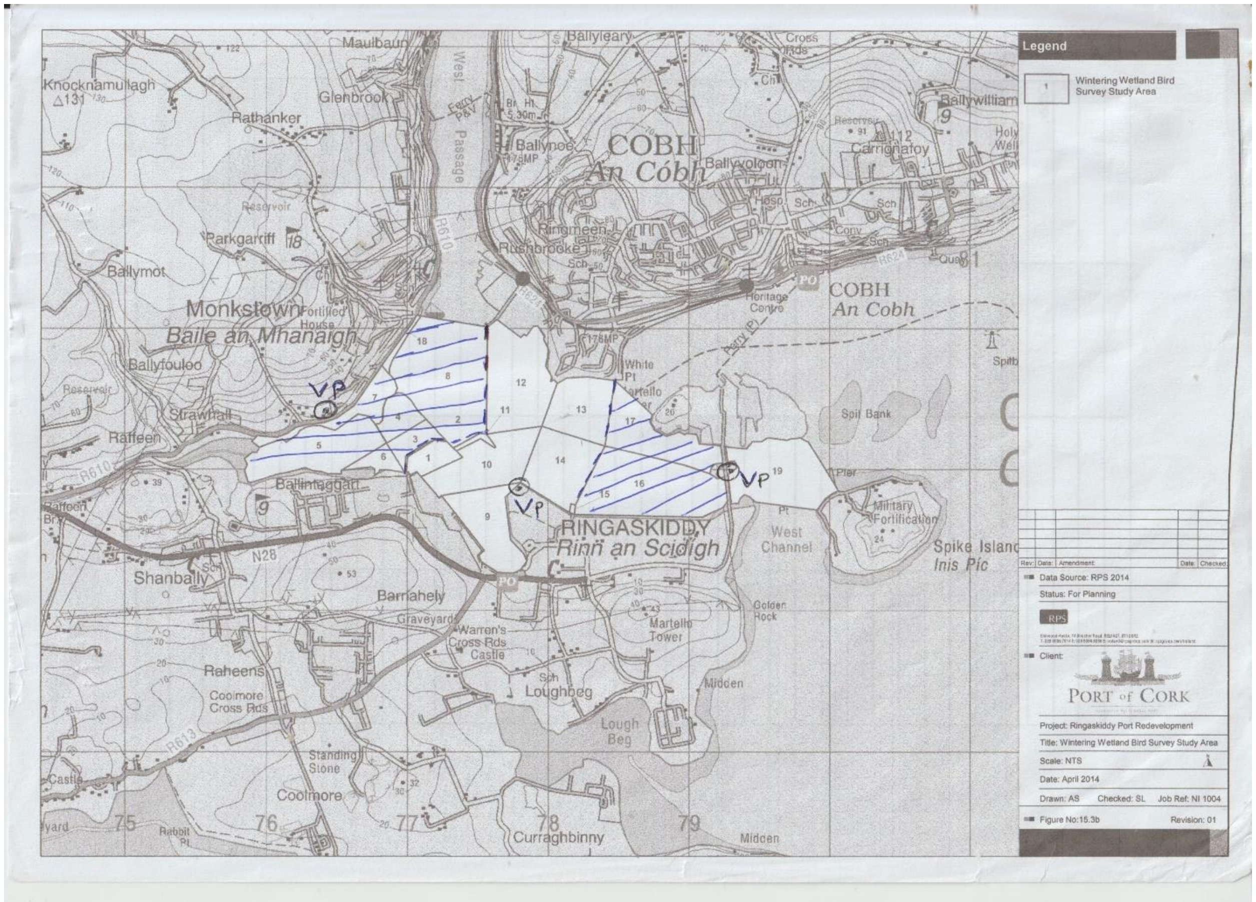


Figure 1: Viewing points marked on a map of west Cork Harbour. From left to right: Monktown, Ringaskiddy and Rocky Island.

Note, Rocky Island vantage point was used to survey an additional count area facing east towards Spike Island from May-August. (Count Area 4).

Figure 2: Stone Breakwater and ADM Jetty

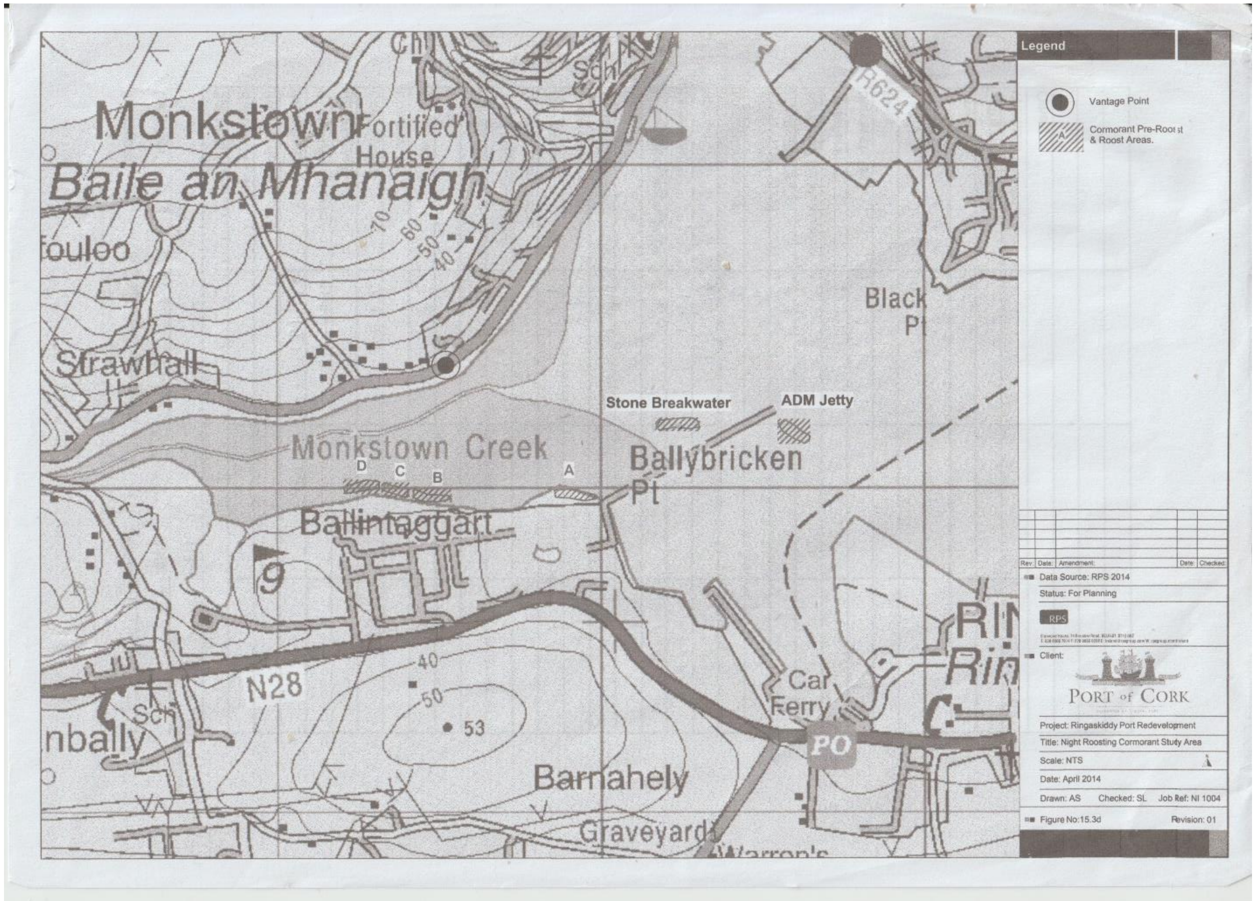


Figure 2: The stone breakwater and ADM jetty indicated just east of Monkstown Creek.

APPENDIX 9.2 BREEDING BIRD SURVEY

Port of Cork Bird Surveys

Report on 2012 Breeding Season Bird Survey at Ringaskiddy

DOCUMENT CONTROL SHEET

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Project Title:	**Port of Cork Bird Surveys**					
Document Title:	**Report on 2012 Breeding Season Bird Survey at Ringaskiddy**					
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This Document Comprises:	**DCS**	**TOC**	**Text**	**List of Tables**	**List of Figures**	**No. of Appendices**
	1	**1**	**11**	**0**	**0**	**3**

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F01	Draft for Client Approval	R. Mundy	A. Fitzgerald	F. Maguire	Cork	18/01/2012

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APPENDICES

1 INTRODUCTION AND OBJECTIVES

This Report presents the findings of a breeding bird survey conducted at Ringaskiddy, Cork Harbour, during the summer of 2012. The objectives of the survey and of this Report are as follows:

- to establish the abundance of all breeding bird species present at the site;
- to identify any breeding bird species of particular interest, such as any species of high conservation concern or any that are locally scarce;
- to identify any breeding bird species for which the site is of particular importance;
- to describe the breeding bird habitats that are present at the site and to identify any that are of particular importance;
- to provide details of any constraints on development of the site by Port of Cork relating to breeding birds, including possible issues relating to Cork Harbour Special Protection Area (SPA); and
- to outline any mitigation measures relating to breeding birds that may be required as part of any development proposal for the site.

2 METHODOLOGY

The breeding bird survey was conducted on six dates: 14th April 2012, 24th May 2012, 25th May 2012, 9th June 2012 and 7th July 2012.

The survey methodology involved a general ‘look-see’ approach with all areas of the site walked, with prolonged pauses to listen for bird vocalisations and to observe birds in order to detect breeding behaviour. All birds’ locations, numbers, behaviour and so on were recorded by annotating field maps and by making notes.

All parts of the site were examined at least twice and all birds either heard or seen were recorded and their locations mapped. All evidence of breeding behaviour, including singing, was recorded. It was not an objective of the survey to establish the precise density or populations of breeding bird species or to locate every territory of every breeding bird species; hence time-consuming intensive methods such as territory mapping or transect counts were not employed. Examination of annotated mapping allowed for the estimates of breeding populations presented in Section 3.2 to be made.

3 RESULTS

3.1 HABITATS FOR BREEDING BIRDS

The northeastern part of the study area comprises a flat reclaimed area dominated by a loose stone, and includes a disused car storage area, with landscaped areas to the south and an extensive area of semi-natural scrub which has developed on a limestone-rich substrate, to the north.

The southern and eastern parts of the study area, the ferry terminal, comprise hardstanding car parking areas and extensive amenity grassland and landscaped areas with some mature trees, mainly exotic conifers.

The western part of the site comprises the Deep Water Port, associated storage areas and warehousing. The study area extends to the two piers at Ballybracken to the northwest of the deep water port, the western stone breakwater supports upper saltmarsh-type habitat and at its base is an area of Sycamore (*Acer pseudoplatanus*) and other mature trees and scrub which is contiguous with a larger area of broadleaved woodland located within the adjacent Pfizer's site (see Figure 1).

3.1.1 Buildings and Hardstanding Surfaces

The Deep Water Port and the Ferry Terminal area comprise buildings and hardstanding surfaces. Both areas are busy port facilities and are subject to high levels of disturbance from pedestrians, vehicles and machinery, particularly the Deep Water Port area, which is an active and busy port facility.

3.1.2 Recolonising Bare Ground

The large former car storage area has a loose stone surface and is becoming vegetated with early coloniser plant species such as willowherbs (*Epilobium* spp.), Pineappleweed (*Matricaria matricaroides*), Groundsel (*Senecio vulgaris*) and numerous other species, mainly annuals, but the general character of the area remains bare loose stone with scattered plants rather than a continuous sward.

3.1.3 Semi-natural Scrub

To the north and southwest of the former car storage area is an extensive area of semi-natural scrub which has developed on a limestone-rich substrate. Dense, mature Common Gorse (*Ulex europaeus*) up to 3m in height dominates, with Elder (*Sambucus nigra*) also frequent. The area includes some open grassland patches which has a calcareous character and numerous well-used paths which break up the scrub forming 'edge' habitats for birds.

3.1.4 Landscaped Areas

The vehicle queuing and parking areas associated with the Ferry Terminal, and its access roads, comprise a large flat landscaped area with scattered trees and shrubs which are mainly exotics, with birch (*Betula* spp.), Rowan (*Sorbus acuparia*) and other species. Stands of larger trees, mainly exotic conifers, occur in the north of this area adjacent to the former vehicle storage areas and along the N28 road (see Figure 1).

3.1.5 Woodland Edge

A small area of woodland occurs in the east of the Deep Water Port on the eastern edge of the site. Whilst only a small number of trees, mainly Sycamore, lie within the site boundary, this area is contiguous with a larger area of broadleaved woodland located within the adjacent Pfizer's site.

3.2 OVERALL RESULTS

Table 3.1 presents details of all breeding bird species recorded during the 2012 survey. There are a number of other bird species that were not recorded during the 2012 survey but which may breed at the site in small numbers in some years including: Cuckoo, Skylark, Stonechat, Willow Warbler, Long-tailed Tit, House Sparrow and Bullfinch.

Table 3.1: Breeding Bird Species Recorded During the 2012 Survey

Common name	Scientific name	Breeding Status*	Estimated Population (number of pairs)	Habitats / Locations
Shelduck	*Tadorna tadorna*	possible	1	Ballybricken Pier area, Monkstown Creek**
Sparrowhawk	*Accipiter nisus*	possible	1	Pfizer's Wood, Monkstown Creek***
Ringed Plover	*Charadrius hiaticula*	probable	2	Disused vehicle storage areas****
Common Tern	*Sterna hirundo*	confirmed	45 to 50	Deep Water Port mooring dolphins
Feral Pigeon	*Columba livia*	confirmed	10	Deep Water Port buildings
Woodpigeon	*Columba palumbus*	probable	3	Trees at ferry terminal, Pfizer's Wood
Collared Dove	*Streptopelia decaocta*	probable	3	Deep Water Port, N28 road
Swallow	*Hirundo rustica*	confirmed	4	Deep Water Port buildings
Pied Wagtail	*Motacilla alba*	confirmed	3	Deep Water Port and ferry terminal buildings
Rock Pipit	*Anthus petrosus*	probable	1	Ferry Terminal
Meadow Pipit	*Anthus pratensis*	probable	2	Scrub, disused vehicle storage area
Wren	*Troglodytes troglodytes*	confirmed	23	Scrub, Deep Water Port, Pfizer's Wood, ferry terminal
Dunnock	*Prunella modularis*	confirmed	18	Scrub
Robin	*Erithacus rubecula*	confirmed	12	Scrub, Pfizer's Wood, ferry terminal
Blackbird	*Turdus merula*	confirmed	18	Scrub, Deep Water Port, Pfizer's Wood
Song Thrush	*Turdus philomelos*	confirmed	5	Scrub, Pfizer's Wood
Whitethroat	*Sylvia communis*	confirmed	2	Scrub
Chiffchaff	*Phylloscopus collybita*	probable	1	Trees at ferry terminal
Goldcrest	*Regulus regulus*	probable	1	Trees at ferry terminal, N28 road
Blue Tit	*Parus caerulus*	confirmed	2	Pfizer's Wood, ferry terminal
Great Tit	*Parus major*	probable	1	Pfizer's Wood
Magpie	*Pica pica*	confirmed	2	Trees at ferry terminal, N28 road
Jackdaw	*Corvus monedula*	confirmed	2	Deep Water Port buildings
Hooded Crow	*Corvus cornix*	probable	2	Pfizer's Wood, ferry terminal
Starling	*Sturnus vulgaris*	confirmed	10	Deep Water Port and ferry terminal buildings
Chaffinch	*Fringilla coelebs*	probable	4	Trees at ferry terminal, N28 road, Pfizer's Wood
Greenfinch	*Carduelis chloris*	probable	4	Trees at ferry terminal, N28 road, Deep Water Port
Goldfinch	*Carduelis carduelis*	probable	1	Pfizer's Wood
Linnet	*Carduelis cannabina*	probable	2	Scrub

* Breeding status is defined as per Sharrock (1976).

** A pair of Shelduck were present around the base of Ballybricken Pier during May and were agitated by the presence of the observer however no nest was found and no ducklings observed later in the summer

*** A pair of Sparrowhawks were seen regularly throughout the summer and probably bred in the woodland at Pfizer's, probably outside the study area

**** Three pairs of Ringed Plover were confirmed breeding at this location in 2011 by observation of recently fledged broods. At least three adult birds were present throughout 2012 however breeding was not confirmed in 2012

4 DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

4.1 ECOLOGICAL VALUE OF THE BREEDING BIRD COMMUNITIES

The most significant feature of the breeding bird community at Ringaskiddy is the breeding colony of the EU Birds Directive Annex I species Common Tern, which is a Qualifying Feature of *Cork Harbour* SPA, located on the mooring dolphins in the Deep Water Port. This colony should be considered as being of 'International Importance' (NRA, 2009) and constitutes a significant constraint to development of the Deep Water Port (see Section 4.2.2).

A range of breeding bird habitats occur within the site boundary, most of which are highly modified by man and are generally of limited value to breeding birds. The habitats of the site support a range of bird species typical of a lowland landscape. Other than Common Tern (see above and Section 4.2.2), none of the species recorded as breeding within the site boundary, or suspected to do so based upon the habitats that are present, is of high conservation concern, however two other species, Ringed Plover (probable breeding 2012, confirmed breeding 2011) and Shelduck (possible breeding) are considered to be of some conservation importance (see below). None of the habitats present within the site boundary can be considered to be of particular importance to breeding birds.

Shelduck is included as Qualifying Interests of *Cork Harbour* SPA for the species' non-breeding population. It is likely that the individual Shelducks recorded during this survey are part of this non-breeding population. As a breeding species, it should be considered part of the ‘Wetlands’ Qualifying Interest of the SPA (see Appendix C). Other waterbird species that are not specifically listed as Qualifying Interests of *Cork Harbour* SPA should, as a whole, also be considered to be included under the ‘Wetlands’ Qualifying Interest of the SPA (see Appendix C), this would include the Ringed Plovers recorded during this survey.

The presence of probable breeding Ringed Plover and possible breeding Shelduck, should be considered as being of ‘Local Importance, Higher Value’ as ‘populations of species that are uncommon in the locality’ (NRA, 2009). In addition, the possibility that the loss of breeding habitat for these species as a result of development of the site may constitute a significant adverse effect on the Conservation Objectives of *Cork Harbour* SPA should be examined through the Appropriate Assessment process. The implications of the presence of these species in terms of the constraints imposed on development of the site are discussed in Section 4.2.

4.2 IDENTIFIED CONSTRAINTS RELATING TO BREEDING BIRDS

4.2.1 All Breeding Bird Species

Other than a small number of ‘excluded species’ such as crows and pigeons, all breeding birds, their young, nests and eggs are protected under Articles 19 and 22 of the Wildlife Act of 1976. Under the provisions of the act it is *inter alia* an offence to destroy or interfere with bird’s nests. In addition, it is an offence under Section 40 of the Act to remove hedgerows and other vegetation during the bird breeding season for purposes other than agriculture or forestry (defined in Section 46 of the Wildlife (Amendment) Act of 2000 as running from the 1st of March to the 31st of October). This imposes a seasonal constraint on construction works at the Marino site in terms of vegetation removal and for the development of the areas where Ringed Plover nest, which is largely free of vegetation.

4.2.2 Common Tern

Between 45 and 50 pairs of Common Tern bred successfully in 2012 at a colony located on the mooring dolphins within the Deep Water Port. There are the three dolphins on the south side of the ferry terminal, adjacent to the Port of Cork security gate and truck weighbridge. Common Tern is an EU Birds Directive Annex I species and is a Qualifying Interest, as a breeding species, of *Cork*

Harbour SPA. Common Terns are present in the area each summer between April and August inclusive.

Adverse effects on this colony or on this species, as a result of any works at Ringaskiddy would constitute an adverse effect on the Conservation Objectives of Cork Harbour SPA and would therefore require the successful completion Stage 3 and Stage 4 Appropriate Assessment in order to be permissible, involving, the demonstration of 'Imperative Reasons of Overriding Public Interest' (IROPI) for progression of the project; demonstration that no alternative solutions are possible that would avoid the adverse effects (e.g. location and design) and the provision of full compensatory measures for impacts on the tern colony. Hence, the presence of this breeding colony of Common Terns must be viewed as a highly significant constraint to development of this part of the Ringaskiddy site.

It is important however to note that the terns have selected a colony location that is subject to extra-ordinarily high levels of disturbance and are therefore habituated to, and highly tolerant of, a range of human activity in very close proximity to the colony. The colony is located less than 50m from a busy road (the N28) and to the vehicle access point to the Port. The proximity to the weighbridge and security gate in particular means that they are habituated to noises such as large truck engines revving, truck air brakes, vehicle doors slamming and human voices at all times of day and night; and to visual disturbance including pedestrians, cars and trucks. In addition, they are within 20m of the location where very large passenger ferries dock and load on a regular basis throughout the summer breeding season and are directly overlooked by passengers on the open decks of the ferries. On infrequent occasions ferries actually moor alongside the dolphins on which the terns nest, bringing the (estimated) 20m vertical metal side of the ferry to within 2 or 3m of the sitting birds on the nests.

Extensive observations over two summer seasons by the author of this Report (RM), who is highly experienced with the breeding biology and behaviour of Common Terns, indicate that none of this human activity induces any severe negative response in the birds, and they have bred successfully at the site for at least the previous three seasons (2010, 2011 and 2012), with the number of nests increasing each year and with no apparent negative effect resulting from human disturbance.

Common Tern is not included under Appendix 7 ‘Species and habitats of special conservation significance within County Cork’ of County Cork Biodiversity Action Plan (Cork Co Co, 2009).

4.2.3 Ringed Plover

This species is a scarce breeding bird in Co Cork, it is not however included under Appendix 7 ‘Species and habitats of special conservation significance within County Cork’ of County Cork Biodiversity Action Plan (Cork Co Co, 2009). Under the National Roads Authority’s criteria (NRA, 2009), which, are widely used as the standard assessment criteria in Ireland, this breeding population should probably be viewed as being of ‘Local Importance, Higher Value’ as a 'Resident or regularly occurring population of a species, assessed to be important at the Local level and protected under the Wildlife Acts'. The loss of this population would be a permanent impact of minor magnitude and of minor extent, affecting up to two pairs of the species, which should be considered to be of significant at a local level (NRA, 2009).

As a Qualifying Interest of *Cork Harbour* SPA under the 'Wetlands' category, loss of breeding habitat for this species should also be considered through the Appropriate Assessment process.

4.2.4 Shelduck

Shelduck is a coastal breeding species, particularly in estuarine environments, and is found throughout Ireland. Co Cork holds a substantial breeding population of the species and as a result

Shelduck is listed under Local Significance Criterion E[1] in Appendix 7 'Species and habitats of special conservation significance within County Cork' of County Cork Biodiversity Action Plan (Cork Co Co, 2009) on the basis that 'there is evidence of decline or a known threat' to the species' population (Threat Criterion B3).

Under the National Roads Authority's criteria (NRA, 2009), which, are widely used as the standard assessment criteria in Ireland, any breeding population of Shelduck present at the site should probably be viewed as being of 'Local Importance, Higher Value' as a 'Resident or regularly occurring population of a species, assessed to be important at the Local level and protected under the Wildlife Acts'. The loss of this population would be a permanent impact of minor magnitude and of minor extent, affecting up to two pairs of the species, which should be considered to be of significant at a local level (NRA, 2009).

As a Qualifying Interest of *Cork Harbour* SPA under the 'Wetlands' category, loss of breeding habitat for this species should also be considered through the Appropriate Assessment process.

4.2.5 Summary of Identified Constraints

Two constraints to development (including clearance) of the site apply with regard to breeding birds as follows:

1. A highly significant constraint with regard to the Common Tern colony at the Deep Water Port. This should be a key consideration in the design of any works, including seasonal timing; and

2. A general constraint on vegetation clearance works, and other works effecting nesting birds, from March to August under the provisions of the Wildlife Acts.

Additional constraints may emerge during the course of the process of Appropriate Assessment of the potential for adverse effects on the Conservation Objectives of *Cork Harbour* SPA under the provisions of Article 6 of the EU Habitats Directive.

Additional constraints will apply to non-breeding birds, including wintering populations of waders and wildfowl which are outside the scope of this report.

[1] Local Significance Criterion E: Species of conservation concern for which Co Cork holds a large proportion of the national/regional population (i.e. a species for which Co Cork is important for maintaining the population at regional or national level).

4.3 LIKELY MITIGATION REQUIREMENTS

The design of any works within the portion of the Deep Water Port where the Common Tern colony is located must be such that relevant Statutory Authorities are satisfied that no adverse effects on the tern colony will occur.

In addition, mitigation measures to eliminate significant impacts on breeding birds during site clearance works may include *inter alia* the following:

1. A seasonal constraint on vegetation clearance and site preparation works between March and August inclusive; and

Additional mitigation measures may be required as a result of Appropriate Assessment of the potential for adverse effects on the Conservation Objectives of *Cork Harbour* SPA under the provisions of Article 6 of the EU Habitats Directive.

Additional mitigation measures will be required to address constraints relating to non-breeding birds, including wintering populations of waders and wildfowl which are outside the scope of this report.

References

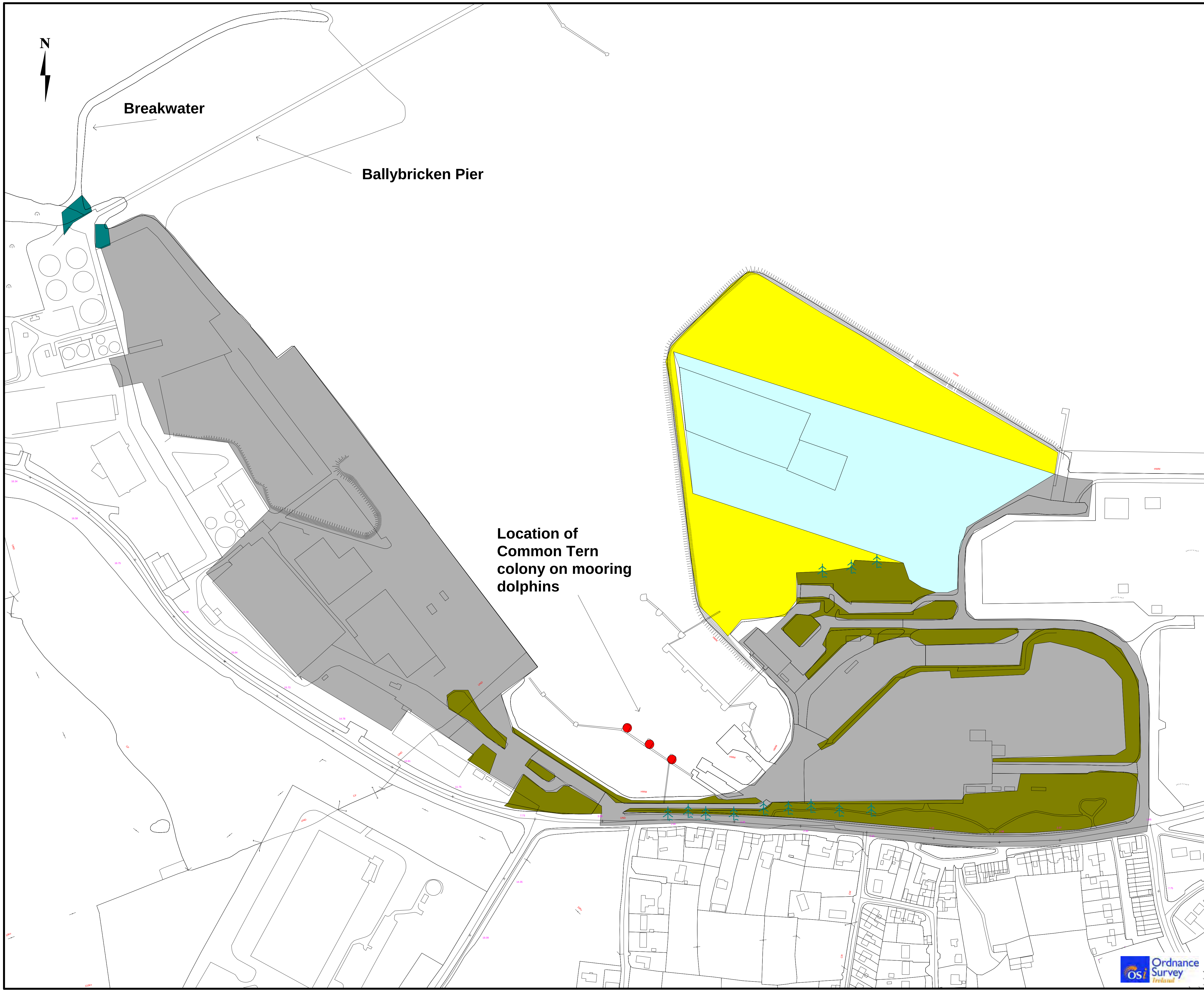
Cork Co Co (2009).County Cork Biodiversity Action Plan 2009 – 2014. Cork County Council.

NRA (2009). Guidelines for Assessment of Ecological Impacts of National Road Schemes; Revision 2, 1st June, 2009. National Roads Authority.

Sharrock, J. T. R. (1976). The Atlas of Breeding Birds in Britain and Ireland. T. & A. D. Poyser, England.

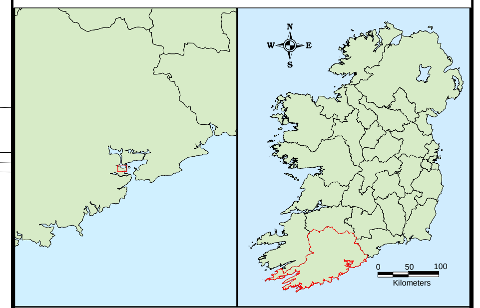
APPENDIX A

FIGURE 1: Location of Breeding Bird Habitats and of Other Features Discussed in this Report



Legend

- Woodland Edge
- Landscaped Areas
- Larger Trees Within Landscaped Areas
- Buildings and Hardstanding Areas
- Semi-natural Scrub
- Recolonising Bare Ground (former car storage area)
- Location of Common Tern Colony on Mooring Dolphins in Deep Water Port



Client

Port of Cork

Project

Port of Cork: Proposed Ringaskiddy Development

Title

Location of Breeding Bird Habitats and Other Features

Figure 1

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Checked by: AMcS		File Ref. MCE0694MI0010A01	
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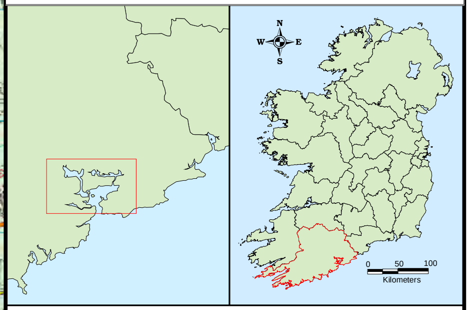
APPENDIX B

FIGURE 2: *Cork Harbour* SPA

Legend

Ringaskiddy Survey Area

Cork Harbour Special Protection Area (SPA)



Port of Cork

Project *Port of Cork Bird Surveys; 2012 Breeding Bird Survey, Ringaskiddy*

Title

Location of Cork Harbour SPA

Figure 2

RPS

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APPENDIX C

Conservation Objectives of *Cork Harbour* SPA
(Site Code 004030)

The following generic text relating to the Conservation Objectives of *Cork Harbour SPA* and to all other Natura 2000 sites is taken from the NPWS website (See:www.npws.ie/protectedsites):

"The overall aim of the Habitats Directive is to maintain or restore the favourable conservation status of habitats and species of community interest. These habitats and species are listed in the Habitats and Birds Directives and Special Areas of Conservation and Special Protection Areas are designated to afford protection to the most vulnerable of them. These two designations are collectively known as the Natura 2000 network.

European and national legislation places a collective obligation on Ireland and its citizens to maintain habitats and species in the Natura 2000 network at favourable conservation condition. The Government and its agencies are responsible for the implementation and enforcement of regulations that will ensure the ecological integrity of these sites.

The maintenance of habitats and species within Natura 2000 sites at favourable conservation condition will contribute to the overall maintenance of favourable conservation status of those habitats and species at a national level.

Favourable conservation status of a habitat is achieved when:

- Its natural range, and area it covers within that range, are stable or increasing; and

- The specific structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future; and

- The conservation status of its typical species is favourable.

The favourable conservation status of a species is achieved when:

- Population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats, and

- The natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and

- There is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis."

Conservation Objectives specific to *Great Island Channel* cSAC are as follows:

Objective 1: To maintain the favourable conservation status of the Qualifying Interests of the SAC; the bird species:

- Wintering Little Grebe (*Tachybaptus ruficollis*) (species code: A004)
- Wintering Great Crested Grebe (*Podiceps cristatus*) (A005)
- Wintering Cormorant (*Phalacrocorax carbo*) (F017)
- Wintering Grey Heron (*Ardea cinerea*) (A028)
- Wintering Shelduck (*Tadorna tadorna*) (A058)
- Wintering Wigeon (*Anas penelope*) (A050)
- Wintering Teal (*Anas crecca*) (A052)
- Wintering Pintail (*Anas acuta*) (A054)
- Wintering Shoveler (*Anas clypeata*) (A056)
- Wintering Red-breasted Merganser (*Mergus serrator*) (A069)
- Wintering Oystercatcher (*Haematopus ostralegus*) (A130)
- Wintering Golden Plover (*Pluvialis apricaria*) (A140)
- Wintering Grey Plover (*Pluvialis squatarola*) (A141)
- Wintering Lapwing (*Vanellus vanellus*) (A142)
- Wintering Dunlin (*Calidris alpina*) (A149)

- Wintering Black-tailed Godwit (*Limosa limosa*) (A156)
- Wintering Bar-tailed Godwit (*Limosa lapponica*) (A157)
- Wintering Curlew (*Numenius arquata*) (A160)
- Wintering Redshank (*Tringa totanus*) (A162)
- Wintering Black-headed Gull (*Chroicocephalus ridibundus*) (A179)
- Wintering Common Gull (*Larus canus*) (A182)
- Wintering Lesser Black-backed Gull (*Larus fuscus*) (A183)
- Breeding Common Tern (*Sterna hirundo*) (A193)

And the Qualifying Feature:

- Wetlands & Waterbirds (A999)

Objective 2: To maintain the extent, species richness and biodiversity of the entire site.

Objective 3: To establish effective liaison and co-operation with landowners, legal users and relevant authorities.

Port of Cork Bird Surveys

Report on 2013 Breeding Season Bird Survey at Ringaskiddy

DOCUMENT CONTROL SHEET

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Rev.	Status	Author(s)	Reviewed By	Approved By	Office of Origin	Issue Date
F01	Draft for Client Approval	N. Robinson	S.Lowry	R. Holbeach	Belfast	05/03/14

TABLE OF CONTENTS

1 INTRODUCTION AND OBJECTIVES

This report presents the findings of a breeding bird survey conducted within the port of Ringaskiddy, Cork Harbour, during the summer of 2013. The objectives of the survey and of this report are as follows:

- to establish the abundance of all breeding bird species present within the survey area;
- to identify any breeding bird species of particular interest, such as any species of high conservation concern;
- to identify any breeding bird species for which the survey area is of particular importance;
- to describe the breeding bird habitats that are present within the survey area and to identify any that are of particular importance;
- to provide details of any constraints on development of the survey area by Port of Cork relating to breeding birds, including possible issues relating to Cork Harbour Special Protection Area (SPA); and
- to outline any mitigation and/or enhancement measures relating to breeding birds that may be required as part of any development proposal for the survey area.

2 METHODOLOGY

The breeding bird survey was conducted over four dates: 14th May 2013, 5th June 2013, 25th June 2013 and 20th July 2013. The survey area is show in Figure 1.

The survey methodology employed was largely based on a scaled down version of the British Trust for Ornithology's (BTO) Common Bird Census (CBC) Technique (Bibby ***et al***., 2000 & Gilbert ***et al***., 1998), with aspects of species specific survey methodologies employed where required (Gilbert ***et al***., 1998). All birds' locations, numbers, behaviour and so on were recorded by annotating field maps and by making notes.

All bird species encountered during survey were mapped and coded using standard BTO 'Species Codes' and 'Categories of Breeding Evidence' e.g. singing male, agitated behaviour, carrying food, recently fledged downy young. No attempts were made to locate nests as such behaviours are generally sufficient to determine probable or confirmed breeding. Survey visits commenced shortly after dawn and were completed before mid-day to coincide with the peak bird activity period. Visits were not made during adverse weather conditions in so far as reasonably practical, and a route was chosen to ensure all parts of the survey area were passed within 100m.

Surveys were undertaken by Nicole Robinson (RPS) a professional ornithologist with considerable experience of undertaking breeding bird surveys in Ireland. The study area was consistent with that outlined in the previous breeding bird survey undertaken in 2012 by Rick Mundy (RPS).

3 RESULTS

3.1 HABITATS FOR BREEDING BIRDS

The northeastern part of the study area comprises a flat reclaimed area dominated by a loose stone, and includes a disused car storage area, with landscaped areas to the south and an extensive area of semi-natural grassland and scrub which has developed on a limestone-rich substrate, to the north. This area is heavily used as an amenity site, primarily for dog walkers.

The southern and eastern parts of the study area, includes the Ringaskiddy Passenger Ferry Terminal, and comprises hardstanding car parking areas and extensive amenity grassland and landscaped areas with some mature trees, mainly exotic conifers.

The western part of the site comprises the Ringaskiddy Deepwater Berth (DWB), associated storage areas and warehousing. The study area also extends to the ADM Jetty to the northwest of the deep water port and the western stone breakwater, which supports upper saltmarsh-type habitat and at its base is an area of Sycamore (***Acer pseudoplatanus***) and other mature trees and scrub which is contiguous with a larger area of broadleaved woodland located within the adjacent Pfizer's site (see Figure 1).

3.1.1 Buildings and Hardstanding Surfaces

The Deepwater Berth and Passenger Ferry Terminal area largely comprise buildings and hardstanding surfaces. Both areas are busy port facilities subject to high levels of disturbance from pedestrians, vehicles and machinery, particularly the Deepwater Berth.

3.1.2 Recolonising Bare Ground

The large temporary storage area has a loose stone surface with establishing vegetation. Early coloniser plant species include willowherbs (***Epilobium*** spp.), Pineappleweed (***Matricaria matricaroides***), Groundsel (***Senecio vulgaris***) and numerous other species, mainly annuals, but the general character of the area remains bare loose stone with scattered plants rather than a continuous sward.

3.1.3 Semi-neutral Grassland and Scrub

To the north and southwest of the former car storage area is an extensive area of semi-neutral grassland with a high degree of scrub. Dense, mature Common Gorse (***Ulex europaeus***) up to 3m in height dominates, with Elder (***Sambucus nigra***) also frequent. The area includes some open grassland patches which has a calcareous character and numerous well-used paths which break up the scrub forming 'edge' habitats for birds.

3.1.4 Landscaped Areas

The vehicle queuing and parking areas associated with the Ferry Terminal, and its access roads, comprise a large flat landscaped area with scattered trees and shrubs which are mainly exotics, with birch (***Betula*** spp.), Rowan (***Sorbus acuparia***) and other species. Stands of larger trees, mainly exotic conifers, occur in the north of this area adjacent to the former vehicle storage areas and along the N28 road which runs to the south of the survey area (see Figure 1).

3.1.5 Pfizers Woodland

A small area of woodland occurs in the east of the Deepwater Berth on the eastern edge of the site. Whilst only a small number of trees, mainly Sycamore, lie within the survey area, this area is contiguous with a larger area of broadleaved woodland located within the adjacent Pfizer landholding.

3.2 OVERALL RESULTS

A full list of bird species recorded during the 2013 survey effort is provided in Table 3.1. The breeding status of all species encountered during survey were classified into four categories: Confirmed (Br), Probable (Pr), Possible (Po) and Non-breeder (N), based on BTO Categories of Breeding Evidence:

Non-breeder (N)
- Flying Over (F)
- Migrant (M)
- Summering non-breeder (U)

Possible breeder (Po)
- Observed in suitable nesting habitat (H)
- Singing Male (S)

Probable breeder (Pr)
- Pair in suitable nesting habitat (P)
- Permanent Territory (T)
- Courtship and Display (D)
- Visiting probable nest site (N)
- Agitated Behaviour (A)
- Brood patch of incubating bird (I)
- Nest Building or excavating nest-hole (B)

Confirmed breeder (Br)
- Distraction-display or injury feigning (DD)
- Used nest or eggshells found from current season (UN)
- Recently fledged young or downy young (FL)
- Adults entering or leaving nest-site indicating occupied nest (ON)
- Adult carrying faecal sac or food for young (FF)
- Nest containing eggs (NE)
- Nest with young seen or heard (NY)

Only the highest level of breeding evidence recorded for each species i.e. that most furthest down the list above is given in Table 3.1. Where a species was encountered within suitable nesting habitat but was known with a high degree of certainty not to have bred within the survey area, the species is categorised as a non-breeder.

Table 3.1: Breeding Bird Species Recorded During the 2013 Survey.

Species	Breeding Status*	Estimated No. of pairs	Habitats / Locations
Blackbird *Turdus merula*	Br-FF	14	Scrub, Deep Water Port, Pfizer's Woodland, Landscaped Areas
Blue Tit *Parus caerulus*	Pr-A	2	Pfizer's Woodland, Landscaped Areas
Chaffinch *Fringilla coelebs*	Pr-A	3	Landscaped Areas, Pfizer's Woodland, Scrub
Chiffchaff *Phylloscopus collybita*	Po-S	1	Pfizer's Woodland
Collared Dove *Streptopelia decaocta*	Br-ON	2	Landscaped Areas and Pfizer's Woodland
Common Tern *Sterna hirundo*	Br-NY	42 to 48	Deepwater Berth Mooring Dolphins - additional 2-3 pairs occupied the Pfizers Golf Course Lake site in early June.
Dunnock *Prunella modularis*	Pr-A	12	Scrub, Landscaped Areas
Feral Pigeon *Columba livia*	Br-NY	c.7-11	Deepwater Berth (buildings and mooring dolphins)

Species	Breeding Status*	Estimated No. of pairs	Habitats / Locations
Goldcrest *Regulus regulus*	Pr-T	1	Landscaped Areas
Great Tit *Parus major*	Pr-P	2	Pfizer's Woodland, Landscaped Areas
Greenfinch *Carduelis chloris*	Pr-P	3	Landscaped Areas
Jackdaw *Corvus monedula*	Br-ON	3	Deepwater Berth (buildings and machinery)
Linnet *Carduelis cannabina*	BR-FL	4	Scrub
Magpie *Pica pica*	Br-FL	3	Landscaped Areas, Pfizer's Woodland
Meadow Pipit *Anthus pratensis*	Pr-A	2	Recolonising Bare Ground - Temporary Storage Area
Pied Wagtail *Motacilla alba*	Pr-N	3	Deepwater Berth and Ferry Terminal
Ringed Plover *Charadrius hiaticula*	Br-ON	2-3	**Recolonising Bare Ground - Temporary Storage Area
Robin *Erithacus rubecula*	Br-FL	10	Scrub, Pfizer's Woodland, Landscaped Areas
Rock Pipit *Anthus petrosus*	Po-H	1	Deepwater Berth (rock armouring)
Shelduck *Tadorna tadorna*	Po-H	0-1	***Monkstown Creek
Song Thrush *Turdus philomelos*	Pr-A	3	Scrub, Pfizer's Woodland
Sparrowhawk *Accipiter nisus*	Po-H	0-1	****Pfizer's Woodland
Starling *Sturnus vulgaris*	Br-NY	8	Deepwater Berth (buildings and machinery), Ferry Terminal
Swallow *Hirundo rustica*	Br-NY	5	Deepwater Berth (buildings)
Whitethroat *Sylvia communis*	Pr-T	2	Scrub
Woodpigeon *Columba palumbus*	Po-H	1	Pfizer's Woodland
Wren *Troglodytes troglodytes*	Br-FL	18	Scrub, Landscaped Areas, Pfizer's Woodland

* Breeding status coded as per BTO Categories of Breeding Evidence.
**Three pairs of Ringed Plover were confirmed breeding at this location in 2011 by observation of recently fledged broods (R.Mundy, *Pers Obvs*). At least five adult birds were present throughout 2013, but successfully fledged young were not recorded. The vehicle storage area experienced significant disturbance during the 2013 survey effort
***A pair of Shelduck were present on the Monkstown Creek side of the stone breakwater during May and June 2013, however no nest was suspected and no ducklings observed later in the summer.
****A male Sparrowhawk was seen regularly perching on a storage tower within the Pfizer landholding. It is likely a pair hold a territory within the Pfizer Woodland as recorded in 2012.

There are a number of other bird species that were not recorded during the 2013 survey but which may breed within or immediately adjacent to the survey area in small numbers in some years including: Cuckoo ***Cuculus canorus***, Skylark ***Alauda arvensis***, Stonechat ***Saxicola rubicola***, Willow Warbler ***Phylloscopus trochilus***, Long-tailed Tit ***Aegithalos caudatus***, House Sparrow ***Passer domesticus*** and Bullfinch ***Pyrrhula pyrrhula***.

4 DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

4.1 ECOLOGICAL VALUE OF THE BREEDING BIRD COMMUNITIES

The most significant feature of the breeding bird community within the survey area is the breeding colony of EU Birds Directive Annex I species Common Tern, which is a Species of Conservation Interest (SCI) in Cork Harbour SPA. This sub-colony of the larger Cork Harbour SPA breeding population is located on the mooring dolphins within the Ringaskiddy Deep Water Berth (DWB) and is considered as being of Very High Ecological Value or of 'International Importance' (NRA, 2009), constituting a significant ecological constraint to any potential development within the DWB.

The remaining breeding bird assemblage which occurs within the development footprint, comprising highly modified habitats, is typical of a lowland landscape. With the exception of Common Tern, no species confirmed as breeding within the survey area, are considered to be of high or very high conservation concern, however there are several species of Low Ecological Value including Linnet, Ringed Plover, Shelduck, Sparrowhawk, Starling and Swallow which breed within or immediately adjacent to the survey area.

4.1.1 Breeding Bird Species - General

With the exception of those species listed on the Third Schedule, all wild breeding birds, their in-use nests, eggs and dependent young are protected under the provisions of Articles 19 and 22 of the Wildlife Act. It is an offence under Section 46 of the Act to cut, grub, burn or otherwise destroy any vegetation (unless for the purposes of cultivation) during the period beginning on the 1st day of March and ending on the 31st day of August, which corresponds to the breeding bird season.

4.1.2 Common Tern

Between 45 and 50 pairs of Common Tern have nested in both 2012 and 2013 at a colony located on the mooring dolphins within the Ringaskiddy DWB. These are the three dolphins on the south side of the passenger ferry terminal, adjacent to the Port of Cork security gate and truck weighbridge. Common Tern is an EU Birds Directive Annex I species and is a SCI, as a breeding species, of Cork Harbour SPA. Common Terns are present in Cork Harbour area each summer between April and August.

The Ringaskiddy colony is a sub-colony of the Cork Harbour SPA population. Adverse effects on this colony or on this species, as a result of any developments undertaken within close proximity to the colony during the breeding season or which may alter the suitability of the dolphins for the species, resulting in the desertion of the site, would constitute a significant adverse effect on the Conservation Objectives of Cork Harbour SPA and would therefore require the successful completion Stage 3 and Stage 4 Appropriate Assessment in order to be permissible, involving, the demonstration of 'Imperative Reasons of Overriding Public Interest' (IROPI) for progression of the project; demonstration that no alternative solutions are possible that would avoid the adverse effects (e.g. location and design) and the provision of full compensatory measures for impacts on the tern sub-colony.

It is important however to note that the terns have selected a nesting location that is subject to extra-ordinarily high levels of disturbance, which they have seemingly habituated to, and are relatively tolerant of, a range of human activity in very close proximity to the colony (R. Mundy & N. Robinson, ***Pers Obvs***). The colony is located c.50m from the busy N28 and to the vehicle entrance point to the DWB. The proximity to the weighbridge and security gate in particular means that they are habituated to noises such as large truck engines revving, truck air brakes, vehicle doors slamming and human voices at all times of day and night; and to visual disturbance including pedestrians, cars and trucks. In addition, they are within 20m of the location where very large passenger ferries dock and load on a regular basis throughout the summer breeding season and are directly overlooked by passengers on the open decks of the ferries. On infrequent occasions ferries actually moor alongside the dolphins on which the terns nest, bringing the (estimated) 20m vertical metal side of the ferry to within 2 or 3m of the sitting birds on the nests.

Extensive observations over three summer seasons by Rick Mundy and Nicole Robinson (RPS) indicate that none of this human activity induces any severe, permanent, negative response on the colony, and pairs have bred successfully at the site for at least the previous four seasons, with the number of nests increasing or stable each year.

Common Tern is not included under Appendix 7 'Species and habitats of special conservation significance within the County Cork Biodiversity Action Plan (Cork Co Co, 2009).

4.1.3 Shelduck

Shelduck is a coastal breeding species and is found throughout the island of Ireland. County Cork holds a substantial breeding population of the species and as a result Shelduck is listed under Criterion B3[1] and E[2] in Appendix 7 'Species and habitats of special conservation significance within County Cork' of County Cork Biodiversity Action Plan (Cork Co Co, 2009).

Under the National Roads Authority's criteria (NRA, 2009), which are widely used as the standard assessment criteria in Ireland, any breeding population of Shelduck which may therefore occur on the site probably be viewed as being of 'Local Importance, Higher Value' as a 'Resident or regularly occurring population of a species, assessed to be important at the Local level and protected under the Wildlife Acts'.

4.1.4 Summary of Identified Constraints

Two constraints to development (including clearance) of the survey area apply with regard to breeding birds as follows:

1. A highly significant constraint with regard to the Common Tern sub-colony location on the mooring dolphins within the Deepwater Berth. This should be a key consideration in the design of any works, including seasonal timing; and

2. A general constraint on vegetation clearance works, and other works effecting nesting wild birds, from March to August under the provisions of the Wildlife Acts.

4.2 LIKELY MITIGATION REQUIREMENTS

The design of any works within the area of the DWB where the Common Tern sub-colony is located must be such that relevant Statutory Authorities are satisfied that no adverse effects on the tern colony will occur.

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[1] Any species where data deficiency precludes listing as B1/B2 but where there is evidence of decline of a known threat also includes e.g. restricted geographical range, highly specialised habitat requirements, pressures from disease, reduction in food supply, threats to habitat etc.

[2] Local Significance Criterion E: Species of conservation concern for which Co Cork holds a large proportion of the national/regional population (i.e. a species for which Co Cork is important for maintaining the population at regional or national level).

In addition, mitigation measures to eliminate significant impacts on breeding birds during site clearance works may include ***inter alia*** the following:

- A seasonal constraint on vegetation clearance and site preparation works between March and August inclusive.

4.3 ENHANCMENT MEASURES

4.3.1 Common Tern

Due to the existing level of disturbance the location of the Common Tern colony on the mooring dolphins within the (DWB) is not seen as a sustainable or secure long-term breeding location for this sub-colony. It has therefore been recommended by RPS that POC in consultation with the relevant Statutory Authority and personnel put in place habitat enhancement and creation measures, in order to safeguard the current sub-colony location on the mooring dolphins but to encourage the uptake of alternative structures.

RPS propose the following measures to be considered for implementation prior to the 2014 breeding, season following a formal consultation with NPWS and Birdwatch Ireland over their suitability.

4.3.1.1 Existing Sub-Colony Enhancement Measures

- Further installation of wooden kerbing which currently edges part of each mooring dolphin to guide nesting attempts away from the working areas. The installation of kerbing will also serve to increase nesting opportunities and stabilise nesting material.

- Provision of additional nesting material to the mooring dolphins within the kerbed areas.

- Installation of chick shelters e.g. ridge tiles to the mooring dolphins to further increase nesting opportunities and to provide shelter to chicks.

4.3.1.2 New Colony Creation Measures

The measures outlined below are by no means definitive but are intended to provide a point for further discussion:

- Removal of the connecting gangway to the terminal platform of the existing Ringaskiddy Jetty, to create a new location for a proportion of the DWB sub-colony. The jetty lies within the known commuting routes of foraging terns from the DWB sub-colony and Martello Tower sub-colonies. The additional provision of wooden kerbing, nesting material, chick shelters, along with the use of adult decoys and playback tern calls will likely increase the site’s attractiveness.

- The provision of wooden curbing, nesting material, chick shelters on the terminal platforms of the western and eastern arms of the ADM Jetty may also serve as alternative locations for a proportion of the existing DWB sub-colony. The jetty lies within the known commuting routes of foraging terns from the Ringaskiddy colony with adult birds regularly recorded perching on the jetty's guard rails. The use of adult decoys and playback tern calls will likely increase the site's attractiveness.

- Remedial measures at historical nesting locations within Lough Beg and the lake within the Pfizer owned Rafeen Creek Golf Course.

- The provision of tern rafts or platforms within Lough Beg or Rafeen Creek Golf Course.

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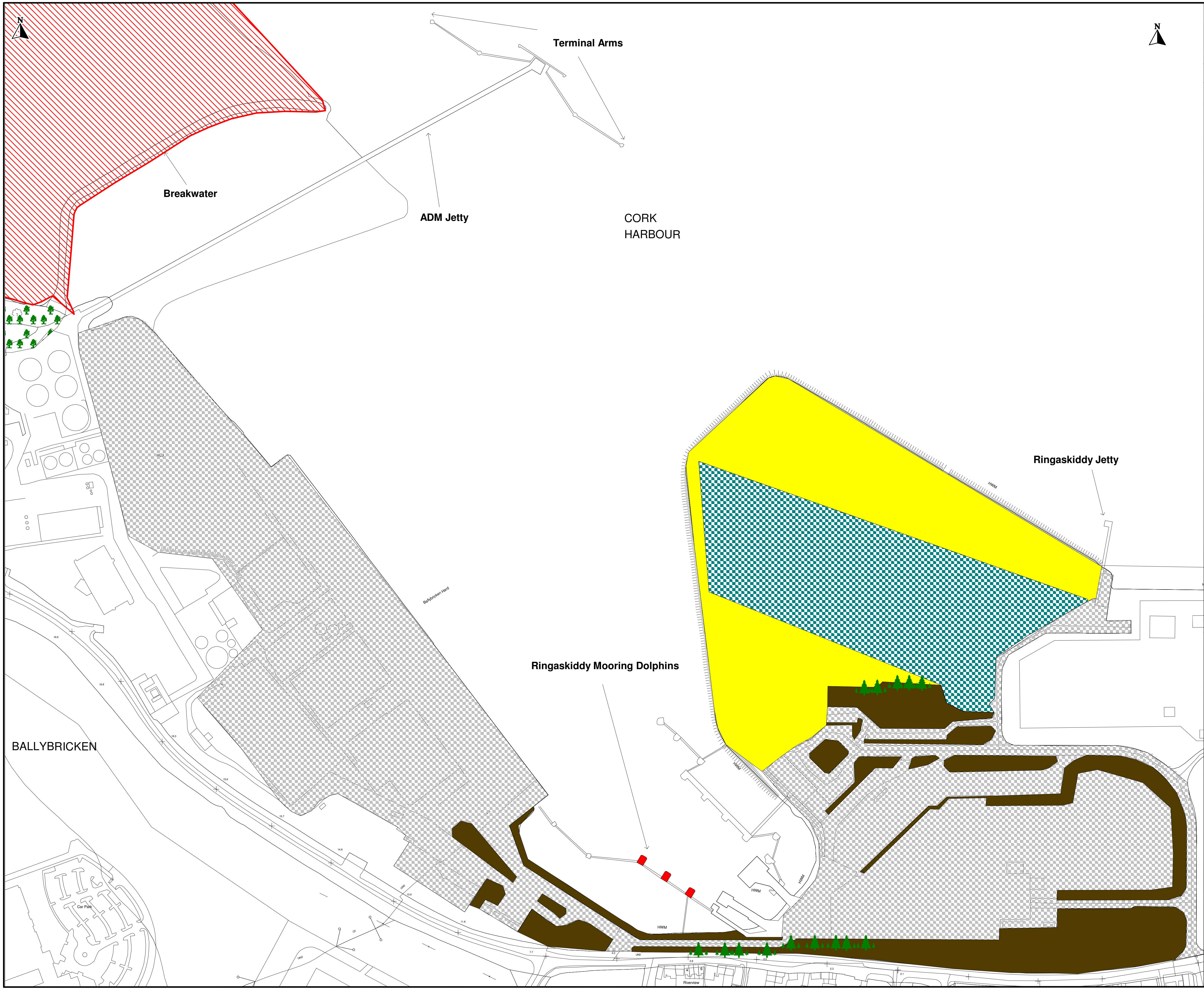
FIGURE 1: Location of Breeding Bird Habitats and Other Features.



Notes 1. This drawing is the property of RPS Planning & Environment. It is a confidential document and must not be copied, used, or its contents divulged without prior written consent.

LEGEND

- Cork Harbour Special Protection Area
- Pfizers Woodland
- Buildings and Hardstanding
- Landscaped Areas
- Recolonising Bare Ground (Car Storage Area)
- Semi-Natural Grassland + Scrub
- Mature Scattered Trees
- Location of Common Tern Colony on Mooring Dolphins within Deep Water Port

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APPENDIX 9.3 REPORT ON THE WINTER 2011-2012 BIRD SURVEYS

RPS

Port of Cork Bird Surveys

Report on the Winter 2011 / 2012 Bird Survey at Ringaskiddy / Monkstown Creek

DOCUMENT CONTROL SHEET

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A01	Draft for Client Approval	R. Mundy	J.McCrory		Cork	30th July 2012

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APPENDICES

1 INTRODUCTION

This report presents the findings of the field survey work conducted by ornithological staff from RPS during the winter of 2011 / 2012. The objectives of the study were as follows:

1. To examine the pattern of usage of marine, intertidal and adjacent terrestrial areas in the vicinity of Ringaskiddy, by birds during the period autumn 2011 to spring 2012;

2. To identify locations of key importance to birds; and

3. To generate data which can be used for forthcoming Impact Assessments (Environmental Impact Assessment and Appropriate Assessment) of proposed port development works at Ringaskiddy.

Special attention is paid to four locations within the Study Area (see Figure 1 in Appendix A), which are likely to be of particular relevance to the proposed Port of Cork development, as follows:

- The stone breakwater at the northeastern corner or Monkstown Creek, which currently separates the creek from the Deep Water Port area to the southeast;
- The elevated metal pier, which runs parallel to the breakwater to its southeast;
- The area of intertidal habitat beneath the metal pier and adjacent to the stone breakwater; and
- The intertidal area immediately to the north of the stone breakwater.

Results from these locations are discussed in the context of the Study Area as a whole and in the context of the Monkstown Creek portion of *Cork Harbour* SPA.

2 METHODOLOGY

The methodology was based upon counts from the shore of birds within subdivisions of the Study Area using 10x magnification binoculars and a tripod-mounted telescope with 20x to 60x magnification. The Study Area and the arrangement of Count Areas within the Study Area are presented in Figure 1 in Appendix A. Boundaries of the Count Areas were selected primarily to delineate patches of relatively homogenous habitat within the Study Area in order to compare bird usage of these different habitats and spatial areas; but were also selected to be easily perceived by the observer. This was done by use of sight-lines to prominent landmarks such as permanent marker buoys, coastal features and features on the horizon.

All birds present within the counts areas other than passerines, doves and pigeons were identified to species and their behaviour noted as either feeding (F); or engaged in other activity such as roosting, resting or preening (R). Birds flying over the count area but not utilising the resources within it, were not included in the counts, however notes were made on any substantial movements of birds that were observed.

Counts were conducted between the 20th of October 2011 and the 30th of March 2012. A total of 14 counts were conducted, seven at high tide and seven at low tide, each covering the entire Study Area (see Figure 1 in Appendix A). Each Count is given a code which is referred to throughout this Report. Details are presented in Table 2.1.

Table 2.1: Summary of Field Monitoring Effort, Winter 2011 / 2012

Date	High Tide Count Code	Low Tide Count Code
20/10/2011	**H1**	**-**
25/10/2011	**-**	**L1**
11/12/2011	**-**	**L2**
18/12/2011	**H2**	**-**
27/12/2011	**-**	**L3**
31/12/2011	**H3**	**-**
17/01/2012	**H4**	**-**
21/01/2012	**-**	**L4**
01/02/2012	**H5**	**-**
07/02/2012	**-**	**L5**
20/02/2012	**H6**	**-**
05/03/2012	**-**	**L6**
30/03/2012	**H7**	**L7**

3 SUMMARY OF KEY SURVEY RESULTS

Tables 3.1 presents a summary of the peak numbers of each species recorded in the Study Area during the high tide and low tide counts. Tables 3.2 and 3.3 present the peak counts for each species from each Count Area during the high tide (Table 3.2) and low tide (Table 3.3) counts.

Table 3.1: Summary of High Tide and Low Tide Counts for Entire Study Area (Count Code is indicated for all totals)

Species	Max. High Tide Count	Max. Low Tide Count
Bar-tailed Godwit	**2** ^{H2}	**0**
Black Guillemot	**0**	**1** ^{L3}
Black-headed Gull	**275** ^{H2}	**317** ^{L4}
Black-tailed Godwit	**38** ^{H7}	**100** ^{L3}
Brent Goose	**3** ^{H2}	**18** ^{L2}
Common Gull	**62** ^{H6}	**95** ^{L3}
Common Tern	**1** ^{H1}	**0**
Cormorant	**74** ^{H1}	**64** ^{L1}
Curlew	**49** ^{H1}	**59** ^{L1}
Dunlin	**350** ^{H3}	**198** ^{L2}
Great Black-backed Gull	**93** ^{H1}	**71** ^{L1}
Great Crested Grebe	**2** ^{H3}	**2** ^{L2}
Greenshank	**7** ^{H1}	**4** $^{L1, L3}$
Grey Heron	**26** ^{H1}	**34** ^{L1}
Herring Gull	**195** ^{H1}	**89** ^{L1}
Lapwing	**600** ^{H3}	**400** ^{L4}
Lesser Black-backed Gull	**14** ^{H1}	**7** $^{L1, L2}$
Little Egret	**1** $^{H1, H5}$	**2** ^{L4}
Mallard	**37** ^{H3}	**50** ^{L3}
Mediterranean Gull	**0**	**1** ^{L3}
Mute Swan	**0**	**2** $^{L3, L4, L5}$
Oystercatcher	**96** ^{H3}	**108** ^{L1}
Red-breasted Merganser	**0**	**1** ^{L4}
Redshank	**84** ^{H1}	**52** ^{L1}
Sandwich Tern	**2** ^{H7}	**0**
Shag	**12** ^{H4}	**9** ^{L2}
Shelduck	**113** ^{H5}	**120** ^{L5}
Snipe	**0**	**11** ^{L2}
Teal	**80** ^{H3}	**54** $^{L5, L6}$
Turnstone	**44** $^{H4, H5}$	**18** ^{L4}
Whimbrel	**0**	**1** ^{L7}

Table 3.2: Peak High Tide Counts of Each Species by Count Area

Species	Count Area																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Bar-tailed Godwit	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Black Guillemot	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Black-headed Gull	0	16	0	1	17	10	4	12	180	6	21	5	7	0	39	3	4	16
Black-tailed Godwit	0	38	0	0	3	1	0	0	0	0	0	0	0	0	0	0	0	0
Brent Goose	0	1	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0
Common Gull	0	0	0	0	0	0	0	2	6	3	50	2	2	0	0	2	5	5
Common Tern	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Cormorant	1	37	0	0	0	0	1	8	1	1	44	2	1	1	0	1	3	0
Curlew	0	1	0	0	7	42	1	0	0	0	0	0	0	0	0	0	0	1
Dunlin	0	350	0	0	0	0	0	0	0	0	75	0	0	0	0	0	0	0
Great Black-backed Gull	1	2	0	0	1	0	0	1	10	1	0	1	1	0	0	0	1	0
Great Crested Grebe	0	0	0	0	1	1	0	1	0	0	0	0	0	0	0	0	0	0
Greenshank	0	4	0	0	2	1	0	0	0	0	0	1	1	0	0	0	0	0
Grey Heron	0	21	0	0	0	20	0	0	3	0	2	1	0	0	0	0	0	0
Herring Gull	0	0	0	0	0	0	0	9	120	1	51	2	1	0	1	0	4	0
Lapwing	0	600	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lesser Black-backed Gull	1	0	0	2	1	0	0	2	3	0	7	0	0	0	0	0	0	0
Little Egret	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0
Mallard	0	0	0	0	23	12	3	0	0	0	0	4	0	0	0	4	0	0
Mediterranean Gull	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mute Swan	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Oystercatcher	0	88	0	0	5	12	33	0	0	0	0	2	3	0	0	4	0	0
Red-breasted Merganser	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Redshank	0	61	0	0	5	21	2	0	0	0	0	2	0	1	0	2	0	0
Sandwich Tern	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0
Shag	0	6	0	0	0	0	0	1	0	1	1	0	0	3	0	2	2	0
Shelduck	2	18	2	0	77	34	0	0	0	0	0	0	0	0	0	0	0	0
Snipe	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Teal	0	0	0	0	80	10	2	0	0	0	0	0	0	0	0	0	0	0
Turnstone	0	18	0	0	26	0	9	0	0	0	0	30	35	0	0	0	0	0
Whimbrel	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 3.3: Peak Low Tide Counts of Each species by Count Area

Species	Count Area																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Bar-tailed Godwit	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Black Guillemot	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Black-headed Gull	125	0	12	35	26	0	22	12	90	4	2	10	206	6	0	144	5	77
Black-tailed Godwit	4	0	2	61	15	18	30	0	0	0	0	6	8	0	0	9	0	0
Brent Goose	0	2	0	3	0	0	8	0	0	0	0	0	10	0	0	0	0	9
Common Gull	8	0	8	4	0	0	1	2	9	0	7	2	62	1	0	20	5	0
Common Tern	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cormorant	2	27	14	4	0	0	1	3	3	2	36	4	3	5	0	3	4	0
Curlew	3	1	15	23	11	4	9	0	0	0	0	1	2	0	1	4	1	4
Dunlin	120	0	7	64	0	0	35	0	0	0	0	0	0	0	0	12	0	0
Great Black-backed Gull	14	3	1	2	2	1	2	1	128	0	14	2	2	1	0	4	2	0
Great Crested Grebe	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	5	0	0
Greenshank	0	0	0	0	1	0	2	0	0	0	0	0	0	1	0	1	1	0
Grey Heron	1	18	1	1	3	9	2	0	3	1	1	3	2	1	0	2	2	1
Herring Gull	8	1	2	1	1	0	3	2	55	0	7	4	37	2	0	7	5	5
Lapwing	380	270	190	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0
Lesser Black-backed Gull	1	0	2	1	4	4	3	0	2	0	0	0	2	0	0	0	0	0
Little Egret	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1
Mallard	0	1	8	0	12	0	38	0	1	0	0	0	0	0	0	10	0	0
Mediterranean Gull	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Mute Swan	0	0	0	0	2	0	2	0	2	0	0	0	0	0	0	0	0	0
Oystercatcher	19	4	7	4	11	3	38	0	0	0	0	12	8	5	0	23	18	18
Red-breasted Merganser	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Redshank	4	0	4	17	17	1	36	0	0	0	0	1	2	1	0	9	2	13
Sandwich Tern	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Shag	0	5	1	0	0	0	0	1	0	1	0	1	0	0	0	3	3	0
Shelduck	3	0	15	10	73	24	11	10	0	0	0	19	0	0	0	2	0	0
Snipe	8	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Teal	0	0	0	0	7	0	51	0	0	0	0	0	0	0	0	0	0	0
Turnstone	4	1	0	0	0	0	13	0	0	0	0	0	1	0	0	5	0	7
Whimbrel	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0

4 ANALYSIS OF RESULTS BY SPECIES

4.1 CORMORANT

Large numbers of Cormorants (up to 259 birds per night in winter 2011 / 2012) roost at night in trees on the southern shore of Monkstown Creek. The stone breakwater and metal pier are used as a high tide roost and also as a ‘pre-roost’ by birds heading to the trees.

At high tide, the numbers of birds roosting on the two structures was broadly similar to one another with a total of 106 records of roosting birds recorded on each over the course of the fourteen counts. The highest Count on the metal pier was 37 (Count ‘H6’), the highest number on the stone breakwater was 44 (Count ‘H1’), however larger numbers than this gather on both structures, particularly on the stone breakwater, during the evening pre-roost. Details of night-time tree-roosting Cormorants at Monkstown Creek in 2011 / 2012 are presented by in the Report: *Night-roosting Cormorant at Monkstown Creek, Cork Harbour 2011 / 2012* (RPS, 2012).

Cormorants were recorded feeding throughout the Study Area predominantly at low tide; there were 62 records of feeding Cormorants at low tide and 23 at high tide. Highest numbers were recorded feeding in Area 13 at low tide and in Area 8 at high tide, however no clearly preferred feeding area was identified.

4.2 GREY HERON

Grey Herons were recorded throughout the period with higher numbers between autumn and mid-winter, with a peak count of 34 in late October (Count ‘L1’). The number of Grey Herons recorded declined substantially during February and into March with a maximum of only 9 on any count after the 7th of February (Count ‘L7’).

There were 86 records of Grey Heron at high tide and 99 at low tide. All high tide records were of roosting birds, no Grey Herons were recorded feeding at high tide. At low tide, 51 were recorded feeding and 48 roosting. Whilst feeding birds were widely distributed around the Study Area, there was a concentration in Area 12 (11 records) and Area 13 (6 records) probably associated with the small breeding colony at Black Point which lies between these two count areas.

Roosting birds at both high tide and low tide were concentrated on the stone breakwater (74 records with a peak count of 21 on Count ‘H1’) or at the small beach at its base (47 records with a peak count of 20 on Count ‘H4’) (see Figure 2 in Appendix B). The remaining 13 records of roosting Grey Herons came from scattered locations, there were five records of up to 2 birds roosting in Area 11, the metal pier.

4.3 SHELDUCK

The number of Shelduck in the Study Area increased gradually from only 8 birds (Count ‘H1’) and 14 birds (Count ‘L1’) in October, to 69 birds in late-December (Counts ‘L3’ and ‘H3’); and to a peak of 120 birds in early-February (Count ‘L5’) before declining again during February and March to 38 birds at low tide in late-March (Count ‘L7’) and only 16 at high tide (Count ‘H7’).

At all times the main concentration of feeding birds at low tide was within Monkstown Creek. Of a total of 351 low tide records of feeding Shelduck, 311 were from within the creek and only 40 records from elsewhere; of these only 7 records of feeding Shelduck were from Area 1, the ‘reclamation area’ (see also Section 5.2).

Within Monkstown Creek, feeding Shelduck were widely distributed, mainly to the east of the base of the stone breakwater and to the south of the creek’s channel. Of the 351 records of feeding birds, 191 came from Area 5; 42 from Area 6; 38 from Areas 3; 22 from Area 7 and 16 from Area 4 (see Figure 1 in Appendix A).

At high tide, roosting Shelduck concentrated along the southern shore of Monkstown Creek. Of a total of 401 high tide records of roosting Shelduck, 229 were from Area 5; 115 from area 6; 53 from Area 2 (the stone breakwater); 2 from Area 1 (the ‘reclamation area’) and 2 from Area 3 (see Figure 1 in Appendix A).

4.4 LAPWING

Lapwing were present between December and early February in the Study Area. The only record outside this period was of two birds in Area 7 on Count ‘H1’ in October. A Lapwing flock numbering up to 600 birds roosted in this area but no Lapwing were observed feeding during the study despite the presence of the flock in the area at low tide as well as at high tide.

The activity of the wintering Lapwing flock within the Study Area was centred around the stone breakwater (Area 2) with birds recorded only from Areas 1, 2 and 3, with a peak of 600 birds present during Count ‘H3’ in late December. Other than this high count, numbers on and around the breakwater were between 190 and 400; however flocks totalling 200 Lapwing were also seen in flight to the west of the Study Area, in the vicinity of Rafeen Village at a time when 400 Lapwing were present within the Study Area (Count ‘H4’) and it is thought that these birds were part of the same flock as those using the breakwater, the total number of birds in the Monkstown Creek area as a whole being approximately 600.

Lapwings roosted on the stone breakwater at high tide and occasionally at low tide, however at low tide they more usually roosted on exposed intertidal mussel beds, rocks and mud either side of the breakwater; either in Area 1, the potential ‘reclamation area’ (see Section 5.2) or in Area 3 immediately to the north of the breakwater (see Section 5.5) (see Figure 1 in Appendix A).

4.5 DUNLIN

Dunlin were not recorded in the Study Area until December when numbers peaked at 350 birds (Count ‘H3’), with smaller number recorded in January and February.

At all times, Dunlin activity within the Study Area was centred around the stone breakwater (Area 2) with high tide roosting birds recorded exclusively at this location (a total of 774 records). At low tide, there were a total of 360 records of feeding Dunlin. These were recorded predominantly to the south of the stone breakwater, in Area 1, the ‘reclamation area’ (233 records); and around the mouth of Monkstown Creek in Areas 4 (64 records), 7 (35 records) and 3 (8 records) (see Figure 1 in Appendix A).

The number of feeding Dunlin within the Study Area was consistently lower than the number of roosting birds indicating that a substantial proportion of roosting birds (approximately 50%) were foraging further afield, outside the Study Area, at low tide.

4.6 BLACK-TAILED GODWIT

Black-tailed Godwits were present throughout the winter with numbers peaking at 100 in late December (Count ‘L3’). There were a total of 290 low tide records and only 47 high tide records indicating that birds feeding within the Study Area (predominantly Monkstown Creek) were roosting, or perhaps feeding, elsewhere at high tide.

Feeding birds at low tide were concentrated within Monkstown Creek. Of a total of 260 records of feeding birds, 225 were within the creek; there were only 4 records of feeding birds in Area 1; the ‘reclamation area’, at low tide, and an additional 4 at high tide (see also Section 3.1). Within the creek, the majority of feeding birds were recorded around the mouth of the channel, with 124 records from Area 4 and 57 records from Area 7 (see Figure 1 in Appendix A). In addition there were 30 records of birds roosting at low tide in Area 7. There were only 3 records of Black-tailed Godwits feeding at low tide in Area 3, the area immediately north of the stone breakwater (see Section 5.5).

The small number of 47 records of roosting birds was made up mainly of a flock of 38 on the stone breakwater, Area 2, in late March (Count 'H7'). Occasional birds (a total of 9) were recorded roosting on Areas 2, 5 and 6 on other high tide counts.

4.7 CURLEW

Curlew numbers within the Study Area were fairly constant throughout the winter with between 25 and 59 birds recorded on each count. The peak count of 59 was in October (Count 'L1'). Numbers declines sharply during the second half of March with only two birds recorded at the end of the month (Count 'L7').

There were 181 high tide records and 244 low tide records. At low tide the vast majority of birds, 227 records, were of feeding birds, with roosting birds occasionally recorded within the feeding areas, presumably following feeding bouts; whilst at high tide the vast majority, 171 records, were of roosting birds.

Of the 237 records of feeding birds, the majority, 174 records, were within Monkstown Creek, predominantly in Area 4 (78 records) and Area 5 (50 records). A total of 22 records of feeding birds came from Area 3, the area immediately to the north of the stone breakwater (see Section 5.5). Feeding birds outside Monkstown Creek were scattered around the shoreline; only 7 records coming from Area 1, the 'reclamation area' (see Section 3.1).

The 171 records of high tide roosting Curlew were concentrated along the southern shoreline of Monkstown Creek predominantly in Area 6 (158 records). There was only a single record of a bird roosting in Count Area 2, on the stone breakwater (Count 'H6').

4.8 REDSHANK

Redshank numbers were highest during October with a peak of 84 birds (Count 'H1'). The number of birds recorded through the winter was then fairly constant at between 25 and 44 birds, with one lower count of 14 (Count 'L5'), until late March when numbers declined markedly to 14 (Count 'L7').

Of 232 low tide records, 214 were of feeding birds, the remaining 18 were birds roosting within the feeding areas, presumably following feeding bouts. A total of 54 birds were also recorded feeding during high tide counts. The majority of the 268 records of feeding birds were from within Monkstown Creek, predominantly in Area 7 (84 records), Area 5 (38 records), Area 6 (35 records) and Area 4 (26 records) (see Figure 1). A total of only 7 records of feeding birds came from Area 3, the area immediately to the north of the stone breakwater (see Section 3.4). Outside Monkstown Creek there were 76 records of feeding birds, with the majority of records coming from Area 18 (19 records) and Area 16 (28 records); there were only ten records of feeding birds from Area 1, the 'reclamation area' (see Section 5.2).

There were 157 records of high tide roosting Redshank. The majority of these, 148 records, were from Area 2, the stone breakwater, where birds tended to roost low down along the breakwater's southern side, adjacent to Area 1, the 'reclamation area' (see Figure 1 in Appendix A). The peak count of birds roosting in this location was 61 (Count 'L1').

4.9 OYSTERCATCHER

Oystercatcher numbers were stable during most of the winter with between 73 and 108 birds recorded on all counts before the start of March, with only one exception, a low count of 48 on Count ‘H2’. During March numbers declined to between 18 and 52 birds.

There were a total of 511 low tide feeding records of Oystercatcher, with 38 low tide records of birds roosting within the feeding areas, presumably following feeding bouts. There were an additional 45 feeding records at high tide. Records of feeding birds were scattered throughout the intertidal parts of the Study Area, with concentrations associated with mussel beds. The most heavily used bed was along the shore at Monkstown in Areas 7 (166 records) and 18 (40 records). A mussel bed in Area 1, the ‘reclamation area’ supported a remarkably stable number of Oystercatchers at low tide, with between 14 and 19 birds recorded on each of the seven low tide counts (a total of 114 records; see also Section 5.2).

A large number of records of feeding Oystercatcher came from the eastern part of the Study Area, with 67 records from Area 16; 35 records from Area 17 and 27 records from Area 13 (see Figure 1 in Appendix A). Hence, unlike other wader species, whose feeding areas were concentrated in Monkstown Creek, of the total of 556 records of feeding Oystercatcher, only 241, less than half, came from Monkstown Creek.

There were 446 records of high tide roosting Oystercatchers. The majority of these, 378 records, were from Area 2, the stone breakwater, where birds tended to roost on the top of the structure and along its southern side, adjacent to Area 1, the ‘reclamation area’ (see Figure 1 in Appendix A).

4.10 TEAL

Teal were not recorded during the early part of the winter. During the period December to February up to 80 birds were present (Count ‘H3’), but numbers then declined and only small numbers were present by late March (7 birds recorded on Count ‘L7’)

All records of Teal were from Monkstown Creek. There were a total of 245 high tide records and 161 low tide records indicating that Teal were leaving the Study Area at low tide. It is believed that these birds were moving into the upper reaches of Monkstown Creek, to the Rafeen village area, (this upper section of Miknostwon Creek is outside the Study Area). The number of birds at both high tide and low tide fluctuated considerably, probably also as a result of birds moving between the Study Area and the upper section of Monkstown Creek.

Teal were recorded only from Areas 5, 6 and 7 (see Figure 1 in Appendix A). At high tide birds concentrated along the southern shore of the creek in Area 5 (219 of the 245 high tide records) and at low tide birds concentrated along the channel in Area 7 (152 of the 161 low tide records).

4.11 MALLARD

Mallard numbers increased steadily from 19 at the start of the winter (Count ‘L1’) to a peak of 50 in late December (Count ‘L3’) before declining again to only 3 by late March (Count ‘H7’). There were 137 high tide records and 152 low tide records, concentrated in Monkstown Creek with only 35 of the total of 289 records from elsewhere in the Study Area.

High tide records were predominantly of birds feeding and roosting along the southern shore of the creek in Areas 5 (80 records) and 6 (35 records). At low tide Mallards concentrated along the channel in Area 7 (108 records). There were 8 records of Mallards in Area 3, the area immediately north of the stone breakwater, these were feeding birds (Count ‘L4’; see also Section 5.5).

5 ANALYSIS OF RESULTS WITH RESPECT TO COUNT AREAS

5.1 RELATIVE USE OF COUNT AREAS BY FEEDING BIRDS

Table 5.1 presents details of the mean density of birds recorded feeding within each Count Area during the seven low tide counts. Results are presented for each species as the mean number of feeding birds per hectare.

Table 5.1: Number of Feeding Birds per Hectare in Monkstown Creek Count Areas at Low Tide

	Whole Area	Count Area 1	Count Area 3	Count Area 4	Count Area 5	Count Area 6	Count Area 7
	58.30ha	5.85ha	5.31ha	6.83ha	25.69ha	4.28ha	10.34ha
Waders Feeding per Hectare							
Dunlin	**0.83**	5.69	0.22	1.34	0	0	0
Oystercatcher	**0.79**	3.52	0.38	0.13	0.13	0.20	2.13
Black-tailed Godwit	**0.56**	0.10	0.08	2.60	0.13	0.60	0.11
Curlew	**0.47**	0.17	0.59	1.63	0.25	0.61	0.33
Redshank	**0.39**	0.24	0.19	0.54	0.19	0.03	1.12
Snipe	**0.02**	0.20	0	0	0	0	0
Turnstone	**0.06**	0.10	0	0	0	0	0.28
Greenshank	**0.01**	0	0	0	<0.01	0	0.07
Whimbrel	**<0.01**	0	0	0	0	0	0.01
Swans, Ducks and Geese Feeding per Hectare							
Shelduck	**0.77**	0.17	1.02	0.34	1.06	0.61	0.30
Teal	**0.30**	0	0	0	0.05	0	1.55
Mallard	**0.11**	0	0	0	0	0	0.50
Brent Goose	**0.03**	0	0	0.06	0	0	0.11
Mute Swan	**<0.01**	0	0	0	<0.01	0	0
Red-breasted Merganser	**<0.01**	0	0	0.02	0	0	0
Other Species (gulls, cormorants, herons and grebes) Feeding per Hectare							
Black-headed Gull	**0.48**	0.81	0.70	1.53	<0.01	0	1.48
Common Gull	**0.10**	0.44	0.43	0.11	0	0	0.04
Herring Gull	**0.06**	0.29	0.07	0.02	0	0	0.12
Great Black-backed Gull	**0.04**	0.17	0.02	0.08	<0.01	0.03	0.04
Lesser Black-backed Gull	**0.02**	0	0	0	0	0	0.10
Grey Heron	**0.03**	0.02	0.03	0.04	0.02	0	0.08
Cormorant	**<0.01**	0	0	0	0	0	<0.01
Great Crested Grebe	**<0.01**	0.02	0	0	0	0	0

The distribution of feeding birds is clearly linked to the preferred feeding habitat of each species. Oystercatcher, Turnstone, Brent Goose (and the single record of Whimbrel) were recorded in the highest densities in Count Areas 1 (highest density of Oystercatcher) and 7 (highest density of Turnstone and Brent Goose), where mussel beds and a shingle beach (Count Area 7) are located.

Other waders, gulls and herons concentrated their feeding activity along the line of the receding or advancing tide and were therefore at highest densities around the mouth of Monkstown Creek during low tide, in Count Areas 1 (highest density of Dunlin, Snipe, Common Gull, Herring Gull and Great Black-backed Gull), 4 (highest density of Curlew, Black-tailed Godwit and Black-headed Gull) and 7 (highest density of Redshank, Greenshank, Grey Heron and Lesser Black-backed Gull). Densities of feeding waders were somewhat lower in Count Area 3, which is also located at the mouth of Monkstown Creek, this is thought to be a function of the sediment type here which appears to be coarser-grained (sandy). This will be confirmed when results of sedimentology assessment are available in any future EIA.

Ducks tended to feed further upstream along Monkstown Creek than other species, either along the channel in Count Area 7 (highest densities of Mallard and Teal), or on the large open expanses of mud and sand in Count Area 5 (highest density of Shelduck).

Very small numbers of Red-breasted Merganser, Great Crested Grebe, Cormorant and Mute Swan were recorded feeding in very small numbers in Count Areas 4, 1, 7 and 5 respectively.

5.2 COUNT AREA 1, THE 'RECLAMATION AREA'

This intertidal area, located to the southeast of the stone breakwater, beneath the metal pier, may be subject to reclamation under a development proposal resulting in direct loss of intertidal habitat. This area is outside the boundary of *Cork Harbour* SPA.

Details of the maximum counts of each species recorded using this area are presented in Tables 3.2 and 3.3. A total of 16 species were recorded using this area over the course of the winter counts.

At high tide (see Table 3.2) very small numbers of birds use this area. Only 1 Cormorant (Count 'H4'); 1 Lesser Black-backed Gull (Count'H1') and 1 Great Black-backed Gull (Count 'H1') were recorded feeding; and two Shelduck (Count 'H5') recorded roosting in Area 1 during the seven high tide counts.

At low tide (see Table 3.3) only four species were recorded in numbers that might indicate that the area is of some importance to them, namely, Dunlin, Lapwing, Oystercatcher and Black-headed Gull. Lapwing were recorded roosting in Area 1 on three of the low tide counts with 190 birds on Count 'L2'; 380 birds on Count 'L3' and 130 birds on Count 'L4' (see also Section 4.4). The maximum count of 132 Black-headed Gulls recorded using Area 1 refers to a roosting flock (with 7 birds feeding) recorded at low tide in late-January (Count 'L4'). Other than this high count, a maximum of only 24 Black-headed Gulls (Count 'L1') were recorded using the Area 1.

Count Area 1 measures approximately 5.85ha. Table 5.1 presents details of the density of birds recorded feeding at low tide in Count Area 1 relative to the other Count Areas within Monkstown Creek. Dunlin, Oystercatcher and Snipe were recorded feeding at higher densities in Count Area 1 than in other parts of Monkstown Creek; and, Turnstone, Black-headed Gull, Common Gull, Herring Gull, Great Black-backed Gull and Great Crested Grebe were recorded feeding at higher densities in Count Area 1 than for Monkstown Creek as a whole.

Dunlin were recorded feeding in Area 1 on three of the low tide counts with 120 birds on Count 'L2'; 110 birds on Count 'L3' and 3 birds on Count 'L4' (see also Section 4.5).

A remarkably stable number of Oystercatchers were recorded feeding on the mussel bed in Area 1 at low tide, with between 14 and 19 birds recorded on each of the seven low tide counts (a total of 114 records) (see also Section 4.9).

5.3 COUNT AREA 2, THE STONE BREAKWATER

Whilst the stone breakwater will be retained as part of any proposal; construction areas, including those in the 'reclamation area' (see Section 3.1 above), will be close to its southern side and it is considered possible that its attractiveness as a roost site for birds might be significantly reduced.

Details of the maximum counts of each species recorded using this area are presented in Tables 3.2 and 3.3. A total of 16 species were recorded using the structure.

The typical locations of bird species roosting on the stone breakwater are presented in Figure 2 in Appendix B.

The stone breakwater was used by birds almost exclusively for roosting. The number of birds recorded feeding was very small, consisting of, a single Brent Goose on Counts 'H4' and 'L4'; a single Shelduck on Count ‘H6’; two Redshank on Count ‘H5’; five Oystercatchers on Count ‘L2’ and one on Count ‘L5’; and a single Turnstone on Count ‘L5’.

The species using the roost site most frequently were Cormorant and Grey Heron both of which were recorded roosting on the stone breakwater on thirteen of the fourteen counts (no Grey Herons were present on Count ‘H4’; no Cormorants were present on Count ‘L5’). The mean number of Cormorants over the 14 counts was 14.4; the mean number of Grey Herons was 5.2. Numbers of both species were generally higher at high tide, maximum counts were 37 Cormorants (Count ‘H6’) and 21 Grey Herons (Count ‘H1’) (see Tables 3.2 and 3.3) and the mean at high tide was xx Cormorants and xx Grey Herons.
Small numbers of Shag were also present on most counts at both high tide (four of the seven counts) and low tide (six of the seven counts), with up to six birds present (Count ‘H4’) and a mean of 1.9 birds.

Other than two Curlew on Count ‘L1’ and four Oystercatcher on ‘L5’, waders roosted on the stone breakwater exclusively at high tide. The maximum counts of each species are presented in Table 3.3. It is considered that the site is a significant roosting location for five wader species, Lapwing, Dunlin, Oystercatcher, Greenshank and Redshank.

Smaller numbers of Black-tailed Godwit and Turnstone roost regularly and Bar-tailed Godwit, Curlew and Snipe were recorded roosting in very small numbers on one occasion each, but it is probably not an important roost site for these species.

The Lapwing flock which was present in the area during December, January and February roosted on the stone breakwater at high tide and tended to use adjacent intertidal areas to roost at low tide, with 270 on Count ‘L2’ the only occasion when they were present on the breakwater at low tide. At high tide 5 were present on Count ‘H1’; 350 on Count ‘H2’; 600 on Count ‘H3’ and 400 on Count’H4’ (see also Section 4.4). Lapwing have a complex feeding pattern which includes night-time feeding on grassland linked to the lunar cycle. As a result they do not follow the more typical wader pattern of roosting at high tide and feeding at low tide, so low tide roosting on some days is typical of the species.
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Shelduck were recorded roosting on the breakwater exclusively at low tide, with a maximum of 18 present (Count ‘H5’) and a mean of 3.8 birds. Mallard were recorded roosting on the stone breakwater only once (a single bird on Count ‘L5’).

The number of gulls roosting on the stone breakwater was very small with Black-headed Gulls recorded only once, 16 birds on Count ’H1’; two or three Great Black-backed Gulls on only four counts and single Herring Gulls on only two counts. Gulls generally roosted instead on the metal pier (see Section 5.3).

5.4 COUNT AREA 11, THE METAL PIER

The metal pier may be removed as part of a development proposal. The typical locations of bird species roosting on the metal pier are presented in Figure 2 in Appendix B.

No birds were recorded feeding on the metal pier, the structure being used exclusively for roosting and for associated activities such as preening and feather-drying by cormorants (see below). Eight species of bird were recorded roosting on the structure, Cormorant, Shag, Grey Heron and five gull species, Black-headed Gull, Common Gull, Herring Gull, Lesser Black-backed Gull and Great Black-backed Gull. Of these, Grey Heron (single birds on three counts and two birds on one count) and Shag (a single bird on one count) were recorded very infrequently.

Cormorants were recorded roosting on the structure on twelve of the fourteen counts. Numbers were rather higher on low tide counts, with a mean of 17.3 birds and a maximum of 36 (Count ‘L5’); than on high tide counts with a mean of 15.1 birds and a maximum of 44 birds (Count ‘H1’). The overall mean was 16.2 birds. It is considered that Cormorants use this exposed site for the essential drying of wings between feeding bouts explaining the relatively high level of use during the low tide period when birds are actively feeding.

Gulls were recorded roosting on the structure almost exclusively at high tide. During low tide counts Black-headed Gull was present on only one count (two birds); Common Gull only twice (totalling 8 birds); Herring Gull only twice (totalling 8 birds) and Great black-backed Gull only once (14 birds). At low tide numbers of gulls fluctuated greatly and rather erratically between counts with no obvious seasonal pattern discernable. The maximum numbers of each species present are given in Table 3.3, the means were as follows: Black-headed Gull 5.4; Common Gull 12.7; Herring Gull 8.6; Great Black-backed Gull 11.7 and Lesser Black-backed Gull 1.1.

5.5 COUNT AREA 3, THE INTERTIDAL AREA IMMEDIATELY TO THE NORTH OF THE STONE BREAKWATER

Mitigation for any reduced value of the stone breakwater (Count Area 2; see Section 5.2) and for the loss of the metal pier (Count Area 11, see Section 5.3) as a result of the proposed works may include the construction of a new structure in Area 3, designed specifically for roosting birds. The possibility that construction of such a structure may impact on existing intertidal feeding areas for birds needs to be considered.

The area includes several large rocks which are submerged at high tide but are used as a roosting and loafing site by birds at low tide. Birds recorded using the rocks included a substantial part of the roosting Lapwing flock of 190 birds on Count ‘L5’ (exact number using the rocks were not recorded); Cormorants on four of the seven low tide counts, totalling 26 records; a single Shag on one count; and occasional Grey Herons, Oystercatchers, Great Black-backed Gulls, Lesser Black-backed Gulls and Shelduck. This behaviour is taken as evidence that an artificial roosting structure in this vicinity is likely to be used by birds.

The number of feeding birds using Area 3 at low tide was low compared to other areas around the mouth of Monkstown Creek, namely Count Areas 4 and 7 (see Figure 1 in Appendix A).

A total of only 38 Shelduck were recorded feeding in Area 3 over the course of the seven low tide counts, a mean of 5.4 birds. Wader numbers were also low, with totals from all seven low tide counts combined (and means) of, 22 Curlew (mean of 3.1); 14 Oystercatcher (mean of 2.0); 8 Dunlin (mean of 1.1), 7 Redshank (mean of 1.0) and 3 Black-tailed Godwit (mean of 0.4). Small numbers of gulls also feed in this area, with a total of 22 Black-headed Gulls over the seven low tide counts; 16 Common Gulls and single Herring Gulls and Lesser Black-backed Gulls.

Count Area 3 measures approximately 5.31ha (0.05312km^2). Table 5.1 presents details of the density of birds recorded feeding at low tide in Count Area 3 relative to the other Count Areas within Monkstown Creek. No species was recorded in its highest density in Count Area 3; however, Curlew, Shelduck, Black-headed Gull, Herring Gull and Grey Heron were recorded feeding at slightly higher densities in Count Area 3 than for Monkstown Creek as a whole.

6 ANALYSIS OF RESULTS IN THE CONTEXT OF CORK HARBOUR AS A WHOLE

This Section presents a brief examination of the relative importance of the Study Area and of specific Count Areas in the context of Cork Harbour as a whole, based upon the findings of this survey. A full analysis of the results of the survey in the context of Cork Harbour as a whole will be prepared for any forthcoming EIA of any development proposal.

Table 6.1 presents the peak counts of species recorded during the survey, in the Study Area as a whole and in the key Count Areas; and five year means (1996-2000) for each species for Cork Harbour recorded during Irish Wetland bird survey (IWeBS) counts as presented by Crowe (2005). Species where the peak count during the survey was less than twelve individuals are not included.

Table 6.1: Peak Counts of Species for the Study Area; and IWeBS Five-Year-Means for Cork Harbour as a Whole

Species	IWeBS 5-year-mean (1996-00) Cork Harbour	Max. Count for Study Area	Peak Count in Study Area as percentage of Cork Harbour 5-year-mean
Black-headed Gull	2,949	**317**	**11.8%**
Black-tailed Godwit	2,021	**100**	**4.9%**
Brent Goose	n/a	**18**	**n/a**
Common Gull	597	**95**	**15.9%**
Cormorant	406	**74**	**18.2%**
Curlew	2,471	**59**	**2.4%**
Dunlin	9,217	**350**	**3.8%**
Great Black-backed Gull	n/a	**93**	**n/a**
Grey Heron	n/a	**34**	**n/a**
Herring Gull	n/a	**195**	**n/a**
Lapwing	6,967	**600**	**8.6%**
Lesser Black-backed Gull	526	**14**	**2.7%**
Mallard	n/a	**50**	**n/a**
Oystercatcher	2,032	**108**	**5.3%**
Redshank	2,121	**84**	**4.0%**
Shelduck	1,971	**120**	**6.1%**
Teal	999	**80**	**8.0%**
Turnstone	n/a	**44**	**n/a**

Figures presented in Table 6.1 indicate that the Study Area supports only a small percentage of the total Cork Harbour population of most species. However, on occasion, the Study Area supports a substantial proportion of the harbour's total populations of Cormorant, black-headed Gull and common Gull. This is largely due to the three roosting locations for these species within the Study Area: the Stone Breakwater (Count Area 2, see Section 5.3), the Metal Pier (see Section 5.4) and the trees on the southern shore of Monkstown Creek (see: RPS, 2012). Whilst Crowe (2005) does not present a Cork Harbour five-year-mean figure for Grey Heron, it is considered likely that the peak count of 34 roosting birds in the Study Area represents a substantial proportion of the total Cork Harbour population of this species also.

'Large' gulls do not generally occur in substantial numbers in the Study Area relative to some other parts of Cork Harbour such as Great Island Channel, The estuary of the River Lee and Cobh (RM *pers. obs.*). The peaks of 195 Herring Gulls and 95 Great Black-backed Gulls in October 2011 were exceptional. Crowe (2005) does not present a Cork Harbour five-year-mean figure for these two species, it is considered likely that the percentage of these species ordinarily present in the Study Area is likely to be comparable to that of Lesser Black-backed Gull (2.7%).

The peak count from the Study Area of 120 Shelduck is of some significance because Cork Harbour supports a high proportion (13.2%) of the National Population of this species. Hence, whilst the total of 120 birds represents only 6.1% of the Cork Harbour population, it represents 0.81% of the National Population bringing the Study Area in itself close to the 1% threshold for a site of National Importance for this species.

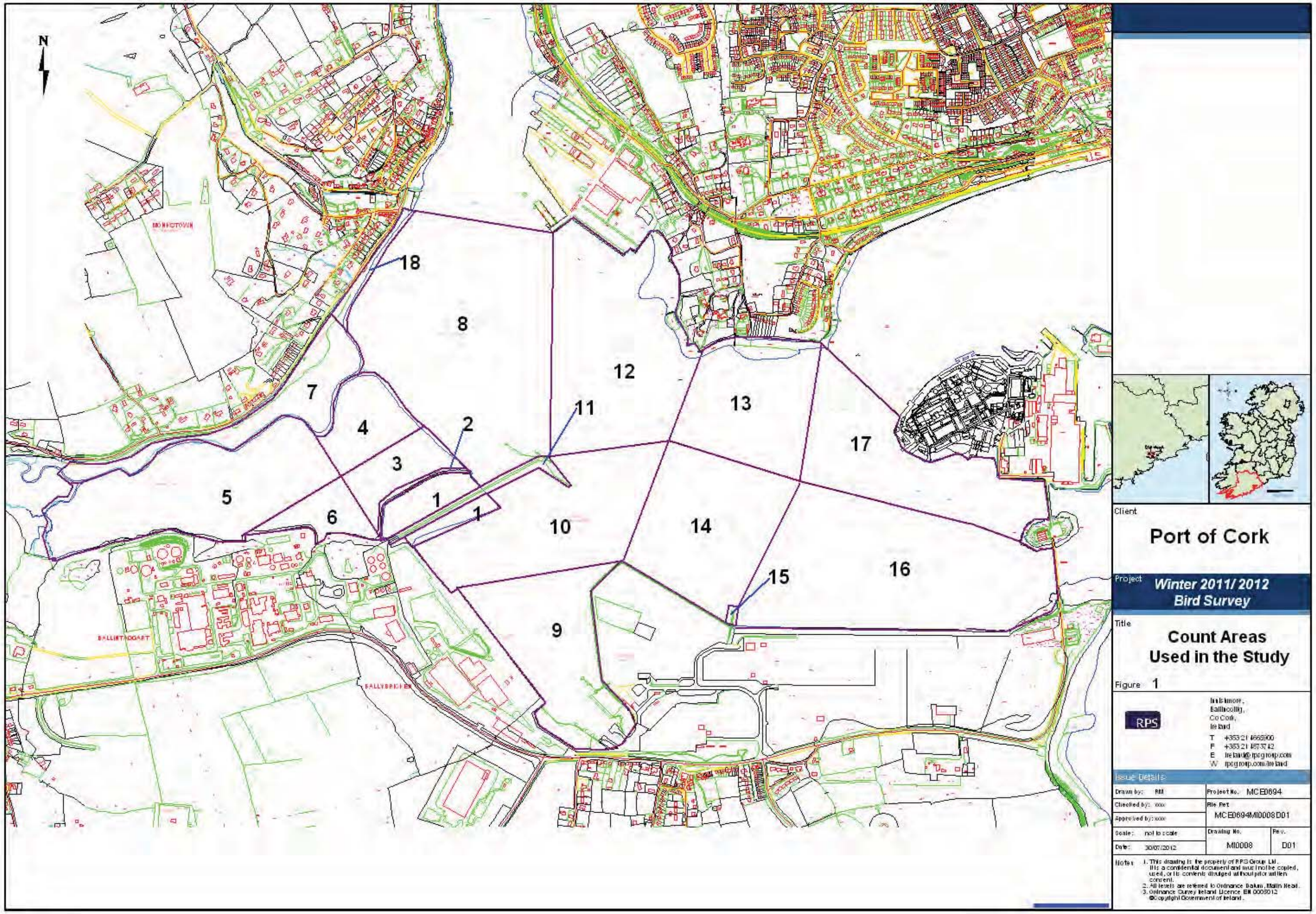
References

Crowe. O. (2005). *Ireland's Wetlands and their Waterbirds: Status and Distribution*. BirdWatch Ireland, Co Wicklow.

RPS (2012). *Night-roosting Cormorant at Monkstown Creek, Cork Harbour 2011 / 2012.* Unpublished RPS Report prepared on behalf of Port of cork.

APPENDIX A

Figure 1: Count Areas Used in the Study


N
18
8
12
7
11
13
4
2
17
3
5
1
1
6
10
14
15
16
9
Client
Port of Cork
Project
Winter 2011/ 2012
Bird Survey
Title
Count Areas
Used in the Study
Figure 1
Inishmore,
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Issue Details
Drawn by: RM
Project No. MCE0694
Checked by: xxx
File Ref
MCE0694MI0008D01
Approved by: xxx
Scale: not to scale
Drawing No. MI0008
Rev. D01
Date: 30/07/2012
Notes 1. This drawing is the property of RPS Group Ltd. It is a confidential document and must not be copied, used, or its contents divulged without prior written consent.
2. All levels are referred to Ordnance Datum, Malin Head.
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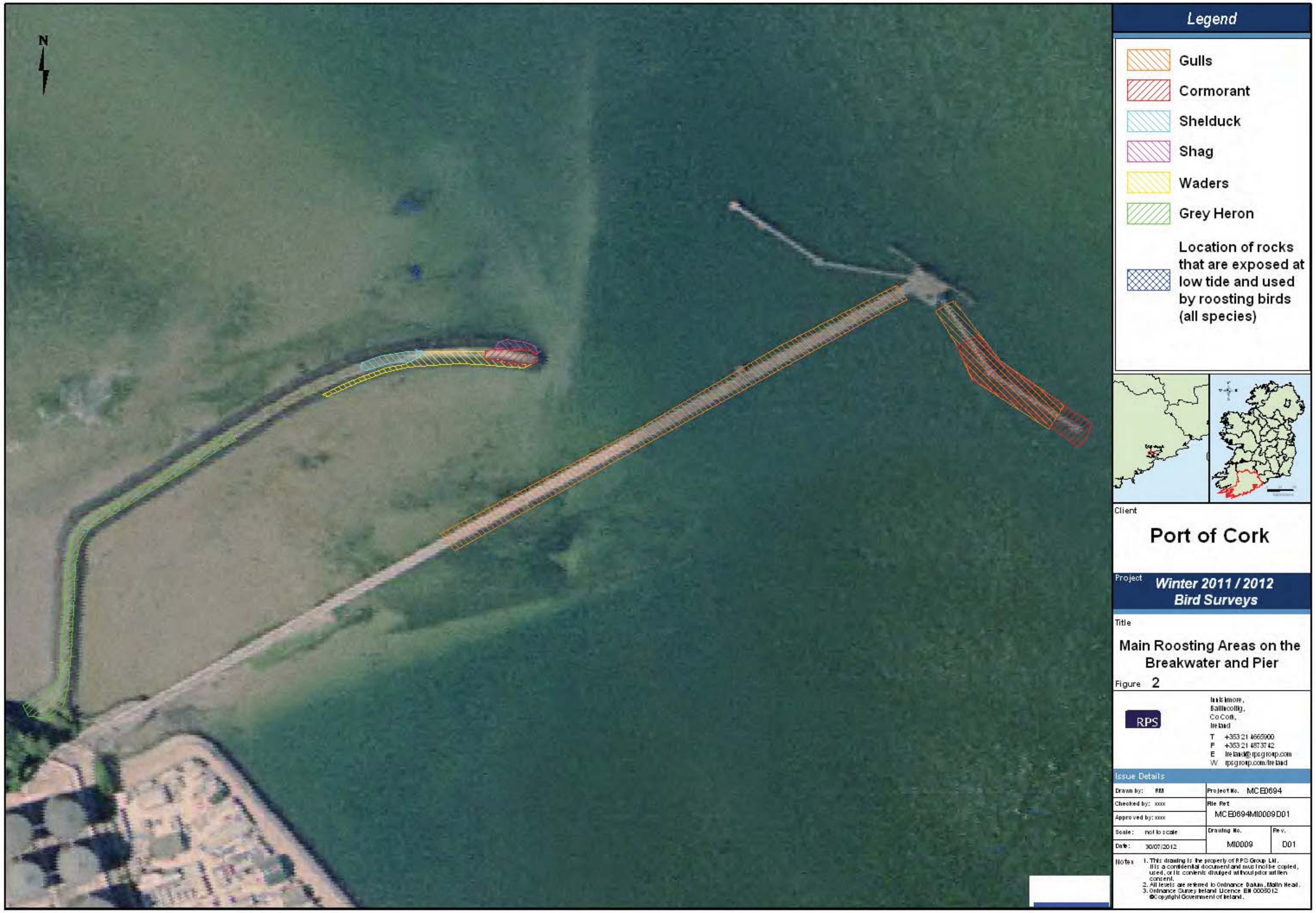
APPENDIX B

Figure 2: Main Roosting Areas of Different Species on the Breakwater (Count Area 2) and Pier (Count Area 11)


N
Legend
Gulls
Cormorant
Shelduck
Shag
Waders
Grey Heron
Location of rocks that are exposed at low tide and used by roosting birds (all species)
Client
Port of Cork
Project
Winter 2011 / 2012 Bird Surveys
Title
Main Roosting Areas on the Breakwater and Pier
Figure 2
RPS
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Project No. MCE0694
Checked by: xxxx
Approved by: xxxx
File Ref MCE0694MI0009D01
Scale: not to scale
Date: 30/07/2012
Drawing No. MI0009
Rev. D01
Notes 1. This drawing is the property of RPS Group Ltd. It is a confidential document and must not be copied, used, or its contents divulged without prior written consent.
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Port of Cork Bird Surveys

Report on the 2013/14 Wintering Wetland Bird Survey, Ringaskiddy

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FIGURES

1 INTRODUCTION

This report presents the findings of a wetland bird survey conducted by RPS during the 2013/14 wintering season. The objectives of the study were as follows:

1. To examine the usage of the marine, intertidal and terrestrial areas adjacent to the Ringaskiddy Port Redevelopment footprint, by waterbirds during the 2013/14 overwintering season;

2. To identify locations of key importance to foraging and roosting waterbirds during the 2013/14 wintering season; and

3. To provide sufficient information to assess the potential impact of the proposed development on the wintering Special Conservation Interests (SCIs) of Cork Harbour Special Protection Area (SPA) and to inform a forthcoming Environmental Impact Assessment (EIA) and Appropriate Assessment (AA).

1.1 CORK HARBOUR SPA

Cork Harbour SPA (Site Code: IE0004030) qualifies for designation under The Birds Directive (Directive 2009/147/EC) by regularly supporting over 20,000 waterbirds including internationally important populations of wintering Black-tailed Godwit *Limosa limosa* and Redshank *Tringa totanus* along with nationally important wintering populations of Little Grebe *Tachybaptus ruficollis*, Great Crested Grebe *Podiceps cristatus*, Cormorant *Phalacrocorax carbo*, Grey Heron *Ardea cinerea*, Shelduck *Tadorna tadorna*, Wigeon *Anas penelops*, Teal *Anas crecca*, Pintail *Anas acuta*, Shoveler *Anas clypeata*, Red-breasted Merganser *Mergus serrator*, Oystercatcher *Haematopus*, Golden Plover *Pluvialis apricaria*, Grey Plover *Pluvialis squatarola*, Lapwing *Vanellus vanellus*, Dunlin *Calidris alpina*, Bar-tailed Godwit *Limosa laponica*, Curlew *Numenius arquata*, Black-headed Gull *Larus ridibundus*, Common Gull *Larus canus* and Lesser Black-backed Gull *Larus fuscus*. The site also qualifies for designation by regularly supporting a nationally important breeding population of Common Tern *Sterna hirundo*.

The Birds Directive pays particular attention to wetlands, and as these form part of this SPA, the site and its associated waterbirds are in their own right a Special Conservation Interest (SCI) - Wetlands & Waterbirds [A999].

Table 1.0 below provides a summary of Cork Harbour SPA SCIs.

Table 1.0: Cork Harbour SPA SCIs.

Cork Harbour SPA [IE0004030] SCIs		Season	Qualifying Population[1]
[A004]	Little Grebe *Tachybaptus ruficollis*	Wintering	68 individuals
[A005]	Great Crested Grebe *Podiceps cristatus*	Wintering	218 individuals
[A017]	Cormorant *Phalacrocorax carbo*	Wintering	620 individuals
[A028]	Grey Heron *Ardea cinerea*	Wintering	47 individuals
[A048]	Shelduck *Tadorna tadorna*	Wintering	1426 individuals
[A050]	Wigeon *Anas penelope*	Wintering	1,750 individuals
[A052]	Teal *Anas crecca*	Wintering	807 individuals
[A056]	Pintail *Anas acuta*	Wintering	84 individuals
[A065]	Shoveler *Anas cylpeata*	Wintering	135 individuals
[A069]	Red-breasted Merganser *Mergus serrator*	Wintering	90 individuals
[A130]	Oystercatcher *Haematopus ostralegus*	Wintering	791 individuals
[A140]*	Golden Plover *Pluvialis apricaria*	Wintering	805 individuals
[A141]	Grey Plover *Pluvialis squatarola*	Wintering	66 individuals
[A142]	Lapwing *Vanellus vanellus*	Wintering	3,614 individuals
[A149]*	Dunlin *Calidris alpina*	Wintering	4,936 individuals

Cork Harbour SPA [IE0004030] SCIs		Season	Qualifying Population[1]
[A156]	Black-tailed Godwit *Limosa limosa*	Wintering	412 individuals
[A157]*	Bar-tailed Godwit *Limosa lapponica*	Wintering	45 individuals
[A160]	Curlew *Numenius arquata*	Wintering	1,345 individuals
[A162]	Redshank *Tringa totanus*	Wintering	1,614 individuals
[A179]	Black-headed Gull *Larus ridibundus*	Wintering	948 individuals
[A182]	Common Gull *Larus canus*	Wintering	2,630 individuals
[A183]	Lesser Black-backed Gull *Larus fuscus*	Wintering	261 individuals
[A193]*	Common Tern *Sterna hirundo*	Breeding	69 pairs
[A999]	Wetlands & Waterbirds		

Key to Table
[1]As obtained from Standard Natura Data Form.
*Species listed on Annex I of The Birds Directive.

2 METHODOLOGY

The survey methodology was based on that used by the British Trust for Ornithology's (BTO) Wetland Bird Survey (WeBS) and also that for the Irish Wetland Bird Survey (I-WeBS), as outlined in Gilbert *et al.* (1998). Both high tide and low tide waterbird point counts were undertaken monthly from September 2013 to February 2014:

1) High Tide Waterbird Counts were undertaken within two hours either side of high tide, to record the distribution, numbers and behaviours of waterbirds the survey area during high tide conditions; and

2) Low Tide Waterbird Counts were undertaken within two hours either side of low tide, to record the distribution, numbers and behaviours of waterbirds within the survey area during low tide conditions.

The study area and the arrangement of count areas are presented in Figure 1. For consistency count area boundaries reflected those used in a previous survey undertaken during the 2011/12 wintering season as detailed in *Report on the Winter 2011/2012 Bird Survey at Ringaskiddy/Monkstown Creek* (RPS, 2012). A further count area was added at Paddys Point (East).

During counts of Monkstown Creek (Count Areas 2-7), Cormorants roosting within trees along the southern shoreline of Monkstown Creek were ignored. A separate survey was undertaken to account for these birds and the results are presented separately in *Report on Night-Time Tree-Roosting Cormorants in Monkstown Creek, Cork Harbour 2013/14* (RPS, 2014).

Within each count area, all waterbirds seen were recorded and dominant behaviours noted as either feeding (F) or engaged in other activity such as roosting, resting, washing or preening (R). Birds flying over were ignored unless they subsequently went onto land within the survey area.

Note: Waterbirds are defined here as all swans and geese, ducks, divers, grebes, herons and rails, waders, gulls and terns.

Table 2.1 provides a summary of count dates.

Table 2.1: Summary of Field Monitoring Effort, Winter 2013/14.

Date	High Tide Count Code	Low Tide Count Code	Tide Time*	Count Areas Surveyed
September 24th 2013	H1	-	High: 09h02 (3.9m)	13-17; 19; 1 & 9-12
September 24th 2013	-	L1	Low: 15h27 (0.7m)	19; 13-17; 2-8 & 18
September 25th 2013	H2	-	High: 09h40 (3.6m)	2-8 & 18
September 25th 2013	-	L2	Low: 16h04 (1.0m)	1 & 9-12
October 29th 2013	-	L3	Low: 06h51 (1.4m)	13-17
October 29th 2013	H3	-	High: 13h04 (1.3m)	1 & 9-12; 13-17; 19
October 30th 2013	-	L4	Low: 07h57 (1.2m)	19; 1 & 9-12; 2-8 & 18
October 30th 2013	H4	-	High: 14h04 (3.4m)	2-8 & 18
November 20th 2013	H5	-	High: 06h35 (4.0m)	19
November 20th 2013	-	L5	Low: 13h00 (0.6m)	2-8 & 18; 19
November 21st 2013	H6	-	High: 07h11 (3.9m)	2-8 & 18
November 21st 2013		L6	Low: 13h36 (0.7m)	13-17; 1 & 9-12
November 22nd 2013	H7	-	High: 07h48 (3.8m)	1 & 9-12; 13-17
December 16th 2013	H8	-	High: 16h46 (3.8m)	13-17; 19
December 17th 2013	-	L7	Low: 11h30 (0.7m)	1 & 9-12; 13-17; 19

Date	High Tide Count Code	Low Tide Count Code	Tide Time*	Count Areas Surveyed
December 17th 2013	H9	-	High 17h23 (3.8m)	2-8 & 18
December 18th 2013	-	L8	Low 12h07 (0.7m)	2-7; 8 & 18
December 18th 2013	H10	-	High 17h58 (3.9m)	1 & 9-12
January 14th 2014	-	L9	Low 10h50 (0.9m)	2-8 & 18; 19; 13-17
January 14th 2014	H11	-	High 16h31 (3.8m)	1 & 9-12; 2-8 & 18
January 15th 2014	-	L10	Low 11h28 (0.8m)	1 & 9-12
January 15th 2014	H12		High 17h12 (3.9m)	19; 13-17
February 05th 2014	-	L11	Low 15h42 (0.6m)	19; 13-17
February 06th 2014	H13	-	High 09h58 (3.7m)	1 & 9-12; 19; 2-8 & 18
February 06th 2014	-	L12	Low 16h38 (0.9m)	1 & 9-12; 2-8 & 18
February 07th 2014	H14	-	High 10h47 (3.5m)	13-17

Key To Table
*Cobh Tide Times.

3 RESULTS

Tables 3.1 and 3.2 present the peak counts from each Count Area during high tide (Table 3.2) and low tide (Table 3.2) respectively.

3.1 RESULTS WITH RESPECT TO KEY COUNT AREAS

3.1.1 Count Area 1, Ringaskiddy Deep Water Berth

This intertidal area, located within the Ringaskiddy Deep Water Berth (DWB) to the southeast of the Stone Breakwater, beneath the ADM Jetty, will be subject to partial reclamation and capital dredging under the proposed Ringaskiddy Redevelopment resulting in the direct loss of intertidal habitat. This area is outside the boundary of Cork Harbour SPA and therefore will not result in the direct loss of wetland habitat from the SPA.

Details of the peak high tide and low tide counts of each species recorded using Count Area 1 are presented in Tables 3.1 and 3.2. A total of 16 species were recorded using Count Area 1 over the course of the 2013/14 survey period.

At high tide very small numbers of birds use the count area. Only a single Herring Gull was recorded foraging during high tide (H10); with peak counts of two Black-headed Gull (H1), Cormorant (H3) and a single Herring Gull (H1) recorded roosting on the water during the five high tide counts undertaken.

At low tide four species were recorded in numbers that might indicate that the area is of some importance to them, namely, Black-headed Gull (104 records), Dunlin (83 records), Lapwing (89 records) and Oystercatcher (69 records). This is consistent with the results of the 2011/12 survey (RPS, 2012).

Lapwing were only recorded on two occasions with a peak count of 82 birds roosting (L10) and an additional count of 7 birds roosting (L7). Lapwing have a complex feeding pattern which includes night-time feeding on grassland linked to the lunar cycle. As a result they do not follow the more typical wader pattern of roosting at high tide and feeding at low tide, so low tide roosting on some count days as recorded in Count Area 1 is typical of the species.

Dunlin were recorded on three occasions with a peak count of 39 birds foraging (LT7). Black-headed Gull and Oystercatcher were also regularly recorded within the count area, albeit in low numbers. The peak count of Black-headed Gull recorded was 36 birds roosting (L10), with the peak count of 11 birds foraging (L2). The peak count of Oystercatcher recorded was 15 foraging birds (L10), with a peak count of 7 birds roosting (L10).

Oystercatchers were typically recorded within the count areas foraging on the exposed mussel bed areas within the count area in relatively stable numbers during all low tide counts, with a mean number of 9.83 birds (n=6) recorded.

3.1.2 Count Area 2, the Stone Breakwater

The Stone Breakwater (or training wall) will be retained as part of the proposed Ringaskiddy Redevelopment. However, construction areas associated with the DWB extension, will be close to its southern side. Capital dredging within the DWB will also occur within close proximity to the breakwater.

Peak counts of each species recorded using Count Area 2 are presented in Tables 3.1 and 3.2. A total of 17 species were recorded using the count area.

The breakwater was used by birds almost exclusively for roosting. The typical locations of bird species roosting on the breakwater are presented in Figure 2. The number of birds recorded feeding was very small, consisting of, a single Barnacle Goose, which was present, and actively foraging in December (Count L8), January (Counts L9 & H11) and February (Count H13); and small numbers of Turnstone in November (Count L5) and December (Count L8), with a peak of 7 birds in November (Count L5).

The species using the roost site most frequently were Cormorant and Grey Heron, with both species recorded during all high tide and low tide counts. The mean number of Cormorants over the 12 counts was 23.41; the mean number of Grey Herons was 5.3. Numbers of both species were generally higher at high tide, with total records of Grey Herons only marginally higher during high tide conditions. The total number of Grey Herons recorded during high tide conditions was 33 (peak of 11 during Count H4; mean of 5.5) and the total number during low tide conditions 31 (peak of 12 during Count L4; mean of 5.16). The total number of Cormorants recorded during high tide conditions was 163 (peak of 41 during Count H11; mean of 27.16) and the total number during low tide conditions 118 (peak of 46 during Count L1; mean of 19.67).

Small numbers of Shag were also present during several counts at both high tide (5 during Count H4; 4 during H6 and 2 during H13) and low tide (2 during Count L4 and 1 during L5) with a mean of 1.25 across all 14 counts.

Other than eight Lapwing during Count L4, waders roosted on the breakwater exclusively at high tide. The peak counts of each species are presented in Table 3.3. Eight wader species were recorded roosting on the breakwater at high tide, with Oystercatcher the most regularly recorded, being recorded during all high tide counts. The peak count of Oystercatcher roosting was 17 birds (Count H6; mean of 8.83).

Lapwing were recorded roosting on the breakwater during high tide on two occasions, with a peak of 88 in November (Count H6) and a further count of 22 in October (Count H4).

Black-tailed Godwit were also recorded on two occasions, with a peak of 90 birds in January (Count H11) prior to dusk and a further count of 54 birds in September (Count H2). Turnstone were recorded on three occasions, with a peak of 15 birds in October (Count H6).

Small numbers of Curlew (peak of 1 during Count H13) and Greenshank (peak of 2 during Count H9) were also recorded along with two single, but relatively notable counts of Dunlin (36 during Count H13) and Redshank (40 during Count H2).

Shelduck were recorded roosting on the breakwater exclusively at high tide, with a maximum of 18 present (Count ‘H5’) and a mean of 3.8 birds.

Small numbers of large gulls frequently roosted on the breakwater but in general showed preference for roosting on the ADM Jetty (see below), or atop the buildings and mooring dolphins within the DWB (Count Area 9).

3.1.3 Count Area 11, The ADM Jetty

The ADM Jetty will not be removed as part of the proposed Ringaskiddy Redevelopment however, construction works associated with the DWB Extension and associated capital dredging will occur in close proximity to the jetty. The typical locations of bird species roosting on the jetty are presented in Figure 2. It should be noted that on occasion vessels are moored to the terminal dolphins of the jetty in order to offload bulks, or as temporary storage, as observed in February.

Only a single waterbird was recorded actively foraging on the jetty, a single Turnstone during Count L2, which was observed foraging on the piled legs of the main jetty. Gulls and Corvids frequently use the jetty to drop mussels onto.

The jetty is therefore overwhelmingly used for roosting and associated activities such as preening and feather-drying by Cormorants. Nine species of waterbird were recorded roosting on the jetty, Cormorant, Shag, Common and Sandwich Tern, and five gull species, Black-headed Gull, Common Gull, Herring Gull, Lesser Black-backed Gull and Great Black-backed Gull.

Cormorants were recorded roosting on the jetty on nine of the twelve counts, with birds exclusively using the terminal mooring arms of the jetty. Cormorants were notably absent from the jetty during February, when a vessel was moored on the terminal dolphins, with workmen visible. Numbers were typically higher on high tide counts, with a total of 101 birds recorded and a peak count of 41 (Count H1). A total of 60 birds were recorded during low tide conditions with a peak of 19 birds (Count L7). The overall mean number of birds (when present i.e. n=9) was 17.89 birds. Cormorants generally use the exposed terminal arms of the jetty for the essential drying of wings between feeding bouts, explaining the relatively high level of use during the low tide period when birds should normally be actively feeding.

Gulls were recorded roosting on the jetty at both high and low tide throughout the survey period, but predominantly at high tide. The peak numbers of each species present are given in Table 3.2 and 3.3, the means were as follows: Black-headed Gull 18.08; Common Gull 6.25; Herring Gull 7.91; Great Black-backed Gull 8.66 and Lesser Black-backed Gull 3.66. In February when the vessel was moored to the jetty, counts of roosting gulls were negligible, but peaked in Monkstown Creek, indicating a visible displacement of birds.

Post-breeding Common Terns were recorded roosting on the jetty on a single occasion with a count of 6 birds in September (Count H1). Sandwich Terns recorded on two occasions, with counts of single birds in September (Counts L2 and H1).

3.1.4 Count Area 16, Paddys point (west)

As part of the Ringaskiddy Redevelopment, it is proposed to install a new public slipway and amenity area at Paddy's Point immediately to the west of the Haulbowline Bridge. The intertidal and subtidal elements of the development will be contained entirely within Count Area 16 therefore restricting the direct loss of intertidal and subtidal habitats to Count Area 16. There may however, be some "knock-on" impacts within adjacent count areas as a result of changes in coastal processes and increased human disturbance.

Count Area 16 is already subject to a high level of human disturbance largely through its use as an amenity space and proximity to traffic from the bridge. During the survey period, construction works including piling, associated with the IMERC Access Road development, were occurring within 40m of the eastern part of the Count Area at Paddy's Point.

A total of 21 species were recorded within Count Area 16 during the survey period but was found to be of most significance to Black-headed Gull (99 records), Oystercatcher (51) and Redshank (67). Details of the peak high tide and low tide counts of each species recorded using Count Area 16 are presented in Tables 3.1 and 3.2.

At low tide the intertidal zone within the count area was used by small numbers of foraging waders including Oystercatcher (peak of 12 during Count L9), Redshank (peak of 8 during Count L3), Curlew (peak of 2 during L1), Greenshank (peak of 1 during L7) and Turnstone (peak of 5). Oystercatchers were typically concentrated on the mussel bank at Paddy's Point.

Small numbers of wildfowl were also recorded foraging within the intertidal zone in the western part of the count area at the base of the Ringaskiddy Jetty. Mallard were recorded foraging on two occasions with a peak count of 5 in December (L7). A small number of Mute Swans were also recorded, with a peak count of 6 birds foraging in September (L1).

At high tide small numbers of birds used the count area for roosting. Two counts of roosting Redshank were recorded on the rock armour in the western portion of the count area, totalling 48 birds, with a peak of 34 birds recorded in February (H14). In both instances roosting birds were flushed by dog walkers. Ringed Plover were recorded roosting on a single occasion, with a peak of 4 birds recorded near the base of the Ringaskiddy Jetty in September (H1). Four Oystercatchers were recorded roosting during high tide on two occasions in November (H7) and December (H8). A single Whimbrel was recorded roosting in October (H3) and a single Grey Heron in September (H1).

The subtidal marine areas are used by small numbers of waterbirds throughout the tidal cycle, for roosting and foraging. Of most note were Black-headed Gulls (peak of 23 foraging during L7), with Cormorant (peak of 2 during H1, L3 and L6), Great Crested Grebe (peak of 2 during H8 and L7), Great Northern Diver (peak of 1 during L11 and L12), Sandwich Tern (peak of 2 during L1), Shag (peak of 1 during L9, H12 and L11) also recorded.

Table 3.1: Peak High Tide Counts of Each Species by Count Area.

Species	Count Area																		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Barnacle Goose	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Black Guillemot	0	0	0	0	1	0	1	0	0	0	0	0	0	1	0	0	0	0	2
Black-headed Gull	2	5	0	1	115	7	4	23	64	19	72	12	15	5	6	7	2	5	16
Black-tailed Godwit	0	90	0	0	0	9	4	0	0	0	0	0	0	0	0	0	0	0	0
Common Gull	0	0	0	0	22	0	0	7	24	5	24	2	0	0	0	0	3	0	22
Common Tern	0	0	0	0	0	0	0	0	0	0	6	0	0	0	0	0	0	0	0
Cormorant	2	41	0	0	0	0	1	9	2	1	41	1	1	1	0	2	13	0	7
Curlew	0	1	0	0	19	37	1	0	0	0	0	0	0	0	0	0	2	0	0
Dunlin*	0	36	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Great Black-backed Gull	0	2	0	0	0	0	0	0	64	1	36	1	0	0	0	0	0	0	3
Great Crested Grebe	0	0	2	0	1	0	0	1	0	0	0	1	0	1	0	2	0	0	0
Great Northern Diver*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Greenshank	0	2	0	0	1	1	0	0	0	0	0	0	1	0	0	0	0	0	0
Grey Heron	0	11	0	0	0	22	0	0	1	0	0	1	1	1	0	1	0	0	0
Herring Gull	1	3	2	0	0	0	2	13	98	2	27	4	5	1	1	0	1	0	19
Lapwing	0	88	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lesser Black-backed Gull	0	3	1	1	1	0	0	5	2	0	22	0	0	0	0	1	0	0	19
Light-bellied Brent Goose	0	0	0	0	1	0	0	0	0	0	0	4	3	0	0	0	0	0	8
Little Egret*	0	2	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Mallard	0	0	0	0	32	5	4	0	0	0	0	2	0	0	0	3	0	0	0
Mediterranean Gull*	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Oystercatcher	0	17	0	0	8	24	2	0	0	0	0	7	9	0	0	8	5	0	22
Red-breasted Merganser	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Redshank	0	2	0	0	18	1	2	0	0	0	0	2	4	1	0	34	0	2	7
Ringed Plover	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0
Sandwich Tern*	0	0	0	0	0	0	0	0	0	1	1	1	1	0	0	0	0	0	0
Shag	0	5	0	0	0	0	0	1	0	0	1	0	0	1	0	1	2	0	1
Shelduck	0	46	8	0	71	29	0	0	0	0	0	2	0	0	0	0	0	0	15
Teal	0	0	0	0	89	12	4	0	0	0	0	0	0	0	0	0	0	0	0
Turnstone	0	15	0	0	0	0	0	0	8	0	0	0	60	0	0	3	0	0	17
Whimbrel	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0

Key To Table
Special Conservation Interest of Cork Harbour SPA.
*Listed on Annex 1 of The Birds Directive.

Table 3.2: Peak Low Tide Counts of Each species by Count Area.

Species	Count Area																		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Barnacle Goose*	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bar-tailed Godwit*	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Black Guillemot	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	2
Black-headed Gull	36	0	27	16	107	11	24	14	74	9	9	15	92	8	0	23	6	9	28
Black-tailed Godwit	0	0	41	35	15	0	11	2	0	0	0	0	0	0	0	0	0	0	0
Common Guillemot	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	1
Common Gull	5	0	12	3	27	0	5	13	16	4	6	0	14	0	0	7	1	0	27
Cormorant	1	46	2	0	0	0	0	6	1	2	19	1	2	2	0	2	3	0	6
Curlew	2	0	9	15	17	3	8	0	0	0	0	1	1	0	0	2	1	1	1
Dunlin*	39	0	52	8	29	0	11	0	0	0	0	0	0	0	0	0	0	0	5
Great Black-backed Gull	2	2	0	1	2	0	0	0	58	0	46	24	0	0	0	0	1	0	7
Great Crested Grebe	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	2	0	0	2
Great Northern Diver*	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	1	1	0	2
Greenshank	0	0	0	1	2	0	1	0	0	0	0	0	0	0	0	1	0	0	0
Grey Heron	1	12	1	1	2	3	1	0	1	0	0	2	1	1	0	2	1	1	0
Herring Gull	7	4	6	0	16	0	1	4	48	0	15	41	36	2	5	4	6	2	16
Lapwing	82	8	110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lesser Black-backed Gull	1	4	2	1	2	0	0	0	2	0	5	6	0	0	0	0	0	0	4
Light-bellied Brent Goose	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	5	22
Little Egret*	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mallard	4	0	0	0	17	0	12	0	0	0	0	0	0	0	0	5	0	0	0
Mediterranean Gull*	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Mute Swan	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	6	0
Oystercatcher	15	0	7	7	17	5	14	0	0	0	0	9	7	0	0	12	11	10	18
Red-breasted Merganser	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5
Redshank	9	0	7	19	36	2	8	0	0	0	0	2	1	2	0	8	1	5	16
Ringed Plover	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Sandwich Tern*	0	0	0	0	2	0	0	0	1	0	1	0	0	0	0	2	0	0	0
Shag	0	3	0	0	0	0	0	1	0	1	0	1	0	1	0	1	1	0	2
Shelduck	2	9	17	30	82	7	5	4	0	0	0	6	0	0	0	0	0	0	16
Snipe	0	0	1	0	8	0	4	0	0	0	0	0	0	0	0	0	0	1	0
Teal	0	0	0	9	72	44	0	0	0	0	0	0	0	0	0	0	0	8	0
Turnstone	11	7	0	0	0	0	15	0	0	0	1	0	15	0	0	13	4	14	12
Whimbrel	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0

Key To Table

Special Conservation Interest of Cork Harbour SPA.

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4 ANALYSIS OF RESULTS IN THE CONTEXT OF CORK HARBOUR AS A WHOLE

This section examines the relative importance of the study area and of specific count areas in the context of Cork Harbour as a whole. As a major wetland Cork Harbour covered by the Irish Wetland Bird Survey (I-WeBS), a joint survey scheme between BirdWatch Ireland (BWI) and the National Parks and Wildlife Service (NPWS), which aims to monitor wintering waterbirds in Ireland. The survey runs from September to March each winter, with over 800 wetland sites surveyed including estuaries, coastlines, bays, rivers, turloughs, lakes, streams and flooded fields. A request was therefore made to BWI to obtain the most recent 5-year peak mean waterbird counts obtained from Cork Harbour (Appendix 1).

Table 4.1 presents combined peak counts of species recorded during the survey for specific clusters of count areas along with the baseline SPA populations, the most recent 5-year peak mean for each species within Cork Harbour and 1% National (N) and 1% International (I) threshold levels. Table 4.2 presents the combined peak counts as a percentage of the most recent 5-year peak mean for each species within Cork Harbour. Count areas have been clustered to represent parts of the study area, which are zoned for development as part of the proposed Ringaskiddy Redevelopment, and where potentially significant impacts upon waterbirds are most likely to occur. Clustered count areas were counted together during the survey period.

It is clear that the count areas listed in Table 4.1 support only a small percentage of the total Cork Harbour wintering populations of most species. No species were recorded in numbers of national or international importance. However, the count areas regularly support a substantial proportion of the Cork Harbour wintering populations of Cormorant, Grey Heron, Black-headed Gull, Common Gull, Great Black-backed Gull, Herring Gull and Lesser Black-backed Gull. This is largely due to the four key roosting locations for these species within the Study Area: the Stone Breakwater (Count Area 2), the ADM Jetty (Count Area 11), the Ringaskiddy DWB Buildings and Mooring Dolphins (Count Area 9) and the trees on the southern shore of Monkstown Creek (see: RPS, 2014).

The peak count of 104 Great Black-backed Gulls in September and 125 Herring Gulls within the DWB in October were exceptional, representing 144% and 195% of the most recent Cork Harbour 5-yr peak mean for each species respectively. On both occasions gulls were observed associating with vessels arriving within the DWB, actively feeding, but largely roosting on the DWB buildings and mooring dolphins.

The peak count of 46 (L1) and 45 (H1) Cormorants using the stone breakwater and DWB both represent 18% of the most recent 5-yr peak mean for Cork Harbour, thus together having the capacity to support almost half of the total population.

Table 4.1: Peak Counts for Key Count Areas.

Species	Stone Breakwater (Count Area 2)	Monkstown Creek (Count Areas 3-7)	Ringaskiddy DWB & ADM Jetty (Count Areas 1, & 9-11)	Ringaskiddy East - Paddys Point (West) (Count Areas 14-16)	Paddys Point (East) (Count Area 19)	Cork Harbour 5-yr Mean (07/08 - 11/12)[1]	SPA Baseline	1% N[2]	1% I[2]
Barnacle Goose*	1 (H9, L8, L9, L12)	0	0	0	0	0		90	710
Bar-tailed Godwit*	0	3 (L9)	0	0	0	309	45	160	1,200
Black-headed Gull	0	134 (L12)	136 (H7)	25 (L7)	28 (L11)	1,684	948	-	20,000
Black-tailed Godwit	90 (H11)	65 (L1)	0	0	0	2,345	412	140	610
Common Gull	0	32 (L12)	48 (H3)	7 (L7)	27 (L9)	151	2,630	-	16,400
Common Tern*	0	0	6 (H1)	0	0	0	69 (p)	-	-
Cormorant	46 (L1)	2 (L4)	45 (H1)	3 (L3, L7)	7 (H1)	252	620	140	1,200
Curlew	1 (H13)	53 (H9)	2 (L6)	2 (L1)	1 (L5)	1,326	1,345	550	8,400
Dunlin*	36 (H13)	52 (L1)	39 (L7)	0	5 (L4)	4,251	4,936	880	13,300
Great Black-backed Gull	2 (H11, L4)	2 (L1)	104 (L2)	0	7 (L9)	72		-	4,200
Great Crested Grebe	0	2 (H13)	0	2 (H8, L7)	2 (11)	129	218	55	3,500
Great Northern Diver*	0	0	0	1 (L7, L9, L11, L12)	2 (L7, L11)	5		-	50
Greenshank	2 (H9)	3 (L12)	0	1 (L7)	0	84		20	2,300
Grey Heron	12 (L4)	22 (H9)	2 (L2)	3 (L1)	0	91	47	30	2,700
Herring Gull	4 (L1, L4)	16 (L12)	125 (H3)	8 (L3)	19 (H12)	64		-	10,200
Lapwing	88 (H6)	110 (L12)	82 (L10)	0	0	2,689	3,614	2,100	20,000
Lesser Black-backed Gull	4 (L8)	3 (L1)	22 (H1)	1 (H1)	6 (H1)	112	261	-	5,500
Light-bellied Brent Goose	0	1 (H9, L8)	0	0	22 (L9)	39		-	400
Little Egret*	2 (H4)	2 (L9)	1 (H11)	0	0	134		-	1,300
Mallard	0	36 (H11)	4 (L6)	5 (L7)	0	396		380	20,000
Mediterranean Gull*	0	2 (L12)	0	0	2 (L1)	29		-	770
Mute Swan	0	0	0	6 (L1)	0	55		110	-
Oystercatcher	17 (H6)	39 (L4)	22 (L10)	12 (L9)	22 (H8)	1,456	791	680	8,200
Red-breasted Merganser	0	1 (H11)	0	0	5 (L7)	64	90	35	1,700
Redshank	40 (H2)	67 (L9)	9 (L12)	34 (H14)	16 (L11)	1,478	1,614	310	3,900
Ringed Plover	0	0	0	4 (H1)	4 (L1)	30		150	730
Sandwich Tern	0	2 (L1)	2 (H1, L2)	2 (L1)	0	84		-	-
Shag	5 (H4)	0	1 (H10, L7)	1 (H8, H12, L6, L9, L11)	2 (L1)	4		-	2,000
Shelduck	46 (H11)	117 (L9)	2 (L7)	0	11 (L4)	1,106	1,426	150	3,000
Snipe	0	8 (L9)	0	0	0	50		-	20,000
Teal	0	98 (H13)	0	0	0	892	807	450	5,000
Turnstone	15 (H4)	15 (L9)	12 (L2)	13 (L3)	17 (H12)	168		120	1,400
Whimbrel	0	1 (L1)	0	1 (H3)	0	5			6,700

Key To Table

Special Conservation Interest of Cork Harbour SPA.

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(p) - Pairs. All other figures related to individual birds.

[1]Most recent 5-year peak mean for Cork Harbour (BirdWatch Ireland I-WeBS Data Request).

[2]National (N) and International (I) important population thresholds (Crowe *et al*., 2012).

Table 4.2: Peak Counts as a % of the Most Recent 5-year Mean for Cork Harbour.

Species	Stone Breakwater (Count Area 2)	Monkstown Creek (Count Areas 3-7)	Ringaskiddy DWB & ADM Jetty (Count Areas 1 & 9-11	Ringaskiddy East - Paddys Point (West) (Count Areas 14-16)	Paddys Point (East) (Count Area 19)
Barnacle Goose*	0	0	0	0	0
Bar-tailed Godwit*	0	1	0	0	0
Black-headed Gull	0	8	8	1	2
Black-tailed Godwit	4	3	0	0	0
Common Gull	0	21	32	5	18
Cormorant	18	1	18	1	3
Curlew	0	4	0	0	0
Dunlin*	1	1	1	0	0
Great Black-backed Gull	3	3	144	0	10
Great Crested Grebe	0	2	0	2	2
Great Northern Diver*	0	0	0	20	40
Greenshank	2	4	0	1	0
Grey Heron	13	24	2	3	0
Herring Gull	6	25	195	13	30
Lapwing	3	4	3	0	0
Lesser Black-backed Gull	4	3	20	1	5
Light-bellied Brent Goose	0	3	0	0	56
Little Egret*	1	1	1	0	0
Mallard	0	9	1	1	0
Mediterranean Gull*	0	7	0	0	7
Mute Swan	0	0	0	11	0
Oystercatcher	1	3	2	1	2
Red-breasted Merganser	0	2	0	0	8
Redshank	3	5	1	2	1
Ringed Plover	0	0	0	13	13
Sandwich Tern	0	2	2	2	0
Shag	125	0	25	25	50
Shelduck	4	11	0	0	1
Snipe	0	16	0	0	0
Teal	0	11	0	0	0
Turnstone	9	9	7	8	10
Whimbrel	0	20	0	20	0

Key To Table
Special Conservation Interest of Cork Harbour SPA.
*Listed on Annex 1 of The Birds Directive.

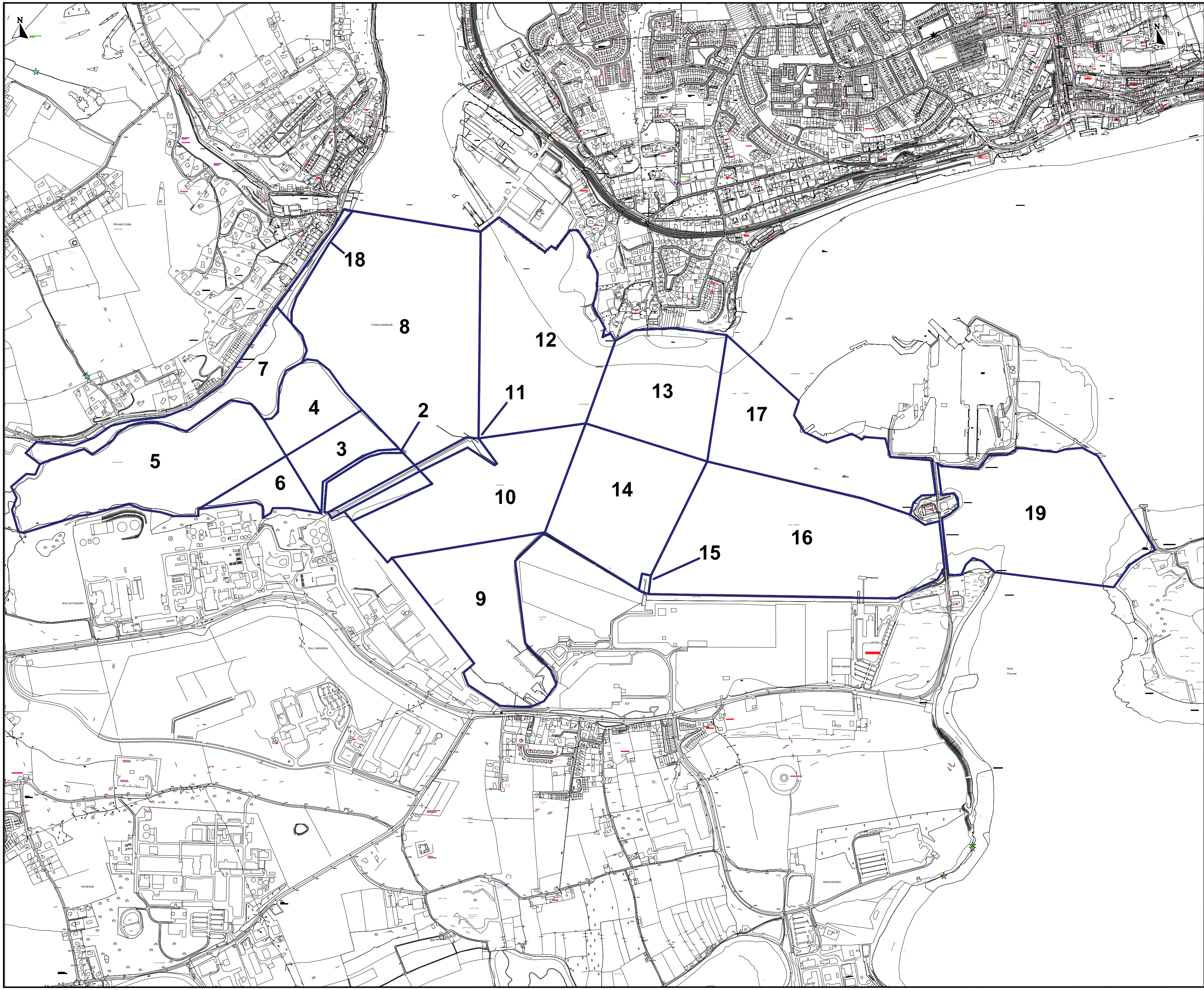
References

Crowe, O., Boland, H. & Walsh, A. (2012) Irish Wetland Bird Survey: Results of Waterbird Monitoring in Ireland in 2010/11. *Irish Birds*, **9**, pp 397-410.

RPS (2014). Report on Night-Time Tree-Roosting Cormorants in Monkstown Creek, Cork Harbour 2013/14. Unpublished RPS Report prepared on behalf of Port of Cork.

RPS (2013. Report on the Winter 2011/2013 Bird Survey at Ringaskiddy/Monkstown Creek. Unpublished RPS Report prepared on behalf of Port of Cork.

Figure 1: Count Areas Used in the Study



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LEGEND

Count Area Boundaries

Issue Details

Drawn: NR		**Project No.** NI 1004	
Chkd: JMC		**File Ref.** N/A	
Appd: RH			
Date: February 2014		**Drawing No.** Figure 1	**Rev.** 01
Scale: NTS			

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Project: ***Port of Cork Bird Surveys***

Title: ***Wintering Wetland Bird Survey Area***

Figure Number: 1

Figure 2: Main Roosting Areas on the Stone Break Water and ADM Jetty.

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LEGEND

- Gulls
- Cormorant and Shag
- Shelduck
- Waders
- Grey Heron

Issue Details

Drawn: NR		**Project No.** NI 1004	
Chkd: JMC		**File Ref.** N/A	
Appd: RH			
Date: February 2014		**Drawing No.** Figure 1	**Rev.** 01
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Project: *Port of Cork Bird Surveys*

Title: *Main Roosting Areas on the Stone Breakater and ADM Jetty*

Figure Number: 2

Appendix 1: Most Recent 5-year I-WeBS Data - Cork Harbour.

Cork Harbour

Species	1% National	1% International	2007/08	2008/09	2009/10	2010/11	2011/12	Peak	Mean
Kittiwake				3				3	1
Mute Swan	110		68	42	70	51	45	70	55
Whooper Swan	130	270	3	1	1			3	1
Greylag Goose	50	980	6			1		6	1
Canada Goose			22	5	9	14	14	22	13
Light-bellied Brent Goose		400	65	30	24	19	58	65	39
Black Brant					1			1	0
Feral/hybrid Goose			5					5	1
Ruddy Shelduck							2	2	0
Shelduck	150	3,000	911	1,303	952	1,223	1,140	1,303	1,106
Wigeon	820	15,000	1,479	1,313	1,236	1,296	1,468	1,479	1,358
Gadwall	20	600	8	6	8	13	22	22	11
Teal	450	5,000	748	1,005	753	1,026	929	1,026	892
Mallard	380	20,000	531	344	285	404	416	531	396
Pintail	20	600		22	27	12	31	31	18
Garganey					1			1	0
Shoveler	25	400	51	37	25	12	33	51	32
Pochard	380	3,000	3	2	4		1	4	2
Ring-necked Duck		1,470,000						0	0
Tufted Duck	370	12,000	16	22	36	16	26	36	23
Scaup	45	3,100		1		1		1	0
Eider	30	14,840			1		1	1	0
Common Scoter	230	5,500	1	1			4	4	1
Surf Scoter							1	1	0
Velvet Scoter			3					3	1
Goldeneye	95	11,500	14	17		2	20	20	11
Red-breasted Merganser	35	1,700	72	53	63	61	71	72	64
Goosander						1		1	0
Black-throated Diver		3,750		1				1	0
Great Northern Diver		50	4	2	16	1		16	5
Little Grebe	25	4,000	65	60	56	64	88	88	67
Great Crested Grebe	55	3,500	107	81	183	110	165	183	129
Slavonian Grebe		55	3		1			3	1
Black-necked Grebe					1	2		2	1
Cormorant	140	1,200	380	168	170	227	317	380	252
Shag		2,000	10	3	1	1	4	10	4
Little Egret		1,300	168	138	184	112	67	184	134
Cattle Egret				3	1			3	1
Grey Heron	30	2,700	170	87	59	68	70	170	91
Great White Egret					1			1	0
Spoonbill			1					1	0
Water Rail			2	2		3		3	1
Moorhen	20	20,000	25	25	22	37	21	37	26
Coot	330	17,500	11	4	4	9	9	11	7
Oystercatcher	680	8,200	1,810	1,241	1,190	1,099	1,939	1,939	1,456
Ringed Plover	150	730	27	38	34	21	29	38	30
Golden Plover	1,700	9,300	5,232	248	4,500	3,356	5,211	5,232	3,709
Grey Plover	65	2,500	39	17	10	20	35	39	24
Lapwing	2,100	20,000	3,321	3,219	1,974	2,713	2,217	3,321	2,689
Knot	190	4,500	111	119	58	250	178	250	143
Dunlin	880	13,300	3,579	5,091	2,632	4,887	5,068	5,091	4,251
Ruff		12,200	4	2		1		4	1
Snipe		20,000	75	17	72	53	34	75	50
Black-tailed Godwit	140	610	2,936	2,050	1,453	2,332	2,955	2,955	2,345

The counts presented in the table refer to the peak counts of species in each I-WeBS season.
Site peak and mean are calculated as the peak and mean of peak counts respectively over the seasons specified. Blank cells within columns which contain positive values for one or more species constitute zero for those species.

Species	1% National	1% International	2007/08	2008/09	2009/10	2010/11	2011/12	Peak	Mean
Bar-tailed Godwit	160	1,200	257	281	396	301	312	396	309
Whimbrel		6,700	1	1	11	11	2	11	5
Curlew	550	8,400	1,719	943	992	1,315	1,662	1,719	1,326
Common Sandpiper			4	3			1	4	2
Green Sandpiper		15,500					1	1	0
Spotted Redshank		900	2	1		2	7	7	2
Greenshank	20	2,300	95	76	79	81	88	95	84
Redshank	310	3,900	1,748	1,471	1,365	1,450	1,354	1,748	1,478
Turnstone	120	1,400	233	115	136	147	207	233	168
Wilson's Phalarope							1	1	0
Mediterranean Gull		770	48	65	21	3	8	65	29
Little Gull		1,100					1	1	0
Black-headed Gull		20,000	2,392	814	466	1,333	3,417	3,417	1,684
Ring-billed Gull		20,000				1	2	2	1
Common Gull		16,400	224	93	193	113	131	224	151
Lesser Black-backed Gull		5,500	72	192	60	163	72	192	112
Herring Gull		10,200	65	49	90	40	74	90	64
Iceland Gull		1,600		1				1	0
Glaucous Gull		2,200	1					1	0
Great Black-backed Gull		4,200	126	54	17	16	149	149	72
Sandwich Tern			35	19		260	104	260	84
Common Tern			1					1	0
Arctic Tern			1					1	0
Unidentified Tern			1	1				1	0
Kingfisher			2	3	2	2	3	3	2

Coverage (number of counts each season)

SubSite Code	Subsite	Grid	2007/08	2008/09	2009/10	2010/11	2011/12
0L099	Rostellan Lake	W877659	6	6	7	6	7
0L415	Rathcoursey & Ahanesk	W8770	7	6	6	5	4
0L453	Lough Beg	W780630	7	3		2	7
0L454	Owenboy Estuary	W751624	6	1		4	6
0L455	Ringaskiddy - Luc Strand	W786649	1			2	2
0L469	Weir Island	W818707	7	7	7	5	7
0L482	Ballintubbrid	W849701	7	7	7	5	7
0L484	Ballynacorra	W882718	7	6	6	5	4
0L485	Cuskinny	W817674	6	5	5	5	6
0L486	Dunkettle	W727723	6	4	7	5	7
0L487	Brick Island	W830703	7	7	7	5	7
0L488	Douglas Estuary	W720698	7	5	7	7	7
0L489	Glounthane Estuary/ Slatty Water	W800726	6	5	7	6	7
0L490	Aghada	W8566	6	6	6	6	7
0L491	Whitegate Bay	W836639	6	6	6	7	7
0L492	North Channel - Ballintubbrid	W805706	5	5	6	6	7
0L496	Monkstown Creek	W768652	6	3		2	7
0L498	Saleen	W8767	6	6	6	6	7
0L452	East Lough Mahon	W7670	6		1		5
0L041	Carrigrenan Pools	W7771	4		1		6
0L495	Belvelly - Marino Point	W790708	1	5			
0L550	Barryscourt	W811717			2		
0L587	Harpers Island (only)	W785726					1
0L480	Harpers Island	W7872		5	3		
0L425	Belvelly Bridge - Railiway	W783705	6		1		6
0L426	Carrigrenan - Great Island & Railway	W775705	6		1		6
0L424	Belvelly Tower	W794707	6				6

The counts presented in the table refer to the peak counts of species in each I-WeBS season.
Site peak and mean are calculated as the peak and mean of peak counts respectively over the seasons specified. Blank cells within columns which contain positive values for one or more species constitute zero for those species.

APPENDIX 9.4 REPORT ON 2011 BREEDING SEASON BIRD SURVEY

Port of Cork Bird Surveys

Report on 2011 Breeding Season Bird Surveys at Ringaskiddy / Monkstown Creek

DOCUMENT CONTROL SHEET

Client:	RPS Belfast / Port of Cork					
Project Title:	Port of Cork Bird Surveys					
Document Title:	Report on 2011 Breeding Season Bird Surveys at Ringaskiddy / Monkstown					
Document No:	MCE0692RP0002A01					
This Document Comprises:	DCS	TOC	Text	List of Tables	List of Figures	No. of Appendices
	1	1	12	0	0	5

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A01	Draft for Client Approval	R. Mundy	J.McCrory	/	Cork	18th June 2012

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APPENDICES

1 INTRODUCTION

This Report presents the findings of a summer season bird survey conducted on the western side of Cork Harbour, mainly in the vicinity of Monkstown and Ringaskiddy, during the period May 2011 to August 2011. All species of birds other than gulls and passerines and doves and pigeons, were included in the survey which aimed to establish the usage of this part of the harbour by birds during the 2011 breeding season. The survey was conducted in order to inform a forthcoming Environmental Impact Assessment and Appropriate Assessment relating to Port of Cork's proposed port redevelopment works at Ringaskiddy.

This part of Cork Harbour supports a breeding population of the Birds Directive Annex I species Common Tern. Breeding Common Tern is a Qualifying Interest of *Cork Harbour* SPA (site code 004030). Historically, Common Terns have nested at a variety of locations in the western part of the harbour; in 2011 they nested in three separate locations, at the Deep Water Port in Ringaskiddy; on the Martello Tower adjacent to the railway line immediately south of Fota Island and on the island in the lake at Pfizer's Golf Course at Shanbally (see Figure 2 in Appendix B).

For the purposes of this Report, the Cork Harbour population is considered as a single colony, with the various nesting locations referred to as sub-colonies.

The Martello Tower and Pfizer's Golf Course lake are located within the boundary of the SPA, the Deep Water Port sub-colony is located outside the SPA boundary (see Figure 3 in Appendix C). Terns from all three sub-colonies feed regularly within the SPA. Maintenance of the Cork Harbour breeding population of Common Tern must be viewed as a Conservation Objective of *Cork Harbour* SPA, regardless of the specific location of the nesting site in relation to the SPA boundary (see Appendix D).

Common Tern is the only Qualifying Interest of *Cork Harbour* SPA (see Appendix D) that relates to a breeding bird species, the other Qualifying Interests are all non-breeding 'wintering' bird populations which are present in the harbour primarily during the winter period and / or the spring and autumn migration periods. A number of these 'wintering' species are however also present in the area in substantial numbers during the summer breeding season; and larger numbers of some species arrive during July and August, at the commencement of the autumn migration period.

Little Grebe, Grey Heron and Shelduck, which are included as Qualifying Interests of the SPA for their non-breeding populations, breed in small numbers within Cork Harbour, and some records of Shelduck and Grey Heron presented in this report refer to birds from these breeding populations. Such breeding populations should be considered part of the 'Wetlands' Qualifying Interest of the SPA (see Appendix D).

Waterbird species that are not specifically listed as Qualifying Interests of Cork Harbour SPA should, as a whole, be considered to be included under the 'Wetlands' Qualifying Interest of the SPA (see Appendix D).

2 METHODOLOGY

The survey results presented in this report are based upon data collected from three sources, as follows:

1. Vantage Point Watches conducted in the Ringaskiddy and Monkstown areas to determine usage of intertidal and marine areas by birds during the period May to August 2011;

2. Monitoring of the 2011 Common Tern breeding sub-colonies;

3. Consultation with local ornithologists.

2.1 VANTAGE POINT WATCHES

Three Vantage Points were established from which all intertidal and marine areas that lie within the potential 'zone of influence' of proposed port redevelopment works at Ringaskiddy can be viewed. From the Vantage Points, the visible area was divided into six Count Areas labelled A to F. Boundaries of the Count Areas were selected primarily to delineate patches of relatively homogenous habitat within the Study Area, in order to compare bird usage of these different habitats and spatial areas; but were also selected to be easily perceived by the observer. This was done by use of sight-lines to prominent landmarks such as permanent marker buoys, coastal features and features on the horizon. Vantage Point locations and Count Area boundaries are shown in Figure 1 in Appendix A.

Counts of birds within the Count Areas were made from the Vantage Points from the 13th of May to the 23rd of August. Each of the six Count Areas was monitored for a duration of 23 hours during the period, details of the monitoring effort are presented in Table 2.1. Locations of Count Areas are presented in Figure 1 in Appendix A.

Count durations varied from 2 hours to six hours. During the count, the observer regularly scanned the Count Area and recorded all birds (other than gulls, passerines, doves and pigeons), their activity as either feeding (F); roosting, loafing or resting (R); or flying through the Count Area (M). Counts were made either every five minutes, or where the number of birds made this unfeasible, every ten minutes. Where relevant, additional notes on the birds (such as age and sex); the specific locations of birds within the Count Area; and additional notes on behaviour (such as breeding display), was also made.

Table 2.1: Summary of Field Monitoring Effort, Summer 2011

	Count Area A	Count Area B	Count Area C	Count Area D	Count Area E	Count Area F
May	2 hours	6 hours	2 hours	6 hours	0	0
June	6 hours	6 hours	6 hours	6 hours	4 hours	4 hours
July	6 hours	6 hours	6 hours	6 hours	9 hours	9 hours
August	9 hours	5 hours	9 hours	5 hours	10 hours	10 hours
Total	**23 hours**	**23 hours**	**23 hours**	**23 hours**	**23 hours**	**23 hours**

2.2 MONITORING OF THE COMMON TERN BREEDING COLONIES / SUB-COLONIES

There are three locations in the vicinity of Monkstown and Ringaskiddy where Common Terns are known to have bred in recent years; the Deep Water Port at Ringaskiddy; the island in the lake at

Pfizer's Golf Course and a rocky 'island' within Lough Beg (it is an island only at high tide, being surrounded by mud at low tide). Common Terns also breed on the top of a Martello Tower adjacent to the railway line immediately to the south of Fota Island. This sub-colony was not monitored as part of this study. The locations of these four sites are presented in Figure 2 in Appendix C.

The Deep Water Port, Lough Beg and Pfizer's Gold Course lake sub-colonies are easily observed from adjacent roads and car parks without causing any disturbance to the birds. Both the Lough Beg and Pfizer's Gold Course lake sub-colonies were examined on a number of occasions during May, June and July 2011 (see Sections3.2.2 and 3.2.3 for details). The Deep Water Port sub-colony was examined on a regular basis throughout the summer period between mid-May and the end of August.

2.3 CONSULTATION WITH OTHER ORNITHOLOGISTS

A number of local ornithologists who have worked on the Cork Harbour Common Terns in an amateur capacity (including ringing of chicks at the nest sites) were contacted in order to gather information on Common Terns and in particular on the sub-colony at the Martello Tower, which was not monitored directly as part of this survey (see Figure 2 in Appendix C). Barry O'Mahony (BOM), Jim Wilson (JW) and Pat Smiddy (PS), in particular provided valuable information which is included in Section 3.2 of this Report.

3 RESULTS

3.1 USAGE BY BIRDS OF INTERTIDAL AND MARINE HABITATS AT RINGASKIDDY AND MONKSTOWN DURING THE BREEDING SEASON

3.1.1 Common Tern

Vantage Point watches indicate that Common Terns feed in small numbers throughout the Ringaskiddy / Monkstown Study Area. Table 3.1 presents details of the mean numbers of Common Terns recorded feeding in each of the six Count Areas during the survey (see Figure 1 in Appendix A). Overall, the data indicates that at any point in time there are an average of 4.77 Common Terns feeding within the Study Area and a further 1.27 Common Terns moving through a Count Area within the Study Area. Hence an average of approximately six Common Terns were engaged in feeding activity within the Study Area at any point in time.

The most heavily used Count Areas for feeding were B and E; with fewest birds recorded in A and F. Count Area A (Monkstown Creek) comprises an area of intertidal mud and sand where suitable foraging habitat is unavailable much of the time during low tide periods, however Count Area F consists of a large area of open water, so the low number of feeding terns in this area is somewhat surprising. The northern shoreline of Count Area F does appear to be an important feeding area for terns on occasion (see Figure 4 in Appendix D), however terns were very rarely recorded feeding elsewhere in Count Area F. Within Count Areas B, C, D and E, terns were observed feeding in most locations on occasion, however two areas appeared to be of particular importance, one on either side of the main channel through the study area. These locations are indicated in Figure 4 in Appendix D.

Table 3.1: Summary of Common Tern Activity, Summer 2011

Count Area	Number of Counts	Mean number of birds recorded feeding within the Count Area	Mean number of birds recorded flying through the Count Area
A	145	0.31	0.23
B	194	1.26	0.41
C	145	0.83	0.01
D	194	0.68	0.19
E	149	1.13	0.26
F	149	0.56	0.17
Whole Study Area		**4.77**	**1.27**

Wiggins and Morris (1987) found that during the incubation and chick stages of the breeding cycle, the non-incubating member of a Common Tern pair spent on average 12 or 13 minutes per hour at the nest. Hence, one member of the pair is absent from the nest for approximately 80% of the time. A total of between approximately 40 and 60 adult birds were associated with the Deep Water Port sub-colony during the 2011 breeding season and it would therefore be expected that during the incubation and chick stages, between approximately 16 and 24 birds will be away from the sub-colony (mainly foraging) at any one time, greatly in excess of the six birds that are on average foraging within the Study Area, there is also evidence that birds from the Martello Tower sub-colony may forage within the Study Area on occasion which is likely to account for a proportion of the six birds. The evidence therefore indicates that a substantial proportion of the foraging activity of birds from the Deep Water Port and Pfizer's Golf Course lake sub-colonies occurs outside the Study Area.

Data on birds flying through Count Areas (see Table 3.1), and additional notes taken during Vantage Point watches, provide information on the likely locations of other foraging areas outside the Study Area.

There is no evidence that birds from the Deep Water Port and Pfizer's Golf Course lake sub-colonies are moving northwards through the Passage West channel. Common Terns passing north to south through the channel were invariably recorded as moving from the channel eastwards around Black Point and were believed to be almost exclusively birds from the Martello Tower sub-colony.

The majority of birds flying through Count Areas C, D, E and F were moving from the Deep Water Port sub-colony, or from the Passage West channel, eastwards across the Study Area and then eastwards out of the Study Area, both to the north and south of Haulbowline Island.

Birds returning westwards through the Study Area either with or without food were recorded less frequently. Birds returning to the Deep Water Port sub-colony with food tend to fly directly there, overland where necessary, and were often seen passing over the reclaimed area to the northeast of the Deep Water Port and along the line of the road from Golden Rock. Observations made by a Cobh-based ornithologist (JW) indicate that Common Terns are regularly seen flying northwards over the western part of Cobh town, apparently commuting between feeding areas to the south of Cobh and the Martello Tower. Less frequently, Common Terns are seem moving north to south along a similar route.

In summary, observations suggest that Common Terns setting out to forage from a nesting colony tend to fly over water, whilst returning birds tend to fly directly to the colony, overland if necessary. Observations suggest strongly that areas to the east of the Study Area provide an important foraging area for birds from both the Deep Water Port / Pfizer's Golf Course lake sub-colonies and the Martello Tower sub-colony.

3.1.2 Waders

Numbers of waders in Cork Harbour, and in Ireland generally, are highest during migration periods and in the winter months. The summer period, and particularly the period between mid-April and mid-July, sees the lowest numbers of waders in the area.

Table 3.2 presents a summary of the mean numbers of feeding waders recorded in each of the six Count Areas during the summer 2011 survey period.

Table 3.2: Mean Number of Wader Species Recorded Feeding in Each Count Area, Summer 2011

	Count Area A	Count Area B	Count Area C	Count Area D	Count Area E	Count Area F	Whole Area
Number of Counts	**145**	**194**	**145**	**194**	**149**	**149**	
Black-tailed Godwit	16.7	0	13.6	0	0	0	**30.3**
Curlew	5.8	<0.1	4.3	0	0	0.1	**10.3**
Oystercatcher	4.8	1.4	1.7	<0.1	0.6	1.1	**9.6**
Redshank	2.7	1.4	1.2	0	0	0.1	**5.3**
Ringed Plover	0	0.7	0	0	0	0.3	**0.9**
Whimbrel	0.3	0	0.1	<0.1	0	0	**0.4**
Greenshank	0.2	<0.1	<0.1	<0.1	0	0	**0.3**
Dunlin	0	<0.1	0	0	0	0	**<0.1**
Sanderling	0	<0.1	0	0	0	0	**<0.1**
Turnstone	<0.1	<0.1	0	0	0	0	**<0.1**

The intertidal mud of Monkstown Creek in Count Areas A and C supported by far the largest numbers of feeding waders during the study period, with only very small numbers of birds recorded feeding elsewhere within the study area. Peak counts of feeding wader species in the Monkstown Creek part of the study area (Count Areas A and C) are presented in Figure 3.3.

Table 3.3: Peak Counts of Feeding* Waders within Monkstown Creek, Summer 2011

Species	Peak Count	Date
Black-tailed Godwit	105	22 / 06 / 2011
Curlew	84	02 / 08 / 2011
Oystercatcher	29	02 / 08 / 2011
Redshank	34	09 / 08 / 2011
Whimbrel	3	02 / 08 / 2011
Greenshank	3	09 / 08 / 2011
Turnstone	1	09 / 08 / 2011

* includes birds that were present within the intertidal feeding habitat but were not actively feeding

Area B occasionally supported small numbers of feeding Oystercatcher (peak count of 13; 22nd July); Redshank (peak count of 44; 22nd July); Ringed Plover (peak count of 10; 14th June); a single Curlew on several dates; and a single Dunlin, a single Sanderling and a single Turnstone on the 22nd of July.

Up to 22 Oystercatcher (2nd August); 5 Ringed Plover (13th July); 2 Redshank (22nd July), a single Curlew on several dates; a single Whimbrel on the 22nd July and a single Greenshank on the 22nd August, were recorded feeding around the shoreline of Areas D, E and F.

3.1.3 Shelduck

Shelduck numbers in Cork Harbour peak during winter and early spring however substantial numbers of mainly non-breeding birds also spend the summer period in the harbour before departing from July onwards for their communal moulting grounds.

Feeding and / or roosting Shelduck were recorded from Count Areas A, B, C and D throughout the study period, with occasional birds recorded flying through Count Area E. The highest count was of 42 birds in Count Areas A and C on the 22nd June; but more usually, between 10 and 20 birds were present within the Study Area, mainly in Areas A and C, within Monkstown Creek, with pairs of birds sometimes moving at low tide to the shore at Rushbrook in Count Area D, or to the intertidal mud in Area B.

3.1.4 Cormorant and Shag

Cormorants are present within the Study Area throughout the year. They feed in all of the Count Areas predominantly at low tide and use the stone breakwater and metal pier as roosting locations, mainly at high tide. A large night-time roost is also present in the Study Area in trees along the southern shore of Monkstown Creek in Count Area A (for details, see RPS, 2012).

Feeding birds were recorded in all six Count Areas, with a mean of 1.9 birds feeding in the Study Area at any one time. The favoured feeding areas were Count Areas F (mean of 0.6 birds feeding at any one time); Count Area E (mean of 0.5) and Count Area C (mean of 0.4). The highest count of feeding birds was 6 in Count Areas E and F on the 2nd of August.

Peak counts of high tide roosting Cormorants on the stone breakwater were, 41 on the 22nd of June, 53 on the 29th of July; 47 on the 2nd of August and 75 on the 9th of August. On the metal pier, peak roosting numbers were 16 on the 22nd of July; 20 on the 9th of August and 27 on the 22nd of August.

Shags use the study area in much the same way as Cormorants (but do not roost in the trees at Monkstown Creek at night) but are present in much smaller numbers with single feeding birds recorded on four dates during the period.

3.1.5 Grey Heron

Grey Herons breed in small numbers in trees in the Black Point area, adjacent to Count Areas D and E. The species is present in the Study Area throughout the year and was recorded in all Count Areas within the Study period.

Feeding birds were recorded in all six Count Areas, with a mean of 2.5 birds feeding in the Study Area at any one time. The favoured feeding areas were the shore at Monkstown in Count Areas C (mean of 0.7 birds feeding at any one time); the shore at Rushbrook in Count Area D (mean of 0.5) and the shore between Black Point and White Point in Count Area E (mean of 0.5). The highest count of feeding birds was 7 in Count Areas E and F on the 2nd of August.

Peak counts of high tide roosting Grey Herons from the stone breakwater were, 21 on the 29th of July; and 28 on the 23rd of August.

3.1.6 Other Bird Species Recorded

In addition to those discussed in Sections 3.11 to 3.15, five other (see Section 1) waterbird species were recorded during the survey period: Mute Swan, Gannet, Little Egret, Mallard and Sandwich Tern. Mallard may breed around the margins of the study area in small numbers, however no positive evidence of breeding was recorded during the 2011 survey. Mute Swan attempted to breed at the lake in Pfizer’s golf Course however the attempt was thought to have been unsuccessful. Little Egret breeds in other parts of Cork Harbour but not in the vicinity of the Study Area; Sandwich Tern and Gannet are non-breeding visitors to Cork Harbour.

Mallard is primarily an autumn and winter visitor to the Study Area, however, small numbers of Mallard were recorded throughout the Study Period in Count Areas A and C, and occasionally flying through Count Areas D and F. The peak counts were 9 in Count Area A on the 23rd of August; and 4 in Count Areas A and C on the 22nd of June. No juveniles were recorded within the Study Area.

A single Mute Swan was on the shore at Monkstown, in Count Area C on the 24th of May, 22nd of June and 23rd of June. A pair was in Monkstown Creek in Count Areas A and C on the 2nd of August.

Little Egret is a relatively recent colonist in the Cork Harbour area, but substantial numbers now breed in the area, mainly in the northern part of the harbour. Perhaps surprisingly relatively few visit the Monkstown Creek area during the summer months. During the study period, three were feeding in Count Areas A and C on the 2nd of August and one was feeding there on the 22nd of June. One was roosting on the stone breakwater at high tide on the 29th of July. These were the only records.

Two adult Gannets were feeding in Count Areas B, D, E and F on the 25th of June, and a single adult was feeding in Count Area E on the 2nd of August.

Small numbers of Sandwich Tern were recorded feeding and occasionally loafing in the Study Area on seven dates during the Study Period, usually in Count Areas E and F but also in Count Areas B and C. The peak counts were 4 on the 13th of July; and 3 on the 2nd of August.

3.2 CORK HARBOUR COMMON TERN BREEDING COLONIES / SUB-COLONIES

3.2.1 Deep Water Port Sub-colony

The Deep Water Port sub-colony is located atop three concrete 'dolphins' which are connected by a concrete and steel gangway. All nests were on the dolphins themselves however the gangway and its hand rails are also used by both adult and juvenile birds for perching, apparently acting as a loafing area for the sub-colony.

A total of approximately 13 to 18 pairs of Common Tern nested on the dolphins in 2011. The breeding season was unusually late with eggs hatching during the period approximately between the 15th July and the 5th August. Cramp *et. al*. (1985) give an incubation period of 21 to 22 days, increasing to 25 to 31 days when predation causes night desertion, so these hatching dates extrapolate back to laying dates between the 23rd of June and the 10th of July. These dates would tally with possible re-nesting birds from Pfizer's Golf Course lake which was thought to have failed at the egg stage in late May (see Section 3.2.3).

A minimum of seven chicks were known to have been successfully fledged from the Deep Water Port sub-colony, but it is considered likely that considerably more than this, and probably 12 to 15 fledged. It appears that fledged birds may be moved by the parents away from the Deep Water Port area soon after fledging, possibly to the Martello Tower (see Section 3.2.4) or to an unknown loafing area either in that vicinity or elsewhere.

3.2.2 Lough Beg

Common Terns were present during May, June and July on the rocky island in Lough Beg where they have attempted to breed in previous years; and a pair was observed displaying once during June. No pairs were however seen that were clearly territorial and no nests were seen. It is not thought that Common Terns attempted to breed at this location in 2011 and certainly no Common Terns bred successfully here. A summary of observations is as follows:

13th May: 2 Common Terns were present, loafing.

23rd May: 15 Common Terns were present, apparently including 6 pairs, but no concerted display and no nests were observed.

24th June: 1 pair was present, in full display.

13th July: 8 Common Terns were present but no nests, obvious territories or display were observed.

29th July: No Common Terns were present.

3.2.3 Pfizer's Golf Course Lake Sub-colony

Breeding was attempted here during 2012 but was not successful. During late May the sub-colony was active. BOM recorded approximately 16 nests during May. However, activity was much reduced during

June, indicating failure of the sub-colony, probably at the egg stage. BOM has indicated that this was due to flooding of the island after a period of heavy rain, a problem that has also beset this site in several previous years. Between two and four nests were then established during July, however these also failed and the sub-colony was abandoned by late July (at which time chicks were present at the Deep Water Port and the sub-colony there was fully active).

It is hypothesised that the July nests at this site and probably some of the very late nests at the Deep Water Port (see Section 3.2.1) resulted from re-nesting by birds whose nests failed at this site during late May or early June. Summary of the author's observations are as follows:

13th May: No Common Terns were present.

23rd May: 20 Common Terns were in the area; estimated to be 12 pairs. Much mate-provisioning, display and other typical pre-laying / egg stage activity was observed.

24th June: 6 Common Terns were present, activity levels were very subdued, no nests were visible, no display or other breeding behaviour was observed.

13th July: 2 Common Terns were apparently on nests; two others birds were loafing, thought to be attending two additional nests which were not visible;

29th July: No Common Terns were present.

31st July: No Common Terns were present.

3.2.4 Martello Tower Sub-colony

Between 20 and 30 pairs of Common Tern nested at this site in 2011, a similar number were present in 2010 (BOM). The number of birds successfully fledged is unknown.

4 DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

Whilst this Report does not constitute an Environmental Impact Statement, the finding presented herein will inform a forthcoming EIA and the data upon which the findings presented in this Report is based will be used in a forthcoming EIS and in an Appropriate Assessment, relating to Port of Cork's proposed redevelopment of their port facilities at Ringaskiddy. Hence, whilst a quantitative impact assessment and proposals for appropriate mitigation are beyond the scope of this Report, the following Sections present discussion and conclusions of the findings of this study in the context of this proposed development and forthcoming impact assessments.

4.1 USAGE BY BIRDS OF INTERTIDAL AND MARINE HABITATS AT RINGASKIDDY AND MONKSTOWN DURING THE BREEDING SEASON

Common Terns from the breeding sub-colonies at the Deep Water Port, Pfizer's Golf Course lake and the Martello Tower fed throughout the study area throughout the period between May and August 2011. The most important feeding areas within the Study Area are depicted in Figure 4 in Appendix D however it is considered that most feeding occurs to the east of the Study Area. It is considered highly unlikely that any development of the Deep Water Port area will result in any impact on foraging habitat for Common Tern either during construction or operation.

Whilst the period between May and July inclusive is the time of year when lowest numbers of non-breeding waders and waterbirds are present in the Study Area, substantial numbers of some species, which are qualifying Features of *Cork Harbour* SPA, are nevertheless present at this time including Shelduck, Cormorant, Black-tailed Godwit and Curlew. All waterbird and wader species (other than breeding Common Tern, and migratory Sandwich Tern and Whimbrel) are however present in greater numbers at other seasons and it is considered that the period from April to July inclusive, provides the most suitably 'window' in which construction activity in sensitive locations, such as the vicinity of the ADM jetty and the stone breakwater, can be carried-out with minimal disturbance to birds.

4.2 CORK HARBOUR COMMON TERN BREEDING COLONIES / SUB-COLONIES

The breeding Common Terns within the Deep Water Port constitutes a significant constraint on Port of Cork's proposed development in the area. Any negative impact on the breeding colony that affects its productivity would constitute a significant negative impact on the Conservation Objectives of *Cork Harbour* Special Protection Area. Such impacts might occur as a result of construction activity that reduces the isolation of the dolphins (on which the terns nest) from the adjacent shoreline.

The suitability of the dolphins as a breeding site is due to several factors as follows:

- Notwithstanding the gangways that connect the dolphins to one another and to the shoreline at three points (see below), they are surrounded by water at all stages of the tide.

- The Deep Water Port is located close to important feeding grounds for the Common Terns (see Section 3.1.1 of this Report);

- The three gangways connecting the dolphins to the shoreline are sealed from human entrance by oversized fine-mesh gates / fences. This prevents not only unauthorised or casual human access to the dolphins but greatly reduces access to the dolphins for ground predators such as foxes.

- There is a continuous fence, approximately 2m in height and supporting bindweed, creepers and other dense vegetation, along the shoreline adjacent to the dolphins to the south, southwest and west, which provides an excellent screen to the intense human activity immediately beyond.

- Human activity to the shoreward side of the fence line (see above) appears to be almost non-existent.

- There are no tall buildings or other tall structures within 75m of the dolphins, and other than the passenger ferry terminal gangways, none within 175m.

- The design of the dolphins, with flat decks and an upstanding concrete kerb (approximately 20cm in height) around three sides of the perimeter of the deck, is undoubtedly an attractive feature to the terns. They build their nests up against these kerbs which provide a degree of shelter for incubating birds, nests, eggs and chicks; and vegetation develops along the base of the kerbs through the summer, which also provides shelter. In addition, the presence of hand rails and other raised structures immediately adjacent to the decks of the dolphins allows adult terns to perch high above their nests, thereby acting as effective sentries for the defence of the colony against aerial predators such as gulls and crows.

The breeding terns are subject to extraordinarily high levels of man-made noise and visual disturbance to which they appear to be entirely habituated. Loud irregular noise from human sources and movement of machinery, vehicles and people close-by is a near-constant feature of the site. Sources include road traffic within 100m, including a high proportion of trucks and other large commercial vehicles many of which are stopping and starting, revving engines and using air brakes; port activity including mass bulk handling within 200m; pedestrians and regular human voices within 100m (for example at the Deep Water Port security desk) and the regular docking of very large ocean going passenger ferries within 30m of the dolphins and on rare but regular occasions, directly up against the dolphins themselves.

Provided the following features: the dolphins themselves, the 'vegetated' fence along the shoreline, the gangways to the dolphins, and the water and shoreline beneath the dolphins, are not directly affected; and provided human activity levels to the areas on the shoreward side of the fence line are not increased; and provided that no large, tall structures are constructed within 150m of the dolphins, then it is considered highly unlikely that any additional noise or human activity resulting from construction work in the vicinity will cause any significant disturbance to the breeding terns.

It is however considered that the Deep Water Port does not provide an ideal long-term situation for the Common Tern sub-colony and it is recommended that attempts are made to encourage the terns to relocate to a more suitable location within the harbour. In this regard, the following is recommended:

- A tern nesting platform (or platforms), similar in design to the Deep Water Port dolphins, is constructed to the north west of Marino Point, as close as possible to the position of the derelict barges that were formerly used by the terns, but were removed in the mid 1990's; and

- The level of the island in Pfizer's Golf course lake is raised to avoid flooding of the island during and following periods of heavy rain. The evidence suggests that flooding of the island has been the main cause of nest failure at this location in recent years (BOM).

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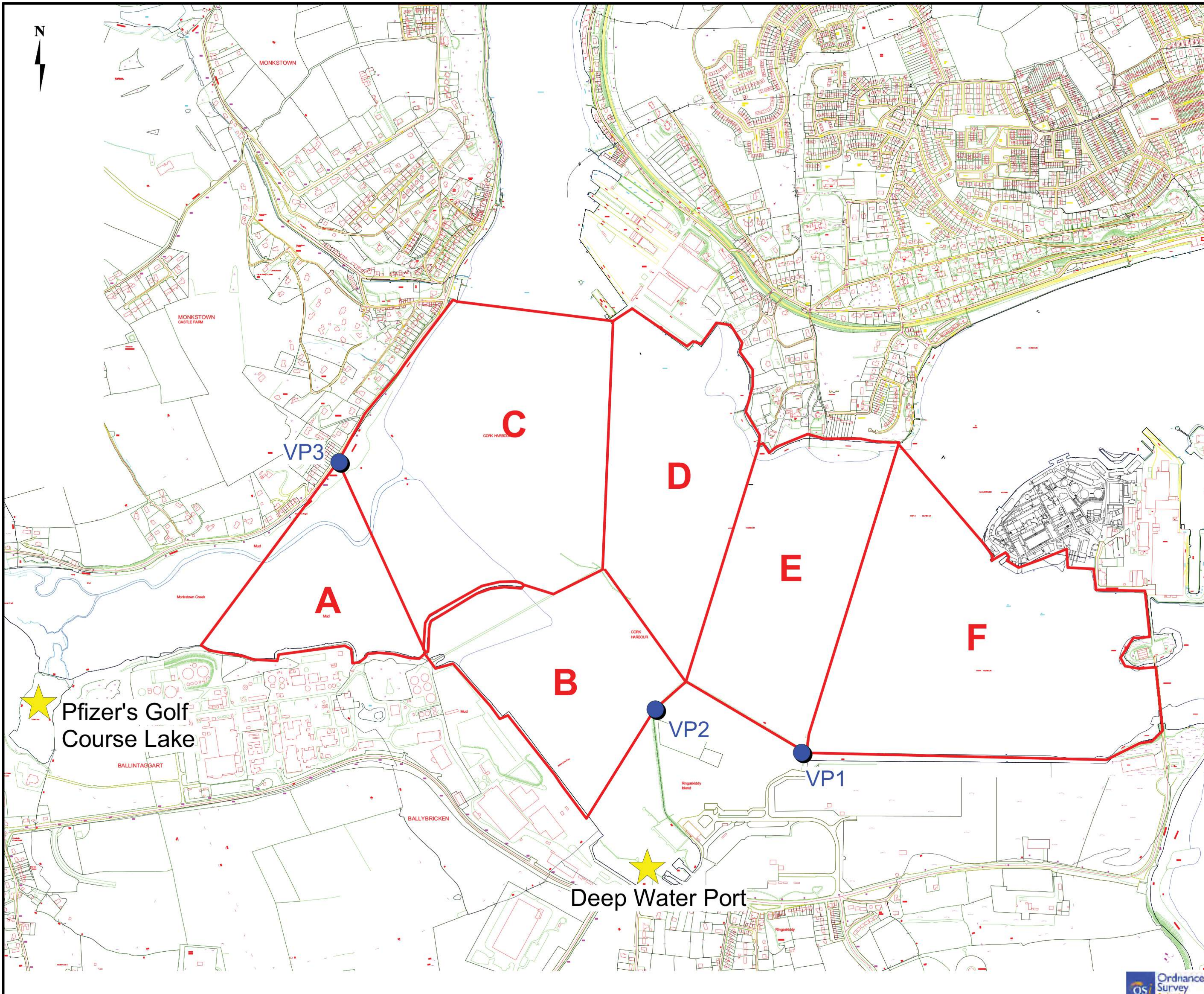
APPENDIX A

FIGURE 1: LOCATIONS OF VANTAGE POINTS AND COUNT AREAS



Client
PORT OF CORK

Project
2011 Breeding Season Bird Surveys

Title
Locations of Vantage Points and Count Areas

Figure 1

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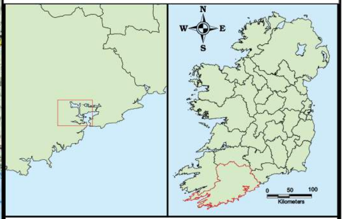
APPENDIX B

FIGURE 2: LOCATIONS OF KNOWN RECENT COMMON TERN BREEDING COLONIES / SUB-COLONIES

Legend

Former Breeding Sites

2011 Breeding Sites



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Project

2011 Breeding Season Bird Surveys

Title

Locations of Known Recent Common Tern Breeding Colonies / Sub-colonies

Figure 2

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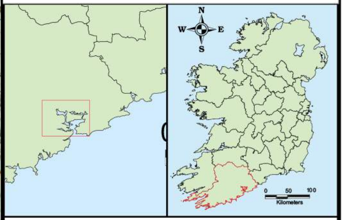
APPENDIX C

FIGURE 3: *CORK HARBOUR* SPA

Legend

2011 Breeding Season Surveys Study Area

Cork Harbour Special Protection Area (SPA)



Client

PORT OF CORK

Project **2011 Breeding Season Bird Surveys**

Title

Cork Harbour Special Protection Area (SPA)

Figure 3

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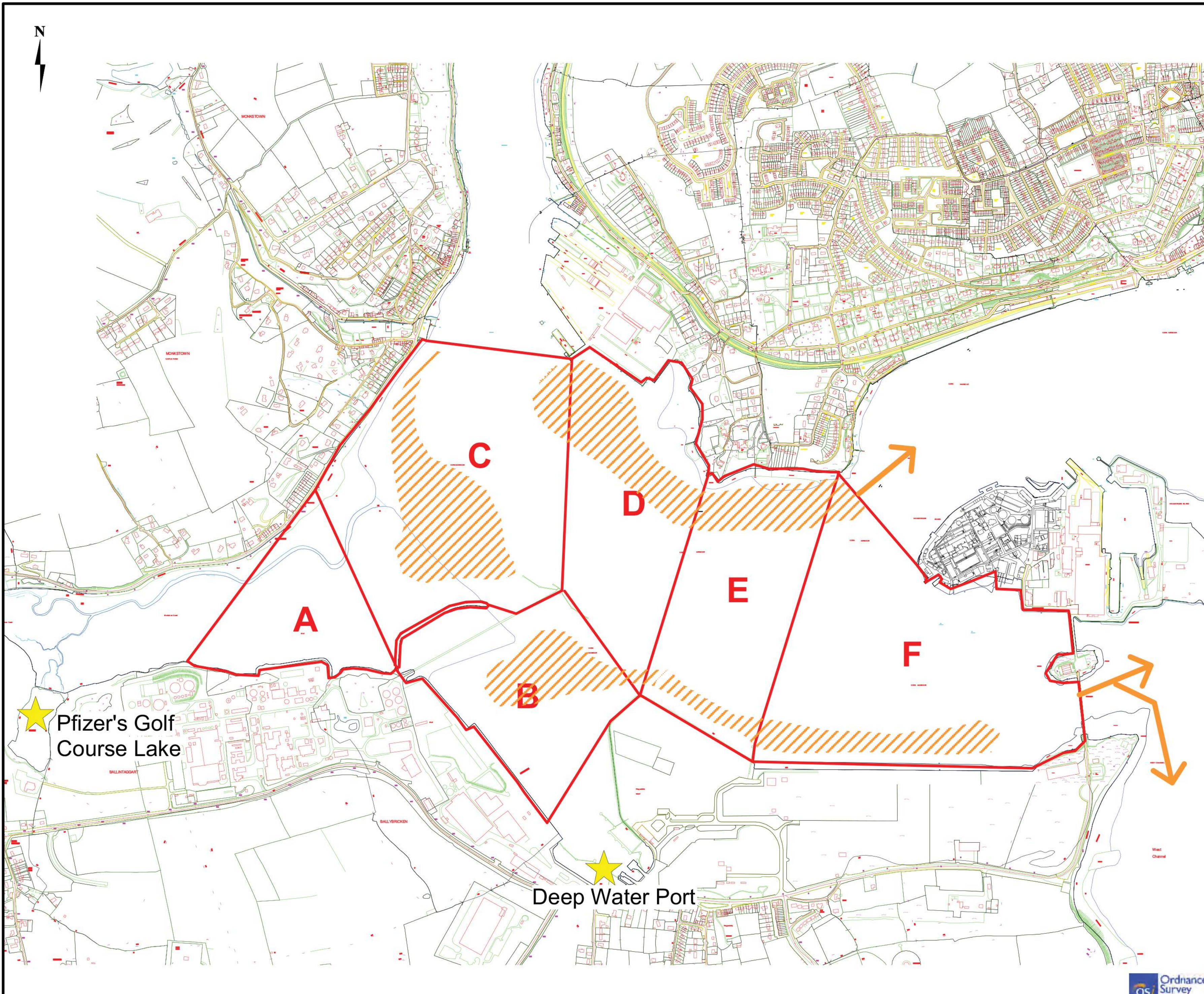
APPENDIX D

FIGURE 4: FAVOURED COMMON TERN FEEDING AREAS WITHIN THE STUDY AREA

APPENDIX E



Legend

Yellow star	Common Tern Breeding Sub-colonies
Orange hatching	Favoured Common Tern Feeding Areas within the Study Area
Red line	Boundaries of Count Areas
Orange arrow	Direction of Other Known Common Tern Feeding Areas

Client

PORT OF CORK

Project

2011 Breeding Season Bird Surveys

Title

Favoured Common Tern Feeding Areas within the Study Area

Figure 4

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Conservation Objectives of *Cork Harbour* SPA

(Site Code 004030)

Conservation Objectives for Cork Harbour SPA [004030]

The overall aim of the Habitats Directive is to maintain or restore the favourable conservation status of habitats and species of community interest. These habitats and species are listed in the Habitats and Birds Directives and Special Areas of Conservation and Special Protection Areas are designated to afford protection to the most vulnerable of them. These two designations are collectively known as the Natura 2000 network.

European and national legislation places a collective obligation on Ireland and its citizens to maintain habitats and species in the Natura 2000 network at favourable conservation condition. The Government and its agencies are responsible for the implementation and enforcement of regulations that will ensure the ecological integrity of these sites.

The maintenance of habitats and species within Natura 2000 sites at favourable conservation condition will contribute to the overall maintenance of favourable conservation status of those habitats and species at a national level.

Favourable conservation status of a habitat is achieved when:
- its natural range, and area it covers within that range, are stable or increasing, and
- the specific structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future, and
- the conservation status of its typical species is favourable.

The favourable conservation status of a species is achieved when:
- population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats, and
- the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and
- there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

Objective: To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA:

- *Tachybaptus ruficollis* [wintering]
- *Podiceps cristatus* [wintering]
- *Phalacrocorax carbo* [wintering]
- *Ardea cinerea* [wintering]
- *Tadorna tadorna* [wintering]
- *Anas penelope* [wintering]
- *Anas crecca* [wintering]
- *Anas acuta* [wintering]
- *Anas clypeata* [wintering]
- *Mergus serrator* [wintering]
- *Haematopus ostralegus* [wintering]
- *Pluvialis apricaria* [wintering]
- *Pluvialis squatarola* [wintering]
- *Vanellus vanellus* [wintering]
- *Calidris alpina* [wintering]

Citation:
NPWS (2011) Conservation objectives for Cork Harbour SPA [004030]. Generic Version 4.0. Department of Arts, Heritage & the Gaeltacht.

For more information please go to: www.npws.ie/protectedsites/conservationmanagementplanning

◆ *Limosa limosa*	[wintering]
◆ *Limosa lapponica*	[wintering]
◆ *Numenius arquata*	[wintering]
◆ *Tringa totanus*	[wintering]
◆ *Chroicocephalus ridibundus*	[wintering]
◆ *Larus canus*	[wintering]
◆ *Larus fuscus*	[wintering]
◆ *Sterna hirundo*	[breeding]
◆ Wetlands	[]

Citation:

NPWS (2011) Conservation objectives for Cork Harbour SPA [004030]. Generic Version 4.0. Department of Arts, Heritage & the Gaeltacht.

For more information please go to: www.npws.ie/protectedsites/conservationmanagementplanning

Port of Cork Bird Surveys

Report on 2012 Survey of Common Tern Activity in Cork Harbour

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Rev.	Status	Author(s)	Reviewed By	Approved By	Office of Origin	Issue Date
D02	Draft	R. Mundy			Cork	11/03/2013

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1 INTRODUCTION

1.1 OBJECTIVES

This Report presents the findings of a survey of Common Tern (*Sterna hirundo*) activity in Cork Harbour during the summer breeding season of 2012. The objectives of the survey were are as follows:

- To examine the spatial pattern of usage of the western part of Cork Harbour by Common Terns during the 2012 breeding season;
- To identify important feeding areas of Common Terns within Cork Harbour;
- To examine patterns of movements of Common Terns between the two breeding colonies (see Section 1.3);
- To provide advice on the most suitable location for any future artificial Common Tern nesting structure.

Two types of observational data were collected to examine these issues.

In order to examine the distribution of Common Terns around Cork Harbour, particularly the distribution of feeding birds, a series of Vantage Points were established from which large areas of open water could be observed. Counts of Common Terns were conducted from these Vantage Points recording the number of birds and their activity type. Methodology for the Distribution study is described in Section 2.1.

In order to examine patters of Common Tern movements around Cork Harbour, and particularly along the Passage West channel, Vantage Point watches were conducted to record all moving Common Terns, their direction of flight, where possible their destination and origin and whether or not they were carrying fish (back to a nesting colony). Methodology for the Movement study is described in Section 2.2.

1.2 ASPECTS OF COMMON TERN BIOLOGY

Common Terns are long-distance migrants, spending the summer in Europe and migrating south in early autumn to spend the winter in coastal west and south Africa before returning to Europe in spring. Hence, Common Terns are present in Ireland, and in Cork Harbour, during the period from April until August and are largely absent from September to March.

Common Terns usually nest in tight-packed, busy, noisy colonies. Nests are built on the ground and consist of a scrape made in loose gravel or sand, or if on a solid surface, of a loose pile of stones, shell-fragments or other material. Nests are often build up against a vertical surface of some sort, such as a rock. At the Deep Water Port for example (see Section 1.3), nests are distributed around the edges of the decks of the dolphins up against the perimeter kerb/sill which is 10 - 15cm in height. Colonies are located in locations that are safe from ground predators, often on small islands.

Common Terns feed over open water by plunge-diving from the air, usually from a height of between one and six metres above the surface of the water (Cramp *et al.*, 1985). Feeding flight is characteristic, with the bird moving slowly with its head pointing downwards and with frequent aborted dives, hovers, circles back to re-examine an area of water, etc. Food consists almost exclusively of small fish such as sand-eels (*Hyperoplus*, *Gymnammodytes* and *Ammodytes* spp.), sprat (*Sprattus* spp.) and other small clupeids, and juvenile gadoids. When Common Terns are provisioning mates and chicks at the nest, and are returning to the nest with fish, fish can usually be clearly seen in the bird's bill and the flight of the bird is characteristically direct and steady.

The breeding season in Ireland extends from April to August inclusive. Common Tern activity, including spatial distribution of birds and feeding activity, changes during the course of the summer breeding cycle.

During the early part of the breeding season, prior to egg-laying, Common Terns indulge in complex courtship display and pair-bonding behaviour much of which involves the carrying of fish and exchange of fish between the members of the pair. The pre-laying part of the breeding cycle also involves a period of mate-provisioning during which the female remains relatively inactive, usually, but not always close to the colony site; whilst the male brings food to her.

Incubation of eggs takes a minimum of 21 days, and is done by both birds, in shifts, with the female taking the largest share of time on the nest, approximately 75% (Cramp *et al.*, 1985). During this period, the male will continue to provision the female on the nest in a similar way to the mate-provisioning conducted during the display period, but the frequency of this gradually decreases during the course of the incubation.

From hatching of eggs to fledging (first flight) of chicks takes between 22 and 28 days. During this period, the male provisions the chicks from hatching with the female joining in after around five days after hatching, from which time the chicks are left alone at the nest for increasingly long periods; this is the busiest period of feeding for the birds. Chicks generally remain attached to the colony for a period of 10 to 15 days after fledging, accompanying parents on feeding flights during the day but returning to the colony at night.

The precise dates for egg-laying, hatching and fledging vary somewhat from pair to pair and from year to year but the breeding cycle is summarised in Table 1.1.

1.3 COMMON TERNS IN CORK HARBOUR

Common Tern is an EU Birds Directive Annex I species and is a Qualifying Interest, as a breeding species, of *Cork Harbour* SPA. Common Terns are present in Cork Harbour each summer between April and August inclusive (see Section 1.2). The SPA is composed of several non-contiguous areas around the Harbour (see Figure 1). The SPA designation is concentrated in locations where extensive intertidal mudflats and sandflats are present; these form the key habitat for most of the other Qualifying Features of the SPA, namely non-breeding, wintering waders and wildfowl. The current survey includes areas both outside and inside the SPA boundary.

Common Terns have nested in Cork Harbour since about 1970, and since 1983 on various artificial structures, notably derelict steel barges close to Marino Point between Great Island, Little Island and Fota Island until these were removed around 1999. The National Parks and Wildlife Service (NPWS) Site Synopsis gives a three-year mean of 69 pairs for the period 1998-2000.

Since approximately 2000, Common Terns have nested on the top of a Martello Tower adjacent to the railway line between Great Island and Fota Island (see Figure 1). In 2012 between 40 and 45 pairs nested at this location. In 2010 Common Terns established a colony on three mooring dolphins at the ferry terminal in the Deep Water Port at Ringaskiddy (see Figure 1). The number of pairs at this location increased in 2011 and again in 2012, when between 45 and 50 pairs nested at this location. Hence, the total population of Common Terns in 2012 was between 85 and 95 pairs, close to the maximum recorded population of 102 pairs in 1995 (NPWS site Synopsis).

According to the most recent national surveys; the All-Ireland Tern Survey of 1995 (Hannon *et al.*, 1997) and 'Seabird 2000', surveys from 1998 to 2002 (Mitchell *et al.*, 2004), the total Irish population of Common Terns is estimated to be, 4,189 pairs (Mitchell *et al.*, 2004), in a total of 88 colonies (Hannon *et al.*, 1997), giving a mean colony size of 48 pairs. Hence the Cork Harbour population of approximately 90 pairs represents approximately 2.1% of the all-Ireland population. The Cork Harbour breeding population of Common Tern is therefore of national importance. It is not clear from the published methodology of Hannon *et al.* (1997) whether the Cork Harbour breeding population would be classified as one or two colonies (see Section 1.3), but it is thought two, which makes both colonies very close to the mean size for Irish Common Tern colonies.

Table 1.1 Summary of Common Tern Breeding Season in Cork Harbour

Calendar Dates	Common Tern Activity
Early to late April	Arrival in the harbour
Late April to mid May	Courtship display, mate-provisioning, colony and nest establishment
Mid to late May	Egg laying
Late May to mid-June	Egg incubation
Mid-June	Egg hatching
Mid-June to mid-July	Chick provisioning
Mid-July	Chick fledging
Mid-July to early August	Adults and juveniles (fledged chicks) feeding, still attached to colony
Mid to late August	Departure from the harbour and colony abandonment

2 METHODOLOGY

Two types of data were collected in order to examine: 1) distribution; and 2) movement patterns, of Common Terns. Whilst in some cases it was possible for the observer to collect the two types of data simultaneously, they are treated as separate data sets and the methodologies for their collection are discussed separately in Sections 2.1 and 2.2.

2.1 DISTRIBUTION DATA

The objective of this part of the survey was to examine the usage of different parts of the Study Area by Common Terns and to identify important feeding areas. Data was collected during the period between the 1st of June and the 29th of July 2012, corresponding to the incubation and chick provisioning stages of the breeding season. Results presented for Count Areas A, B, C, D, E and F also includes data collected between the 23rd of May and the 29th of July 2011 (see RPS, 2012 for details).

Vantage points were established from which areas of open water can be viewed. The visible open water was divided into Count Areas which could be readily distinguished from the vantage point (see Figure 2). Counts of the Common Terns present within each Count Area were conducted at intervals (usually every 10 minutes) over the period of the Vantage Point watch. The visible area was scanned using binoculars and a tripod mounted telescope and the activity of each Common Tern present was recorded as one of the following categories: **Feeding**: engaged in feeding-type flight (see Section 1.2); **Resting**: perched birds, either loafing, preening or occasionally displaying; **Moving**: birds engaged in a directional movement, and not feeding, including birds involved in display-type flights (see Section 1.2).

2.2 MOVEMENT DATA

The objectives of this part of the study were to determine routes around Cork Harbour that are frequently travelled by Common Terns. This provides information on important feeding locations; on the degree to which birds are moving between the two colonies and on the parts of the harbour frequented by birds from each colony. During the chick-provisioning period of the breeding season (see Section 1.2) the vast majority of movements involved birds moving to and from the breeding colonies, mainly between colonies and feeding areas, and this information can therefore be used to determine preferred feeding locations of birds from each of the two colonies (see Section 1.3). A second objective of this part of the study was to examine the extent to which birds move between the two colonies and thereby provide some information on the extent to which the Cork Harbour tern population might be considered as a single breeding colony.

Vantage Points were established at locations around Cork Harbour where Common Terns movements can be easily observed (see Figure 2). Where possible, locations were selected where it is possible to determine whether terns are moving either to or from one of the two colonies. Considering the objective discussed above, it is clear that the key location for examining bird movements is the Passage West channel, and a large proportion of the observations was therefore concentrated in this area. Other important locations are the channels to the north and south of Haulbowline Island.

The following parameters for each Common Tern observed during the watch were recorded:

1. The direction of the bird's flight movement;
2. Where possible, whether or not they were moving to or from one of the two colonies;
3. Whether or not the bird was carrying food; and
4. A general impression of the type of flight (e.g. direct and determined, feeding, etc.)

Data was collected during the period between the 1st of June and the 29th of July 2012. Watches were conducted for periods of between one and five hours; in addition to the date and times of the watch, the tide state, weather and wind conditions for each watch were recorded.

2.2.1 Subjective Elements in the Collection of Movement Data

Where birds were flying in a direct and determined way, were clearly not engaged in feeding, and were moving in a direction consistent with a movement either to or from one of the colonies, it was assumed that they were indeed passing to or from the colony.

Where birds were observed carrying food and were moving in a direction consistent with a movement to one of the colonies, it was assumed that they were indeed passing to the colony.

3 RESULTS

3.1 DISTRIBUTION OF FEEDING BIRDS

Table 3.1 presents details of the mean numbers and mean density of Common Terns recorded feeding within each of the Count Areas.

Figure 3 shows the density data presented in the right hand column of Table 3.1. The map shows that two parts of the Study Area supported relatively high densities of feeding Common Terns during the incubation period and chick provisioning period as follows:

- Spit Bank and the areas to its southwest (between Spike and Haulbowline Islands) and to its east; and
- The waters around the Martello Tower colony.

Observations suggest that one additional areas is of importance to feeding terns, however the field survey failed to pick this up, probably due to limited survey effort in this area:

- The Lakeland Strand and outer Douglas Estuary area is, on occasion, frequented by large numbers of feeding terns.

Outside the Study Area, observations suggest that whilst Common Terns use locations such as Grest Island Channel and Glounthaune Estuary for feeding, the only additional area likely to be of particular importance to feeding terns, from which a large amount of food is provisioned to the Deep Water Port colony and to a lesser extent to the Martello Tower colony, is:

- To the south of Spike Island.

Figure 5 presents a summary of the areas considered to be of importance to feeding terns during the breeding season, based partly upon empirical data as presented above and partly upon casual observation made by the author over a period of several years.

The quantity of data collected is not sufficient to examine the effects of time of day, or probably more importantly, the state of the tide. The data on movements of common Terns around the harbour has however been analysed in this regard (see Sections 3.2.1 and 3.2.2).

Table 3.1 Mean Numbers and Density of Feeding Common Terns within Count Areas

Count Area	Area (km^2)	Number of counts	Mean number of feeding terns	Range in number of feeding birds	Mean number of feeding birds per km^2
A	0.1919	69*	0.217*	0 - 5*	1.13*
B	0.3963	118*	0.932*	0 - 5*	2.35*
C	0.7118	69*	0.609*	0 - 8*	0.86*
D	0.4210	118*	0.093*	0 - 3*	0.22*
E	0.3858	80*	0.988*	0 - 9*	2.56*
F	0.6485	80*	0.613*	0 - 6*	0.95*
G	0.4963	36	0.722	0 - 3	1.46
J	0.2707	46	0	0 0	
K	0.5671	10	0	0 0	
L	0.8492	241	0.693	0 - 46	0.82
M	0.4452	12	3.75	1 - 9	8.42
N	1.4870	9	3.667	1 - 9	2.47
O	0.8792	9	2.000	0 - 5	2.28
P	0.7294	12	2.417	0 - 8	3.31
Q	0.4515	13	2.000	0 - 5	4.43
R	0.5898	22	5.727	0 - 13	9.71
S	1.3860	46	0.565	0 -5	0.41
T	0.7852	12	0.667	0 - 2	0.85
U	0.6478	12	4.333	0 - 12	6.69
V	0.7089	20	20.20	0 - 60	28.5
W	1.5790	18	0.333	0 - 4	0.21
X	1.8940	18	0.222	0 - 2	0.12
Y	1.2140	18	0.722	0 - 4	0.60
Z	1.4680	18	0.333	0 - 2	0.23

* Includes data from equivalent counts made in June and July 2011

3.2 MOVEMENTS

This Section presents results of the study of movements of Common Terns around Cork Harbour. Table 3.2 presents a summary of the survey effort at each location and of the numbers of birds recorded moving along various routes.

Table 3.2 Movements of Common Terns at Vantage Points

Route	Duration (hours)	Number recorded	Mean number per hour
South through Passage West Channel	26.58	103	3.9
North through Passage West Channel	26.58	116	4.4
West at Belvelly	1.00	12	12.0
East at Belvelly	1.00	5	5.0
East at Rocky Island	4.00	61	15.3
West at Rocky Point	4.00	37	9.3
East at White Point	2.00	8	4.0
West at White Point	2.00	0	0
To Martello Tower from across Great Island	1.00	3	3.0

A key objective of the study was to examine movements of birds between the vicinity of the two breeding colonies; the majority of observation were therefore made at Vantage Points along Passage West channel. Results of observations at these locations indicate that virtually all of the birds moving along the Passage West channel are passing between the breeding colony at the Martello Tower and the portion of the harbour to the east of Black Point. No birds were recorded moving between the Deep Water Port colony and Passage West Channel. The destination of 53 of the birds moving northwards through the channel was recorded; all of these were observed to be heading to the Martello Tower and none were observed passing north and then west to Lough Mahon; however casual observations outside count times indicate that some birds do follow this route.

The busiest part of the harbour in terms of tern movements is at Haulbowline Island bridge. Terns from both colonies move eastwards over the bridge to feeding areas, some then heading south towards Lough Beg and others east to Spit Bank, an important feeding area (see Section 3.1). Birds return westwards over the bridge towards the two colonies, often with fish. A map of the main patterns of movement of terns in the harbour is presented in Figure 4.

3.2.1 Effects of Time of Day

Table 3.3 Hourly Variations in Common Tern Movements at Passage West and in the Number of Birds Returning to the Martello Tower Colony with Fish Via Passage West

	Hour after Sunrise							Total
	2nd	3rd	4th	5th	6th	7th	8th	
Total minutes of observation	26	141	322	346	370 205		65	1,475
Total number of terns recorded moving South	2	10	23	29	38 14		0	116
Mean number moving South per hour	4.6	4.3 4.3		5.0	6.2	4.1	0	4.7
Total number of terns recorded moving North	4	7	12	33	33 10		4	103
Mean number moving North per hour	9.2	3.0 2.2		5.7	5.4	2.9	3.7	4.2
Total number of terns carrying fish	1	4	10	11	15	0	0	41
Mean number of terns per hour carrying fish	2.3	1.7 1.9		1.9	2.4	0	0	1.7

Results presented in Table 3.3 indicate that the number of Common Terns moving southwards through Passage West Channel (representing those birds departing the Martello Tower colony to feeding grounds to the south) remains remarkably constant through the morning period at between 4.1 and 6.2 per hour, but tails off sharply during the 8th hour after sunrise. It is not known whether or when the number of movements then increases again later in the day. The number moving northwards is more variable, at between 2.2 and 9.2 per hour, peaking during the second hour after sunrise but with no discernable pattern through the morning. The number passing northward that are carrying food to the Martell Tower colony is fairly constant at between 1.7 and 2.4 per hour between the second and sixth hour after sunrise but then tailing off sharply thereafter. It is not known whether or when the number of bird bringing fish to the Martello Tower from the south then increases again later in the day.

3.2.2 Effects of Tide State

Results presented in Table 3.4 indicate that there are substantial variations in the movements of Common Terns around the harbour and in the provisioning rates at the colonies according to the state of the tide. Number of birds moving around the harbour (most of which during June and July are likely to be moving between breeding colonies and feeding areas) were highest between low tide and the middle of the rising tide period.

Table 3.4 Effects of Tide State on Bird Movements and on the Number of Birds Returning to the Colonies with Fish, all movement counts

	Early falling	Mid falling	Late falling	Early rising	Mid rising	Late rising
Total minutes of observation	524	433	266	280	316	136
Total terns recorded	108	53	41	69	70	28
Terns per hour	12.4	7.3	9.2	14.8	13.3	12.4
Total carrying fish	10	7	9	21	19	3
Total per hour carrying fish	1.15	0.97	2.03	4.50	3.60	1.32
Percentage of terns recorded that were carrying fish	9.3%	13.2%	22.0%	30.4%	27.1%	10.7%

The number of birds per hour returning towards the breeding colonies with fish was substantially higher during the low tide and rising tide period (from two hours before low tide to two hours before high tide) and peaks as the start of this period, as the tide begins to rise. Similarly, the proportion of moving birds recorded that are carrying fish was highest at the same tide stages and peaks during the same period following low tide. There is a clear indication in this data that Common Tern feeding patterns in the harbour are closely linked to the tidal cycle.

Table 3.4 Effects of Tide State on Bird Movements and on the Number of Birds Returning to the Colonies with Fish, Passage West Channel only

	Early falling	Mid falling	Late falling	Early rising	Mid rising	Late rising
Total minutes of observation	406	431	206	227	249	76
Total terns recorded	63	53	10	43	40	10
Terns per hour	9.3	7.4	2.9	11.4	9.6	7.9
Total carrying fish	7	7	2	14	11	0
Total per hour carrying fish	1.03	0.97	0.58	3.70	2.65	0
Percentage of terns recorded that were carrying fish	11.1%	13.2%	20.0%	32.6%	27.5%	0

Results presented in Table 3.5 indicate that the pattern for birds moving through Passage West channel was similar to that for all count locations but the variation was less pronounced, with highest rate of moving birds recorded during the two hour period following low tide and the lowest numbers in the two hour period preceding this, just before low tide, however there was little variation in the number of birds moving at other tide states.

The number of birds per hour returning towards the Martello Tower colony northwards through Passage West channel with fish is substantially higher during the period following low tide and into the middle art of the rising tide than at other times.

4 DISCUSSION

The most important findings of this study are as follows:

- The evidence indicates that birds from the Deep Water Port colony do not generally move northwards along Passage West channel; they do not provision nests with food caught from this direction.

- Birds from the Deep Water Port colony feed mainly to the east of Rocky Island / Haulbowline Bridge, particularly around Spit Bank and in areas to the south of Spike Island.

- Birds from the Martello Tower colony feed over a large area including Lough Mahon, Glounthaune Estuary, Great Island Channel and in substantial numbers in areas downstream of Passage West Channel such as Spit Bank and areas to the south of Spike Island.

- Hence, the birds from the Martell Tower colony range much more widely around the harbour than birds from the Deep Water Port colony.

This information is important for determining the most suitable locations for any future Common Tern nesting island / platform which may be constructed as a mitigation / compensation measure if negative impacts on Common Terns are considered possible as a result of port development works at Ringaskiddy.

Possibly the key finding of the study in this regard is that birds currently nesting at the Deep Water Port do not feed in areas upstream of (i.e to the north of) Passage West to any great extent. If it is assumed that proximity to currently preferred feeding areas will be an important influence on any future colony location, then the implication of this is that these birds may not easily be enticed to use a new nesting location upstream of (i.e to the north of) Passage West, and that an artificial nest site in areas currently used by the birds such as the vicinity of *inter alia* Ringaskiddy, Spike Island or Monkstown Creek may be more attractive to them. It should be stressed however this is one interpretation only and should not be taken as a definitive or even likely outcome; many factors other than proximity to the currently favoured feeding areas may influence whether terns choose to use a particular location for nesting.

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FIGURE 1: Cork Harbour SPA and Common Tern Breeding Colony Locations

Legend

Locations of Common Tern Breeding colonies

Cork Harbour Special Protection Area (SPA)

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Survey of Common Tern Activity in Cork Harbour

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Cork Harbour SPA and Common Tern Colony Locations

Figure **1**

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FIGURE 2: Count Areas and Vantage Point Locations for Common Tern Distribution Study

Legend

- Vantage Points
- Common Tern Breeding Colonies
- Count Areas

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Survey of Common Tern Activity in Cork Harbour

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Count Areas and Vantage Points

Figure 2

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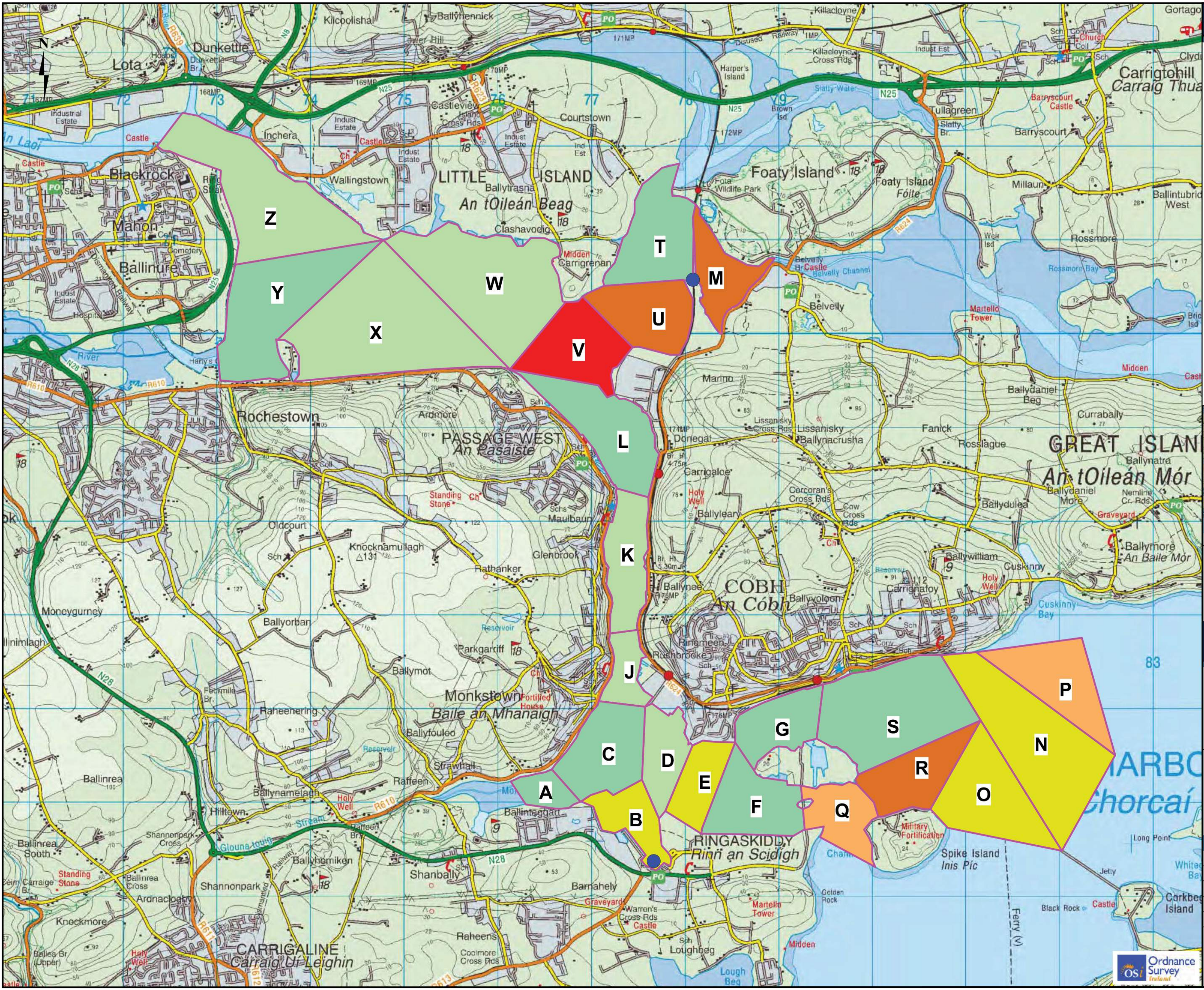
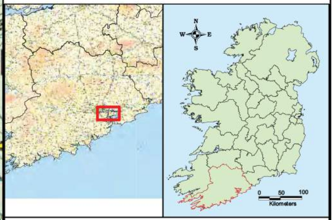
FIGURE 3: Mean Densities of Common Terns in Count Areas



Legend

	>10 per square kilometre
	6 to 10 per square kilometre
	3 to 6 per square kilometre
	2 to 3 per square kilometre
	0.3 to 2 per square kilometre
	<0.3 per square kilometre
	Common Tern Breeding colony Locations



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Mean Density of Feeding Common Terns in Count Areas

Figure 3

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FIGURE 4: Routes Followed by Common Terns

Legend

- Main Route Followed by Terns Returning to Colonies with Food
- Other Routes Followed by Terns Returning to Colonies with Food
- Colony Locations

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Survey of Common Tern Activity in Cork Harbour

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Routes Followed by Common Terns Provisioning Nests

Figure 4

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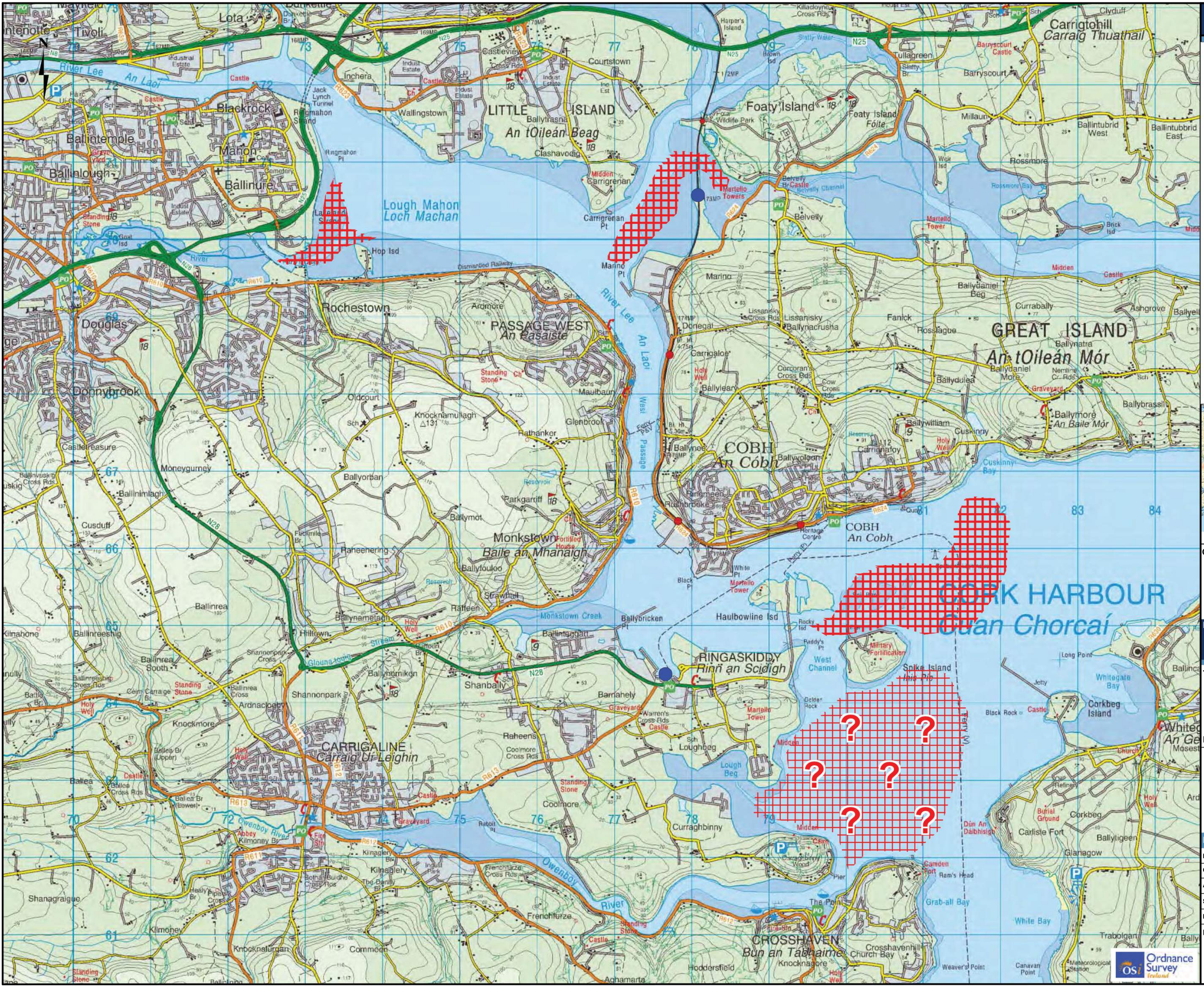
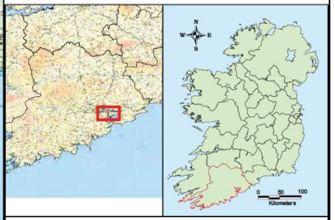
FIGURE 5: Areas of Cork Harbour Considered to be of Particular Importance to Feeding Common Terns During the Breeding Season



Legend

- Locations of Common Tern Breeding Colonies
- Important Feeding Areas
- Probable Additional Important Feeding Area (outside Study Area of current survey)



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Survey of Common Tern Activity in Cork Harbour

Title

Important Common Tern Feeding Areas in Cork Harbour

Figure 5

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Port of Cork Bird Surveys

Report on 2013 Breeding Season Wetland Bird Survey, Ringaskiddy

DOCUMENT CONTROL SHEET

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Document Title:	**Report on 2013 Breeding Season Wetland Bird Survey, Ringaskiddy**

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D01	Draft for Client Approval	N. Robinson	S.Lowry	R. Holbeach	Belfast	06/03/2014

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FIGURES

1 INTRODUCTION

This Report presents the findings of a wetland bird survey conducted by RPS during the 2013 breeding season within the predicted "Zone of Influence" (ZoI) of the proposed Ringaskiddy Port Redevelopment.

The survey aimed to establish the usage of the predicted ZoI by waterbirds during the 2013 breeding season (May-August), in order to inform a forthcoming Environmental Impact Assessment (EIA) and Appropriate Assessment (AA) relating to Port of Cork's (POCs) proposed Ringaskiddy Port Redevelopment. The survey is a continuation of similar studies undertaken previously within the 2011 and 2012 breeding seasons.

The key focus of the study was on the foraging activity of Common Terns *Sterna hirundo* however, with the exception of gulls all waterbird[1] species were included within the survey.

1.1 ASPECTS OF COMMON TERN BIOLOGY

The Common Tern is a long-distance migrant seabird. The species has a broad breeding distribution throughout the northern hemisphere, with the European breeding population wintering mainly in the southern hemisphere on the coast of west and south Africa. The Common Tern is the most abundant tern species that occurs in Britain and Ireland, with breeding colonies scattered around most of the UK and Irish coastlines. Colonies can also be found inland on lakes, reservoirs and gravel pits. During Seabird 2000 the breeding population of Britain and Ireland was estimated at 14,497 pairs, with 29% of pairs occurring in Ireland (Mitchell *et al*., 2004).

Terns are colonial ground nesters, traditionally nesting on shorelines and natural islands, but where such nesting sites have been lost or heavily disturbed terns are increasingly choosing man-made structures such as rooftops and piers as nesting sites. Broadly the nesting preferences of terns are few and simple, the key requirements being a suitable open nesting substrate with a good supply of food close by.

Common Terns are generalist or opportunistic feeders, foraging over open water and obtaining prey items close to the surface by shallow plunge-diving or surface-dipping. Diets are known to vary considerably between colonies, from year to year, day to day, even hour to hour and will largely depend on available feeding habitats and local prey abundances. Typical marine fish in the diet of Common Terns in Britain and Ireland consistently include Herring *Clupea harengus*, Sprat *C. sprattus* (clupeids) and sandeels (*Ammodytes marinus* and *A. tobianus*). Crustaceans including shrimps and crabs can also form important dietary components.

During the breeding season, April to August, Common Terns will commonly range up to 20km from their colony, often up to 30km, with a mean range of 8.67km and have a notable association with foraging over submerged sandbanks (BirdLife International, 2014). Observations of foraging terns from the Rockabill colony Co. Dublin, indicate birds primarily forage within 10km of the colony (Newton & Crowe, 2000).

During the early part of the breeding season, prior to egg-laying, Common Terns indulge in complex courtship display and pair-bonding, much of which involves the carrying of fish and mate-provisioning by the male. Incubation of eggs takes a minimum of 21 days and is undertaken by both parent birds in shifts, with the female typically taking the larger share of time on the nest. During this period, the male

[1] Defined here as all swans, geese, ducks, waders, terns, divers, grebes, herons & rails.

will continue to provision the female, but lesser so in the later stages of incubation. During the chick-rearing stage, c. 22-28 days, both parents will provision with young chicks left alone at the nest for extended periods of time. A summary of the Common Tern breeding cycle is summarised in Table 1.1 below however, the precise dates vary somewhat from pair to pair and from year to year.

Table 1.1: Summary of Common Tern Breeding Season.

Period	Activity
Early to late April	Arrival at colony site (e.g. Cork Harbour)
Late April to mid-May	Courtship, mate-provisioning and colony establishment
Mid to late May	Egg laying
Late May to mid-June	Incubation
Mid-June	Hatching
Mid-June to mid-July	Chick rearing
Mid-July	Chick fledging
Mid-July to early August	Post-breeding attachment to colony
Mid to late August	Colony abandonment and migration departure

1.2 COMMON TERNS IN CORK HARBOUR

Breeding Common Tern is a Special Conservation Interest (SCI) of Cork Harbour Special Protection Area (SPA) (Site Code: 004030), with a mean of 69 pairs for the period 1998-2000 and a maximum of 102 pairs in 1995 (NPWS, 2008). The SPA if composed of several non-contiguous areas around the Harbour, which comprise extensive intertidal and mudflats, the key habitat for the non-breeding 'wintering' wader and waterfowl SCIs (Figure 1.0).

Common Terns have nested in a number of locations within Cork Harbour since c.1970, and since 1983 have chosen various artificial structures as nest sites, including the derelict steel barges close to Marino Point until these were removed c.1999; the roof of a Martello Tower adjacent to the railway line between Great Island and Fota Island; and since 2010 the mooring dolphins within the POCs Ringaskiddy Deepwater Berth (DWB) have also supported a notable number of breeding pairs. In 2012 the total population of Common Terns which nested within Cork Harbour was between 85 and 95 pairs, close to the maximum recorded population of 102 pairs in 1995 (NPWS, 2008). This represents c.2.1% of the all-Ireland population estimated at 4,189 during Seabird 2000 (Mitchell *et al.*, 2004).

Additional recent nesting sites within close proximity to the Port of Ringaskiddy include the stone breakwater to the west of the DWB, an island within a lake of the Pfizer owned Rafeen Creek Golf Course and a rocky island within Lough Beg.

For the purpose of this report breeding Common Terns within Cork Harbour are regarded as a single colony, with alternative nesting sites regarded as sub-colonies. Figure 1.1 provides an overview of the known recent locations of Common Tern nesting sites within Cork Harbour.

2 METHODOLOGY

The survey results presented in this report are based upon data collected from three sources:

- Vantage Point Watches conducted in the Ringaskiddy, Monkstown and Haulbowline areas to determine the use of intertidal and marine areas by waterbirds during the period May to August 2013;
- Monitoring of 2013 Common Tern breeding sub-colonies;
- Consultation with local ornithologists.

2.1 VANTAGE POINT WATCHES

Four Vantage Points were established from which all intertidal and marine areas, which lie within the predicted ZOI of the proposed Ringaskiddy Port Redevelopment, could be viewed. From the Vantage Points, the visible area was divided into eight Count Areas A to F and Q and R, consistent with those count areas used in previous surveys undertaken in 2011 and 2012. Vantage Point locations and Count Area boundaries are shown in Figure 2.0.

Counts of birds within the Count Areas were made from the Vantage Points between 13th of May to the 23rd of August. Each of the eight Count Areas was monitored for a duration of 10 hours over the survey effort. Details of the monitoring effort are presented in Table 2.1.

Count durations lasted 1 hour. During the count, the observer regularly recorded the number of waterbirds (excluding gulls) which were using the survey area. Their activity was also recorded, either as feeding (**F**); roosting, loafing or otherwise resting (**R**); or flying through the Count Area (**M**). Scans were made every ten minutes, however all flying birds were tracked to determine if they eventually went on to use the survey area and were then added to the peak count for the 10 minute count period.

Table 2.1: Summary of Field Monitoring Effort, Summer 2011.

Month	Count Area							
	A	B	C	D	E	F	Q	R
May	2 hours	2 hours	2 hours	2hours	2 hours	2 hours	2 hours	2 hours
June	2 hours	2hours	2 hours	2 hours	2 hours	2 hours	2 hours	2 hours
July	4 hours	4 hours	4 hours	4 hours	4 hours	4 hours	4 hours	4 hours
August	2 hours	2 hours	2 hours	2 hours	2 hours	2 hours	2 hours	2 hours
Total	10 hours	10 hours	10 hours	10 hours	10 hours	10 hours	10 hours	10 hours

Counts were undertaken to account for tidal, diurnal and environmental (weather) variation, in so far as reasonably practical, with surveys generally undertaken within 2 hours either side of high or low tide. Tidal variation is generally accepted as the key factor affecting the distribution and behaviours of waterbirds within estuarine habitats.

2.2 MONITORING OF COMMON TERN SUB-COLONIES

There are three locations in the vicinity of Monkstown and Ringaskiddy where Common Terns are known to have bred in recent years; the Ringaskiddy DWB; the island in the lake of Rafeen Golf Course and a rocky 'island' within Lough Beg (it is an island only at high tide, being surrounded by mud at low tide). Common terns also breed on the top of a Martello Tower adjacent to the railway line immediately to the south of Fota Island. The Martello Tower sub-colony was not monitored as part of this study.

The Ringaskiddy DWB, Loughbeg and Rafeen Creek Golf Course sub-colonies were easily observed at a distance from adjacent roads and car parks, without causing any disturbance to the birds. Nest sites were not visited by the observer.

3 RESULTS

3.1 USAGE BY BIRDS OF INTERTIDAL AND MARINE HABITATS AT RINGASKIDDY AND MONKSTOWN DURING THE BREEDING SEASON

3.1.1 Common Tern

Consistent with observations made in 2011 and 2012 Vantage Point watches indicate that Common Terns regularly feed in small numbers throughout the Ringaskiddy/Monkstown Area. Table 3.1 presents details of the mean numbers of Common Terns recorded feeding and moving (flying through) in each of the eight Count Areas during the survey. Overall, a crude analysis of the data indicates that at any point in time there is an average of 9.74 Common Terns feeding within the Study Area.

The most heavily used Count Areas for feeding were B, R and D in descending order; with the fewest birds recorded in F, A and Q in ascending order. Count Area A (Monkstown Creek) comprises an area of intertidal mud and sand where suitable foraging habitat for Common Terns is unavailable for much of the time during low tide periods, however Count Area F consists of a large area of open water, so the low number of feeding terns in this area is somewhat surprising and may be due to the availability of prey items. Observations of foraging Common Terns within Count Area F and Q appeared largely opportunistic with birds rarely making multiple dives at potential prey items.

Within Count Areas B and D, foraging activity was generally widespread, but generally concentrated either side of the main channel through the study areas; in the wake of vessels including those moored on the DWB and in close proximity to the mooring dolphins. Observations of foraging terns around the mooring dolphins, where birds could be observed at close range suggested birds foraging here were self-provisioning on shrimp and potentially flatfish fry.

Foraging concentrations observed in the 2013 survey effort are indicated in Figure 3.0.

Table 3.1: Summary of Common Tern Activity, Summer 2013.

Count Area	No. of Counts	Mean No. of Birds Recorded Feeding (F) within Count Area	Mean No. of Birds Recorded Flying Through (M) the Count Area
A	70	0.27	0.70
B	70	3.21	2.40
C	70	0.89	0.99
D	70	1.83	1.47
E	70	0.61	1.37
F	70	0.14	1.04
Q	70	0.53	0.6
R	70	2.26	0.71
Whole Study Area	**560**	**9.74**	**9.28**

Wiggins and Morris (1987) found that during the incubation and chick stages of the breeding cycle, the non-incubating member of a Common Tern pair spent on average 12 or 13 minutes per hour at the nest. Hence, one member of the pair is absent from the nest for approximately 80% of the time. With between 80 and 90 adult birds associated with the DWB sub-colony during the 2013 breeding season, it may therefore be expected that during the incubation and chick stages, between approximately 32 and 36 birds will be away from the sub-colony (mainly foraging) at any one time. This is greatly in excess of the c.10 birds that are on average foraging within the Study Area at any one time, there is also evidence that birds from the Martello Tower sub-colony may forage within the Study Area on occasion which is likely to account for a proportion of the c.10 birds.

Consistent with the evidence from the previous 2011 and 2012 studies, a substantial proportion of the foraging activity of birds from the sub-colonies therefore occurs outside the Study Area and predicted ZoI of the proposed Ringaskiddy Port Redevelopment.

Additional notes taken during Vantage Point watches, provide information on the likely locations of other foraging areas outside the Study Area as shown in Figure 3.1.

There remains no evidence that birds from the DWB sub-colony are moving northwards through the Passage West channel. Common Terns passing north to south through the Passage West channel and Count Area C were invariably recorded as moving from the channel eastwards, around Black Point. These birds were considered to be birds originating from the Martello Tower sub-colony.

Consistent with the findings of the 2011 and 2012 studies, the majority of birds flying through Count Areas C, D, E and F were moving from the Deep Water Port sub-colony, or from the Passage West channel, eastwards across the Study Area and then eastwards out of the Study Area. Birds returning westwards through the Study Area with or without food were recorded less frequently. Birds returning to the DWB with food tended to fly directly there, overland where necessary, and were often seen passing over the reclaimed area to the northeast of the DWB.

3.1.1.1 Effect of Tidal State

During 2013 the mean number of foraging birds within the study area during low tide was notably higher than during high tide conditions, indicating that foraging within Cork Harbour may be linked to the tidal cycle as suggested from the findings of the 2012 study. This observation remained true for all Count Areas, with the exception of Count Areas A, B and Q where on average more birds were recorded foraging during high tide conditions. Table 3.2 presents numbers of feeding terns recorded during both high and low conditions for each Count Area.

Table 3.2: Effect of Tidal State on the Number of Common Terns Foraging within each Count Area.

Count Area	No. of Counts		No. of birds recorded feeding within the Count Area during High Tide Conditions		No. of birds recorded feeding within the Count Area during Low Tide Conditions	
	High Tide	Low Tide	Total	Mean	Total	Mean
A	35	35	5	0.4	14	0.14
B	35	35	116	3.31	109	3.11
C	35	35	32	0.91	37	1.06
D	35	35	45	1.29	83	2.37
E	35	35	10	0.29	33	0.94
F	35	35	5	0.14	5	0.14
Q	35	35	19	0.54	18	0.51
R	35	35	16	0.46	142	4.06
Whole Study Area	**280**	**280**	**248**	**7.34**	**441**	**12.33**

The negligible difference in foraging activity between tidal states within Count Area B is likely due to the observed preference of birds to forage in the wake of vessels, both moored and moving, with moving vessels typically passing during high tide conditions.

3.1.2 Waders

Numbers of waders in Cork Harbour, and in Ireland generally, are highest during migration periods and the winter months.

Table 3.3 presents a summary of the mean number of waders recorded feeding (F) in each of the eight Count Areas during low tide conditions.

Table 3.3: Mean Number of Wader Species Recorded Feeding (F) in Each Count Area, during Low Tide Conditions.

No. of Counts	Species	Count Area								Whole Study Area
		A	B	C	D	E	F	Q	R	
35	Black-tailed Godwit	3.66	-	36.26	-	-	-	-	-	**39.69**
35	Curlew	2.40	0.40	8.54	-	0.80	0.06	0.17	-	**12.37**
35	Oystercatcher	7.17	5.23	5.94	0.83	2.23	1.91	3.00	-	**26.31**
35	Redshank	3.34	3.37	2.77	-	0.06	-	-	-	**9.54**
35	Ringed Plover	-	0.51	-	-	0.23	-	0.57	-	**1.31**
35	Whimbrel	-	-	0.26	-	-	-	-	-	**0.26**
35	Greenshank	0.29	-	-	-	-	-	-	-	**0.29**
35	Dunlin	-	-	-	-	-	-	-	-	**-**
35	Sanderling	-	-	-	-	-	-	-	-	**-**
35	Turnstone	-	-	0.23	-	-	-	0.31	-	**0.54**

Table 3.4 presents a summary of the mean numbers of waders recorded roosting, loafing or otherwise resting (R) in each of the eight Count Areas during high tide conditions.

Table 3.4: Mean Number of Wader Species Recorded Roosting (R) in Each Count Area, during High Tide Conditions.

No. of Counts	Species	Count Area									Whole Study Area
		A	B	Breakwater	C	D	E	F	Q	R	
35	Black-tailed Godwit	8.00	-	10.74	-	-	-	-	-	-	18.74
35	Curlew	14.60	-	0.6	-	-	-	0.11	0.09	-	15.40
35	Oystercatcher	8.09	-	-	-	-	1.14	1.34	2.37	-	10.81
35	Redshank	0.37	-	-	-	-	-	0.11	-	-	0.48
35	Ringed Plover	-	-	-	-	-	0.06	-	-	-	0.06
35	Whimbrel	-	-	-	-	-	-	-	-	-	-
35	Greenshank	0.20	-	-	-	-	-	-	-	-	0.20
35	Dunlin	-	-	-	-	-	-	-	-	-	-
35	Sanderling	-	-	-	-	-	-	-	-	-	-
35	Turnstone	-		-	-	-	-	-	-	-	-

Consistent with the 2011 study the intertidal flats of Monkstown Creek in Count Areas A and C by far supported the largest numbers of feeding waders, predominantly feeding, during the study period, with only very small numbers of birds recorded feeding elsewhere within the study area. Peak counts of feeding wader species in the Monkstown Creek part of the study area (Count Areas A and C) are presented in Table 3.5 and 3.6.

Table 3.5: Peak Counts of Feeding Waders during Low Tide Conditions within Count Area A.

Species	Peak Count	Date
Black-tailed Godwit	13	25th June 2013
Curlew	4	21st July 2013
Oystercatcher	19	21st July 2013
Redshank	15	7th August 2013
Greenshank	1	21st July & 7th August 2013

Table 3.6: Peak Counts of Feeding Waders during Low Tide Conditions within Count Area C.

Species	Peak Count	Date
Black-tailed Godwit	72	21st July 2013
Curlew	20	07th August 2013
Oystercatcher	13	21st July 2013
Redshank	9	21st July 2013
Greenshank	8	5th August 2013
Whimbrel	1	13th May & 07th August 2013

Area B occasionally supported small numbers of feeding Oystercatcher (peak count of 10 on the 20th July); Redshank (peak count of 14; 20th July); Ringed Plover (peak counts of count of two on the 05th June, 26th June and 20th July); a single Curlew on several dates; and three Turnstone on the 06th of August.

Counts of waders elsewhere within the survey area were sparse and likely due to limited intertidal foraging habitat and undisturbed roosting sites.

3.1.3 Shelduck

Shelduck numbers in Cork Harbour peak during winter and early spring however substantial numbers of mainly non-breeding birds also spend the summer period in the harbour before departing from July onwards for their communal moulting grounds.

Feeding and/or roosting Shelduck were recorded within Count Areas A, B, C, D and Q, and also on the stone breakwater throughout the study period, with occasional birds recorded flying through Count Area E. The highest count was of 36 foraging birds in Count Area A during low tide conditions on the 07th August.

3.1.4 Cormorant and Shag

Cormorants are present within the Study Area throughout the year. They were observed feeding in all but one of the Count Areas predominantly at low tide and use the stone breakwater and ADM Jetty as roosting locations, mainly at high tide. A large night-time roost is also present within the Study Area in the tree-line along the southern shore of Monkstown Creek in Count Area A.

Feeding birds were recorded in seven out of the eight Count Areas. The mean numbers of feeding birds recorded in each Count Area is presented in Table 3.7. The favoured feeding areas were Count Areas D, C and R. The highest count of feeding birds was 4 in Count Area R on the 8th of June. All other records were mainly of one or two feeding birds.

Table 3.7: Mean Number of Cormorants Recorded Feeding (F) in Each Count Area.

Species	No. of Counts	Count Area								
		A	B	Breakwater	C	D	E	F	Q	R
Cormorant	70	-	0.23	-	0.51	0.53	0.21	0.20	0.10	0.46

The mean numbers of roosting birds recorded in each Count Area is presented in Table 3.8. Favoured roosting areas were clearly the stone breakwater and the ADM Jetty, with the Spit Bank Lighthouse in Count Area R and also the southeast tip of Haulbowline in Count Area Q.

Table 3.8: Mean Number of Cormorants Recorded Roosting (R) in Each Count Area.

Species	No. of Counts	A	B	Breakwater	C	D	E	F	Q	R
Cormorant	70	0.10	7.81	11.87	0.01	0.23	0.13	-	1.29	3.77

The peak count of roosting Cormorants on the stone breakwater was 41, during high tide conditions on the evening of the 05th of August. The peak count of roosting birds on the ADM Jetty (Count Area B) was 25, during high tide conditions on the evening of the 06th of August.

Shags were recorded exclusively within Count Areas Q and R during the 2013 survey effort. Counts were generally of one or two birds foraging, with a peak count of three birds recorded roosting on the Spit Bank Lighthouse on the 6th of August.

3.1.5 Grey Heron

Grey Herons breed in small numbers in trees in the Black Point area, adjacent to Count Areas D and E. The species is present in the Study Area throughout the year and was recorded in all Count Areas, with the exception of R, during the survey effort.

Feeding birds were recorded in seven Count Areas, with favoured feeding areas including the Rushbrook shoreline in Count Area D (mean of 0.57); the Monkstown Shoreline within Count Areas A and C (mean of 0.21 birds feeding at any one time). Bird were typically recorded in ones or twos.

Roosting birds were also recorded in all Count Areas with the exception of R. Peak counts of roosting Grey Herons were recorded on the stone breakwater with a peak count of 13 birds recorded on the stone breakwater during high tide conditions on the 05th August and 20th July and a peak count of 6 birds recorded in Count Area A during high tide conditions on the evening of 20th July. Birds roosting within Count Area A roosted at the base of the stone breakwater on a shingle embankment.

3.1.6 Other Waterbird Species Recorded

In addition to those species discussed above, five other (see Section 1) waterbird species were recorded during the survey period: Mute Swan, Little Egret, Mallard and Sandwich Tern all in negligible numbers. Two seabird species including Common Guillemot and Gannet were also recorded in singletons.

It is likely that Mallard breed around the margins of the study area in small numbers however no positive evidence of breeding was recorded during the 2013 survey effort. Mute Swan has historically attempted to breed at the lake within Rafeen Creek Golf Course however no evidence of a nesting attempt was recorded in 2013. Little Egrets also breed in other parts of Cork Harbour but not within the vicinity of the Study Area.

Mallard is primarily an autumn and winter visitor to the Study Area, however, small numbers of Mallard were recorded throughout the survey effort in Count Areas A, B and C. Peak counts were recorded in Count Area A, with 12 roosting and 9 foraging birds on the 05th and 07th of August respectively. The peak count recorded in Count Area B was three roosting birds on the 24th June, with the peak count recorded in Count Area C a mere two birds foraging on the 25th June. No juveniles were recorded within the Study Area.

An adult pair of Mute Swans were recorded roosting on the Monkstown Shoreline within Count Area C on the 05th of August.

Little Egret is a relatively recent colonist in the Cork Harbour area, but notable numbers now breed in the area, mainly in the northern part of the harbour. Perhaps surprisingly relatively few visit the Monkstown Creek area during the summer months. During the study period, a single bird was recorded feeding in Count Area A on the 07th of August, and a single bird recorded roosting at the stone breakwater on the 05th August.

A single adult Gannet was recorded flying over Count Area E on the 06th of August and over Count Area R on the 5th August.

Small numbers of Sandwich Tern were recorded feeding and flying over the Count Areas C, Q and R during the late breeding season. A single bird was recorded feeding in Count Area C on the 20th July, with single birds recorded feeding and flying over Count Area Q on the 21st July, 5th and 8th of August, and a single bird flying over Count Area R on the 21st July. A single bird was also recorded roosting on the ADM Jetty on the 6th August during the Study Period, usually in Count Areas E and F but also in Count Areas B and C. The peak counts were 4 on the 13th of July; and 3 on the 2nd of August.

3.2 CORK HARBOUR COMMON TERN BREEDING SUB-COLONIES

3.2.1 Ringaskiddy DWB

The Ringaskiddy DWB sub-colony is located on top of three concrete ‘dolphins’ which are connected by a concrete and steel gangway. During the 2013 breeding season all nests were located on the dolphins themselves however the gangway and its hand rails were also used by both adult and juvenile birds for perching, apparently acting as a loafing area for the sub-colony.

It should be noted that the sub-colony site was not visited directly, but it is estimated that between 40 and 48 pairs of Common Tern nested on the dolphins in 2013. The breeding season was typical with eggs hatching around mid to late June. The presence of nestlings noted from this time onwards.

Through consultation with Barry O'Mahony, who monitors the Cork Harbour Common Tern population in an amateur capacity (including the ringing of chicks at the nest sites), a minimum of 85 chicks were ringed at the sub-colony site in 2013.

3.2.2 Lough Beg

Common Terns were not recorded at this sub-colony site during 2013. The previous nesting site comprises a small rocky island which is only isolated from the surrounding shorelines at high tide.

A summary of observations is as follows:

13th May 2013 (17h00): No Common Terns present.

14th May 2013 (10h15): No Common Terns present.

4th June 2013 (17h30): No Common Terns present.

5th June 2013 (10h00): No Common Terns present.

25th June 2013 (16h10): No Common Terns present.

19th July 2013 (15h40): No Common Terns present.

3.2.3 Rafeen Creek Golf Course

It is suspected that breeding was attempted here during 2013 but was not successful. During late May the sub-colony was active with 2-3 pairs recorded however, subsequent observations in June and July indicated the sub-colony had failed as no birds were present. A summary of the observations are as follows:

13th May 2013 (17h25): No Common Terns present.

14th May 2013 (10h45): No Common Terns present.

5th June 2013 (10h30): Five Common Terns present; 2-3 pairs. Mate-provisioning. Displaying. Scraping.

6th June 2013 (13h10): Four Common Terns present; 2 pairs. Mate-provisioning. Displaying. Scraping.

25th June 2013 (10h05): No Common Terns present.

19th July 2013 (16h15): No Common Terns present.

3.2.4 Martello Tower Sub-colony

This sub-colony was not monitored by RPS during the 2013 breeding season.

4 DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

This Report alone does not constitute an Ecological Impact Assessment (EcIA), the findings presented herein will however be used to inform a forthcoming EcIA relating to POCs proposed Ringaskiddy Port Redevelopment.

Hence, whilst a quantitative impact assessment and proposals for appropriate mitigation are beyond the scope of this Report, the following Sections present discussion and conclusions of the findings of this study in the context of this proposed development and forthcoming impact assessment.

4.1 USAGE BY BIRDS OF INTERTIDAL AND MARINE HABITATS AT RINGASKIDDY AND MONKSTOWN DURING THE BREEDING SEASON

Common Terns fed throughout the study area between May and August 2013. The most important feeding areas recorded during the 2013 survey effort are shown in Figure 3.0, however it is considered that most feeding occurs outside of the predicted ZoI and foraging activity is widespread throughout Cork Harbour. It is therefore considered highly unlikely that any development of the Deep Water Port area will result in any significant impact on foraging habitat for Common Tern either during construction or operation.

Whilst the breeding season is the time of year when lowest numbers of non-breeding waders and waterbirds are present in the Study Area, substantial numbers of some species, which are wintering SCIs of Cork Harbour SPA, are nevertheless present at this time including Shelduck, Cormorant, Black-tailed Godwit and Curlew. All waterbird and wader species (other than breeding Common Tern, and migratory Sandwich Tern and Whimbrel) are however generally present in greater numbers at other seasons and it is considered that the breeding season (April to July inclusive), provides the most suitable ‘window’ in which construction activity in sensitive locations, such as in close proximity to the ADM jetty and the stone breakwater, can be carried-out with minimal disturbance to waterbirds.

4.2 CORK HARBOUR COMMON TERN BREEDING COLONIES / SUB-COLONIES

The breeding Common Terns within the Ringaskiddy DWB constitute a significant constraint on POCs proposed development within their landholding at this locale. Any negative impact on the breeding colony that affects its productivity would constitute a significant negative impact on the Conservation Objectives of Cork Harbour SPA. Such impacts might occur as a result of construction activity that reduces the attractiveness of the mooring dolphins to nesting pairs.

It is considered that the suitability of the mooring dolphins as a breeding site is due to several factors:

- Notwithstanding the gangways that connect the dolphins to one another and to the shoreline at three points (see below), the mooring dolphins are surrounded by water at all stages of the tide;
- The Deep Water Port is located close to important feeding grounds for the Common Terns;
- The three gangways connecting the dolphins to the shoreline are largely sealed from human entrance by oversized fine-mesh gates / fences. This prevents not only unauthorised or casual human access to the dolphins but greatly reduces access to the dolphins for ground predators such as foxes;

- There is a continuous fence, approximately 2m in height, supporting bindweed, creepers and other dense vegetation, along the shoreline adjacent to the dolphins to the south, southwest and west, which provides an excellent screen to the intense human activity immediately within the DWB;

- Human activity to the shoreward side of the fence line (see above) appears to be almost non-existent;

- There are no tall buildings or other tall structures within 75m of the dolphins, and other than the passenger ferry terminal gangways, none within 175m; and

- The design of the dolphins, with flat decks and an upstanding concrete kerb (approximately 20cm in height) around three sides of the perimeter of the deck, is undoubtedly an attractive feature to the terns. They build their nests up against these kerbs which provide a degree of shelter for incubating birds, nests, eggs and chicks; and vegetation develops along the base of the kerbs through the summer, which also provides shelter. In addition, the presence of hand rails and other raised structures immediately adjacent to the decks of the dolphins allows adult terns to perch high above their nests, thereby acting as effective sentries for the defence of the colony against aerial predators such as gulls and crows.

The Ringaskiddy DWB sub-colony is currently subject to extraordinarily high levels of anthropogenic disturbance to which they appear to be entirely habituated. The occurrence of loud irregular noise from humans, machinery, vehicles and vessels and the presence of people in high-visibility clothing is a near-constant feature of the lands immediately surrounding the mooring dolphins. Key disturbance sources include road traffic from the internal roadway within the DWB and N28, within 100m, including a high proportion of trucks and other large commercial vehicles many of which are stopping and starting, revving engines and using air brakes; port activity including mass bulk handling within 200m; pedestrians and regular human voices within 100m (for example at the DWB security desk) and the regular docking of very large ocean going passenger ferries within 50m of the dolphins and on rare but regular occasions, directly up against the dolphins themselves, requiring direct access to the dolphins. It is important to note that the terns have opted to utilise this nesting site despite this level of disturbance already occurring.

Provided the following features: the dolphins themselves, the ‘vegetated’ fence (screening) along the shoreline, the gangways to the dolphins, and the water and shoreline beneath the dolphins, are not directly affected; and provided human activity levels to the areas on the shoreward side of the fence line are not increased; and provided that no large, tall structures are constructed within 150m of the dolphins, then it is considered highly unlikely that any additional noise or visual disturbance resulting from construction work in the vicinity of the dolphins will cause any significant impact on the breeding terns.

It is however considered that the DWB does not provide an ideal long-term situation for the Common Tern sub-colony and it is recommended that attempts are made to encourage the terns to relocate to a more suitable location within the harbour.

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FIGURE 1.0: CORK HARBOUR SPA

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LEGEND

Cork Harbour SPA

Issue Details

Drawn: NR	**Project No.** NI 1004
Chkd: JMC	**File Ref.** N/A
Appd: RH	
Date: February 2014	**Drawing No.** Figure 1 — **Rev.** 01
Scale: NTS	

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Project: *Port of Cork Bird Surveys*

Title: *Cork Harbour SPA*

Figure Number: 1

FIGURE 1.1: LOCATIONS OF KNOWN RECENT COMMON TERN BREEDING SUB-COLONIES

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LEGEND

- Cork Harbour SPA
- Sub-Colony Locations (2013)
- Former Sub-Colony Locations

Issue Details

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Project: *Port of Cork Bird Surveys*

Title: *Locations of Known Recent Common Tern Breeding Sub-Colonies*

Figure Number: 1.1

FIGURE 2.0: COUNT AREAS AND VANTAGE POINT LOCATIONS

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LEGEND

- Count Areas
- Sub-Colony Locations (2013)
- Vantage Point Locations

Issue Details

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Project: *Port of Cork Bird Surveys*

Title: *Count Areas and Vantage Point Locations*

Figure Number: 2

FIGURE 3.0: FAVOURED COMMON TERN FEEDING AREAS WITHIN THE STUDY AREA

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LEGEND

Count Areas

Favoured Feeding Areas

Issue Details

Drawn: NR		Project No. NI 1004	
Chkd: JMC		File Ref. N/A	
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Project: *Port of Cork Bird Surveys*

Title: *Favoured Common Tern Foraging Areas*

Figure Number: 3

FIGURE 3.1: POTENTIAL ADDITIONAL FEEDING AREAS

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LEGEND

Count Areas

Possible Additional Feeding Areas

Issue Details

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Chkd: JMC	File Ref. N/A
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Project: *Port of Cork Bird Surveys*

Title: *Additional Feeding Areas*

Figure Number: 3.1

APPENDIX 9.5 NIGHT-ROOSTING CORMORANT SURVEY

Port of Cork Bird Surveys

Night-roosting Cormorants at Monkstown Creek, Cork Harbour 2011 / 2012

DOCUMENT CONTROL SHEET

Client:	**RPS Belfast / Port of Cork**					
Project Title:	**Port of Cork Bird Surveys**					
Document Title:	**Night-roosting Cormorant at Monkstown Creek, Cork Harbour 2011 / 2012**					
Document No:	**MCE0692RP0003A01**					
This Document Comprises:	**DCS**	**TOC**	**Text**	**List of Tables**	**List of Figures**	**No. of Appendices**
	1	1	8	0	0	1

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A01	Draft for Client Approval	R. Mundy	J.McCrory		Cork	22/06/2012

TABLE OF CONTENTS

APPENDICES

1 INTRODUCTION

This Report presents the findings of a study of the night-time tree-roosting Cormorants at Monkstown Creek between June 2011 and March 2012. The survey was conducted in order to inform a forthcoming Environmental Impact Assessment and Appropriate Assessment relating to Port of Cork's proposed port redevelopment works at Ringaskiddy. 'Wintering' (non-breeding) Cormorant is a Qualifying Interest of *Cork Harbour* SPA (site code 004030).

2 METHODOLOGY

A Vantage Point was established on the northern shore of Monkstown Creek from which the trees used for roosting are clearly visible, and the stone breakwater, where Cormorants roost during the day and appear to use as a 'pre-roost' (see Section 3.4) is also clearly visible.

As viewed from the Vantage Point, the visible trees form a linear feature along the southern shore of Monkstown Creek. Cormorants roost only in some of the trees in four relatively discrete areas. These are labelled as Roost Areas A to D and their extent and location are presented in Figure 1 in Appendix A.

Cormorants were monitored arriving into the trees over a variable period prior to darkness. The arrival time and Roost Area of each arriving bird was recorded. During periods when large numbers of birds were arriving simultaneously it was not possible to record the exact arrival time of each bird. At such times, the trees were scanned regularly and the total number of roosting birds recorded and the time of the scan noted, hence generating an on-going chronology of arriving birds throughout the watch period. The number of birds present on the stone breakwater and those visible on the metal ADM jetty were also counted regularly during the course of the watches.

Watches ended when the light became too poor to see the birds. At this point the number of birds arriving into the roost was very small and all birds had invariably departed from the stone breakwater.

3 RESULTS

3.1 TOTAL NUMERS OF ROOSTING CORMORANTS

Table 3.1 presents a summary of the total number of tree-roosting Cormorants recorded during each watch.

Numbers of cormorants using the trees as a roost site increased steadily from 72 in late June through July, August and September to a peak of 259 in late October. This is a large number of Cormorants to be found at a single location, representing nearly 2% (1.889%) of the total Irish population of 13,710 (Crowe *et. al*., 2008). Numbers then declined through November and December, rising again slightly in January and February.

Table 3.1: Numbers of Cormorants Roosting in Trees at Monkstown Creek 2011 / 2012

Date	Wind Direction and Beaufort Speed	Roost Area A	Roost Area B	Roost Area C	Roost Area D	Total
23 Jun 2011	NW 3	11	8	13	40	**72**
12 Jul 2011	NW 2	17	18	13	45	**93**
29 Jul 2011	NE 1	23	19	14	52	**108**
09 Aug 2011	N 3	35	24	21	61	**141**
30 Aug 2011	N 1	39	27	26	86	**178**
14 Sep 2011	W 3	44	27	52	106	**229**
27 Oct 2011	W 1	57	28	58	116	**259**
09 Nov 2011	S 4	44	26	49	90	**209**
10 Dec 2011	SW 3	32	22	30	77	**161**
27 Dec 2011	S 3	28	12	28	58	**126**
20 Jan 2012	SW 3	33	19	29	84	**165**
07 Feb 2012	SE 3	38	14	38	91	**181**
05 Mar 2012	E 1	29	12	42	70	**153**
Range	n/a	11 to 57	8 to 28	13 to 58	40 to 116	**72 to 259**

3.2 COMPARATIVE PATTERNS OF ROOSTING BETWEEN THE FOUR ROOST AREAS

Table 3.1 presents details of the percentage of the total using each of the four Roost Areas, and Table 3.2 presents the same data as percentages of Cormorants using each Roost Area.

Table 3.2: Percentage of Cormorants Roosting in Each Roost Area at Monkstown Creek 2011 / 2012

Date	Wind Direction and Beaufort Speed	% of birds in Roost Area A	% of birds in Roost Area B	% of birds in Roost Area C	% of birds in Roost Area D	Total Number of birds
23 Jun 11	NW 3	15%	11%	18%	56%	72
12 Jul 11	NW 2	18%	19%	14%	49%	93
29 Jul 11	NE 1	21%	18%	13%	48%	108
09 Aug 11	N 3	25%	17%	15%	43%	141
30 Aug 11	N 1	22%	15%	15%	48%	178
14 Sep 11	W 3	19%	12%	23%	46%	229
27 Oct 11	W 1	22%	11%	22%	45%	259
09 Nov 11	S 4	21%	12%	23%	43%	209
10 Dec 11	SW 3	20%	14%	19%	48%	161
27 Dec 11	S 3	28%	12%	28%	48%	126
20 Jan 12	SW 3	20%	12%	18%	51%	165
07 Feb 12	SE 3	21%	8%	21%	50%	181
05 Mar 12	E 1	19%	8%	27%	46%	153
Range	n/a	15% to 28%	8% to 19%	13% to 28%	43% to 56%	

Roost Area D invariable supported the largest number of Roosting Cormorants with up to 116 birds present during October and November when the highest numbers of birds are present at the site as a whole. Roost Areas D supported fewest birds, and is the only one of the four Roost Areas where there is some indication that the carrying capacity is reached on occasion. Between late August and late November the total number of birds using the site as a whole increased from 178 to 259, however the number of birds using Roost Area B increased by only one, from 27 to 28.

Other than this apparent limit to the number of birds able to use Roost Area C, the there is no discernable pattern to the variation in usage of the four Roost Areas in terms of a seasonal trend or any tendency for one Roost Area to hold a higher or lower proportion of birds when larger or smaller total numbers are present.

There is no discernable pattern in the data to indicate that different Roost Areas were preferred by birds according to wind strength or direction. Birds do on occasion have difficulties landing in particular locations but observations suggest that they generally tend to persist with their chosen location, often making three or more attempts to land. Only on rare occasions were birds seen to ‘give up’ on a particular location and land elsewhere.

3.3 OBSERVATIONS ON THE EXTENT OF DISTURBANCE CAUSED DURING CONSTRUCTION OF A WAREHOUSE ADJACENT TO THE ROOST

During the winter period of 2011 / 2012 a large grain storage warehouse was constructed within the Deep Water Port complex in close proximity to Roost Area A. It’s location is shown in Figure 1 in Appendix A. The works included loud pounding and hammering clearly audible from the Vantage Point at Monkstown and also included periods where workmen were present on the roof of the new structure, on scaffolds against the wall of the new structure which faces Roost Area A. On the 7th of February 2012, during the course of the roost survey on that date, several construction workers were clearly visible from the Vantage Point at Monkstown and their hammering was clearly audible. Cormorants arrived at the roost in the normal way and results from that date (see Tables 3.1 and 3.2) indicate that the number and proportion of Cormorants using Roost Area A was typical. No evidence of disturbance to the roosting cormorants was observed as a result of these works.

3.4 CORMORANTS PRE-ROOSTING ON THE STONE BREAKWATER

During the watches, the number of Cormorants present on the stone breakwater during the dusk period was monitored and observations of movements of birds to and from the breakwater were noted. A proportion of the cormorants roosting in the trees at Monkstown Creek spend time on the breakwater preening and drying plumage prior to flying to the trees. These birds arrive to the breakwater from all directions, namely from the Passage West channel to the north; from the channel to the north of Haulbowline Island or from the vicinity of Spike Island to the east.

Not all birds arriving to the tree roost stop at the breakwater and a substantial proportion of birds, particularly late in the dusk period (close to dark) fly directly to the trees, particularly, it appears, those arriving from the east.

Cormorants departing the breakwater for the trees often do so in small groups indicating that this pre-roost gathering may also have a social function. During the pre-dusk period, Cormorants were never seen departing the stone breakwater for any destination other than the Monkstown Creek tree roost.

Due to the turnover of birds on the breakwater, the proportion of birds which stop there is not known however based upon casual observations it is estimated to be in excess of 50% of those which roost in the trees, i.e. the majority of birds stop-off at the breakwater.

The number of Cormorants on the breakwater peaked consistently at a time approximately 90 minutes before dark; approximately 70 minutes before the last bird departed the breakwater. The peak number of birds at this time was usually between 15% and 25% of the total number using the tree roost an any given night, however when larger numbers of Cormorants are using the roost this proportion increases, with 99 Cormorants present 90 minutes before dark on the 27th of October, which is 38% of the total of 259 which roosted in the trees that night. This was the largest gathering of cormorants on the stone breakwater that was observed during the study.

4 DISCUSSION AND CONCLUSIONS

Whilst this Report does not constitute an Environmental Impact Statement, the finding presented herein will inform a forthcoming EIA and will in large part be used in a forthcoming EIS and in an Appropriate Assessment, relating to Port of Cork's proposed redevelopment of their port facilities at Ringaskiddy. Hence, whilst a quantitative impact assessment and proposals for appropriate mitigation are beyond the scope of this Report, this Section presents discussion and conclusions of the findings of this study in the context of this proposed development and forthcoming impact assessments.

The design of the proposed redevelopment of Port of Cork's Deep Water Port at Ringaskiddy does not involve the felling of any trees and will not involve any other direct impact on the tree roosts used by Cormorants at Monkstown Creek. There are however three possible sources of indirect impact on the roosting birds as follows:

- Works adjacent to the stone breakwater that is used by Cormorants for day time roosting, appears to be used as a pre-roost and may be an integral element in the attractiveness of the Monkstown Creek trees as a night time roost site;
- Possible disturbance to tree-roosting Cormorants during construction activity; and
- Possible disturbance to tree-roosting Cormorants during operation of the new port facilities.

4.1 POSSIBLE DISTURBANCE DURING CONSTRUCTION

Roost Area A is located substantially closer to the proposed works site than the other Roost Areas, with the closest part of the proposed works, at the base of the ADM jetty, being 80m to 200m from the trees used by the birds. The next closest roosting trees in Roost Area B are approximately 450m away from this point and the closest trees in Roost Areas C and D are 600m and 650m distant respectively.

Hence, the potential for disturbance and possible displacement of roosting birds is substantially greater in Roost Area A than in the other Roost Areas, and it is considered that this possibility is limited to Roost Area A. It is not considered possible, given the relatively high levels of noise and human activity already present in the area to which the birds are habituated, that birds in Roost Areas B, C and D, at distances in excess of 450m from and proposed works, could be vulnerable to disturbance or displacement as a result of additional noise and human activity at the proposed works location.

Section 3.2 or this Report discusses the relative use of the four Roost Areas and concludes that Roost Areas B is the only one of the four where there is an indication that carrying capacity is ever reached. Between late August and late November the total number of birds using the site as a whole increased from 178 to 259, the number of birds using Roost Area B increased by only one, from 27 to 28.

The maximum number of birds recorded in Roost Areas C and D combined is 174. This can therefore be described as a minimum carrying capacity for these Roost Areas. In a worst case scenario where all of the birds using Roost Area A were displaced during construction activity, the data indicates that this minimum carrying capacity of Roost Areas C and D is easily sufficient to absorb the relocation of the birds from Roost Area A at all times other than the period of peak usage of the site during September and October. Were all of the Cormorants displaced from Count Area A during September or October it is not known whether or not there would be sufficient capacity for all of them to relocate to Roost Areas C and D.

4.2 POSSIBLE DISTURBANCE DURING OPERATION

The issues surrounding the potential for disturbance and displacement of birds during operation of the new facility are to all intents and purposes the same as those for the construction period, as discussed in Section 4.2; however it is considered that the likelihood of significant disturbance during operation is substantially lower.

Roost Area A lies close to the existing port facility where noise levels are likely to be substantially higher that at Roost Areas C and D. The fact that large numbers of birds choose to use Roost Area A, even at times when there is vacant space within Roost Areas C and D provides strong evidence that the existing port facility does not disturb the roosting birds. Were disturbance occurring, it would be expected that roosting locations remote from the port (or from other similar sources of disturbance, such as the noisier and more brightly lit parts of Pfizer’s plant) would be favoured but the data shows no evidence whatsoever for such a pattern, with birds using the trees closest to the port and to the brightest, noisiest parts of Pfizer’s plant even when there is clearly ‘vacant space’ in much more secluded, dark and quiet location in Roost Areas C and D. Furthermore, trees further west again from Roost Area D along the Monkstown Creek shore are located within the Golf Course area and are subject to much reduced disturbance levels, but are not used at all by roosting Cormorants (see Figure 1).

In summary, the Cormorants roosting in the trees at Monkstown Creek appear to highly habituated to noise, light and movement in the vicinity of the trees and it is considered highly unlikely that the proposed construction works, or operation of the proposed new facility will negatively affect them.

The proposed works may affect the stone breakwater and the potential affect of this on the roost is not known. It is currently anticipated that the design of the works will include the construction of a new structure close to the existing breakwater designed to facilitate roosting birds, and it is considered likely that any effect of will be mitigated by the creation of such a structure. A more detailed assessment of impacts will be presented in a forthcoming Environmental Impact Statement relating to the proposed development and this should be viewed only as a preliminary conclusion.

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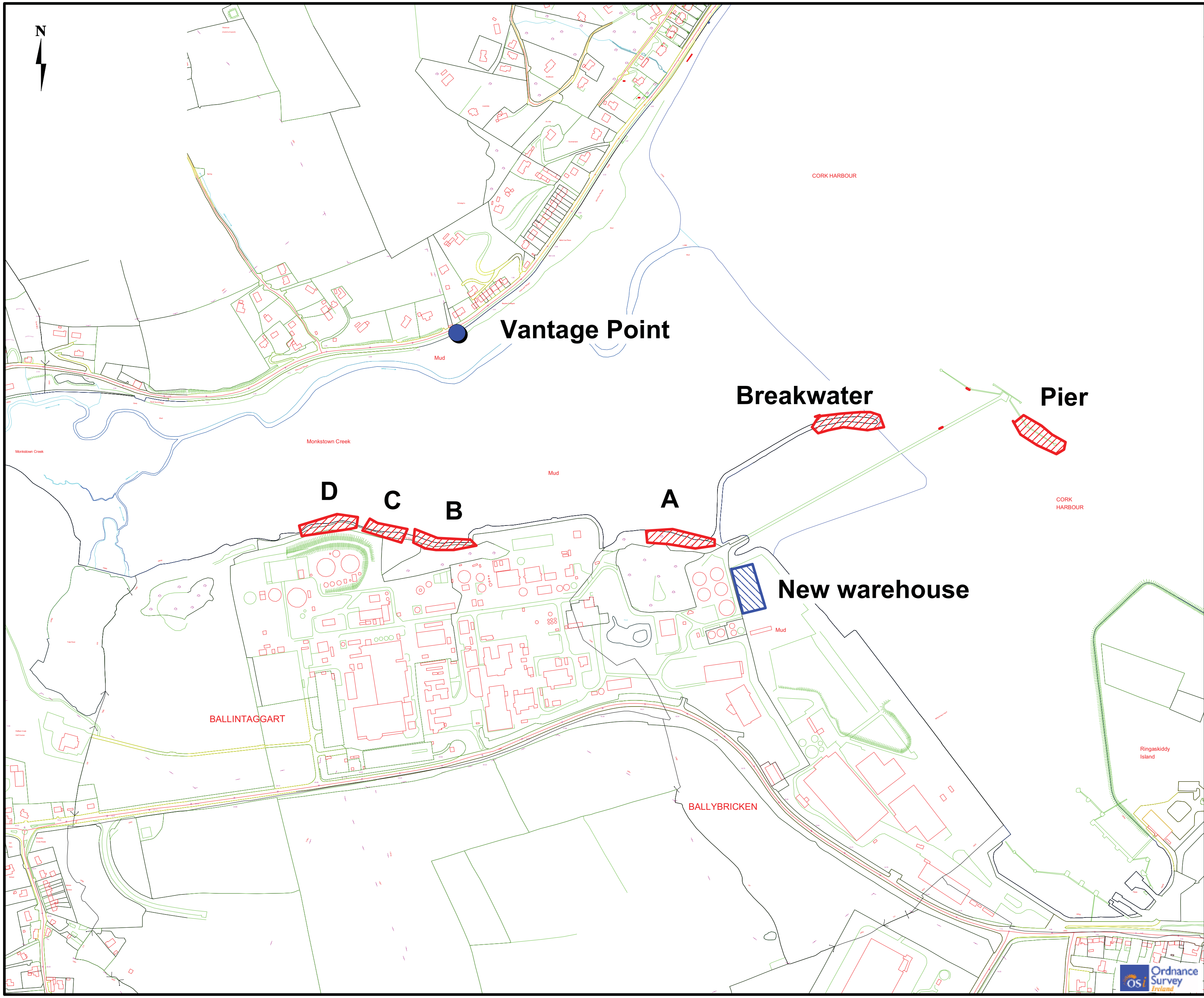
APPENDIX A

FIGURE 1: LOCATIONS OF VANTAGE POINTS AND COUNT AREAS



Legend

Cromorant Roost and Pre-roost Areas

Vantage Point

Approximate location of newly constructed warehouse

Client
PORT OF CORK

Project
Night-roosting Cormorants at Monkstwon Creek

Title
Cormorant Roost Areas and Vantage Point Location

Figure 1

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Port of Cork Bird Surveys

Report on Night-Time Tree-Roosting Cormorant Survey at Monkstown Creek, Cork Harbour 2013/14

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TABLE OF CONTENTS

1 INTRODUCTION

This report presents the findings of a survey of night-time tree-roosting Cormorants in Monkstown Creek, Cork Harbour undertaken by RPS between September 2013 and February 2014. The survey was commissioned in order to inform a forthcoming Environmental Impact Assessment (EIA) and Appropriate Assessment (AA) relating to the Port of Cork's (POC) proposed Ringaskiddy Redevelopment. This study is a repeat of a previous study conducted in 2011/12 (RPS, 2012).

'Wintering' (non-breeding) Cormorant is a Special Conservation Interest (SCI) of Cork Harbour Special Protection Area (SPA) (Site Code IE0004030). Table 1.1 provides a summary of Cork Harbour SPA Special Conservation Interests.

Table 1.1: Cork Harbour SPA SCIs.

Cork Harbour SPA [0004030] SCIs		**Season**	**Baseline Population[1]**
[A004]	Little Grebe *Tachybaptus ruficollis*	Wintering	68 (individuals)
[A005]	Great Crested Grebe *Podiceps cristatus*	Wintering	218 (individuals)
[A017]	Cormorant *Phalacrocorax carbo*	Wintering	620 (individuals)
[A028]	Grey Heron *Ardea cinerea*	Wintering	47 (individuals)
[A048]	Shelduck *Tadorna tadorna*	Wintering	1,426 (individuals)
[A050]	Wigeon *Anas penelope*	Wintering	1,750 (individuals)
[A052]	Teal *Anas crecca*	Wintering	807 (individuals)
[A056]	Pintail *Anas acuta*	Wintering	84 (individuals)
[A065]	Shoveler *Anas cylpeata*	Wintering	135 (individuals)
[A069]	Red-breasted Merganser *Mergus serrator*	Wintering	90 (individuals)
[A130]	Oystercatcher *Haematopus ostralegus*	Wintering	791 (individuals)
[A140]*	Golden Plover *Pluvialis apricaria*	Wintering	805 (individuals)
[A141]	Grey Plover *Pluvialis squatarola*	Wintering	66 (individuals)
[A142]	Lapwing *Vanellus vanellus*	Wintering	3,614 (individuals)
[A149]	Dunlin *Calidris alpina*	Wintering	4,936 (individuals)
[A156]	Black-tailed Godwit *Limosa limosa*	Wintering	412 (individuals)
[A157]*	Bar-tailed Godwit *Limosa lapponica*	Wintering	45 (individuals)
[A160]	Curlew *Numenius arquata*	Wintering	1,345 (individuals)
[A162]	Redshank *Tringa totanus*	Wintering	1,614 (individuals)
[A179]	Black-headed Gull *Larus ridibundus*	Wintering	948 (individuals)
[A182]	Common Gull *Larus canus*	Wintering	2,630 (individuals)
[A183]	Lesser Black-backed Gull *Larus fuscus*	Wintering	261 (individuals)
[A193]*	Common Tern *Sterna hirundo*	Breeding	69 (pairs)
[A999]	Wetlands & Waterbirds		

Key to Table
[1]As obtained from Standard Natura Data Form.
*Species listed on Annex I of The Birds Directive.

2 METHODOLOGY

A vantage point was established on the northern shore of Monkstown Creek along the Strand Road (R610) from which the trees used for roosting along the southern shore were clearly visible, along with the stone breakwater which Cormorants use to roost on during the day and appear to use as a 'pre-roost' prior to taking up a position with the Monkstown tree-roost as night falls. The vantage point was consistent with that used in the 2011/12 study however, during periods of poor visibility counts were undertaken from various positions along the Strand Road.

As viewed from the vantage point, the trees form a linear feature along the southern shore of Monkstown Creek. Cormorants roost only in some of the trees in four relatively discrete areas. These are labelled as Roost Areas A to D and their extent and location are presented in Figure 1.

Cormorants were monitored arriving into the trees prior to nightfall. In 2013/14 scans were undertaken every 15 minutes approximately 90 minutes prior to darkness. The number of birds present on the stone breakwater and those visible on the western arm of the ADM Jetty were also counted regularly during the course of the watches.

Watches ended when visibility became too poor to see the birds. At this point the number of birds arriving into the roost was usually very small and all birds had invariably departed from the stone breakwater. It is however, likely that birds continue to arrive at the roost after nightfall.

3 RESULTS

3.1 TOTAL NUMERS OF ROOSTING CORMORANTS

Table 3.1 presents a summary of the total number of tree-roosting Cormorants recorded during each watch. During all watches the number of Cormorants present exceeded the nationally important all-Ireland threshold of 140 individuals.

Overall the total number of Cormorants using the Monkstown tree roost site rose from September through to November, with a peak of 336 in October. The peak count recorded in October represents 2.45% of the most recently published Irish wintering population of 13,710 (Boland & Crowe, 2012) and 54.19% of the Cork Harbour SPA qualifying population at the time of designation (620 individuals).

Interestingly the peak count also represents 133% of the most recently available 5-year peak mean Irish Wetland Birds Survey (I-WeBS) count for Cork Harbour presented in Appendix A. This may suggest that I-WeBS counts are currently underestimating the overwintering Cormorant population of Cork Harbour, or that the Monkstown tree roosts supports a varying influx of birds that choose to overwinter outside of the I-WeBS Cork Harbour survey area.

Table 3.1: Numbers of Cormorants Roosting in Trees at Monkstown Creek 2013/2014

Date	Visibility	Roost Area A	Roost Area B	Roost Area C	Roost Area D	Total
24/09/2013	Poor	26	21	34	65	**146**
25/09/2013	Poor	30	19	31	71	**151**
29/10/2013	Good	65	49	69	151	**336**
21/11/2013	Good	42	19	26	118	**205**
17/12/2013	Good	32	22	28	91	**173**
14/01/2014	Fair	21	12	18	46	**97**
06/02/2014	Fair	28	8	14	64	**114**
Total	-	**244**	**150**	**220**	**606**	**1222**
Range	-	**21-65**	**8-49**	**14-69**	**64-151**	**97-336**

3.2 COMPARATIVE PATTERNS OF ROOSTING BETWEEN THE FOUR ROOST AREAS

Table 3.1 above presents details of the percentage of the total using each of the four Roost Areas. Table 3.2 below presents the same data as percentages of Cormorants using each Roost Area.

Table 3.2: Percentage of Total Cormorants Roosting within each Roost Area, 2013/14

Date	Wind Speed	% of birds in Roost Area A	% of birds in Roost Area B	% of birds in Roost Area C	% of birds in Roost Area D	Total Number of birds
24/09/2013	F1	18	14	23	45	146
25/09/2013	F1	20	13	21	47	151
29/10/2013	F1	19	15	21	45	334
21/11/2013	F1-2	20	9	13	58	205
17/12/2013	F1-2	18	13	16	53	173
14/01/2014	F2	22	12	19	47	97
06/02/2014	F2	25	7	12	56	114

In line with the findings of the 2011/12 survey, Roost Area D was consistently found to support the largest number of roosting Cormorants with a peak of 151 birds present in October 2013. Roost Area B also supported the fewest birds with a peak count of 49 birds recorded in October 2013. This peak count somewhat undermines the suggested carrying capacity of Roost Area B of c.28 birds from the

2011/12 survey. This unusually high count may be considered an anomaly, with the typical count of birds within Roost Area B during 2013/14 in the range of 19-22 birds. However, the number of birds that continue to arrive at the roost after dark, when surveys cease, remains unknown. During the October 2013 total tree roost peak count, the number of birds within all roost areas rose, but the typical proportion of the total number of birds recorded within each roost area remained consistent.

Also in line with the findings of the 2011/12 survey, no discernable pattern in the data indicated that different roost areas were preferred by birds according to wind strength or prevailing tide. Birds on occasion were observed to have difficulties landing in particular roost areas, but tended to persist with their chosen location, making multiple attempts to land.

3.3 CORMORANTS PRE-ROOSTING ON THE STONE BREAKWATER

During survey, the number of Cormorants present on the stone breakwater during the dusk period was also monitored. A proportion of the cormorants roosting in the trees at Monkstown Creek spend time on the breakwater preening and drying their plumage prior to flying to the trees. These birds arrive to the breakwater from various directions namely from the Passage West channel to the north or to the east towards Haulbowline.

Not all birds arriving to the tree-roost stop at the breakwater and a substantial proportion of birds, particularly when close to dark fly directly into the trees.

Cormorants departing the breakwater for the tree roost often do so in small groups indicating that this pre-roosting behaviour may also have some social function. During the 2013/14 pre-dusk period, Cormorants were not seen departing the stone breakwater for any destination other than the tree roost. This is consistent with the 2011/12 survey.

4 DISCUSSION AND CONCLUSIONS

The POCs proposed redevelopment works at Ringaskiddy will not require the felling of any trees within Monkstown Creek.

There are however possible sources of additional impacts on the night-roosting birds as follows:

- visible or audible construction works adjacent to the stone breakwater used by roosting Cormorants, which may be an integral element in the attractiveness of the Monkstown Creek night-time tree-roost;

- visual (including lighting) and noise disturbance to tree-roosting Cormorants during construction activity; and

- visual (including lighting) and noise disturbance to tree-roosting Cormorants during operation of the new port facilities.

4.1 POSSIBLE DISTURBANCE DURING CONSTRUCTION

Roost Area A is located substantially closer to the proposed Ringaskiddy Redevelopment footprint than any other Roost Area. Hence, the potential for disturbance and possible displacement of roosting birds is substantially greater in Roost Area A than in the other Roost Area. It is unlikely that given the relatively high levels of noise and human activity already present in the proximity to the tree-roost to which the birds appear habituated, that birds in Roost Areas B, C and D, could be vulnerable to disturbance or displacement as a result of additional noise and human activity within the Ringaskiddy Redevelopment footprint.

The true carrying capacity of the each roost area is not yet known but is likely to be greater than outlined from the findings of the 2011/12 survey. As highlighted from the peak count of 336 birds in October 2013, all roost areas have the capacity to support an influx of birds. Therefore in a worst case scenario where all of the birds using Roost Area A were displaced during construction activity, the data indicates that the potential carrying capacities of Roost Areas B, C and D are sufficient to absorb the relocation of the birds from Roost Area A.

4.2 POSSIBLE DISTURBANCE DURING OPERATION

The issues surrounding the potential for disturbance and displacement of birds during operation of the new facility are to all intents and purposes the same as those for the construction period, as discussed above; however it is considered that the likelihood of significant disturbance during operation is substantially lower.

Roost Area A lies close to the existing Ringaskiddy Deep Water Berth where existing noise levels from current port activities are likely to be substantially higher than at Roost Areas B, C and D. The fact that large numbers of birds still choose to use Roost Area A, even at times when there is vacant space within Roost Areas B, C and D provides strong evidence that the existing port facility and operation do not disturb the tree-roosting birds.

If disturbance was occurring, it would be expected that roosting locations remote from the port (or from other similar sources of disturbance, such as the noisier and more brightly lit parts of Pfizer's plant) would be favoured but the data from both the 2011/12 and 2013/14 surveys shows no evidence whatsoever for such a pattern, with birds using the trees closest to the port and to the brightest, noisiest parts of Pfizer's plant even when there is clearly 'vacant space' in much more secluded, dark and quiet locations, particularly in Roost Areas C and D. Furthermore, trees further west from Roost

Area D located within the Raffeen Golf Course area, which are subject to much reduced disturbance levels at dusk during the wintering period, were not used at all by roosting Cormorants (see Figure 1).

In summary, the Cormorants roosting in the trees at Monkstown Creek appear to be highly habituated to existing noise, light and movement in the vicinity of the trees and it is considered highly unlikely that the proposed construction works, or operation of the proposed new facility will negatively impact upon them.

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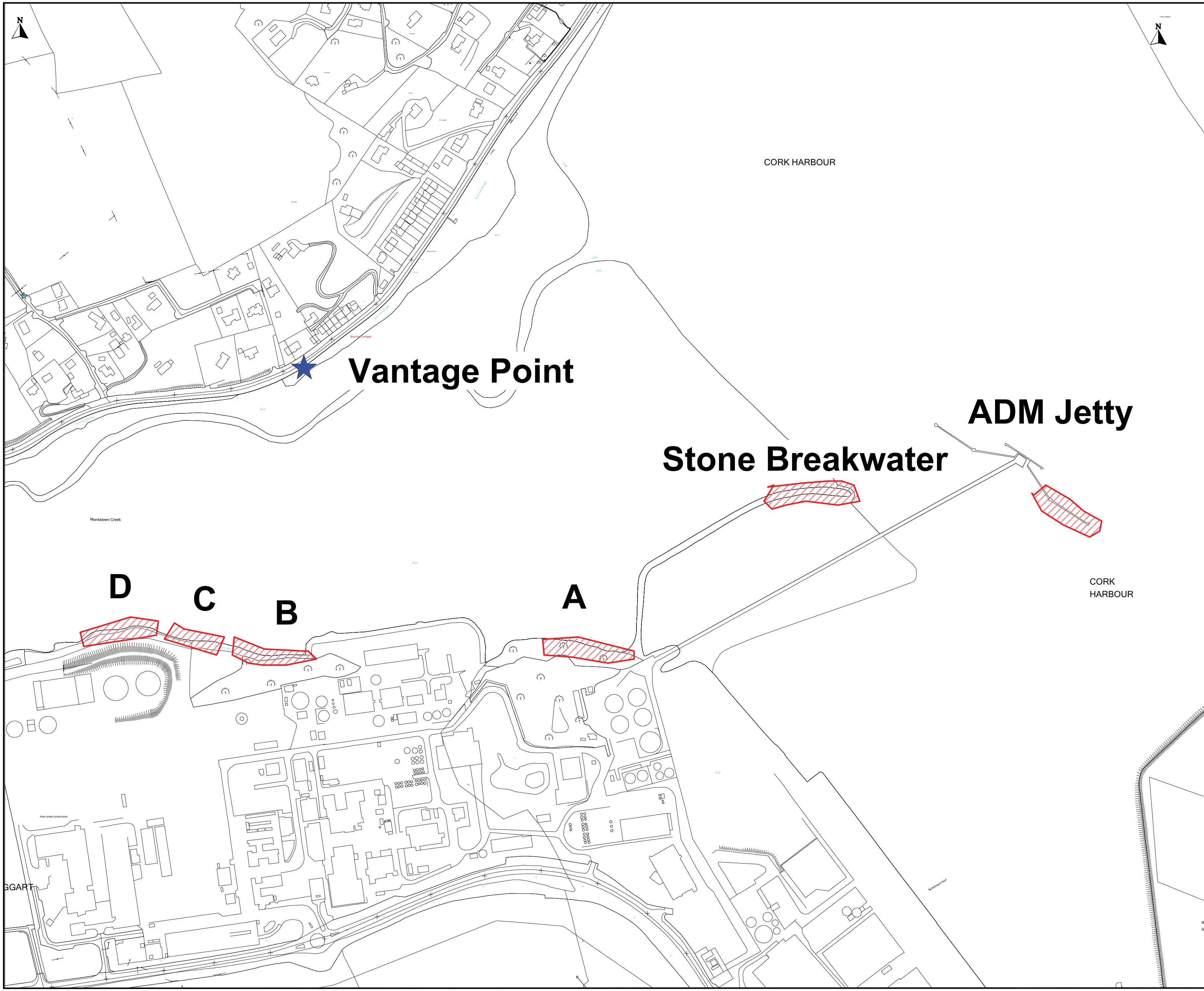
RPS (2012) Night-roosting Cormorant at Monkstown Creek, Cork Harbour 2011/12. Unpublished RPS Report prepared on behalf of Port of Cork.

FIGURE 1: LOCATIONS OF VANTAGE POINTS AND ROOST AREAS



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LEGEND

Roost Areas

Vantage Point

Issue Details

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Project: *Port of Cork Bird Surveys*

Title: *Cormorant Roost Areas and Vantage Point Locations*

Figure Number: 1

APPENDIX A: MOST RECENT 5-YEAR I-WEBS DATA, CORK HARBOUR

Cork Harbour

Species	1% National	1% International	2007/08	2008/09	2009/10	2010/11	2011/12	Peak	Mean
Kittiwake				3				3	1
Mute Swan	110		68	42	70	51	45	70	55
Whooper Swan	130	270	3	1	1			3	1
Greylag Goose	50	980	6			1		6	1
Canada Goose			22	5	9	14	14	22	13
Light-bellied Brent Goose		400	65	30	24	19	58	65	39
Black Brant					1			1	0
Feral/hybrid Goose			5					5	1
Ruddy Shelduck							2	2	0
Shelduck	150	3,000	911	1,303	952	1,223	1,140	1,303	1,106
Wigeon	820	15,000	1,479	1,313	1,236	1,296	1,468	1,479	1,358
Gadwall	20	600	8	6	8	13	22	22	11
Teal	450	5,000	748	1,005	753	1,026	929	1,026	892
Mallard	380	20,000	531	344	285	404	416	531	396
Pintail	20	600		22	27	12	31	31	18
Garganey					1			1	0
Shoveler	25	400	51	37	25	12	33	51	32
Pochard	380	3,000	3	2	4		1	4	2
Ring-necked Duck		1,470,000						0	0
Tufted Duck	370	12,000	16	22	36	16	26	36	23
Scaup	45	3,100		1		1		1	0
Eider	30	14,840			1		1	1	0
Common Scoter	230	5,500	1	1			4	4	1
Surf Scoter							1	1	0
Velvet Scoter			3					3	1
Goldeneye	95	11,500	14	17		2	20	20	11
Red-breasted Merganser	35	1,700	72	53	63	61	71	72	64
Goosander						1		1	0
Black-throated Diver		3,750		1				1	0
Great Northern Diver		50	4	2	16	1		16	5
Little Grebe	25	4,000	65	60	56	64	88	88	67
Great Crested Grebe	55	3,500	107	81	183	110	165	183	129
Slavonian Grebe		55	3		1			3	1
Black-necked Grebe					1	2		2	1
Cormorant	140	1,200	380	168	170	227	317	380	252
Shag		2,000	10	3	1	1	4	10	4
Little Egret		1,300	168	138	184	112	67	184	134
Cattle Egret				3	1			3	1
Grey Heron	30	2,700	170	87	59	68	70	170	91
Great White Egret					1			1	0
Spoonbill			1					1	0
Water Rail			2	2		3		3	1
Moorhen	20	20,000	25	25	22	37	21	37	26
Coot	330	17,500	11	4	4	9	9	11	7
Oystercatcher	680	8,200	1,810	1,241	1,190	1,099	1,939	1,939	1,456
Ringed Plover	150	730	27	38	34	21	29	38	30
Golden Plover	1,700	9,300	5,232	248	4,500	3,356	5,211	5,232	3,709
Grey Plover	65	2,500	39	17	10	20	35	39	24
Lapwing	2,100	20,000	3,321	3,219	1,974	2,713	2,217	3,321	2,689
Knot	190	4,500	111	119	58	250	178	250	143
Dunlin	880	13,300	3,579	5,091	2,632	4,887	5,068	5,091	4,251
Ruff		12,200	4	2		1		4	1
Snipe		20,000	75	17	72	53	34	75	50
Black-tailed Godwit	140	610	2,936	2,050	1,453	2,332	2,955	2,955	2,345

The counts presented in the table refer to the peak counts of species in each I-WeBS season.
Site peak and mean are calculated as the peak and mean of peak counts respectively over the seasons specified. Blank cells within columns which contain positive values for one or more species constitute zero for those species.

Species	1% National	1% International	2007/08	2008/09	2009/10	2010/11	2011/12	Peak	Mean
Bar-tailed Godwit	160	1,200	257	281	396	301	312	396	309
Whimbrel		6,700	1	1	11	11	2	11	5
Curlew	550	8,400	1,719	943	992	1,315	1,662	1,719	1,326
Common Sandpiper			4	3			1	4	2
Green Sandpiper		15,500					1	1	0
Spotted Redshank		900	2	1		2	7	7	2
Greenshank	20	2,300	95	76	79	81	88	95	84
Redshank	310	3,900	1,748	1,471	1,365	1,450	1,354	1,748	1,478
Turnstone	120	1,400	233	115	136	147	207	233	168
Wilson's Phalarope							1	1	0
Mediterranean Gull		770	48	65	21	3	8	65	29
Little Gull		1,100					1	1	0
Black-headed Gull		20,000	2,392	814	466	1,333	3,417	3,417	1,684
Ring-billed Gull		20,000				1	2	2	1
Common Gull		16,400	224	93	193	113	131	224	151
Lesser Black-backed Gull		5,500	72	192	60	163	72	192	112
Herring Gull		10,200	65	49	90	40	74	90	64
Iceland Gull		1,600		1				1	0
Glaucous Gull		2,200	1					1	0
Great Black-backed Gull		4,200	126	54	17	16	149	149	72
Sandwich Tern			35	19		260	104	260	84
Common Tern			1					1	0
Arctic Tern			1					1	0
Unidentified Tern			1	1				1	0
Kingfisher			2	3	2	2	3	3	2

Coverage (number of counts each season)

SubSite Code	Subsite	Grid	2007/08	2008/09	2009/10	2010/11	2011/12
0L099	Rostellan Lake	W877659	6	6	7	6	7
0L415	Rathcoursey & Ahanesk	W8770	7	6	6	5	4
0L453	Lough Beg	W780630	7	3		2	7
0L454	Owenboy Estuary	W751624	6	1		4	6
0L455	Ringaskiddy - Luc Strand	W786649	1			2	2
0L469	Weir Island	W818707	7	7	7	5	7
0L482	Ballintubbrid	W849701	7	7	7	5	7
0L484	Ballynacorra	W882718	7	6	6	5	4
0L485	Cuskinny	W817674	6	5	5	5	6
0L486	Dunkettle	W727723	6	4	7	5	7
0L487	Brick Island	W830703	7	7	7	5	7
0L488	Douglas Estuary	W720698	7	5	7	7	7
0L489	Glounthane Estuary/ Slatty Water	W800726	6	5	7	6	7
0L490	Aghada	W8566	6	6	6	6	7
0L491	Whitegate Bay	W836639	6	6	6	7	7
0L492	North Channel - Ballintubbrid	W805706	5	5	6	6	7
0L496	Monkstown Creek	W768652	6	3		2	7
0L498	Saleen	W8767	6	6	6	6	7
0L452	East Lough Mahon	W7670	6		1		5
0L041	Carrigrenan Pools	W7771	4		1		6
0L495	Belvelly - Marino Point	W790708	1	5			
0L550	Barryscourt	W811717			2		
0L587	Harpers Island (only)	W785726					1
0L480	Harpers Island	W7872		5	3		
0L425	Belvelly Bridge - Railiway	W783705	6		1		6
0L426	Carrigrenan - Great Island & Railway	W775705	6		1		6
0L424	Belvelly Tower	W794707	6				6

The counts presented in the table refer to the peak counts of species in each I-WeBS season.
Site peak and mean are calculated as the peak and mean of peak counts respectively over the seasons specified. Blank cells within columns which contain positive values for one or more species constitute zero for those species.

APPENDIX 9.6 WINTERING AND BREEDING WETLAND BIRD SURVEY REPORT

FLYNN FURNEY
ENVIRONMENTAL CONSULTANTS

Port of Cork Bird Surveys 2023/2024

Ringaskiddy Wintering & Breeding Wetland Bird Survey Report.

Document Details

Client: Port of Cork Company
Scheme Name: Port of Cork Bird Surveys
Document Title: 2023/2024 Ringaskiddy Wintering and Breeding Wetland Bird Survey Report
Prepared by: Jack Coffey

Flynn Furney Environmental Consultants

Rev	Status	Date	Author(s)	Approved by
01	DRAFT	01/10/2024	JC	

Contents

1. INTRODUCTION

This report presents the findings of a wetland bird survey conducted by Ronan Ó' Driscoll during the 2023/24 wintering season. The objectives of the study were as follows:

1. To examine the usage of the marine, intertidal and terrestrial areas adjacent to the Ringaskiddy Port Redevelopment footprint, by waterbirds during the 2023/24 overwintering season;
2. To identify locations of key importance to foraging and roosting waterbirds during the 2023/24 wintering season; and
3. To provide sufficient information to assess the potential impact of the proposed development on the wintering Special Conservation Interests (SCIs) of Cork Harbour Special Protection Area (SPA) and to inform a forthcoming Environmental Impact Assessment (EIA) and Appropriate Assessment (AA).

1.1 Cork Harbour SPA

Cork Harbour SPA (Site Code: IE0004030) qualifies for designation under The Birds Directive (Directive 2009/147/EC) by regularly supporting over 20,000 waterbirds.

The Birds Directive pays particular attention to wetlands, and as these form part of this SPA, the site and its associated waterbirds are in their own right a Special Conservation Interest (SCI) - Wetlands & Waterbirds [A999].

Table 1: Cork Harbour SPA [IE0004030] SCIs

Cork Harbour SPA SCIs.		**Season**	**Qualifying Population**[1]
A004	Little Grebe (*Tachybaptus ruficollis*)	Wintering	68 individuals
A005	Great Crested Grebe (*Podiceps cristatus*)	Wintering	218 individuals
A017	Cormorant (*Phalacrocorax carbo*)	Wintering	620 individuals
A028	Grey Heron (*Ardea cinerea*)	Wintering	47 individuals
A048	Shelduck (*Tadorna tadorna*)	Wintering	1426 individuals
A050	Wigeon (*Anas Penelope*)	Wintering	1,750 individuals
A052	Teal (*Anas crecca*)	Wintering	807 individuals
A056	Pintail (*Anas acuta*)	Wintering	84 individuals
A065	Shoveler (*Anas cylpeata*)	Wintering	135 individuals

A069	Red-breasted Merganser (*Mergus serrator*)	Wintering	90 individuals
A130	Oystercatcher (*Haematopus ostralegus*)	Wintering	791 individuals
A140*	Golden Plover (*Pluvialis apricaria*)	Wintering	805 individuals
A141	Grey Plover (*Pluvialis squatarola*)	Wintering	66 individuals
A142	Lapwing (*Vanellus vanellusi)*	Wintering	3,614 individuals
A149*	Dunlin (*Calidris alpina*)	Wintering	4,936 individuals
A156	Black-tailed Godwit (*Limosa limosa*)	Wintering	412 individuals
A157*	Bar-tailed Godwit (*Limosa lapponica*)	Wintering	45 individuals
[A160	Curlew (*Numenius arquata*)	Wintering	1,345 individuals
A162	Redshank (*Tringa tetanus*)	Wintering	1,614 individuals
A179	Black-headed Gull (*Larus ridibundus*)	Wintering	948 individuals
A182	Common Gull (*Larus canus*)	Wintering	2,630 individuals
A183	Lesser Black-backed Gull (*Larus fuscus*)	Wintering	Wintering 261 individuals
A193*	Common Tern (*Sterna hirundo*)	Breeding	69 pairs
A999	Wetlands & Waterbirds	N/A	N/A
Key to Table 1As obtained from Standard Natura Data Form. *Species listed on Annex I of The Birds Directive.			

Numerous species present supported by the Cork Harbour SPA are considered **nationally important** wintering populations, including the following:
Little Grebe (*Tachybaptus ruficollis*), Great Crested Grebe (*Podiceps cristatus*), Cormorant (*Phalacrocorax carbo*), Grey Heron (*Ardea cinerea*), Shelduck (*Tadorna tadorna*), Wigeon (*Anas penelops*), Teal (*Anas crecca*), Pintail (*Anas acuta*), Shoveler (*Anas clypeata*), Red-breasted Merganser (*Mergus serrator*), Oystercatcher (*Haematopus*), Golden Plover (*Pluvialis apricaria*), Grey Plover (*Pluvialis squatarola*), Lapwing (*Vanellus vanellus*), Dunlin (*Calidris alpina*), Bar-tailed Godwit (*Limosa laponica*), Curlew (*Numenius Arquata*), Black-headed Gull (*Larus ridibundus*), Common Gull (*Larus canus*) and Lesser Black-backed Gull (*Larus fuscus*). The site also qualifies for designation by regularly supporting a **nationally important** breeding population of Common Tern (*Sterna hirundo*).

2. METHODOLOGY

The survey methodology was based on that used by the British Trust for Ornithology's (BTO) Wetland Bird Survey (WeBS) and the Irish Wetland Bird Survey (I-WeBS).

These surveys were conducted from three vantage points: Monkstown, Ringaskiddy and Rocky Island. See **Figure 1, Appendix 1**.

The Wintering Bird Survey was conducted monthly from October 2023 to March 2024.
The Breeding Bird Surveys were conducted monthly May 2024 to August 2024.

All surveys were performed by Ronan O'Driscoll.

1. High Tide Waterbird Counts were undertaken within two hours either side of high tide, to record the distribution, numbers and behaviours of waterbirds the survey area during high tide conditions; and

2. Low Tide Waterbird Counts were undertaken within two hours either side of low tide, to record the distribution, numbers and behaviours of waterbirds within the survey area during low tide conditions.

3. In May 2024, a further count area (Count Area 4) was added at Rocky Island, facing east towards Spike Island.

4. Within each count area, all waterbirds seen were recorded and dominant behaviours noted as either feeding (F) or engaged in other activity such as roosting, resting, washing or preening (R). Birds moving through the area only are indicated with (M). Note, gulls were not recorded in the Breeding Bird Survey (May-August).

5. Birds flying over were ignored unless they subsequently went onto land within the survey area.

6. Equipment used: 20-60 zoom scope, 7X42 binoculars, tripod.

Note: "Waterbirds" are defined here as all swans and geese, ducks, divers, grebes, herons and rails, waders, gulls and terns.

2.1 Survey Timeline

Table 2: Survey dates, tide times and count areas included for each survey.

Survey	Date	Tide Time	Count Areas Surveyed
Wintering	26/10/2023	High 16:25	1,2,3
Wintering	27/10/2023	Low 11:20	1,2,3
Wintering	28/10/2023	Low 12:04	1,2,3
Wintering	29/10/2023	High 17:30	1,2,3
Wintering	30/10/2023	High 18:16	1,2,3
Wintering	21/11/2023	High11:38	1,2,3
Wintering	25/11/2023	Low 9:55	1,2,3
Wintering	15/12/2023	Low 13:12	1,2,3
Wintering	22/12/2023	High 13:23	1,2,3
Wintering	13/01/2024	Low 13:06	1,2,3
Wintering	22/01/2024	High 15:00	1,2,3
Wintering	07/02/2024	High 15:27	1,2,3
Wintering	09/02/2024	Low 11:24	1,2,3
Wintering	26/03/2024	Low 12:28	1,2,3
Wintering	27/03/2024	High 18:49	1,2,3
Wintering	28/05/2024	High 9:26	1,2,3
Wintering	28/05/2024	Low15:58	1,2,3
Breeding	24/06/2024	Low 14:18	1,2,3,4
Breeding	26/06/2024	High 9:21	1,2,3,4
Breeding	19/07/2024	Low 10:59	1,2,3,4
Breeding	19/07/2024	High 16:53	1,2,3,4
Breeding	20/08/2024	High 19:12	1,2,3,4
Breeding	22/08/2024	Low 14:43	1,2,3,4

3. RESULTS

Species	October 2023 - Wintering					
	1. Ringskiddy Port		2. Rocky Island		3. Monkstown Creek	
	HIGH	LOW	HIGH	LOW	HIGH	LOW
Bar tailed Godwit						
Black Guillemot						
Black-headed Gull	72 R	39 R	37 R	16 R		46 R
Black-tailed Godwit					41 R	
Brent Goose						
Common Gull	4 R	5 R	5 R	2 R		3 R
Common Tern						
Cormorant	43 R	29 R	12 R	7 R	334 R	65 R
Curlew		2 F		4 R	1 F	31 F
Dunlin				25 F		
Great Black-backed Gull	8 R	4 R	1 R	5 R	1 R	1 R
Great Crested Grebe					1R	
Greenshank	1 R	1 F		3 F	9 R	3 F
Grey Heron	2 R	7 F	2 R	5 F	17 R	30 R
Herring Gull	13 R	28 R	3 R	11 R	5 R	3 R
Lapwing						
Lesser Black-backed Gull	1 R	8 R			5 R	3 R
Little Egret	1 F	2 F	1 F	1 F	6 R	4 F
Mallard	4 R	28 R			17 R	5 R
Mediterranean Gull						1 R
Mute Swan	1 R	7 R		1 R	1 R	
Oystercatcher		8 F	1 F	19 F	7R	7 F
Red-breasted Merganser						
Redshank	2 F	2 F		3 F	5 F	68 F
Sandwich Tern						
Shag	2 R	2 R	6 R	8 R		
Shelduck						
Snipe						
Teal					23 R	53 R
Turnstone	3 F			4 F	2 F	
Whimbrel						
Other						
Common Sandpiper	1 R	1 F	1 F			
Ringed Plover				20 F		

Species	November 2023 - Wintering					
	1. Ringskiddy Port		2. Rocky Island		3. Monkstown Creek	
	HIGH	LOW	HIGH	LOW	HIGH	LOW
Bar tailed Godwit						
Black Guillemot			1 F			
Black-headed Gull	92 R	126 R	8 R	19 F	28 R	41 F
Black-tailed Godwit					5 R	33 F
Brent Goose						
Common Gull		2 R		3 F	2 R	
Common Tern						
Cormorant	85 R	19 R	1 F	6 F	91 R	15 R
Curlew	1 R	2 F		3 F	12 R	21 F
Dunlin	9 R					97 F
Great Black-backed Gull	5 R	1 R	2 R	3 F	2 R	
Great Crested Grebe					1 F	1 F
Greenshank	2 R	1 R		2 F	2 F	4 F
Grey Heron	2 F	7 R	1 R	6 F	5 R	9 F
Herring Gull	1 R	8 F		9 F	3 R	
Lapwing						5 R
Lesser Black-backed Gull	1 R	2 R			2 R	1 R
Little Egret	1 R					3 F
Mallard	8 R	46 R			67 R	5 R
Mediterranean Gull						
Mute Swan	7 R	6 R	2 R			
Oystercatcher		7 F		29 F	14 R	12 F
Red-breasted Merganser				2 R		
Redshank	17 R	4 F		5 F	3 F	57 F
Sandwich Tern						
Shag		1 R	6 R	2 R	2 R	
Shelduck	1 R				7 R	15 F
Snipe	8 R			2 F		5 F
Teal					56 R	78 R
Turnstone					11 F	
Whimbrel						
Common Sandpiper	1 R	1 R	1 R	2 F		
Ringed Plover				1 F		
Great Northern Diver					1 F	

Wigeon					1 F	

Species	December 2023 - Wintering					
	1. Ringskiddy Port		2. Rocky Island		3. Monkstown Creek	
	HIGH	LOW	HIGH	LOW	HIGH	LOW
Bar tailed Godwit						2 F
Black Guillemot						
Black-headed Gull	193 R	258 F	1 R	2 R	17 R	119 F
Black-tailed Godwit		20 F			58 R	38 F
Brent Goose		19 F		9 F	5 F	
Common Gull					1 R	3 F
Common Tern						
Cormorant	2 R	62 R	2 F	3 F	169 R	31 R
Curlew		2 F		1 F	8 F	13 F
Dunlin						56 F
Great Black-backed Gull	5 R	2 R	2 R	2 R	1 R	3 R
Great Crested Grebe						
Greenshank		1 F	1 F	1 R	4 F	2 F
Grey Heron		5 F	1 R	4 R	21 R	7 F
Herring Gull	36 R	26 F		15 R	4 R	6 F
Lapwing						
Lesser Black-backed Gull	2 R	2 R		1 R	2 R	3 F
Little Egret			1 R	1 F	1 F	
Mallard	3 R	67 R			79 R	23 R
Mediterranean Gull						
Mute Swan	6 R	5 R	2 F	2 R		
Oystercatcher		7 F	1 F	3 F	2 F	8 R
Red-breasted Merganser					3 F	1 R
Redshank		2 F			2 F	64 F
Sandwich Tern						
Shag	1 F	1 R	1 F	5 R	6 R	
Shelduck	3 R	3 F			17 R	15 F
Snipe						
Teal		1 R			91 R	63 F
Turnstone					7 F	
Whimbrel						
Other						

Species	January 2024 - Wintering					
	1. Ringskiddy Port		2. Rocky Island		3. Monkstown Creek	
	HIGH	LOW	HIGH	LOW	HIGH	LOW
Bar tailed Godwit						
Black Guillemot			3 F		2 F	
Black-headed Gull	197 R	322 R	1 R	36 R	67 R	24 F
Black-tailed Godwit		35 F				112 F
Brent Goose						
Common Gull		28 R	1 R	67 F		26 R
Common Tern						
Cormorant	5 F	29 F	2 F	2 F	426 R	37 R
Curlew		3 F		4 F	6 F	13 F
Dunlin						23 F
Great Black-backed Gull	3 R	5 R	2 R	4 R	2 R	2 R
Great Crested Grebe						
Greenshank	3 R	2 F	1 F	2 F	3 F	2 F
Grey Heron	2 R	5 F		5 F	11 R	17 R
Herring Gull	41 R	53 R	4 R	24 F	2 R	9 F
Lapwing						
Lesser Black-backed Gull	4 R	6 R		2 R	3 F	4 R
Little Egret		2 F			1 F	1 F
Mallard	2 R	87 R			29 F	6 F
Mediterranean Gull		2 R				
Mute Swan		4 R				
Oystercatcher		7 F		29 F		3 F
Red-breasted Merganser						
Redshank	1 R	3 F		2 F	7 F	62 F
Sandwich Tern						
Shag			2 F	2 F		
Shelduck		10 F			26 F	27 F
Snipe						
Teal					53 F	109 F
Turnstone					6 F	5 F
Whimbrel						
Other						
Great Northern Diver			1 F			
Common Sandpiper				1 F		

Species	February 2024 - Wintering					
	1. Ringskiddy Port		2. Rocky Island		3. Monkstown Creek	
	HIGH	LOW	HIGH	LOW	HIGH	LOW
Bar tailed Godwit						4 F
Black Guillemot						
Black-headed Gull	243 R	82 R	9 R	5 R	49 R	139 R
Black-tailed Godwit					27 R	127 F
Brent Goose		34 F				
Common Gull	61 R	29 R	2 R	13 R	1 R	102 R
Common Tern						
Cormorant	109 R	86 R	4 F	3 F	407 R	11 R
Curlew		4 F		2 F	8 R	16 F
Dunlin						
Great Black-backed Gull	4 R	3 R	3 R	1 R	5 R	
Great Crested Grebe						
Greenshank		1 F	1 F		3 F	5 F
Grey Heron	2 R	4 R			23 R	8 R
Herring Gull	51 R	23 R	3 R	11 R	39 R	9 R
Lapwing				12 R		
Lesser Black-backed Gull	18 R	5 R	1 R		2 R	5 F
Little Egret						
Mallard	3 R	19 R			38 R	6 F
Mediterranean Gull	1 R				1 R	
Mute Swan	2 F	3 F				1 F
Oystercatcher		2 F	3 R	3 F		2 F
Red-breasted Merganser						
Redshank		1 F	5 F		3 F	64 F
Sandwich Tern						
Shag	1 R		1 R	4 R		
Shelduck					12 R	12 F
Snipe						
Teal					98 R	144 F
Turnstone						2 F
Whimbrel	1 F					
Other						
Common Sandpiper	1 R			1 R		
Ringed Plover						

Species	March 2024 - Wintering					
	1. Ringskiddy Port		2. Rocky Island		3. Monkstown Creek	
	HIGH	LOW	HIGH	LOW	HIGH	LOW
Bar tailed Godwit						
Black Guillemot						
Black-headed Gull	1 R	1 F				7 F
Black-tailed Godwit		26 F			97 R	550+ F
Brent Goose	2 R				2 F	
Common Gull	41 R	7 F				19 F
Common Tern						
Cormorant	2 F	3 F	1 F		69 R	13 R
Curlew		2 F				8 F
Dunlin						
Great Black-backed Gull	3 R		2 R			2 R
Great Crested Grebe						
Greenshank					1 R	5 F
Grey Heron	2 R	3 F	1 R		6 R	8 R
Herring Gull	5 R	12 F			2 R	
Lapwing						
Lesser Black-backed Gull		1 F				1 R
Little Egret					2 R	
Mallard	19 R	13 R			7 R	
Mediterranean Gull						
Mute Swan						
Oystercatcher		5 F				6 F
Red-breasted Merganser						
Redshank						31 F
Sandwich Tern						
Shag	2 R		1 R			
Shelduck		1 F			5 R	2 R
Snipe						
Teal					13 R	9 R
Turnstone						
Whimbrel						
Other						
Common Sandpiper	1 R	1 R				
Sandwich Tern	1 R					

Species	May 2024 - Breeding							
	1. Ringskiddy Port		2. Rocky Island		3. Monkstown Creek		4. Spike Island	
	HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW
Bar tailed Godwit								
Black Guillemot							2 F	
Black-headed Gull								
Black-tailed Godwit								
Brent Goose								
Common Gull								
Common Tern	16 R	19 R	4 F	5 F	5 F	12 F	5 F	3 F
Cormorant	10 R	3 R	2 F	1 F	2 F	9 R	2 F	
Curlew								
Dunlin								
Great Black-backed Gull								
Great Crested Grebe								
Greenshank								
Grey Heron	1 R	5 F	1 R	2 F	1 R	3 F	1 R	1 R
Herring Gull								
Lapwing								
Lesser Black-backed Gull								
Little Egret						1 F		
Mallard	4 R	29 R	2 F	2 F	11 R	2 R		3 F
Mediterranean Gull								
Mute Swan		1 R						
Oystercatcher		2 F	4 M			8 F	4 R	4 R
Red-breasted Merganser								
Redshank								
Sandwich Tern								
Shag				1 R	1 R	2 R	1 F	
Shelduck					2 R	5 F		
Snipe								
Teal								
Turnstone								
Whimbrel								
Other								
Ringed Plover				2 F			3 F	

Species	June 2024 - Breeding							
	1. Ringskiddy Port		2. Rocky Island		3. Monkstown Creek		4. Spike Island	
	HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW
Bar tailed Godwit								
Black Guillemot								
Black-headed Gull								
Black-tailed Godwit								
Brent Goose								
Common Gull								
Common Tern	15 F	13 F	3 F	8 F	6 F	11 F	2 F	5 F
Cormorant	5 R	9 R	1 F	2 F	7 R	13 R	10 R	6 R
Curlew					5 F	12 F	2 M	1 F
Dunlin								
Great Black-backed Gull								
Great Crested Grebe								
Greenshank						4 F	1 R	
Grey Heron	2 R	2 F	1 R	2 F	11 R	9 F		2 F
Herring Gull								
Lapwing								
Lesser Black-backed Gull								
Little Egret					1 F	1 F		
Mallard		1 R			9 R			
Mediterranean Gull								
Mute Swan	3 F	1 R	6 R		2 F			
Oystercatcher		3 F		4 F		7 F	7 R	2 F
Red-breasted Merganser								
Redshank								
Sandwich Tern								
Shag			2 R	3 R			1 R	
Shelduck					7 R	7 F	2 R	
Snipe								
Teal								
Turnstone				2 F				
Whimbrel								
Other								
Ringed Plover				2 F				
Sandwich Tern						1 R		

Species	July 2024 - Breeding							
	1. Ringskiddy Port		2. Rocky Island		3. Monkstown Creek		4. Spike Island	
	HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW
Bar tailed Godwit								
Black Guillemot								
Black-headed Gull								
Black-tailed Godwit						1 F		
Brent Goose								
Common Gull								
Common Tern	26 R	21 R	4 F	12	6 F	8 F		2 M
Cormorant	23 R	15 R	1 R		36 R	12 R	1 F	7 R
Curlew		1 F		2		8 F		2 F
Dunlin								
Great Black-backed Gull								
Great Crested Grebe								
Greenshank		1 F				1 F		
Grey Heron	2 R	6 F		3	11 R	11 R		1 F
Herring Gull								
Lapwing								
Lesser Black-backed Gull								
Little Egret		1 F			5 R	3 R		1 F
Mallard	28 R	11 F			2 F	1 F		
Mediterranean Gull								
Mute Swan		2 R				1 F		
Oystercatcher		9 F		3	17 R	9 F	2 R	6 F
Red-breasted Merganser								
Redshank					1 F			
Sandwich Tern								
Shag	1 R			1	2 R			
Shelduck								
Snipe								
Teal								
Turnstone								
Whimbrel								
Other								
Common Sandpiper		2 R		1				
Ringed Plover				2				

Species	August 2024 - Breeding							
	1. Ringskiddy Port		2. Rocky Island		3. Monkstown Creek		4. Spike Island	
	HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW
Bar tailed Godwit								
Black Guillemot								
Black-headed Gull								
Black-tailed Godwit				8 F		4 F		
Brent Goose								
Common Gull								
Common Tern						6 F	1 F	
Cormorant	2 F	16 R	3 F	3 F	148 R	43 R	2 R	17 R
Curlew	1 R	1 F		6 F		7 F		5 F
Dunlin								
Great Black-backed Gull								
Great Crested Grebe								
Greenshank	4 R					7 F	1 F	
Grey Heron	1 R	6 F	1 R	5 F	2 R	5 R		3 F
Herring Gull								
Lapwing								
Lesser Black-backed Gull								
Little Egret	1 R			1 F	7 R			
Mallard	14 R	2 F			19 R	4 F		
Mediterranean Gull								
Mute Swan								
Oystercatcher	25 R	29 F		42 F	2 R	4 F	1 M	27 F
Red-breasted Merganser								
Redshank						51 F		
Sandwich Tern		1 M				2 F	3 F	
Shag	1 F	2 F		2 R		3 R	4 R	3 F
Shelduck								
Snipe								
Teal								
Turnstone								
Whimbrel							1 F	
Other								
Gannet			1 M					
Ringed Plover				33 F				

4. ANALYSIS OF RESULTS BY SPECIES

4.1 Cormorant

In October 2023 Cormorants were present at all counting sites, and a large number, 334, were recorded at Monkstown Creek. High numbers of cormorants were recorded in November, December and January, with 426 individuals recorded at Monkstown creek in January. By February 2024, Cormorants were still recorded at every site, with 407 present at Monkstown Creek.

By March 2024 Cormorant numbers began to drop, with only 1 individual and Rocky Island at high tide and none at low tide. 69 cormorants were recorded at Monkstown at high tide.

Numbers from May to August 2024 were low; they highest recording in May 2024 was 10 individuals counted at Ringaskiddy Port at high tide.

August saw an increase in cormorants recorded with a high of 148 at Monkstown Creek at high tide.

Cormorants utilised trees in Raffeen Golf Course and the trees to the east at Ballintaggart Cormorants were also observed to use the jetty and stonewall for roosting before dark.

4.2 Grey Heron

30 grey herons were recorded roosting at low tide at Monkstown in October 2023.

One month later, in November 2023, only 7 feeding grey herons were recorded.

However, in December 2023, a high of 21 roosting grey herons was recorded at Monkstown at high tide.

By January 2024, 17 individuals were found roosting at Monkstown Creek at Monkstown at low tide.

In February 2024, numbers of grey herons were recorded at 23 roosting individuals.

By March 2024, grey heron numbers dropped off to a high of only 23 roosting at Monkstown at low tide.

Numbers of grey herons throughout the breeding season (May-August) remained low, with only a few instances of recording above 10 at any site.

4.3 Shelduck

No recordings of shelduck were made during October 2023.

November 2023 featured a high of 15 shelduck feeding at Monkstown at low tide. None were recorded at Rocky Island and only one individual was recorded at Ringaskiddy Port at high tide.

In December 2023, 17 and 15 shelduck were counted at Monkstown Creek, at high and low tide respectively. Yet again, none were recorded at Rocky Island and only 3 individuals at Ringaskiddy and both high and low tide.

Numbers increased to a peak of 27 feeding shelduck at Monkstown at low tide. None were recorded at Rocky Island.

In February 2024, 12 shelduck were recorded feeding at both high and low tide at Monkstown Creek. No other shelduck were recorded at either Rocky Island or Ringaskiddy Port.

Numbers dropped to a high of only 5 individuals in March 2024 feeding at high tide at Monkstown Creek.

Shelduck numbers stayed consistent in May and June.

Shelduck recordings decreased to 0 in July and August 2024.

4.4 Lapwing

No lapwing recordings were made in October 2023. 5 individuals were counted roosting at Monkstown Creek at low tide in November.

No lapwings were recorded in December or January.

In February at Rocky Island, a peak of 12 lapwing were counted roosting at low tide.

No lapwing were recorded in March 2024.

No lapwing were recorded during the breeding season May-August.

4.5 Dunlin

In October 25 feeding dunlin recorded at Rocky Island low tide.

in November, numbers increased to 97 feeding at Monkstown low tide.

In December, recordings of Dunlin dropped to 56 feeding at Monkstown low tide.

By January, a decrease to 23 feeding at Monkstown low tide.

A further decrease to 0 recordings in February and March.

0 recordings were made in the breeding season May-August.

4.6 Black-tailed Godwit

October, a high of 41 roosting Black-tailed godwits were recorded at Monkstown Creek during high tide.

In November, 33 were counted feeding at low tide at Monkstown creek.

By December, total records had increased. 20 feeding at Ringaskiddy Port, low tide. 58 roosting at Monkstown Creek high tide, 38 feeding at Monkstown Creek low tide.

January, 35 feeding Ringaskiddy Port low tide.112 recorded feeding Monkstown low tide.

February, 127 feeding at Monkstown low tide.

In March, 27 were counted roosting at Monkstown Creek at high tide. A peak of 550+ feeding black-tailed godwits were recorded at Monkstown Creek low tide.

For the breeding season, May-August, black-tailed godwits were mostly absent.

4.7 Curlew

October, 31 feeding curlew at Monkstown Creek at low tide.

November, a high count of 21 feeding at Monkstown low tide was made.

By December, a there was a decrease to a high of 13 feeding Monkstown low tide.

In January, records were similar;13 feeding at Monkstown Creek, low tide.

In February, counts were quite consistent, with 16 feeding at Monkstown Creek, low tide.

By March, counts has decreased to a high of 8 feeding at Monkstown Creek low tide, almost completely absent elsewhere.

May – No sightings of curlew.

June, a modest increase to a high of 12 feeding at Monkstown Creek low tide.

July – high of 8 feeding at Monkstown Creek low tide.

Aug – a modest increase to 7 feeding at Monkstown low tide, 6 feeding at Rocky Island low tide and 5 feeding at Spike Island, low tide.

4.8 Redshank

In October, a high of 68 redshank were recorded feeding at Monkstown Creek at low tide.

November, high of 57 feeding at Monkstown Creek low tide. 17 recorded roosting at Ringaskiddy Port, high tide.

December, 64 redshank feeding at Monkstown Creek low tide. Mostly absent elsewhere.

January, 62 feeding at Monkstown Creek low tide.

February, counts remain consistent with 64 recorded feeding at Monkstown Creek low tide.

March, a decrease to 31 feeding at Monkstown creek low tide. Completely absent elsewhere.

May, a large decrease to 0 recordings.

June, 0 recordings

July, 1 curlew feeding at Monkstown creek high.

August, a large increase to 51 feeding at Monkstown low tide.

4.9 Oystercatcher

October, 19 oystercatchers feeding at Rocky Island low tide. 7 to 8 individuals at other locations.

November 29 feeding at Rocky Island low tide. 14 roosting at Monkstown Creek high tide. 12 feeding at Monkstown Creek low tide.

December, a decrease in numbers recorded. 7 feeding at Ringaskiddy low tide. 8 roosting at Monkstown Creek low tide.

January, 29 oystercatchers recorded feeding at Rocky Island low tide.

February, a decrease, low numbers recorded of 2-3 individuals.

March 5 feeding at Ringaskiddy Port, low tide. 6 feeding at Monkstown Creek low tide. Absent elsewhere.

May, a high count of 8 feeding at Monkstown Creek low tide.

June, 7 recorded feeding at Monkstown Creek low tide. 7 roosting at Spike Island high tide.

July, slight increase to 17 roosting at Monkstown Creek high tide. 2 to 9 individuals recorded at other sites.

August, increase to 25 roosting high tide, 29 feeding low tide at Ringaskiddy Port. 42 feeding at Rocky Island low tide. 27 feeding at Spike Island low tide.

4.10 Teal

October, 23 roosting at Monkstown Creek high tide. 53 roosting at Monkstown Creek low tide.

November, slight increase to 56 roosting Monkstown high tide. 78 roosting Monkstown low tide.

December, further slight increase to 91 roosting at Monkstown high tide. 63 feeding Monkstown low tide.

January, numbers almost consistent at 53 feeding at Monkstown high tide. 109 feeding at Monkstown low tide.

February, further slight increase to 98 roosting at Monkstown high tide. 144 feeding Monkstown low tide.

March, large decrease to 13 roosting at Monkstown high tide. 9 roosting at Monkstown low tide.

Further decrease to no recordings in May, June, July or August.

4.11 Mallard

October, a high of 28 mallard roosting at Ringskiddy Port, low tide. 17 roosting at Monkstown high tide.

November, increase to 46 roosting at Ringaskiddy Port low tide. 67 roosting at Monkstown Creek high tide.

December, slight increase to 91 roosting at Monkstown high tide. 63 feeding at Monkstown low tide. Absent elsewhere.

January, slight decrease to 87 roosting at Ringaskiddy Port low tide. Absent from Rocky Island. 29 feeding at Monkstown high tide.

February, decrease to 19 roosting at Ringaskiddy Port low tide. Absent from Rocky Island. 38 roosting at Monkstown Creek high tide.

March, further decrease to 19 roosting at Ringaskiddy Port high tide. 13 roosting at Ringaskiddy Port low tide. 0 recorded at Monkstown Creek at high tide, 6 feeding at Monkstown Creek low tide.

May 29 roosting at Ringaskiddy Port low tide. 11 roosting at Monkstown high tide.

June 9 roosting at Monkstown Creek high tide. Absent elsewhere.

July 28 roosting at Ringaskiddy Port high tide. 11 feeding at Ringaskiddy Port low tide. Mostly absent elsewhere.

August 14 roosting at Ringaskiddy Port high tide. 19 roosting at Monkstown Creek high tide.

4.12 Brent Goose

October, no recordings.

November, no recordings,

December increase to 19 brent goose recorded feeding at Ringaskiddy low tide. 9 feeding at Rocky Island low tide. 5 feeding at Monkstown Creek high tide.

Jan, decrease to 0 recordings.

February, increase to 34 feeding Ringaskiddy low tide. Absent elsewhere.

March, decrease to 2 roosting at Ringaskiddy Port. 2 feeding at Monkstown.

May to August, decrease to zero recordings.

Brent goose utilised the jetty and stonewall to roost during the day, Monkstown Creek woods for roosting at night.

4.13 Common Tern

October – March, zero recordings.

May, increase to 16 roosting at Ringaskiddy Port high tide. 19 roosting Ringaskiddy Port low tide. 12 feeding at Monkstown Creek low tide. 3-5 individuals recorded elsewhere.

June, recordings steady; 15 feeding at Ringaskiddy Port high tide. 13 feeding at Ringaskiddy Port low tide. 11 feeding at Monktown Creek low tide. 2-8 individuals elsewhere.

July, steady; 26 roosting at Ringaskiddy Port high tide. 21 roosting at Ringaskiddy Port low tide. 12 feeding at Rocky Island. 8 feeding at Monkstown Creek low tide.

August, decrease to just 6 feeding at Monkstown Creek low tide, absent elsewhere.

4. ANALYSIS OF RESULTS IN THE CONTEXT OF CORK HARBOUR AS A WHOLE

This section examines the relative importance of the study area and of specific count areas in the context of Cork Harbour as a whole. As a major wetland Cork Harbour covered by the Irish Wetland Bird Survey (I-WeBS), a joint survey scheme between BirdWatch Ireland (BWI) and the National Parks and Wildlife Service (NPWS), which aims to monitor wintering waterbirds in Ireland. The survey runs from September to March each winter, with over 800 wetland sites surveyed including estuaries, coastlines, bays, rivers, turloughs, lakes, streams and flooded fields. A request was therefore made to BWI to obtain the most recent 5-year peak mean waterbird counts obtained from Cork Harbour, **Appendix 1, table 4.**

Table 3 presents the combined peak counts of species recorded during the survey against the most recent 5-year peak mean for each species within Cork Harbour.

Table 3.

Species	IWeBS 5-year mean (2016-21) Cork Harbour	Max. Count for Study Area	Peak Count in Study Area as percentage of Cork Harbour 5-year mean
Bar tailed Godwit	297	4	1.35%
Black Guillemot	N/A	3	N/A
Black-headed Gull	3711	322	8.68%
Black-tailed Godwit	2782	550+	19.78% +
Brent Goose	62	34	54.84%
Common Gull	218	102	46.79%
Common Tern	3	26	866%
Cormorant	256	426	166.4%
Curlew	942	31	3.3%
Dunlin	2738	97	3.54%
Great Black-backed Gull	131	8	6.1%
Great Crested Grebe	129	1	0.78%
Greenshank	97	9	9.28%
Grey Heron	101	30	29.7
Herring Gull	171	53	30.99%
Lapwing	1114	12	1.08%
Lesser Black-backed Gull	164	18	10.98%
Little Egret	120	7	5.83%
Mallard	341	87	25.51%
Mediterranean Gull	130	2	1.54%
Mute Swan	48	7	14.58%
Oystercatcher	1136	42	3.7%
Red-breasted Merganser	58	3	5.17%

Redshank	1517	68	4.48%
Sandwich Tern	71	3	4.23%
Shag	8	8	100%
Shelduck	773	27	3.49%
Snipe	69	8	11.59%
Teal	1384	144	10.4%
Turnstone	95	11	11.58%
Whimbrel	4	1	25%
Other			
Gannet	0	1	N/A
Ringed Plover	38	33	86.84%
Common Sandpiper	2	2	100%
Great Northern Diver	9	1	11.11%
Wigeon	1342	1	0.075%

APPENDIX

Most Recent 5-year I-WeBS Data - Cork Harbour.

Table 4.

Species	1% national	1% international	2016 /2017	2017 /2018	2018 /2019	2019 /2020	2020 /2021	Mean	Peak Months
Unidentified duck						1*		0	Jan, Feb, Dec
Unidentified tern								0	Sep
Hybrid shelduck			1					0	Nov
Mute Swan	90	100	55	55	44	47	40	48	Dec
Whooper Swan	150	340			2			0	Oct
Pink-footed Goose					1	1		0	Mar
Canada Goose			7*	5	4	6		4	Nov
Barnacle Goose	160	810						0	Jan, Feb, Dec
Light-bellied Brent Goose	350	400	102*	35	16	151	4	62	Jan
Shelduck	100	2500	715*	953	924*	670	601	773	Feb
Wigeon	560	14000	1498	1848	1242*	1141	980	1342	Jan
Gadwall	20	1200	11*	13	12	9*	1*	9	Jan, Feb
Teal	360	5000	1142*	1340	1791	1316	1329	1384	Jan
Mallard	280	53000	338	305	386*	425*	253*	341	Sep
Pintail	20	600	36*	1	51*	20	26	27	Dec
Shoveler	20	650	23*	29	20	12	4*	18	Jan, Feb
Pochard	110	2000						0	Jan
Tufted Duck	270	8900	13*	14*	43*	36*	15	24	Feb, Mar
Scaup	25	3100						0	Oct, Nov
Long-tailed Duck			1			1		0	Jan
Eider	55	9800						0	Feb, Nov
Common Scoter	110	7500		1	2	4		1	Nov
Goldeneye	40	11400	1*	3	4	5		3	Feb

Red-breasted Merganser	25	860	68*	77	62	60	24	58	Dec
Red-throated Diver	20	3000			1	1		0	Jan, Nov
Black-throated Diver					1*			0	Mar
Great Northern Diver	20	50	2*	18	11	12		9	Jan
Little Grebe	20	4700	89	86	78*	116	6	75	Nov, Dec
Great Crested Grebe	30	6300	159	174	62	249		129	Jan
Slavonian Grebe					1	1*		0	Nov
Cormorant	110	1200	427*	300	189*	337	26	256	Sep, Nov
Shag			8	12	12	5	3	8	Dec
Little Egret	20	1100	147*	61*	120*	125*	145*	120	Sep
Grey Heron	25	5000	92*	115	99*	96*	102	101	Sep
Water Rail			3*	2*	2*	2	1	2	Feb
Moorhen			29*	13*	16*	22*	15*	19	Sep
Coot	190	15500	4*	3*	1*	4*		2	Mar, Sep
Oystercatcher	610	8200	1397	1074	1239*	956*	1014*	1136	Sep
Ringed Plover	120	540	43	31*	27*	28*	62*	38	Sep
Golden Plover	920	9300	144*	1450	2650*	27*	36*	861	Nov
Grey Plover	30	2000	7*	10	22	10	9	12	Jan
Lapwing	850	72300	919	1350	1384	1058	857	1114	Dec
Knot	160	5300	24	83	78*	67*	26	56	Feb
Little Stint			1*					0	Sep, Nov
Curlew Sandpiper			2*					0	Oct
Dunlin	460	13300	763	3166	3965	4248	1550	2738	Dec
Ruff								0	Nov
Snipe			62*	98	133	23	31	69	Dec
Black-tailed Godwit	200	1100	2146*	3074	2559*	3153*	2976*	2782	Sep
Bar-tailed Godwit	170	1500	172*	241	430*	490	154	297	Jan
Whimbrel			6*	1*	5*	5*	2	4	Sep
Curlew	350	7600	993	849*	1142*	1078*	650*	942	Sep
Spotted Redshank			2*	2	1	1*		1	Feb, Mar, Nov

Redshank	240	2400	1521*	1653	1493	1528*	1392	1517	Oct
Greenshank	20	3300	125*	87	103	100*	72*	97	Oct
Green Sandpiper			2	1*		1*		1	Sep, Dec
Common Sandpiper			2	2	2*	2*		2	Sep
Turnstone	95	1400	80	84	85	124*	100	95	Nov
Kingfisher			1*	2*	1*	2*	1*	1	Sep
Black-headed Gull			3586*	3011*	3955*	3649*	4356*	3711	Sep
Common Gull			283	203	252*	243	111	218	Nov
Lesser Black-backed Gull			106*	217*	220	122	153*	164	Sep, Nov
Herring Gull			152*	149	127*	176*	249*	171	Sep
Great Black-backed Gull			154*	92*	179*	134*	94*	131	Sep
Mediterranean Gull			114*	91	152	56*	237*	130	Sep
Sandwich Tern			3*	40*	199*	110*	5*	71	Sep
Common Tern					15*			3	Sep
Arctic Tern								0	Apr
Ruddy Shelduck			1					0	Jan
American Wigeon								0	Dec
Green-winged Teal								0	Mar
Surf Scoter								0	Nov
Black-necked Grebe							1	0	Feb, Dec
Wilson's Phalarope								0	Sep
Kittiwake			1*					0	Sep
Little Gull								0	Oct
Ring-billed Gull			3*		2	1*		1	Mar
Glaucous Gull			1*					0	Mar
Yellow-legged Gull				1*	1*	3*	1*	1	Sep
Glossy Ibis								0	Feb
Cattle Egret			9*		4	2*		3	Mar, Oct, Dec
Great White Pelican					2*		2*	1	Oct

Figure 1: Count Areas Used in the Study

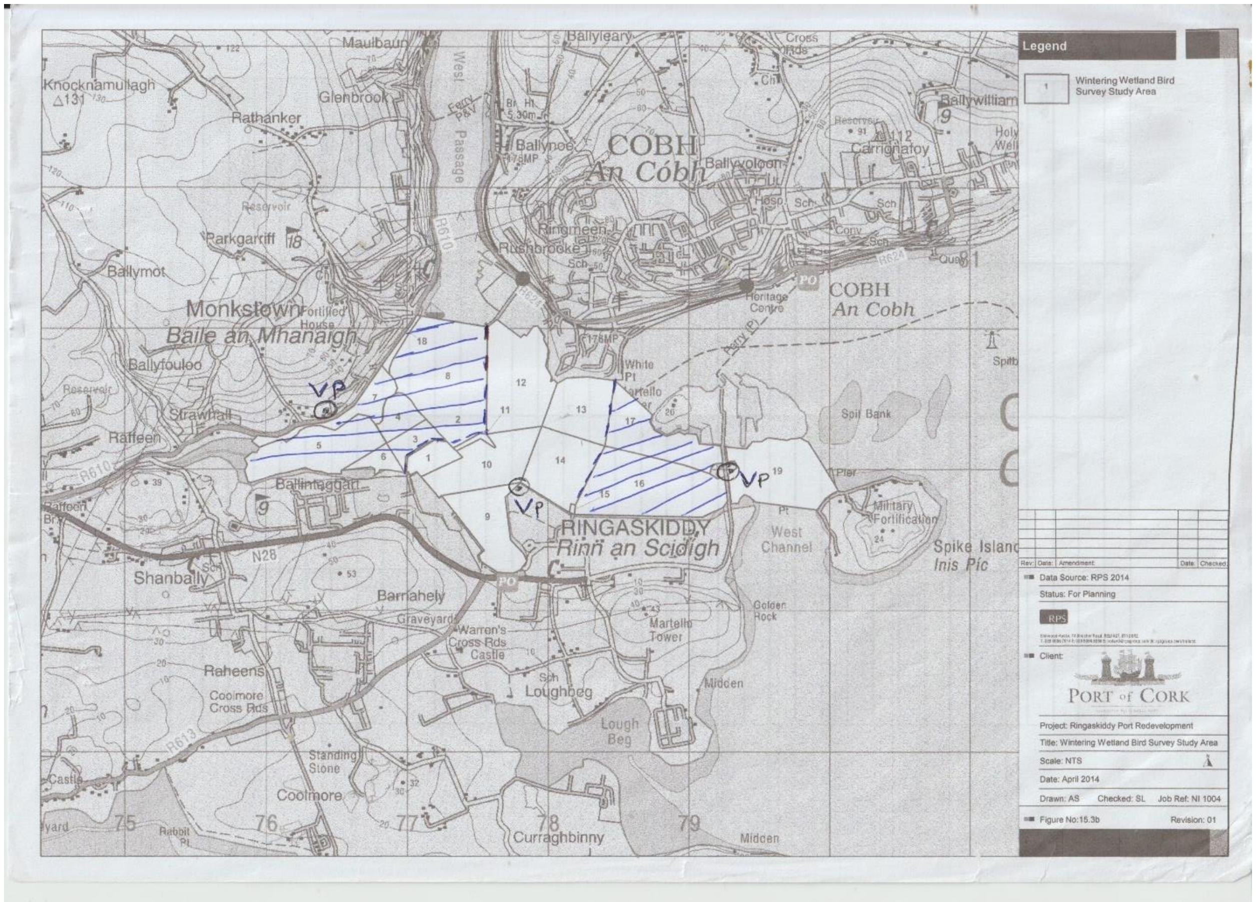


Figure 1: Viewing points marked on a map of west Cork Harbour. From left to right: Monktown, Ringaskiddy and Rocky Island.

Note, Rocky Island vantage point was used to survey an additional count area facing east towards Spike Island from May-August. (Count Area 4).

Figure 2: Stone Breakwater and ADM Jetty

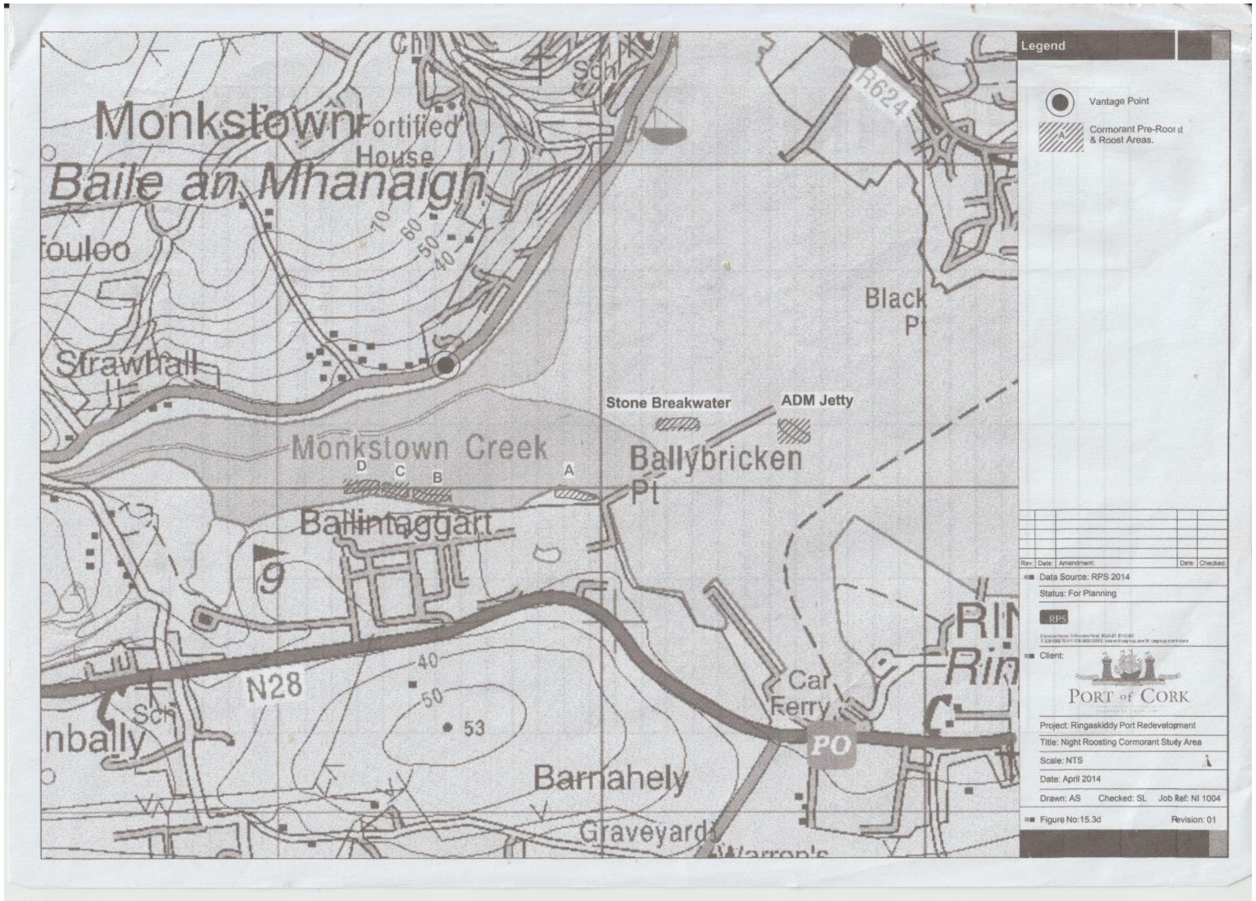


Figure 2: The stone breakwater and ADM jetty indicated just east of Monkstown Creek.

APPENDIX 9.7 BAT SURVEY REPORT

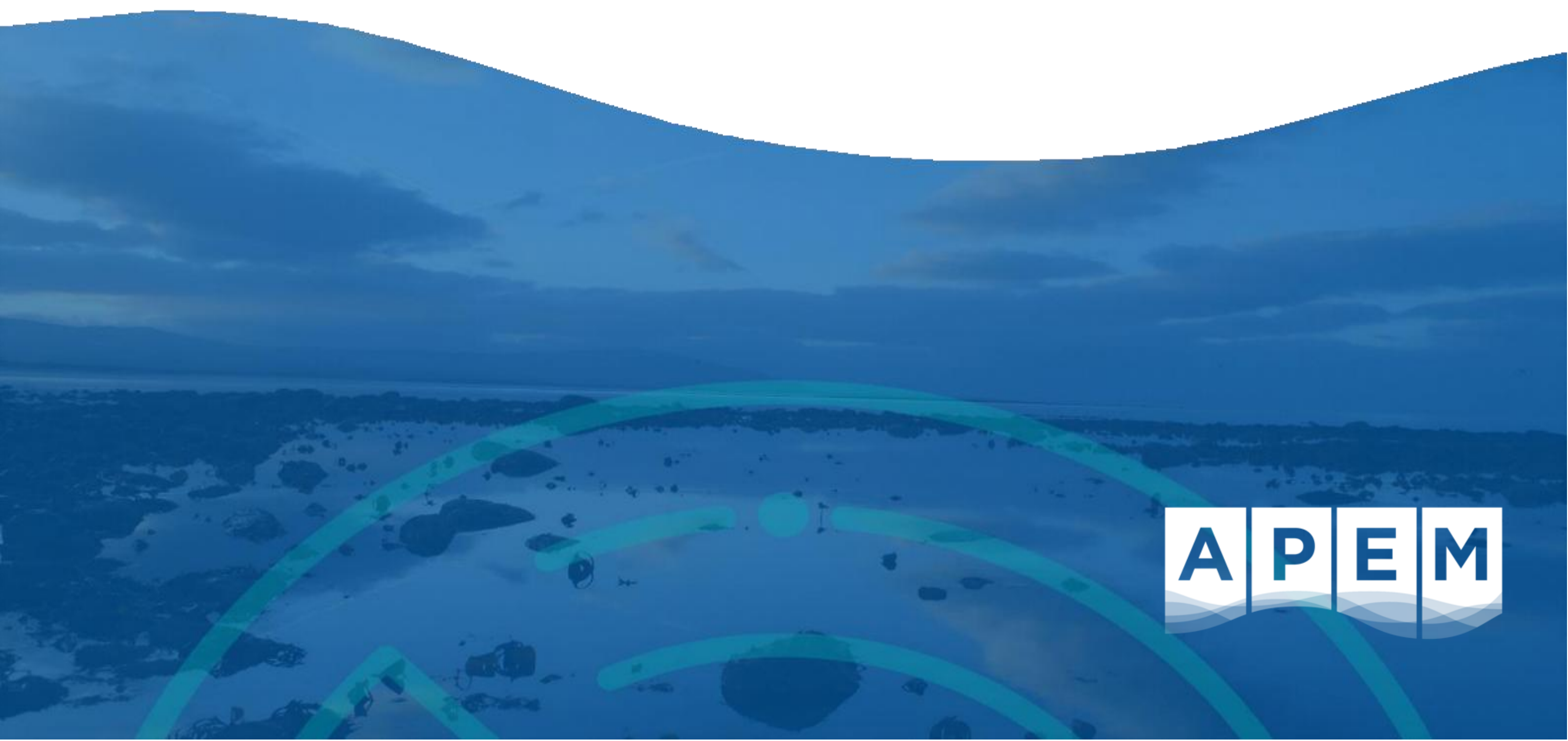
AYESA

Ringaskiddy Port Development

Bat Survey Report

P00015494

November 2024



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1. Introduction

1.1. Background

APEM Ireland were commissioned by AYESA to provide support for an updated bat survey and report for the Ringaskiddy Port Development in Ringaskiddy, Co. Cork. Section 1.2 outlines the importance of conducting bat surveys to assess bat activity and risk, prior to any proposed upgrades to a development.

1.2. Bat Survey Requirements

1.2.1. Legislative Protection

Bats are protected by law in the Republic of Ireland under the Wildlife Act 1976 and subsequent amendments (2000, 2010, 2012 and 2023). For the purpose of this report, the Wildlife Act 1976 and subsequent amendments will be referenced as "Wildlife Acts". Under the Wildlife Acts, it is an offence to intentionally disturb, injure or kill a bat or disturb its resting place.

NPWS (2021a and 2021b) guidelines outline the further legal protection afforded to species listed on Annex IV of the of the Habitats Directive (92/43/EEC), as required by Articles 12, 13 and 16. The Habitats Directive is transposed into Irish law by the European Communities (Birds and Natural Habitats) Regulations, 2011-2021 (Habitats Regulations) and this legislates for requirements in relation to Strict Protection of animals listed on Annex IV of the Habitats Directive, which are set out in Regulation 51, with Regulation 54 pertaining to derogation licences, including Regulation 54 A when the Minister is applying for a derogation. Refer to Appendix A for additional text on the Habitats Directive.

All species of bat are listed on Annex IV of the EU Habitats Directive (1992). The system of Strict Protection is applied across the entire natural range of Annex IV species, even outside of protected sites. As set out in Regulation 51, carrying out of any work with the potential to capture or kill any specimen of a Strictly Protected species, or to disturb these species, and for which a derogation licence has not been granted, may constitute an offence under Regulation 51 of the Habitats Regulations. Furthermore, any action resulting in damage to, or destruction of a breeding or resting place of an animal may constitute an offence unless a derogation licence has been granted. This action does not need to be deliberate, and this places onus on demonstrating due diligence. Breeding and resting places are protected even when the animals are not using them, once there is a high probability that they will return. Planning authorities may refuse planning permission solely on grounds of the predicted impact on protected species like bats.

The lesser horseshoe bat (Rhinolophus hipposideros), which occurs only in Counties Cork, Kerry, Limerick, Clare, Mayo and Galway in the Republic of Ireland (NPWS, 2019), is listed on Annex II of the EU Habitats Directive 1992. The level of protection offered to the lesser horseshoe bat effectively means that areas important for this species are designated as Special Areas of Conservation (SACs). Among Ireland's obligations under the Habitats Directive, is a requirement to "maintain favourable conservation status" of this Annex II-listed species.

Ireland has also ratified the Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention 1979, enacted 1983). This convention was instigated to protect migrant species across all European boundaries, which covers all European bat species including the nine main species found in Ireland: Daubenton's bat, whiskered bat, Natterer's bat, Leisler's bat, lesser horseshoe bat, brown long-eared bat, common pipistrelle, soprano pipistrelle, and Nathusius' pipistrelle bat.

1.2.2. Policy

The 4th National Biodiversity Action Plan 2023-2030

This plan confers general responsibilities on all participants in the development process to take account of protected species. *"The overall objective is to secure the conservation, and where possible the enhancement, and sustainable use of biological diversity in Ireland and to contribute to conservation and sustainable use of biodiversity globally".*

1.3. Site Location

The proposed development site ("the Site") is located at the Port of Cork, Ringaskiddy, Co. Cork. The Site is centred at approximate Irish Transverse Mercator (ITM) coordinates 706992, 735455 and is ca.0.4ha.

1.4. Site Description

The Site is accessed from the N28, Ringaskiddy Co. Cork, located to the South of the Site. The Site is currently in use as the Port of Cork functioning as an international gateway for trade. The closest waterbody is Cork Harbour surrounding the northern boundary of the Site.

1.5. Proposed Work

The proposed works are identified in the planning application under the previously permitted Strategic Infrastructure Development application (ref: PA0035, as modified by PM0010, 304437-19 and 310847-21).

The remaining redevelopment at Ringaskiddy involves several key construction elements across multiple sites and are summarised below (Refer to Appendix B for the accompanying planning drawing).

Ringaskiddy East (Container and Multi-purpose Berth (CB/MPB)):

- A Container Berth of approximately 200m in length Cork Container Terminal (CCT) 2
- Dredging of the seabed to a level of -13.0 m Chart Datum (CD)
- Installation of link-span comprising a floating pontoon and access bridge
- Installation of container handling cranes
- Lighting and fencing

Ringaskiddy West (Deepwater Berth Extension):

- A new 182m extension to the existing Deepwater Berth (DWB) which will comprise a filled quay structure (of approximately 231m) extending no further seaward than the edge of the existing DWB
    - Dredging works to varying levels to facilitate navigational access to the new facilities
    - Lighting
- Road Improvements:

- Improvements to internal road network at Ringaskiddy East to facilitate future access to the N28:
- Lighting and fencing

The redevelopment also features Load on Load off (LoLo), Roll on and Roll off (RoRo), and general cargo operations, with specific quay structures, surfacing, and reclamation works. Key services such as drainage, lighting, and security systems will be installed to ensure the safe and efficient operation of the terminal.

2. Survey Methodology

Bat surveys were conducted by APEM Ireland at the Port of Cork in August 2024 during the active bat season. Based on standard guidance and from previous field surveys carried out at the Site, the survey approach included an emergence survey and transect activity survey, a potential roost feature survey and the deployment of a static detector.

2.1. Desk Study

A desk-based review of habitat availability in the environs of the proposed development, and the available bat data was used to inform the scope of the bat surveys required. Collins, (2023) recommends a minimum of a 2 km radius background data search for small-scale projects, including any temporary works. For this desk study, a pre-cautionary 10 km radius was taken to cover core sustenance zones of different bat species, and any potential zone of influences exceeding the 2 km range. The desk-based study included:

- Reviewing distances from closest Natura 2000 sites designated for bats (the only bat SACs in Ireland are for lesser horseshoe bat *Rhinolophus hipposideros*).
- Examining aerial imagery and 6-inch maps to identify potential bat foraging and roosting habitats, including old buildings and caves.
- Reviewing Lundy *et al*. (2011), as display on Biodiversity Maps[3], which provides a high-level assessment of potential habitat suitability for Irish bat species.
- Review of Biodiversity Maps reports for the 10-km squares covering the Site [W76 and W86], including species recorded and known roosting sites (https://maps.biodiversityireland.ie/Map).

2.2. Field Surveys

2.2.1. Potential Roost Features

An external daylight potential roost features (PRF) survey and endoscope inspection (under license) where applicable were undertaken on the 08 August 2024 to establish potential roost sites and to look for signs of roost activity such as bat presence, bat droppings and staining.

Surveyors utilised the assessment criteria described in Collins (2023), which provides guidelines for assessing potential suitability of habitat features as bat roosts and for foraging bats. Table 1 sets out the criteria surveyors followed to assign Potential Roost Features (PRFs), as none, negligible, low, moderate or high status in terms of potential for roosting bats.

The 2023 guidelines acknowledge the difficulty of applying the categorisation detailed in Table 1 for assessing the suitability of features in trees when surveyed from the ground. Therefore, Collins (2023) recommend categorising trees as per detailed in Table 2.

Table 1: Guidelines for assessing the potential suitability of proposed development sites for bats

Source: Collins (2023).

Suitability	Description roosting habitats	Commuting and foraging habitats
None	No habitat features on site likely to be used by any roosting bats at any time of the year (i.e., a complete absence of crevices/suitable shelter at all ground and underground levels).	No habitat features on site likely to be used by any commuting or foraging bats at any time of the year (i.e., no habitats that provide continuous lines of shade/protection for flight-lines or generate/shelter insect populations available to foraging bats).
Negligible [a]	No obvious habitat features on site likely to be used by roosting bats; however, a small element of uncertainty remains as bats can use small and apparently unsuitable features on occasion.	No obvious habitat features on site likely to be used as flightpaths or by foraging bats; however a small element of uncertainty remains in order to account for non-standard bat behaviour.
Low	A structure with one or more potential roost sites that could be used by individual bats opportunistically at any time of the year. However, these potential roost sites do not provide enough space, shelter, protection, appropriate conditions[b] and/or suitable surrounding habitat to be used on a regular basis or by larger numbers of bats (i.e. unlikely to be suitable for maternity and not a classic cool/stable hibernation site but could be used by individual hibernating bats[c]).	Habitat that could be used by small numbers of commuting bats such as a hedgerow or unvegetated stream, but isolated, i.e. not very well connected to the surrounding landscape by other habitat. Suitable, but isolated habitat that could be used by small numbers of foraging bats such as a lone tree (not in a parkland situation) or a patch of scrub.
Moderate	A structure or tree with one or more potential roost sites that could be used by bats due to their size, shelter, protection, conditions[b], and/or surrounding habitat but unlikely to support a roost of high conservation status (with respect to roost type only, such as maternity and hibernation – the categorisation described in this table is made irrespective of species conservation status, which is established after presence is confirmed).	Continuous habitat connected to the wider landscape that could be used by bats for commuting such as lines of trees and scrub or linked back gardens. Habitat that is connected to the wider landscape that could be used by bats for foraging such as trees, scrub, grassland, or water.
High	A structure or tree with one or more potential roost sites that are obviously suitable for use by larger numbers of bats on a more regular basis and potentially for longer periods of time due to their size, shelter, protection, conditions, and surrounding habitat. These structures have the potential to support high conservation status roosts e.g. maternity or classic cool/stable hibernation site.	Continuous, high-quality habitat that is well connected to the wider landscape that is likely to be used regularly by commuting bats such as river valleys, streams, hedgerows, lines of trees and woodland edge. High-quality habitat that is well connected to the wider landscape that is likely to be used regularly by foraging bats such as broadleaved woodland, treelined watercourses and grazed parkland. Site is close to and connected to known roosts.

[a] Negligible is defined as so small or unimportant as to be not worth considering, insignificant. This category may be used where there are places that a bat could roost or forage (due to one attribute), but it is unlikely that they actually would (due to another attribute).

[b] For example, in terms of temperature, humidity, height above ground level, lights levels or levels of disturbance.

[c] Evidence from the Netherlands shows mass swarming events of common pipistrelle bats in autumn followed by mass hibernation in a diverse range of building types in urban environments (Korsten *et al.*, 2016 and Jansen *et al.*, 2022). Common pipistrelle swarming has been observed in the UK (Bell, 2022 and Tomlinson, 2020) and winter hibernation of numbers of this species has been detected at Seaton Hall in Northumberland (National Trust, 2018). This phenomenon requires some research in the UK, but ecologists should be aware of the potential for larger numbers of this species to be present during the autumn and winter in prominent buildings in the landscape, urban or otherwise.

Table 2: Guidelines for assessing the suitability of trees on proposed development sites for bats

Source: Collins (2023).

Suitability	Description
NONE	Either no PRF's in the tree or highly unlikely to be any.
FAR	Further assessment required to establish if PRF's are present in the tree.
PRF	A tree with at least one PRF present.

Table 2 gives guidance on how to give classification to the first assessment or very early assessments of trees during a winter survey. The classification "none" can be given to trees with no PRFs present. "FAR" refers to trees which will need further assessment (e.g. aerial, or others as deemed appropriate). These will also help with the organisation of future surveys. A "PRF" refers to a tree which has at least one potential roosting feature suitable for bats.

Based on the features present and the location of the trees or other structures, the potential use of the feature can also be considered, and classified (as in Hundt, 2012):

- Maternity (breeding roost);
- Summer/transitional (to include transitional, occasional, satellite, night and day roosts); and,
- Hibernation roost.

Surveyors initially employed non-invasive external and internal inspection techniques for any building encountered, and trees were assessed from the ground.

2.2.2. Emergence Survey

An emergence survey was conducted to characterise potential bat roosts including species, population numbers and entry and exit points. This survey was used to confirm the presence or likely absence of roosting bats at this building within the development.

On 08 August 2024, one emergence survey was conducted at the Ringaskiddy Ferry Terminal (51.832355, -8.322169) which surveyed for bats with full spectrum bat detectors. The emergence survey location is shown in Figure 1.

2.2.1. Transect Activity Survey

An activity survey, comprising a driven transect was conducted to provide valuable information on the usage of bats within the Site and to identify key features or areas within the Site that may be used as foraging / commuting corridors, or to locate potential roost sites if present.

On 08 August 2024, one driven transect was conducted which followed a set transect route and surveyed for bats with full spectrum bat detectors. The transect route and results are shown in Figure 2.

2.2.2. Static Detector Surveys

One static bat detector was deployed to record the types of bat species present and to provide an overview of how bat activity is broadly distributed over the site.

On 08 August 2024, one Wildlife Acoustics Song meter 4 (SM4) static detector was deployed for 12 days within the Site. The location of this static detector is shown in Figure 3.

3. Survey Results

3.1. Desk Study

A review of aerial photography and mapping of the Site found that there is limited potential for roosting and hibernating bats within a 10 km radius. High quality foraging and commuting habitat is recorded within the Site such as hedgerows, treelines, open grassland and waterbodies.

A total of 5 species of bats have been recorded within 10 km grid squares as described in Table 3.

Table 3: NBDC Bat Records from last 10 years (grid squares W76 and W86*).

Species	10 km Grid Square	Total Number Recorded	Date of Most Recent Record
Common pipistrelle *Pipistrellus pipistrellus*	W76	14	28/08/2018
Soprano pipistrelle *Pipistrellus pygmaeus*	W76	33	28/08/2018
Leisler's bat *Nyctalus leisleri*	W76	33	15/067/2023
Brown long-eared bat *Plecotus auritus*	W76	40	31/08/2023
Daubenton's bat *Myotis daubentonii*	W76	18	30/08/2021

*All bat species records within the W86 grid square were older than 10 years.

A search of SACs, NHAs and pNHAs within a 10 km radius of the Site found no sites designated for the conservation of any bat species.

The landscape suitability index, as generated by Lundy *et al* (2011) for bat species at the Site, is detailed in Table 4. The highest index ratings are for soprano pipistrelles and Leisler's bats. Nathusius' pipistrelle and Lesser horseshoe bat have the lowest rating. The overall rating for all bats was 29.33 (high) out of a maximum 100.

Table 4: Landscape Suitability Index at Site

Species	Suitability Index
All Bats	**29.33**
Soprano pipistrelle *Pipistrellus pygmaeus*	49
Leisler's bat *Nyctalus leisleri*	43
Common pipistrelle *Pipistrellus pipistrellus*	43
Brown long-eared bat *Plecotus auritus*	41
Natterer's bat *Myotis nattereri*	33

Species	Suitability Index
Whiskered bat *Myotis mystacinus*	26
Daubenton's bat *Myotis daubentonii*	23
Nathusius' pipistrelle *Pipistrellus nathusii*	6
Lesser horseshoe *Rhinolophus hipposideros*	0

3.1. Habitat and Roost Availability Assessment

The port itself is a built-up area, with small areas of green within the port. Within these green areas, it is mainly immature trees which are not suitable for roosting bats. However, south of the port there are some agricultural fields, treelines and small mixed broadleaf woodland. This particular mixed broadleaf woodland is outside the red-line boundary. The buildings present on site are of industrialised warehouses and portacabins. There were no PRFs located within these buildings. The use of strong lit floodlights at night makes for unfavourable conditions and would deter any light-sensitive bats away from these areas. There were no suitable features identified within the red-line boundary. The only tree with suitable PRF's was identified outside the redline boundary

3.2. Emergence Survey

An emergence survey was conducted on the 08 August 2024 at the ferry terminal. This terminal was originally classed as having "low" potential for roosting bats but changed to "negligible" once it was observed that the floodlights lit up the entire Site.

The survey started at 20:55 and ended at 22:40. Once the survey has started, the floodlights lit up the entire Site causing considerable light spill into the area. Weather conditions were favourable for bat species. There were three records of Leisler's bat passes recorded during the survey. One Leisler's bat was recorded foraging. There was one record of a Leisler's bat commuting west at approximately 30 m high. Another record was of a Leisler's bat commuting easterly at approximately 30 m in height. There were no records of bats relating to the features being targeted for the emergence survey. There were no emergences observed.

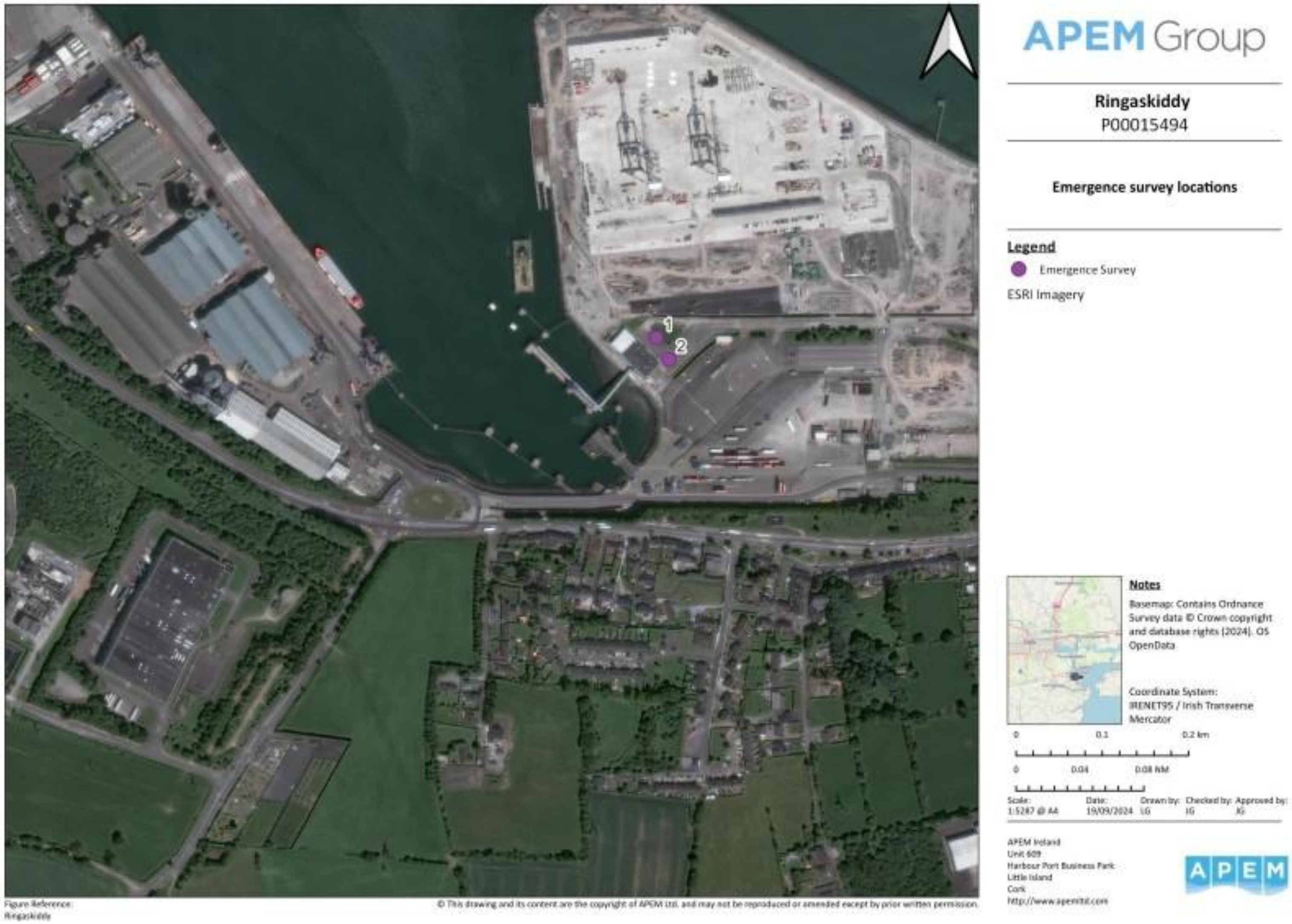

Figure 1: Emergence survey locations for the 08 August 2024

3.3. Transect activity survey

A transect activity survey was conducted after the emergence survey on the 08 August 2024. There were Leisler's bats, common pipistrelles and soprano pipistrelles recorded during the survey. Common pipistrelles were the more common species recorded, with 32 bat passes. Leisler's bat passes were identified 16 times, while there were only four bat passes from soprano pipistrelles. The locations of these passes are shown in Figure 2. No other species were recorded on site.

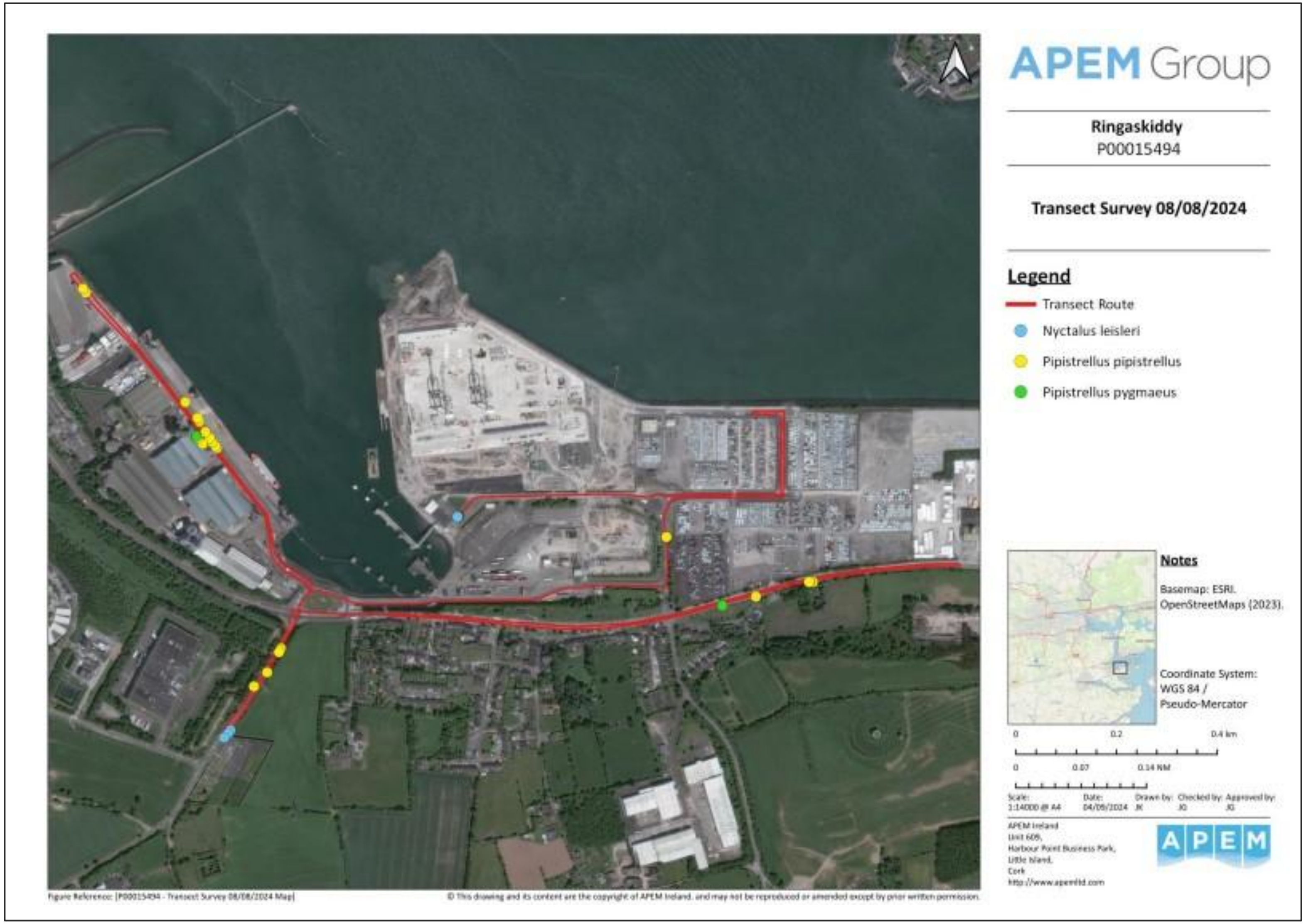

Figure 2. Transect Route and Results

3.4. Static Detector Surveys

A song meter SM4BAT-FS bat detector was deployed on the 08 August 2024 for 12 nights. Refer to Figure 3 for the static locations.

Weather data for the deployment period has been extracted from Roches Point public weather station (met.ie, 2024) and is shown graphically in Figure 4. Collins (2023) recommends surveys to be carried out during optimum weather conditions. Weather conditions should be checked regularly, including temperature, rainfall and windspeed.

Leisler's bats, soprano pipistrelles and common pipistrelles were recorded. There was a total of 2,122 bat passes identified during the 12-night deployment. Soprano pipistrelles had the majority of passes accounting for 1,141 of the bat passes recorded. Leisler's bats accounted for 756 of these passes, while common pipistrelles had 223 passes recorded by this detector. There were also two *Pipistrellus* passes recorded.

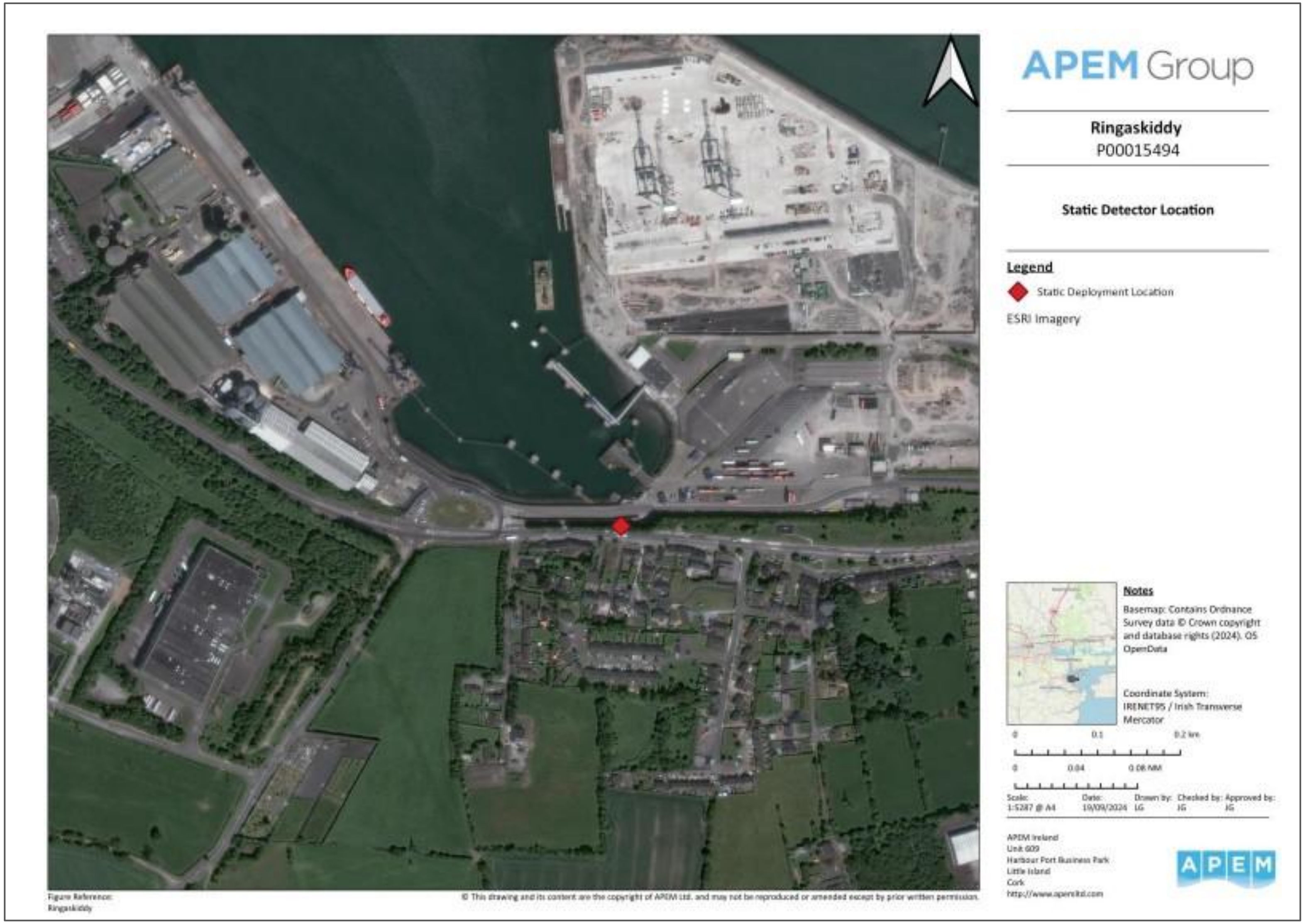

Figure 3: Static detector location

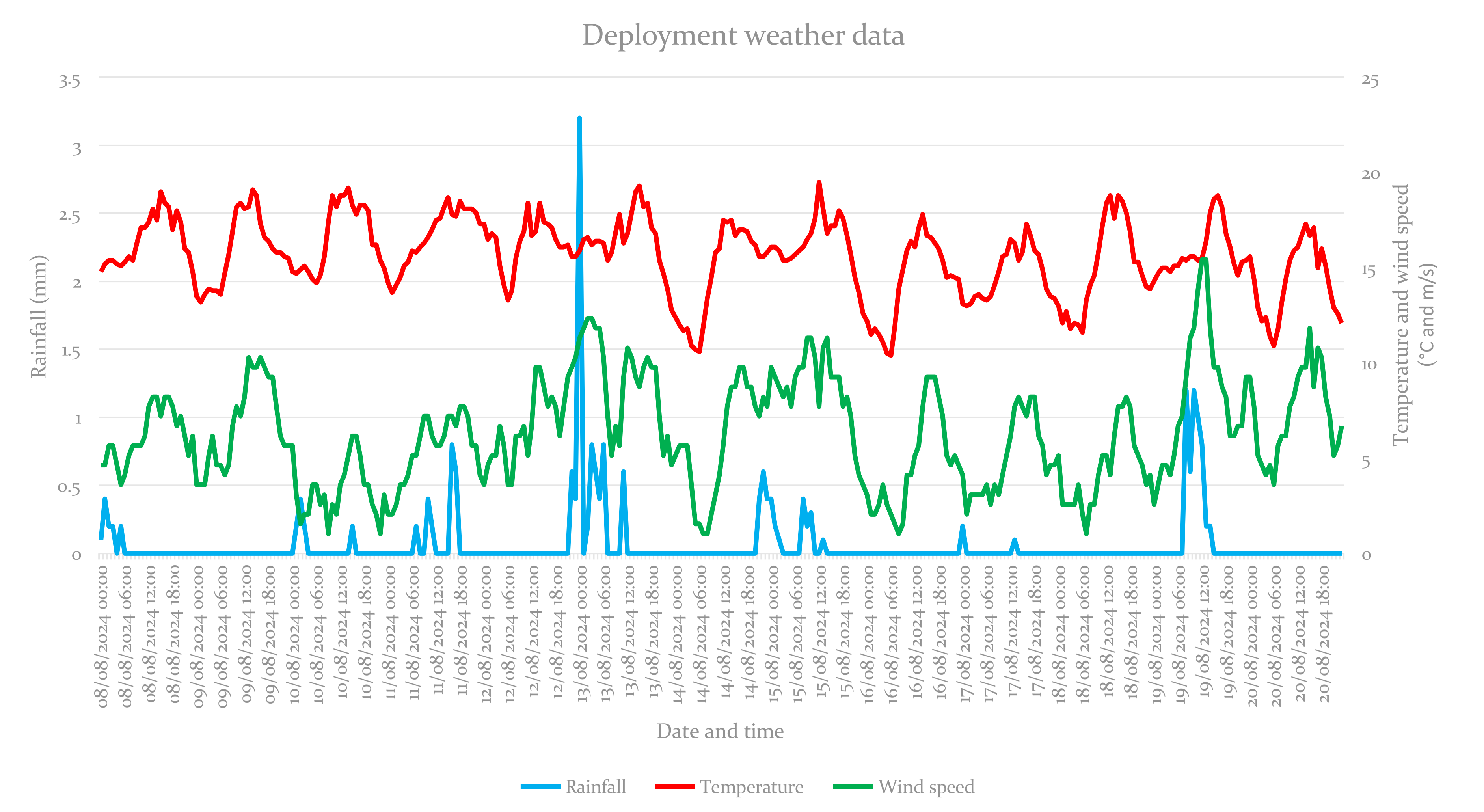

Figure 4: Rainfall (mm), temperature (°C) and wind speed (m/s) during the deployment period*

*Temperature (°C) and windspeed (m/s) are on the same axis

4. Discussion

4.1. Leisler's bats

Leisler's bats were recorded during the emergence survey, transect activity survey and static detector survey. Leisler's bats like to forage over open grassland, drainage canals, lakes, conifer forests, lit-up areas, estuaries, streams, beaches and dunes. Surveyors noted strong floodlights lit up the Site after dusk, which could explain the attraction from Leisler's bats to this area. This species is very adaptable to change and can be found in any habitat although it has a preference of pastures and freshwater areas. Leisler's bats can be found in urban areas and sometimes forages on insects attracted to streetlights (Roche, A. and Torsney, A. 2021). ILP, (2023) states that Leisler's bats can congregate around white light sources with the bats subsequently feeding on the insects attracted to the light. This species should not be affected by the proposed development. There were no roosts identified during the surveys. There was very little potential for roosts to be available within the Site.

Furthermore, Leisler's bats are capable of fission and fusion behaviour. The fission and fusion behaviour refers to when bats switch between roosting sites on a regular occurrence. This behaviour means usually bats will only spend a few days, sometimes only a single night in a tree roost (Kaňuch *et al.* 2022). However, the trees close to the development were ruled out as having any features.

Leisler's bats are known to have earlier emergences (Shiel and Fairly, 2006) than most other species. There were four records on the 10 August 2024 of Leisler's bats recorded between 15 and 17 minutes before sunset at 21:05 and three records being nine minutes, 11 minutes and 19 minutes on the 14, 12 and 08 August respectively. The remaining records were all recorded at least 30 minutes after sunset. While the data suggests a roost within close proximity to the detector, due to the unsuitability of the buildings and trees on Site and no roost having been identified, it is unlikely that the proposed development will have a significant impact on the Leisler population within the area.

4.2. Common and soprano pipistrelles

Common pipistrelles were the most common recorded species during the transect activity survey, however, they were the least recorded species during the static deployment. Soprano pipistrelles were the least recorded species during the transect activity survey, and the most recorded species during the static deployment. Neither of these species were not recorded during the emergence survey.

Common pipistrelles are a flexible species that can be found in any habitat type, even urban areas. They mainly occur around linear features such as hedgerows, woodland edges or riparian habitats at heights of 2 – 10 m (Roche, A. and Torsney, A. 2021). Soprano pipistrelles are a similar species which are very adaptable. This species is also associated with linear features flying between 2 – 10m in height close to shrubs and trees (Roche, A. and Torsney, A. 2021). Both of these species are adaptable to change, and given the low activity within the Site, should not be affected by the proposed development. ILP (2023) states that "…*Even bat species that have been shown to opportunistically forage in lit conditions are also impacted by ALAN when commuting through the landscape. In our cities, for example, common pipistrelles, the UK's most numerous species, have been recorded avoiding gaps that are well lit, thereby creating a barrier effect*…" The well-lit floodlights on Site may attribute to the low activity as even the more light-tolerant species are still known to try avoiding these more lit-up areas.

4.3. Other species

The three species of bats which are tolerant to streetlights are the three species which were recorded during the static deployment. The more light-sensitive species who avoid lights when commuting through urban areas (ILP, 2023), the brown long-eared bat and *Myotis* species, are not recorded on the detector of this well-lit area. There were no other species recorded during any of the surveys carried out. These species include brown long-eared bats, and *Myotis* sp.. These species are sensitive to lit-up areas which may explain their absence within this area. Brown long-eared bats are found in sheltered habitats, such as wooded river valleys and dense woodland edges. They also forage close to roost sites, typically within 2 km, in woodlands, particularly deciduous woods. This species is found less frequent in urban areas and avoids street lighting (Roche, A. and Torsney, A. 2021). *Myotis* sp. include Daubenton's bats, natterer's bats and whiskered bats. The Daubenton's bat is found foraging over open waters. This species prefers still, slow flowing waters and avoids streetlights (Roche, A. and Torsney, A. 2021). Natterer's bats are found in semi-natural broadleaf woodlands but can also be found in open pastures. Whiskered bats can be found in riparian mixed woodlands and small areas of pasture, urban and scrub land cover (Roche, A. and Torsney, A. 2021).

5. Conclusion

There were no roosts found during the roost survey and little activity for foraging and commuting common pipistrelle, soprano pipistrelle and Leisler's bat observed during the emergence and transects surveys. Therefore, based on the data collected in 2024 and that collected as part of the EIAR for planning application PA0035, as modified by PM0010, 304437-19 and 310847-21, there will be ***no likely significant effect*** from direct or indirect impacts from the proposed development on bats.

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Appendix A: Relevant Legislation

European Nature Directives (Habitats and Birds)

The Habitats Directive (Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora) forms the basis for the designation of Special Areas of Conservation. Similarly, Special Protection Areas are classified under the Birds Directive (Council Directive 2009/147/EEC on the Conservation of Wild Birds). Collectively, Special Areas of Conservation (SAC) and Special Protection Areas (SPA) are referred to as the Natura 2000 network. In general terms, they are considered to be of exceptional importance for rare, endangered or vulnerable habitats and species within the European Community.

Under Article 6(3) of the Habitats Directive an appropriate assessment must be undertaken for any plan or project that is likely to have a significant effect on the conservation objectives of a Natura 2000 site. An appropriate assessment is an evaluation of the potential impacts of a plan or project on the conservation objectives of a Natura 2000 site[2], and the development, where necessary, of mitigation or avoidance measures to preclude negative effects.

Article 6, paragraph 3 of the EC Habitats Directive 92/43/EEC ("the Habitats Directive") states that:

"*Any plan or project not directly connected with or necessary to the management of the site but likely to have a significant effect thereon, either individually or in combination with other plans or projects, shall be subject to appropriate assessment of its implications for the site in view of the site's conservation objectives. In the light of the conclusions of the assessment of the implications for the site and subject to the provisions of paragraph 4, the competent national authorities shall agree to the plan or project only after having ascertained that it will not adversely affect the integrity of the site concerned and, if appropriate, after having obtained the opinion of the general public"*

The Habitats Directive is transposed into Irish law by the EC (Birds and Natural Habitats) Regulations 2011 – 2015. Part XAB of the Planning and Development Acts 2000 to 2020 transposes Article 6(3) and 6(4) of the Habitats Directive in respect of land use plans and proposed projects requiring development consent.

European Commission (Birds and Natural Habitats) Regulations 2011 to 2021 – Part 5

Part 5 of the European Commission (Birds and Natural Habitats) Regulations 2011 – 2021 sets out the circumstances under which an 'appropriate assessment' is required. Section 42(1) requires that '*a screening for Appropriate Assessment of a plan or project for which an application for consent is received, or which a public authority wishes to undertake or adopt, and which is not directly connected with or necessary to the management of the site as a European Site, shall be carried out by the public authority to assess, in view of best scientific knowledge and in view of the conservation objectives of the site, if that plan or project, individually or in combination with other plans or projects is likely to have a significant effect on the European site.*'

[2] Also referred to as European Sites in the Planning and Development Acts 2000 – 2020.

Section 42(2) expands on this, stipulating that a public authority must carry out a screening for Appropriate Assessment before consent for a plan or project is given, or a decision to undertake or adopt a plan or project is taken. To assist a public authority to discharge its duty in this respect, Section 42(3)(a) gives them the authority to direct a third party to provide a Natura Impact Statement and Section 42(3)(b) allows them to request any additional information that is considered necessary for the purposes of undertaking a screening assessment.

Section 42(6) requires that 'the public authority shall determine that an Appropriate Assessment of a plan or project is required where the plan or project is not directly connected with or necessary to the management of the site as a European Site and if it cannot be excluded, on the basis of objective scientific information following screening under this Regulation, that the plan or project, individually or in combination with other plans or projects, will have a significant effect on a European site'.

Appendix B: Planning Drawing

APPENDIX 9.8 BEAM TRAWL SURVEY

AYESA (Port of Cork)

Beam Trawl Survey

Ringaskiddy, Cork Harbour

AQUAFACT Ref: P15494

November 2024

COMMERCIAL IN CONFIDENCE

AQUAFACT

APEM Group

Client: AYESA (Port of Cork)

Reference no: **P15494**

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Report Approval Sheet

Client	**Ayesa (Port of Cork)**
Report Title	**Beam Trawl Survey – Ringaskiddy**
Job Number	**P15494**
Report Status	**Final**
Issue Date	**11/11/2024**

Rev	Status	Issue Date	Document File Name	Author (s)	Approved by:
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1	Final	11/11/2024	P15494_Ringaskiddy _Beam Trawl Port of Cork_Final	Ronan Browne	E. McCormack

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DAS	Dumping at Sea
IFI	Inland Fisheries Ireland
T1	Transect (Beam trawl)

1. Introduction

AQUAFACT - APEM Group (herein referred to as AQUAFACT) was commissioned by Ayesa on behalf of the Port of Cork Company to undertake a beam trawl survey at Ringaskiddy as part of preparing an Environmental Impact Assessment Report (EIAR) chapter on Marine Ecology for a proposed development.

In June and July of 2024 seven beam trawl transects (T) were carried out in the vicinity of the proposed development using a 2-metre beam trawl with an 11 mm mesh size. The survey transect trawls were conducted at a speed of 2 knots, resulting in an average trawl length transect of circa. 0.3 km (ranging from 0.2 to 0.6 km). Once brought on board, the contents of the trawl were placed into a container and photographed prior to processing. Fish and invertebrate species were separated, counted, and selected specimens measured to the nearest millimetre, with every effort made to return them to the water alive after processing. Other animal groups, such as colonial invertebrates (e.g., hydroids, bryozoans), were recorded based on their presence or absence.

This report provides an overview of the finfish and invertebrate species captured in each trawl, detailing the number of species, their relative abundance, and, where available, comparisons to relevant reports and data collected by Inland Fisheries Ireland (IFI). Additionally, the report includes information on the size distribution of selected species.

2. Methodology

AQUAFACT staff conducted the beam trawl survey on the 27th of June and the 22nd of July 2024 in the vicinity of Ringaskiddy. The survey utilised a two-metre-wide beam trawl equipped with a tickler chain and an 11 mm mesh (Figure 2-1), which was towed at a speed of 1.5 to 2.5 knots from the A-frame at the stern of the vessel. The beam trawl was deployed from the *Denis Murphy*, a vessel kindly provided by the Port of Cork.

Figure 2-1: Beam trawl (2 m diameter with an 11 mm mesh) on the deck of the Denis Murphy.

For this survey in the Ringaskiddy area, seven beam trawl transects (T1 to T7) were conducted. The track of each trawl was recorded using a handheld GPS and is plotted in Figure 2-2. After each transect, the beam trawl was recovered, the cod end sack opened, and the catch was deposited into a fish box. If a trawl contained a significant amount of mud, AQUAFACT staff used a deck hose and a 1 mm sieve to clean the catch upon retrieval. Most of the catch from each trawl was processed on deck by AQUAFACT staff, with some species retained for identification upon return to the AQUAFACT laboratory. Brown shrimp (*Crangon crangon*) and green crab (*Carcinus maenas*) species were identified and measured on board.

For this survey the catch of organisms was separated, identified, counted and the total length (the tip of the snout to the tip of the longer lobe of the caudal fin) of selected fish specimens measured to the nearest millimetre. Every attempt was made to return them alive to the water after processing. The size distribution of organisms such as green crabs (*Carcinus maenas*) and brown shrimp (*Crangon crangon*) were also assessed.

Figure 2-2: Location of trawl survey tracks (T1 to T7) for Ringaskiddy on the 27th of June and the 22nd of July 2024.

3. Results

3.1 Overview

This marine ecological survey was conducted using seven beam trawl transects (T1 to T7) as part of the baseline assessment for the Ringaskiddy EIAR. The beam trawls revealed a diverse assemblage of finfish species present as shown in Table 3-1.

Plaice (*Pleuronectes platessa*), a flat fish commonly found on sandy and muddy seabeds, was observed across most transects, with a peak in transect 5 (T5). The Sand Goby (*Pomatoschistus minutus*), a small demersal species often inhabiting shallow coastal waters, was the most abundant species, particularly in T1. The Reticulated Dragonet (*Callionymus reticulatus*), typically found in sandy and gravelly substrates, was present in several transects, with the highest numbers in T5. Dover Sole (*Solea solea*), a commercially significant species known for its preference for soft, sandy bottoms, was also recorded in good numbers, especially in T1. Other species like the Thornback Ray (*Raja clavata*), which frequents sandy, muddy, and gravelly areas, were noted, but in lower numbers. For the areas surveyed there was a greater species diversity in T1 and T4, with T5 also showing relative fish abundance, particularly of commercially important species. This data illustrates the ecological worth of the surveyed area, providing baseline information for evaluating the potential impacts of future developments in Ringaskiddy.

During the seven-beam trawl transects undertaken at Ringaskiddy, a total of 965 invertebrates were recorded, representing over 20 species. The most abundant species included the Harbour Crab (*Polybius depurator*), which was the most frequently captured with a total of 184 individuals, and the Green Crab (*Carcinus maenas*), with 177 individuals recorded across the transects. The Shrimp (*Palaemon serratus*) and Brown Shrimp (*Crangon crangon*) were also prevalent, with totals of 52 and 101 individuals, respectively. Other species of note observed include the Blue Mussel (*Mytilus edulis*), with 113 individuals, and Amphipods, with a significant single occurrence of 170 individuals in one transect. Additionally, Velvet Crabs (*Necora puber*) and Moon Jellyfish (*Aurelia aurita*) were found in smaller numbers. Species diversity varied across the transects, with the highest diversity observed in T7, where 12 different species were recorded. In contrast, T6 had the lowest species diversity, with only six species noted. Overall, the invertebrate community at Ringaskiddy was dominated by crabs and shrimps, with several other species contributing to the biodiversity of the area.

Specimens of the following species were measured during the survey: Green Crab (*Carcinus maenas*), Brown Shrimp (*Crangon crangon*), Velvet Swimming Crab (*Necora puber*), Thornback Ray (*Raja clavata*), Edible Crab (*Cancer pagurus*), Plaice (*Pleuronectes platessa*), Common Goby (*Pomatoschistus microps*), Sand Goby

(*Pomatoschistus minutus*), Grey Gurnard (*Eutrigula gurnardus*), Common Dragonet (*Callionymus lyra*), Black Goby (*Gobius niger*), Rock Goby (suspected), Butterfish, Fivebeard Rockling, Yellow Eel, Reticulated Dragonet, Dover Sole, Dab, Greater Pipefish, Pogge, 15-Spined Stickleback, and Nilsson's Pipefish.

3.2 Fish species

Table 3-1 shows the recorded catch data for various fish species collected by the beam trawl in different locations. The survey provided key insights into the fish populations across the seven transects (T1 to T7), highlighting the species diversity and abundance in the surveyed area. Species were also allocated their AphiaID identity number. The AphiaID platform is a system for managing taxonomic data, with an online environment that allows experts to update information efficiently. It underpins the World Register of Marine Species (WoRMS) and over 80 related databases, supporting both marine and non-marine data. AphiaID uses Life Science Identifiers (LSIDs) to provide unique, stable identifiers for each name, storing both accepted and unaccepted names while documenting their relationships. This makes AphiaID a key tool for taxonomic quality control and linking information across scientific names. It also plays a significant role in marine biodiversity informatics and supporting data integration (Vandepitte *et al.,* 2015). From the seven-beam trawl transects undertaken at Ringaskiddy there were a total of 148 finfish recorded and 17 species identified.

Plaice (*Pleuronectes platessa*) were found in all beam trawl transects except T3, with the highest counts recorded in T5, where eight individuals were captured. The Sand Goby (*Pomatoschistus minutus*) emerged as the most abundant finfish species overall, with a significant number of individuals observed in T1 (40 individuals) and presence across most transects, except T7. The Reticulated Dragonet (*Callionymus reticulatus*), typically found in sandy and gravelly substrates, was recorded in T1, T2, T4, and T5, with the highest count of ten individuals in T5. Dover Sole (*Solea solea*), a species of commercial significance often associated with soft, sandy bottoms, was present in T1, T4, and T5, with six individuals recorded in T1 (Table 3-1).

Other notable species recorded in Table 3-1 included the Thornback Ray (*Raja clavata*), found in T1, and T3, though in lower numbers, with just one individual per transect. The Five-bearded Rockling (*Ciliata mustela*) was present in T1 and T2, contributing a total of three individuals to the catch. The Black Goby (*Gobius niger*) was observed in T1, T4, and T7, with the highest count of four individuals in T7. The Butterfish (*Pholis gunnellus*) was exclusively found in T1, where two individuals were captured. Additional species, including Grey Gurnard, Common Goby, Common Dragonet, Yellow Eel, Rock Goby, Dab, Greater Pipefish, Fifteen-Spined Stickleback, Pogge, and Nilsson Pipefish, were recorded in smaller numbers across different transects.

Regarding total counts, T1 and T5 were the most populous transects. T1 had the highest overall fish abundance, with 61 individuals and the greatest species diversity, recording ten different species. T5 followed closely, with a total of 41 fish and high species diversity, particularly notable for species such as Sand Goby and Plaice.

Observations from the survey included the identification of Juvenile Pipefish and *Gobius* spp., each with two individuals observed in T4 and T1, respectively (Table 3-1). The presence of species like the Thornback Ray and Dover Sole indicates various demersal species in the area, reflecting the ecological substance of the surveyed habitats.

Table 3-1: Fin fish species and the number of individuals recorded during beam trawl transects (T1 to T7).

Species	AphiaID	T1	T2	T3	T4	T5	T6	T7	Total (T1 –T7)
Plaice (*Pleuronectes platessa*)	127143	2	2		1	8	2		**15**
Grey Gurnard (*Eutrigula gurnardus*)	150637						1		**1**
Sand Goby (*Pomatoschistus minutus*)	126928	40	3		5	16	1		**65**
Black Goby (*Gobius niger*)	126892	1			1			4	**6**
Common Dragonet (*Callionymus lyra*)	126792						1		**1**
Common Goby (*Pomatoschitus microps*)	126927						2	4	**6**
Thornback Ray (*Raja clavata*)	105883	1		1					**2**
Dover Sole (*Solea solea*)	127160	6			4	5			**15**
Butterfish (*Pholis gunnellus*)	126996	2							**2**
Reticulated Dragonet (*Callionymus reticulatus*)	126795	4	2		4	10			**20**
Fivebeard Rockling (*Ciliata mustela*)	126448	2	1						**3**
Yellow Eel (*Anguilla anguilla*)	126281	1							**1**
Rock Goby (*Gobius paganellus*)	126893							1	**1**
Dab (*Limanda limanda*)	127139		1						**1**
Greater Pipefish (*Syngnathus acus*)	127387				1				**1**
Fifteen-Spined Stickleback (*Spinachia spinachia*)	126508				1	1			**2**
Pogge (*Agonus cataphractus*)	127190				1				**1**
Nilsson Pipefish (*Syngnathus rostellatus*)	127389					1			**1**
Juvenile Pipefish					2				**2**
Gobius Species		2							**2**
Total number of fish		**61**	**9**	**1**	**20**	**41**	**7**	**9**	**148**
Total number of species		**10**	**5**	**1**	**9**	**6**	**5**	**3**	

Fish species specimens measured during the survey included Plaice (*Pleuronectes platessa*), Common Goby (*Pomatoschistus microps*), Sand Goby (*Pomatoschistus minutus*), Grey Gurnard (*Eutrigula gurnardus*), Common Dragonet (*Callionymus lyra*), Black Goby (*Gobius niger*), and the suspected Rock Goby. Other fin fish measured were Butterfish, Fivebeard Rockling, Yellow Eel, Reticulated Dragonet, Dover Sole, Dab, Greater Pipefish, Pogge, 15-Spined Stickleback, Nilsson's Pipefish, and Thornback Ray (*Raja clavata*).

Figure 3-1 illustrates the size distribution of Plaice (*Pleuronectes platessa*) recorded across all trawls. The majority of individuals were clustered between 74-82 mm in length, with an apparent peak at 76-78 mm. Fewer numbers of individuals are observed at 88-90 mm and in the largest size category of 124-126 mm. The distribution indicates a range of Plaice sizes, with the most common being in the mid-range (around 74-82 mm). The data suggests some variability, with a few individuals recorded at both smaller and larger sizes.

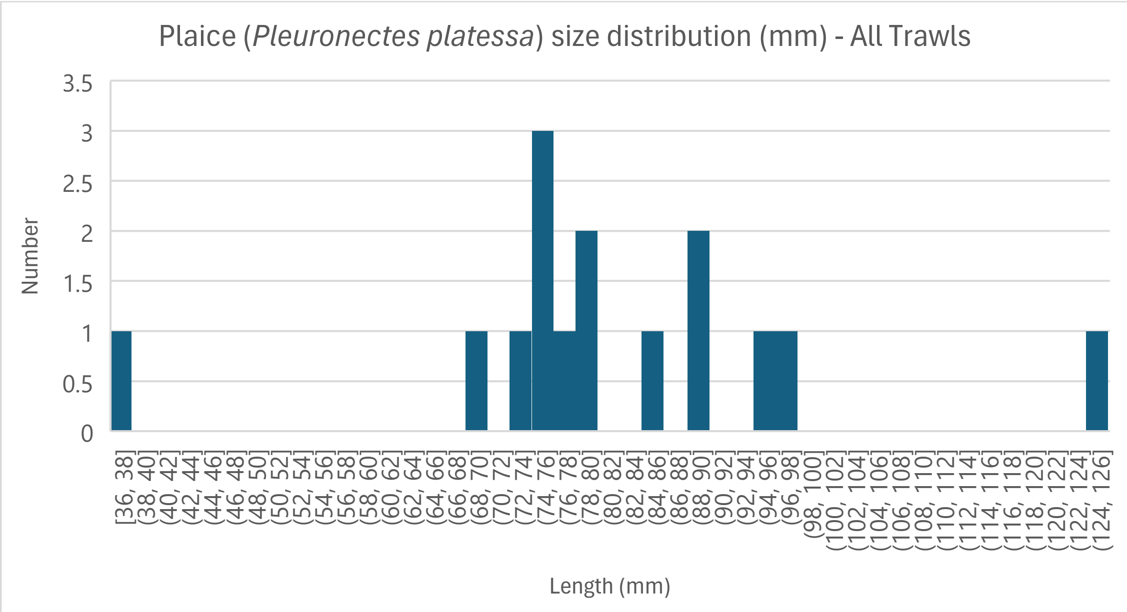

Figure 3-1: Size distribution (mm) of Plaice (*Pleuronectes platessa*), recorded in all trawls.

Figure 3-2 shows the size distribution of Sand Goby (*Pomatoschistus minutus)* across all trawls, with many individuals measuring between 45-55 mm, and a noticeable peak at 49-51 mm.

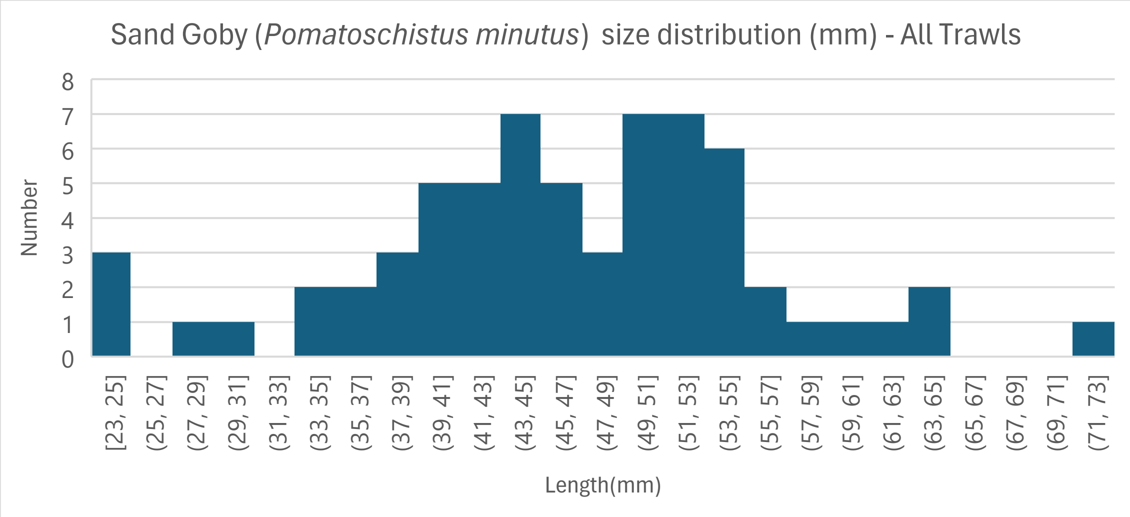

Figure 3-2: Size distribution (mm) of Sand Gobies (*Pomatoschistus minutus*), recorded in all trawls.

Figure 3-3 displays the size distribution of Reticulated Dragonet across all trawls. Most individuals fall within the 55-61 mm range, with a notable peak at 55-57 mm. There is a smaller cluster of sizes in the 63-69 mm range, and a single outlier at 127-129 mm. The distribution indicates that most of the Reticulated Dragonet captured were within the mid-size range, with very few large individuals.

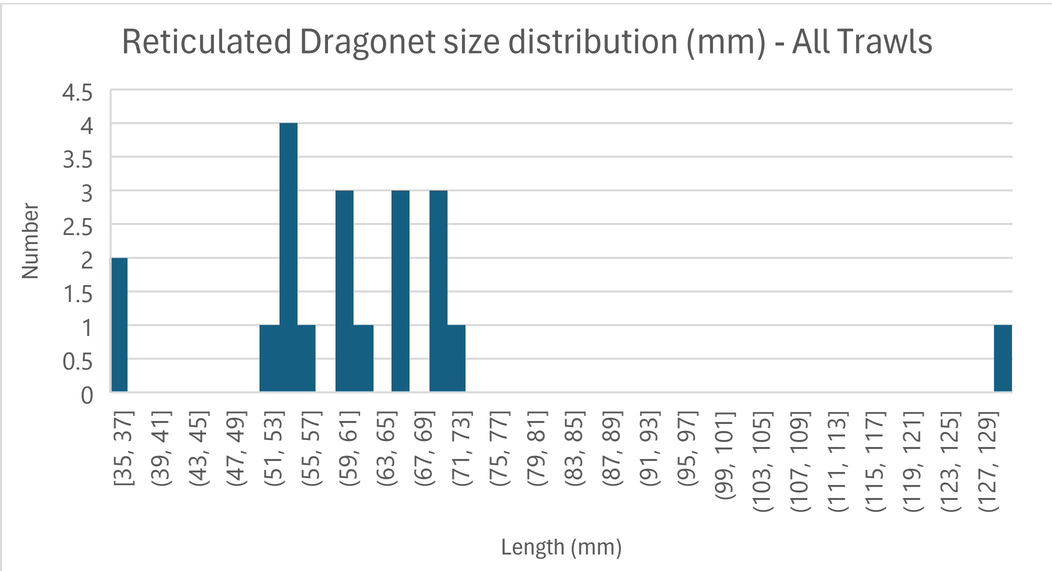

Figure 3-3: Size distribution (mm) of Reticulated Dragonet, recorded in all trawls.

3.3 Invertebrates

The seven-beam trawl transects at Ringaskiddy recorded a total of 965 invertebrates (individuals) representing more than 20 species (Table 3-2). The most abundant species found were the Harbour Crab (*Polybius depurator*) with 184 individuals, and the Green Crab (*Carcinus maenas*), which accounted for 177 individuals. Both species were present across multiple transects, indicating their widespread distribution in the area. Other significant species included the Blue Mussel (*Mytilus edulis*), which was notably abundant in transect T3 with 76 individuals and had a total of 113 across all transects. The Brown Shrimp (*Crangon crangon*) also appeared in significant numbers, with 101 individuals recorded overall (Table 3-2).

Less common species recorded during the survey included the Velvet Crab (*Necora puber*), with a total of 19 individuals, and various other species such as the Anemones, Brittlestar, and Hermit Crab, each of which was found in low numbers. Notably, a large single occurrence of Amphipods was recorded, with 170 individuals captured in one transect, contributing significantly to the total count. The survey also recorded unique species like the Cuttlefish and Cockle, each with only two individuals. This beam trawl data collection provides essential insights into the invertebrate populations and their distribution in the Ringaskiddy area.

Table 3-2: Invertebrate species and number of individuals recorded at each trawl transects (T1 to T7).

Species	AphiaID	T1	T2	T3	T4	T5	T6	T7	Total number (T1 - T7)
Shrimp (*Palaemon serratus)*	107616	22	19	1	2	6		2	**52**
Moon Jelly fish (*Aurelia aurita*)	135306			3				2	**5**
Harbour crab (*Polybius depurator*)	107387	33	28	1	41	61	13	7	**184**
Velvet crab (*Necora puber*)	107398		5				1	13	**19**
Blue mussel (*Mytilus edulis*)	140480	2	13	76	7	12		3	**113**
Common starfish (*Asterias rubens*)	123776				1		1	1	**3**
Hermit crab (*Pagurus bernhardus*)	107232						4		**4**
Anemones (Sea anemone)				1	2				**3**
Brittlestar Sp.								1	**1**
Brown crab (*Cancer pagurus*)	107276	1	1	1					**3**
Acidians Sp.		73	6		6	2		1	**88**
Sponge Sp.		15		11		2		1	**29**
Broad-clawed porcelain crab (*Porcellana platycheles*)	107190			1					**1**
Hornwrack - bryozoan (*Flustra foliacea*)	111367							1	**1**

Species	AphiaID	T1	T2	T3	T4	T5	T6	T7	Total number (T1 - T7)
Green Crab (*Carcinus maenas*)	107381	61	13	17	37	33	13	3	**177**
Brown Shrimp (*Crangon crangon*)	107552	29	6	8	29	16	4	9	**101**
Long legged spider crab (*Macropodia rostrata*)	107345	3	1						**4**
Amphipod		170							**170**
Cuttlefish		2							**2**
Cockle					2				**2**
Polychaete sp.						3			**3**
Total Invertebrates		**411**	**92**	**120**	**127**	**135**	**36**	**44**	**965**
Total Species		**11**	**9**	**10**	**9**	**8**	**6**	**12**	

An aspect of this survey involved the measurement of size distribution of green crab and brown shrimp as these have been studied in other areas close to Ringaskiddy. The size distribution for green crab and brown shrimp respectively for all trawls are presented in Figure 3-4 and Figure 3-5.

Figure 3-4 shows the frequency distribution of Green Crab (*Carcinus maenas*) carapace widths across a range of measurements. The most common carapace widths are clustered around 20 mm, 40 mm, and 45 mm, with these sizes showing the highest frequency of occurrence. The distribution illustrates a spread of carapace widths from as small as 5 mm up to 67 mm, with a noticeable peak in the 20-25 mm and 40-45 mm ranges, indicating these are the most prevalent sizes within the sampled population.

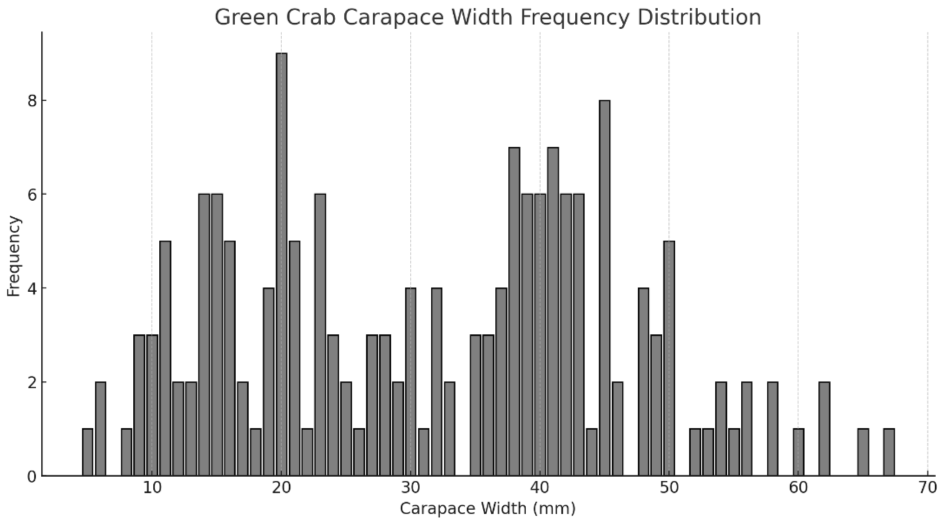

Figure 3-4: Size distribution (carapace width mm) of Green Crab (*Carcinus maenas*) in all trawls.

Figure 3-5displays the length frequency distribution of Brown Shrimp (*Crangon crangon*) captured across various trawls. The majority of shrimp fall within the 30-45 mm length range, with the highest frequency observed between 35-40 mm. There are smaller numbers of shrimp in the smaller size ranges (15-30 mm) and the larger size ranges (45-65 mm), indicating that the population sampled was predominantly composed of mid-sized individuals. This distribution suggests that the Brown Shrimp in the sampled area are mostly of intermediate size, with fewer very small or very large individuals. It is possible that the size distribution of shrimp that were captured was on account of mesh selectivity.

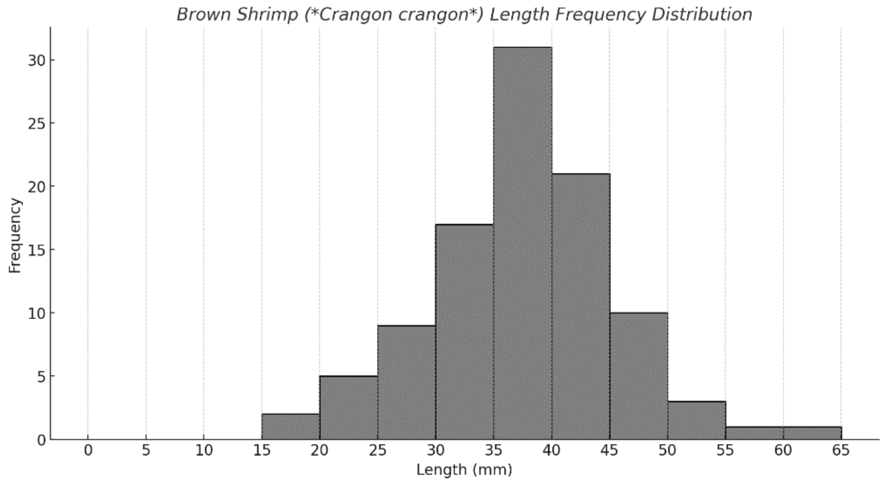

Figure 3-5:Size distribution (mm) of Brown Shrimp (*Crangon crangon*) in all trawls.

Other invertebrate species measured during the survey included the Velvet Swimming Crab (*Necora puber*), and Edible Crab (*Cancer pagurus*).

4. Discussion

A beam trawl survey was conducted in 2012 as part of the EIS process for the proposed developments at Ringaskiddy. However, to ensure the validity of biological survey information for an EIAR, the data must be recent and reflect current site conditions. Biological surveys are typically considered valid for up to two years, though this timeline may vary depending on project specifics or the species studied. Therefore, the outdated beam trawl data necessitated a supplementary survey to provide accurate and up-to-date ecological information, which is essential to meet the requirements of Directive 2014/52/EU, ensuring decision-makers have reliable data when assessing the environmental impact of projects.

A beam trawl study for the Ringaskiddy NIS in 2012 was conducted in the Ringaskiddy Basin on August 27th, 2013, including areas within the Basin and along the edge of the Oyster Bank at the eastern approaches. Eight trawls (T1-T8) were performed using a 1.5m beam trawl, with the trawl tracks recorded using a Trimble Geo-XM GPS (Figure 4-1).

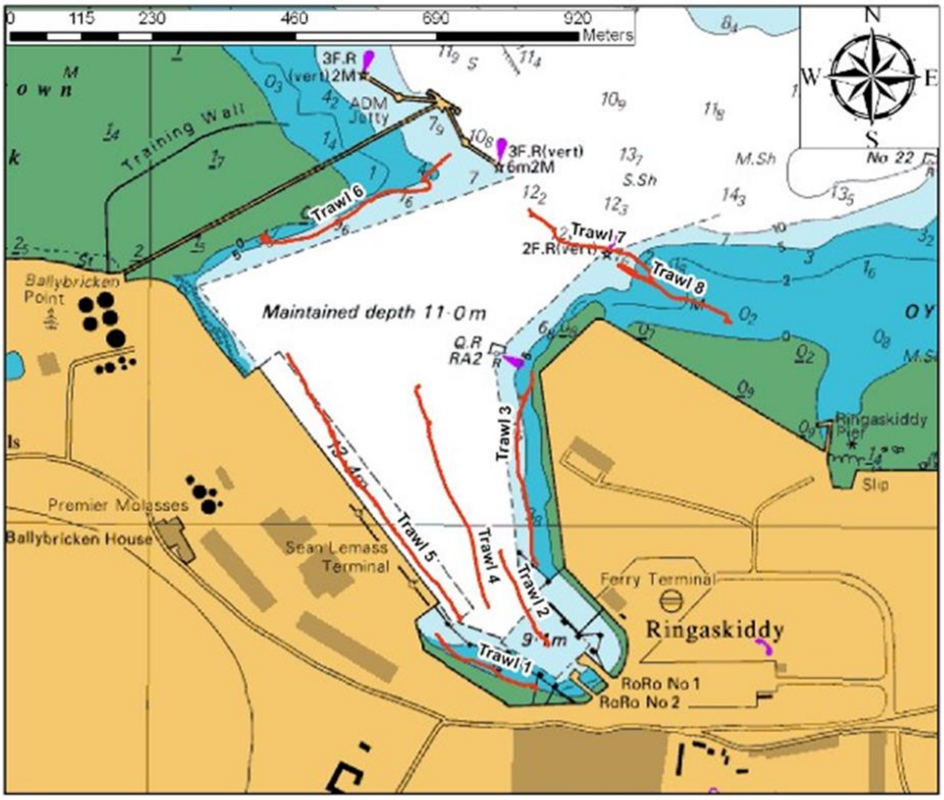

Figure 4-1: Ringaskiddy Basin showing locations of 8 beam trawls (T1-T8) August 2013 (Source RPS report)

The fisheries result from these trawls, along with prior surveys conducted by Inland Fisheries Ireland (IFI) under the Water Framework Directive (WFD) for the Greater Cork Harbour area, provide an overview of marine and estuarine species. In the 2010 IFI surveys, the most abundant species included sprat, sand goby, juvenile mullet, and common goby. The 2010 IFI survey identified 29 species in total, with sprat and sand goby being particularly dominant (IFI 2011).

The 2013 Ringaskiddy Basin trawls showed that plaice was the most frequently captured fish, appearing in seven out of eight trawls and being the most abundant species. Other species were encountered in lower numbers, with sand goby recorded in two trawls. The soft-bottom habitats likely contributed to the prevalence of juvenile flatfish. Pelagic species like sprat and mackerel were also observed in small shoals near the water surface.

In 2013 invertebrates, including brown shrimp (*Crangon crangon*), green crabs (*Carcinus maenas*), swimming crabs (*Polybius spp*.), and hermit crabs, were dominant in the trawls, particularly in T6 where a high number of hermit crabs were recorded. The presence of significant amounts of brown and green seaweeds in some trawls suggests the area functions as a nursery for juvenile fish and mobile epibenthic crustaceans, emphasizing the ecological importance of the Ringaskiddy Basin.

There are several differences between the 2013 survey and the 2024 report. In 2013, a 1.5 m diameter beam trawl was used, whereas in 2024, a larger 2 m trawl was employed. Additionally, eight trawls were conducted in 2013, compared to seven trawls in 2024. However, T7 (Figure 2-2) in 2024 roughly approximates to Trawl 7 and 8 undertaken in 2013.

Comparing the surveys, the 2024 survey recorded a broader range of species and a higher overall abundance of both finfish and invertebrates compared to the 2013 survey. The use of a larger beam trawl in 2024 likely contributed to this increased diversity and abundance. Plaice remained a consistent presence across all surveys, highlighting the species' significance in the Ringaskiddy Basin.

The 2024 survey provided more information to understanding of the area’s ecological structure, particularly through some additional data for key invertebrate species. Overall, the information from these surveys is very useful for assessing changes at the site and the potential impact of future developments in the area.

5. Conclusion

This beam trawl survey undertaken by AQUAFACT in 2024 recorded a diverse array of finfish species (20). With plaice (*Pleuronectes platessa*) being among the most frequently observed, particularly in transect T5. Sand goby (*Pomatoschistus minutus*) emerged as the most abundant fish species overall, especially in T1. Other significant species included the reticulated dragonet (*Callionymus reticulatus*), which was most prevalent in T5, and Dover sole (*Solea solea*), which showed a preference for soft, sandy bottoms. The results highlighted the ecology of the surveyed area. Transects T1 and T5, which exhibited high species diversity and abundance.

In total, there were 965 individual invertebrates recorded, representing over 20 species were noted across the seven transects in 2024. The harbour crab (*Polybius depurator*) was the most captured invertebrate, followed closely by the green crab (*Carcinus maenas*). Brown shrimp (*Crangon crangon*) were also prevalent in the landings. The beam trawl survey revealed varying species diversity across each transects, with T7 recording the highest diversity of species. The data collected provides valuable insights into the invertebrate populations of the area, with crabs and shrimp dominating much of the catches.

The survey methodology also involved measuring the size distribution of some key invertebrate species such as green crab and brown shrimp. The size distribution of green crabs showed a concentration of individuals with carapace widths around 20 mm, 40 mm, and 45 mm, indicating these were the most common sizes within the sampled population. Brown shrimp size distribution revealed that most individuals fell within the 30-45 mm range, suggesting a high proportion of mid-sized shrimp in the area.

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7. Appendix

7.1 Appendix 1: Recorded fish size measurements (mm) from T1 to T7.

Table 7-1: Size distribution (mm) of Plaice (*Pleuronectes platessa*) (T1 to T7).

Plaice (*Pleuronectes platessa*)						
T1	T2	T3	T4	T5	T6	T7
125	98		76	95	74	
90	75			78	75	
				85		
				70		
				80		
				79		
				90		
				36		

Table 7-2: Size distribution (mm) of Common Goby (*Pomatoschitus microps*) (T1 to T7).

Common Goby (*Pomatoschitus microps*)						
T1	T2	T3	T4	T5	T6	T7
					40	38
					36	52
						39
						43

Table 7-3: Size distribution (mm) of Sand Goby (*Pomatoschistus minutus*) (T1 to T7).

Sand Goby (*Pomatoschistus minutus*)						
T1	T2	T3	T4	T5	T6	T7
73	40		54	56	47	
55	55		61	62		
52	40		42	58		
55			53	55		
50			65	50		
51				50		
64				52		
42				45		
37				45		
47				40		
45				47		
42				42		
55				40		
36				39		
52				48		
53				25		
50						
45						
49						
50						
57						
46						
45						
48						
45						
46						
52						
53						
50						
34						
35						
38						
39						
42						
44						
40						
25						
23						
30						
29						

Table 7-4: Size distribution (mm) of Grey Gurnard (*Eutrigula gurnardus*) (T1 to T7).

Grey Gurnard (*Eutrigula gurnardus*)						
T1	**T2**	**T3**	**T4**	**T5**	**T6**	**T7**
					46	

Table 7-5: Size distribution (mm) of Common Dragonet (*Callionymus lyra*) (T1 to T7).

Common Dragonet (*Callionymus lyra*)						
T1	T2	T3	T4	T5	T6	T7
					45	

Table 7-6: Size distribution (mm) of Black Goby (*Gobius niger*) (T1 to T7).

Black Goby (*Gobius niger*)						
T1	T2	T3	T4	T5	T6	T7
104			85			73
						92
						93
						71

Table 7-7: Size distribution (mm) of Rock Goby (*Gobius paganellus* - suspected) (T1 to T7).

Rock Goby (*Gobius paganellus*) (Suspected)						
T1	T2	T3	T4	T5	T6	T7
						85

Table 7-8: Size distribution (mm) of Butterfish (*Pholis gunnellus*) (T1 to T7).

Butterfish (*Pholis gunnellus*)						
T1	T2	T3	T4	T5	T6	T7
140						
140						

Table 7-9: Size distribution (mm) of Five Bearded Rockling (*Ciliata mustela*) (T1 to T7).

Five Bearded Rockling (*Ciliata mustela*)						
T1	T2	T3	T4	T5	T6	T7
87	51					
61						

Table 7-10: Size distribution (mm) of Yellow eel (*Anguilla anguilla*) (T1 to T7).

Yellow eel (*Anguilla anguilla*)						
T1	T2	T3	T4	T5	T6	T7
190						

Table 7-11: Size distribution (mm) of Reticulated Dragonet (*Callionymus reticulatus*) (T1 to T7).

Reticulated Dragonet (*Callionymus reticulatus*)						
T1	T2	T3	T4	T5	T6	T7
61	66		71	73		
55	60		67	62		
53			35	71		
37			131	70		
				66		
				55		
				56		
				60		
				55		
				55		

Table 7-12: Size distribution (mm) of Dover sole (*Solea solea*) (T1 to T7).

Dover Sole (*Solea solea*)						
T1	T2	T3	T4	T5	T6	T7
60			89	52		
65			62	70		
70			80	56		
68			76	64		
60				65		
65						

Table 7-13: Size distribution (mm) of Dab (*Limanda limanda*) (T1 to T7).

Dab (*Limanda limanda*)						
T1	T2	T3	T4	T5	T6	T7
	120					

Table 7-14: Size distribution (mm) of Greater pipe fish (*Syngnathus acus*) (T1 to T7).

Greater Pipefish (*Syngnathus acus*)						
T1	T2	T3	T4	T5	T6	T7
			239			

Table 7-15: Size distribution (mm) of Pogge (*Agonus cataphractus*) (T1 to T7).

Pogge (*Agonus cataphractus*)						
T1	T2	T3	T4	T5	T6	T7
			97			

Table 7-16: Size distribution (mm) of 15-spined stickleback (*Spinachia spinachia*) (T1 to T7).

15-spined stickleback (*Spinachia spinachia*)						
T1	T2	T3	T4	T5	T6	T7
			77	57		

Table 7-17: Size distribution (mm) of Nilsson's Pipefish (*Syngnathus rostellatus*) (T1 to T7).

Nilsson's Pipefish (*Syngnathus rostellatus*)						
T1	T2	T3	T4	T5	T6	T7
				158		

Table 7-18: Size distribution (mm) of Thornback Ray (*Raja clavata*) (T1 to T7).

Thornback Ray (*Raja clavata*)									
T1		T2	T3		T4	T5	T6	T7
Length	215		Length	180				
Width	132		Width	108				

7.2 Appendix 2: Recorded invertebrate size measurements (mm) from T1 to T7.

Table 7-19: Size distribution (mm) of Green Crab (*Carcinus maenas*) (T1 to T7).

Green Crab (*Carcinus maenas*)						
T1	T2	T3	T4	T5	T6	T7
40	30	67	50	56	50	32
48	40	46	62	40	45	38
48	33	38	38	46	45	20
58	42	45	45	39	43	
36	45	49	41	42	48	
44	28	53	39	62	35	
43	20	60	58	49	32	
43	20	28	49	45	30	
41	36	40	37	41	37	
38	24	48	42	35	40	
41	27	37	50	56	40	
26	21	17	45	50	24	
65	20	17	31	36	21	
41		15	41	38		
43		29	32	54		
35		19	23	43		
39		15	26	39		
30			23	39		
11			41	54		
25			21	32		
27			21	45		
20			28	33		
23			29	42		
19			24	42		
23			21	55		
25			27	37		
11			38	42		
18			19	50		
16			14	39		
23			14	52		
20			13	43		
9			22	38		

Green Crab (*Carcinus maenas*)						
T1	T2	T3	T4	T5	T6	T7
6			20	30		
23			39			
16			15			
16			19			
9			14			
15						
10						
5						
16						
20						
14						
15						
14						
15						
20						
16						
13						
12						
14						
15						
11						
12						
11						
10						
10						
11						
9						
8						
6						

Table 7-20: Size distribution (mm) of Brown Shrimp (*Crangon crangon*) (T1 to T7).

Brown Shrimp (*Crangon crangon*)						
T1	T2	T3	T4	T5	T6	T7
31	40	38	42	44	36	38
41	51	25	40	48	38	36
30	40	39	43	50	43	34
28	40	31	40	38	41	32
32	35	35	43	23		33
36	57	32	40	45		34
38		29	36	45		33
29		60	35	35		32
24			36	45		36
23			27	45		
35			41	45		
31			37	46		
32			41	38		
25			37	42		
36			45	40		
27			43	24		
31			39			
36			45			
27			40			
26			50			
23			45			
34			36			
42			37			
36			35			
39			35			
34			42			
19			27			
18			32			
32			35			

Table 7-21: Size distribution (mm) of Velvet Swimming Crab (*Necora puber*) (T1 to T7).

Velvet Swimming Crab (*Necora puber*)						
T1	T2	T3	T4	T5	T6	T7
					40	60
						64
						80
						78
						87
						85
						80
						64
						78
						65
						85
						58
						45

Table 7-22: Size distribution (mm) of Edible Crab (*Cancer Pagurus*) (T1 to T7).

Edible Crab (Cancer Pagurus)						
T1	T2	T3	T4	T5	T6	T7
		82				

APPENDIX 9.9 MMO SURVEY

AYESA (Port of Cork)

Marine Mammal Observer Survey – Ringaskiddy, Cork Harbour

AQUAFACT Ref: P15494

November 2024

COMMERCIAL IN CONFIDENCE

AQUAFACT
APEM Group

Report Approval Sheet

Client	**Ayesa (Port of Cork)**
Report Title	**Marine Mammal Observer Survey – Ringaskiddy**
Job Number	**P15494**
Report Status	**Final**
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Rev	Status	Issue Date	Document File Name	Author (s)	Approved by:
1	Draft	03/09/2024	P15494_Ringaskiddy _Marine Mammal Observer Survey Port of Cork v1	Brónagh Boylan	R. Browne
2	Final	08/11/2024	P15494_Ringaskiddy _Marine Mammal Observer Survey Port of Cork	Brónagh Boylan	E. McCormack

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1. Introduction

AQUAFACT - APEM Group (herein referred to as AQUAFACT) were commissioned by Ayesa and behalf of the Port of Cork Company to undertake a marine mammal observer survey at Ringaskiddy as part of preparing an EIAR chapter on Marine Ecology for proposed developments.

In July and August of 2024, a series of land-based watches over the proposed development area were carried out from five vantage points to record any marine mammal activity (Figure 1-1). Where possible, a photograph of a species was captured alongside its behaviour. Additionally, the time, coordinates of the species, and environmental conditions each day were recorded.

This report provides an overview of the marine mammals recorded during the survey period and, where available, comparisons to relevant data collected by bodies such as the Irish Whale and Dolphin Group (IWDG) and the National Biodiversity Data Centre (NBDC).

Figure 1.1 shows the vantage points selected for the Marine Mammal Observer Surveys.

Figure 1-1- Marine Mammal Observer Vantage Point locations.

2. Statement of Authority

Marine Mammal Observer (MMO) surveys of the Ringaskiddy port area were carried out for 5 days between the 22nd of July 2024 and the 1st of August 2024. Brónagh Boylan (BSc.) and Niamh Lynch (BSc., MSc.) are fully trained AQUAFACT MMO surveyors. Both Brónagh and Niamh hold the JNCC certification- *Marine Mammal Observer (MMO) Guidelines for Industry- Marine Mammal Mitigation* and the NPWS certification – *Irish Mitigation Guidelines for Industry*. This report has been prepared by Brónagh, who has a range of experience in ecological surveying and assessment.

3. Methodology

3.1 Desk Study

A desk study was carried out to provide background on the presence, or absence, of marine mammals within the proposed development area. Sources such as the National Biodiversity Data Centre (NBDC) and Irish Whale and Dolphin Group (IWDG) were used for the purpose of this study. The results of this search can be found in Section 4.1 below.

3.2 Field Survey

A detailed account of the methodology used for the Marine Mammal Observer surveys carried out for the proposed development can be found in the following sub-sections, while detailed results can be found in Section 4.2 below.

3.2.1 Data Collection

The Marine Mammal Observer (MMO) survey was carried out on the following dates:

- 22nd of July 2024
- 23rd of July 2024
- 30th of July 2024
- 31st of July 2024
- 1st of August 2024

All surveys were carried out by AQUAFACT staff who hold the JNCC certification- Marine Mammal Observer (MMO) Guidelines for Industry- Marine Mammal Mitigation and the NPWS certification – Irish Mitigation Guidelines for Industry. The waters in the vicinity of the Ringaskiddy port facilities were surveyed from a range of vantage points (see Figure 1-1). Depending on the date, surveys were carried out either side of low water or either side of high water. To replicate previous survey effort. Surveyors used a 10 x 50 pair of binoculars and a Canon EOS 2000D camera with a 75-300mm lens, as recommended in current MMO guidelines. Effort watches were stopped when weather conditions were deemed unfavourable, *i.e.*, sea state = choppy (many white caps) and/or swell = medium (2-4 m) and/or visibility = poor (less than 1km), however watches were carried out these conditions when the observer deemed it appropriate.

Effort watches was focused on an arc of 180° and up to 1km distance in priority. Sightings outside of this distance are extremely hard to record. Effort watches were conducted with the naked eye and the help of a 10x50 binoculars, to confirm species identification, group size and behaviour of the animals encountered.

Species identification, group size, age composition, heading and behaviour of the animals were also recorded for each sighting. All sightings were identified to species level when possible. However, whether the identification could not be confirmed, appropriate taxonomic levels and associated confidence levels were assigned to the animals observed. All cetacean sightings that occurred off effort and were reported to the MMO were also recorded as auxiliary sightings in an independent form.

Environmental variables were also recorded every hour approximately and/or when a weather variable changed. These variables included:

- Wind direction: in degrees.
- Wind force: in Beaufort scale.
- Sea state: g = glassy (like mirror), s = slight (no/few white caps), c = choppy (many white caps), r = rough (big waves, foam, spray).
- Swell: o = low (< 2m), m = medium (2-4 m), 1 = large (> 4m).
- Visibility: p = poor (< 1km), m = moderate (1-5 km), g = good (> 5km).
- Sun glare: n = none, wf = weak forward, sf = strong forward, vf = variable forward, wb = weak behind, sb = strong behind, vb = variable behind.
- Precipitation: n = none, l = light rain, m = moderate rain, h= heavy rain, s = snow.

The 'Marine Mammal recording form' for sightings include several parameters including:

- Date, time, position of the encounter,
- Species group and behaviour,
- Group size (number of adults, juveniles and calves),
- Bearing of the animal,
- Range to the animal, and
- Direction of travel.

3.2.2 Data Treatment

All watches and sightings data were recorded in an excel file.

4. Results

4.1 Desk Study

A search was carried out on the National Biodiversity Data Centre (NBDC) map viewer to note any records of marine mammals in the vicinity of Ringaskiddy port. The 2km grid squares W76S and W76X were selected, and the results of the search are detailed below.

The results of the search showed 5 records of marine mammal have been noted since 2002, however only 2 of these records have occurred in the last 10 years; in 2014 one common seal (*Phoca vitulina*) was recorded (IWDG Causal Cetacean Sightings Database), and in 2017 one common porpoise (*Phocoena phocoena*) was recorded. Both records were within W76X.

A search was carried out of the Irish Whale and Dolphin Sightings Database, which holds records of the last 12 months of sighting data. The results showed no records of marine mammals within the last 12 months in the Ringaskiddy, or nearby Carrigaline area.

The proposed development site is not located within a Special Area of Conservation (SAC), Special protection Area (SPA) or Natural Heritage Area (NHA).

4.2 Field Surveys

4.2.1 Survey Effort and Weather Conditions

A total of 20 hours of surveys were carried out across 5 days. Effort watches were recorded hourly on each survey. Weather conditions did not limit survey effort, the conditions on the 27th of July were most variable however the majority of the survey was conducted in favourable conditions. Table 4-1 shows the details of the effort watches.

Table 4-1- Record of MMO effort watches.

Date	Time of Start	Time of End	Location	Wind Direction (°)	Wind Force (Beaufort Scale)	Swell	Precipitation	Tide
22/07/24	17:00	18:00	Location 1	NE	3	o	l	High
22/07/24	18:00	19:00	Location 1	E	4	o	n	High
22/07/24	19:00	20:00	Location 1	E	5	o	h	High
22/07/24	20:00	21:00	Location 1	E	4	o	m	High
23/07/24	12:00	13:00	Location 2	S	1	o	n	Low
23/07/24	13:00	14:00	Location 2	S	0	o	n	Low

Date	Time of Start	Time of End	Location	Wind Direction (°)	Wind Force (Beaufort Scale)	Swell	Precipitation	Tide
23/07/24	14:00	15:00	Location 2	SE	2	o	n	Low
23/07/24	15:00	16:00	Location 2	SE	1	o	n	Low
30/07/24	11:45	12:45	Location 3	NE	2	o	n	High
30/07/24	12:45	13:45	Location 3	NE	2	o	n	High
30/07/24	13:45	14:45	Location 3	NE	2	o	n	High
30/07/24	14:45	15:45	Location 3	NE	2	o	n	High
31/07/24	07:20	08:20	Location 4	NE	1	o	n	Low
31/07/24	08:20	09:20	Location 4	NE	1	o	n	Low
31/07/24	09:20	10;20	Location 4	NE	1	o	n	Low
31/07/24	10:20	11:20	Location 4	NE	1	o	n	Low
01/08/24	08:25	09:25	Location 5	NW	1	o	n	Low
01/08/24	09:25	10:25	Location 5	NW	1	o	n	Low
01/08/24	10:25	11:25	Location 5	NW	2	o	n	Low
01/08/24	11:25	12:25	Location 5	NW	2	o	n	Low

4.2.2 Sightings

Table 4-2- Total number of sightings per marine mammal over the 5-day survey period.

Date	Otter *Lutra lutra*	Harbour seal *Phoca vitulina*	Grey seal *Halichoerus grypus*	Total
22/07/24	1			1
23/07/24		1	1	2
30/07/24		6		6
31/07/24		2		2
01/08/24		17		17

The two seal species encountered were the harbour seal (*Phoca vitulina*) and the grey seal (*Halicheros grypus*) (Table 4-2). The harbour seal was the most sighted species, with a haul out location adjacent to Location 2, near the port jetty (Figure 4-2).

Harbour seal were also recorded both hauled-out and travelling through the proposed development area (Figure 4-32, Figure 4-3). A grey seal (*Halichoerus grypus*) was recorded travelling through the port development area. Otter *Lutra lutra* was recorded at 20:39pm on the 22nd of July, near Location 1.

Figure 4-1- Harbour seal (*Phoca vitulina*) haul-out site location.

Figure 4-2- Harbour seal (*Phoca vitulina*) recorded hauled-out adjacent to the port jetty.

Figure 4-3- Harbour seal (*Phoca vitulina*) recorded travelling through the proposed development area.

There were 3 different behaviours recorded during the surveys, 'resting(bottling)', 'travelling', and 'hauled-out'. The 'resting("bottling")' (and 'travelling/resting("bottling")') behaviours are specific to the seal species which is displayed when a seal is resting vertically with only the head outside the surface of the water, and the nose pointing at the sky. All three behaviours were exhibited by the harbour seal (*Phoca vitulina*), with the greatest numbers recorded as 'Hauled-out'.

Table 4-3 lists all sightings information, including the time of each sighting and the behaviour recorded.

4.2.3 Incidental Species

A number of bird species were recorded as 'Incidental Species' during the MMO surveys. Photographs of these species were captured where possible and are listed below. Across the 5 survey dates, the following species were recorded:

- Figure 4-4Common tern (*Sterna hirundo*) (Figure 4-4)
- Black-headed gull (*Chroicocephalus ridibundus*)
- Little gull (*Hydrocoloeus minutus*)
- Grey heron (*Ardea cinerea*)
- Cormorant (*Phalacrocorax carbo*) (Figure 4-6)
- Shag (*Phalacrocorax aristotelis*)
- Mute swan (*Cygnus olor*)

- Great black-backed gull (*Larus marinus*) (Figure 4-5)
- Lesser black-blacked gull (*Larus fuscus*)
- Oystercatcher (*Haematopus ostralegus*)

Figure 4-4- Common tern (*Sterna hirundo)* foraging within the proposed development area.

Figure 4-5- Great black-backed gull (*Larus marinus*) captured in flight during MMO surveys.

Figure 4-6- A group of cormorants (*Phalacrocorax carbo*) resting on the rocky slope at the edge of the intertidal area.

Table 4-3- List of sightings and all information recorded at time of sighting.

Date	Sighting	Time (start)	Time (end)	Species	Group size	Behaviour	Direction of travel	Tide	Coordinates
22/07/24	1	20:38	20:39	Otter *Lutra lutra*	1	Travelling	W	High	51.836813, -8.3227001
23/07/24	1	12:10	Until 16:00 in same location	Harbour seal *Phoca vitulina*	10	Hauled out	na	Low	51.839099, -8.3301352
23/07/24	2	13:04	13:05	Harbour seal *Phoca vitulina*	1	Bottling	na	Low	51.835499, -8.3283341
23/07/24	3	14:14	14:15	Grey seal *Halichoerus grypus*	1	Travelling	W	Low	51.833484, -8.3263385
23/07/24	4	14:45	14:45	Grey seal *Halichoerus grypus*	1	Travelling	W	Low	51.835459, -8.3255017
30/07/24	1	12:58	13:01	Harbour Seal	1	Travelling	NW	High	51.835539, -8.304202
30/07/2024	1	13:22	13:30	Harbour Seal	1	Travelling	SE	High	51.834591, -8.305515
30/07/24	2	14:40	15:19	Harbour Seal	2	Travelling/Bottling	Back and Forth NW-SE	High	51.835001, -8.304182
30/07/24	2	15:26	15:45	Harbour Seal	2	Hauled out	N/A	High	51.834581, -8.305894
31/07/24	3	09:36	09:42	Harbour Seal	1	Travelling	NW	Low	51.840470, -8.315498
31/07/24	4	10:15	10:16	Harbour Seal	1	Travelling	NW	Low	51.8378583, -8.3110013
01/08/24	5	08:45	12:25	Harbour Seal	13-15	Hauled out	N/A	Low	51.839070, -8.330146
01/08/24	6	08:55	09:01	Harbour Seal	1	Travelling	NW	Low	51.8417429. -8.3200622
01/08/24	6	09:21	09:23	Harbour Seal	1	Travelling	NW	Low	51.8421708, -8.3218150

5. Discussion

There were no limitations on the Marine Mammal Observer surveys undertaken in 2024, weather conditions were ideal and suitable vantage points were selected to provide the best view of the proposed survey area. The results of the 2013 Marine Mammal Observer survey at the proposed development area noted one juvenile grey seal observed in the water approximately 50m south of Haulbowline Island, one seal (unidentified between grey or harbour) observed hauled out at the breakwater, and three harbour seals observed hauled out at the slip at Haulbowline Island.

The results of the 2024 surveys also reflect the use of the Ringaskiddy port area by both harbour and grey seal, with greater numbers of both recorded in the 2024 surveys than in 2013. This could be due to a greater presence of the species in the area since 2013, or the more favourable weather conditions of the 2024 surveys in comparison to those of 2013.

No cetaceans were observed in the 2024 or 2013 surveys however as noted in 2013, due to the transient nature of the cetacean movement patterns this does not indicate that the area is not visited by dolphins or porpoises. One otter was observed in the 2024 surveys. All seal species are strictly protected under Annex IV and Annex II, V of the Habitats Directive, respectively, and the otter is listed under Annex II of the Habitats Directive.

Comparing the 2013 and 2024 surveys show greater numbers of marine mammals present within the proposed development area. The ideal weather conditions, greater number of survey days, and varying vantage point locations used in the 2024 survey likely contributed to the increase in marine mammal sightings.

6. Conclusion

The 2024 Marine Mammal Observer surveys provide a robust baseline for the assessment of marine mammals present within the proposed development area. Of note, there is a greater number of harbour seal (*Phoca vitulina*) recorded within the area than previously noted in 2013, with the greatest number of species found in one haul-out location adjacent to the port jetty. Grey seal (*Halicheros grypus*) and otter (*Lutra lutra*) were also recorded during the 2024 surveys showing their presence in the proposed development area. Notably, a range of seabirds were recorded as incidental species, indicating the use of the area for foraging and commuting purposes for these species.

7. References

Joint Nature Conservation Committee (2017)-JNCC guidelines for minimising the risk of injury to marine mammals from geophysical surveys

National Biodiversity Data Centre (NBDC) Map Viewer- Accessed on 19th July 2024, and the 4th of September 2024.

Irish Whale and Dolphin Group (IWDG)-Sightings Database- Accessed on the 4th of September.

APPENDIX 9.10 MARINE BENTHIC REPORT

AYESA (Port of Cork)

Ringaskiddy Marine Benthic Ecology

AQUAFACT
APEM Group

AQUAFACT Ref: P15494

November 2024

COMMERCIAL IN CONFIDENCE

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1. Introduction

AQUAFACT - APEM Group (hereafter referred to as AQUAFACT) was commissioned by Ayesa on behalf of the Port of Cork Company to conduct marine ecology surveys as part of the preparation of an EIAR chapter on Marine Ecology for proposed developments at Ringaskiddy, Co. Cork.

Under the EU's Environmental Impact Assessment (EIA) Directive (2011/92/EU as amended by 2014/52/EU), major building or development projects in the EU must first be assessed for their impact on the environment. The proposed development site ("the Site") is located at the Port of Cork, Ringaskiddy, Co. Cork. The Site is centred at approximate Irish Transverse Mercator (ITM) coordinates 706992, 735455 and is *ca*. 0.4ha.

This intertidal and subtidal study focuses on the maritime area near the proposed redevelopment of Ringaskiddy. The Port of Cork Company (POCC) has completed major redevelopment at Ringaskiddy under the permitted Strategic Infrastructure Development (PA0035, with modifications). The main elements of these works are operational, but further permission is needed to complete remaining works due to EIA and AA requirements.

The remaining redevelopment at Ringaskiddy involves several key construction elements across multiple sites and are summarised below (also see redline boundaries Figure 1-1).

Ringaskiddy East (Container and Multi-purpose Berth (CB/MPB)):

- A Container Berth of approximately 200m in length (CCT 2)
- Dredging of the seabed to a level of -13.0 m Chart Datum (CD)
- Installation of link-span comprising a floating pontoon and access bridge
- Installation of container handling cranes
- Lighting and fencing

Ringaskiddy West (Deepwater Berth Extension):

- A new 182m extension to the existing Deepwater Berth (DWB) which will comprise a filled quay structure (of approximately 231m) extending no further seaward than the edge of the existing DWB
- Dredging works to varying levels to facilitate navigational access to the new facilities
- Lighting

Road Improvements:

Improvements to internal road network at Ringaskiddy East to facilitate future access to the N28

Lighting and fencing

The redevelopment also features Load on Load off (LoLo), Roll on and Roll off (RoRo), and general cargo operations, with specific quay structures, surfacing, and reclamation works. Key services such as drainage, lighting, and security systems will be installed to ensure the safe and efficient operation of the terminal.

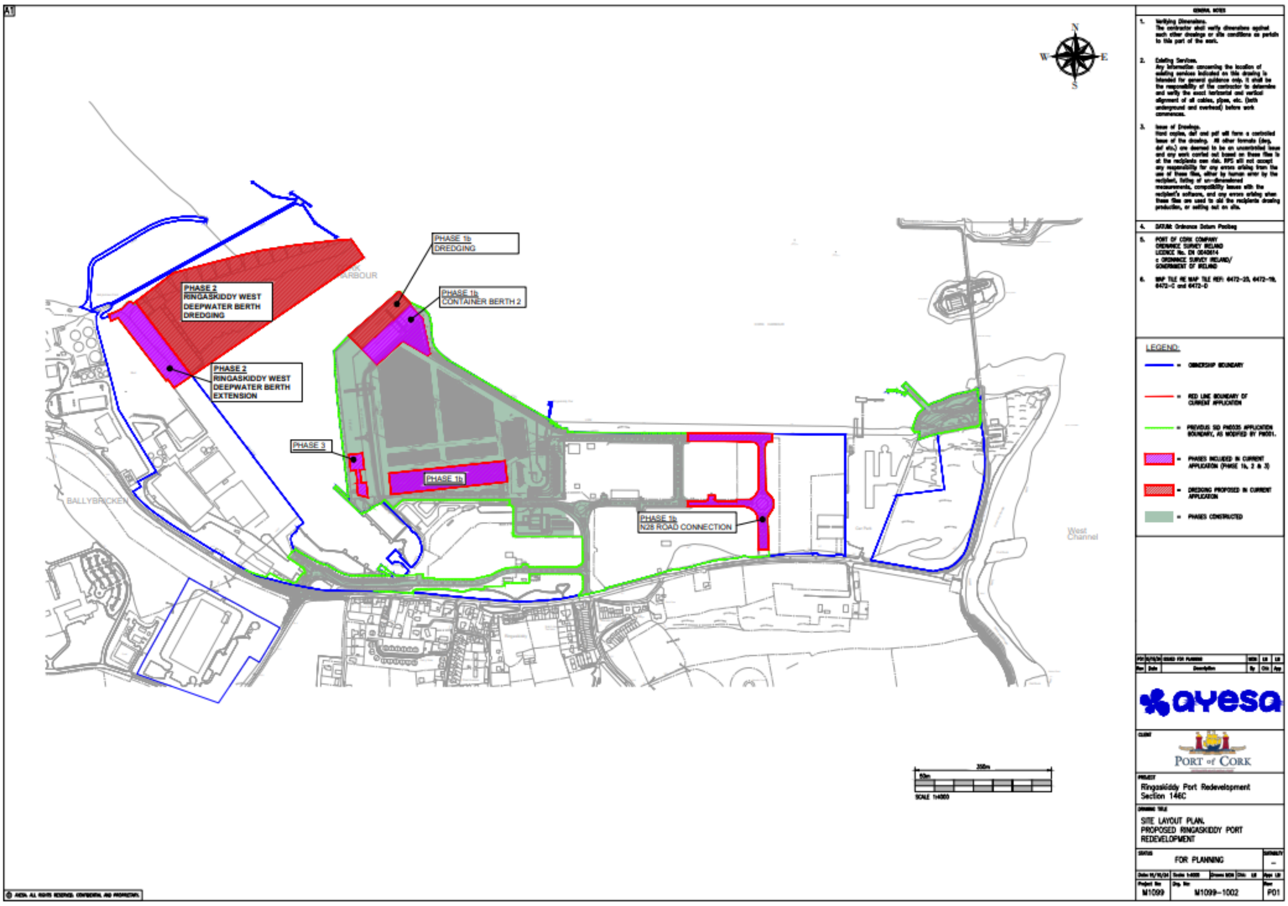

Figure 1-1: Ringaskiddy development site

2. Materials & Methods

2.1 Subtidal Benthic Grab Survey

The subtidal benthic grab survey took place on the 23rd of July 2024 using a $0.1m^2$ Day Grab on board the Port of Cork vessel the *Denis Murphy.* Figure 2.1 shows the locations of the subtidal and intertidal sample stations at Ringaskiddy.

Figure 2-1: Subtidal and Intertidal Survey Stations at Ringaskiddy

Table 2-1: 2024 Subtidal station coordinates.

Station	Latitude	Longitude
St. 1	51.83631	-8.32391
St. 2	51.83482	-8.32446
St. 3	51.83272	-8.32401
St. 4	51.83137	-8.32383
St. 5	51.83165	-8.3256
St. 6	51.83686	-8.33259
St. 7	51.83757	-8.33111
St. 8	51.83817	-8.32495
St. 9	51.8351	-8.32715
St. 10	51.838	-8.32422
St. 11	51.83951	-8.32159
St. 12	51.83706	-8.32204
St. 13	51.83753	-8.32155
St. 14	51.83817	-8.32097

2.1.1 Biological Sampling

AQUAFACT has in-house standard operational procedures for benthic sampling, and these were followed for this project. Additionally, AQUAFACT follows the NMBAQC standard for benthic sampling and analysis (Worsfold *et al.,* 2010). The subtidal biological samples were collected using a 0.1m^2 Day grab sampler at 14 stations listed in Table 2.1 above. On arrival at each sampling station, the vessel location was recorded using DGPS (Lat/Long & ING). A total of 14 sites were sampled, with 1 faunal grab and 1 sediment grab collected at each station. The grab failed to recover a sufficient sample for station 12 after three attempts and accordingly this station was abandoned. Only one grab was conducted for both station 04 and station 05 due to the proximity of these stations to the quay walls and the difficulty in manoeuvring the *Denis Murphy* in this area. For each of these stations the sediment sample for organic carbon analysis and sample for fauna analysis were taken from the same grab sample. The grab deployment and recovery rates did not exceed 1 metre/sec and were <0.5 m/sec for the last 5 metres for water depths up to 30m and for the last 10m for depths greater than 30m.

A digital image of each sample (including the sample label) was taken, and its reference number was entered in the sample data sheet. These images can be made available on request. The grab sampler was cleaned between stations to prevent cross contamination.

Each grab sample was carefully and gently sieved on a 1mm mesh sieve as a sediment water suspension for the retention of fauna. Great care was taken during the sieving process in order to minimise damage to taxa such as spionids, scale worms, phyllodocids and amphipods. The sample residue was carefully flushed into a pre-labelled (internally and externally) container from below. Each label contained the sample code and date. The samples were stained immediately with Eosin-briebrich scarlet and fixed with 4% w/v buffered formaldehyde solution (10% w/v buffered formaldehyde solution for very organic mud).

All grab returns were sieved on a 1mm mesh sieve and fixed in 6% w/v buffered formalin solution upon returning to the laboratory (within 24 hours).

An additional grab sample was collected at each station for sediment analysis (organic carbon and granulometry). Each sediment sample was placed in plastic sampling bags and labelled internally and externally. These samples were frozen (<-18ºC) as soon as possible after acquisition.

2.2 Intertidal Grab Survey

The Phase I walkover survey of the two intertidal transect locations took place at low tide on the 24th of July 2024. Initially it was planned to carry out the Phase II quantitative transect survey on foot to take core samples from the littoral zone. A dynamic risk assessment was carried out on site, and it was determined that the sediment type was not suitable to traverse across on foot and alternatively a decision was made to achieve the required sampling from a suitable vessel at high tide using a 0.25m^2 van Veen grab sampler. Grab sampling took place on the 12th of September 2024 on board the *Oisre.* A total of 6 stations were sampled along 2 transects, with 1 fauna sample and 1 sediment sample collected at each station. Footage of the sample area was captured using a drop-down video at each transect. Additionally, images of the shoreline were captured by the survey team during the first intertidal survey attempt on the 24th of July 2024. Figure 2.2 below shows the locations of the subtidal and intertidal sample stations at Ringaskiddy.

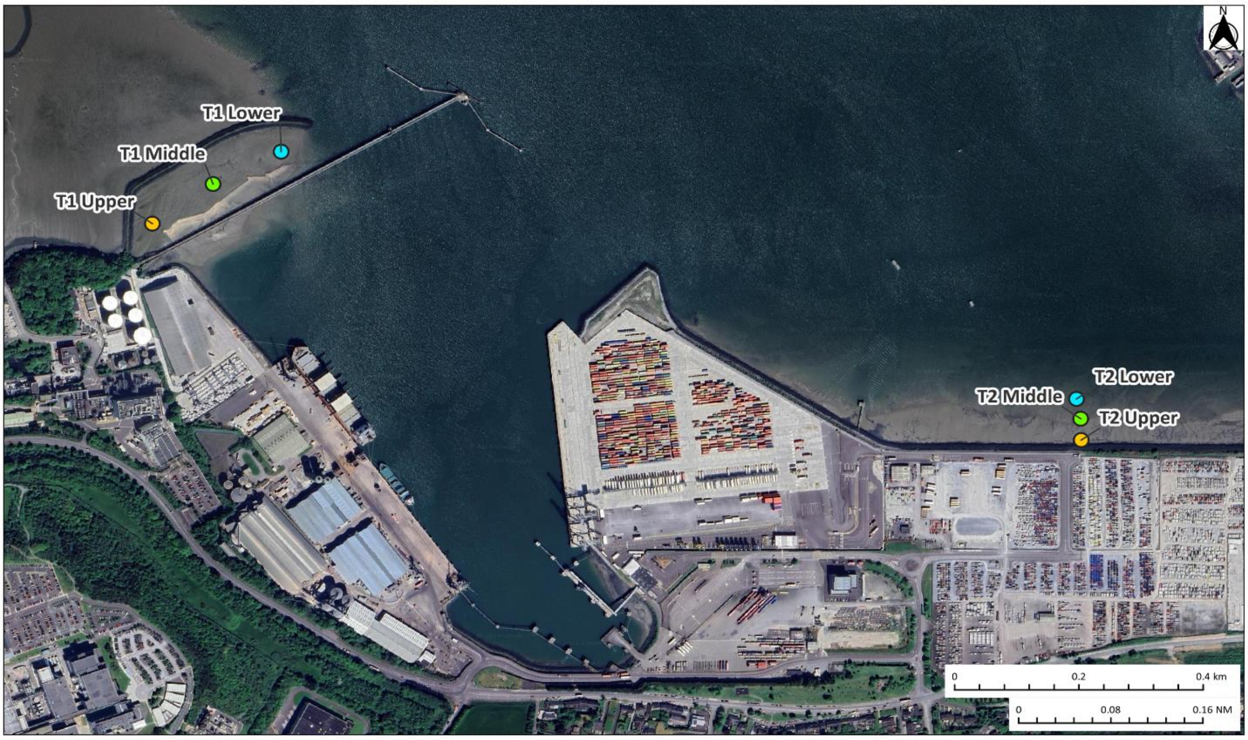

Figure 2-2: Locations of Ringaskiddy intertidal transect

Table 2-2: 2024 Intertidal station coordinates

Station	Latitude	Longitude
T1 Upp	51.8376	-8.3338
T1 Mid	51.83821	-8.33239
T1 Lwr	51.8387	-8.3308
T2 Upp	51.83438	-8.31209
T2 Mid	51.8347	-8.3121
T2 Lwr	51.835	-8.3122

2.2.1 Biological sampling

As the intertidal area at both transects was of soft thick mud, it was determined after a couple of attempts that it would not be safe to sample the intertidal from the shore. Instead, the decision as discussed above was taken to survey the transects at highwater from a Rigid Inflatable Boat (RIB) using a small van Veen grab (0.025 m^2) of the same volume as the intertidal cores. Triplicate cores were collected at each shore height (upper, middle, and lower) with an additional grab collected for sediment analysis. On arrival at each sampling station, the vessel location was recorded using DGPS (Lat/Long & ING). A digital image of each sample (including sample label) was taken and its reference number entered in the sample data sheet. These images can be made available on request. The grab sampler was cleaned between stations to prevent cross contamination.

Each sample was sieved and preserved upon return to the lab in the manner outlined for the subtidal grab samples.

2.3 Lab Analysis

2.3.1 Sample Processing

All faunal samples were placed in an illuminated shallow white tray and sorted first by eye to remove large specimens and then sorted under a stereo microscope (x 10 magnification). Following the removal of larger specimens, the samples were placed into Petri dishes, approximately one-half teaspoon at a time and sorted using a binocular microscope at x25 magnification.

The faunal samples were sorted into four main groups: Annelida, Mollusca, Arthropoda, and others. The 'others' group consisted of echinoderms, nematodes, nemerteans, cnidarians, and other lesser phyla. The fauna were maintained in stabilised 70% industrial methylated spirit (IMS) following retrieval and identified to species level where practical using a binocular microscope, a compound microscope and all relevant taxonomic keys. After identification and enumeration, specimens were pooled and stored station level.

2.3.2 Sediment Sampling

For the sediment samples, a sample was retrieved from the grab for granulometric analysis. A further sediment subsample was retrieved from the grab for loss on ignition (LOI) organic carbon content analysis. The samples were placed in plastic sampling bags and labelled internally and externally. These samples were frozen (<-18ºC) as soon as possible after acquisition. AQUAFACT carried out the sediment PSA (as described in Section 2.3.2.1 below) while sediment LOI organic carbon content analysis was carried out by the ALS Ltd. Laboratories, Co. Galway, using the Loss on Ignition technique (see Section 2.1.3.2 below for further details).

2.3.2.1 Particle Size Analysis

AQUAFACT carried out the PSA analysis in-house using the following methodology:

1. Approximately 100g of dried sediment (previously washed in distilled water and dried) was weighed out and placed in a labelled 1L glass beaker to which 100ml of a 6 percent hydrogen peroxide solution was added. This was allowed to stand overnight in a fume hood.
2. The beaker was placed on a hot plate and heated gently. Small quantities of hydrogen peroxide were added to the beaker until there was no further reaction. This peroxide treatment removed any organic material from the sediment which can interfere with grain size determination.

3. The beaker was then emptied of sediment and rinsed into a 63µm sieve. This was then washed with distilled water to remove any residual hydrogen peroxide. The sample retained on the sieve was then carefully washed back into the glass beaker up to a volume of approximately 250ml of distilled water.
4. 10ml of sodium hexametaphosphate solution was added to the beaker and this solution was stirred for ten minutes and then allowed to stand overnight. This treatment helped to dissociate the clay particles from one another.
5. The beaker with the sediment and sodium hexametaphosphate solution was washed and rinsed into a 63µm sieve. The retained sample was carefully washed from the sieve into a labelled aluminium tray and placed in an oven for drying at 100ºC for 24 hours.
6. The dried sediment was then passed through a Wentworth series of analytical sieves (>8,000 to 63µm; single phi units). The weight of material retained in each sieve was weighed and recorded. The material which passed through the 63µm sieve was also weighed and the value added to the value measured in Point 5 (above).
7. The total silt/clay fraction was determined by subtracting all weighed fractions from the initial starting weight of sediment as the less than 63µm fraction was lost during the various washing stages.
8. The following range of particle sizes were reported.: <63µm, >63 - <125µm, >125 - <250µm, >250 <500µm, >500 - <1000µm, >1000 - <2000µm, >2000 - <4000µm and >4000 - <8000µm.

Table 2.3 shows the classification of sediment particle size ranges into size classes. Sieves, which corresponded to the range of particle sizes were used in the analysis.

Table 2-3: The classification of sediment particle size ranges into size classes (adapted from Buchanan, 1984).

Range of Particle Size	Classification	Phi Unit
<63µm	Silt/Clay	>4 Ø
63-125 µm	Very Fine Sand	4 Ø, 3.5 Ø
125-250 µm	Fine Sand	3 Ø, 2.5 Ø
250-500 µm	Medium Sand	2 Ø, 1.5 Ø
500-1000 µm	Coarse Sand	1 Ø, 1.5 Ø
1000-2000 µm (1 – 2mm)	Very Coarse Sand	0 Ø, -0.5 Ø
2000 – 4000 µm (2 – 4mm)	Very Fine Gravel	-1 Ø, -1.5 Ø
4000 -8000 µm (4 – 8mm)	Fine Gravel	-2 Ø, -2.5 Ø
8 -64 mm	Medium, Coarse & Very Coarse Gravel	-3 Ø to -5.5 Ø
64 – 256 mm	Cobble	-6 Ø to -7.5 Ø
>256 mm	Boulder	< -8 Ø

2.3.2.2 Loss on Ignition Organic Carbon Analysis

The methodology outlined below was followed.

1. The collected sediments should be transferred to aluminium trays, homogenised by hand and dried in an oven at 100º C for 24 hours.
2. A sample of dried sediment should be placed in a mortar and pestle and ground down to a fine powder.
3. 1g of this ground sediment should be weighed into a pre-weighed crucible and placed in a muffle furnace at 450ºC for a period of 6 hours.
4. The sediment samples should be then allowed to cool in a desiccator for 1 hour before being weighed again.
5. The LOI organic content of the sample is determined by expressing as a percentage of the weight of the sediment after ignition over the initial weight of the sediment.

2.4 Data Analysis

2.4.1 Sediment Data

Organic content of sediment samples was determined for each sample by expressing it as a percentage the sediment weight loss following combustion over the initial weight of the sediment. In general, Loss Of carbon Ignition (LOI) correlates with sediment particle size with fine-grained sediments typically containing higher levels of organic matter than coarse sediments.

For the granulometric analysis of sediment samples, the <63 µm (Silt-Clay) fraction was determined by weight loss following wet sieving. Coarser fractions comprising the sediment samples were determined by mechanical dry sieving through a series of Wentworth sieves; >4mm (Fine Gravel), 2-4mm (Very Fine Gravel), 1-2mm (Very Coarse Sand), 0.5-1mm (Coarse Sand), 0.25-0.5mm (Medium Sand), 125-250µm (Fine Sand), 62.5-125µm (Very Fine Sand). For each station, the weight of each fraction of the sediment retained on the sieve was expressed as a percentage of the total sample. The relative proportion of sediments in each fraction was used to classify sediments at the station *sensu* Folk (1954).

2.4.2 Faunal Data

Uni- and multi-variate statistical analysis of the faunal data was undertaken using PRIMER v.6 (Plymouth Routines in Ecological Research).

2.4.2.1 Univariate Indices

Using PRIMER the faunal data was used to produce a range of univariate indices. Univariate indices are designed to condense species data in a sample into a single coefficient that provides quantitative estimates of biological variability (Heip *et al*., 1998; Clarke and Warwick, 2001). Univariate indices can be categorised as primary or derived indices.

Primary biological indices used in the current study include:

- number of taxa (S) in the samples and
- number of individuals (N) in the samples.

Derived biological indices, which are calculated based on the relative abundance of species in samples, used in the study include:

- Margalef's species richness index (D) (Margalef, 1958),

$$D = \frac{S - 1}{\log_2 N}$$

where: N is the number of individuals and S is the number of species

Margalef's species richness (D) is a measure of the total number of species present for a given number of individuals.

- Pielou's Evenness index (J) (Pielou, 1977)

$$J = \frac{H^{'}\,(\text{observed})}{H^{'}_{max}}$$

where: $H^{'}_{max}$ is the maximum possible diversity, which could be achieved if all species were equally abundant (= $\log_2 S$)

Pielou's evenness is a measure of how evenly the individuals are distributed among different species.

- Shannon-Wiener diversity index (H') (Pielou, 1977)

$$H^{'} = -\sum_{i=1}^{S} p_i(\log_2 p_i)$$

where: p_I is the proportion of the total count accounted for by the i^{th} taxa

Shannon-Wiener diversity index takes both species abundance and species richness into account quantify diversity (Shannon & Wiener, 1949).

- Simpson's Diversity Index (Simpson, 1949)

$$1\text{-}\lambda' = 1\text{-}\{\Sigma_i N_i(N_i\text{-}1)\} / \{N(N\text{-}1)\}$$

where N is the number of individuals of species i.

- The Shannon-Wiener based Effective Number of Species (ENS) (Hill, 1973; Jost, 2006)

$$H = \exp(H')$$

where H' is the Shannon-Wiener diversity index.

The Shannon-Wiener index diversity index is converted to ENS to reflect 'true diversities' (Hill, 1973, Jost, 2006) that can then be compared across communities (MacArthur, 1965; Jost, 2006). The ENS is equivalent to the number of equally abundant species that would be needed in each sample to give the same value of a diversity index, *i.e.,* Shannon-Wiener Diversity index. The ENS behaves as one might? intuitively expect when diversity is doubled or halved, while other standard indices of diversity do not (Jost, 2006). If the ENS of one community is twice that of another, then it can be said that the community is twice as diverse as the other.

2.4.2.2 Multivariate Analysis

The PRIMER programme (Clarke & Warwick, 2001) was used to carry out multivariate analyses on the station-by-station faunal data. All species abundance data from the grab surveys was square root transformed and used to prepare a Bray-Curtis similarity matrix in PRIMER. The square root transformation allows some of the less abundant species to play a part in the similarity calculation. Various ordination and clustering techniques can then be applied to the similarity matrix to determine the relationship between the samples.

Multidimensional scaling (MDS) is a technique that ordinates samples as points in 2D or 3D space based on similarity in species distribution data. MDS performed on the Bray-Curtis similarity matrix produce ordination maps whereby the placement of samples reflects the similarity of their biological communities, rather than their simple geographical location (Clarke & Warwick, 2001).

An indication of how well the similarity matrix is represented by the ordination is given by stress values calculated by comparing the interpoint distances in the similarity matrix with the corresponding interpoint distances on the ordinations. Perfect or near perfect matches are rare in field data, especially in the absence of a single overriding forcing factor such as an organic enrichment gradient. Stress values increase, not only with the reducing dimensionality (lack of clear forcing structure), but also with increasing quantity of data (it is a sum of the squares type regression coefficient). Clarke & Warwick (2001) have provided a classification of the reliability of MDS plots based on stress values, having compiled simulation studies of stress value behaviour and archived empirical data. This classification generally holds well for ordinations of the type used in this study. Their classification is given below:

- Stress value < 0.05: Excellent representation of the data with no prospect of misinterpretation.
- Stress value < 0.10: Good representation, no real prospect of misinterpretation overall structure, but very fine detail may be misleading in compact subgroups.
- Stress value < 0.20: This provides a useful picture, but detail may be misinterpreted, particularly nearing 0.20.
- Stress value 0.20 to 0.30: This should be viewed with scepticism, particularly in the upper part of the range, and discarded for a small to moderate number of points such as < 50.
- Stress values > 0.30: The data points are close to being randomly distributed in the ordination and not representative of the underlying similarity matrix.

Each stress value must be interpreted both in terms of its absolute value and the number of data points. In the case of this study, the moderate number of data points indicates that the stress value can be interpreted more or less directly. While the above classification is arbitrary, it does provide a framework that has proved effective in this type of analysis.

Hierarchical Agglomerative Clustering (HAC) is used to cluster samples based on between-sample similarities into groups in dendrograms. Similarity Profiling (SIMPROF) is used to test if differences between HAC derived similarity-based clusters are significant. Similarity Percentages (SIMPER) analysis can be used to determine the characterising species of each cluster of stations identified either arbitrarily (by eye) from HAC dendrograms or statistically using SIMPROF testing (Clarke and Warwick, 2001; Clarke and Gorley, 2006; Anderson *et al*., 2008).

The species, which are responsible for the grouping of samples in CLUSTER analyses, were identified using the PRIMER programme SIMPER (Clarke & Warwick, 1994). This programme determined the percentage contribution of each species to the dissimilarity/similarity within and between each sample group.

3. Results

3.1 Subtidal Faunal Results

The taxonomic identification of the benthic infauna across all 13 subtidal benthic stations surveyed at Ringaskiddy yielded a total count of 99 taxa, comprising 1,918 individuals ascribed to 8 phyla. Of the 99 taxa identified, 64 were identified to species level. The remaining 34 could not be identified to species level because they were juveniles, damaged, or indeterminate. The full faunal abundance species list can be seen in Appendix 1. Station 12 could not be sampled as the substrate was of large boulders.

Of the 99 taxa recorded, 2 were cnidarians (anemones, hydroids *etc.*), 1 was a nemertean (ribbon worm), 1 was a nematode (round worm), 29 were annelids (segmented worms), 38 were arthropods (crabs, shrimps, insects *etc*.), 24 were molluscs (mussels, cockles, snails etc.), 1 was a bryozoan (moss animal), and 3 were echinoderms (brittlestars, sea cucumbers *etc.*).

Four taxa accounted for over 55% of the faunal abundance: the bivalve Mytilidae juvenile (319 individuals, 16.63% abundance) and the polychaetes *Melinna palmata* (292 individuals, 15.22% abundance), *Nephtys* spp (damaged) (229 individuals, 11.94% abundance), and Ampharetidae (damaged) (222 individuals, 11.54% abundance).

3.1.1 Subtidal Univariate Analysis

Univariate statistical analyses were carried out on the station-by-station faunal data. As the same survey method and replication were used in both the intertidal and subtidal survey, all data was analysed together. The following parameters were calculated and can be seen in Table 3.1; Total Number of Taxa, Total number of Individuals, Richness, evenness, Shannon-Wiener diversity, Effective Number of Species (ENS), and Simpson's Diversity. Number of taxa ranged from 4 (St. 6 & St. 7) to 46 (St. 14). Number of individuals ranged from 22 (St. 6 & St. 7) to 401 (St. 13). Richness ranged from 0.97 (St. 6 & St. 7) to 8.05 (St. 14). Evenness ranged from 0.6 (St. 2) to 0.88 (St. 10). Shannon-Wiener diversity ranged from 0.55 (St. 7) to 2.96 (St. 11). Simpson's diversity ranged from 0.26 (St.7) to 0.93 (St. 10). Effective number of species ranged from 1.73 (St. 7) to 19.34 (St. 11), indicating that station St. 11 is over 11 times more diverse than St. 7. Figure 3.1 shows these community indices in graphical form.

Table 3-1: Univariate measures of community structure.

Station	No. Taxa	No. Individuals	Richness	Evenness	Shannon-Wiener Diversity	Effective Number of Species	Simpson's Diversity
	S	N	d	J'	H'(loge)	EXP(H')	1-Lambda
St1	31	131	6.15	0.84	2.89	17.97	0.92
St2	17	245	2.91	0.60	1.69	5.41	0.73
St3	16	121	3.13	0.70	1.95	7.03	0.81
St4	6	35	1.41	0.64	1.14	3.14	0.57
St5	7	30	1.76	0.80	1.56	4.77	0.77
St6	4	22	0.97	0.79	1.10	3.00	0.64
St7	4	22	0.97	0.40	0.55	1.73	0.26
St8	39	218	7.06	0.61	2.25	9.51	0.73
St9	8	195	1.33	0.64	1.33	3.80	0.61
St10	28	90	6.00	0.88	2.94	18.83	0.93
St11	37	141	7.27	0.82	2.96	19.34	0.91
St13	42	401	6.84	0.67	2.49	12.12	0.83
St14	46	267	8.05	0.72	2.75	15.67	0.86

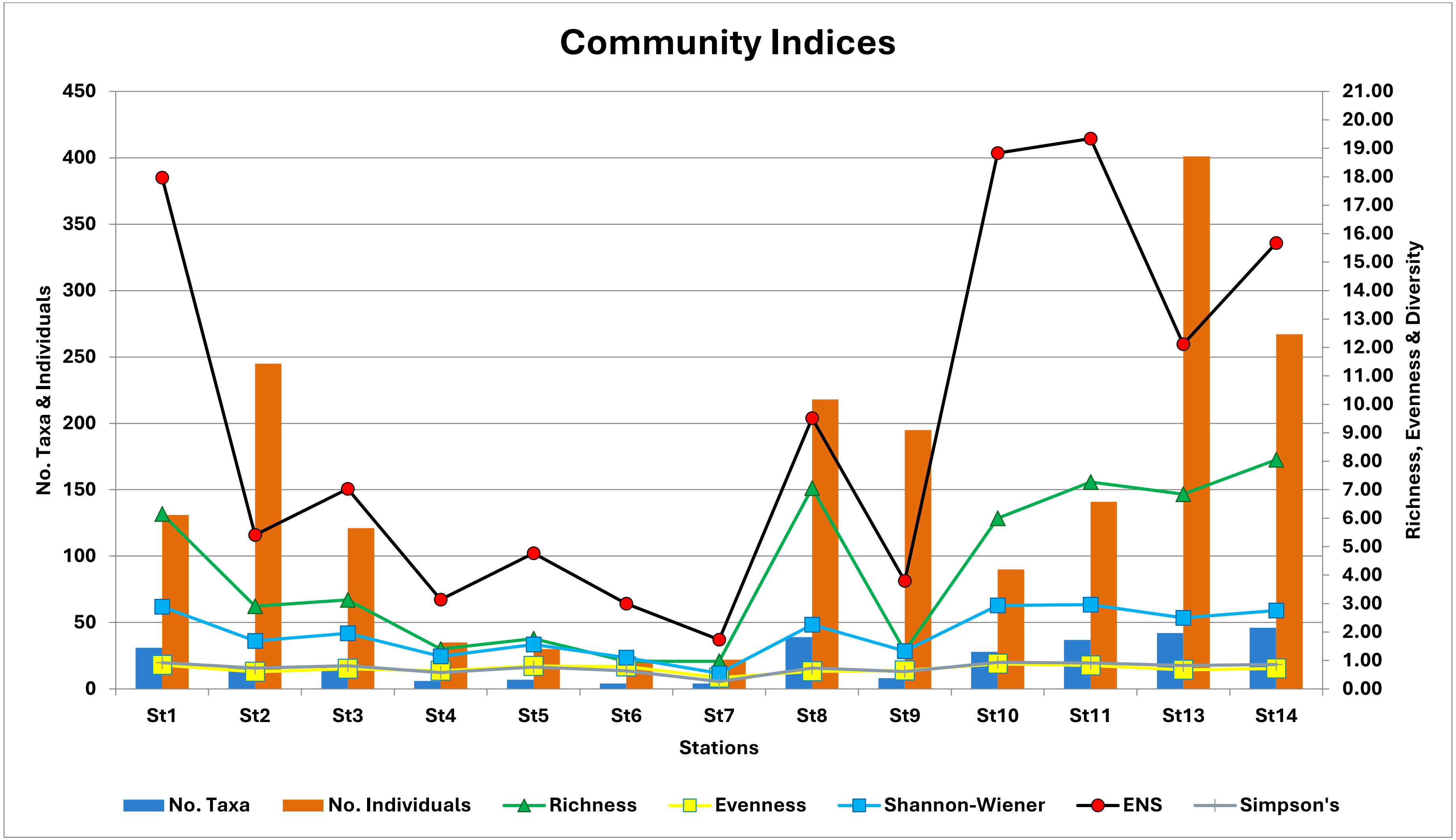

Figure 3-1: Subtidal community diversity indices. Diversity is expressed in Effective Number of Species (ENS), Shannon-Wiener Diversity index, and Simpson's Diversity index.

3.1.2 Subtidal Multivariate Analysis

The same data set used above for the univariate analyses was also used for the multivariate analyses. The dendrogram and the MDS plot can be seen in Figures 3.2 and 3.3, respectively. SIMPROF analysis revealed 4 statistically significant groupings between the 13 stations (the samples connected by red lines cannot be significantly differentiated). The stress level on the MDS plot indicates a good representation of the data with no real prospect of misinterpretation of the overall structure, but very fine detail may be misleading in compact subgroups.

A clear divide (79.95% dissimilarity) can be seen between **Group a** within the inner Ringaskiddy harbour area and those outside (**Groups b**, **c**, and **d**).

Group a consisted of stations St.2, St.3, St.4, St.5, St.6, St.7, and St.9. This group separated from all the other groups at a 79.95% dissimilarity level. Group a had a 46.89% within group similarity. This group contained 29 taxa comprising 670 individuals. Of the 29 taxa, 20 of the taxa were present twice or less. Six taxa accounted for over 93% of the faunal abundance: the molluscs Mytilidae (juvenile) (282 individuals, 42.09% abundance), *Peringia ulvae* (65 individuals, 9.7% abundance), and *Abra nitida* (53 individuals, 7.91% abundance) and the polychaetes *Nephtys* spp. (damaged) (133 individuals, 19.85% abundance), Ampharetidae (damaged) (52 individuals, 7.76% abundance), and *Nephtys hombergii* (38 individuals, 5.67% abundance). SIMPER analysis revealed the same taxa as characterising for this group. *Nephtys* spp. and *Nephtys hombergii* indifferent to enrichment and are typically present in low densities with non-significant variations over time. Mytilidae (juvenile *Mytilus edulis*), *Peringia ulvae,* and *Abra nitida* are tolerant of disturbance, occurring under normal conditions, but their populations are stimulated by organic enrichment. Group a stations exhibit elements of the JNCC biotopes 'SS.SMu.IFIMu.CerAnit *Cerastoderma edule* with *Abra nitida* in infralittoral mud' (EUNIS code A5.341) (Tillin & Tyler-Walters, 2016) and 'SS.SSa.IMuSa.SsubNhom *Spisula subtruncata* and *Nephtys hombergii* in shallow muddy sand' (EUNIS code A5.244) (Tillin, 2016).

Group b consisted of one station, St. 11. This group separated from Groups c and d at 60.96% dissimilarity level. Group b contained 37 taxa comprising 141 individuals. Of the 37 taxa, 23 were present twice or less. Six taxa accounted for almost 57% of the faunal abundance: the polychaetes *Melinna palmata* (35 individuals, 24.82% abundance), *Galathowenia oculata* (10 individuals, 7.09% abundance) *Lumbrineris cingulata* aggregate (6 individuals, 4.26% abundance), the crustaceans *Bodotria scorpioides* (12 individuals, 8.51% abundance) and *Euphilomedes sinister* (10 individuals, 7.09% abundance) and the bivalves Mytilidae (juvenile) (7 individuals, 4.96% abundance. SIMPER analysis could not be carried out as the groups contained only one station. *Bodotria scorpioides* is indifferent to enrichment and is typically present in low densities with non-significant variations over time. *Melinna palmata, Galathowenia oculata,* Mytilidae (juvenile *Mytilus edulis*), and *Lumbrineris cingulata* aggregate are tolerant of disturbance, occurring under normal conditions, but their populations are stimulated by organic enrichment. Group b can be classified as belonging to the JNCC biotope 'SS.SMu.ISaMu.MelMagThy *Melinna palmata* with *Magelona* spp. and *Thyasira* spp. in infralittoral sandy mud' (EUNIS code A5.334) (De-Bastos, 2016).

Group c contained stations St. 13 and St 14. This group separated from Group d at a 56.57% dissimilarity level and had a within group similarity of 61.78%. This group contained 60 taxa comprising 668 individuals. Of the 60 taxa, 36 were present twice or less. Nine species accounted for over 74% of the faunal abundance: the polychaetes Ampharetidae (damaged) (157 individuals, 23.5% abundance), *Melinna palmata* (119 individuals, 17.81% abundance), *Nephtys* spp. (damaged) (57 individuals, 8.53% abundance), and *Ampharete lindstroemi* aggregate (25 individuals, 3.74% abundance), the amphipod *Ampelisca tenuicornis* (48 individuals, 7.19% abundance), the bivalves *Abra nitida* (29 individuals, 4.34% abundance) and Mytilidae (juvenile *Mytilus edulis*) (22 individuals, 3.29% abundance), and the gastropods *Tragula fenestrata* (21 individuals, 3.14% abundance) and *Odostomia unidentata* (20 individuals, 2.99% abundance). SIMPER analysis could not be carried out as the group only contained 2 stations. *Ampelisca tenuicornis* are very sensitive to organic enrichment and are present in unpolluted conditions. *Nephtys* spp., *Tragula fenestrata,* and *Odostomia unidentata* are indifferent to enrichment and are typically present in low densities with non-significant variations over time. *Melinna palmata, Abra nitida,* and *Ampharete lindstroemi* aggregate are tolerant of disturbance, occurring under normal conditions, but their populations are stimulated by organic enrichment. Group c can be classified as belonging to the JNCC biotope 'SS.SMu.ISaMu.MelMagThy *Melinna palmata* with *Magelona* spp. and *Thyasira* spp. in infralittoral sandy mud' (EUNIS code A5.334) (De-Bastos, 2016).

Group d contained stations St. 1, St. 8, and St 10. This group separated from Group c at a 56.57% dissimilarity level and had a within group similarity of 51.71%. This group contained 59 taxa comprising 439 individuals. Of the 59 taxa, 33 were present twice or less. Seven species accounted for over 61% of the faunal abundance: the polychaetes *Melinna palmata* (137 individuals, 31.21% abundance), *Nephtys* spp. (damaged) (34 individuals, 7.74% abundance), *Notomastus* sp. (32 individuals, 7.29% abundance), and *Phyllodoce mucosa* (12 individuals, 2.73% abundance) the amphipod *Ampelisca* sp. (damaged) (26 individuals, 5.92% abundance), the cumacean *Bodotria scorpioides* (14 individuals, 3.19% abundance), and the gastropod *Peringia ulvae* (14 individuals, 3.19% abundance). SIMPER analysis further revealed the bivalves Veneridae (juvenile), *Kurtiella bidentata,* and *Cerastoderma edule*, and the holothurian *Paraleptopentacta elongata* as characterising taxa of this group. *Ampelisca* spp. are very sensitive to organic enrichment and are present in unpolluted conditions. *Nephtys* spp. and *Bodotria scorpioides* are indifferent to enrichment and are typically present in low densities with non-significant variations over time. *Melinna palmata, Notomastus, Peringia ulvae,* and *Phyllodoce mucosa* are tolerant of disturbance, occurring under normal conditions, but their populations are stimulated by organic enrichment. Group d can also be classified as belonging to the JNCC biotope SS.SMu.ISaMu.MelMagThy *Melinna palmata* with *Magelona* spp. and *Thyasira* spp. in infralittoral sandy mud (EUNIS code A5.334).

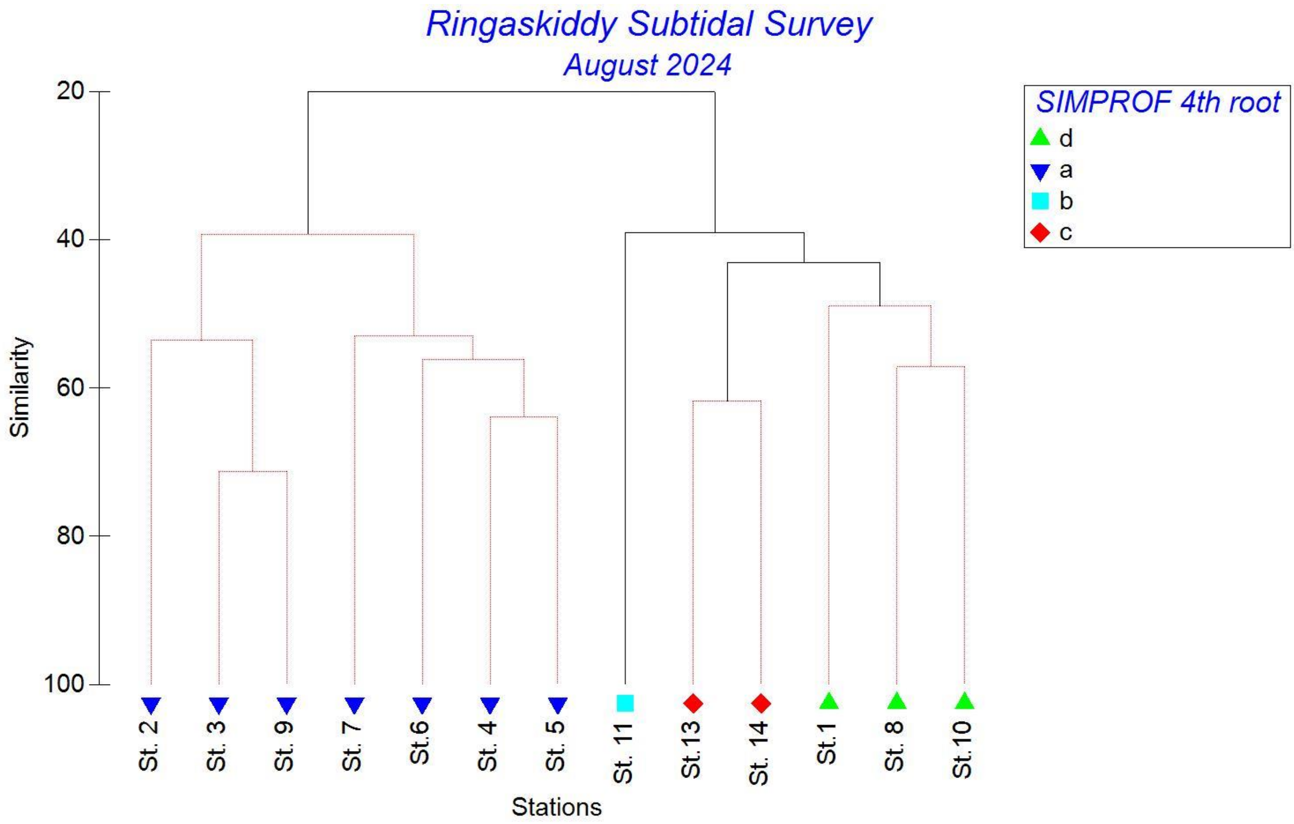

Figure 3-2: Dendrogram produced from Cluster analysis of the subtidal data.

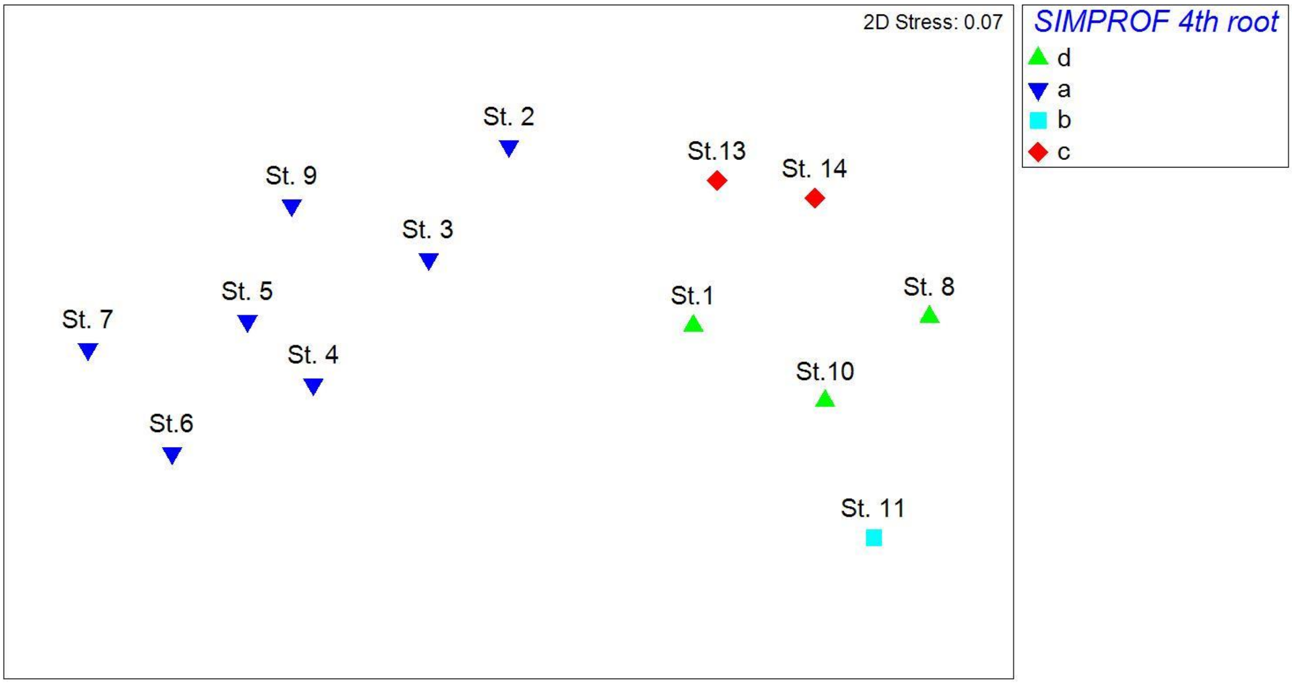

Figure 3-3: MDS Plot of the subtidal data.

3.1 Intertidal Walkover Survey

Walkover surveys of the upper shore areas of Transect 1 and Transect 2 revealed sloped rock armour boulders leading onto a shore of thick fine mud. As outlined above, attempts to retrieve cores along the upper, middle, and lower shores proved a safety risk and an alternative method of sampling from a RIB at highwater was employed. The results of the intertidal faunal grab survey are presented in section 3.3 below.

3.1.1 Transect 1 location

Transect 1 was previously surveyed in 2014. This location is situated to the south of the training wall and north of the ADM jetty. Figure 3.4. illustrates the locations of the intertidal faunal grab stations. The upper shore rock armour along the training wall has a zonation typical of hard substrates in this sheltered muddy mid estuarine location. Figure 3.5 illustrates this zonation adjacent to the intersection of the training wall and the jetty. Sloping stable boulders in the supralittoral has a community of yellow and grey lichens including *Xanthoria parietina, Caloplaca marina*, and *Hydropunctaria maura* (formerly *Verrucaria maura*). This can be classified as the JNCC biotope 'LR.FLR.Lic.YG – Yellow and grey lichens on supralittoral rock' (EUNIS code B3.111) (Tyler-Walters, 2016). This band transitions into a narrow upper rocky shore biotope characterised by *Pelvetia canaliculata* and *Fucus spiralis* ('LR.LLR.F.Fspi – *Fucus spiralis* on sheltered upper eulittoral rock' (EUNIS code A1.312)(Perry, 2015)). This biotope then transitions into a band dominated by *Ascophylum nodosum* and *Vertebrata lanosa* with some *Ulva* spp. ('LR.LLR.F.Asc.FS – *Ascophyllum nodosum* on full salinity mid eulittoral rock' (EUNIS code A1.3141)(Perry & Hill, 2020)).

Beneath the ADM jetty there is an extensive area of mussel bed that was previously recorded in the 2008 and 2014 surveys and remains relatively unchanged since the last surveys. This mussed bed can be seen in Figure 3.6 and it can be classified as 'LS.LBR.LMus.Myt.Mu - *Mytilus edulis* beds on littoral mud' (EUNIS code A2.7213)(Tillin & Mainwaring, 2018).

Figure 3-4: Intertidal Transect 1 station locations.

Figure 3-5: Rock armour zonation in upper shore along Transect 1.

Figure 3-6: Transect 1 Intertidal mussel beds beneath ADM Jetty.

3.1.2 Transect 2 location

Transect 2 was not surveyed previously. This transect is located along the quay wall to the east of the proposed 160m quay wall extension and to the west of the bridge at Paddy’s Point. The location was chosen as a representative intertidal location downstream from the proposed extension and likely to be influenced by the proposed works. Figure 3.7. illustrates the locations of the intertidal faunal grab stations. The upper shore rock armour along the quay wall is similar to Transect 1. Figure 3.8 illustrates this zonation. Sloping stable boulders in the supralittoral has a community of yellow and grey lichens including *Xanthoria parietina, Caloplaca marina*, and *Hydropunctaria maura* (formerly *Verrucaria maura*). (‘LR.FLR.Lic.YG – Yellow and grey lichens on supralittoral rock’ (EUNIS code B3.111). This band transitions into a narrow upper rocky shore biotope characterised by *Pelvetia canaliculata* and *Fucus spiralis* (‘LR.LLR.F.Fspi – *Fucus spiralis* on sheltered upper eulittoral rock’ (EUNIS code A1.312)). This biotope then transitions into a band dominated by *Ascophylum nodosum* and *Vertebrata lanosa* with some *Ulva* spp. (‘LR.LLR.F.Asc.FS – *Ascophyllum nodosum* on full salinity mid eulittoral rock’ (EUNIS code A1.3141)).

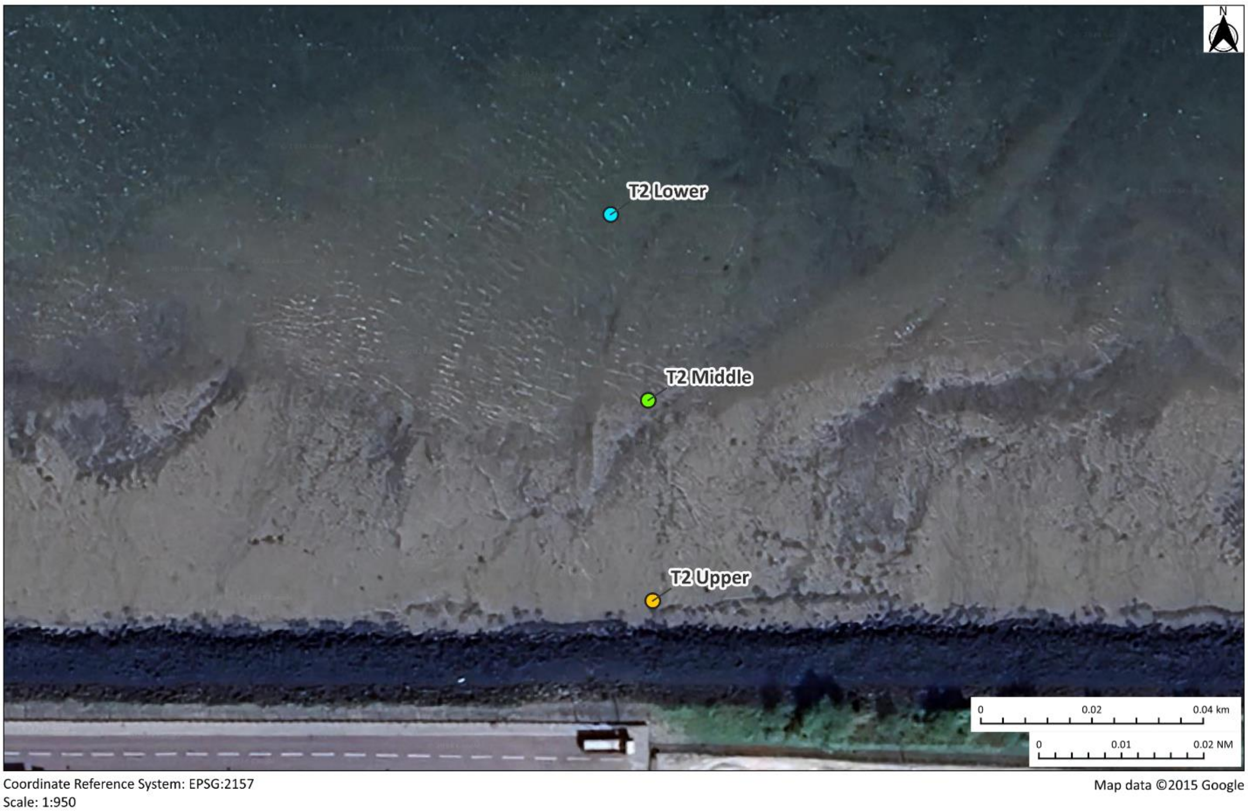

Figure 3-7: Transect 2 station locations.

Figure 3-8: Rock armour zonation in upper shore along Transect 2.

3.2 Intertidal Faunal Results

The taxonomic identification of the benthic infauna across the six stations of the two intertidal transects surveyed at Ringaskiddy yielded a total count of 72 taxa, comprising 1,664 individuals ascribed to 6 phyla. Of the 72 taxa identified, 37 were identified to species level. The remaining 35 could not be identified to species level because they were juveniles, damaged, or indeterminate. The full faunal abundance species list can be seen in Appendix 1.

Of the 72 taxa recorded, 1 was a cnidarian (hydroid), 2 were nemerteans (ribbon worm), 1 was a nematode (round worm), 27 were annelids (segmented worms), 23 were arthropods (crabs, shrimps, insects *etc*.), and 18 were molluscs (mussels, cockles, snails etc).

Six taxa accounted for over 69% of the faunal abundance and all were present in each station: the oligochaete *Tubificoides benedii* (616 individuals, 37.02% abundance), Nematoda (163 individuals, 9.8% abundance), the polychaetes *Melinna palmata* (118 individuals, 7.09% abundance) and *Nephtys hombergii* (98 individuals, 5.89% abundance), the bivalve *Cerastodema edule* (104 individuals, 6.25% abundance), and the amphipod *Gammarus locusta* (58 individuals, 3.49% abundance).

3.2.1 Intertidal Univariate Analysis

Univariate statistical analyses were carried out on the combined replicates of the station-by-station faunal data. The following parameters were calculated and can be seen in Table 3.2; Total Number of Taxa, Total number of Individuals, Richness, Evenness, Shannon-Wiener diversity, Simpson's diversity and Effective Number of Species (ENS). Number of taxa ranged from 23 (T2 Upper and T2 Mid) to 33 (T1 Mid). Number of individuals ranged from 147 (T1 Lower) to 603 (T2 Upper). Richness ranged from 3.44 (T2 Upper) to 6.01 (T1 Lower). Evenness ranged from 0.47 (T2 Upper) to 0.87 (T2 Lower). Shannon-Wiener diversity ranged from 1.48 (T2 Upper) to 2.88 (T1 Lower). Simpson's diversity ranged from 0.54 (T2 Upper) to 0.93 (T1 Lower) Effective number of species ranged from 4.39 (T2 Upper) to 17.82 (T1 Lower), indicating that station T2 upper is over 4 times more diverse than T2 Upper. Figure 3.9 shows these community indices in graphical form.

Table 3-2: Univariate measures of intertidal community structure.

Station	No. Taxa	No. Individuals	Richness	Evenness	Shannon-Wiener Diversity	Effective Number of Species	Simpson's Diversity
	S	N	d	J'	H'(loge)	EXP(H')	1-Lambda
T1 Upp	24	288	4.06	0.66	2.11	8.24	0.82
T1 Mid	33	247	5.81	0.65	2.27	9.68	0.81
T1 Lwr	31	147	6.01	0.84	2.88	17.82	0.93
T2 Upp	23	603	3.44	0.47	1.48	4.39	0.54
T2 Mid	23	196	4.17	0.82	2.58	13.18	0.91
T2 Lwr	24	183	4.42	0.87	2.75	15.65	0.92

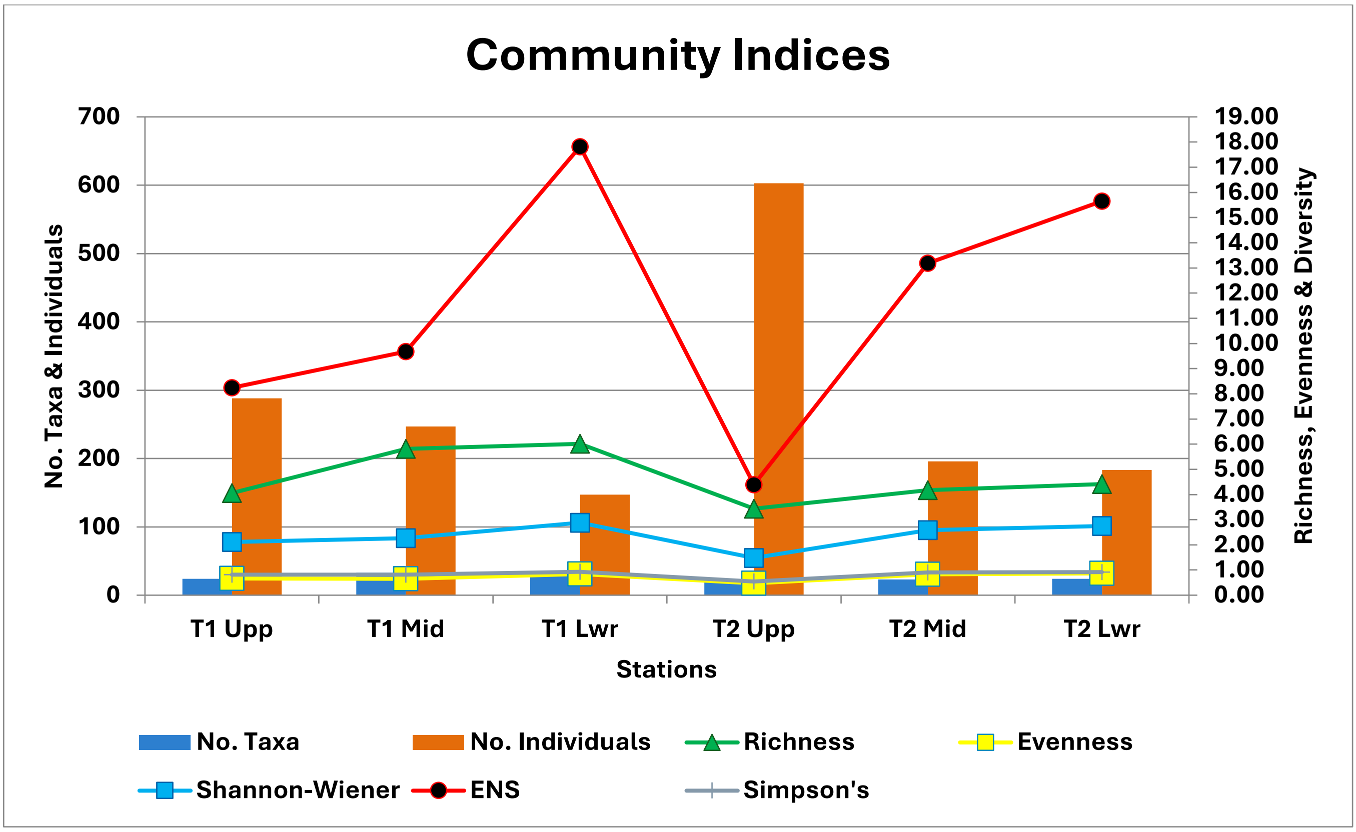

Figure 3-9: Intertidal community diversity indices. Diversity is expressed in Effective Number of Species (ENS), Shannon-Wiener Diversity index, and Simpson's Diversity index.

3.2.2 Intertidal Multivariate Analysis

The same data set used above for the intertidal univariate analyses was also used for the multivariate analyses. The dendrogram and the MDS plot can be seen in Figures 3.10 and 3.11, respectively. SIMPROF analysis revealed 2 statistically significant groupings between the 6 stations (the samples connected by red lines cannot be significantly differentiated). The stress level on the MDS plot indicates an excellent representation of the data with no prospect of misinterpretation of the structure.

A clear divide (57.87% dissimilarity) can be seen between **Group a** and **Group b**.

Group a consisted of stations T1 Lower, T2 Upper, T2 Mid, and T2 Lower. This group separated from Group b at a 57.87% dissimilarity level. Group a had a 54.02% within group similarity. This group contained 49 taxa comprising 1,129 individuals. Of the 49 taxa, 22 of the taxa were present twice or less. Six taxa accounted for over 70% of the faunal abundance: the oligochaete *Tubificoides benedii* (433 individuals, 38.35% abundance), the polychaetes *Melinna palmata* (113 individuals, 10.01% abundance) and *Nephtys hombergii* (83 individuals, 7.35% abundance), the bivalve *Cerastodema edule* (69 individuals, 6.11% abundance), Nematoda (49 individuals, 4.34% abundance), and the amphipod *Microprotopus maculatus* (58 individuals, 3.49% abundance). SIMPER analysis further revealed *Gammarus* sp. and Cirratulidae (damaged) as additional characterising for this group. *Tubificoides benedii* is a first order opportunist that proliferates in reduced sediments. Cirratulidae are second order opportunistic species present in slight to pronounced unbalanced conditions. *Melinna palmata, Cerastoderma edule,* and Nematoda are tolerant of disturbance, occurring under normal conditions, but their populations are stimulated by organic enrichment. *Nephtys hombergii* indifferent to enrichment and are typically present in low densities with non-significant variations over time. *Microprotopus maculatus* and *Gammarus* sp. are very sensitive to organic enrichment and are present in unpolluted conditions.
Group a stations exhibit elements of the JNCC biotopes ‘SS.SMu.SMuVS.AphTubi *Aphelochaeta marioni* and *Tubificoides* spp. in variable salinity infralittoral mud’ (EUNIS code A5.322) (De-Bastos & Hiscock, 2016) and ‘LS.LMx.Mx.CirCer Cirratulids and *Cerastoderma edule* in littoral mixed sediment’ (EUNIS A2.421) (Tillin & Marshall, 2016).

Group b consisted of stations T1 Upper and T1 Mid. This group separated from Group a at a 57.87% dissimilarity level. Group b had a 48.05% within group similarity. This group contained 44 taxa comprising 535 individuals. Of the 44 taxa, 24 of the taxa were present twice or less. Six taxa accounted for over 76% of the faunal abundance: the oligochaetes *Tubificoides benedii* (183 individuals, 334.21% abundance) and *Tubificoides brownae* (25 individuals, 4.67% abundance), Nematoda (114 individuals, 21.31% abundance), the bivalve *Cerastoderma edule* (35 individuals, 6.54% abundance), the amphipod *Gammarus locusta* (34 individuals, 63.6% abundance), and the gastropod *Peringia ulvae* (18 individuals, 3.36% abundance) SIMPER analysis could not be carried out as the group only contained 2 stations. *Tubificoides benedii* is a first order opportunist that proliferates in reduced sediments. *Cerastoderma edule,* Nematoda, and *Peringia ulvae* are tolerant of disturbance, occurring under normal conditions, but their populations are stimulated by organic enrichment. *Gammarus locusta* are very sensitive to organic enrichment and are present in unpolluted conditions.

Group b stations also exhibit elements of the JNCC biotopes 'LS.LMx.Mx.CirCer Cirratulids and *Cerastoderma edule* in littoral mixed sediment (EUNIS A2.421) (Tillin & Marshall, 2016).

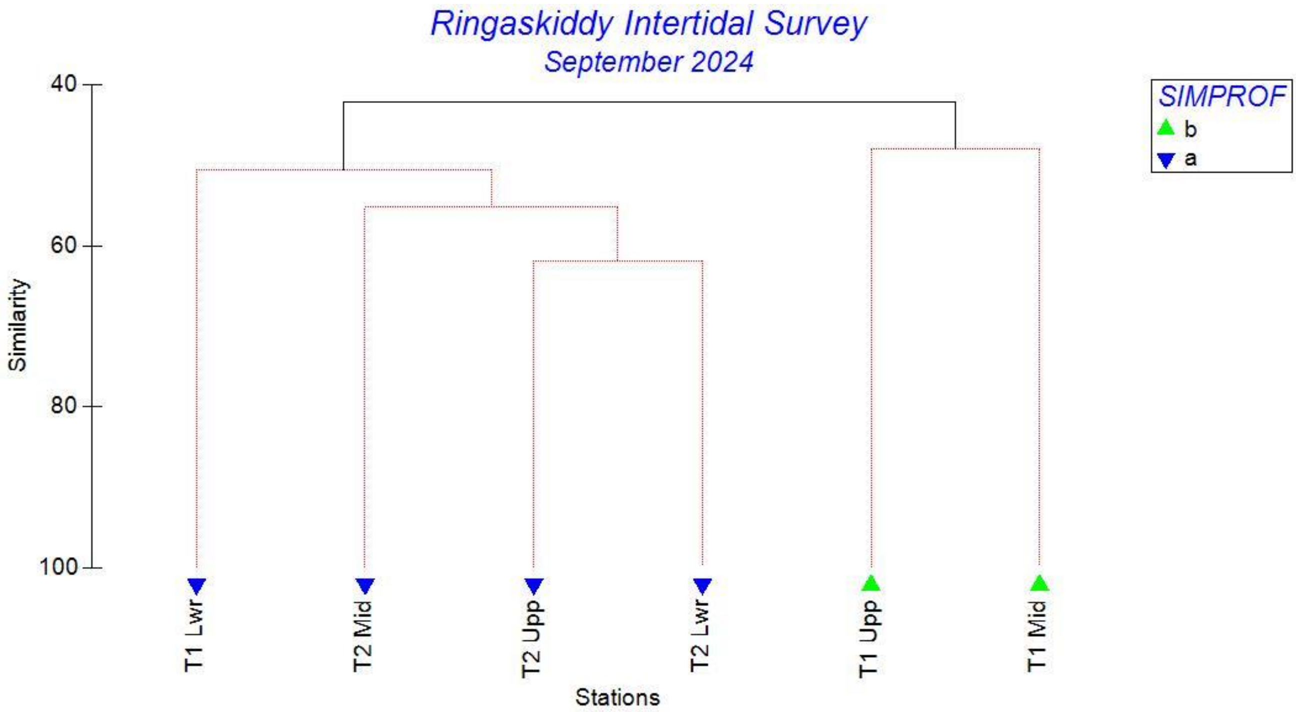

Figure 3-10: Dendrogram produced from Cluster analysis of the intertidal data

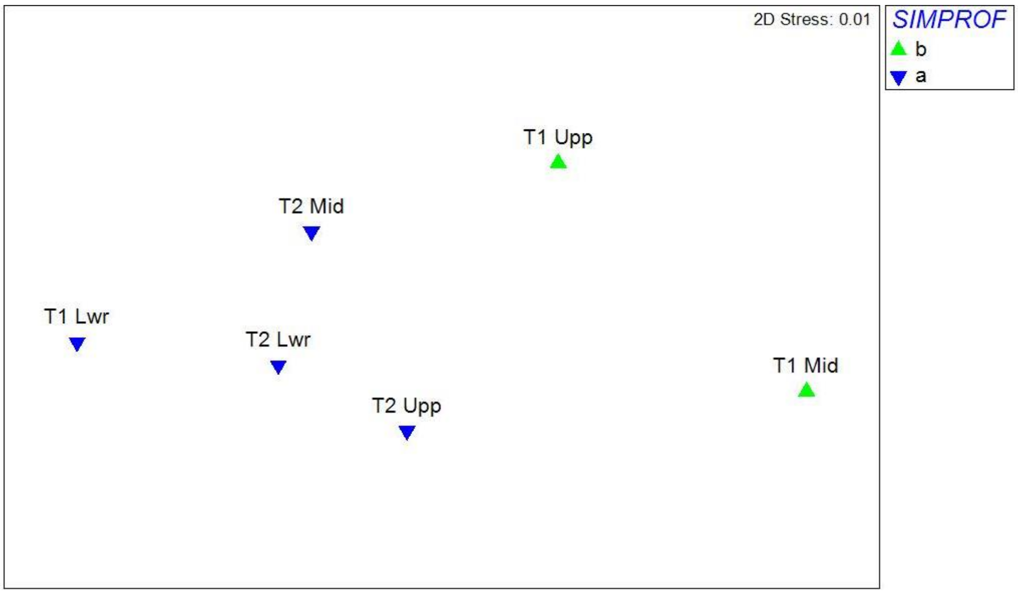

Figure 3-11: MDS plot of the intertidal data.

3.3 Sediment Results

3.3.1 Subtidal Sediments

Table 3.3 shows the sediment characteristics of the subtidal stations surveyed including the granulometry and the percentage organic carbon.

The sediment sampled within the study area was classified as muddy sand, gravelly sand, gravelly muddy sand, and slightly gravelly muddy sand according to Folk (1954). Highest levels of medium gravel-boulders, fine gravel and very fine gravel were recorded at St. 4 (9.8%, 11.7%, and 14.6% respectively). Highest levels of very coarse sand and coarse sand were found at St. 14 (20.2% and 18.1% respectively). Highest levels of medium sand were recorded at St. 6 (13.6%). Highest levels of fine sand were found at St. 1 (13.9%). Highest levels of very fine sand were found at St. 7 (28.9%) and highest levels of silt-clay were found at St. 13 (56.5%). Figure 3.12 shows the breakdown of sediment composition at each station and Figure 3.13 illustrates the sediment type according to Folk (1954).

Organic matter values ranged from 5.81% (St.14) to 10.15% (St. 2) in the subtidal stations.

3.3.2 Intertidal Sediments

Table 3.4 shows the sediment characteristics of the intertidal stations surveyed including the granulometry and the percentage organic carbon.

The sediment sampled within the study area was classified as muddy sand, gravelly muddy sand, and slightly gravelly muddy sand according to Folk (1954). No stations had medium gravel-boulders. Highest levels of fine gravel and very fine gravel were recorded at T1 Mid (2.7% and 8.2% respectively). Highest levels of very coarse sand were recorded at T1 Upper (14.7%). Highest levels of coarse sand were found at T1 Lower (9.1%). Highest levels of medium sand were recorded at T2 Lower (10.5%). Highest levels of fine sand were found at T2 Mid (53.9%). Highest levels of very fine sand were found at T1 Mid (38.9%) and highest levels of silt-clay were found at T1 Upper (34.9%). Figure 3.13 shows the breakdown of sediment composition at each station and Figure 3.14 illustrates the sediment type according to Folk (1954).

Organic matter values ranged from 3.6% (T2 Mid) to 6.22% (T1 Lower) in the intertidal stations.

Table 3-3: Sediment characteristics of the benthic faunal stations sampled. LOI refers to the % organic carbon loss on ignition.

Station	>8mm	Fine Gravel (4-8mm)	Very Fine Gravel (2-4mm)	Very Coarse Sand (1-2mm)	Coarse Sand (0.5-1mm)	Medium Sand (0.25-0.5mm)	Fine Sand (125-250mm)	Very Fine Sand (62.5-125mm)	Silt-Clay (<63mm)	Folk (1954)	
St1	0	0.6	3.8	12.9	12.5	11.1	13.9	13.5	31.7	Slightly Gravelly Muddy Sand	8.55
St2	0	0	2.5	15.9	13	10.9	11.9	16.5	29.3	Slightly Gravelly Muddy Sand	10.15
St3	0	0.5	0.2	14.9	14.2	11.1	18	13.7	27.4	Muddy Sand	9.54
St4	9.8	11.7	14.6	15.9	12.9	9	4.8	7.8	13.5	Gravelly Muddy Sand	9.87
St5	0	1.9	1.4	16.1	15	11.1	12.1	16	26.4	Slightly Gravelly Muddy Sand	8.55
St6	0	0	0.1	9.9	13.9	13.6	5.5	19.2	37.9	Muddy Sand	9.08
St7	0	0.3	0.5	11.8	8.7	6.5	11.4	28.9	31.9	Muddy Sand	6.19
St8	0	4.8	4.1	11.5	11.1	10.9	1.5	26.3	29.7	Gravelly Muddy Sand	8.31
St10	0	0.3	0.8	12.8	12.5	8.7	1.7	11.3	51.9	Gravelly Muddy Sand	6.74
St11	0	0.1	0.8	10.7	10	7.4	4.7	18.9	47.4	Gravelly Sand	7.57
St13	0	0	0.2	7.2	5.3	5.1	5.8	20	56.5	Muddy Sand	8.38
St14	0	0.4	0	20.2	18.1	13	6.4	7.8	34.1	Slightly Gravelly Muddy Sand	5.81

Table 3-4: Sediment characteristics of the Intertidal faunal stations sampled. LOI refers to the % organic carbon loss on ignition.

Station	>8mm	Fine Gravel (4-8mm)	Very Fine Gravel (2-4mm)	Very Coarse Sand (1-2mm)	Coarse Sand (0.5-1mm)	Medium Sand (0.25-0.5mm)	Fine Sand (125-250mm)	Very Fine Sand (62.5-125mm)	Silt-Clay (<63mm)	Folk (1954)	LOI
T1 Upp	0	2.5	2.2	14.7	7.9	8.6	10.8	18.5	34.9	Slightly Gravelly Muddy Sand	5.47
T1 Mid	0	2.7	8.2	10.4	5.5	7	2.6	38.9	24.6	Gravelly Muddy Sand	5.78
T1 Lwr	0	1.2	3.3	14	9.1	9	5.8	27	30.6	Slightly Gravelly Muddy Sand	6.22
T2 Upp	0	0	0.5	10	6.9	9.5	33.5	12.8	26.9	Muddy Sand	5.82
T2 Mid	0	0	0.4	2.1	1.1	7.3	53.9	22.6	12.5	Muddy Sand	3.6
T2 Lwr	0	0.2	0.3	6.4	2.1	10.5	45.9	17.3	17.4	Muddy Sand	5.09

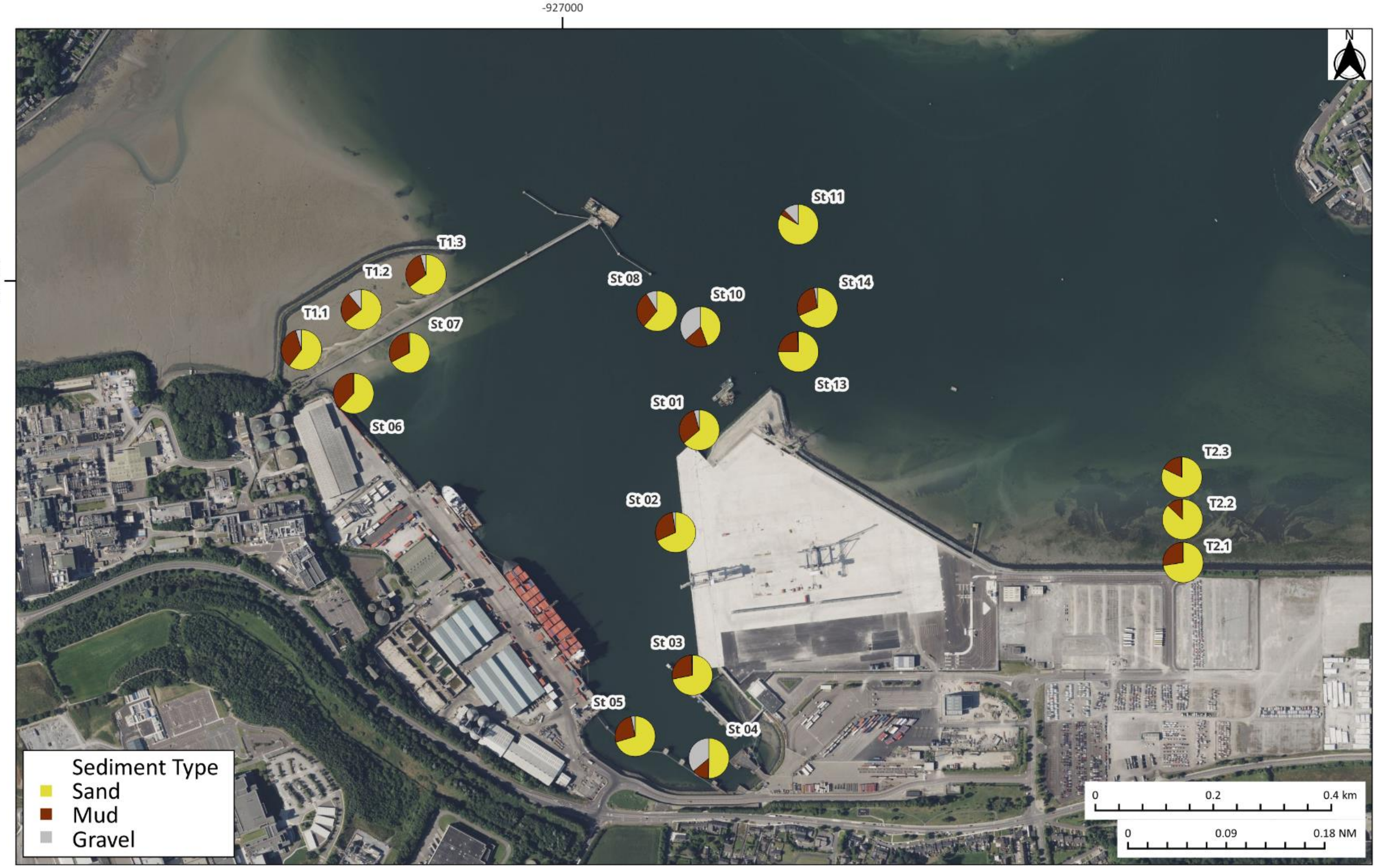

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Figure 3-12: A breakdown of sediment type fraction at each of the subtidal and intertidal stations.

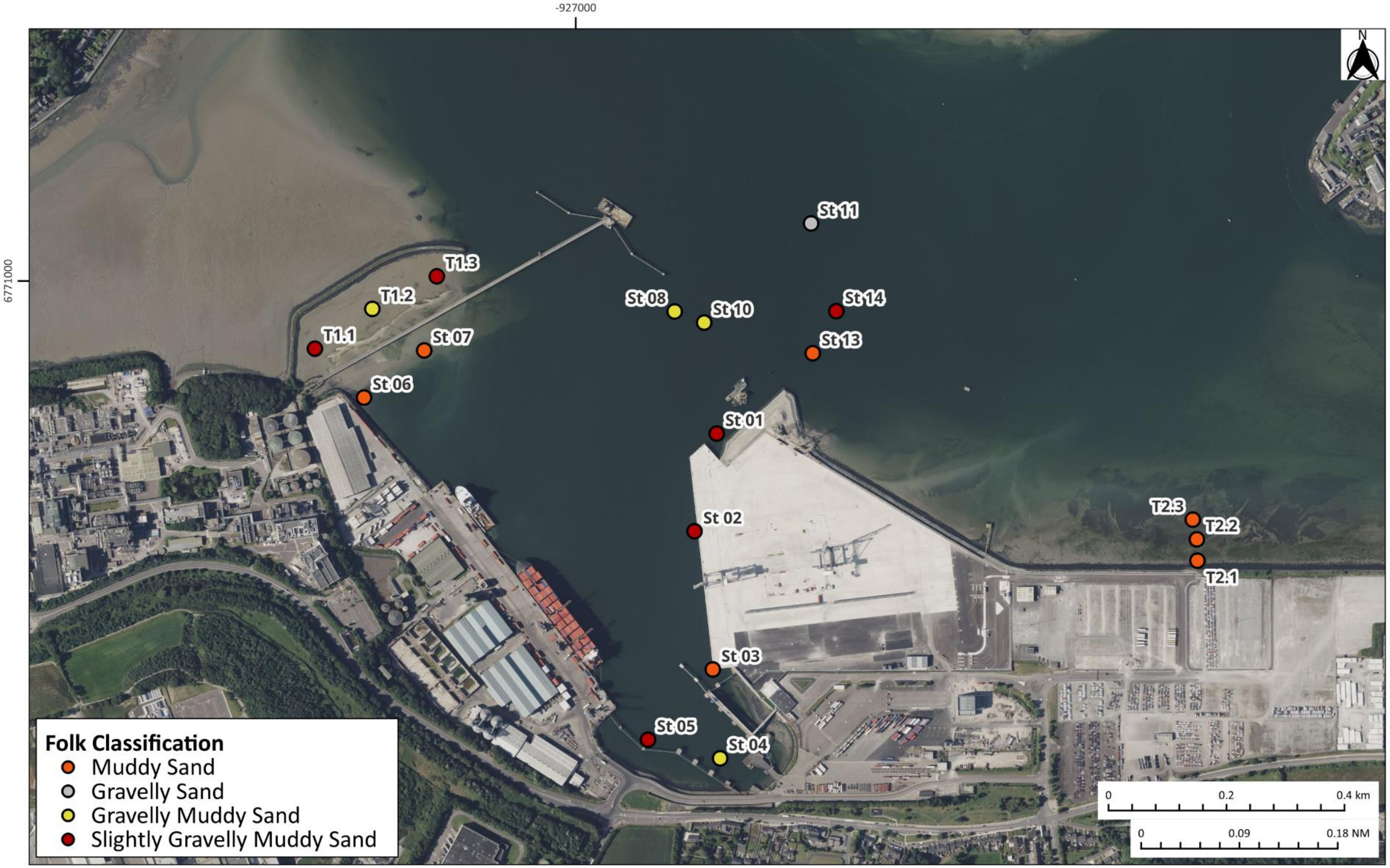

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Figure 3-13: Sediment type at each of the subtidal and intertidal stations according to Folk (1954).

4. Discussion

Marine Ecology surveys were carried out at Ringaskiddy in order to characterise the communities present in the subtidal and intertidal environment. Subtidal grab surveys took place on 23rd of July 2024. Multivariate analysis of the faunal samples revealed a clear divide between the stations within the inner Ringaskiddy harbour area and those outside. The stations within the inner harbour area can be classified as a mosaic of the JNCC biotopes SS.SMu.IFIMu.CerAnit *Cerastoderma edule* with *Abra nitida* in infralittoral mud' and 'SS.SSa.IMuSa.SsubNhom *Spisula subtruncata* and *Nephtys hombergii* in shallow muddy sand. The stations surveyed outside of the inner harbour area were classified as 'SS.SMu.ISaMu.MelMagThy *Melinna palmata* with *Magelona* spp. and *Thyasira* spp. in infralittoral sandy mud'.

The intertidal surveys took place on the 24th of July and 12th of September 2024. The initial intertidal walkover survey documented the biotopes present on the rock armour in the upper shore of the transect locations. These included 'LR.FLR.Lic.YG – Yellow and grey lichens on supralittoral rock', 'LR.LLR.F.Fspi – *Fucus spiralis* on sheltered upper eulittoral rock', and LR.LLR.F.Asc.FS – *Ascophyllum nodosum* on full salinity mid eulittoral rock'. In addition, an area of mussel beds that was identified in the previous surveys in the vicinity of the ADM jetty was again recorded in the present survey. This biotope can be classified as LS.LBR.LMus.Myt.Mu - *Mytilus edulis* beds on littoral mud'. During the intertidal walkover survey, attempts were made to survey two transects at low water using cores. However, it was apparent that due to the depth of mud at these locations it would be a health and safety risk. An alternative method was selected to sampling the transects at high water from a RIB using a small van Veen grab instead of cores. Multivariate analysis of the faunal data revealed two biotopes present along the transects: the JNCC biotopes SS.SMu.SMuVS.AphTubi *Aphelochaeta marioni* and *Tubificoides* spp. in variable salinity infralittoral mud' and 'LS.LMx.Mx.CirCer Cirratulids and *Cerastoderma edule* in littoral mixed sediment.

Table 4.1 lists the subtidal and intertidal biotopes identified. Full descriptions of each of these biotope types can be found on the Marine Biological Association MarLIN website[1]. The sensitivities of these biotopes to various pressures (Physical, Chemical, Biological, and Hydrological) are well understood and each biotope is assessed on the Resistance, Resilience, and Sensitivity of a variety of activities that could impact on them. The proposed dredging activities have the most potential to impact on the biotopes identified. Dredging may result in light siltation (deposition of less than 5cm depth), heavy siltation (deposition of greater than 30cm depth) and/or removal of the substrate by extraction.

[1] UK Marine habitat classification (22.04) list - MarLIN - The Marine Life Information Network

Table 4-1: Ringaskiddy Subtidal and Intertidal Biotopes and sensitivities to physical pressures.

Biotope	Sensitivity to Pressures		
	Physical – Dredging Light siltation (<5cm)	**Physical – Dredging Heavy siltation (>30cm)**	**Physical Removal of substrate (extraction)**
Subtidal			
SS.SMu.IFIMu.CerAnit *Cerastoderma edule* with *Abra nitida* in infralittoral mud	Low	Medium	Medium
SS.SSa.IMuSa.SsubNhom *Spisula subtruncata* and *Nephtys hombergii* in shallow muddy sand	Low	Medium	Medium
SS.SMu.ISaMu.MelMagThy *Melinna palmata* with *Magelona* spp. and *Thyasira* spp. in infralittoral sandy mud	Not Sensitive	Low	Medium
Intertidal			
LR.FLR.Lic.YG – Yellow and grey lichens on supralittoral rock	N.A.	N.A.	N.A.
LR.LLR.F.Fspi – *Fucus spiralis* on sheltered upper eulittoral rock	Low	Medium	N.A.
LR.LLR.F.Asc.FS – *Ascophyllum nodosum* on full salinity mid eulittoral rock	Medium	High	N.A.
LS.LBR.LMus.Myt.Mu - *Mytilus edulis* beds on littoral mud	Medium	Medium	High
SS.SMu.SMuVS.AphTubi *Aphelochaeta marioni* and *Tubificoides* spp. in variable salinity infralittoral mud	Not Sensitive	Low	Medium
LS.LMx.Mx.CirCer - Cirratulids and *Cerastoderma edule* in littoral mixed sediment	Low	Medium	Medium

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Appendix I

Subtidal and Intertidal Species Lists

Ringaskiddy Subtidal Fauna	AphiaID	St1	St2	St3	St4	St5	St6	St7	St8	St9	St10	St11	St13	St14
Actiniaria	1360								1			1		
Edwardsiidae	100665	1												
Tubulanus polymorphus	122637	1							4		2			1
Nematoda	799			1								1		1
Polynoidae	939								2			1		
Pholoe baltica (sensu Petersen)	130599	1							2		1	5		
Pholoe inornata (sensu Petersen)	130601			1										1
Sthenelais	129595											1		
Phyllodocidae	931	1												
Eteone longa	130616	1		1					1					
Phyllodoce mucosa	334512	9			1				2		1		3	1
Paranaitis kosteriensis	130662								1					
Parexogone hebes	757970											1		
Nephtys	129370	28	27	30	22	2	12	19	3	21	3	5	44	13
Nephtys hombergii	130359	1		6	2	6	3	1		20			9	3
Lumbrineridae	967								1					
Lumbrineris cingulata (aggregate)	130240											6		
Orbiniidae	902								1					
Cirratulidae	919					1								
Capitella	129211		6											
Mediomastus fragilis	129892											2		
Notomastus	129220	3	1						19		10	5		
Galathowenia oculata	146950											10	4	1
Pectinariidae	980	1	1						1					1
Lagis koreni	152367	2							3				1	
Sabellaria spinulosa	130867								5		4	5		2
Ampharetidae (aggregate)	981	6	37	7	7	1			1		2	4	152	5
Melinna palmata	129808	10	1						110		17	35	25	94
Ampharete lindstroemi (aggregate)	129781			1						1			25	

Ringaskiddy Subtidal Fauna	AphiaID	St1	St2	St3	St4	St5	St6	St7	St8	St9	St10	St11	St13	St14
Serpulidae	988								1		5			
Spirobranchus	129582											2		
Spirobranchus lamarcki	560033								7		4	1		
Tubificoides benedii	137571	1												
Callipallene	134581											1		1
Callipallene brevirostris	134643													1
Longipedia	115403											2	1	
Ostracoda	1078								1				2	
Euphilomedes sinister	127866	1							5		2	10	1	7
Cylindroleberis mariae	238708													1
Perioculodes longimanus	102915		1								1		2	1
Apolochus neapolitanus	236495								2			1		
Leucothoe lilljeborgi	102462								1		1			
Stenothoe monoculoides	103169										1			
Harpinia antennaria	102960													1
Ampelisca	101445	6							13		7	4	11	7
Ampelisca brevicornis	101891										1		6	3
Ampelisca spinipes	101928													2
Ampelisca tenuicornis	101930								6		4		25	23
Gammarus	101537												1	
Megaluropus agilis	102783												1	1
Melitidae	101397	1										3		
Abludomelita obtusata	102788											1		
Microprotopus maculatus	102380	1							6			1	2	4
Photis longicaudata	102383								2					5
Aoridae	101368										5			
Pariambus typicus	101857		1										2	7
Phtisica marina	101864								1			2	2	1
Pseudoprotella phasma	101871								1					1

Ringaskiddy Subtidal Fauna	AphiaID	St1	St2	St3	St4	St5	St6	St7	St8	St9	St10	St11	St13	St14
Gnathiidae (juvenile)	118278											1		
Gnathia oxyuraea (male)	118995										1	1		
Tanaopsis graciloides	136458								2			1		
Apseudes talpa	136285											1		
Cumopsis goodsir	110465												1	1
Bodotria	110387										1		2	
Bodotria scorpioides	110445	8		1					2		4	12	2	11
Eudorella truncatula	110535	3											5	6
Monopseudocuma gilsoni	422916												1	1
Pseudocuma longicorne	110627													1
Diastylis bradyi	110472												1	1
Diastylis cornuta	110474			1									1	1
Carcinus maenas	107381							1			1			
Peringia ulvae	151628	14	43	10		1				11				
Odostomia unidentata	141025												5	15
Tragula fenestrata	238068												5	16
Turbonilla lactea	141072	2											1	1
Retusa truncatula	141138													1
Nucula (juvenile)	138262	1												2
Nucula nitidosa	140589	2											2	
Mytilidae (juvenile)	211	4	111	37	1	11	6			116	4	7	19	3
Kurtiella bidentata	345281	2							1		1		1	
Cardiidae (juvenile)	229			1								1		
Parvicardium pinnulatum	181343											1		
Cerastoderma edule	138998	9	5	2					1	3	1		1	
Mactridae (juvenile)	230						1							
Mactra stultorum	140299		1										1	
Spisula subtruncata	140302		2										2	
Tellinidae (juvenile)	235	3	4	1						3			1	

Ringaskiddy Subtidal Fauna	AphiaID	St1	St2	St3	St4	St5	St6	St7	St8	St9	St10	St11	St13	St14
Gari (juvenile)	138388													1
Abra	138474	2	1	1					1					
Abra alba	141433										2	1	2	
Abra nitida	141435		2	20	2	8		1	1	20			20	9
Veneridae (juvenile)	243	4	1						3		3	3	6	3
Mysia undata	140728								1					2
Mya (juvenile)	138211								1					1
Varicorbula gibba	378492								1				2	2
Conopeum seurati	111352													P
Amphiuridae (juvenile)	123206											1		
Amphipholis squamata	125064											1		
Paraleptopentacta elongata	1474372	2							1		1		1	

Ringaskiddy Intertidal Fauna (T1)	**AphiaID**	**T1 Upper 1**	**T1 Upper 2**	**T1 Upper 3**	**T1 Mid 1**	**T1 Mid 2**	**T1 Mid 3**	**T1 Lower 1**	**T1 Lower 2**	**T1 Lower 3**
Nemertea	152391						7			
Tubulanus polymorphus	122637									1
Nematoda	799	2		65			47		13	2
Pholoe	129439					1			1	
Pholoe inornata (sensu Petersen)	130601									
Eteone longa	130616	1							1	
Phyllodoce	129455								1	
Phyllodoce mucosa	334512									
Glycera (juvenile)	129296									1
Goniada maculata	130140									
Nereididae (juvenile)	22496			2		1			1	
Nephtys	129370							1	1	
Nephtys hombergii	130359	5	1	5	3	1			4	8
Leitoscoloplos mammosus	130514			1					2	4
Scoloplos armiger	130537									1
Spionidae	913					1				
Streblospio shrubsolii	131193									
Cirratulidae	919					1	2		4	
Capitellidae	921						1			
Ampharetidae	981					1			13	1
Melinna palmata	129808			4		1			11	12
Ampharete lindstroemi agg.	129781	1								1
Branchiomma	129524								1	
Manayunkia aestuarina	130926			2						
Paranais litoralis	137485	2		2						
Tubificoides	137393	1		1			2			
Tubificoides benedii	137571	31	8	54		3	87		1	

Ringaskiddy Intertidal Fauna (T1)	AphiaID	T1 Upper 1	T1 Upper 2	T1 Upper 3	T1 Mid 1	T1 Mid 2	T1 Mid 3	T1 Lower 1	T1 Lower 2	T1 Lower 3
Tubificoides brownae	137572	1		23		1				
Acari	292684					1				
Austrominius modestus	712167					7				
Semibalanus balanoides	106210								2	
Ostracoda	1078			1						
Amphipoda	1135	1								
Dexamine thea	102136									
Gammaridae	101383					2				
Gammarus	101537	1							6	
Gammarus locusta	102281	1			24	5	4		1	2
Melitidae	101397						2			
Melita palmata	102843				1					
Microprotopus maculatus	102380					1		2	10	5
Aoridae	101368			3		2			1	1
Microdeutopus	101471									
Microdeutopus gryllotalpa	102048				1					
Monocorophium sextonae	148603									
Caprellidae	101361					1				
Caprella	101430									
Lekanesphaera monodi	118956				1		1			
Jaera albifrons	118715				1		1			
Zeuxo holdichi	416601									
Carcinus maenas	107381	1				2	5			
Boreochiton ruber	386411				1	1	2			
Gastropoda	101	1								
Littorina littorea	140262						10			
Peringia ulvae	151628		11	6		1				
Bivalvia	105								1	3

Ringaskiddy Intertidal Fauna (T1)	AphiaID	T1 Upper 1	T1 Upper 2	T1 Upper 3	T1 Mid 1	T1 Mid 2	T1 Mid 3	T1 Lower 1	T1 Lower 2	T1 Lower 3
Mytilidae	211		2			1			8	
Parvicardium (juvenile)	137739								3	
Cerastoderma edule	138998	19		10		2	4	3	3	3
Mactridae	230			1						
Spisula subtruncata	140302					1				
Tellinidae (juvenile)	235								2	
Macomangulus tenuis	878470									
Abra	138474									2
Abra alba	141433									
Abra nitida	141435				1	1				
Veneridae (juvenile)	243								1	
Mya arenaria	140430	8	2	8						1
Hiatella arctica	140103								1	

Ringaskiddy Intertidal Fauna (T2)	AphiaID	T2 Upper 1	T2 Upper 2	T2 Upper 3	T2 Mid 1	T2 Mid 2	T2 Mid 3	T2 Lower 1	T2 Lower 2	T2 Lower 3
Nemertea	152391									
Tubulanus polymorphus	122637									
Nematoda	799			7		13	1			13
Pholoe	129439									
Pholoe inornata (sensu Petersen)	130601							1		
Eteone longa	130616	1	2	5						2
Phyllodoce	129455									
Phyllodoce mucosa	334512		2		1	1	1	2		1
Glycera (juvenile)	129296									
Goniada maculata	130140					1				

Ringaskiddy Intertidal Fauna (T2)	**AphiaID**	**T2 Upper 1**	**T2 Upper 2**	**T2 Upper 3**	**T2 Mid 1**	**T2 Mid 2**	**T2 Mid 3**	**T2 Lower 1**	**T2 Lower 2**	**T2 Lower 3**
Nereididae (juvenile)	22496									1
Nephtys	129370	20	1					2		13
Nephtys hombergii	130359		8	11	4	8	8	14	12	6
Leitoscoloplos mammosus	130514						1	5	2	1
Scoloplos armiger	130537									
Spionidae	913									
Streblospio shrubsolii	131193			3			1			
Cirratulidae	919	3	4	2		8	5	2		8
Capitellidae	921					2	1			
Ampharetidae	981							4		
Melinna palmata	129808	19	20	15		4	9	12	6	5
Ampharete lindstroemi agg.	129781									
Branchiomma	129524									
Manayunkia aestuarina	130926									
Paranais litoralis	137485									
Tubificoides	137393		1						2	
Tubificoides benedii	137571	139	125	138		3	20			7
Tubificoides brownae	137572			17						8
Acari	292684									
Austrominius modestus	712167									
Semibalanus balanoides	106210									
Ostracoda	1078									
Amphipoda	1135									
Dexamine thea	102136		1							
Gammaridae	101383									
Gammarus	101537			8		5		5		
Gammarus locusta	102281	5		1	5	9				1
Melitidae	101397									

Ringaskiddy Intertidal Fauna (T2)	AphiaID	T2 Upper 1	T2 Upper 2	T2 Upper 3	T2 Mid 1	T2 Mid 2	T2 Mid 3	T2 Lower 1	T2 Lower 2	T2 Lower 3
Melita palmata	102843									
Microprotopus maculatus	102380	1		3	5	11		6		2
Aoridae	101368				2					
Microdeutopus	101471				1		1			
Microdeutopus gryllotalpa	102048									
Monocorophium sextonae	148603							1		
Caprellidae	101361	1								
Caprella	101430		3	3				4		
Lekanesphaera monodi	118956									
Jaera albifrons	118715									
Zeuxo holdichi	416601				1					
Carcinus maenas	107381	7	5	5			1			
Boreochiton ruber	386411									
Gastropoda	101									
Littorina littorea	140262									
Peringia ulvae	151628	2					1			1
Bivalvia	105									
Mytilidae	211			1						
Parvicardium (juvenile)	137739									
Cerastoderma edule	138998	3	4	3	6	3	23	13	4	1
Mactridae	230									
Spisula subtruncata	140302									
Tellinidae (juvenile)	235						1			
Macomangulus tenuis	878470						1			
Abra	138474	1	1					2		
Abra alba	141433						3			
Abra nitida	141435							2	3	
Veneridae (juvenile)	243									

Ringaskiddy Intertidal Fauna (T2)	AphiaID	T2 Upper 1	T2 Upper 2	T2 Upper 3	T2 Mid 1	T2 Mid 2	T2 Mid 3	T2 Lower 1	T2 Lower 2	T2 Lower 3
Mya arenaria	140430		1	1	5	9	11	6	2	1