List of Appendices

Appendix 3.1

Drawings of the Proposed Scheme

Cork County Council

Douglas Flood Relief Scheme (Including Togher Culvert)

Proposed Scheme Drawings

ARUP

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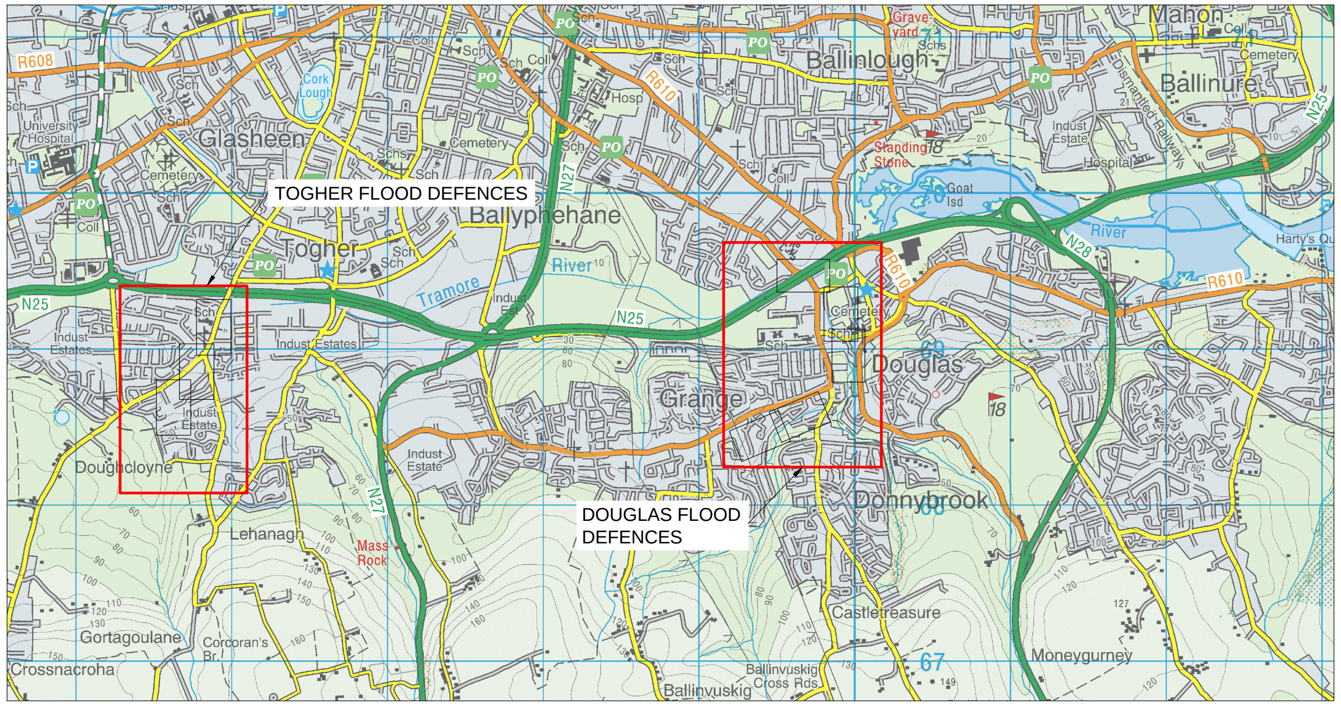
Cork County Council

Douglas Flood Relief Scheme (including Togher Culvert)

Proposed Scheme Drawings

Drawing Number	Drawing Name
C-000-001	Cover Sheet
C-000-002	Index Sheet
C-000-003	Key Plan
C-000-004	Existing Flood Extents and Proposed Flood Benefit Area (Sheet 1 of 3)
C-000-005	Existing Flood Extents and Proposed Flood Benefit Area (Sheet 2 of 3)
C-000-006	Existing Flood Extents and Proposed Flood Benefit Area (Sheet 3 of 3)
C-000-007	Proposed Togher Flood Defences - (Sheet 1 of 3)
C-000-008	Proposed Togher Flood Defences - (Sheet 2 of 3)
C-000-009	Proposed Togher Flood Defences - (Sheet 3 of 3)
C-000-010	Proposed Douglas Flood Defences - (Sheet 1 of 5)
C-000-011	Proposed Douglas Flood Defences - (Sheet 2 of 5)
C-000-012	Proposed Douglas Flood Defences - (Sheet 3 of 5)
C-000-013	Proposed Douglas Flood Defences - (Sheet 4 of 5)
C-000-014	Proposed Douglas Flood Defences - (Sheet 5 of 5)
C-000-015	Proposed Flood Defences - Sections (Sheet 1 of 3)
C-000-016	Proposed Flood Defences - Sections (Sheet 2 of 3)
C-000-017	Proposed Flood Defences - Sections (Sheet 3 of 3)
C-000-018	Proposed Flood Defences - Togher Details Sheet 1 of 2
C-000-019	Proposed Flood Defences - Togher Details Sheet 2 of 2
C-000-020	Proposed Tree Replanting - Togher Sheet 1 of 2
C-000-021	Proposed Tree Replanting - Togher Sheet 2 of 2
C-000-022	Proposed Tree Replanting - Douglas Sheet 1 of 2
C-000-023	Proposed Tree Replanting - Douglas Sheet 1 of 2



Location Plan

ARUP
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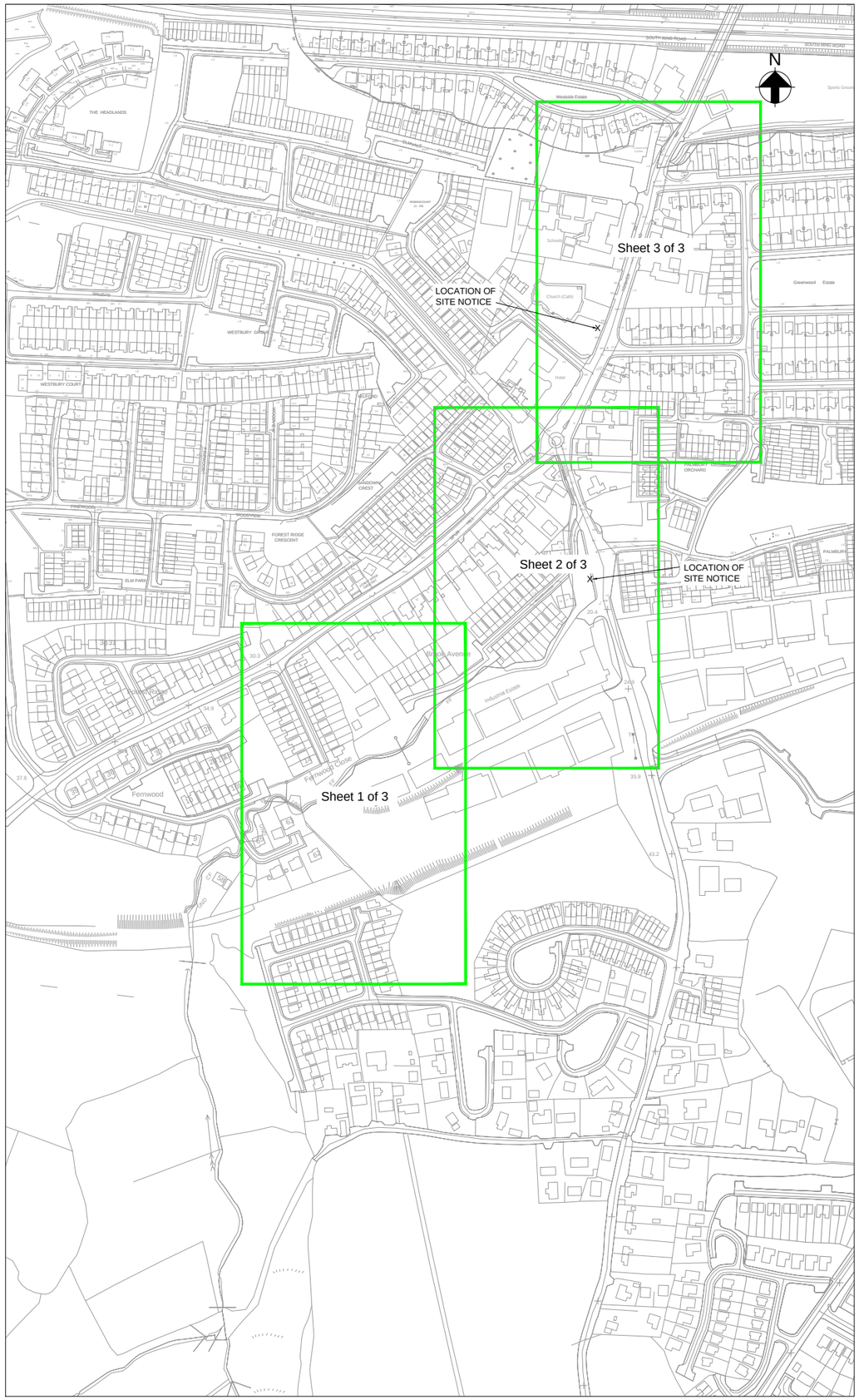
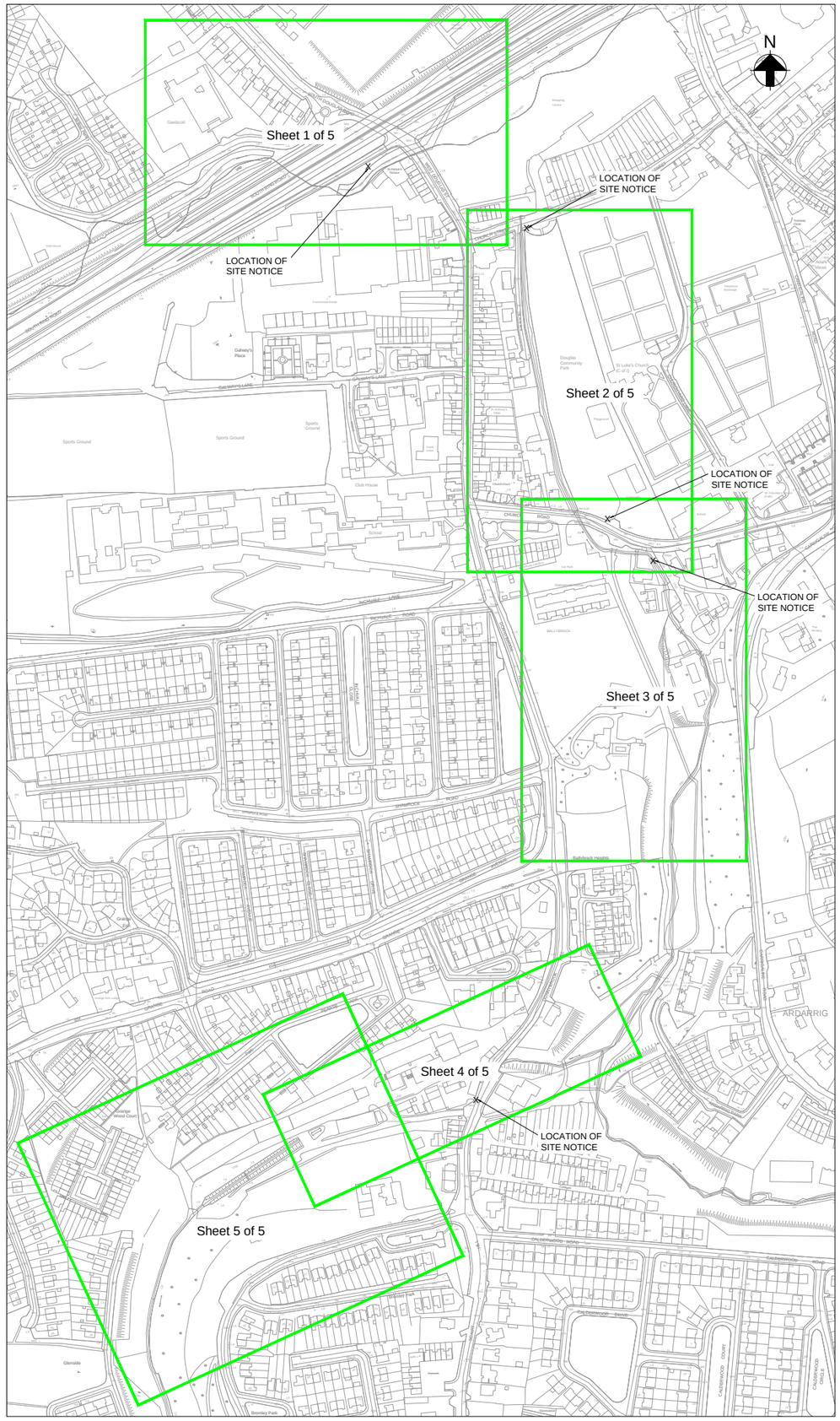
A1





Do not scale

Rev	Date	By	Chkd	Appd
PL1	11.05.17	SB	DT	KL

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Client

Cork County Council

Project Title

Douglas Flood Relief Scheme
(Including Togher Culvert)

Drawing Title

Key Plan

Scale at A1 1:5,000 Scale at A3 1:10,000

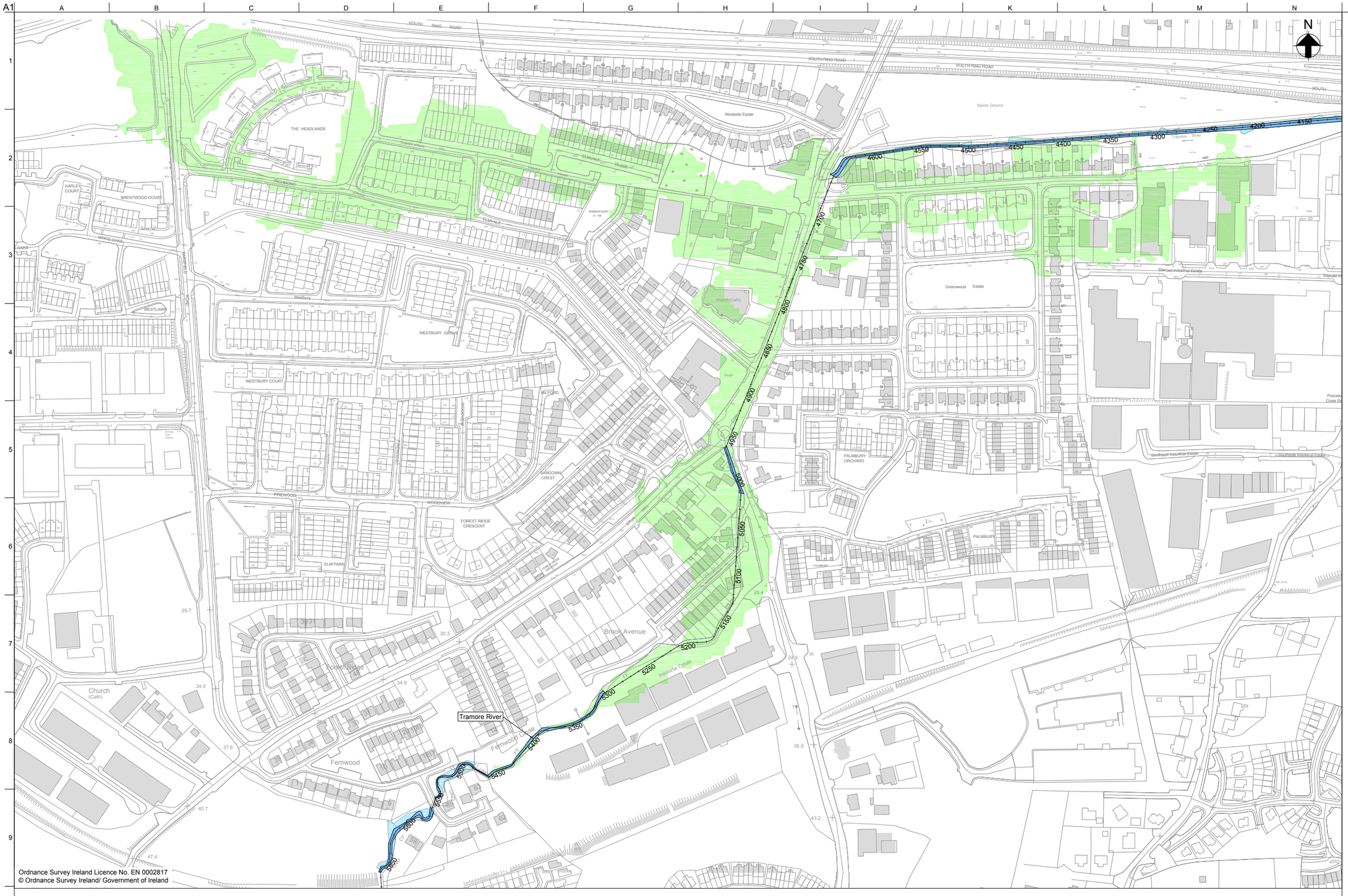
Role Planning

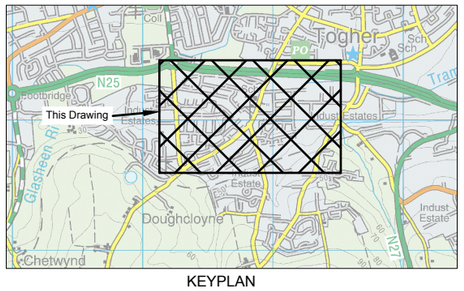
Suitability Preliminary

Arup Job No **234335-00** Rev **PL1**

Name **C-000-003**

A1





KEYPLAN

Legend

- Benefiting Lands (Defended Against Flood Events up to 1 in 100 Year Fluvial Event)
- 1% AEP Fluvial Flood Extent (1 in 100yr Fluvial)
- Watercourse
- 4150 Channel Centreline and Chainage

Notes:

1. The 1 in 100 year fluvial flood extents shown on this map have been reproduced from the Lee Catchment Flood Risk Assessment and Management Study current scenario maps (Ref: M6/UA/EXT/CURS/001 & 002).

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Client
Cork County Council

Project Title
Douglas Flood Relief Scheme
(Including Togher Culvert)

Drawing Title
Existing Flood Extents and
Proposed Flood Benefit Area
Sheet 1 of 3

Scale at A1 1:2000 Scale at A3 1:4000

Role Civil

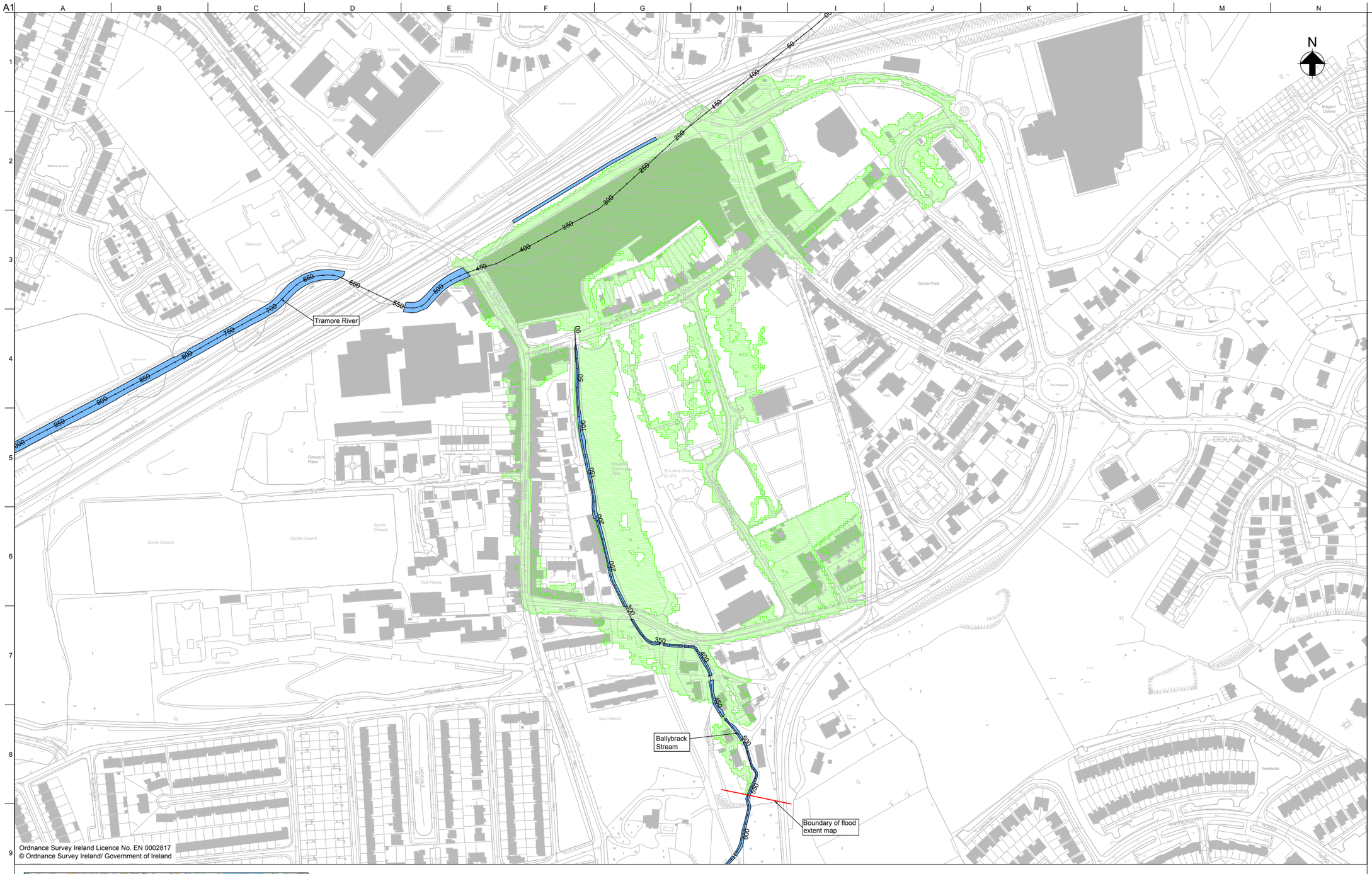
Suitability Planning

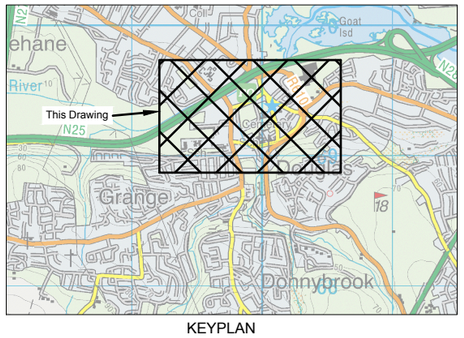
Arup Job No **234335-00** Rev **PL1**

Name **C-000-004**

Do not scale

A1





KEYPLAN

Legend

- Benefiting Lands (Defended Against Flood Events up to 1 in 100 Year Fluvial Event)
- 1% AEP Fluvial Flood Extent (1 in 100yr Fluvial)
- Watercourse
- 150 Channel Centreline and Chainage

Rev	Date	By	Chkd	Appd
PL1	11.05.17	SB	DT	KL

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Client

Cork County Council

Project Title

Douglas Flood Relief Scheme
(Including Togher Culvert)

Drawing Title

Existing Flood Extents and
Proposed Flood Benefit Area
Sheet 2 of 3

Scale at A1 1:2000 Scale at A3 1:4000

Role Civil

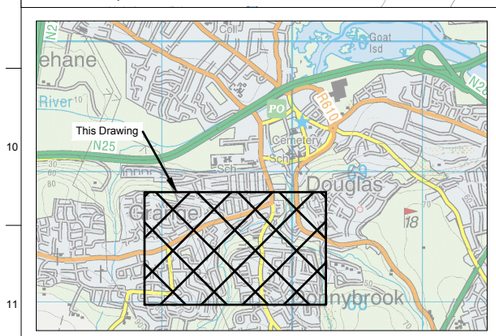
Suitability Planning

Arup Job No **234335-00** Rev **PL1**

Name **C-000-005**

Do not scale

A1



KEYPLAN

Legend

- Benefiting Lands (Defended Against Flood Events up to 1 in 100 Year Fluvial Event)
- 1% AEP Fluvial Flood Extent (1 in 100yr Fluvial)
- Watercourse
- 150 — Channel Centreline and Chainage

Rev	Date	By	Chkd	Appd
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Client

Cork County Council

Project Title

Douglas Flood Relief Scheme
(Including Togher Culvert)

Drawing Title

Existing Flood Extents and
Proposed Flood Benefit Area
Sheet 3 of 3

Scale at A1 1:1000 Scale at A3 1:2000

Role Civil

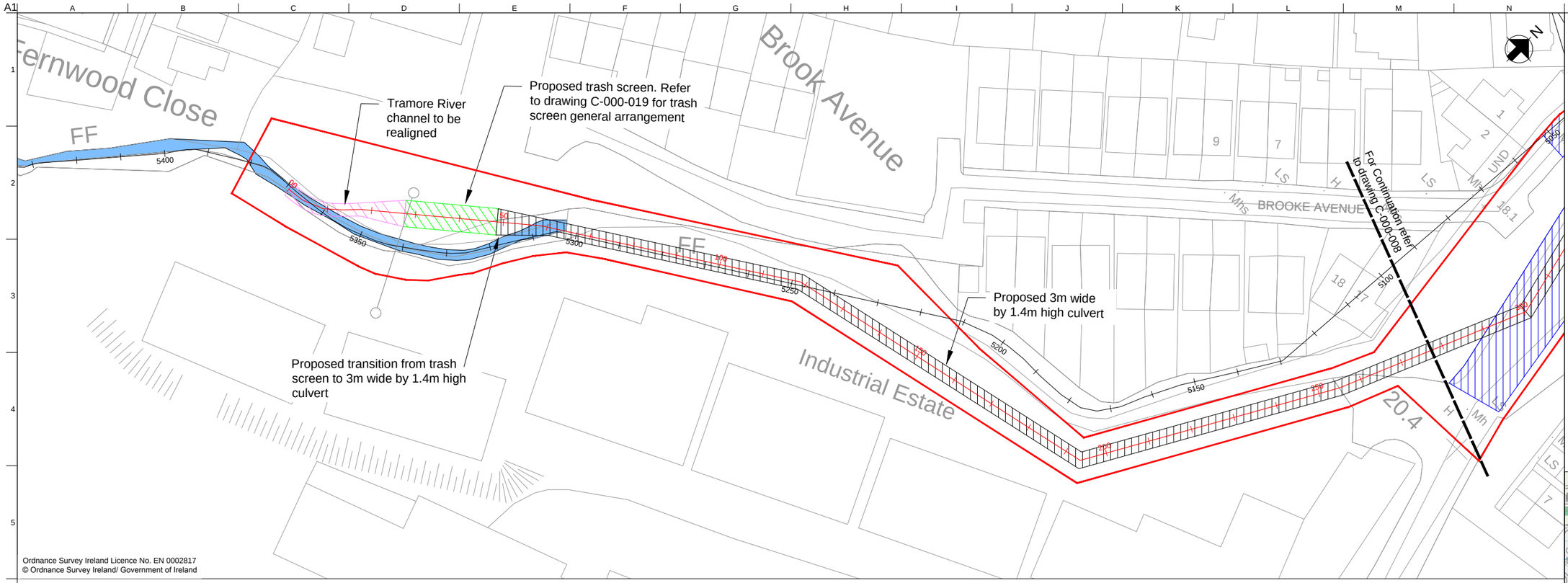
Suitability Planning

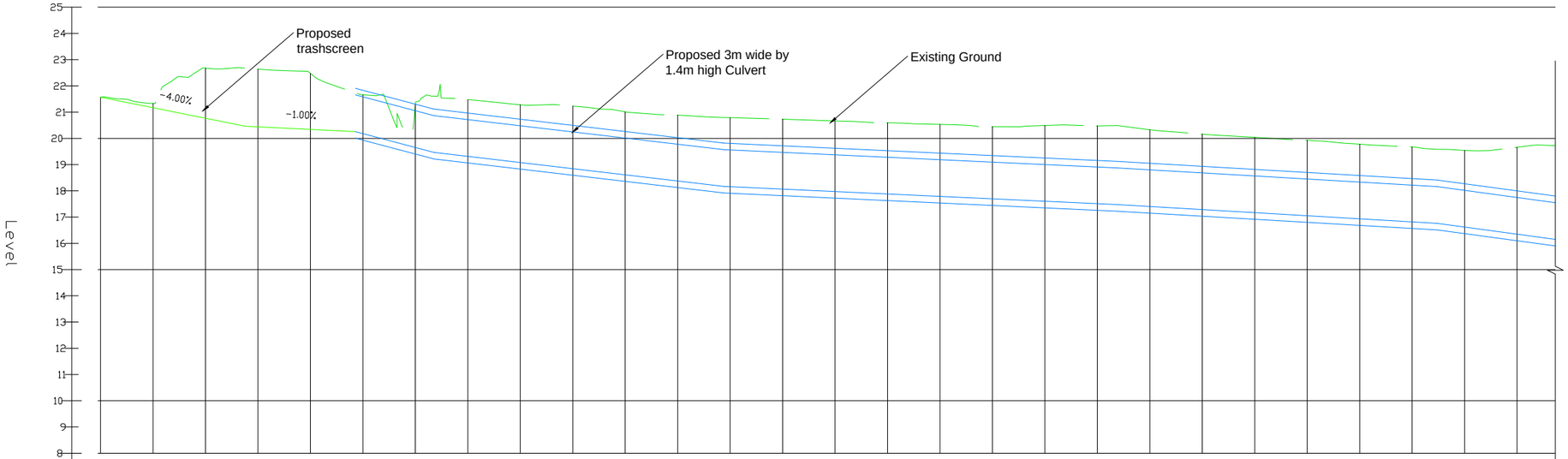
Arup Job No **234335-00** Rev **PL1**

Name **C-000-006**

Do not scale

A1





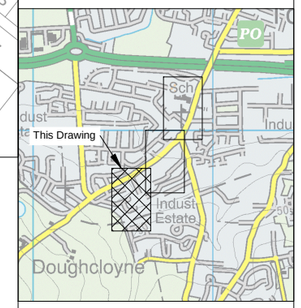
Chainage	00.000	10.000	20.000	30.000	40.000	50.000	60.000	70.000	80.000	90.000	100.000	110.000	120.000	130.000	140.000	150.000	160.000	170.000	180.000	190.000	200.000	210.000	220.000	230.000	240.000	250.000	260.000	270.000
Existing Ground Levels	21.568	21.330	22.678	22.639	22.480	21.661	21.292	21.478	21.279	21.230	21.012	20.887	20.790	20.732	20.665	20.594	20.532	20.448	20.491	20.475	20.330	20.162	20.039	19.932	19.779	19.670	19.542	19.661
Pipe Gradient							5.27%		2.35%				0.93%					1.17%										2.7
Invert Level							20.26		19.46				18.17					17.47									16.76	

Legend

- Proposed Regrading
- Proposed Culvert
- Proposed Works Area
- Watercourse
- C01 ▲ C-000-001 — Location and Reference of Cross Section
- Proposed Channel Realignment
- Proposed Trash Screen
- 150 — Proposed Culvert Chainage
- 150 — Tramore River Chainage

Notes:

1. All levels are in Metres Ordnance Datum Malin Head (mOD) unless otherwise noted.



KEYPLAN

Rev	Date	By	Chkd	Appd
PL1	11.05.17	SB	DT	KL

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Client

Cork County Council

Project Title

Douglas Flood Relief Scheme (Including Togher Culvert)

Drawing Title

Proposed Togher Flood Defences (Sheet 1 of 3)

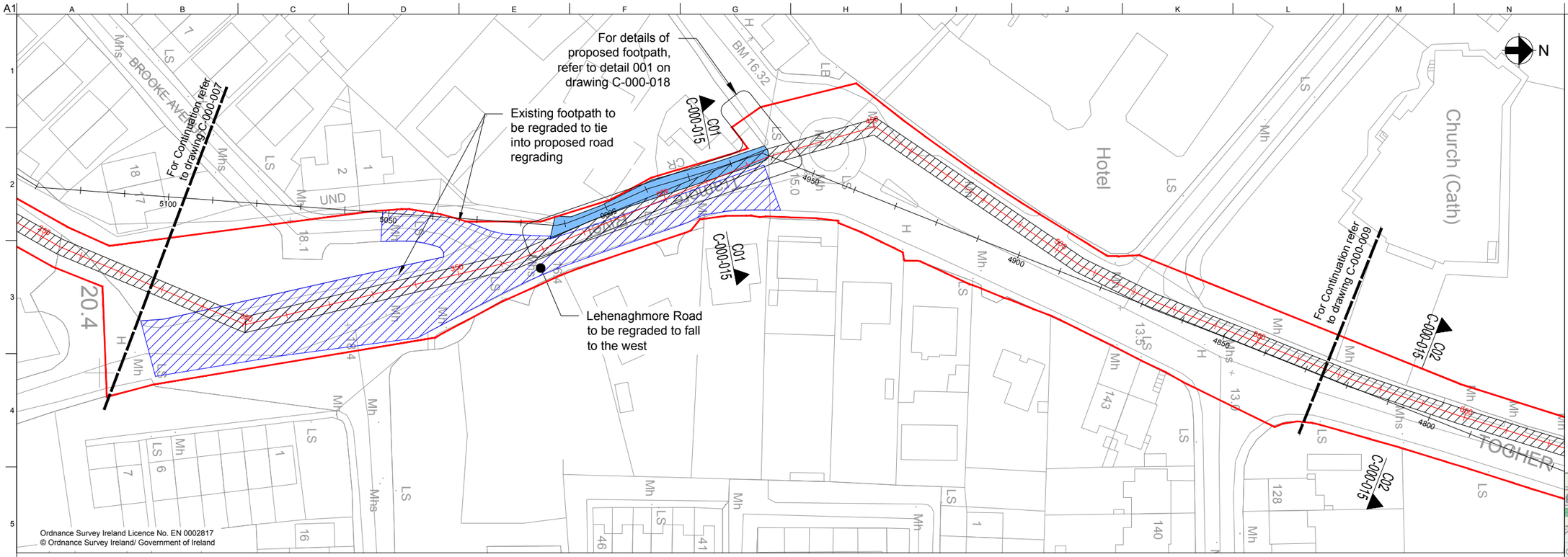
Scale at A1: 1:500 Scale at A3: 1:1000

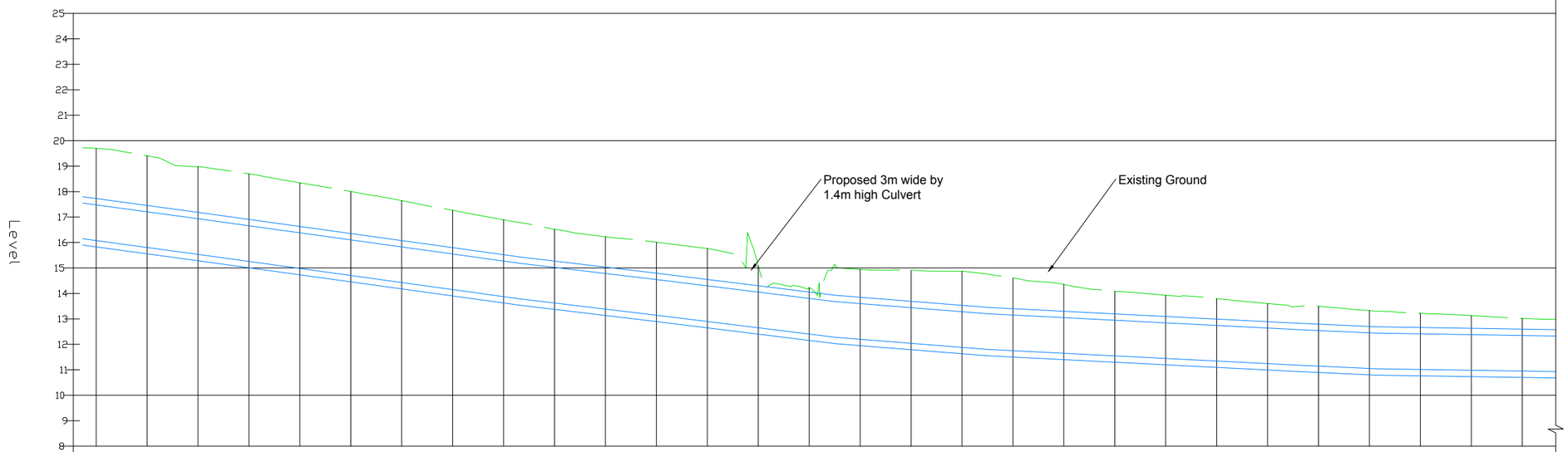
Role: Civil

Suitability: Planning

Arup Job No: 234335-00 Rev: PL1

Name: C-000-007





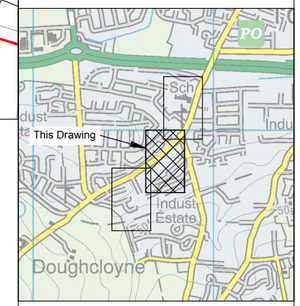
Chainage	280.000	290.000	300.000	310.000	320.000	330.000	340.000	350.000	360.000	370.000	380.000	390.000	400.000	410.000	420.000	430.000	440.000	450.000	460.000	470.000	480.000	490.000	500.000	510.000	520.000	530.000	540.000	550.000	560.000
Existing Ground Levels	19.695	19.402	18.977	18.694	18.342	18.003	17.644	17.264	16.892	16.519	16.221	16.007	15.764	15.083	14.229	14.943	14.918	14.867	14.606	14.353	14.082	13.927	13.792	13.601	13.495	13.327	13.217	13.129	13.022
Pipe Gradient	1%		0.00%	2.77%					2.39%			2.46%		1.62%					1.02%					0.92%					0.32%
Invert Level	15.72								13.78			13.16		12.27					11.80					11.18		11.04			

Legend

- Proposed Regrading
- Proposed Culvert
- Proposed Works Area
- Watercourse
- C01 / C-000-001 — Location and Reference of Cross Section
- 150 — Proposed Culvert Chainage
- 150 — Tramore River Chainage

Notes:

1. All levels are in Metres Ordnance Datum Malin Head (mOD) unless otherwise noted.



KEYPLAN

Rev	Date	By	Chkd	Appd
PL1	11.05.17	SB	DT	KL

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Client

Cork County Council

Project Title

Douglas Flood Relief Scheme (Including Togher Culvert)

Drawing Title

Proposed Togher Flood Defences (Sheet 2 of 3)

Scale at A1 1:500 Scale at A3 1:1000

Role Civil

Suitability Planning

Arup Job No **234335-00** Rev **PL1**

Name **C-000-008**

Do not scale

Existing footpath to be broken out and regraded to fall towards existing open channel. Existing kerb to be lowered to direct overland flow to the open channel

Proposed 3m wide by 1.4m high culvert

Proposed reinforced concrete channel wall with a 1.2m high pedestrian guardrail

Existing concrete channel wall to be demolished and channel widened by 1m along the left bank

Level of existing ramp to be increased to direct overland flow towards the open channel

For Continuation refer to drawing C-000-008

C02 C-000-015

C03 C-000-015

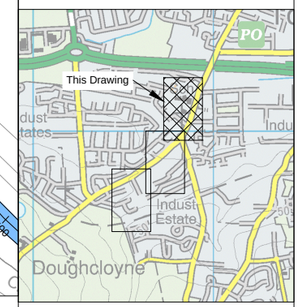
Legend

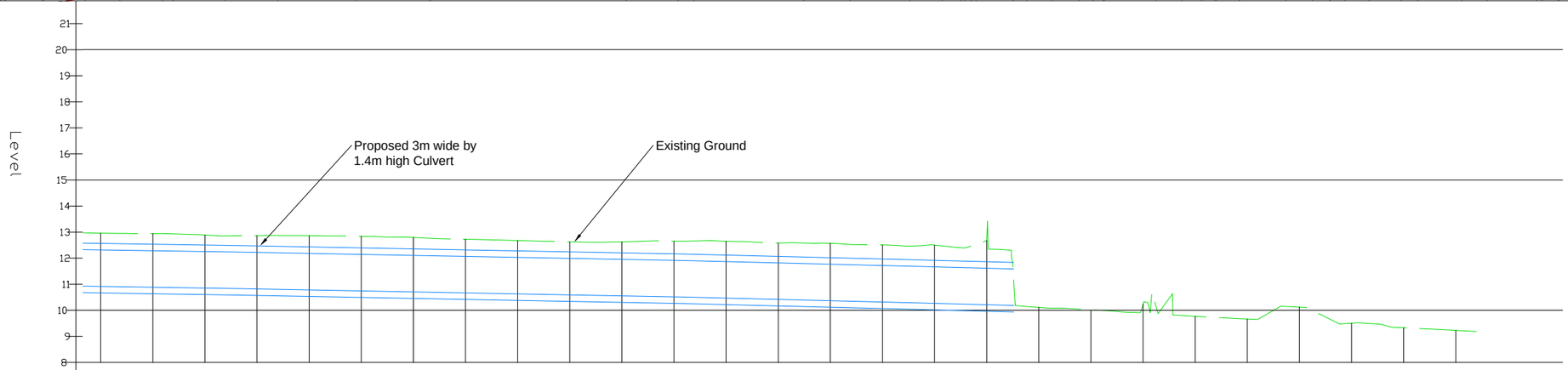
- Proposed Culvert
- Proposed Concrete Channel Wall and Pedestrian Guardrail
- Proposed Works Area
- Watercourse
- C01 C-000-001 — Location and Reference of Cross Section
- 150 — Proposed Culvert Chainage
- 150 — Tramore River Chainage

Notes:

1. All levels are in Metres Ordnance Datum Malin Head (mOD) unless otherwise noted.

KEYPLAN





Chainage	570.000	580.000	590.000	600.000	610.000	620.000	630.000	640.000	650.000	660.000	670.000	680.000	690.000	700.000	710.000	720.000	730.000	740.000	750.000	760.000	770.000	780.000	790.000	800.000	810.000	820.000	830.000	840.000	850.500
Existing Ground Levels	12.958	12.943	12.889	12.864	12.864	12.835	12.793	12.726	12.676	12.627	12.625	12.652	12.648	12.580	12.571	12.508	12.498	12.679	10.112	10.017	10.234	9.768	9.663	10.121	9.505	9.329	9.228		
Pipe Gradient					0.38%								0.50%									0.51%							
Invert Level				10.83									10.51									10.30							

Rev	Date	By	Chkd	Appd
PL1	11.05.17	SB	DT	KL

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Client
Cork County Council

Project Title
Douglas Flood Relief Scheme (Including Togher Culvert)

Drawing Title
Proposed Togher Flood Defences (Sheet 3 of 3)

Scale at A1 1:500 Scale at A3 1:1000
Role Civil
Suitability Planning
Arup Job No 234335-00 Rev PL1
Name C-000-009

Do not scale

A1

Surface water drainage outlets, with non-return valves fitted, to be constructed in proposed bridge parapet to retain existing overland flow route into the Tramore River

Proposed undergound surface water pumping station

Reinforced concrete flood defence wall - limestone masonry finish on dry side

SOUTH DOUGLAS ROAD

SOUTH RING ROAD

Gaelscoil

Tennis Grounds

Shopping Centre

DOUGLAS ST.

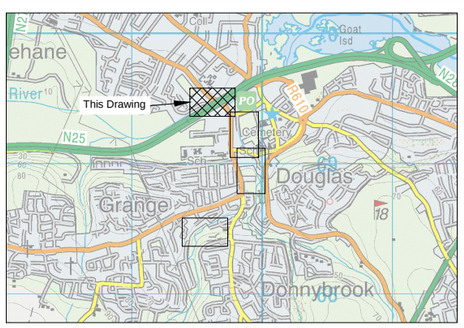
CHURCH STRE

Tramore River

City Co Bdy

C04 C-000-015

C01 C-000-001



KEYPLAN

Legend

- Proposed Works Area
- Existing Watercourse
- Location and Reference of Cross Section (C01 C-000-001 / C01 C-000-001)
- Proposed 1.2m High Reinforced Concrete Flood Defence Wall
- Proposed 1.2m High Reinforced Concrete Bridge Parapet
- 150 — Tramore River Chainage

Notes:

1. All levels are in Metres Ordnance Datum Malin Head (mOD) unless otherwise noted.

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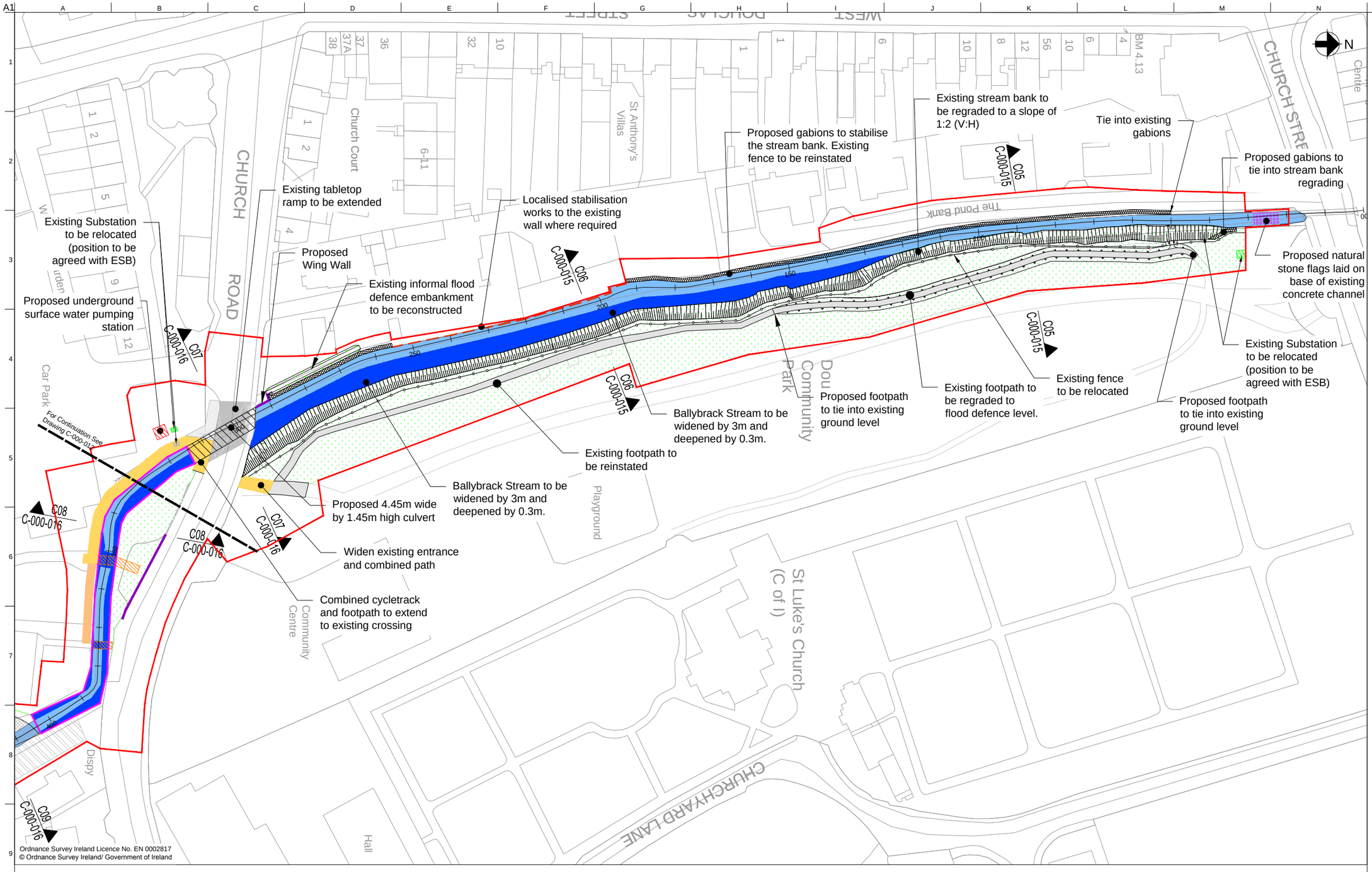
Client
Cork County Council

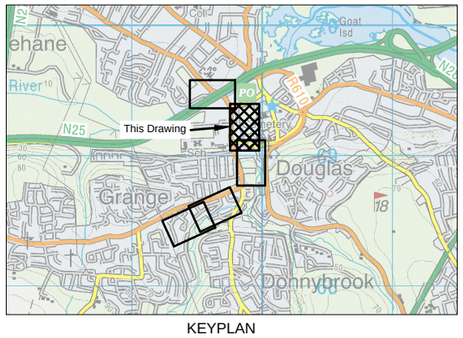
Project Title
Douglas Flood Relief Scheme (Including Togher Culvert)

Drawing Title
Proposed Douglas Flood Defences (Sheet 1 of 5)

Scale at A1	1:500
Scale at A3	1:1000
Role	Civil
Suitability	Planning
Arup Job No	234335-00
Rev	PL1
Name	C-000-010

Do not scale





KEYPLAN

Legend

- Proposed Works Area
- Existing Watercourse
- Location and Reference of Cross Section (▲C01 C-000-001 / C01▲ C-000-001)
- Proposed 1.2m High Flood Defence Wall
- Proposed Flood Defence Embankment
- Localised Bank Stabilisation Works Where Required
- Proposed 2m Wide Footway
- Proposed 3m Wide Footway / Cycle Track
- Proposed Channel Widening
- Proposed Culvert
- Existing Bridge to be Removed
- Ballybrack Stream Chainage (150)

Notes:

1. All levels are in Metres Ordnance Datum Malin Head (mOD) unless otherwise noted.

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Client
Cork County Council

Project Title
Douglas Flood Relief Scheme (Including Togher Culvert)

Drawing Title
Proposed Douglas Flood Defences (Sheet 2 of 5)

Scale at A1	Scale at A3
1:500	1:1000

Role: Civil
Suitability: Planning
Arup Job No: 234335-00
Rev: PL1
Name: C-000-011

Do not scale

A1

Combined cycletrack and footpath to be constructed adjacent to the proposed flood defence wall

Existing Ballybrack Woods cycle track bridge and ramp to be removed

Reinforced concrete flood defence wall - masonry finish both sides

New pedestrian access to ICA Hall

Existing ICA Hall access bridge to be removed

New bridge and access road

New Parking and Turning Area

New Retaining Wall

Reinforced concrete flood defence wall - masonry finish both sides

Reinforced concrete flood defence wall - masonry finish both sides

Proposed coarse trash screen

Reinforced concrete flood defence wall - masonry finish both sides

New flood defence wall to tie-in to existing gabion wall

Reinforced concrete flood defence wall - masonry finish stream side, as per opposite wall dry side

Existing bridges to be retained. New parapets to be constructed 1.2m above existing ground levels

New access to park at each end

Section of existing wall to be rebuilt over this length

Existing road to be regraded to tie into proposed bridge

Lower Ravensdale Bridge to be removed

Existing Laneway (Highlighted for clarity)

For Continuation See Drawing C-000-011

BALLYBRACK

Retireme e

Car Park

ROAD

Community Centre

School

Swimming Pool

BM 24.51

Mhs

LS

Disp

Hal

C07 C-000-016

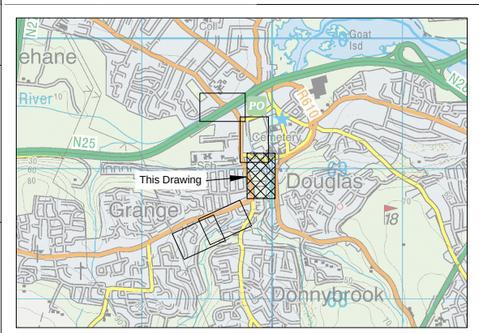
C08 C-000-016

C09 C-000-016

C10 C-000-016

C11 C-000-017

C12 C-000-017



KEYPLAN

Legend

- Proposed Works Area
- Existing Watercourse
- Location and Reference of Cross Section (▲C01 C-000-001 / C01▲ C-000-001)
- Proposed 1.2m High Reinforced Concrete Flood Defence Wall
- Proposed Coarse Trash Screen
- Proposed 2m Wide Footway
- Proposed 3m Wide Footway / Cycle Track
- Proposed River Widening
- Proposed Bridge/Culvert
- Existing Bridge to be Removed
- 150 Ballybrack Stream Chainage

Notes:

1. All levels are in Metres Ordnance Datum Malin Head (mOD) unless otherwise noted.

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Client

Cork County Council

Project Title

Douglas Flood Relief Scheme (Including Togher Culvert)

Drawing Title

Proposed Douglas Flood Defences (Sheet 3 of 5)

Scale at A1	Scale at A3
1:500	1:1000

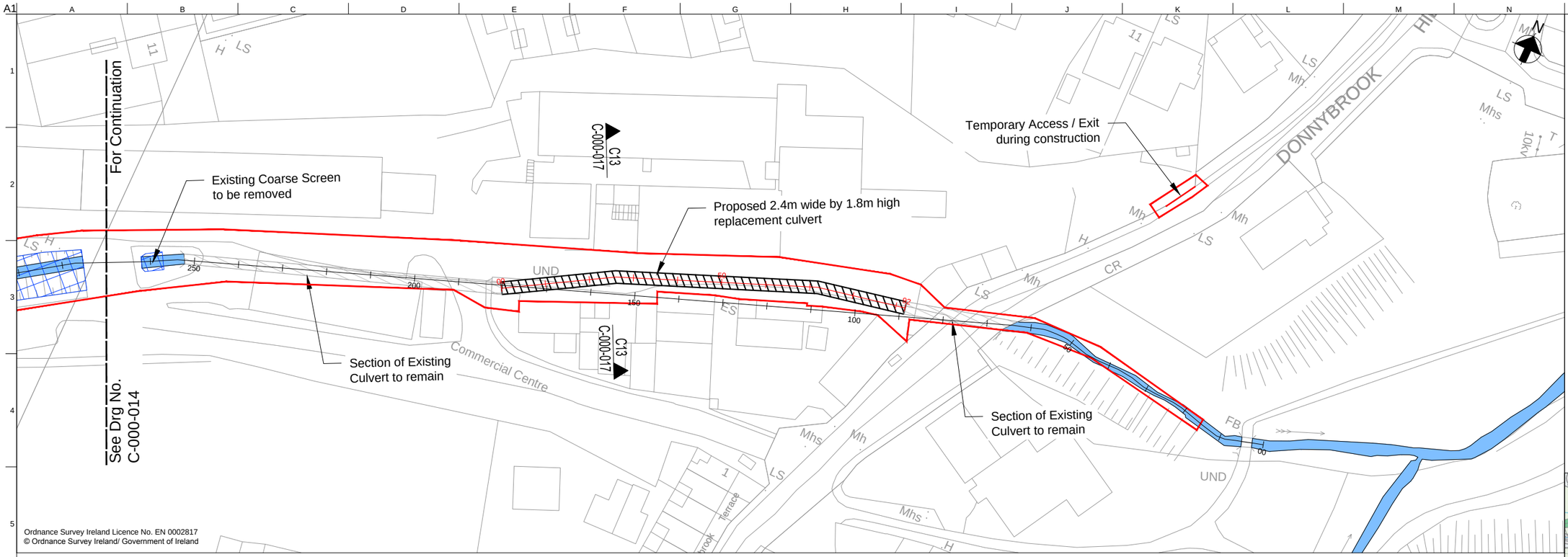
Role: Civil

Suitability: Planning

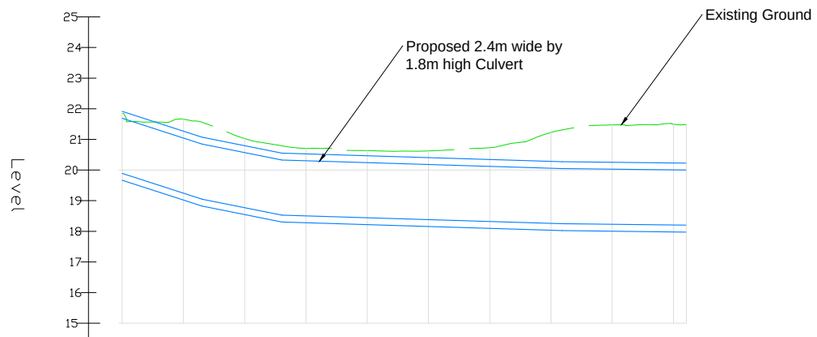
Arup Job No	Rev
234335-00	PL1

Name: C-000-012

Do not scale



PROPOSED CULVERT CL - LONGSECTION
SCALE: H 1:500,V 1:100. DATUM: 15.000



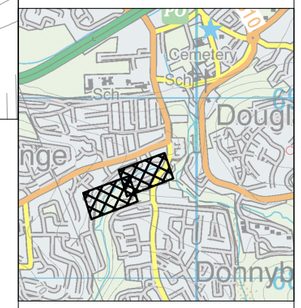
Existing Ground Levels	21.851	21.661	21.027	20.709	20.637	20.625	20.730	21.226	21.472	21.497	21.479
Chainage	00.000	10.000	20.000	30.000	40.000	50.000	60.000	70.000	80.000	90.000	92.100
Pipe Gradient		6.46%		4.00%		0.61%				0.23%	
Invert Level	19.89	19.05		18.53				18.25		18.21	

Legend

- Channel Regrading
- Proposed Culvert
- Proposed Works Area
- Watercourse
- C01 ▲ C-000-001 — Location and Reference of Cross Section
- 150 — Proposed Culvert Chainage
- 150 — Grange Stream Chainage

Notes:

1. All levels are in Metres Ordnance Datum Malin Head (mOD) unless otherwise noted.



KEYPLAN

Rev	Date	By	Chkd	Appd
PL1	11.05.17	SB	DT	KL

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www.arup.com

Client
Cork County Council

Project Title
Douglas Flood Relief Scheme (Including Togher Culvert)

Drawing Title
Proposed Douglas Flood Defences (Sheet 4 of 5)

Scale at A1 1:500 Scale at A3 1:1000
Role Civil
Suitability Planning
Arup Job No 234335-00 Rev PL1
Name C-000-013

Do not scale

A1

Existing Coarse Screen
to be removed.
Service pipes to be diverted

Existing Coarse Screen
to be removed

Existing channel to be
regraded to remove
sedimentation.
Channel banks to be reinforced
with rock armour as required

Section of Existing
Culvert to remain

Proposed Coarse Screen
(steel posts at 300mm centres)

Existing channel to be
regraded to remove
sedimentation.
Channel banks to be reinforced
with rock armour as required

For Continuation

See Drg No.
C-000-013

C14
C-000-017

C01
C-000-001

Grange Wood Court

Pearse Park

PEARSE

Commercial C

UND

10kv

Legend

- Channel Regrading
- Proposed Culvert
- Proposed Works Area
- Watercourse
- Proposed Coarse Screen
- C01 / C-000-001 — Location and Reference of Cross Section
- 150 — Culvert Chainage
- 150 — Grange Stream Chainage

Notes:

1. All levels are in Metres Ordnance Datum Malin Head (mOD) unless otherwise noted.

KEYPLAN

Do not scale

Rev	Date	By	Chkd	Appd
PL1	11.05.17	SB	DT	KL

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Project Title

Douglas Flood Relief Scheme
(Including Togher Culvert)

Drawing Title

Proposed Douglas Flood Defences
(Sheet 5 of 5)

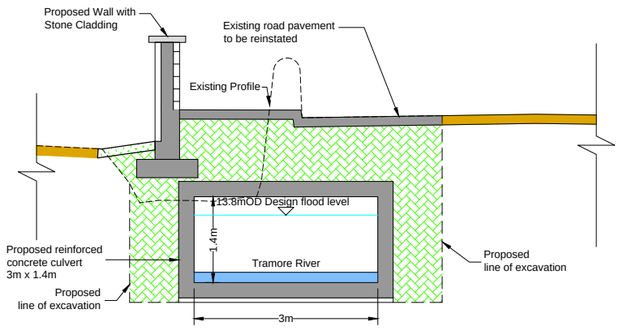
Scale at A1 1:500 Scale at A3 1:1000

Role Civil

Suitability Planning

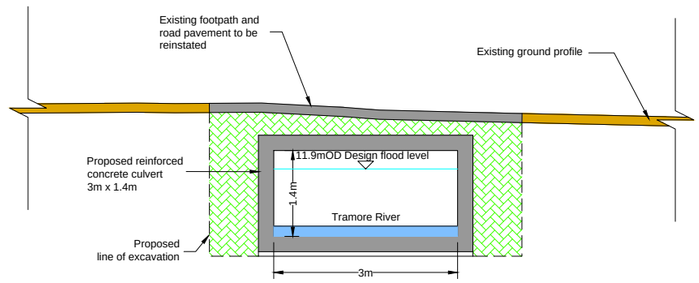
Arup Job No **234335-00** Rev **PL1**

Name **C-000-014**



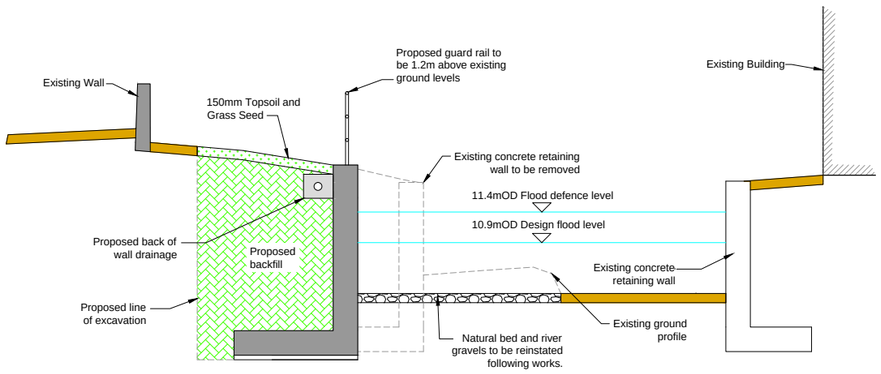
C01 Cross Section (Lehenaghmore Road)

Scale 1:50



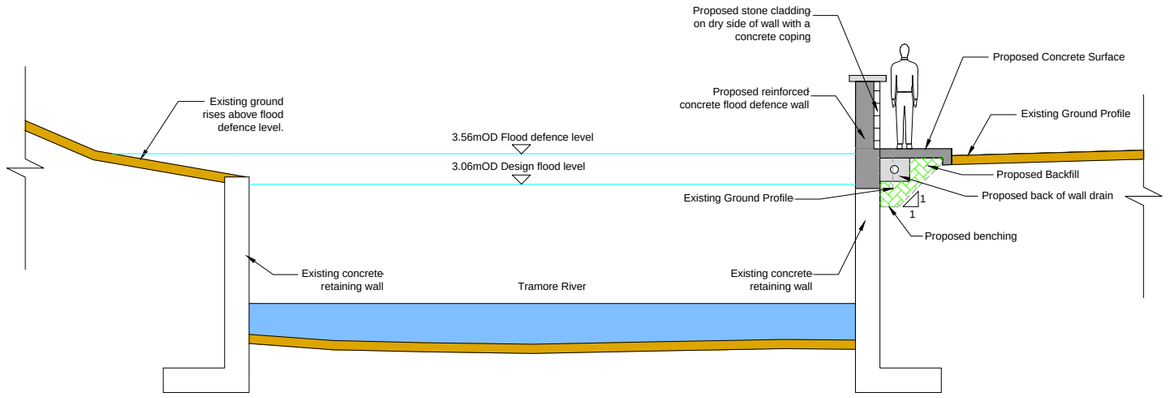
C02 Cross Section (Togher Road)

Scale 1:50



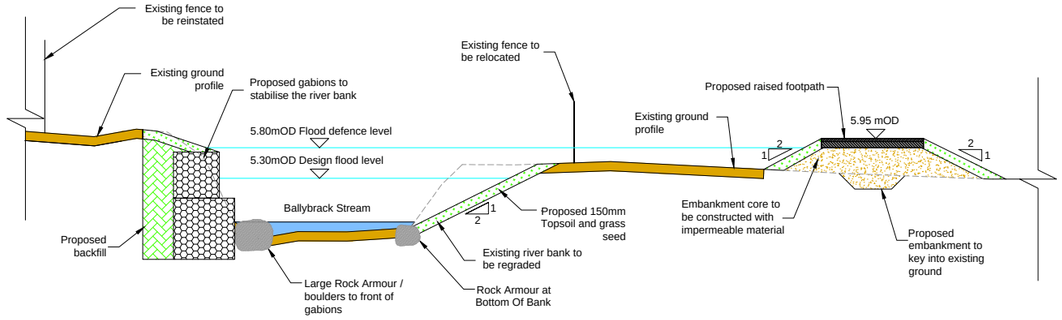
C03 Cross Section (Griffin Pianos)

Scale 1:50



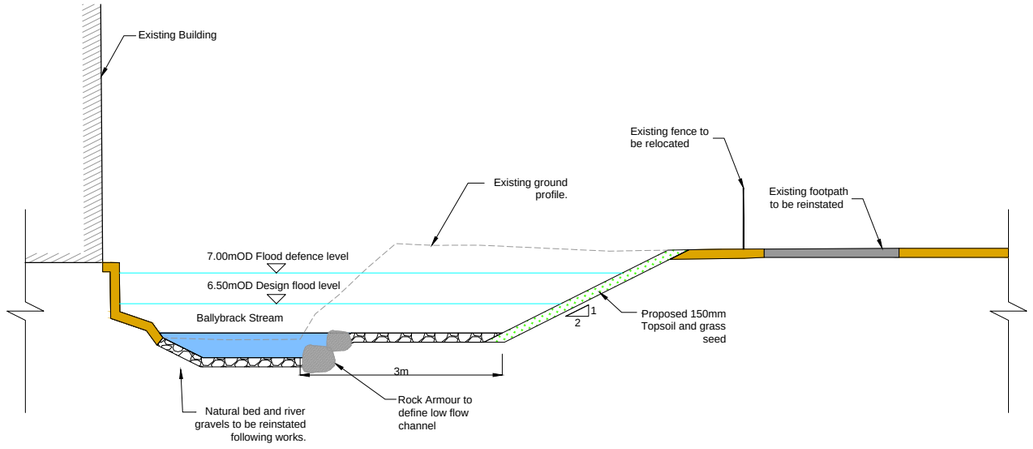
C04 Cross Section (Douglas Mills)

Scale 1:50



C05 Cross Section (Douglas Community Park)

Scale 1:50



C06 Cross Section (Douglas Community Park)

Scale 1:50

Notes:

1. All levels are in Metres Ordnance Datum Malin Head (mOD) unless otherwise noted.

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Project Title

Douglas Flood Relief Scheme
(Including Togher Culvert)

Drawing Title

Proposed Flood Defences Sections
Sheet 1 of 3

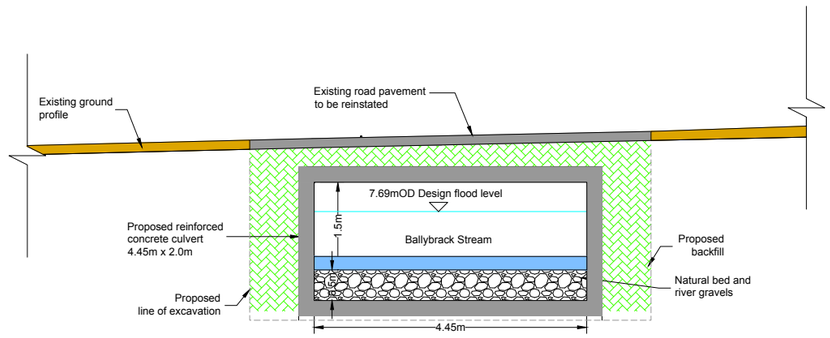
Scale at A1	Scale at A3
1:50	1:100

Role: Civil

Suitability: Planning

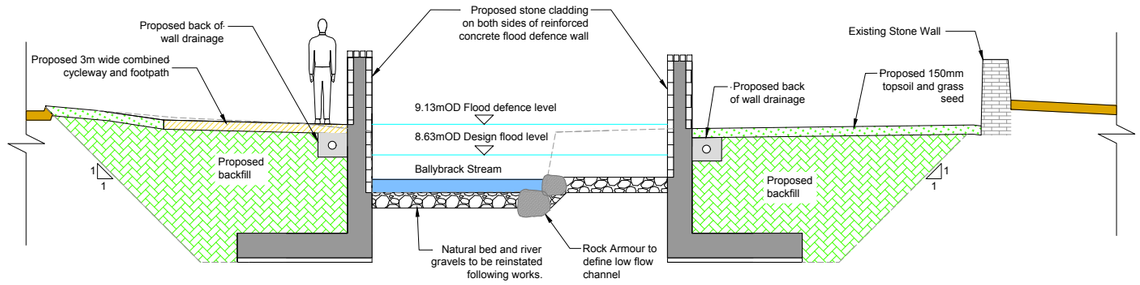
Arup Job No	Rev
234335-00	PL1

Name: C-000-015



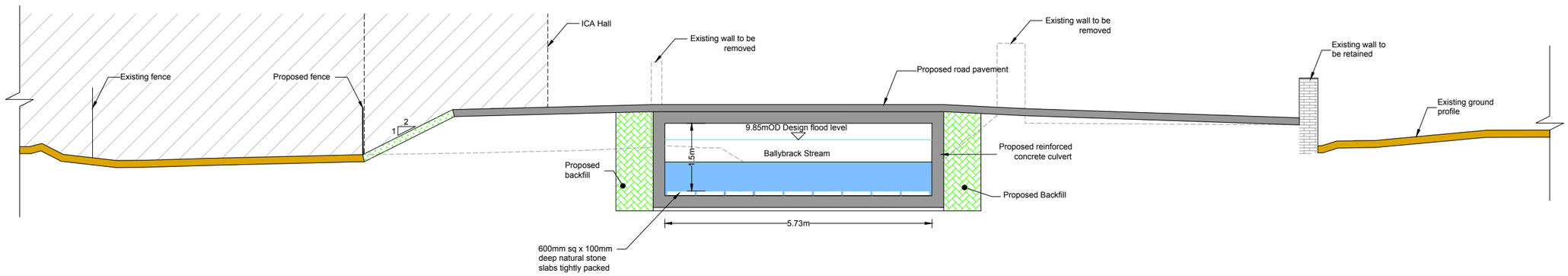
C07 Cross Section (Church Road)

Scale 1:50



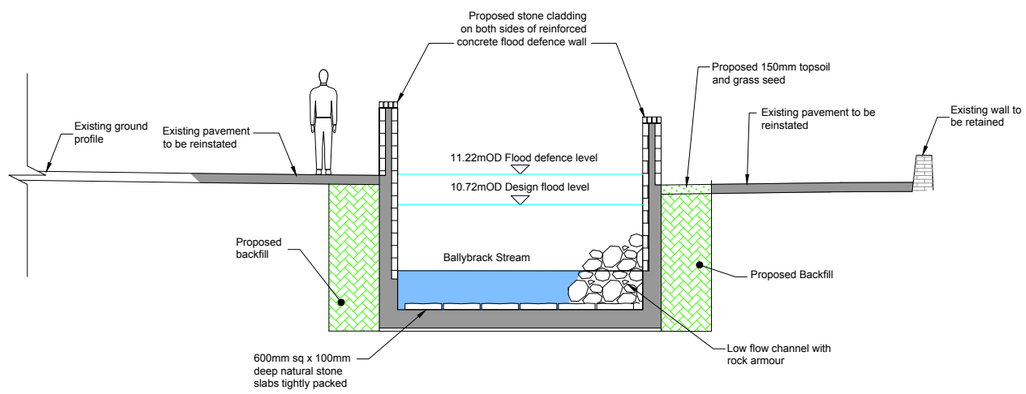
C8 Cross Section (Ravensdale)

Scale 1:50



C9 Cross Section (Lower Ravensdale Bridge)

Scale 1:50



C10 Cross Section (Ravensdale)

Scale 1:50

Notes:

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Project Title

Douglas Flood Relief Scheme (Including Togher Culvert)

Drawing Title

Proposed Flood Defences Sections Sheet 2 of 3

Scale at A1	Scale at A3
1:50	1:100

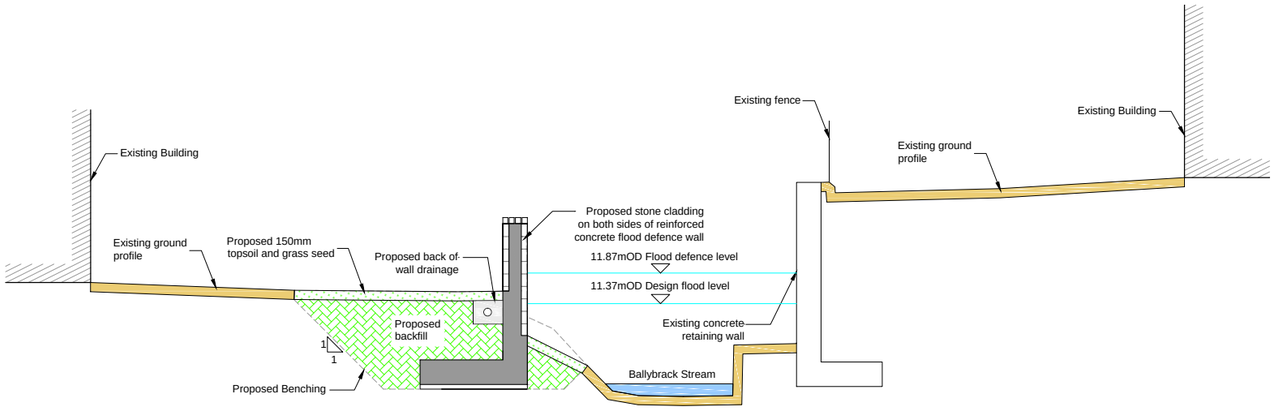
Role: Civil

Suitability: Planning

Arup Job No	Rev
234335-00	**PL1**

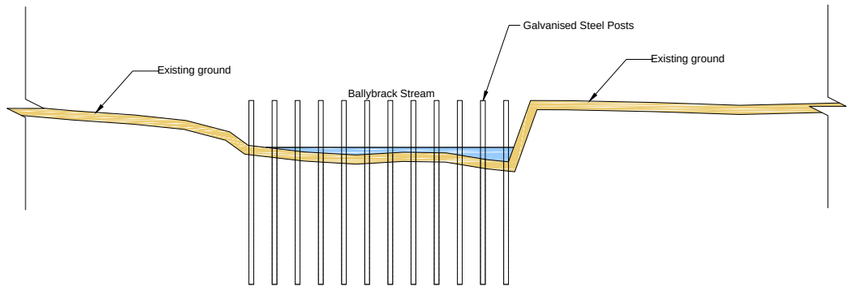
Name

C-000-016



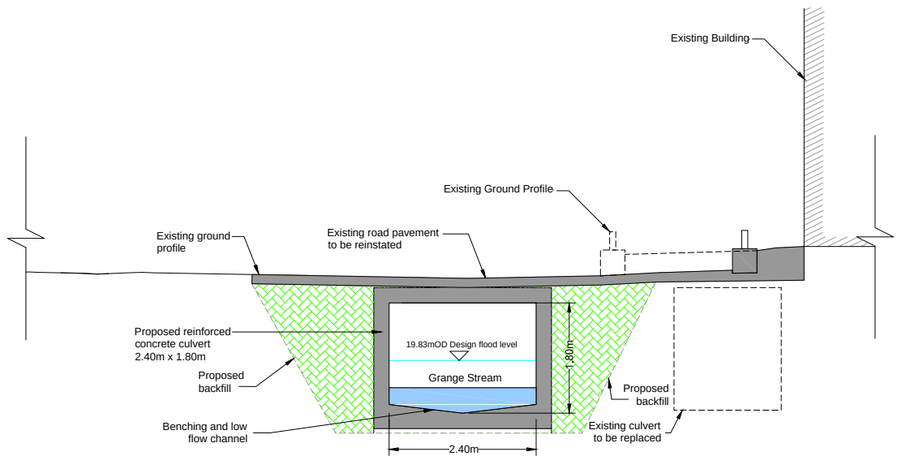
C11 Cross Section (Ravensdale)

Scale 1:50



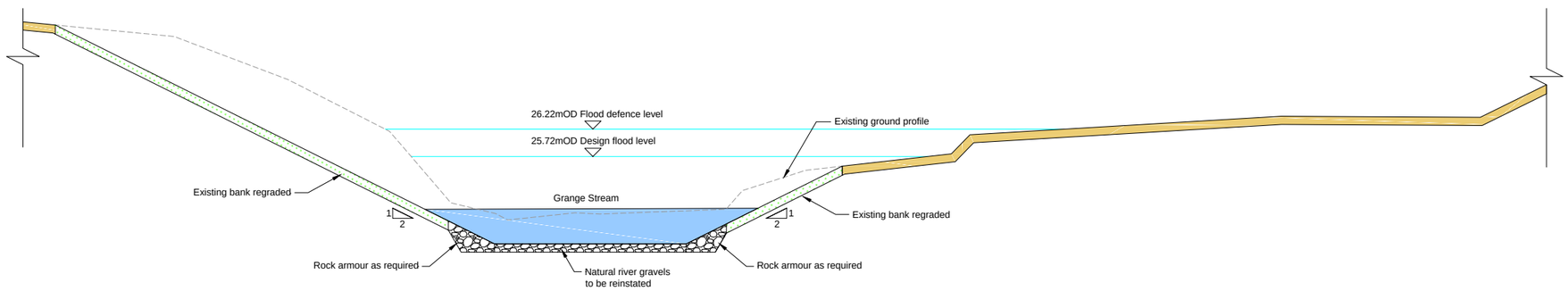
C12 Cross Section (Ballybrack Woods)

Scale 1:50



C13 Cross Section (Grange Stream Culvert)

Scale 1:50



C14 Cross Section (Donnybrook CC)

Scale 1:50

Notes:

1. All levels are in Metres Ordnance Datum Malin Head (mOD) unless otherwise noted.

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Project Title

Douglas Flood Relief Scheme (Including Togher Culvert)

Drawing Title

Proposed Flood Defences Sections Sheet 3 of 3

Scale at A1: As Shown

Role: Civil

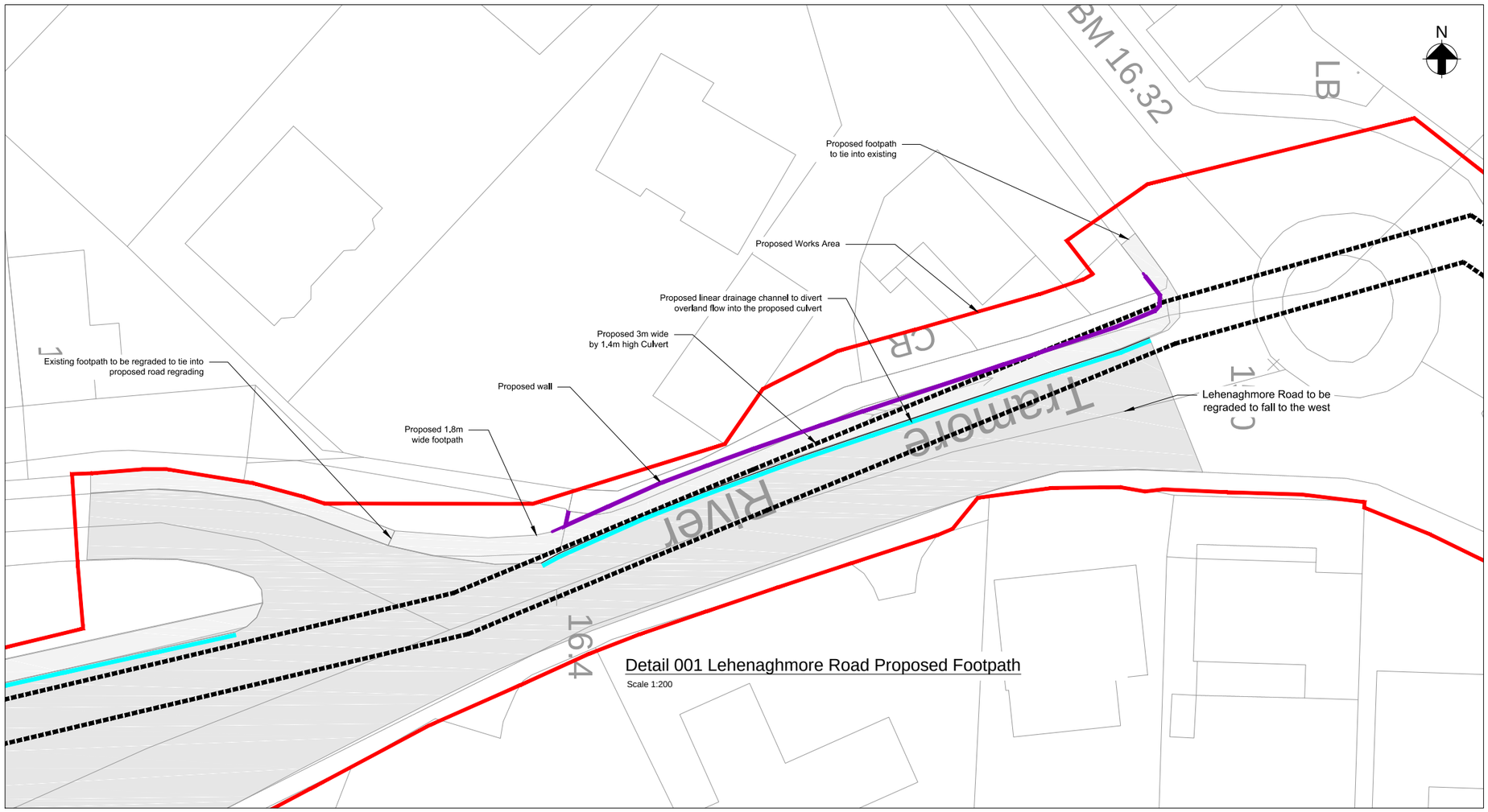
Suitability: Planning

Arup Job No: **234335-00**

Rev: **PL1**

Name: **C-000-017**

Do not scale



Detail 001 Lehenaghmore Road Proposed Footpath

Scale 1:200

Notes:

1. All levels are in Metres Ordnance Datum Malin Head (mOD) unless otherwise noted.

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Project Title

Douglas Flood Relief Scheme
(Including Togher Culvert)

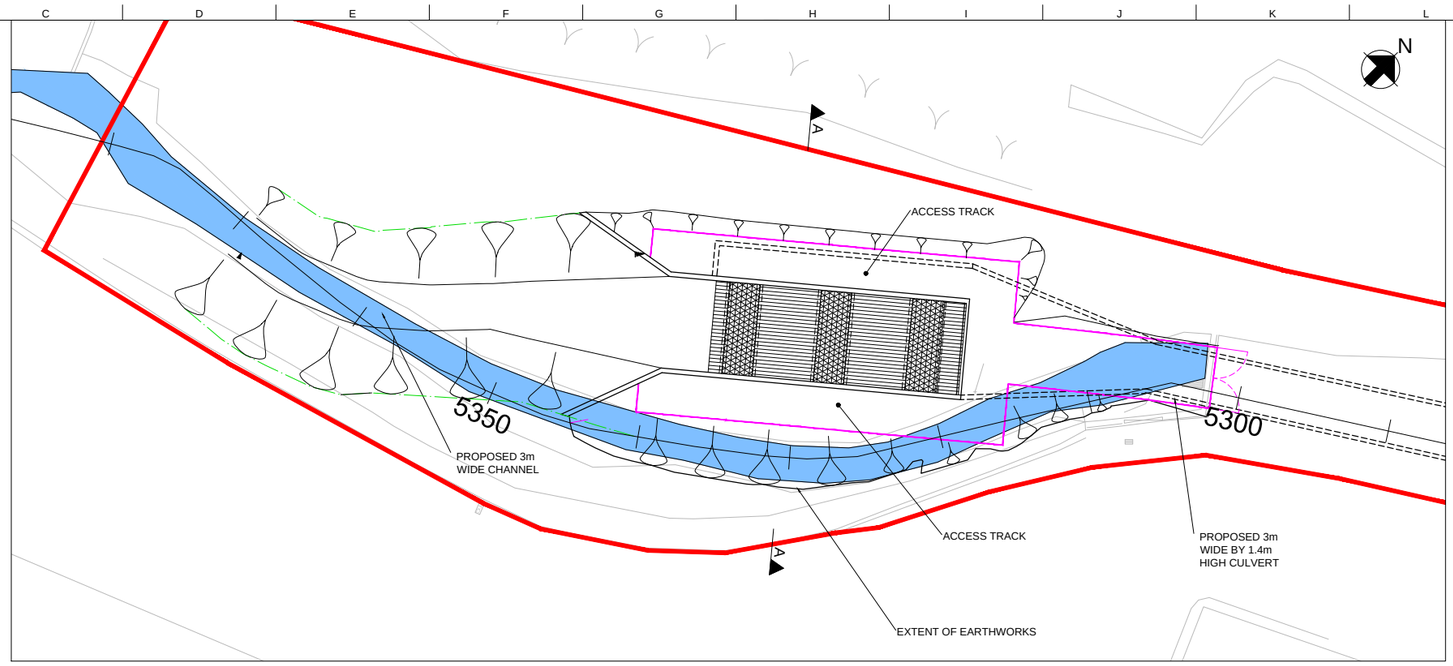
Drawing Title

Proposed Flood Defences
Togher Details
Sheet 1 of 2

Scale at A1	1:200	Scale at A3	1:400
Role	Civil		
Suitability	Planning		

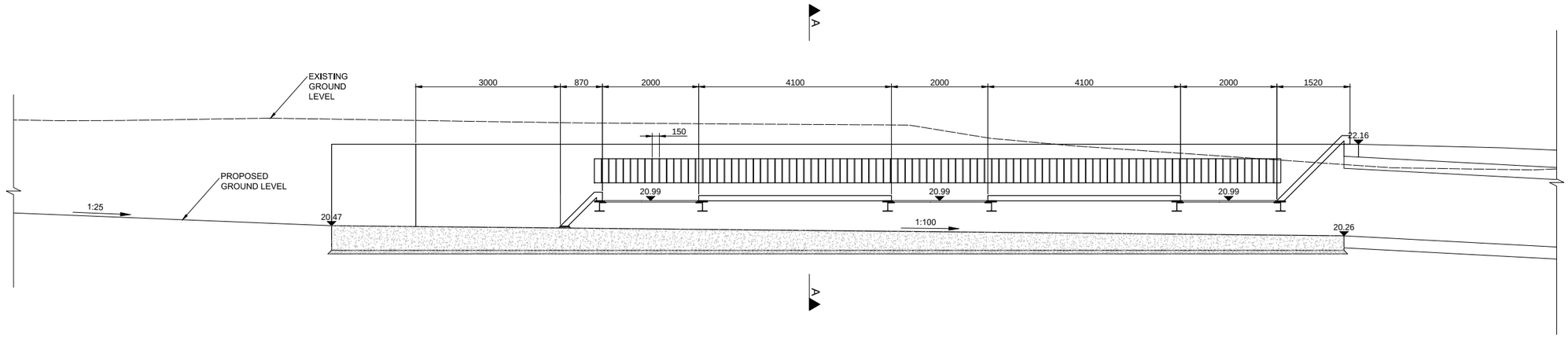
Arup Job No	Rev
234335-00	PL1

Name
C-000-018



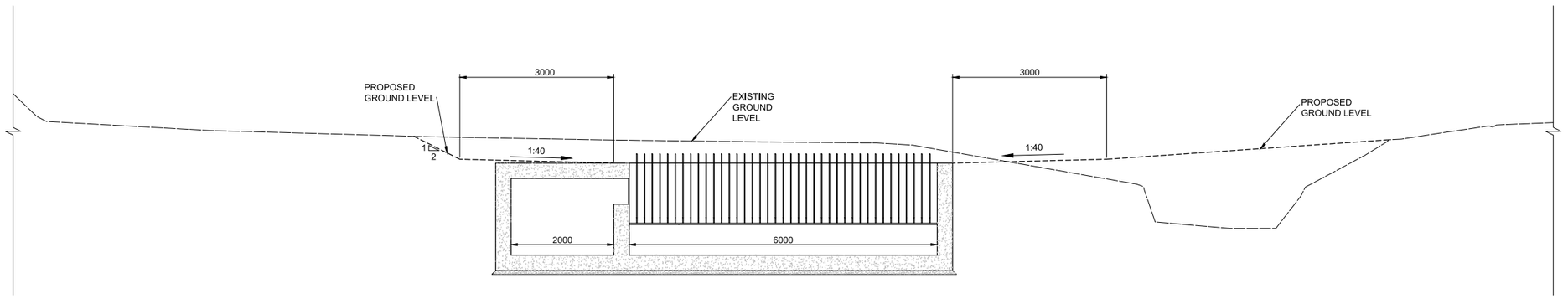
Plan of Trash Screen & Access Track

SCALE 1:200



Elevation

SCALE 1:50



Section A-A

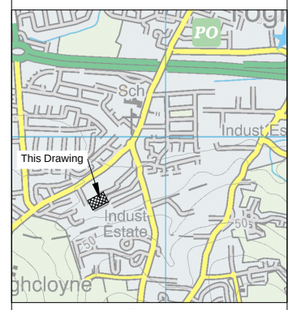
SCALE 1:50

Legend

- Proposed Works Area
- Existing Watercourse
- 2.4m High Palisade Fence

Notes:

1. All levels are in Metres Ordnance Datum Malin Head (mOD) unless otherwise noted.



KEYPLAN

Rev	Date	By	Chkd	Appd
PL1	11.05.17	SB	DT	KL

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Project Title

Douglas Flood Relief Scheme
(Including Togher Culvert)

Drawing Title

Proposed Flood Defences
Togher Details
Sheet 2 of 2

Scale at A1	As Shown
Role	Civil
Suitability	Planning
Arup Job No	234335-00
Rev	PL1
Name	C-000-019

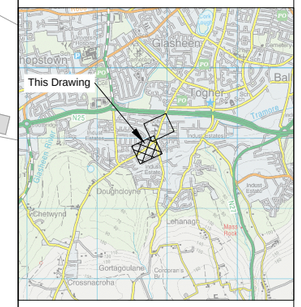
A1

Legend

- Proposed Works Area
- Watercourse
- Proposed Semi Mature Tree Planting

Notes:

1. All levels are in Metres Ordnance Datum Malin Head (mOD) unless otherwise noted.



KEYPLAN

Rev	Date	By	Chkd	Appd
PL1	11.05.17	SB	DT	KL

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Cork County Council

Project Title

Douglas Flood Relief Scheme
(Including Togher Culvert)

Drawing Title

Proposed Tree Replanting
Togher - Sheet 1 of 2

Scale at A1	1:1000	Scale at A3	1:2000
Role	Civil		
Suitability	Planning		

Arup Job No	Rev
234335-00	**PL1**

Name
C-000-020

Do not scale

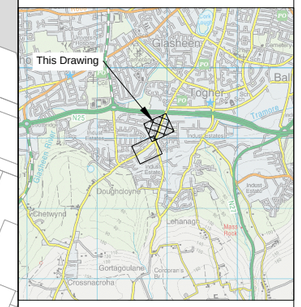
A1

Legend

- Proposed Works Area
- Watercourse
- Proposed Semi Mature Tree Planting

Notes:

1. All levels are in Metres Ordnance Datum Malin Head (mOD) unless otherwise noted.



KEYPLAN

PL1	11.05.17	SB	DT	KL
Rev	Date	By	Chkd	Appd

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Client

Cork County Council

Project Title

Douglas Flood Relief Scheme
(Including Togher Culvert)

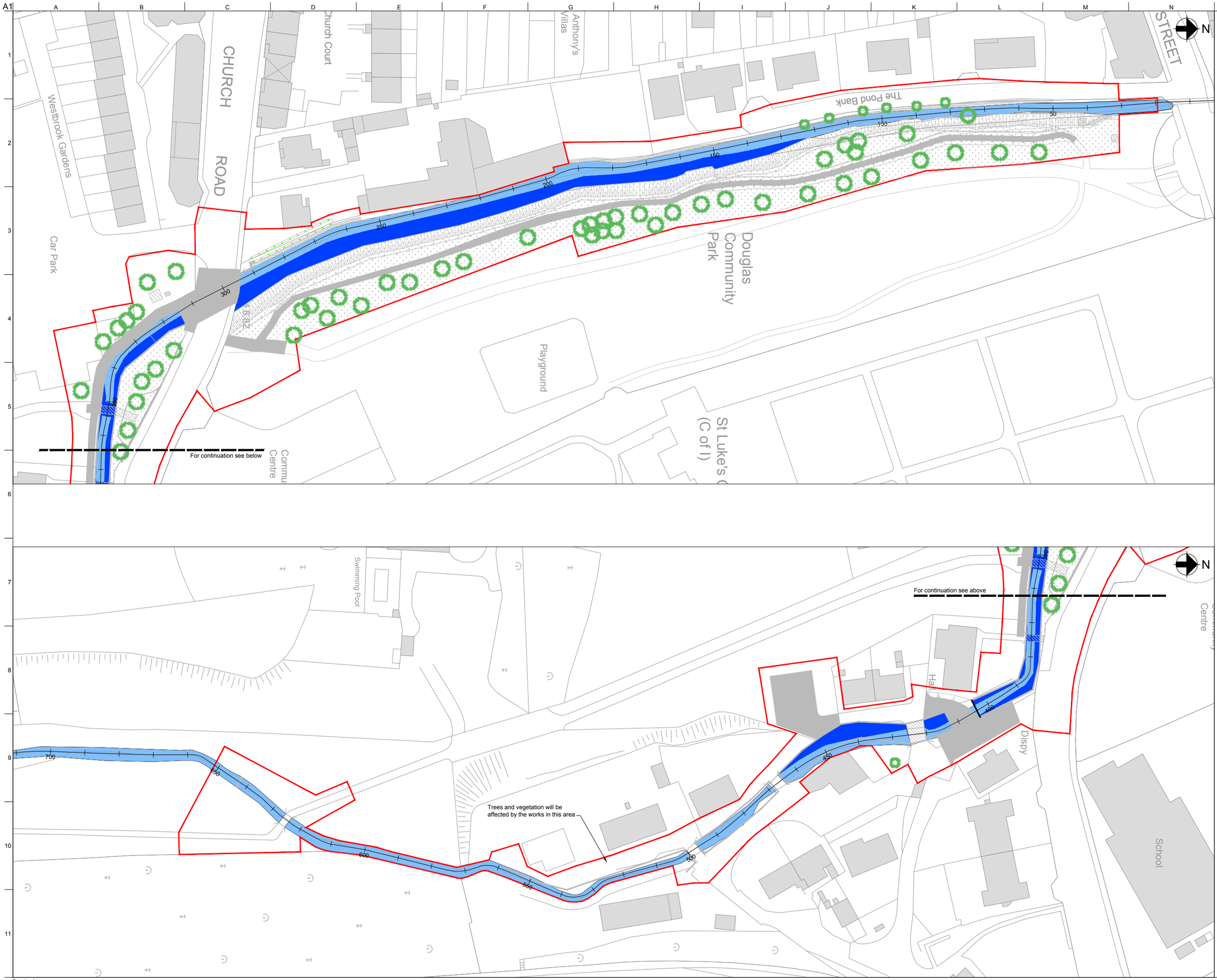
Drawing Title

Proposed Tree Replanting
Togher - Sheet 2 of 2

Scale at A1	1:1000	Scale at A3	1:2000
Role	Civil		
Suitability	Planning		
Arup Job No	234335-00	Rev	PL1
Name	C-000-021		

Do not scale

A1

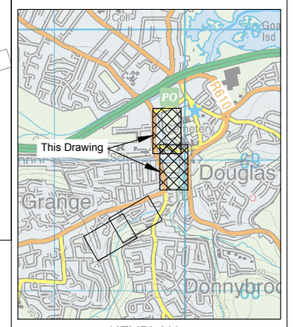


Legend

- Proposed Works Area
- Watercourse
- Proposed Semi Mature Tree Planting

Notes:

1. All levels are in Metres Ordnance Datum Malin Head (mOD) unless otherwise noted.



KEYPLAN

P1	25.04.17	SB	DT	KL
Rev	Date	By	Chkd	Appd

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Cork County Council

Project Title

Douglas Flood Relief Scheme
(Including Togher Culvert)

Drawing Title

Proposed Tree Replanting
Douglas - Sheet 1 of 2

Scale at A1 1:500 Scale at A3 1:1000

Role Civil

Suitability Planning

Arup Job No **234335-00** Rev **PL1**

Name **C-000-022**

Do not scale

A1

Grange Wood Court

Pearse

UND

UND

Commercial Centre

Bromley Park

For continuation see drawing No. C-000-032

150

200

250

300

350

400

450

500

Immature Trees in this area will be affected by the works

N

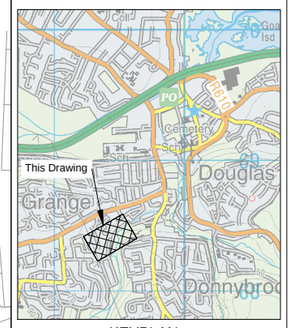
N

Legend

- Proposed Works Area
- Watercourse
- Proposed Semi Mature Tree Planting

Notes:

1. All levels are in Metres Ordnance Datum Malin Head (mOD) unless otherwise noted.



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Rev	Date	By	Chkd	Appd

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Project Title

Douglas Flood Relief Scheme
(Including Togher Culvert)

Drawing Title

Proposed Tree Replanting
Douglas - Sheet 2 of 2

Scale at A1 1:500 Scale at A3 1:1000

Role Civil

Suitability Planning

Arup Job No **234335-00** Rev **PL1**

Name **C-000-023**

Do not scale

Appendix 3.2

Drawings of Trees to be Removed

A1

Legend

- Proposed Works Area
- Watercourse
- ## Existing tree to be removed

Notes:

1. To be read in conjunction with the Tree Survey.
2. All levels are in Metres Ordnance Datum Malin Head (mOD) unless otherwise noted.

KEYPLAN

Rev	Date	By	Chkd	Appd
PL1	11.05.17	SB	DT	KL

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Client
Cork County Council

Project Title
Douglas Flood Relief Scheme
(Including Togher Culvert)

Drawing Title
Trees Affected by the Works
Togher - Sheet 1 of 2

Scale at A1	1:1000	Scale at A3	1:2000
Role	Civil		
Suitability	Planning		
Arup Job No	234335-00	Rev	PL1
Name	C-000-030		

Do not scale

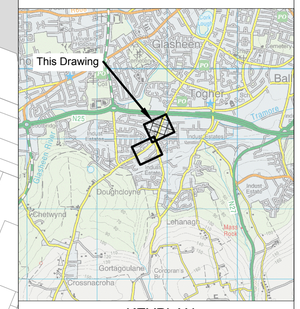
A1

Legend

- Proposed Works Area
- Watercourse
- ## Existing tree to be removed

Notes:

1. To be read in conjunction with the Tree Survey.
2. All levels are in Metres Ordnance Datum Malin Head (mOD) unless otherwise noted.



KEYPLAN

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Rev	Date	By	Chkd	Appd

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Client

Cork County Council

Project Title

Douglas Flood Relief Scheme
(Including Togher Culvert)

Drawing Title

Trees Affected by the Works
Togher - Sheet 2 of 2

Scale at A1	1:1000	Scale at A3	1:2000
Role	Civil		
Suitability	Planning		
Arup Job No	234335-00	Rev	PL1
Name	C-000-031		

Do not scale

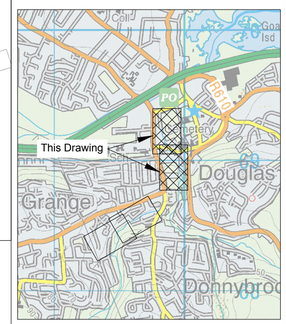
A1

Legend

- Proposed Works Area
- Watercourse
- ## Existing tree to be removed

Notes:

1. To be read in conjunction with the Tree Survey.
2. All levels are in Metres Ordnance Datum Malin Head (mOD) unless otherwise noted.



KEYPLAN

P1	25.04.17	SB	DT	KL
Rev	Date	By	Chkd	Appd

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Client

Cork County Council

Project Title

Douglas Flood Relief Scheme
(Including Togher Culvert)

Drawing Title

Trees Affected by the Works
Douglas - Sheet 1 of 2

Scale at A1	1:500	Scale at A3	1:1000
Role	Civil		
Suitability	Planning		
Arup Job No	234335-00	Rev	PL1
Name	C-000-032		

Do not scale

A1

For continuation see drawing No C-000-032

Immature Trees in this area will be affected by the works

Grange Wood Court

Pearse

Commercial Centre

Bromley Park

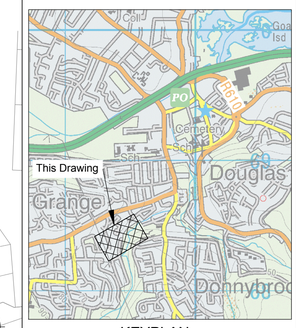
N

Legend

- Proposed Works Area
- Watercourse
- ## Existing tree to be removed

Notes:

1. To be read in conjunction with the Tree Survey.
2. All levels are in Metres Ordnance Datum Malin Head (mOD) unless otherwise noted.



KEYPLAN

PL1	11.05.17	SB	DT	KL
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Client

Cork County Council

Project Title

Douglas Flood Relief Scheme
(Including Togher Culvert)

Drawing Title

Trees Affected by the Works
Douglas - Sheet 2 of 2

Scale at A1 1:500 Scale at A3 1:1000

Role Civil

Suitability Planning

Arup Job No **234335-00** Rev **PL1**

Name **C-000-033**

Do not scale

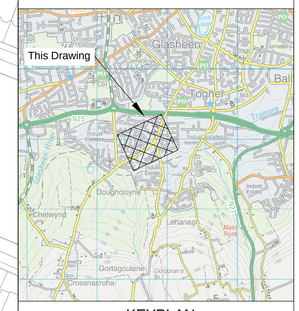
Appendix 3.3

Access Routes

A1

Legend

- Proposed Works Area
- Watercourse
- Construction Access Route



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Project Title

Douglas Flood Relief Scheme
(Including Togher Culvert)

Drawing Title

Proposed Togher Flood Defences
Proposed Construction Access Routes

Scale at A1 1:1000 Scale at A3 1:2000

Role Civil

Suitability Planning

Arup Job No **234335-00** Rev **PL1**

Name **C-000-040**

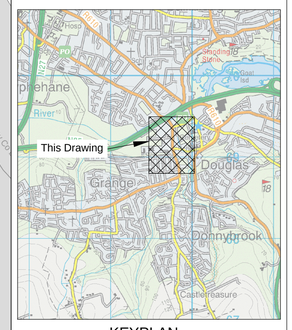
Do not scale

A1

Legend

- Proposed Works Area
- Watercourse
- Construction Access Route

N



KEYPLAN

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Project Title

Douglas Flood Relief Scheme
(Including Togher Culvert)

Drawing Title

Proposed Douglas Flood Defences
Proposed Construction Access Routes
Sheet 1 of 2

Scale at A1	1:1000	Scale at A3	1:2000
Role	Civil		
Suitability	Planning		

Arup Job No	Rev
234335-00	PL1

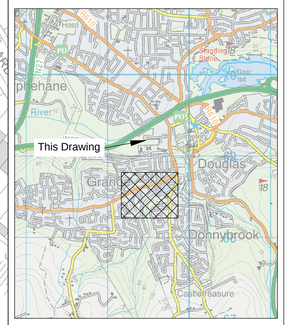
Name
C-000-041

Do not scale

A1

Legend

- Proposed Works Area
- Watercourse
- Construction Access Route



KEYPLAN

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Project Title

Douglas Flood Relief Scheme
(Including Togher Culvert)

Drawing Title

Proposed Douglas Flood Defences
Proposed Construction Access Routes
Sheet 2 of 2

Scale at A1 1:1000 Scale at A3 1:2000

Role Civil

Suitability Planning

Arup Job No **234335-00** Rev **PL1**

Name **C-000-042**

Do not scale

Appendix 4.1

Outline Invasive Species Management Strategy

Cork County Council

Douglas Flood Relief Scheme (including Togher Culvert)

Outline Invasive Species Management Strategy

Appendix 4.1

Issue | May 2017

Job number 234335-00

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Document Verification

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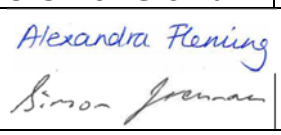
Job title		Douglas Flood Relief Scheme (including Togher Culvert)			**Job number** 234335-00
Document title		Outline Invasive Species Management Strategy			**File reference**
Document ref		Appendix 4.1			
Revision	**Date**	**Filename**	234335_EIS_Appendix 4.1_Issue 080517.docx		
Issue	8 May 2017	**Description**	Issue		
			Prepared by	Checked by	Approved by
		Name	Alexandra Fleming & Simon Grennan	Fiona Patterson	Fiona Patterson
		Signature			
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Contents

Appendices

1 Introduction

Non-native invasive plant species have been identified and documented within proposed works areas that are included in the Douglas Flood Relief Scheme (including Togher Culvert), hereafter referred to as the proposed scheme.

The purpose of this outline non-native invasive species management plan is to present the strategy that will be adopted during the construction and operation of the proposed scheme in order to manage and prevent the spread of the invasive plant species.

This outline plan is intended to be a working document and will be updated during both the construction and operational phases. During construction, it will be updated by the contractor to form the detailed invasive species management plan which will form part of the detailed Construction Environmental Management Plan (CEMP). Following construction, the plan will be updated for the operational phase, taking into account the results of the detailed construction invasive species management plan and operational maintenance requirements etc.

Construction (and potentially operational maintenance works) could potentially disturb stands of invasive plants and/or soils contaminated with invasive plant material. In addition to lands within the proposed works areas, there is an identified risk of invasive plant species being spread onto neighbouring lands and onto public roads and other locations.

Invasive plant species which have been identified in the proposed works areas include Himalayan Balsam (*Impatiens glandulifera*), White Heliotrope (*Petasites fragrans*) and Japanese knotweed.

This report outlines the strategy that will be adopted during the construction and operation of the flood relief scheme in order to prevent the spread of invasive plant species.

The main objective of the invasive species management strategy for the scheme will be to:

- Prevent the spread of invasive plant species during the construction phase;
- Manage the growth of invasive plant species adjacent to flood defences so as to protect the integrity of the structures from the impacts of these species;
- Prevent the spread of invasive plant species during channel maintenance works in the future.

2 Methodology

This report applies the most relevant and current guidance in relation to the treatment and management of non-native invasive plant species in construction projects. The following literature was referred to in preparation of this report.

- NRA Guidelines on The Management of Noxious Weeds and Non-Native Invasive Plant Species on National Roads (2008)
- Managing Japanese knotweed on development sites - The Knotweed Code of Practice produced by the Environmental Agency (2013)[1]
- Managing Invasive Non-native Plants in or near Freshwater, Environment Agency (2010)
- Best Practice Management Guidelines Japanese knotweed *Fallopia japonica*, Invasive Species Ireland (2015).

3 Legislation

The control of invasive species in Ireland comes under the Wildlife (Amendment) Act 2000 where it states that

'*Any person who— [...] plants or otherwise causes to grow in a wild state in any place in the State any species of flora, or the flowers, roots, seeds or spores of flora, ['refers only to exotic species thereof'][...] otherwise than under and in accordance with a licence granted in that behalf by the Minister shall be guilty of an offence*.'

Under the European legislation, the Birds and Natural Habitats Regulations 2011 (SI 477 of 2011) , Section 49(2) prohibit the introduction and dispersal of species listed in the Third Schedule (including Japanese knotweed) whereby "*any person who plants, disperses, allows or causes to disperse, spreads or otherwise causes to grow ….] shall be guilty of an offence."*

The implementation of the management measures set out in this plan have been informed by the above legislation.

[1] This document was officially withdrawn by the UK Environment Agency as a guidance document in July 2016 but contains relevant, practical advice and is included here for that reason.

4 Non-Native Invasive Species in the Study Area

Non-native invasive species have been identified in a number of areas where the proposed construction works will take place. Invasive plant species which have been identified include Himalayan Balsam (*Impatiens glandulifera*), Winter Heliotrope (*Petasites fragrans*), Buddleia (*Buddleja davidii*) and Japanese knotweed (*Fallopia japonica*). The above listed invasive species are present in many locations in the Togher and Douglas areas. However, for the purposes of this scheme, a non-native invasive species management plan will only be put in place within the footprint of the construction works.

A number of surveys have been carried out The most recent invasive species survey carried out within the proposed construction footprint area and in surrounding areas was during in September 2016 by Dixon Brosnan.

The drawings appended to the end of this report show the locations of just some of the non-native invasive species identified within the works area based on surveys carried out between 2015 and 2017. Refer to drawings presented in **Appendix A** showing the Ballybrack stream (Douglas), Togher and Donnybrook Commercial Centre.

5 Management Options

5.1 General measures to avoid spreading invasive species during construction or soil movement

Many of the species noted above are highly invasive, and can easily spread to new areas. Most are particularly effective at colonising disturbed ground (e.g. construction sites). Some species spread by the re-growth of cut fragments or root material such as Japanese Knotweed, so if they are broken up during site clearance or other earthworks they can readily re-grow in new areas to which soil is moved.

The unintentional spread of invasive species during construction works is a significant issue, and if not managed in the correct manner, species like Japanese Knotweed could be spread to uninfested areas, which would increase the future cost and effort required to control the species, and could pose further public health and safety risks (Knotweed species can cause damage to buildings and infrastructure).

The most common ways that these species can be spread are:

- Site and vegetation clearance, mowing, hedge-cutting or other landscaping activities
- Spread of seeds or plant fragments during the movement or transport of soil

- Spread of seeds or plant fragments through the local surface water and drainage network
- Contamination of vehicles or equipment with seeds or plant fragments which are then transported to other areas
- Importation of soil from off-site sources contaminated with invasive species plant material

Depending on the timescale for the construction of the proposed scheme it may be possible to eradicate some species prior to the onset of construction on the site via an advance treatment contract (refer to Section 5.2 below); this would be preferable. However if control programmes have not been achieved before construction begins, then site hygiene measures will need to be put in place to ensure that the further spread of invasive species is avoided. Refer to the Section 5.4 below on site hygiene below for further details on same.

5.2 Advance Treatment

As mentioned previously, it may be necessary to implement an advance works contract to commence treatment of some invasive species such as knotweed species before construction starts. By treating in advance there will be much more control over the spread of infestations. In some locations, infestations if left untreated, may spread further by the time construction commences. It is expected that the advance treatment for the knotweed species will likely be chemical treatment rather than excavation. The specific treatment method will be decided on a site by site basis. Chemical treatment (spraying) of knotweed was carried out in Area 1 (Ballybrack Stream) in 2015 and it is envisaged that further treatment will be carried out in 2017.

As part of the advance works contract, the contractor will be required to update and implement the recommendations of this outline management plan prior to advance treatment commencing. This purpose of the advance treatment plan will be to:

- Identify the extent of the infestation on the site
- Ensure further growth and spread of the plant on the site does not occur
- Ensure the plant is not spread to other sites either adjacent to the infested site or through transportation of contaminated soil to another site
- Identify the best method for managing and controlling the invasive species on the site with regard to the future proposed site works and construction methods
- Communicate the plan to all site operatives to ensure success of the plan
- Document and record the treatment and management methods carried out on site for future reference (for use during main construction contract, future site owners, site users etc.)

The advance treatment plan shall be completed by a qualified ecologist, made as simple as possible and will include the following:

- Site background including proposed works

- Extent of the current known locations of invasive species infestations. The drawings appended to the end of this report show the locations of just some of the non-native invasive species identified within the works area based on surveys carried out between 2015 and 2017. Refer to drawings presented in **Appendix A** showing the Ballybrack stream (Douglas), Togher and Donnybrook Commercial Centre.
- Site survey at known locations of infestations and along entire construction footprint of all areas where construction works are proposed
- Following on from site survey and based on recommendations from this outline invasive species management plan, confirm specific advance treatment to be put in place.
- Site hygiene protocols during advance treatment (refer also to section 5.4 above)
- Responsible individuals
- Follow up requirements
- Any other relevant information deemed necessary by the ecologist
- Close out report documenting details of advance treatment carried out and any recommendations to be carried out during main construction phase

5.3 Pre-construction Survey

As species may have spread, or their distribution may have changed, between the habitat surveys carried out in September 2016 by Dixon Brosnan and advance treatment (if implemented), and the commencement of the main construction works, the implementation of this Outline Invasive Species Management Plan will require a pre-construction re-survey by a suitably qualified person within the proposed scheme boundary and any additional areas where construction works are required (e.g. temporary construction compounds, haul routes etc.). In accordance with the TII guidance this survey will produce accurate 1:5,000 scale mapping for the precise location of invasive species. The pre-construction surveys will be undertaken by suitable experts with competence in identifying the species concerned having regard to any seasonal constraint.

5.4 Site Hygiene

Maintaining site hygiene at all times in an area where invasive non-native species are present is essential to prevent further spread. It is also necessary on sites where invasive non-native species are not present but where there is risk of contaminated material being brought to site, for example, site machinery being used on multiple site, construction staff travelling between infested and not infested sites. Preventative measures must be taken. Construction equipment, vehicles and footwear may provide a vector for the spread of invasive non-native species.

The following site hygiene measures shall be taken for each site where applicable:

- In relation to knotweed plant species - understand the possible extent of the rhizome (root) system underground – up to 7m horizontally and 3 meters vertically.
- Fence off the infested areas prior to and during construction works where possible in order to avoid spreading seeds or plant fragments around or off the construction site. In relation to knotweed plant species, allow for a 10m buffer around the area.
- Clearly identify and mark out infested areas. Erect signs to inform Contractors of the risk.
- Avoid if possible using machinery with tracks in infested areas.
- Clearly identify and mark out areas where contaminated soil is to be stockpiled on site and cannot be within 50m of any watercourse or within a flood zone.
- Create designated entry and exit points for operators on foot and for small mobile equipment. A delineated access track to be maintained free of non-native invasive species to be established through the site to avoid the spread of Japanese knotweed by permitted vehicles accessing the site.
- Installation of a dedicated footwear and vehicular wheel wash down facility into a contained area within the site.
- Vehicles leaving the site to be inspected for any plant material and washed down into a contained area.
- Vehicles used in the transport of contaminated material will need to be visually checked and washed down into a contained area before being used for any other work, either on the same site or at a different site.
- Material gathered in dedicated wash down contained areas will need to be appropriately treated along with other contaminated soil on site. Refer to sections below in relation to treatment methods.
- If soil is imported to the site for landscaping, infilling or embankments, the contractor shall gain documentation from suppliers that it is free from invasive species.
- Ensure all site users are aware of measures to be taken and alert them to the presence of the Invasive Species Management Plan.
- Erection of adequate site hygiene signage in relation to the management of non-native invasive material.

5.5 Treatment Methods

In addition to the advance treatment works (if implemented) and pre-construction survey, when the works areas becomes available to the contractor for fencing and commencement of site clearance, areas identified as requiring specific treatment will be demarcated and the designated control measures implemented at the earliest possible stage to reduce the risk of spread along the proposed scheme or beyond the land take.

There are a number of management options that may be implemented to control and prevent the spread of invasive species. These are presented in the sections below. It is also noted that it may not be possible to completely eradicate the invasive species before or during the construction phase. For example, where structures are proposed at sites that contain Japanese knotweed, root barrier membranes may require to be installed to protect the structures from the plant. The design of these membranes will form part of the detailed design stage.

It should be noted that those involved in the application of herbicides/pesticides must be competent to do so and, consequently, must have sufficient training, experience and knowledge in the area of herbicides/pesticides application. It is important that all staff involved in the application of herbicides/pesticides have received appropriate training, which may include achieving competency certification in the safe use of herbicides/pesticides through a National Proficiency Tests Council registered assessment centre or achieving an appropriate FETAC award in this area.

5.5.1 Chemical Treatment

The control of some species will require the use of herbicides (if not buried), which can pose a risk to human health, to non-target plants or to wildlife. In order to ensure the safety of herbicide applicators and of other public users of the site, a qualified and experienced Contractor will be employed to carry out all work.

It is advised that contractor refer to the following documents, which provides detailed recommendations for the control of invasive species and noxious weeds:

- Chapter 7 and Appendix 3 of the TII Publication The Management of Noxious Weeds and Non-Native Invasive Plant Species on National Roads (NRA, 2008)
- Invasive Species Ireland Best Practice Management Guidelines for Japanese Knotweed (2015)
- The Knotweed Code of Practice: Managing Japanese knotweed on development sites (UK Environment Agency, 2013)

These documents include measures to aid the identification of relevant species, with details for the timing, chemicals and methodology for chemical control, and for measures to avoid environmental damage during the use of herbicides.

Chemical treatment involves the application of a herbicide to invasive species plant such as Japanese Knotweed stands without any excavation or removal of the plant material. The preferred types of herbicides to be used in the treatment of Knotweed are Glyphosate and 2,4-D Amine. Generally, if herbicide is applied as the treatment option, it will need to be reapplied for up to five years after the first application to ensure the plant control measures have been effective, or monitored for a minimum of two years during which no regrowth is recorded.

Glyphosate is non-persistent and can be used near water but it is not selective (i.e. it is a broad spectrum chemical - will impact all plant species) whereas 2-4-Amine, can be persistent for up to one month, can also be used near water but is more selective on certain plants. The selection of chemical will depend on the site conditions, proximity to water, surrounding habitats etc.

The most effective time to apply Glyphosate is from July to September (or before cold weather causes leaves to discolour and fall). The majority of herbicides are not effective during the winter dormant stage because they require living foliage to take up the active ingredient. It is essential that a competent and qualified person carries out the herbicide treatment. Reapplication rates will depend on site specific considerations including the extent of the infestation, its location, and the time of year treatment commences. Details of the proposed chemical treatment plan will be required in the site-specific invasive species management plan.

Chemical control of Himalayan balsam is readily achieved with the use of glyphosate or 2,4-D amine, which should be applied during active growth in late spring but late enough to ensure that germinating seedlings have grown sufficiently to be covered by the spray. Repeat treatments or other means of controlling seedling germination will be required for a period of five or more years. Monitoring of the site will be required in mid-spring and mid-summer to assess the occurrence of seedlings and determine appropriate control.

In relation to winter heliotrope, an application of a glyphosate-based herbicide after flowering in February to March is recommended by Cornwall Nature Reserves (2008), though the Royal Horticultural Society (2008) recommends spraying in midsummer or later but before the foliage begins to die back.

In relation to buddleia, recommended practice for the application of herbicides requires cutting back of plants to a basal stump during active growth (late spring to early summer) which is then treated (brushed on) immediately with a systemic weed killer mix (Starr et al, 2003). Foliar application of triclopyr or glyphosate may be adequate for limited infestations of younger plants, but should be followed up at 6 monthly intervals.

Foliar treatment (spraying) is usually applied with a sprayer such as a knapsack sprayer or a larger spray system. It is important to use a treatment dye to identify clearly all areas treated. It is an efficient way to treat large monocultures of invasive plants, or to spot-treat individual plants that are difficult to remove mechanically such as Japanese knotweed.

In the case of knotweed, depending on weather and temperatures in the days following the initial treatment, and to ensure optimal uptake of herbicide into the rhizome system, a second similar treatment will be required usually within ten days, before the internal vascular system is no longer capable of translocating the herbicide to the root system. While the upper surface of the leaves will be easier to treat, it is also important to treat the leaf under surface as knotweed possesses many stomata openings on the leaf under surface. Dead stems should be cut, removed and burned on/off site in accordance with the Waste Management Acts 1996 as amended and the Waste Management (Prohibition of Waste disposal by burning) Regulations 2009 (SI 286).

The stem injection method is sometimes used for Japanese knotweed control. This treatment requires a higher concentration of the active ingredient than is used in foliar applications. It involves the use of a specialist herbicide injection tool whereby the injection tool injects the herbicide directly into each of the canes approximately 20-30cms from the base of each cane (between the 1st and 2nd nodule).

Subsequently approximately 10 mls of herbicide mix is injected into each cane at a ratio of 5:1 through the use of a specialist stem injection tool. The application of glyphosate based products, are most effective when applied in the early Autumn (mid to late Sept). Regrowth will occur in subsequent years, albeit much less vigorously, which will require follow up treatment at the appropriate time of year. Spot treatment will be required each year until no regrowth is observed.

In order to ensure that the use of herbicides does not contravene legislation, the contractor must comply with Circular Letter NPWS 2/08 dealing with the application on to non-target areas from the National Parks and Wildlife Service.

5.5.2 Excavation and Chemical Treatment

This option employs both physical and chemical methods of treatment. This method is employed in situations where treatment of invasive species in particular knotweed is required to be completed in a shorter timeframe. The Environment Agency suggest that by digging up the rhizomes and recultivating it stimulates plant growth and will result in more successful herbicide application and management.

In summary this management method requires cutting and killing of the surface plant. The cut material must be left on top of plastic sheeting until dried out and subsequently monitored for any sign of regrowth (this is not recommended for a river bank habitat where there is the possibility of flooding occurring). They should not be placed in a green waste recycling bin. Once dried out, the material should be burned on site in accordance with the Waste Management Acts 1996 as amended and the Waste Management (Prohibition of Waste disposal by burning) Regulations 2009 (SI 286). The surface of the affected area should be raked with tines to remove crowns and surface material, and in order to break up the rhizomes, bringing them to the surface, which will stimulate leaf production. This will make the plant more vulnerable to herbicide treatment. The more rhizomes that are brought to the surface, the more growth will occur and allowing for a more successful treatment. An excavator can be used to scrape the surface crowns and rhizomes into a pile and then cultivate the ground to stimulate rhizomes to produce higher density of stems for treatment. Reapplication of herbicide may be required for up to five years after initially application, subject to the site specific management plan.

5.5.3 Excavation and Burial

Excavated material containing knotweed can also be buried on site. This will require burying the material at a depth of at least five metres. The contaminated material must be covered with a root barrier membrane before being backfilled with topsoil or other suitable fill material. The membrane must stay intact for at least 50 years. A manufacturer’s guarantee is required. Accurately map and record the location of the burial site to prevent any future accidental disturbance. Inform future owners of its position. If soil containing Japanese knotweed is stockpiled, the material must be stored in a manner that will not harm health or the environment. The stockpile should be on an area of the site that will remain undisturbed. The area should be clearly fenced and signed, and should be regularly treated with herbicide to prevent any regrowth or reinfestation.

As a precaution, the stockpiled material should be laid on a root barrier membrane and covered to avoid contaminating the site further.

5.5.4 Excavation and Root Barrier Cell Method

Excavated material containing knotweed can also be buried on site within a root barrier membrane cell. Similar procedure to above. This will require burying the material at a depth of at least two metres. The contaminated material must be within a contained cell consisting of a root barrier membrane before being backfilled with topsoil or other suitable fill material. The membrane must stay intact for at least 50 years. A manufacturer's guarantee is required. Stockpiling method as above.

5.5.5 Excavation and Bund Method

Where there is not sufficient depth on a site for deep burial the EA Guidelines set out another option whereby such excavated material is placed in a structured bund. The bund will comprise a raised area above ground level or a shallow excavation, no more than 0.5m deep, and lined with a root barrier membrane. The membrane must stay intact for at least 50 years and a manufacturer's guarantee is required. This method of treatment can also be used where knotweed material needs to be moved from a location and there is another ideal area of the site available to contain it.

The aim of this method is to concentrate the rhizome material into the upper surface of the bund, where it will grow and be controlled by herbicide. If the rhizome is buried deep, it will become dormant when inside the bund and regrow when the apparently clean soil is used for landscaping on the site. The bund location needs to be clearly signed and protected from potential accidental damage.

Reapplication of herbicide may be required for up to five years after the initial application, subject to the site-specific management plan.

5.5.6 Excavation and Removal from Site

Where the above treatment options are not possible (site is too small to contain excavated material, two shallow for burial, or where there is lack of space or where the infestation simply cannot be avoided by the construction works) removal of excavated material may be the only option. Where there are small amounts of Knotweed material to be removed it is possible to double bag the material and send to a fully licenced waste facility for disposal (i.e. landfill). Where the amount of material is larger in volume it will be necessary to haul from site to a suitably licenced waste facility. It should also be noted that in the process of excavating the knotweed if it has been treated with a persistent herbicide, the excavated material will need to be classified as hazardous waste and there will need to be disposed of to a hazardous waste facility

If any invasive species plant material is collected (e.g. by hand-pulling or mowing), it is important that its disposal will not lead to a risk of further spread. The movement of invasive plant material requires a licence from the National Parks and Wildlife Service (NPWS) under Section 49 of the European Communities (Birds and Natural Habitats) Regulations, 2011 (as amended).

Invasive species (particularly roots, flower heads or seeds) will be disposed of at licensed waste facilities or composting sites, appropriately buried, or incinerated having regard to relevant legislation. For example Section 32 of the Waste Management Act, 1996 to 2008; Section 4 of the Air Pollution Act, 1987; relevant local authority byelaws and any other relevant legislation). All disposals will be carried out in accordance with the relevant Waste Management legislation (as per guidance from NRA, 2008). It should be noted that some invasive species plant material or soil containing residual herbicides may be classified as either 'hazardous waste' or 'non-hazardous waste' under the terms of the Waste Management Acts, and both categories may require special disposal procedures or permissions. Advice will be sought from a suitably qualified waste expert regarding the classification of waste and the suitability of different disposal measures. As noted above, additional specific measures for the management of Japanese Knotweed cuttings or contaminated soil can be found in the UK Environment Agency document *The Knotweed Code of Practice*: *Managing Japanese knotweed on development sites* (UK Environment Agency, 2013).

5.5.7 Hand pulling/mowing or cutting

Control measures for Himalayan balsam should aim to prevent flowering and are therefore essentially undertaken before the commencement of flowering in June. Where flower production can be prevented, eradication may still take over 5 years.

Mechanical control is only likely to be effective where good access is available and the ground smooth enough to permit either mowing or cutting back. Where accessible plants can be cut, mown or strimmed back to ground level before flowering in June. Do not cut earlier as this promotes greater seed production in any re-growth. Unless the plant is cut to below the lowest node, it will respout. Regular mowing will control the plant provided the frequency of mowing is regular enough to prevent sprouting and flower formation. Repeat annually until complete control is attained. As plants are very shallow rooted, they can also be easily pulled by hand. Hand pulling will require a follow up pull in August due to new seeds sprouting. Vegetative material can be disposed of by composting unless seeds are present, in which case the material should be disposed of to licensed landfill or burnt.

Due to the extensive rhizome network, physical removal of winter heliotrope is really only practical on a limited scale. Where mechanical means can be employed, it should be possible to deal with larger infestations but due to the potential for regeneration from fragments of roots, it may be best to tackle its control using a combination of excavation with follow-up treatment by herbicides. As with other plants with the potential to spread from small root fragments, disposal of material should be undertaken with due caution to prevent accidental spread of the plant.

Other means of disposal include burial of material at a depth of at least 2m, incineration or disposal to licensed landfill. There is no evidence that the material would withstand composting though this approach would probably only be suitable for limited infestations.

In relation to buddleia, management methods such as digging it out are applicable only to minor infestations at the initial stage of invasion. Hand-picking of young plants is feasible but should be undertaken with care to avoid soil disturbance which can give rise to a flush of new seedling. Grubbing of mature stands as a sole attempt at control is not recommended for the same reason. After uprooting, it is essential to plant the ground in order to prevent a flush of new seedling growth. When it is cut, Buddleia grows back from the stump very vigorously. Mowing of young plants does not provide control as they re-sprout with vigour. Where removal of mature plants is not feasible in the short term, the flower heads should be cut off in June before seed set.

6 Management during the Operational Phase

6.1.1 Protecting Flood Defence Structures

As part of the operation phase there will need to be on-going treatment of non-native invasive species. A management plan for the operational phase will need to be formulated in consultation with the relevant bodies i.e. NPWS, IFI and Cork County Council.

Site hygiene protocols will need to be implemented.

6.1.2 Channel Maintenance Works

During channel maintenance works, a management plan will need to be put in place to prevent the spread of non-native invasive species downstream during those works.

Site hygiene protocols will need to be implemented.

As discussed above, the management plan for the operational phase will need to be formulated in consultation with the NPWS, IFI and Cork County Council.

7 Conclusion

The presence of non-native invasive species along the works areas of the proposed scheme requires the need for an Outline Invasive Species Management Plan. This Plan shall be written by a qualified ecologist.

Given the nature of the species and the rate of growth, each proposed works site will need to be re-surveyed prior to works. Site hygiene will be particularly important on sites where invasive species are present but also 'clean' sites. Incoming vehicles, and equipment (including footwear worn by contractors) will need to be cleaned and inspected before coming on site to prevent the further spread of the plant.

Where possible material will remain on site and be reused. Any material that must be removed off site to landfill or other suitable facility will require a licence from the National Parks and Wildlife Service.

The Plan must be clearly communicated to all site staff and must be adhered to if it is to be implemented successfully.

8 References

Managing Japanese knotweed on development sites - The Knotweed Code of Practice produced by the Environmental Agency (2013)

Invasive Species Ireland (2015) Best Practice Management Guidelines Japanese knotweed *Fallopia japonica*

Managing Japanese knotweed on development sites - The Knotweed Code of Practice produced by the Environmental Agency (2013)

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NRA Guidelines on The Management of Noxious Weeds and Non-Native Invasive Plant Species on National Roads (2008)

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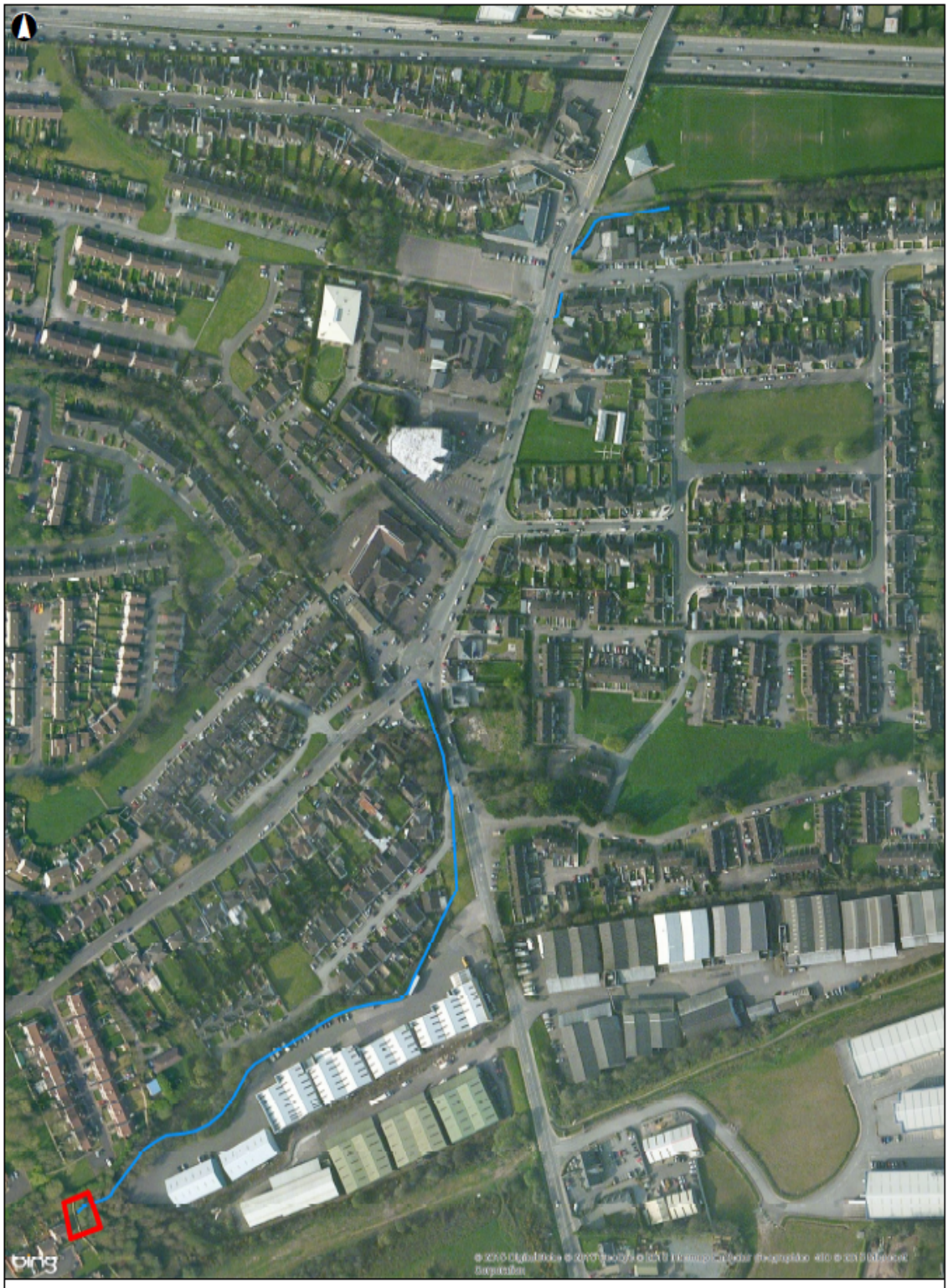
Royal Horticultural Society, 2008. Winter Heliotrope. [Online]. Available at:

http://www.rhs.org.uk/advice/profiles0904/winter_heliotrope.asp

Appendix A

Non-Native Invasive Species Drawings

A3


Legend
Japanese Knotweed Extent
River Channel and Bank Survey Extent
ARUP
Cork County Council
Office of Public Works
Douglas Flood Relief Scheme
(including Togher Culvert)
Japanese Knotweed
Survey Extent
Togher
1:2,500
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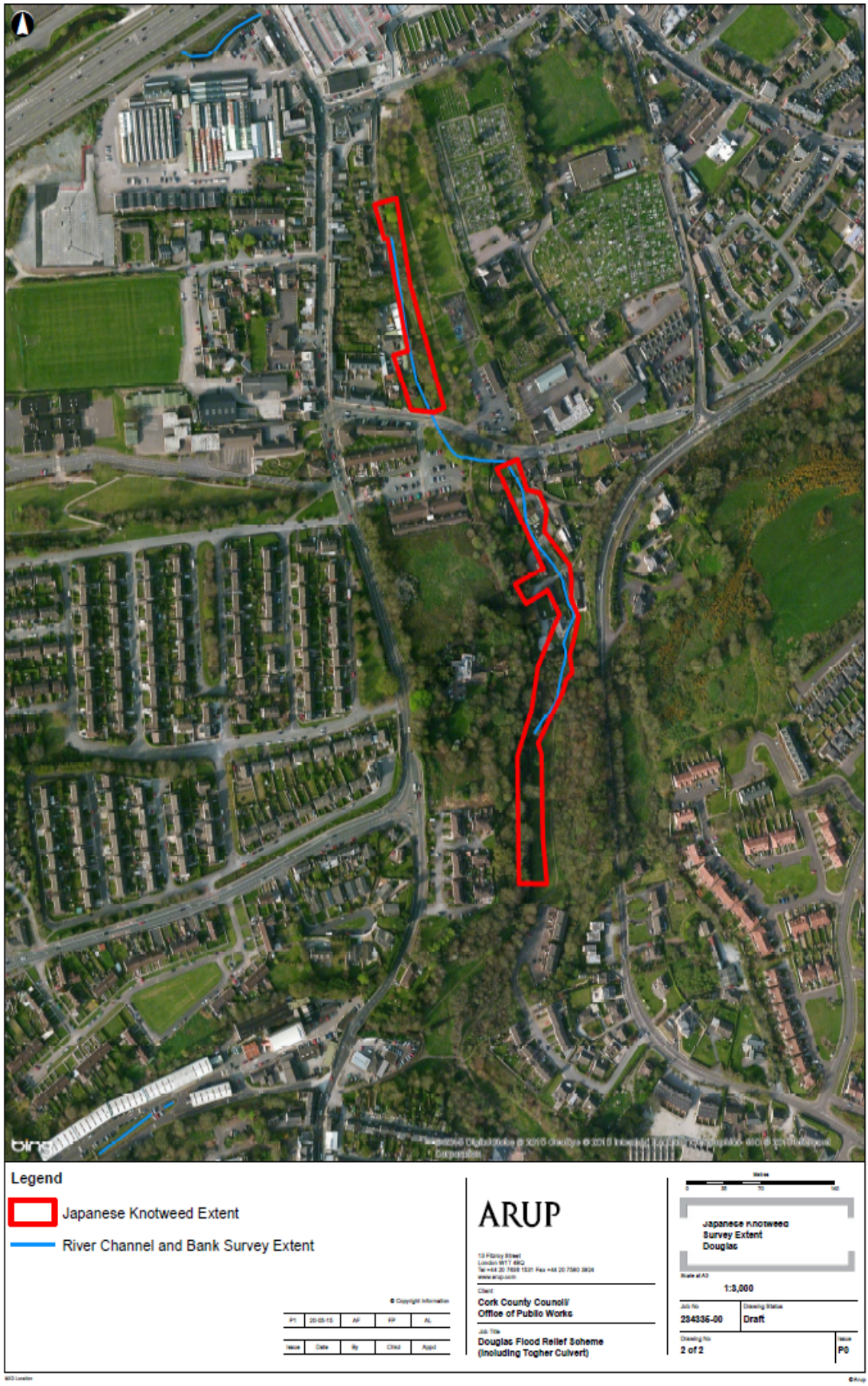
Draft
1 of 2
P0

A3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Japanese Knotweed Extent
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ARUP
Cork County Council
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Douglas Flood Relief Scheme
(Including Togher Culvert)
Japanese Knotweed
Survey Extent
Douglas
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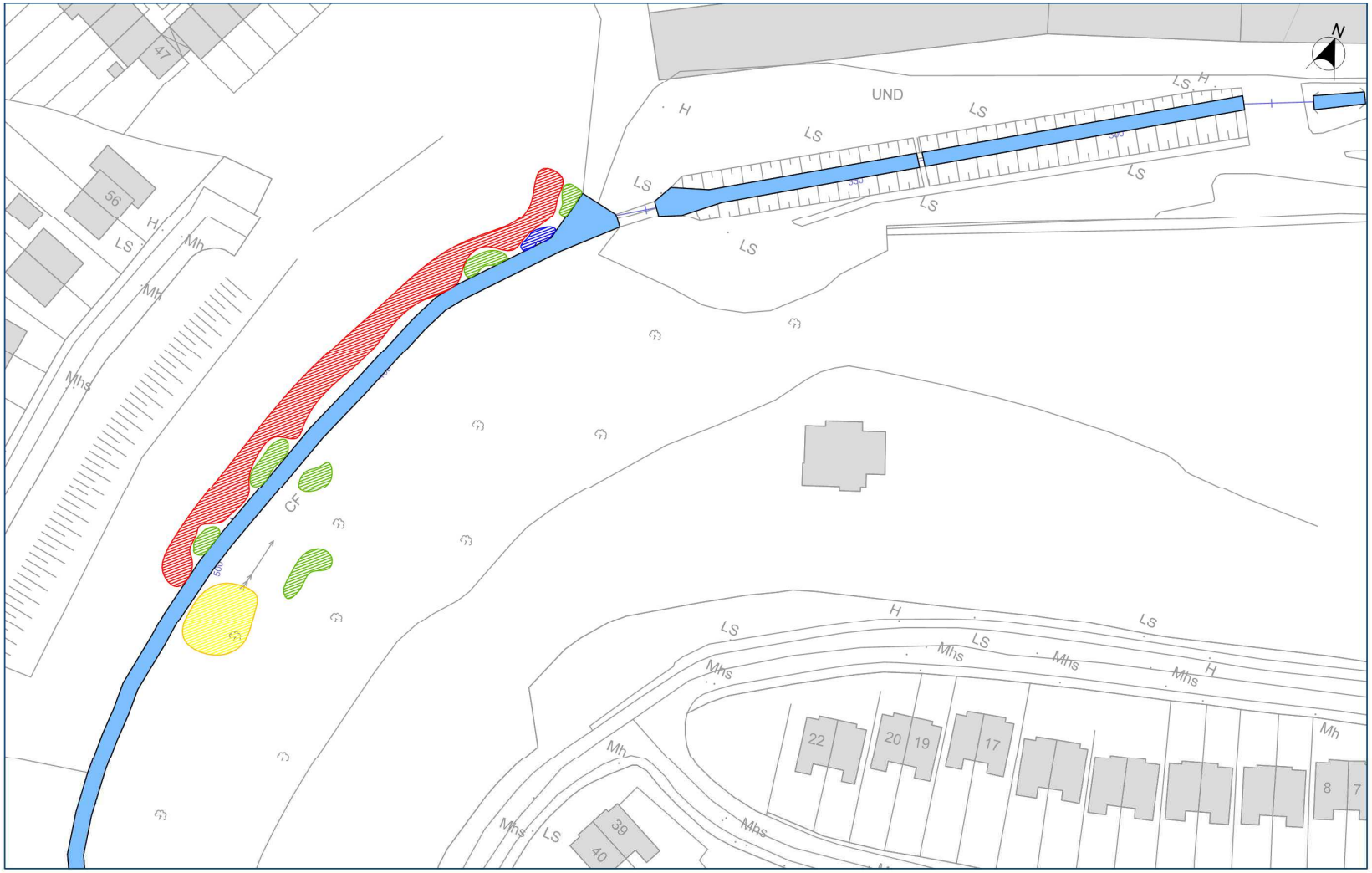
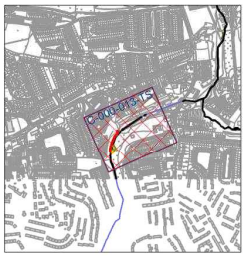


Key to Plan

- Japanese Knotweed *(Fallopia japonica*
- Winter Heliotrope *(Petasites fragrans)*
- Old Man's Beard *(Clematis vitalba)*
- Himalayan Balsam *(Impatiens glandulifera)*
- Buddleja *(Buddleja davidii)*
- Himilayan Honeysuckle *(Lycesteria formosa)*
- Watercourse
- Channel Centreline & Chainage

Key Plan - Togher OSI



(Not to Scale)

Invasive Species Survey
Donnybrook Commercial Centre

DIXON BROSNAN
ENVIRONMENTAL CONSULTANTS

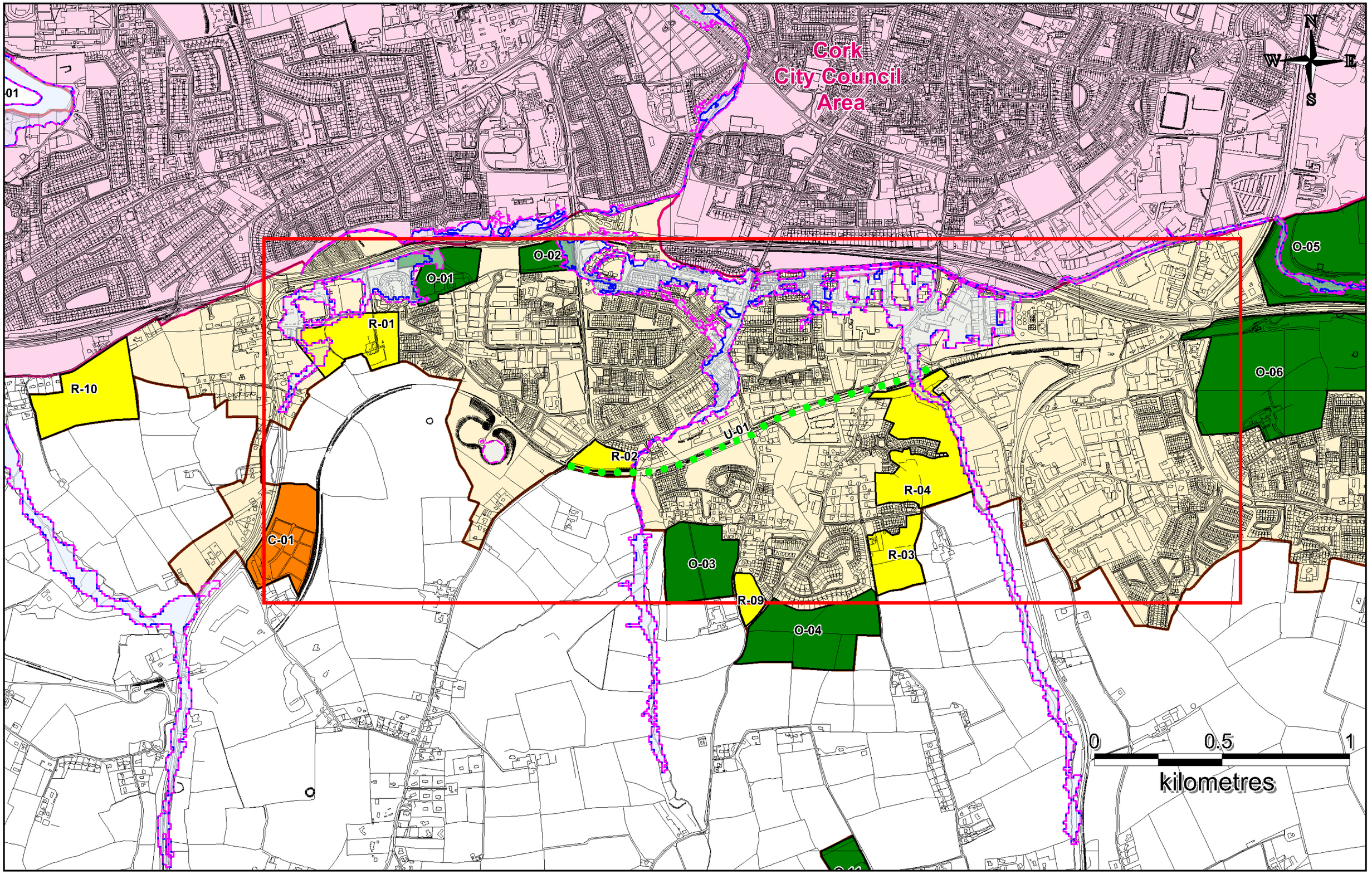
Appendix 5.1

Zoning Map - Carrigaline

Electoral Area Local Area Plan 2011

Cork County Council
Local Area Plans

Carrigaline Electoral Area Local Area Plan (August 2011) Zoning Map CORK CITY SOUTH ENVIRONS 1

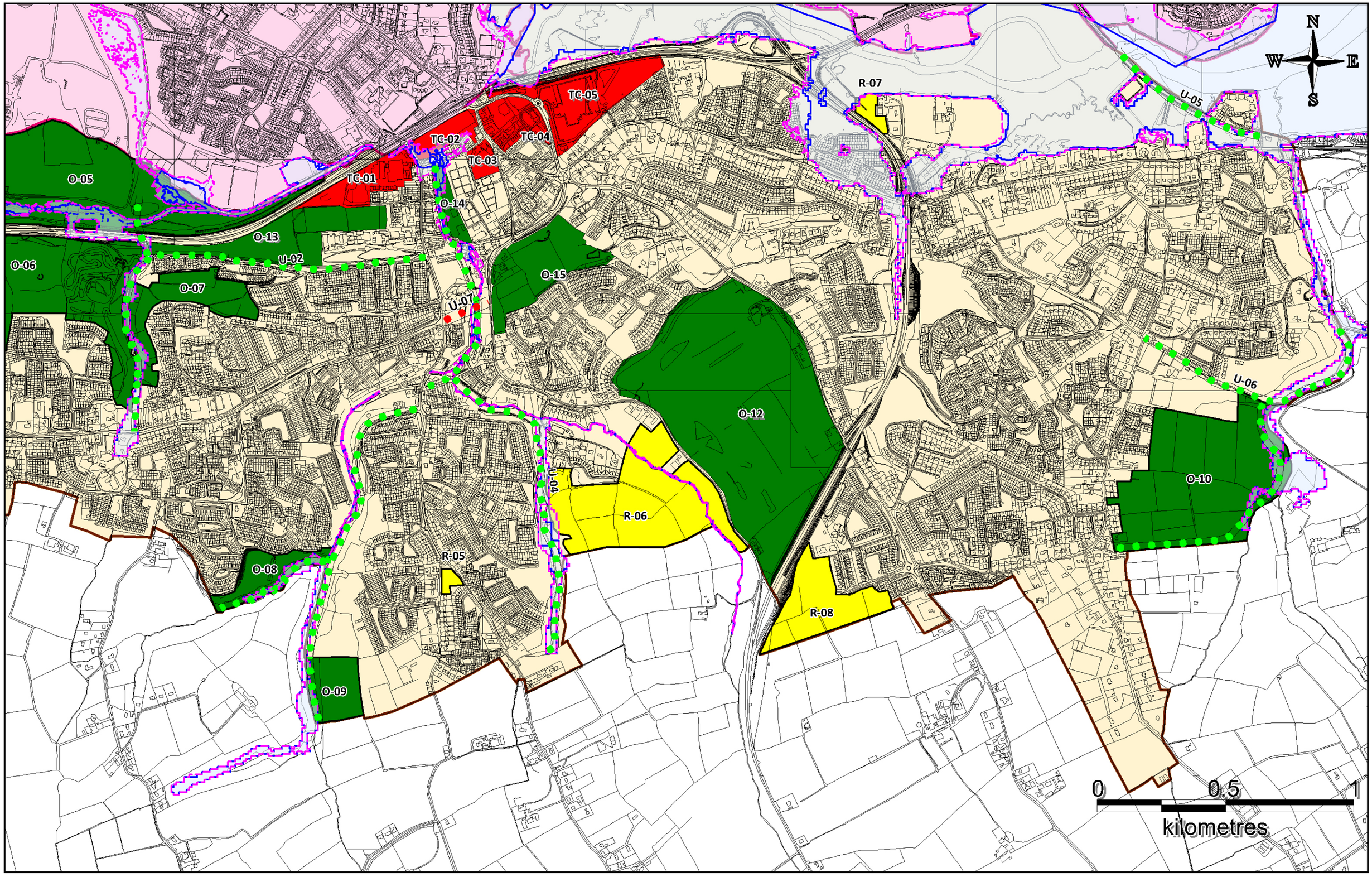


Settlement Boundary
Existing Built-up Area
Open Space / Sports Recreation / Amenity
Residential
Town Centre / Neighbourhood Centre
Community / Utility
Industry
Business
Special Policy Area
Enterprise
Utilities
Roads
Walkways
Area Susceptible to Flooding: Zone A
Area Susceptible to Flooding: Zone B

Cork County Council
Local Area Plans

Carrigaline Electoral Area Local Area Plan 2011

Zoning Map (2nd Edition 2015) CORK CITY SOUTH ENVIRONS 2



Settlement Boundary
Existing Built-up Area
Open Space / Sports Recreation / Amenity
Residential
Town Centre / Neighbourhood Centre
Community / Utility
Industry
Business
Special Policy Area
Enterprise
Utilities
Roads
Walkways
Area Susceptible to Flooding: Zone A
Area Susceptible to Flooding: Zone B

Appendix 6.1

Fish Survey Report

Dixon.Brosnan

environmental
consultants

project title	**Fish Stock survey of the Tramore River for the Douglas Flood Relief Scheme**
client	ARUP Consulting Engineers
client ref.	--
revision	0- issue to client
date	12th November, 2014
approved by	Carl Dixon M.Sc. Ecological Monitoring

Dixon.Brosnan Environmental Consultants
7 The Cedars, Bridewood, Ovens, Co. Cork, Ireland.
Tel: +353 (0)21 4875389
Carl Dixon: 086 8511437 Damian Brosnan: 086 8131195
email: carl@dixonbrosnan.com

1. Introduction

As part of the proposed Douglas Flood Relief Scheme, works are proposed on the Tramore River. A fish stock survey of the upper catchment was carried out in response to a request for the information from Inland Fisheries Ireland. The primary concern in relation to the upper catchment is the potential impact arising from works associated with the large Togher culvert. The information provided by this survey allows a more accurate assessment of the potential impacts on fish stocks to be made.

This report details the results of these surveys which were carried out in September 2014.The objectives of the study were to determine the following:

1. Presence/absence for all fish species including trout, lamprey and European eel within the overall catchment.
2. Assessment of the fish populations upstream of the Togher Culvert which may form a barrier to migration.
3. General overview of fish populations within the upper Tramore catchment.

As part of this scheme instream works are also likely to take place within the Ballybrack River in proximity to Douglas Village. An inspection of the area within which works are likely to take place, did not record any suitable habitat for juvenile lamprey and culverts downstream of the works area present an impassable barrier to migratory fish such as salmon. Following consultation with Inland Fisheries Ireland, who noted that the Ballybrack River supports a population of brown trout and eel, further stock surveys in this watercourse were not considered necessary.

2. Methodology

DixonBrosnan received a Section 14 licence from the Department of Communications, Energy & Natural Resources for an electro-fishing lamprey stock assessment. All bio security protocols as submitted to and agreed with the Department Communications, Energy & Natural Resources were followed during surveying. Surveys were carried out using a Safari Back Pack electrofishing unit.

Captured fish were held in a large bin of oxygenated water. After processing, fish were allowed to fully recover and were then returned to the water. Following consultation with Karen Delanty (Inland Fisheries Ireland) a 10 min., single pass at each stretch was utilised.

Surveying was carried by Carl Dixon M.Sc. Ecological Monitoring and Ian McDermott M.Sc. Ecological Monitoring on September 29, and September 30, 2014.

3. Overview of the Tramore River

The Tramore is a small river which discharges to Cork Harbour in Douglas. The main channel runs west to east with a low gradient and is joined by a number of tributaries flowing from higher agricultural grassland to the north. Due to its urban location, water quality issues have occurred in the past and are an ongoing concern. An overview of the catchment is shown below in **Figure 1.** The location of the Togher culvert is indicated in **Figure 2.**

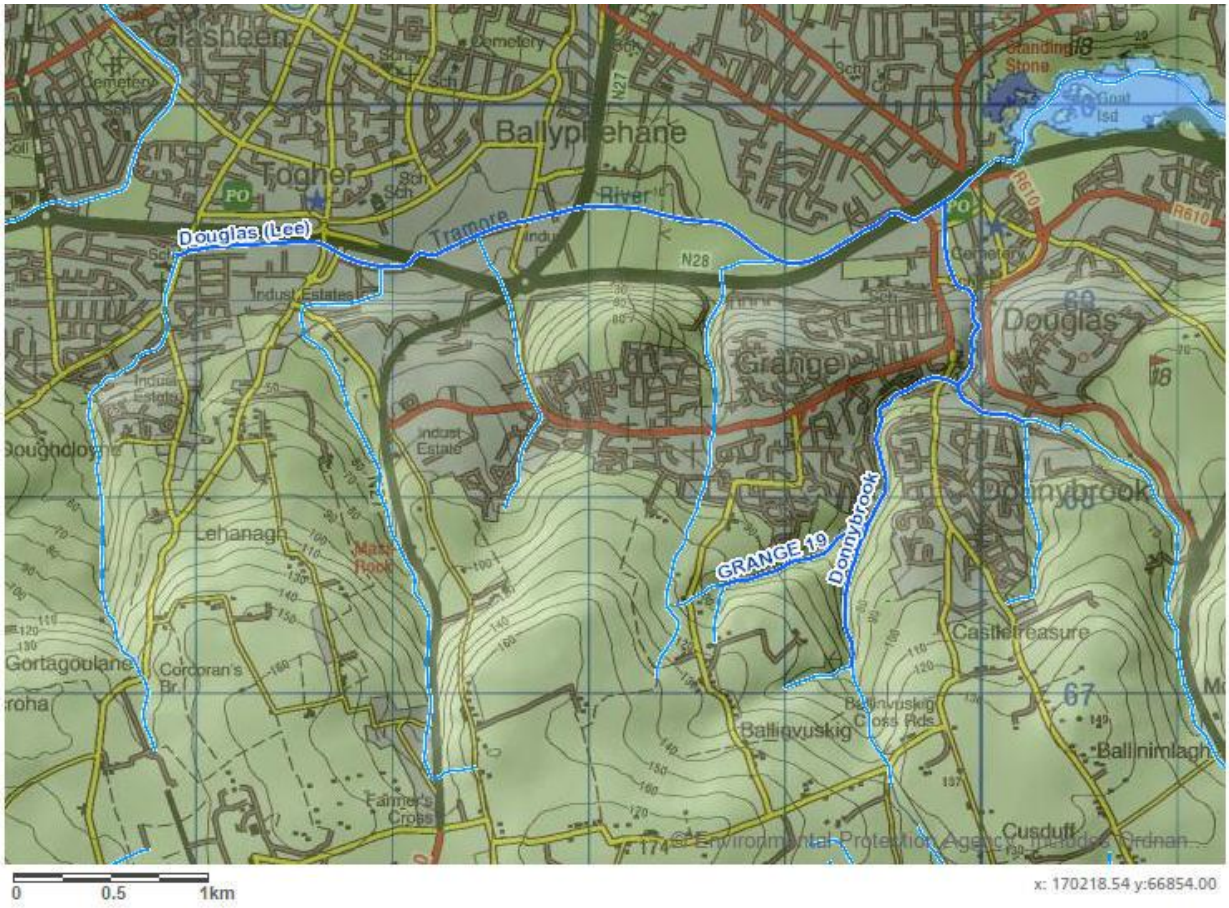


Fig. 1 Overview of the Tramore River catchment.

4. Species of conservation value potentially occurring within the Tramore River.

4.1 Salmon *Salmo salar*

It is considered improbable that salmon *salmo salar* (listed on Annex II of the Habitats Directive) would occur in the Tramore due to poor water quality, limited channel size, lack of holding pools, barriers to migration and lack of spawning habitat.

4.2 Lamprey species

Lamprey species are of high conservation value and three species occur in Ireland namely sea lamprey, *Petromyzon marinus*, river lamprey *Lampetra fluviatilis* and brook lamprey, *Lampetra planeri*. Lamprey are listed on Annex II of the EU Habitats Directive. The presence of migratory lamprey species (sea lamprey and river lamprey) is unlikely due to barriers to migration and lack of spawning habitat. Brook lamprey could potentially occur within suitable areas of habitat.

4.3 European Eel

Although not protected under the Habitats Directive, European eel (*Anguilla anguilla*) is a species very much under threat, with numbers in catastrophic decline. This is seen in the fisheries for yellow and silver eels, as well as in surveys of the number of glass eels that are returning to Europe. The decline can be tracked back to the early 1980s and considerable effort is now needed to reverse the situation. The habitats within the survey area are suitable for eel.

4.4 Brown trout

Brown trout are considered an important game fish in Irish rivers and lakes, but are not protected under European legislation. Notwithstanding water quality issues, brown trout are known to occur within the main channel of the Tramore River.

4.5 Other species

Conditions are unsuitable for other Annex II species (i.e. freshwater pearl mussel or crayfish) or Annex 1 habitats (i.e Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation-maintain*).*

5. Results

Surveys were carried out on the main channel of the Tramore River and on two tributaries which flow southward from higher ground to the north. The characteristics of the survey areas are detailed below in **Table 1** and results are included in **Table 2.** The survey sites are shown below on **Figure 2.** Photographs are included in **Appendix 1.**

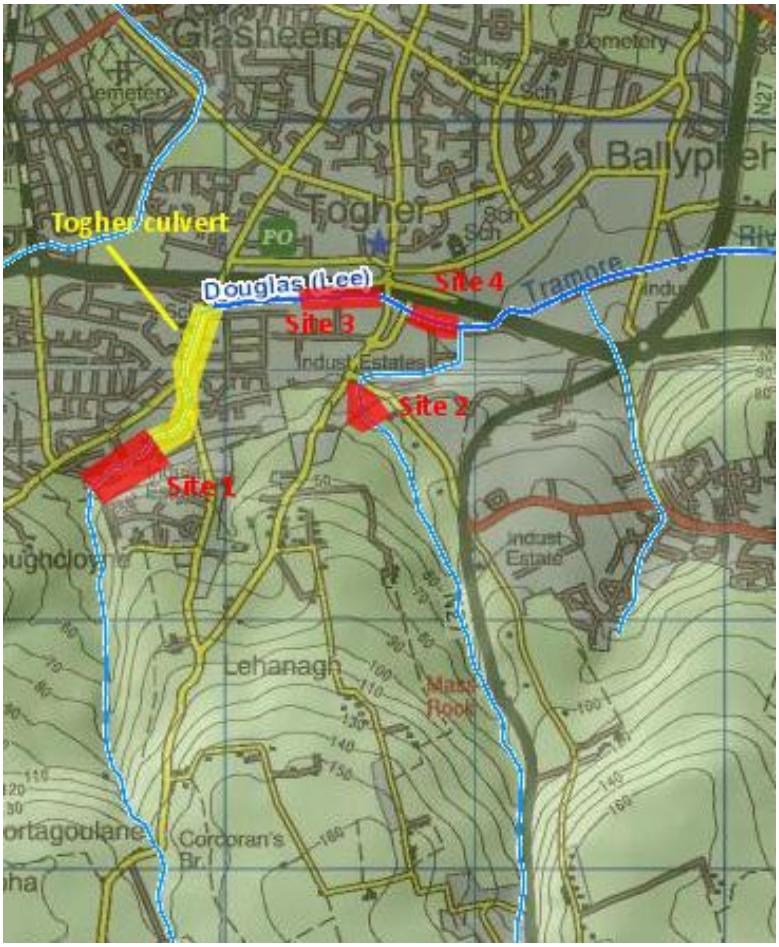


Figure 2. Survey sites in relation to the Togher Culvert.

Table 1. Characteristics of survey sites

Site 1	Upstream of the Togher culvert. The survey section is defined by a metal grill at the downstream end. At the upstream end, the river is piped and falls a considerable distance into a deep plunge pool. The drop from this pipe creates an additional barrier to fish movement. This section of the stream is heavily shaded and generally shallow with the exception of some small pools and the larger plunge pool which was approximately 1.5m in depth at the time of the survey. Upstream of this plunge pool the river flows through gardens and from there drops rapidly in size. No suitable habitat for juvenile lamprey was recorded within this section of the stream; however, some potential habitat for brown trout and eel was noted.
Site 2	Small stream which flows parallel to the N27 through agricultural land. Site 2 itself was heavily shaded with deep banks and a mixture of riffle and shallow pool habitat. Some potential eel and brown trout habitat was recorded. An examination of the stream found that flow in the stream is low and no potential sites with enough depth for an effective survey were located upstream of site 2. Due to low flows, the value of the upper sections of this stream for eels and brown trout and is minimal. Lamprey species are unlikely to occur.
Site 3	Located on the main channel of the Tramore River. Site 3 is dominated by riffle glide and is slightly deeper due to the presence of a weir. Cover from overhanging vegetation provides some cover for fish species and for trout in particular. Some suitable habitat for brown trout and eel was recorded. No habitat suitable for lamprey species was recorded.
Site 4	Site 4 is characterised by deep silt in places, slow flows and only small areas of suitable cover for trout. Some water quality impairment noted. Some suitable habitat for eel and lamprey was recorded

Table 2. Survey results

Location	Brown trout	Salmon	Eel	Brook Lamprey	Stickleback
Site 1	**0**	**0**	**11**	**0**	**0**
Site 2	**0**	**0**	**2**	**0**	**0**
Site 3	**12**	**0**	**21**	**0**	**>25**
Site 4	**22**	**0**	**20**	**0**	**>25**

6. Conclusions

The Togher culvert, including the grill at its upstream end, creates a significant barrier to fish migration and no trout were recorded upstream of this culvert (Site 1). A pipe at the upstream end of Site 1 also creates a significant barrier to fish movement. A small number of eels were recorded in isolated pockets of deeper water including the plunge pool at the upstream end of the site.

Only two large eel were recorded at Site 2 and upstream of this site, the stream was generally too shallow to effectively survey. There are culverts in place downstream of Site 2 which probably prevent trout from accessing suitable habitat on this tributary.

The main channel of the Tramore River (Sites 3 and 4) was found to support trout, eel and stickleback. Eels were recorded in moderate numbers and high numbers of stickleback, which can provide food for other piscivorous species, were also recorded. Although water quality varies in this river, vegetative cover was the determining factor in relation to trout distribution. Moderate numbers were recorded where there was sufficient bankside cover; however long sections which were open and shallow were largely devoid of trout. Although areas of silt suitable for juvenile lamprey were noted, no lamprey was recorded during the survey.

Appendix 1 - Photographs

Photo 1 Stream heavily shaded and shallow at Site 1

Photo 2. Plunge pool and pipe which forms a further barrier to fish movement at the upstream end of Site 1.

Photo 3. Main channel of Tramore at site 3 with high silt levels and patchy cover for fish

Photo 4. Site 2- shallow channel with large areas of bedrock. Heavily shaded.

Appendix 6.2

Habitat Maps - Figures 6.2 to 6.7

Figure 6.2 Habitat Map Lehenaghmore Industrial Estate Togher (Area 3)

Figure 6.3 Habitat Map Togher (Area 4)

Figure 6.4 Habitat Map Douglas Mills (Area 2)

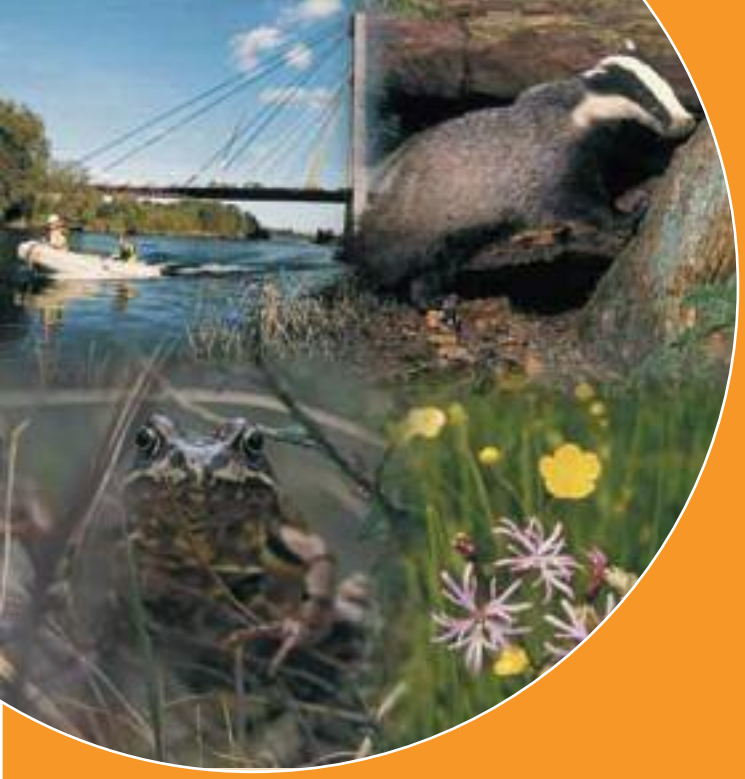
Figure 6.5 Habitat Map Donnybrook Commercial Centre (Area 3)

Figure 6.6 Habitat Map Douglas (Area 1)

Figure 6.7 Habitat Map Ballybrack Wood and Douglas (Area 1)

Appendix 6.3

Guidelines for Assessment of Ecological Impacts of National Road Schemes (NRA, 2009)



National Roads Authority

Guidelines for Assessment of Ecological Impacts of National Roads Schemes

NRA
An tÚdarás um Bóithre Náisiúnta
National Roads Authority

Revision 2, 1st June, 2009

REVISION

This document was revised in 2009 to align it with changes in legislative, best practice and policy requirements with regard to Ecological Impact Assessment arising since the previous revision in March, 2006.

With regard to best practice and policy requirements the revisions take account of the procedure for the ecological component of Environmental Impact Assessment laid down in the Institute of Ecology and Environmental Management's (IEEM) (2006) *Guidelines for Ecological Impact Assessment in the United Kingdom*.

These Guidelines have also been revised to sychronise them with the supplementary guidance document: the NRA's *Ecological Surveying Techniques for Protected Flora & Fauna during the Planning of National Road Schemes* published in 2008.

With regard to legislative requirements, the Guidelines provide more detailed information on certain relevant environmental law provisions, including: Articles 25 and 30/33 of the Habitats Regulations, 1997; Articles 6(3) and 6(4) of the Habitats Directive; and the Environmental Liability Directive.

ACKNOWLEDGEMENTS

The 2009 revision was prepared by: Dr. Warren Cresswell, Cresswell Associates (a Hyder Consulting group company) and Richard Nairn, Natura Environmental Consultants in association with the National Roads Authority.

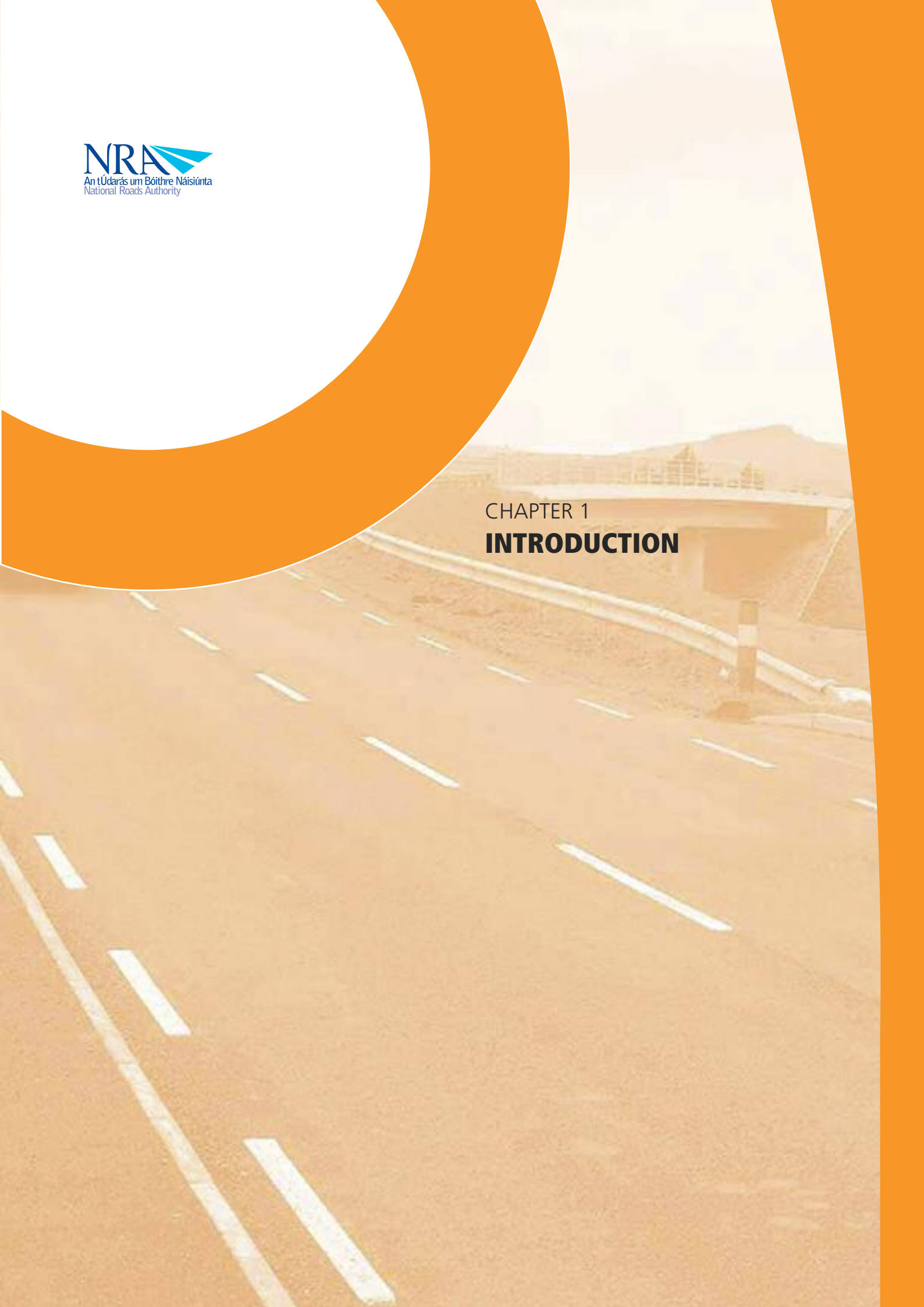
The Authority wishes to express its thanks to the National Parks and Wildlife Service; Ms. Katharine Duff, Dr. Maeve Flynn and Mr. Matthew Hague (of Natura Environmental Consultants); and Paul Scott of Scott Cawley for providing additional material and comments.

The original document was prepared by Natura Environmental Consultants on behalf of the National Roads Authority. The Authority wishes to express its thanks to the main authors Mr. Richard Nairn and Dr. Julie Fossitt, and to Mr. Paul Murphy and Ms. Katharine Duff (of Natura Environmental Consultants) for providing additional material. Special thanks are due to Dr. Bill Quirke (Conservation Services) for advice on the evaluation of watercourses.

The Authority wishes to express its appreciation to the following organisations for providing constructive comments in relation to the original document: National Parks and Wildlife Service; Environmental Protection Agency; Heritage Council; Department of Environment, Heritage and Local Government; Central Fisheries Board; South Western Regional Fisheries Board; Southern Regional Fisheries Board; Eastern Regional Fisheries Board; BirdWatch Ireland; An Taisce; Irish Peatland Conservation Council; CoastWatch Ireland; and members of the COST Action 341.

DISCLAIMER

NRA
An tÚdarás um Bóithre Náisiúnta
National Roads Authority



CHAPTER 1

INTRODUCTION

1 INTRODUCTION

1.1 Background and rationale

The procedures followed by the National Roads Authority (NRA) and local authorities in the planning, design and implementation of road schemes are specified in the Roads Act, 1993, as amended, and in the NRA's (2000) *National Roads Project Management Guidelines* ('NRPMG'). A key objective of the NRPMG is to ensure the efficient delivery of the national roads programme in a manner which minimises adverse human and environmental effects while maximising the benefits of the new road infrastructure and respecting all applicable legislation.

The aim of this document (hereafter referred to as the 'Ecology Guidelines') is to provide guidance on the assessment of impacts on the natural environment during the planning and design of national road schemes. It elaborates on the references to ecology (habitats, flora and fauna) contained in the NRPMG, which provides the overall framework for managing the planning and design of national road schemes. In particular, the guidelines expand on the ecological work to be undertaken at the Constraints Study (CS) phase, Route Corridor Selection (RCS) phase and the subsequent preparation of the Environmental Impact Statement (EIS).

National road schemes are large developments that have potential impacts on the natural environment (habitats, flora and fauna, including fisheries) along their entire length. Concomitant with the need for new and safer roads, there has been a growing awareness of the need to conserve and protect Ireland's natural heritage and biodiversity. One of the objectives of the planning stages of road schemes is to avoid or reduce the negative impacts of the final route on the natural environment. This is achieved in part through the Environmental Impact Assessment (EIA) process that, for road schemes, is carried out in a series of project management phases, including CS, RCS and EIS (See Section 1.3).

When impacts on the natural environment are unavoidable, a variety of measures can be introduced to reduce, remedy or off-set these impacts. Principles and general guidance with regard to mitigation, compensation and enhancement measures are presented in this document. More detailed guidance with regard to individual habitats and species is available in the relevant supplementary guidance documents set out in Section 1.6.

The National Biodiversity Plan (Department of Arts, Heritage, Gaeltacht and the Islands, 2002) includes a requirement for all statutory agencies to prepare "guides to best practice" for any activities that have an impact on biodiversity conservation. These guidelines form part of the NRA response to the National Biodiversity Plan.

1.2 Environmental Impact Assessment

General guidance on the scope and detail of environmental impact assessment is available in *Guidelines on the information to be contained in Environmental Impact Statements* (Environmental Protection Agency, 2002), and the NRA's (2008a) *Environmental Impact Assessment of National Road Schemes - A Practical Guide*, helps to interpret this guidance in the context of road projects. The 'Ecology Guidelines' adopt the principles presented in these

guidance documents, whilst integrating the approach to impact assessment detailed in the Institute of Ecology and Environmental Management's (2006) *Guidelines for Ecological Impact Assessment*.

1.3 Outline of project management phases

In the *National Roads Project Management Guidelines* (NRPMG) (NRA, 2000), planning for road schemes in general is divided into four phases. Phase 1 involves the overall planning of the scheme, including defining the road need, obtaining NRA formal approval to carry out the further phases, appointing consultants, if programmed, and setting out to incorporate the need in the local development plan once approval for planning has been obtained from the NRA. Phases 2 and 3, the Constraints and RCS studies, are primarily concerned with the avoidance of impacts (i.e., where feasible) and the consideration of alternatives, two fundamental components of the EIA process. Phase 4 includes preparing the EIS for the preferred route. As the scheme progresses through the stages (from 2-4), the area of study generally decreases, or becomes more focused, while the level of detail in the study increases. The natural environment section of the CS phase involves a desk study only, while the RCS phase also includes fieldwork. The preparation of the natural environment section of the EIS requires an in-depth study of the preferred route corridor, including both desk study and field study. This is summarised graphically in Figure 1.

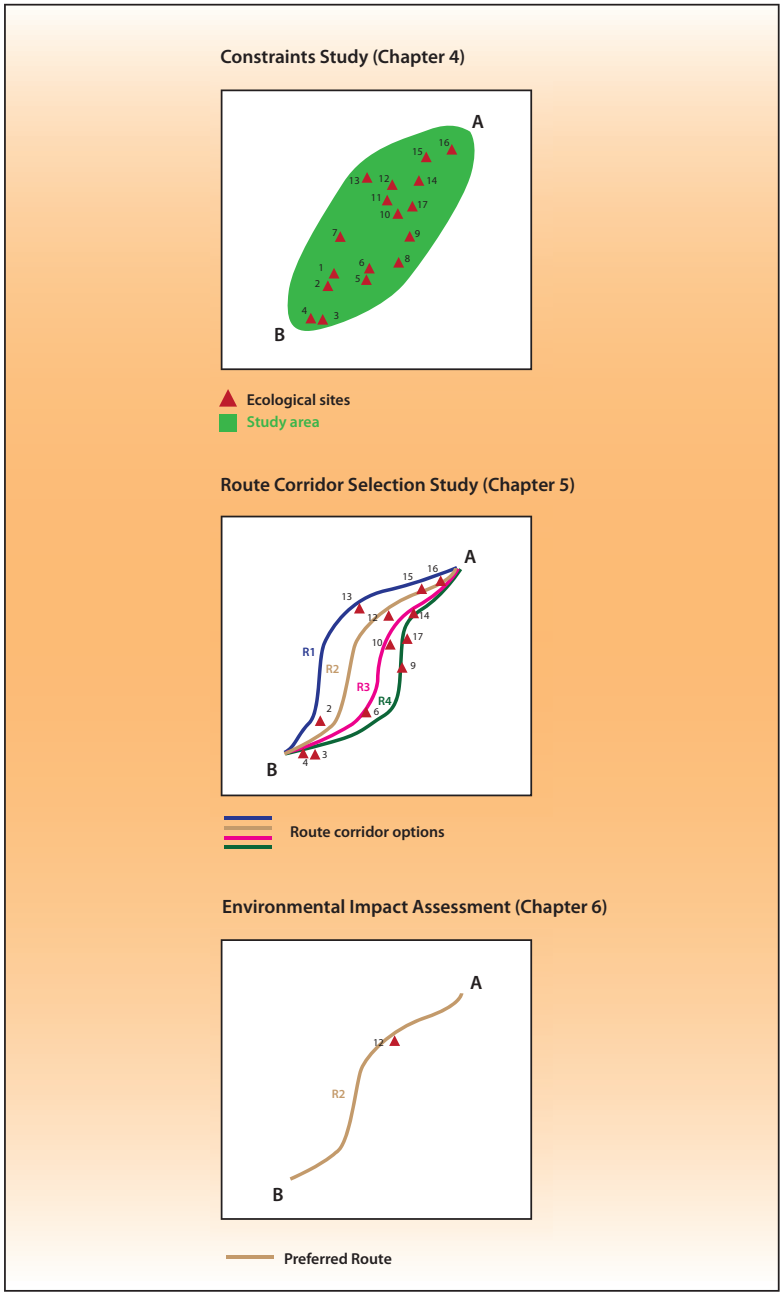


Figure 1: *The phases of planning for ecological assessment of national road schemes showing a typical study area and route corridors*

1.4 Consultees

Consultees in the EIA process include authorities or agencies with statutory responsibility for the protection of the natural environment, including the collection and provision of data and information, and those to whom ecological aspects of the proposed development may be referred for comment. For the natural environment, the main statutory bodies are the National Parks and Wildlife section of the Department of Environment, Heritage and Local Government, and the

Central and Regional Fisheries Boards[1] (Department of Communications, Energy and Natural Resources). These agencies have special responsibilities to respond to the procedural and pragmatic demands of EIA. They should be approached initially at an early stage in the planning process to inform them of the development proposals, to seek data or information about the existence or significance of ecological or natural resources and, later, to seek evaluations of the likely acceptability of residual impacts or mitigation proposals. The EPA and the Heritage Council may also be consulted on certain issues affecting the natural environment.

Of the voluntary groups, only An Taisce is prescribed under planning legislation to have special rights as a statutory consultee, while it and other Non-Governmental Organisations (NGOs) have responsibilities that can interact with the EIA process in a number of ways. Early, open and constructive engagement has frequently proven to be beneficial to both the protection of the environment and to the quality of development projects (EPA, 2002). The main NGOs with an interest in the natural environment include An Taisce, BirdWatch Ireland, the Irish Wildlife Trust, the Irish Peatland Conservation Council, CoastWatch Ireland and Bat Conservation Ireland. These organisations, and others, can provide an informed and experienced focus and, where appropriate, their views should be sought at an early stage. They can help to identify additional sources of data/information and can ensure that potential issues, which might lead to costly work at a later stage, are not overlooked.

1.5 REQUIREMENTS OF AN ECOLOGIST

The survey and assessment of the natural environment for the purpose of these guidelines requires expertise, experience, independence and objectivity. The ecologist should hold appropriate academic qualifications, have relevant experience and be accredited by a recognised professional body. The EPA (2002) provides guidance on the requirements of environmental specialists and this includes the need for qualified ecologists to carry out the environmental assessment of road schemes. In summary, the ecologist should be capable of characterising the existing environment and evaluating its importance. The ecologist must also be able to predict how the proposed road scheme will interact with the receiving environment. Where mitigation measures are required, the ecologist must be capable of assisting in designing such measures. The ecologist should have a knowledge of the relevant legislation and standards that apply to the subject; be familiar with the relevant standards and criteria for evaluation and classification of significance of impacts; be able to interpret the specialised documentation of the construction sector, in so far as it is relevant to the natural environment; and be able to clearly and comprehensively present the findings. One individual ecologist is unlikely to have all the expertise necessary and various specialists may be required to carry out detailed surveys of fauna (e.g. bats, birds or invertebrates), flora (e.g. rare plants), vegetation communities, or of marine or freshwater habitats.

1.6 SCOPE AND STRUCTURE OF THE 'ECOLOGY GUIDELINES' AND SUPPLEMENTARY DOCUMENTS

Chapter 2 of this document presents a general overview of ecological resources in Ireland, their conservation status, and the legal and policy framework for their protection.

Chapter 3 provides guidance on ecological impact assessment procedures.

[1] The Regional Fisheries Boards have a statutory duty, under the Fisheries (Consolidation) Act, 1959, to conserve, protect, develop, manage and promote inland fisheries, including the conservation of fish, other species, habitats and the biodiversity of inland water ecosystems

Chapter 4, Chapter 5 and Chapter 6 set out the scope and detail of ecological surveys and impact assessments associated with each of the project management phases: CS, RCS study and EIS.

Appendix I identifies designated conservation areas in the Republic of Ireland.

Appendix II provides advice in relation to Appropriate Assessment (for those instances where road projects could affect European sites).

Appendix III provides advice on derogation licensing procedures in relation to protected flora and fauna.

Appendix IV discusses the provisions of the Environmental Liability Directive.

Appendix V deals with the issue of local authority works affecting Nature Reserves, Nature Refuges and Natural Heritage Areas (NHAs).

Guidance on ecological surveys is presented in a supplementary document: *Ecological Surveying Techniques for Protected Flora & Fauna during the Planning of National Road Schemes* (NRA, 2008b); hereafter referred to as the 'Survey Guidelines'. The appendices to this document present a suggested list of desk study contacts and key consultees; details of optimum seasonal survey timings; and legal, policy and conservation status of sites, habitats and species in Ireland. Further species and group-specific guidance on surveys and mitigation is presented in: *Best Practice Guidelines for the Conservation of Bats in the Planning of National Road Schemes* (NRA, 2006a); *Guidelines for the Treatment of Bats During the Construction of National Road Schemes* (NRA, 2005a); *Guidelines for the Treatment of Otters prior to the Construction of National Road Schemes* (NRA, 2006b); and *Guidelines for the Treatment of Badgers prior to the Construction of National Road Schemes* (NRA, 2005b). Two further documents contain general guidance relevant to the issues addressed by the 'Ecology Guidelines', particularly in relation to mitigation measures: *A Guide to Landscape Treatments for the National Road Schemes in Ireland* (NRA, 2006c) and *Guidelines for the Crossing of Watercourses During the Construction of National Road Schemes* (NRA, 2005c). The NRA's (2006d) *Guidelines for the Protection and Preservation of Trees, Hedgerows and Scrub Prior to, During and Post Construction of National Road Schemes* also contain relevant information.

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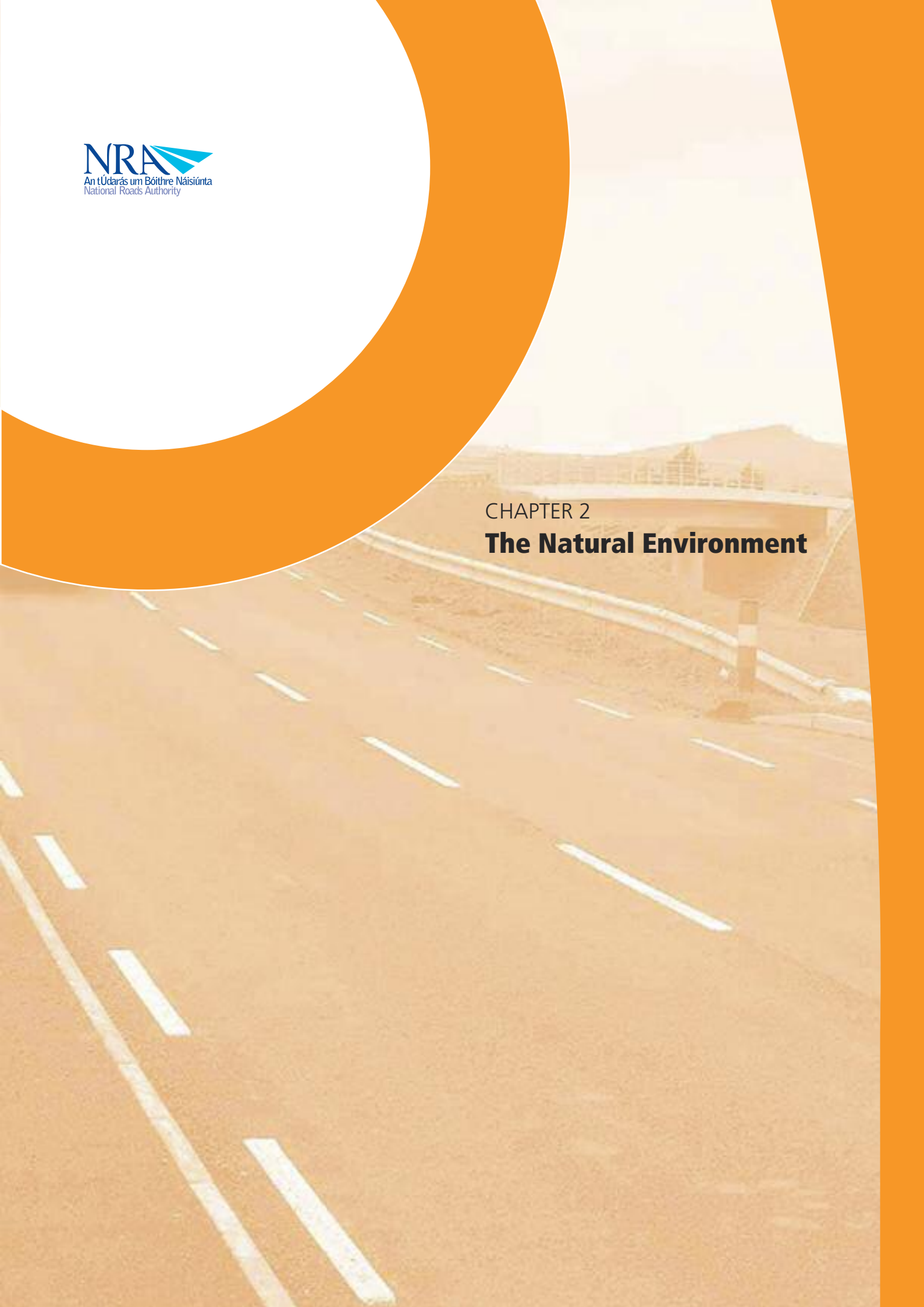

CHAPTER 2

The Natural Environment

CHAPTER 2 THE NATURAL ENVIRONMENT

2.1 Introduction

Ecology is the study of the relationships between living organisms and between them and their physical environment, their energy flows and their interactions with their surroundings (EPA, 2002). Thus, the natural environment includes ecosystems, habitats and species of terrestrial, freshwater and marine environments, or the full range of biological diversity (biodiversity for short).

The framework for the identification and protection of these ecological resources is set out below.

2.2 Designated conservation areas

The national network of designated areas for nature conservation covers approximately 14% of the national territory of Ireland and includes the following site designations: Natural Heritage Area (NHA), Special Area of Conservation (SAC), Special Protection Area (SPA), National Park, Nature Reserve, Refuge for Fauna, Refuge for Flora, Wildfowl Sanctuary, Ramsar Site, Biogenetic Reserve and UNESCO Biosphere Reserve. Sites are designated by the Department of Environment, Heritage and Local Government under national legislation or EU directives and other international conventions, and are considered to be of prime importance for the conservation of valuable components of the natural environment (biodiversity, ecosystems, habitats and species). Many sites have multiple designations and the process of site selection and designation is ongoing. Designated areas fall into a hierarchy in terms of their importance for conservation and priority for protection, as outlined in in Appendix I. The degree of protection afforded designated areas varies considerably but most are either legally protected, protected through ownership by the State, or their existence is recognised for most administrative purposes.

For the protection of fisheries, Ireland also supports a network of Salmonid Waters designated by the Department of Environment, Heritage and Local Government under the EU Freshwater Fish Directive (78/659/EEC).[2] These rivers, and a number of other non-designated waters, are important for salmonids (salmon and trout) and, accordingly, their water quality and fish habitat must be maintained.

The EU Water Framework Directive (2000/60/EC) establishes a framework for action to achieve a sustainable water policy. The Directive covers all community waters, including surface waters (e.g. rivers and lakes), transitional waters, coastal waters and groundwaters. A primary objective of the Directive is to ensure that no deterioration occurs in relation to the existing status of waters and that at least "good status" (based on ecological and chemical 'status') is achieved for all waters by 2015. Scannell (2006, p. 290) indicates that '*Under Art.6(1), Ireland must have ensured that registers of areas designated as requiring special protection under Community legislation and for the protection of surface or groundwater or habitats and species depending on water were established for each river basin district by December 22, 2004*.' For more information on these issues readers are directed to *Guidelines on Procedures for the Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes* (National Roads Authority, 2008c).

[2] Council Directive of 18 July 1978 on the quality of fresh waters needing protection or improvement in order to support fish life (78/659/EEC), implemented in Ireland under the European Communities (Quality of Salmonid Waters) Regulations, 1988 (S.I. No. 84 of 1988)

Macken (2007, p. 7/23) states that under Part XIII of the Planning and Development Act, 2000, planning authorities have the power to designate 'areas of special amenity'. These are designated by reason of an area's outstanding natural beauty or its special recreational value and having regard to any benefits for natural conservation.

Planning authorities may also make an order for the preservation of '*any tree, group of trees or woodlands*' if they consider that it is expedient in the interest of amenity or the environment to make such an order, for stated reasons (Macken, 2007, p. 7/25). The orders may prohibit, subject to any conditions or exemptions for which provision is made in the order, the cutting down, topping, lopping, or willful destruction of trees.

Planning authorities will often designate conservation areas under their County Development Plans. For example, Westmeath County Council's *Draft County Development Plan 2008-2014* (WCC, 2008) proposes the designation of a number of 'areas of high amenity.' The draft objectives for these areas are: (1) To conserve the natural resources of each area in terms of landscape character, scenic quality, habitat value and water quality; (2) To provide for the use of each area for recreational purposes by local communities; and (3) To provide for the development of sustainable and natural resource tourism. A number of other County Development Plans contain similar designations with similar objectives.

2.3 Non-designated areas

The designated area network in Ireland is neither exhaustive nor static and there are many areas of semi-natural habitat outside these sites that are important for wildlife. These areas must be taken into consideration if the ecological resources of the wider countryside are to be maintained and protected. Section 3.3 provides guidance on the valuation of non-designated ecological resources.

2.4 Rare and protected species

Special consideration must be given in the planning of national road projects to protected species. Several species of flora and fauna are afforded protection under national, European and international law. At a national level, species are protected under, *inter alia*, the Wildlife Acts. At a European level, species are protected under, *inter alia*, the Birds Directive (Council Directive 79/409/EEC) and Habitats Directive (Council Directive 92/43/EEC), which are transposed into national law by various measures including the European Communities (Natural Habitats) Regulations, 1997-2005, and the European Communities (Conservation of Wild Birds) Regulations, 1985. In many cases a derogation licence will be required to remove or disturb these legally protected species or their habitats (see Appendix III).

Additionally, special consideration must be given in the planning of national road projects to species of conservation concern. The conservation status of a number of species is reviewed in the Red Data Books (Curtis & McGough, 1988, Stewart & Church, 1992, Whilde, 1993) where they are listed as rare, endangered, threatened or indeterminate, although these reviews are now somewhat out-of-date. More recent data on birds of conservation concern in Ireland is given in Lynas *et al* (2007). The Red Data Book (Vascular Plants) is currently being updated by Curtis *et*

al. The conservation status of EU protected habitats and species is presented in *The Status of EU Protected Habitats and Species in Ireland* (DoEHLG, 2008a).

Guidance is presented in Section 3.3 on how to value rare and protected species in the context of EIAs for road projects. Information on the status of protected species and species of conservation concern is also collated and summarised in Appendix III of the 'Survey Guidelines'.

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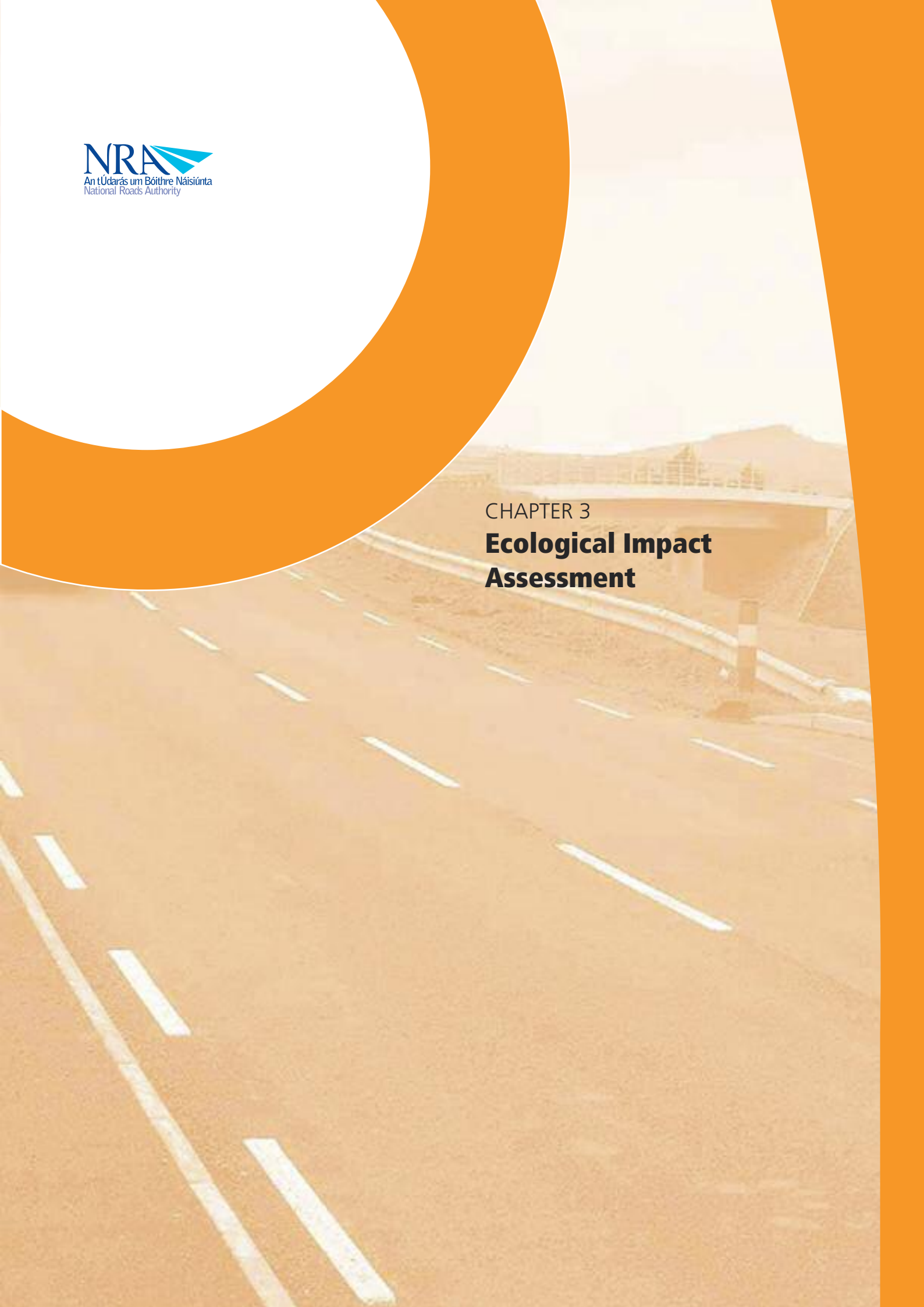

CHAPTER 3

Ecological Impact Assessment

CHAPTER 3 ECOLOGICAL IMPACT ASSESSMENT

3.1 Introduction

Ecological impact assessment (EcIA) is a tool to identify, estimate and evaluate the consequences of proposed actions on the natural environment. It has been defined as "*the process of identifying, quantifying and evaluating the potential impacts of defined actions on ecosystems or their components*" (Treweek, 1999).

In the context of this document 'ecological resources' relate to sites, habitats, features, assemblages, species or individuals that occur in the vicinity of a project and upon which impacts are possible. The term 'ecological receptors' is used when impacts upon them are likely. The term 'resources/receptors of ecological value' is intended to refer to those that are judged to be of importance at a particular geographic scale (e.g. at an international, national, county scale – this is explained further in Section 3.3).

A range of activities tend to be associated with the construction, improvement, operation, maintenance and decommissioning of roads. Each of these will potentially give rise to changes in the natural environment that could have impacts upon resources of ecological value. It is possible to identify several broad impact types that are most often associated with road projects: habitat loss, habitat degradation, habitat fragmentation, disturbance, construction- and road traffic- related mortality. There are also opportunities throughout the different phases of national road development projects to generate positive impacts on ecological resources through habitat enhancement.

The approach to EcIA set out in the subsequent sections applies to each of the project management phases: CS, RCS and EIS, although the evaluation of ecological resources and investigation of potential impacts will be undertaken in increasing detail as the road project is refined. The principles and assessment methodologies are therefore set out in the remaining parts of Chapter 3, with guidance on how these should be applied within each project management phase given as appropriate in Chapter 4, Chapter 5 and Chapter 6.

3.2 Scoping for Ecological Impact Assessment

Scoping is the process by which the necessary information to be gathered during the environmental assessment of a road project is refined, ensuring that there is an efficient and economic use of resources, while gathering adequate information to fully inform the assessment of impacts upon the key ecological receptors.

It is an iterative procedure which should take place throughout each phase of the project management process, with the information gathered at each phase of project development being used to inform the requirements for survey and assessment at the next stage. As more information is collected, this should be used to amend the scope of the RCS study and, subsequently the EIS, as appropriate.

Effective consultation is also key within the scoping process. Engagement of stakeholders and statutory consultees helps to ensure that the key ecological issues are being adequately addressed and that the methodologies for data collection and impact assessment are appropriate. It is

important, therefore, that a framework for consultation is set out at an early stage of a national road development project and that discussions and reviews continue, as appropriate, throughout the project management phases.

3.2.1 Understanding a road project and predicting its likely impacts

Predicting the likely impacts of a road project requires a thorough understanding of the construction activities and project programme. It is necessary to review the various activities associated with road construction and operation that are likely to cause biophysical changes that would result in ecological impacts. As part of this, information will need to be obtained on the spatial extent, timing, frequency and duration of these activities. It is necessary also to consider activities throughout the lifetime of the project.

For a road project, the key construction activities that may result in ecological impacts are:

- vegetation and soil stripping;
- other earthworks;
- blasting and other excavations causing high levels of noise and vibration;
- construction of structures and hard surfaces;
- construction of barriers to wildlife movements such as berms, fences, median barriers;
- construction site drainage;
- demolition operations;
- air pollution and dust deposition;
- work associated with site compounds and storage areas;
- temporary access routes;
- lighting;
- movement of plant and vehicles;
- disturbance associated with the presence of construction staff;
- new planting; and
- environmental incidents and accidents.

Key operational-phase activities include:

- traffic use;
- operational drainage;
- lighting;

- management of new planting; and
- maintenance operations.

3.2.2 Establishing a 'zone of influence' for the project

It is important to establish, on a project-by-project and phase-by-phase basis, the receiving environment for the activities associated with the project and the biophysical changes that are likely to result. It is important for each of these activities and the associated changes, to estimate an 'effect area' over which the change is likely to occur. Wherever possible, it is helpful to map the location of the various activities and their 'effect areas,' for example, zones within which noise is expected to increase, or the anticipated locations of drainage outfalls and the receiving watercourses. It is then necessary to identify, as part of this mapping exercise, the ecological areas and features (i.e. the ecological resources/receptors) likely to be affected by the biophysical changes caused by the project, however remote from the route. From this it will be possible to establish a 'zone of influence' for the project that encompasses all of its potential impacts. The 'zone of influence' should be reviewed as the project develops, through each of the project management phases.

3.2.3 Identifying the ecological 'resources' and requirements for detailed assessment

Ecological resources within the 'zone of influence' should be identified initially by desk studies and consultations and then by limited site inspections and walkover surveys, as appropriate. Guidance on when to undertake these investigations during the different project management phases is set out in Chapter 4, Chapter 5 and Chapter 6. As part of the desk studies, it is also important to collate contextual information wherever possible, to provide a background for subsequent elements of the assessment process. For example, in order to value a particular ecological resource within an appropriate geographic frame of reference (as explained in Section 3.3), it may be necessary to review the distribution and abundance of that resource on a national, county or local basis.

Whether further surveys then need to be undertaken, and the extent of these, will depend upon whether designated sites or protected species (or other sites, species or assemblages of ecological value) are likely to be affected significantly by any aspect of the project in question. The aim of the procedure should be to focus the assessment only on the likely significant impacts of the project (guidance on determining significance is presented in Section 3.4.4).

In making this decision, it is important to consider both direct and indirect impacts that could arise from the various project activities and their associated biophysical changes. For example, depending upon its location, the direct impact of vegetation clearance and earthworks on a site might be the loss of an area of valuable woodland habitat that supports a population of protected plants. The indirect impacts associated with this activity might be less obvious. This loss of habitat may, for example, change the dynamics or viability of a population of a protected animal species which forages within it, perhaps only on a seasonal basis. It might also, for example, have effects on the local hydrology that could affect plant species composition in adjacent areas. In addition, the loss of sheltering trees could increase the likelihood of windthrow in the future, potentially affecting a different group of protected species.

This part of the process culminates in the selection of those 'key ecological receptors' for which detailed assessment is required and the design of any further surveys that may be necessary to underpin this assessment. Further advice on the scope, detail, techniques and boundaries of ecological surveys is presented in the 'Survey Guidelines'.

Whilst the EcIA process should focus only on likely significant impacts, *any* effects on a European site may need to be the subject of further investigations and actions; guidance on dealing with European sites is presented in Appendix II and, as appropriate, in Chapter 4, Chapter 5 and Chapter 6.

3.3 Valuing ecological resources

3.3.1 Geographic context for determining value

The following geographic frame of reference should be used when determining value:

- International importance
- National importance
- County importance (or vice-county in the case of plant or insect species)[3]
- Local importance (higher value)
- Local importance (lower value)

The collection of adequate contextual information is crucial in determining the value of ecological resources at the lower end of the geographic scale. For example, when dealing with locally important resources, it is often not possible to rely on or refer to designated sites or equivalent criteria. So, to value a site, area of habitat, or species population in a meaningful way, it is necessary to have some understanding of the distribution and abundance of that resource on a local and county basis.

Table 1 provides Examples of valuation at different geographical scales. Examples of the valuation and selection of ecological receptors are provided in Table 2. It should be noted that such examples are indicative and that all ecological resources should be valued and selected by competent experts having regard to the guidance provided in Section 3.3.

[3] For further information on the vice-county system in Ireland see:
http://www.botanicgardens.ie/herb/census/webbvcs.htm
http://www.mothsireland.com/vcmap.htm

Ecological valuation: Examples

International Importance:

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

National Importance:

- Site designated or proposed as a Natural Heritage Area (NHA).
- Statutory Nature Reserve.
- Refuge for Fauna and Flora protected under the Wildlife Acts.
- National Park.
- Undesignated site fulfilling the criteria for designation as a Natural Heritage Area (NHA); Statutory Nature Reserve; Refuge for Fauna and Flora protected under the Wildlife Act; and/or a National Park.
- Resident or regularly occurring populations (assessed to be important at the national level)[7] of the following:
  - Species protected under the Wildlife Acts; and/or
  - Species listed on the relevant Red Data list.
- Site containing ‘viable areas’[8] of the habitat types listed in Annex I of the Habitats Directive.

4 See Articles 3 and 10 of the Habitats Directive.

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

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

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

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

County Importance:

- Area of Special Amenity.[9]
- Area subject to a Tree Preservation Order.
- Area of High Amenity, or equivalent, designated under the County Development Plan.
- Resident or regularly occurring populations (assessed to be important at the County level)[10] of the following:
  - Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive;
  - Species of animal and plants listed in Annex II and/or IV of the Habitats Directive;
  - Species protected under the Wildlife Acts; and/or
  - Species listed on the relevant Red Data list.
- Site containing area or areas of the habitat types listed in Annex I of the Habitats Directive that do not fulfil the criteria for valuation as of International or National importance.
- County important populations of species, or viable areas of semi-natural habitats or natural heritage features identified in the National or Local BAP,[11] if this has been prepared.
- Sites containing semi-natural habitat types with high biodiversity in a county context and a high degree of naturalness, or populations of species that are uncommon within the county.
- Sites containing habitats and species that are rare or are undergoing a decline in quality or extent at a national level.

Local Importance (higher value):

- Locally important populations of priority species or habitats or natural heritage features identified in the Local BAP, if this has been prepared;
- Resident or regularly occurring populations (assessed to be important at the Local level)[12] of the following:
  - Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive;
  - Species of animal and plants listed in Annex II and/or IV of the Habitats Directive;
  - Species protected under the Wildlife Acts; and/or
  - Species listed on the relevant Red Data list.
- Sites containing semi-natural habitat types with high biodiversity in a local context and a high degree of naturalness, or populations of species that are uncommon in the locality;
- Sites or features containing common or lower value habitats, including naturalised species that are nevertheless essential in maintaining links and ecological corridors between features of higher ecological value.

Local Importance (lower value):

- Sites containing small areas of semi-natural habitat that are of some local importance for wildlife;
- Sites or features containing non-native species that are of some importance in maintaining habitat links.

Table 1: *Examples of valuation at different geographical scales*

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

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

11 BAP: Biodiversity Action Plan

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

Ecological receptors subject to impacts associated with a new road scheme	Summary descriptions of the ecological receptors	Value of the ecological receptors	Selection as key ecological receptors
Hedgerow network (managed by regular cutting to a height of approximately 1.5m)	The hedgerows comprise mainly hawthorn (*Crataegus monogyna*), with ash (*Fraxinus excelsior*) and occasional sycamore (*Acer pseudoplatanus*). Dog-rose (*Rosa canina*) and ivy (*Hedera helix*) are common and frequently grow extensively up into the canopy, along with brambles (*Rubus fruticosus Agg.*) The ground flora is relatively species-poor and includes cow parsley (*Anthriscus sylvestris*), hart's tongue-fern (*Phyllitis scolopendrium*), ivy and herb-robert (*Geranium robertianum*).	These hedgerows are not particularly species-rich and are of limited intrinsic ecological value. They also do not link other features of particular ecological importance and, thus, the local hedgerow network should be valued as of Local Importance (lower value).	As set out in Section 3.4.1, in the context of national road projects ecological resources of below Local Importance (Higher Value) do not represent 'key ecological receptors' for which detailed assessment is required.
Two fields of species-poor damp grassland (each 0.5ha in size)	This area of grassland is subject to periodic flooding, is grazed irregularly and is dominated by rushes (*Juncus spp.*). Meadow-grasses (*Poa spp.*) dominate the grass sward, with yorkshire-fog (*Holcus lanatus*) also present. The fields support a low diversity of common herb species. A limited assemblage of invertebrates was noted during the walkover surveys and no other records of animal or plant species exist for this area.	This small area of grassland is likely to be of some local importance for wildlife but lacks the diversity and other characteristics of a more valuable site and should therefore be valued as of Local Importance (lower value).	As set out in Section 3.4.1, in the context of national road projects ecological resources of below Local Importance (Higher Value) do not represent 'key ecological receptors' for which detailed assessment is required.
Relict demesne woodland approximately 40 Ha in size with mixed deciduous/ coniferous trees, an associated stream, and supporting rare/protected species.	This woodland contains a mix of native and non-native tree species including oak (*Quercus sp.*), ash, sycamore, beech (*Fagus sylvatica*), hazel (*Corylus avellana*) and yew (*Taxus baccata*). The ground flora is dominated by ivy with wood speedwell (*Veronica montana*), wood avens (*Geum urbanum*), dog-violet (*Viola riviniana*), wild angelica (*Angelica sylvestris*) and ramsons (*Allium ursinum*) also present. A moderately polluted (Q-value 3) stream, approximately 1m wide and 30cm deep runs through the woodland. Hairy St. John's wort (*Hypericum hirsutum*), a species legally protected under the Flora Protection Order, 1999, and green figwort (*Scrophularia umbrosa*) (listed in the Irish Red Data Book 1: Vascular Plants), have both been recorded near the stream in the recent past. There is a resident population of red squirrel present within the woodland and a 'main' badger sett has been found on one of the woodland boundaries. These species are protected under the Wildlife (Amendment) Act, 2000.	The site does not fulfill the relevant criteria for designation as a site of National Importance, nor is it likely to support protected species in nationally-important numbers. However, on the basis of the woodland's size and quality, the population of red squirrels is likely to be of County Importance in terms of its size. In addition, this represents a substantial area of semi-natural habitat with high intrinsic biodiversity. It also supports rare/declining species. On this basis, it should be valued as of County Importance.	As this site has been identified as being of County Importance, and a significant impact upon it is possible, it should be selected as a 'key ecological receptor' and as such requires detailed assessment.

Table 2: Examples of the valuation and selection of ecological receptors

3.3.2 Designated sites and features

In the case of designated sites or features, it is appropriate to recognise the level of ecological value accorded by that designation and value the site or feature accordingly within the subsequent assessment; the reasons for the designation then need to be taken fully into account within the impact assessment process. In addition, sites for which the process of designation has commenced should be valued equivalently. In the event that surveys reveal that designated sites no longer meet their criteria for designation, the potential for them to be re-established should be assessed and their current value interpreted in consultation with the relevant designating authority.

3.3.3 Un-designated sites and features that meet the relevant criteria for designation

As identified in Chapter 2, the network of site designation in Ireland is not exhaustive and it is important that the valuation process does not overly rely on existing site designation. Surveys may reveal sites and features that appear to meet the criteria for designation at a particular level. In this case, the resources should be valued accordingly and their importance confirmed with DoEHLG/NPWS and/or the potential designating authority.

3.3.4 Other resources of nature conservation value

Where areas of a particular habitat do not obviously meet criteria for selection as a designated site, or where it is appropriate to value an assemblage, species or population, it is important to consider the features that tend to characterise valuable ecological resources.

These include:

- Species that are rare at a particular geographic scale, and the habitats or features upon which they depend;
- species undergoing substantial declines in abundance and distribution;
- endemic species;
- species on the edge of their natural range or distribution, particularly where this is contracting;
- large populations of uncommon species;
- species-rich assemblages;
- features exhibiting a high degree of habitat diversity, structural diversity, connectivity and/or valuable juxta-positions of otherwise less intrinsically valuable habitats, that create conditions favourable for rare or protected species.

Wherever possible, values should be assigned to ecological resources on the basis of their known (or perceived) rarity, status and distribution, and hence collating contextual information for the resource at different geographic 'levels' is particularly relevant. In many cases it is appropriate to assign a value to assemblages of species, and these can be of greater value than their constituent parts.

3.3.5 Other considerations

For sites, features, habitats and populations that are currently below favourable conservation status, their potential to be restored and the potential value they could reasonably attain should be taken into account, and described, in the valuation process. In addition, some features that are of limited intrinsic ecological value may perform important ecological functions for adjacent designated sites (e.g. buffer zones). This should also be taken into account, and explained, in the valuation process.

3.3.6 Other attributes of ecological resources

People derive benefits from ecological resources in a variety of ways. Some elements of social value are likely to have formed part of the designation criteria for sites identified as important at a county level. For other, non designated sites, it is also appropriate to take account of considerations of social value, as far as this relates to ecology and nature conservation. For example, a local nature reserve or site of value for conservation education should be taken into account. It is important to ensure appropriate integration with the other relevant topic areas with regard to this issue.

Impacts on certain ecological resources may have financial implications. Whilst it is not intended that economic value be subsumed within the valuation of ecological resources, it is important to recognise, within the ecology and nature conservation topic, these financial implications and to ensure effective integration with other related topic areas.

The likely impacts on some species and groups (e.g. deer) need to inform project design and mitigation as a result of potential road safety and animal welfare issues, even when these are not selected as key receptors and/or the impacts upon their populations are not assessed as significant.

3.4 Impact assessment

3.4.1 General guidance

It is necessary to assess impacts, on an iterative basis, at several stages during project development: guidance is presented in Section 3.2 on the broad assessments necessary during the initial project management phases and to underpin selecting the key ecological receptors for which detailed assessment is required, on the basis of ecological value and likely significant impacts. More detailed impact assessment is then required during the latter stages of project development, in order to identify the need to avoid impacts, to help design mitigation measures and inform the assessment process. This should be reviewed as the project progresses to take account of design changes. As the impact assessment process continues, it will be necessary to distinguish between those design changes seeking to avoid or reduce impacts that go on to form an integral part of project design (and should therefore be assessed as part of the 'unmitigated project'), and those that represent additional mitigation measures. Wherever possible all mitigation measures should be incorporated in project design, as that design progresses, on an iterative basis; however, for impact assessment purposes the 'unmitigated project' should include those measures where delivery is unequivocal and success is highly likely. Where more uncertainty exists, the

measures should be assessed as 'mitigation'. For example, alterations in vertical adjustment and/or land-take to avoid impacts on an area of valuable habitat would properly be identified as an integral part of scheme design (and thus part of the 'unmitigated project'). An operation to translocate an area of habitat that would otherwise be destroyed during site clearance would be an additional 'mitigation' measure. Once the mitigation measures have been refined and their likely success considered, it is necessary to assess any residual impacts. If significant adverse impacts remain likely, it may be appropriate to design measures to off-set these; once again, the positive impacts of these measures should also be assessed. (These issues are also addressed, in relation to impacts on European sites, in Section App.II.iv.c.)

The basis of the impact assessment should be a determination of which ecological resources within the 'zone of influence' are both of sufficient value to be material in decision making and, therefore, included in the assessment (valuation is described in Section 3.3) and likely to be affected significantly (determination of impact significance is addressed in Section 3.4.4). In the context of national road projects, ecological resources of below 'Local Importance (higher value)' should not be selected as 'key ecological receptors' for which detailed assessment is required.

3.4.2 Baseline conditions and cumulative impact assessment

The impact assessment should be undertaken in relation to baseline conditions within the zone of influence at the time of the proposed activities, in the absence of the project. Construction-phase impacts should relate to the date by which construction activities are anticipated to commence and their likely duration. Similarly, operational impacts should refer to predicted baseline conditions during the design life of the national road project.

It is necessary to predict future baseline conditions on the basis of:

- environmental trends, including climate change;
- locally-important factors such as changes associated with likely future management and land-use;
- completed developments or developments currently under construction that could affect resources within the zone of influence in the future; and
- other developments for which planning consent has been granted that also could affect resources within the zone of influence in future.

3.4.3 Characterising impacts

Having identified the project activities likely to give rise to significant impacts (as described in Section 3.2.1), it is then necessary to describe the resultant biophysical changes and to characterise the impacts on the 'key ecological receptors'. In doing so, it will be important to liaise with colleagues in the project team, to ensure that the implications of these changes, e.g. in hydrology, noise or air quality, are fully understood and that there is appropriate integration between disciplines. It is necessary to ensure that any assessment of impact is sufficiently comprehensive:

it needs to take account of impacts associated with construction and operation; direct, indirect and synergistic[13] impacts; and those that are temporary, reversible and irreversible.

It is important that when identifying impacts, explicit reference is made to the aspects of ecological structure and function on which the key receptor depends, and that these are followed-through during the characterisation procedure.

The process of impact characterisation helps to build-up a balanced understanding of the nature of each impact and receptor. Consideration should be given during this process to the interactions between ecological receptors. For example, the loss of a particular habitat may have implications not just for those species directly living within or using that habitat, but also for others that may interact with those species.

When characterising impacts, wherever possible reference should be made to the following parameters:

3.4.3.1 Magnitude

'Magnitude' should be predicted in a quantified manner wherever possible and relates to the quantum of an impact, for example the number of individuals affected by an activity.

3.4.3.2 Extent

'Extent' should also be predicted in a quantified manner and relates to the area over which the impact occurs. Where the receptor is in an area of a particular plant community for example, Extent=Magnitude.

3.4.3.3 Duration

'Duration' is intended to refer to the time during which the impact is predicted to continue, until recovery or re-instatement (which may be longer than the impact-causing activity). This should be quantified wherever possible, and interpreted in relation to the ecological processes involved rather than on a human timescale.

3.4.3.4 Reversibility

'Reversibility' should be addressed by identifying whether an impact is ecologically reversible (either spontaneously or through specific action) and whether such an outcome is likely.

3.4.3.5 Timing and frequency

The timing of impacts in relation to important seasonal and/or life-cycle constraints should be evaluated. Similarly, the frequency with which activities (and concomitant impacts) would take place can be an important determinant of the impact on receptors and should also be assessed and described.

[13] Synergistic impacts occur where two or more impacts/impact types act together to create a combined effect on one or more receptors greater than the sum of their separate effects.

3.4.3.6 Integration of impact characteristics

An informed integration, for each potentially significant impact, of each of these impact characteristics is necessary in order to underpin the determination of impact significance set out below.

In each case, it is important to assess the likelihood that the change will occur as anticipated and that the impact on ecological structure and function will manifest as predicted. Wherever possible, this should be based on previous evidence. The following scale should be applied (adapted from IEEM 2006):

Near-certain:	>95% chance of occurring as predicted
Probable:	50-95% chance of occurring as predicted
Unlikely:	5-50% chance of occurring as predicted
Extremely unlikely:	<5% chance of occurring as predicted

3.4.4 Determining impact significance

3.4.4.1 Effects on conservation status of 'key ecological receptors'

A likely change in 'conservation status' should be used as a measure to determine whether an impact on a habitat or species is likely to be significant, and it should be evaluated at whichever geographic scale is appropriate (see below).

In the context of ecological impact assessment of national road development projects, conservation status of a natural habitat means the sum of the influences acting on a natural habitat and its typical species that may affect its long-term natural distribution, structure and functions as well as the long-term survival of its typical species within a given geographical area. Thus, an impact will be significant if it would affect the long-term distribution, structure or function of the habitat in question as well as the long-term survival of its associated species, at the appropriate geographical scale.

Similarly, the conservation status of a species means the sum of the influences acting on the species concerned that may affect the long-term distribution and abundance of its populations within the appropriate geographic scale. Thus, an impact will be significant if it would affect the long-term distribution or abundance of the species' populations at the appropriate geographic scale.

For those species or habitats for which conservation objectives or targets have been set, then any impact which would inhibit the achievement of those targets would also be considered significant, at the geographic scale at which the target has been set.

3.4.4.2 Effects on integrity of 'key ecological receptors'

Likely effects on 'integrity' should be used as a measure to determine whether an impact on a site is likely to be significant. For this to be a valid approach, the site in question needs to be sufficiently complex to recognise ecosystem processes and functions. Otherwise it will be more appropriate to consider potential changes in the conservation status of the site's component habitats and species (see above).

In the context of ecological impact assessment for national road development projects, 'integrity' should be regarded as the coherence of ecological structure and function, across the entirety of a site, that enables it to sustain all of the ecological resources for which it has been valued. Impacts resulting in adverse changes to those ecological structures and functions would be considered to be significant.

3.4.4.3 Process of assessing significance

In this process, significance of ecological impact is determined empirically, on the basis of an analysis of the factors which characterise it, irrespective of the value of the receptor. Significance is determined by effects on conservation status or integrity, regardless of the geographical level at which these would be relevant.

If impacts are not found to be significant at the highest geographical level at which the resource has been valued, they may be significant at a lower level, and this should be tested sequentially. Similarly, impacts that do not affect the integrity of a site, may nevertheless affect the conservation status of a valuable constituent habitat or species, at a lower geographic scale. An equivalent approach also needs to be applied to mitigation and enhancement measures, which may have a significant beneficial impact, but at a higher or lower geographic scale than the value of the receptor to which they have been applied.

Key Ecological Receptor: principal elements of ecological value	Construction-phase Impacts	Operational Impacts	Ecological Significance if Unmitigated
Mixed deciduous/coniferous woodland habitat	There would be permanent loss of approximately 4 ha of woodland habitat along a boundary of the wood associated with land-take for the scheme (the road would be in a shallow cutting at this point). There would also be the potential for direct/indirect impacts on woodland habitat immediately adjacent to the land-take area as a result of physical damage to trees and compaction of the ground in the vicinity of the roots; increased exposure to windthrow in the future; trampling of ground flora associated with construction activities; and alterations in local hydrology. In the absence of mitigation, it is probable that this would occur, and would affect a further approximately 2 ha of woodland habitat.	Deposition of airborne pollutants (NO_X, ammonia, metals) and salt spray drift onto vegetation and soils adjoining the verge.	In this case it would be most appropriate to consider the significance of these impacts in combination, in terms of integrity of the site as a whole. It is considered that the impact on the site would be significant, primarily on the basis that: approximately 10% of the valuable woodland habitat would be lost, with a further 5% affected indirectly, meaning that ecological structure and function would be affected across a substantial proportion of the site. This loss of habitat could also threaten the viability of the red squirrel population; an important element of the ecological resources for which the site has been valued.
Stream	Potential indirect, temporary impacts as a result of hydrocarbon contamination and siltation associated with installation of a new culvert upstream (beyond the woodland boundary). In the absence of mitigation, it is probable that this will occur.	None. No operational discharge is proposed to this stream.	
Rare/protected plant species	No impacts envisaged as no specimens occur within or close to the land-take area.	None.	
Red squirrel	Individuals within the population would be affected by permanent losses of feeding resources and existing/potential drey sites. There would be the potential for the incidental mortality of individuals, including dependant offspring associated with site clearance (timed for September/October). On the basis of the detailed surveys completed to date, the risks of direct mortality are likely to be low. Disturbance to individual squirrels through construction noise and visual disturbance, and lighting is considered likely. Given that habitat loss would occur along a woodland boundary, no additional impacts of fragmentation are predicted, associated with the woodland population. Similarly, no habitat features linking these animals with a wider squirrel population would be severed by the scheme and thus there would be no additional fragmentation effects.	Some possibility of future road traffic- related mortality of small numbers of squirrels, but this is considered unlikely. No continuing effects of fragmentation.	

Key Ecological Receptor: principal elements of ecological value	Construction-phase Impacts	Operational Impacts	Ecological Significance if Unmitigated
Badger	Main sett would not be affected directly as >30m from land-take. Some temporary disturbance of individuals when foraging as a result of construction noise and visual disturbance, and lighting, for those periods where night-time working is necessary. Land-take would entail some loss of foraging resources and would fragment the resident social group's existing territory.	The resident badgers would be expected to continue to access their territory but would be at increased risk of road traffic-related mortality. An increase in local mortality rate is considered 'probable'.[14]	There would be no direct impacts on the main sett within the wood and thus badgers do not contribute to the assessment of significance outlined above. The impact on this social group would be a likely increase in the number of badger road deaths, and the majority of these are likely to occur beyond the site boundaries. It is also likely that other nearby groups would experience an increase in mortality rate associated with the new road scheme; it would therefore be appropriate to deal with badgers as a separate receptor, but on a scheme-wide basis.

Table 3: *An illustrative example of impact characterisation and determining significance*

[14] Had a median barrier been included in the design of this part of the new road, it would have been necessary to take account of the fragmentation of territorial resources as well as increased rates of mortality.

3.5 Mitigation measures

The development of mitigation measures should be an iterative process, throughout project design. These measures need to be fully integrated into the project proposals and should involve elements of avoidance, reduction and restoration, in that order of priority. Mitigation measures should be developed primarily to address any significant impacts on key ecological receptors that have been revealed during the impact assessment process. However, some measures may also be necessary to ensure legislative and policy compliance; for example, when dealing with protected species that have not been identified as key ecological receptors, or for which significant impacts are not anticipated.

In each case, the appropriate form of mitigation should be tailored to the nature of the receptor and the impact being mitigated. Furthermore, the measures should be designed and presented in terms of the integrity or conservation status of the resources or features to which they apply. This ensures that the mitigation measures address significant impacts directly; allows them to be assessed more readily in terms of residual impact significance (see below); and monitoring, and remedial actions can be more effectively targeted. Decisions on the design of mitigation should be reached through consultation with the appropriate statutory and non-statutory bodies. It is imperative that the proposed mitigation can be justified in terms of likely success and cost-effectiveness.

It is important to set aims for mitigation measures at an early stage. Where mitigation measures are developed to address impacts on key ecological receptors, the aims should be determined on a case-by-case basis and as a minimum, and where appropriate, should seek to ensure that any residual impacts would not be significant. In some situations, it may be appropriate to set an aim of returning a receptor to pre-construction conditions. In specific circumstances, some mitigation measures may need to involve additional resources, on a precautionary basis, to take account of uncertainty with regard to the success of the proposals, but again the cost-effectiveness of such an approach should be ascertained.

In each case, it will be necessary to appraise the likely success of mitigation measures against the aims that have been set for them, ideally with reference to equivalent measures that have been employed in similar situations on previous projects. This appraisal should then inform:

(a) decisions concerning the extent and type of mitigation to be employed, for example, it may be appropriate to specify a greater extent and number of alternative treatments for mitigation measures with a more uncertain outcome; and

(b) the assessment of residual impacts.

In addition to potential deficiencies inherent in the mitigation measures themselves, it is necessary to identify external factors that also contribute to uncertainty of outcome. In situations where, for example, sites may be impacted by climate change consideration should be given to the use of less climate change sensitive options.

The assessment should only take account of mitigation proposals that have been fully agreed and incorporated within the design and construction process. Mitigation that cannot be guaranteed to be delivered should be clearly identified as such and should not be taken into account when assessing residual impacts.

3.6 Residual impacts

The significance of any residual impacts should be assessed by evaluating the likely effectiveness of the proposed mitigation in addressing the impacts on integrity and conservation status of each of the key ecological receptors. In doing so, the projected outcome and uncertainty of the mitigation measures should be taken into account.

Key Ecological Receptor: principal elements of ecological value	Mitigation	Residual Impact
Mixed deciduous/coniferous woodland habitat	Habitat loss would be minimised by reducing land-take through the construction of a retaining wall in place of a graded cutting slope; amount of woodland habitat removed now approximately 0.25ha. Hydrological (draw-down) effects would be minimised through the installation of a clay seal along the edge of the land-take parallel to the woodland. This measure would have a probable chance of success. The likelihood of future windthrow would be reduced by coppicing selected shrubs and trees in advance of site clearance, to establish a new woodland edge as rapidly as possible. This measure would also have a probable chance of success. The likelihood of damage to adjoining woodland habitat would be avoided by the use of protective fencing established at the outset and 'tool-box talks' to contractors (see NRA 2007); all construction works to be undertaken in strict compliance with NRA Guidelines (e.g. NRA 2006d). These measures have a probable chance of success. Landscape planting undertaken in this location to comprise an appropriate species-rich mixture of locally-provenant trees and shrubs, and designed to link with the existing woodland habitat and, in the longer-term provide linear extension to the woodland along the verge to either direction, comprising approximately 2ha.	The impact on this feature would no longer be significant, primarily on the basis that: now 0.6% of the woodland habitat would be lost and it is unlikely that there would be substantial indirect effects on the remainder. Thus ecological structure and function would be expected to remain unaffected. In the longer-term, the area of new planting may actually represent a net beneficial effect. Similarly, it is likely that the red squirrel population would remain viable: given the size of their home ranges and the fact that a narrow strip of habitat removal along the edge of a wood would probably involve very small losses from several ranges, it is likely the loss of resources from any individual squirrels would be insignificant. NB. Having assessed the residual impacts on the site of County Importance to be not significant, it would be appropriate also to consider separately the residual impacts on semi-natural woodland habitat, red squirrels and badgers, in the context of their local conservation status, in the event that there would be a significant impact at that (lower) level. In this case, however, it is unlikely that any of these impacts would be significant, even at the local level.
Stream	Culvert construction in compliance with NRA Guidelines (2005c), incorporating effective pollution controls. These have a 'probable' likelihood of success.	
Rare/protected plant species	No additional measures required; already avoided.	
Red squirrel	The measures above would also serve to mitigate the majority of the impacts on red squirrels. In addition, the felling and removal of trees would be undertaken in a manner that minimises the likelihood of killing adult squirrels and would now take place in December, further reducing the likelihood of encountering dependent young. This would increase the confidence in avoiding squirrel mortality during construction to near-certain.	
Badger	Future road traffic-related mortality of badgers would be minimised through the provision of badger-resistant highway fencing to direct the animals to a nearby mammal underpass. This measure would be focussed in part on mitigating the effects of road operation on the woodland site and its constituent species, but would also form part of a wider, scheme-wide provision, with the intention of minimising impacts on the local badger population and improving road safety on the new scheme.	

Table 4: *An example illustrating mitigation options and residual impact assessment*

3.7 Informing project appraisal and integration with other topics

Reference should be had to the NRA's *Project Appraisal Guidelines* (2008d) and *National Roads Project Management Guidelines* (2000) (and any relevant revisions or amendments to these documents) on the issue of 'informing project appraisal and integration with other topics.'

In summary, the residual impacts identified (in the manner outlined above) should be interpreted in the context of the geographic scale at which the receptor they affect has been valued. The analysis of all residual impacts will then form the basis of a quantitative statement (NRA, 2008d). This quantitative statement, along with required qualitative statements, will form part of the Project Appraisal Balance Sheet ('PABS') (NRA, 2008d).[15] The quantitative and qualitative statements will then be interpreted and a scaling statement devised that ranks the complete selected route on a seven-point scale.

3.8 Compensation and related measures

In the context of assessment procedures for national road projects, 'compensation' refers to measures to address residual impacts on European sites (e.g. Special Area of Conservation (SAC), Site of Community Importance (SCI), Special Protection Area (SPA) or *proposed* Special Areas of Conservation) or protected species. This is set out in more detail in Appendix II and Appendix III.

3.9 Enhancement measures

Road projects routinely present opportunities to enhance ecological resources in their immediate vicinity, for example, through the creation of habitat features parallel to the scheme that link otherwise fragmented sites, or through improvements in pollution controls. These often do not address specific (or significant) adverse impacts, but may nevertheless be considered worthwhile. Where these contribute to project objectives and/or national or local polices, they should be adopted in a cost-effective manner, with priority given to those measures that would make a meaningful contribution to the local conservation status of the habitats or species in question.

[15] The PABS will provide an overview of the costs and benefits of the road project.

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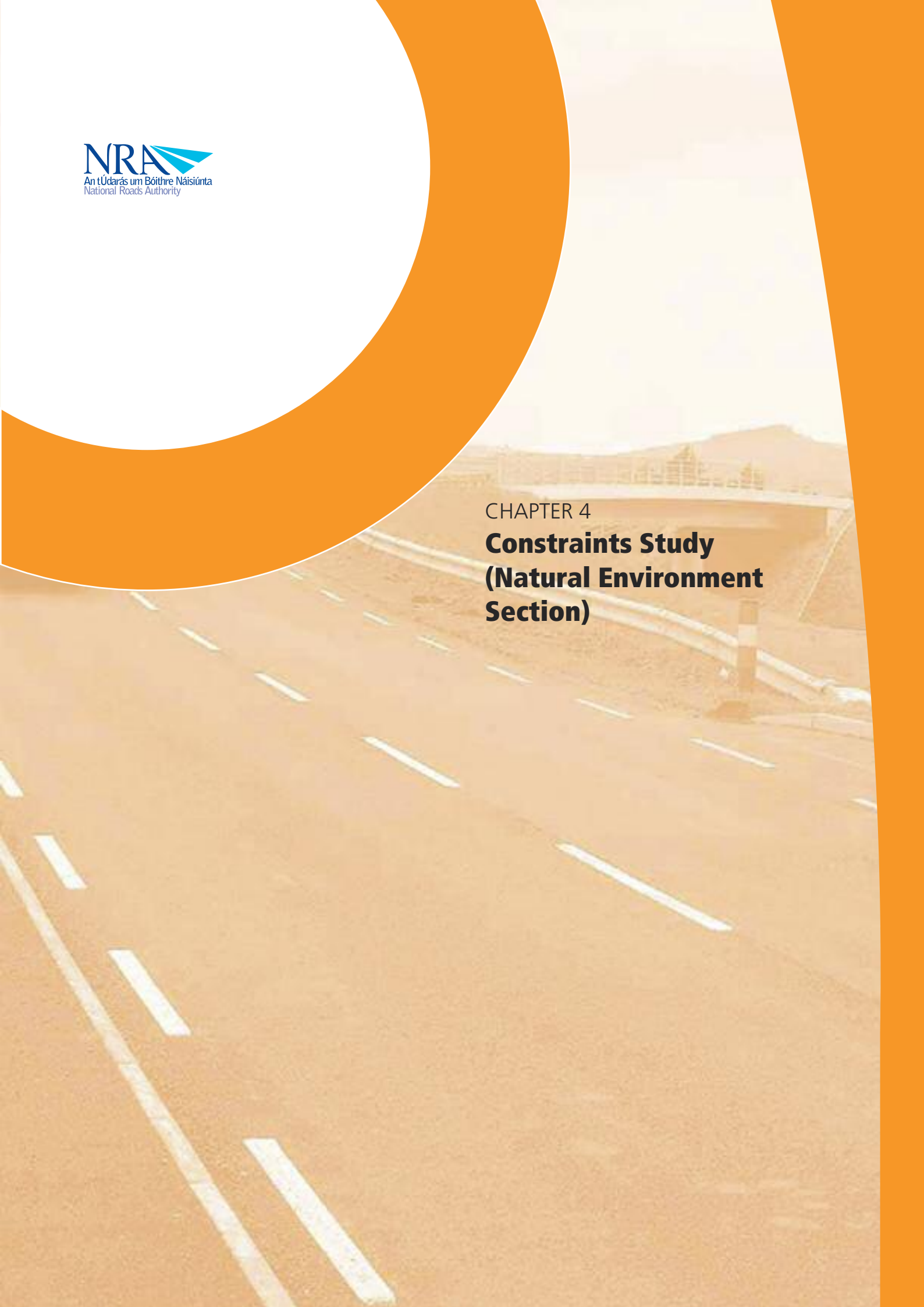

CHAPTER 4

Constraints Study (Natural Environment Section)

CHAPTER 4 CONSTRAINTS STUDY (NATURAL ENVIRONMENT SECTION)

4.1 Objectives

The objective of the natural environment section of the CS is to identify the international, national, county and local issues that must be taken into account when planning and designing roads so that the phases which follow (RCS study and EIS) can be planned properly. For the natural environment, this includes the main ecological constraints that should be avoided or that could affect the design of the scheme, delay progress or influence the costs.

4.2 Approach

The natural environment section of the CS is primarily a desk exercise that comprises a search for available information, or information that can be readily obtained.

One of the first exercises to be completed during the CS phase is defining the CS area. In terms of the natural environment (note that other disciplines may required additional areas to be considered), the extent of the CS area should based on the broad corridor within which route corridor options are likely to be located and their potential zones of influence (see Section 3.2.2). In defining the CS area one should take into account the full range of impacts that could arise including, for example, indirect impacts on wetlands and river systems or impacts on highly mobile groups such as bats and birds that could be associated with important sites some distance from the project.

Following definition of the CS area a review of available information should be completed, after which the ecological resources present in the CS study area should be presented in the CS Report. The CS Report should include summary details of the ecological resources within the study area and a map that shows the location and extent of these constraints.

Consultations with the Department of Environment, Heritage and Local Government and the relevant Regional Fisheries Board should be initiated. Details of the statutory designations and protection for sites and species, or legislative requirements regarding the environment, should be established.

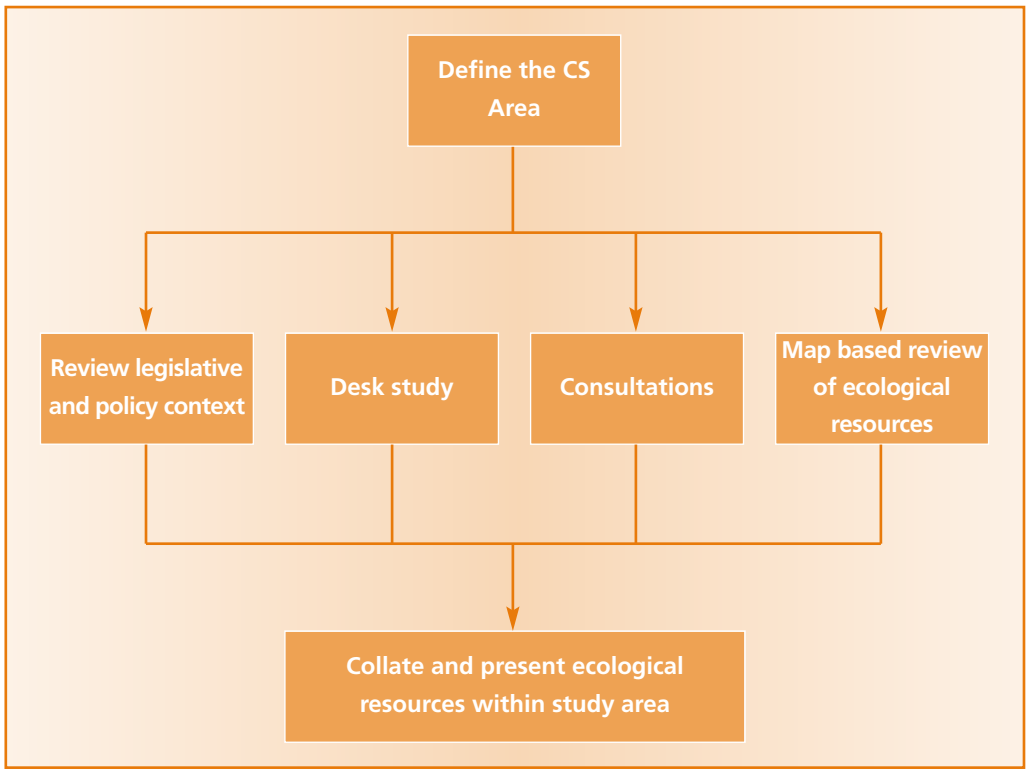

Figure 2: *Constraints Study Procedure*

4.3 Contents of the Constraints Study (Natural Environment Section) Report

4.3.1 Methodology

The CS should include a statement of how the natural environment section of the CS was prepared, including data and information sources, consultations with relevant agencies, methods and dates of any field surveys and how the ecological resources have been valued. Any limitations in the methodology or in the approach adopted should be highlighted.

4.3.2 Background information on the study area

The CS should include a brief overview of the existing environment and ecological resources within the study area, including topography and landscape features, the main land uses, designated conservation areas, the main habitats of conservation value and the main water or drainage features.

The CS Report should consider and provide summary details of the following ecological constraints (where applicable):

- Designated conservation areas and sites proposed for designation (see Section 2.2) within the study area,
- All the main inland surface waters (e.g. rivers, streams, canals, lakes and reservoirs) that are intersected by the study area, including their fisheries value and any relevant designations,

- All major aquifers and dependent ecosystems (cooperation will be required with hydrogeologists working on the project),
- Any intertidal and marine areas within the study area,
- Any known or potentially important sites for rare or protected flora or fauna that occur within, or in close proximity to, the study area,
- Any other sites of ecological value, identified from aerial photographs, within or in close proximity to the study area (see Section 2.3),
- Any other relevant conservation designations or programmes (e.g. catchment management schemes, habitat restoration or creation projects, community conservation projects, etc),
- Any other features of particular ecological or conservation importance within the study area.

The legal status of all the ecological constraints and the implications for new road schemes should be clearly identified. Any other information relevant to the ecological constraints should also be set out.

4.3.3 Details of ecological constraints

Designated conservation areas should be listed with their site name, site code(s), conservation status/designations, county, location relative to the study area and a brief description of the main features of the site, including the key habitats and species present (see example in Box 1). The CS report should contain a map of all designated conservation areas which could be affected, either directly or indirectly, by a national road project within the study area. Indirect effects could include hydrogeological impacts on groundwater dependant sites or water quality/quantity impacts on water bodies.

It is essential that the location and extent of designated conservation areas are updated throughout all phases of project planning. This information can be checked online at http://www.npws.ie/en/MapsData/. However, regular communication with the Site Designations and Plans Unit of the National Parks and Wildlife Service is recommended.

As outlined in Appendix II, European sites warrant additional consideration over and above other designated conservation areas. Figure 3 illustrates a flowchart relating to the consideration of European sites during the CS phase. In addition to the information required for other designated conservation areas, the CS report should, where practicable, contain a map of the European sites indicating those parts of the sites containing Annex I priority and non-priority habitats and Annex II non-priority species. Regard should be had to the practicability of collecting this information and this work should generally be confined to desktop studies/collection of information from NPWS.

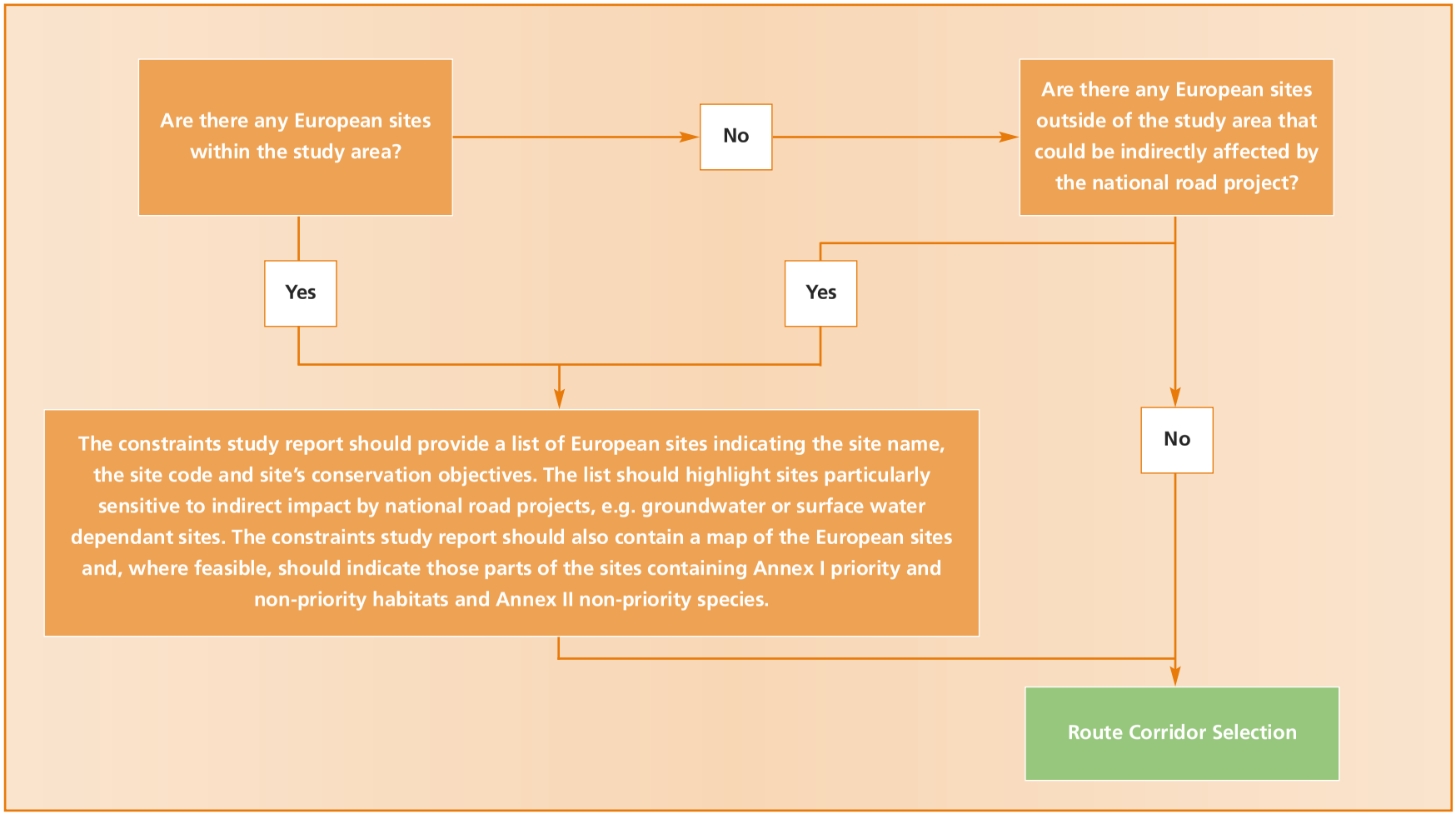

Figure 3: *Consideration of European sites during Constraints Study*

Site name	Code	Status	Features of conservation interest/description
Michelstown Cave	651	pNHA	Limestone caves. Important for invertebrates, particularly rare spider species.
Scaragh Wood	971	pNHA	Six blocks of acid oak woodland withina conifer plantation on the south-eastern slopes of the Galtee Mountains.
Aherlow River	2133	cSAC	Designated Salmonid Water (EU Freshwater Fish Directive). River also supports populations of the legally protected species freshwater pearl-mussel and white-clawed crayfish.

Box 1: *Example of a list of designated sites/features*

All other sites of potential ecological value, including important sites for flora or fauna, should be listed with a site name and a map reference to the feature, with a description of the key features of ecological value as derived from desk studies (particularly aerial photograph interpretation) and any other available information sources. Site details should be tabulated where practicable for ease of reference (see example in Box 2.).

Site no. (map reference)	Site name	Site description/habitat(s)
1	Rock of Cashel	Semi-natural dry grassland on hill; scrub; wet grassland near stream
2	Lough Nahinch	Lakes (partially infilled) with wetland fringe; treelines of broadleaved trees
3	Deerpark	Broadleaved woodland and treeline on old estate
4	Outbuildings at Lismoore	Known maternity colony of common pipistrelle bats
5	Hedgerows north of Broadford.	Network of species-rich, overgrown hedgerows with trees

Box 2: *Example of a list of non-designated sites/features*

Any documented rare or protected plants within the study area should be listed by species name (common and scientific) and conservation status (see Section 2.4). The general locations of the rare plant sites should be given (site name and grid reference, or site name and code in the case of designated areas), as should an indication of the habitat requirements for each species. Exact locations should not be given to protect rare species from unlicensed collection.

Any documented rare or protected animals should be listed by species name (common and scientific) and conservation status (see Section 2.4). Any other notable populations of animals should also be listed. The general locations of sites, or river/lake systems in the case of aquatic species, or the intertidal or marine area in the case of estuarine or marine species, should be given (site name and grid reference, or site name and code in the case of designated areas), as should an indication of the habitat requirements for each species.

Inland surface waters should be described in relation to their hydrometric or catchment area numbers, water quality (EPA data where available), drainage characteristics, fisheries value and any other relevant features.

A list of information sources cited in the text should be included.

4.3.4 Figures/maps

Figures to accompany the report should include a map (scale 1:50,000 or larger) of the study area boundaries, ecological sites/features within and in close proximity to the study area (with identifying site codes, site names or numbers), the main surface waters referred to in the text and the general locations of rare or protected species (if they occur outside designated areas). Other figures should be included where necessary, e.g. to clarify details of site boundaries where sites have multiple designations. Up-to-date maps of designated site boundaries should be included in appendices.

Checklist for Constraints Study

- List of designated areas (including proposed designations) within the study area - SACs, NHAs, etc.
- Any other known sites or features of ecological value
- Documented rare and protected species
- Documented fisheries value of watercourses
- Documented bird sites (IWeBS or other data)
- List other important sites from aerial photography
- Note major features to be avoided
- Highlight any issues for special attention in later phases
- Prepare final report
- Map of designated areas (including proposed designations) with Annexed Habitats and Species indicated in relation to European sites (where practicable).

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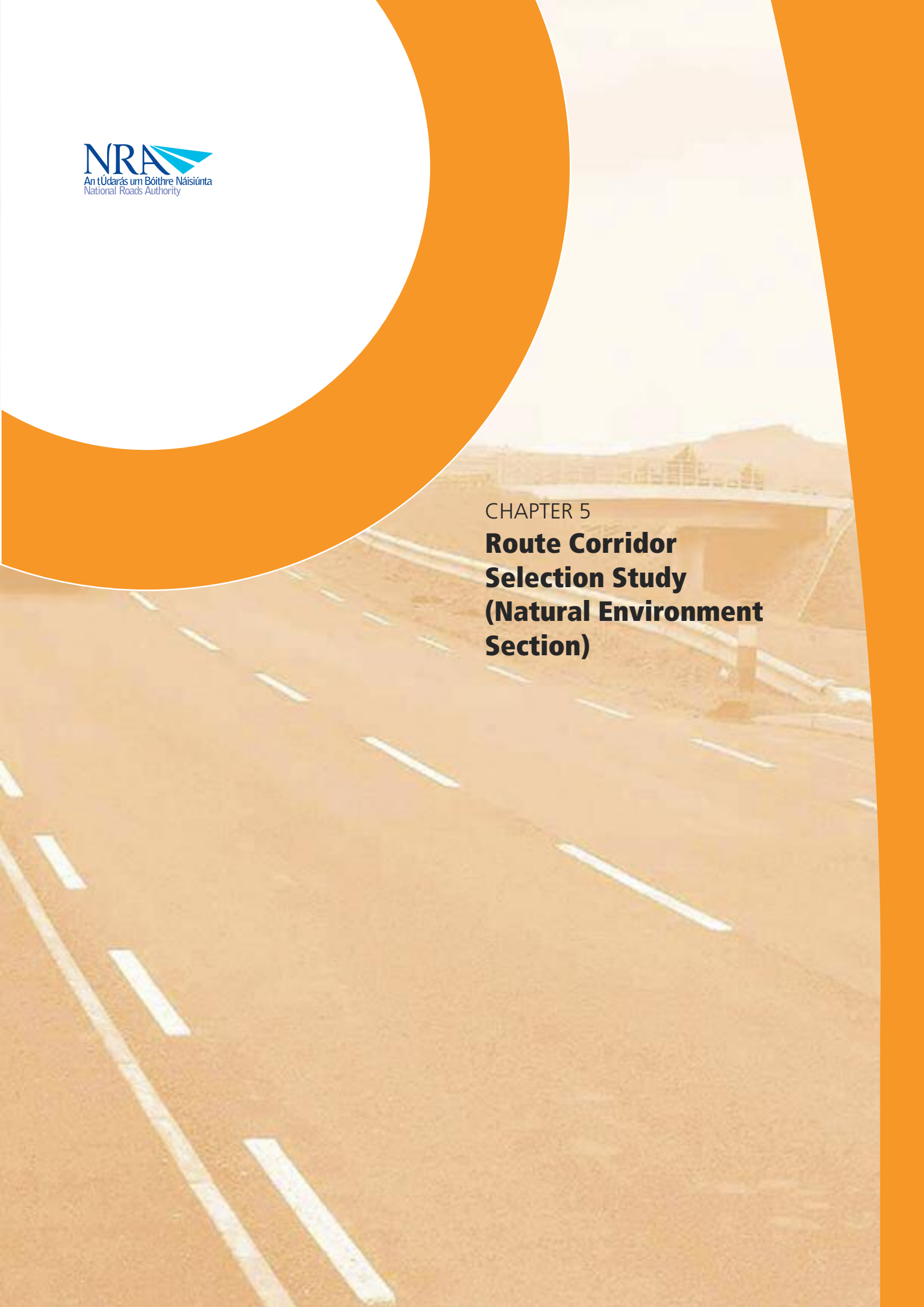

CHAPTER 5

Route Corridor Selection Study (Natural Environment Section)

CHAPTER 5 ROUTE CORRIDOR SELECTION STUDY (NATURAL ENVIRONMENT SECTION)

5.1 Objectives

RCS typically involves a comparative evaluation of route corridor options. The objective of the study is to evaluate and compare the alternative route corridor options taking account of engineering, environmental, traffic and cost considerations. The ecological impacts for each of the options are identified so that those with unacceptably high levels of impact can be avoided to the extent feasible as part of the overall route assessment process. RCS is the single most effective means of avoiding or reducing ecological impacts.

The NRA's approach to sustainable development requires that economic growth supports social progress while respecting the environment; that social policy underpins economic performance; and that environmental policy is cost effective. Ecological impacts thus have to be seen in the broader perspective of engineering constraints, costs, landscape, cultural heritage, recreation, agriculture and forestry. Each RCS process within the country will have unique features and the constraints may vary. In some cases the optimum route from an ecological perspective may not be the overall optimum route when other impacts and considerations are evaluated. However, ecological considerations should receive detailed consideration and, in some cases, these may be the most important factors to be considered during RCS and subsequent design of the road scheme.

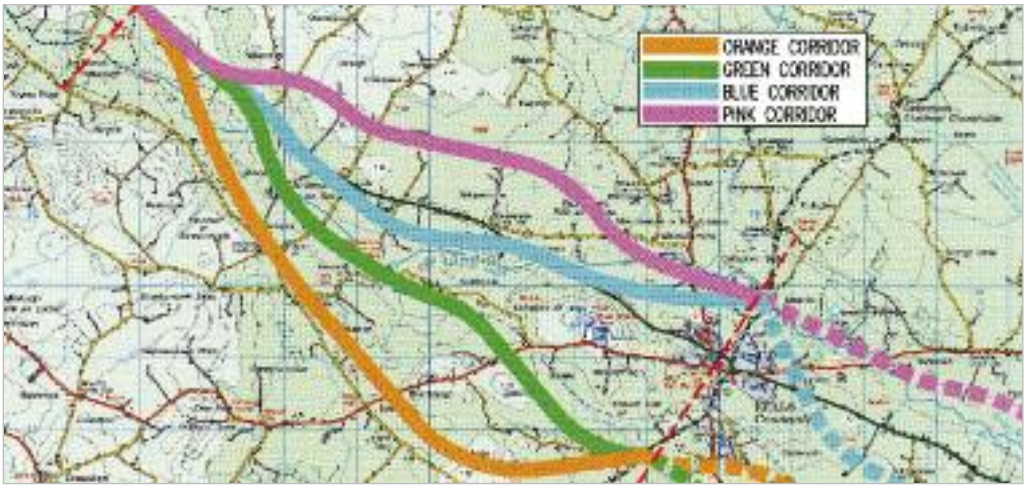

Figure 4: *Example of Route Corridor under Review*

5.2 Consideration of European sites

A possible case where ecological considerations may constitute the most important factor in RCS is where consideration has to be given to European sites.

In considering European sites during the RCS phase, regard should be had to the flow diagram outlined in Figure 5 and to Appendix II.

At the start of the RCS phase all reasonably practicable efforts should be made to ensure that the initial route corridors selected avoid significant effects on European sites.

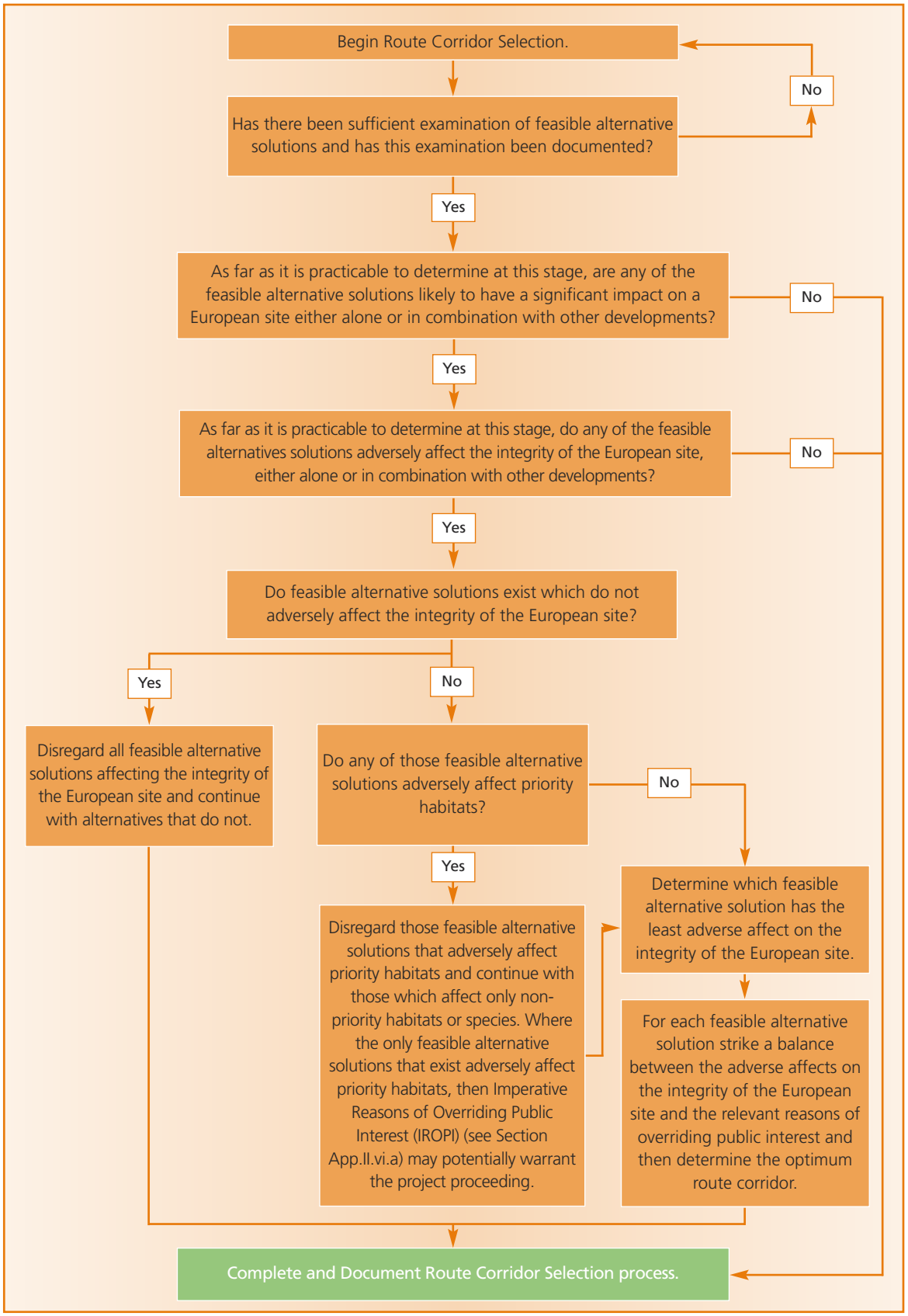

Figure 5: *Consideration of European sites during Route Corridor Selection*

5.3 Approach

The Natural Environment section of the RCS study involves the identification of ecological resources/receptors along each of the route option corridors and a broad assessment of the likely impacts upon them. The zone(s) of influence for the route options should take account of the range of impacts likely to arise from construction and operation of them. Following on from the earlier CS, the RCS study should involve a combination of desk study and field survey. At this stage the desk study should be more comprehensive than during the previous phase (a list of sources of information is presented in Appendix I of the 'Survey Guidelines').

In those situations where a large number of route options are still being considered (or during the earlier stages of the process), it will not be appropriate to investigate the full length of each route in the field, but rather to restrict field surveys to key sites, features or route sections that appear to be of particular ecological value, to assess the potential impacts of the route(s) upon them. It will also be appropriate to undertake 'vantage point' surveys of the remainder of the routes: visual inspections from strategic locations for which access is available, supplemented by, for example, scrutiny of aerial photographs, to ensure that hitherto undisclosed potential constraints are not missed. However, in those situations where a smaller number of options are being considered (or towards the end of the process), it may be more effective to undertake a more comprehensive assessment of each route, in the form of a 'multi-disciplinary walkover survey' (the scope and detail of multi-disciplinary walkover surveys are presented in the 'Survey Guidelines'). Since the aim of this approach is reliably to scope all subsequent surveys and to restrict them to specific locations, this can offer advantages in accelerating the impact assessment process in the latter stages of scheme design.

Further consultations with statutory agencies, including the Department of Environment, Heritage and Local Government and the appropriate Regional Fisheries Board, should be undertaken to seek their views on the proposed routes and on any other issues of concern. Any relevant information about recent or proposed changes in site designations, site boundaries or in the conservation status of species or habitats, should be sought.

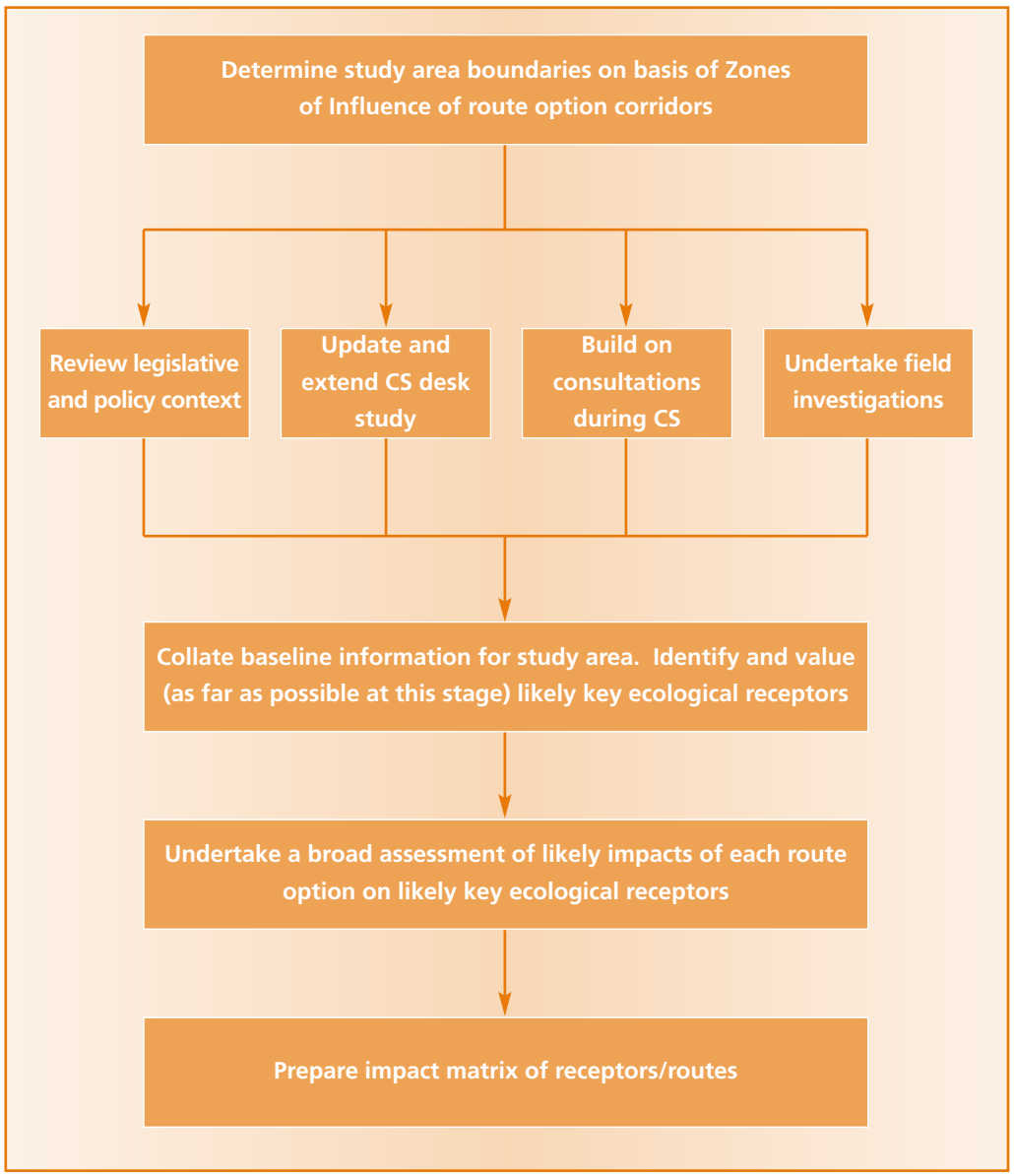

Figure 6: *Route Corridor Selection Procedure*

5.4 Contents of the Route Corridor Selection Study (Natural Environment Section) Report

5.4.1 Methodology

This should include the scope and detail of the desk study and field surveys, including an evaluation of any limitations on this phase of the assessment. This section should also refer to the approach and methods set out in Chapter 3, with regard to scoping, valuation and impact assessment, and indicate how these were applied, in particular, how the boundaries of the study area were chosen.

5.4.2 Baseline information on the study area

This should begin with a brief overview of ecological resources within the study area, along with an update of the relevant information presented in the CS.

The RCS report should include details and descriptions of the following (where applicable):

- Designated conservation areas and sites proposed for designation (see Section 2.2) within the zone(s) of influence of any of the route options,
- All the main inland surface waters (e.g. rivers, streams, canals, lakes and reservoirs) that are intersected by any of the route corridor options, including their fisheries value and any relevant designations,
- Aquifers and dependent systems and turloughs and their subterranean water systems,
- Any intertidal and marine areas along any of the route corridor options,
- Any known or potentially important sites for rare or protected flora or fauna that occur along or within the zone(s) of influence of any of the route options,
- Any other sites of ecological value, that are not designated, along or in close proximity to any of the route corridor options (see Section 2.3),
- Any other relevant conservation designations or programmes (e.g. catchment management schemes, habitat restoration or creation projects, community conservation projects, etc),
- Any other features of particular ecological or conservation significance along any of the route options.

A preliminary list of key ecological receptors should be compiled for each option, with an indication as to their likely value in a geographical context in some cases, pending a more comprehensive assessment at a later phase of project development. For ease of reference, details of sites and watercourses should be summarised in tables or appendices, together with their site ratings. Updated drawings of boundaries of designated areas are needed.

5.4.3 Assessment of impacts

A broad assessment should be undertaken of the likely impacts of each of the route options on the key ecological receptors, with an indication as to which, if any, of these are likely to be significant, and at what geographical level. The impacts associated with each route option should be tabulated (see Box 3). (For details on overall project appraisal see Section 3.7.)

In the example given in Box 3, three of the sites identified in the CS (see Box 1 & Box 2) are affected by one of the route corridor options (hereafter referred to as Option 1).

Site no.	Site name	Site description/ habitat(s)	Receptor importance	Impact significance
971	Scaragh Wood pNHA	Six blocks of acid oak woodland within a conifer plantation on the south-eastern slopes of the Galtee Mountains	National	Significant negative impact
3	Deerpark	Broadleaved woodland and treeline on old estate	County	Significant negative impact
5	Hedgerows North of Broadford	Network of species-rich, overgrown hedgerows with trees	Local (Higher value)	Significant negative impact

Box 3: *Example of some sites (designated and non-designated), the Constraints Study, that would be affected by a possible route corridor option (Option 1)*

In the example given in Box 4, the number of significant impacts, at each geographic level, associated with Option 1 (see Box 3) is compared with the number and level of corresponding impacts associated with each of two other illustrative options. This allows an order of preference, from an ecological standpoint, to be determined. In those cases where multiple options would all involve significant impacts on one or more receptors valued at the same geographic level (receptors of international or national importance, in particular), it is not appropriate simply to assign an order of preference on the basis of the number affected. Instead, it will be necessary to characterise the impacts upon them (as far as possible at this stage, using the approach set out in Section 3.4.3) and to apply professional judgement, as appropriate.

Impact Level	Route Corridor Options		
	Option 1 (see Box 3)	Option 2	Option 3
Significant impact on feature of National Importance	1	0	0
Significant impact on feature of County Importance	1	2	0
Significant impact on feature of Local (higher value)	1	4	1
Order of preference	3rd	2nd	1st

Box 4: *Summary comparison of impacts on ecological sites of three route corridor options*

The levels of impact assigned to particular routes make the assumption that general mitigation measures will be implemented and *this should be clearly stated*. However, site-specific mitigation measures are normally excluded in the assessment of impacts of the scheme, at this stage. Section 3.4.1 presents guidance on distinguishing between routine measures delivered as part of scheme design and additional mitigation.

Checklist for route corridor selection study

Includes desk study and field survey

- Define sites from aerial photography,
- List of designated sites (including proposed designations) affected by any route corridor,
- Field visits to designated sites and adjoining habitats, and other sites/features of ecological value; walkover surveys of entire routes as appropriate,
- Brief description and valuation of all ecological resources likely to be affected,
- Adequate documentation of the consideration of European sites,
- Consult the Department of Environment, Heritage and Local Government/National Parks and Wildlife Service on protected species and sites,
- Consult Regional Fisheries Board on fisheries waters,
- Assess likely significance of impacts on affected sites,
- Prepare impact matrix of sites/routes,
- Prepare final report.

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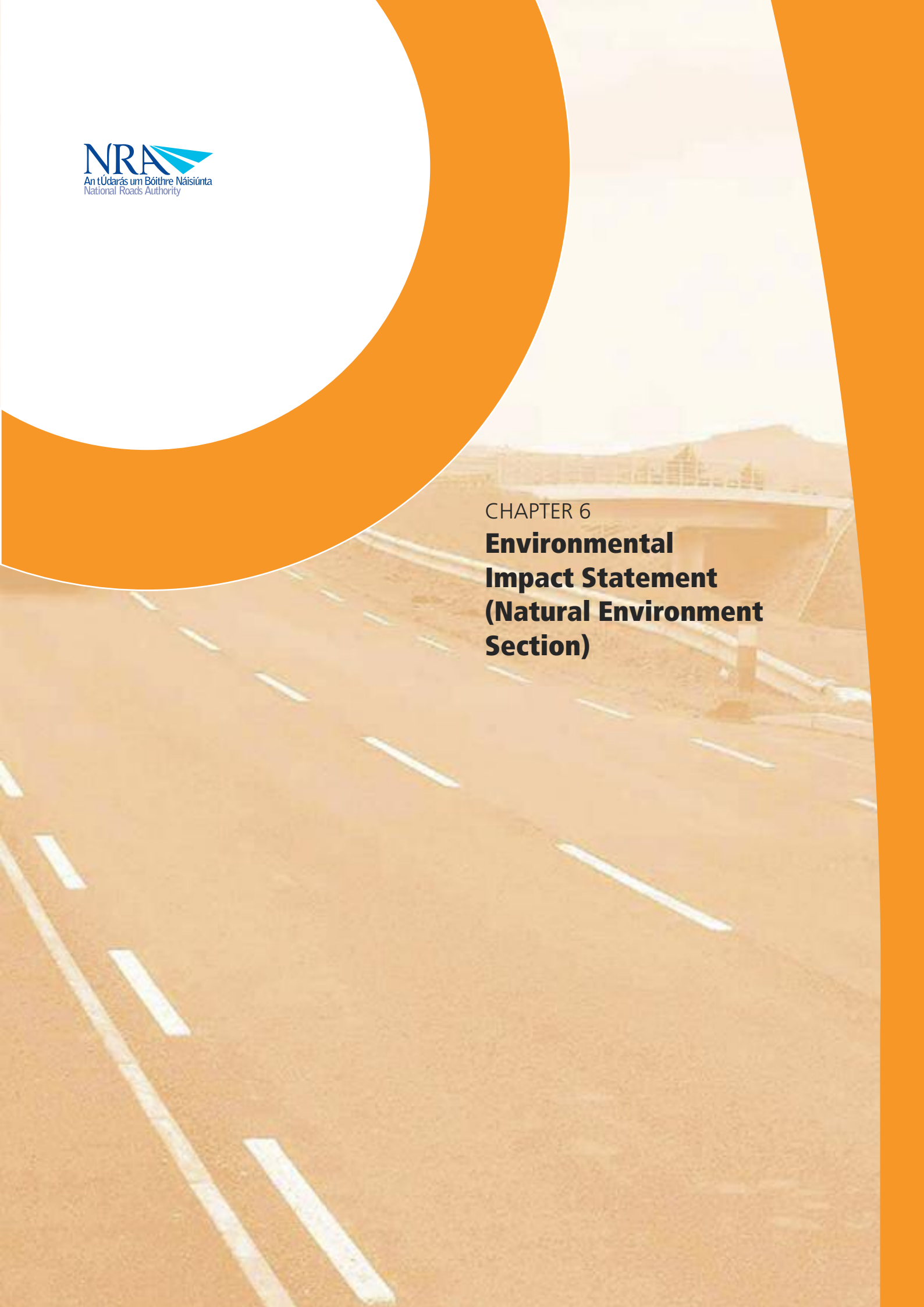

CHAPTER 6

Environmental Impact Statement (Natural Environment Section)

CHAPTER 6 ENVIRONMENTAL IMPACT STATEMENT (NATURAL ENVIRONMENT SECTION)

6.1 Objectives

The objective of the EIS is to undertake sufficient assessment to identify and quantify any significant impacts on the natural environment likely to arise from construction and operation of the preferred route. The baseline ecological conditions in the area of the proposed road project are described, based on information provided by consultees, background sources of information and the results of surveys carried out for the EIS. In those situations where European sites need also to be considered, additional investigations may need to be undertaken in parallel with the preparation of the EIS, as detailed in Section 6.2.

6.2 Consideration of European sites

The reader should refer to other sections (including Appendix II) dealing with the consideration of European sites.

6.2.1 Screening

The consideration of European sites during the Environmental Impact Assessment phase begins with a thorough review of the RCS report.

Figure 7 illustrates the flow path for the consideration of European sites during Environmental Impact Assessment.

The first stage of this consideration involves a thorough review of all existing or planned (i.e. in receipt of the relevant consent) developments that might act in combination with the proposed road development to produce a likelihood of significant impact on the European sites, if present. Then one should proceed to screen the project and determine if it can be excluded, on the basis of objective information, that the proposed road development will have a significant impact on the European site, either individually or in combination with other plans or projects. Here the precautionary principle operates (see Section App.II.iv.a). Where it can be objectively demonstrated that there is no likelihood of significant effects, then a 'Findings of No Significant Effects Report' should be completed in line with the guidance provided by the Commission. This report should be annexed, as appropriate, to the EIS. Where it cannot be demonstrated that there is no likelihood of significant effects, then efforts should be made to refine the preliminary design by way of realignment, method of construction and/or scheduling proposals to avoid or reduce impacts. Screening should be carried out on this new alternative. This iterative exercise should be carried out until either no further feasible refinement is possible; or until it can be demonstrated that there is no likelihood of significant effects. If it cannot be demonstrated that there is no likelihood of significant effects then appropriate assessment should be carried out. Appropriate assessment is dealt with under Article 6(3) of the Habitats Directive and Regulation 30 of the Habitats Regulations, 1997.

6.2.2 Article 6(3) and Appropriate Assessment

Appropriate assessment must answer the question '*is there conclusive evidence, after applying the precautionary principle, that the integrity of the European site will not be adversely affected by the national road project?*' If the answer to this question is yes, then this 'positive' appropriate assessment should be distinctly documented within the EIS. If the answer is no, then mitigation measures should be designed and residual effects predicted. It should then be determined whether the mitigated national road project has an adverse effect on the integrity of the European site. This iterative loop continues until such time as either a positive appropriate assessment can be made; or until no further mitigation is possible and a 'negative' appropriate assessment results. Where a 'negative' appropriate assessment results, Article 6(4) of the Habitats Directive will apply. The 'negative' appropriate assessment should be distinctly documented within the EIS.

[It should be noted that it is in actual fact An Bord Pleanála who carry out the appropriate assessment, not the project proponent. However, the project proponent should provide the information necessary to complete the appropriate assessment within the national road development project EIS and should document their own determination as to whether the assessment is positive or negative. Readers are referred to Section App.II.v regarding these issues.]

6.2.3 Article 6(4)

Readers are referred to Sections App.II.vi and App.II.vii, which outline the requirements imposed by Article 6(4) and discuss 'Overriding Public Interest,' 'Assessment of Alternative Solutions' and compensatory measures.

6.2.3.1 Overriding Public Interest

It is important that the EIS clearly and distinctly outlines the factors that may be relevant to a determination by the competent authority that the national road project should proceed, notwithstanding an adverse effect, on the basis of imperative reasons of overriding public interest. It is also important to note that where priority habitat are affected, then, subject to a statement on the specific case from the Commission to the contrary, overriding public interest can only be related to human health or public safety, or to beneficial consequences of primary importance for the environment.

6.2.3.2 Assessment of Alternative Solutions

The EIS should detail the assessment of alternative solutions, which will have taken place during the RCS and EIA phases.

6.2.3.3 Compensation

Where no alternative solutions are deemed to exist and where adverse impacts remain, the proposed national road project may still proceed if imperative reasons of overriding public interest warrant it. However, in such circumstances compensatory measures will be required. In designing and assessing such measures; establishing implementation procedures; and designing monitoring plans, close liaison with National Parks and Wildlife Service is required.

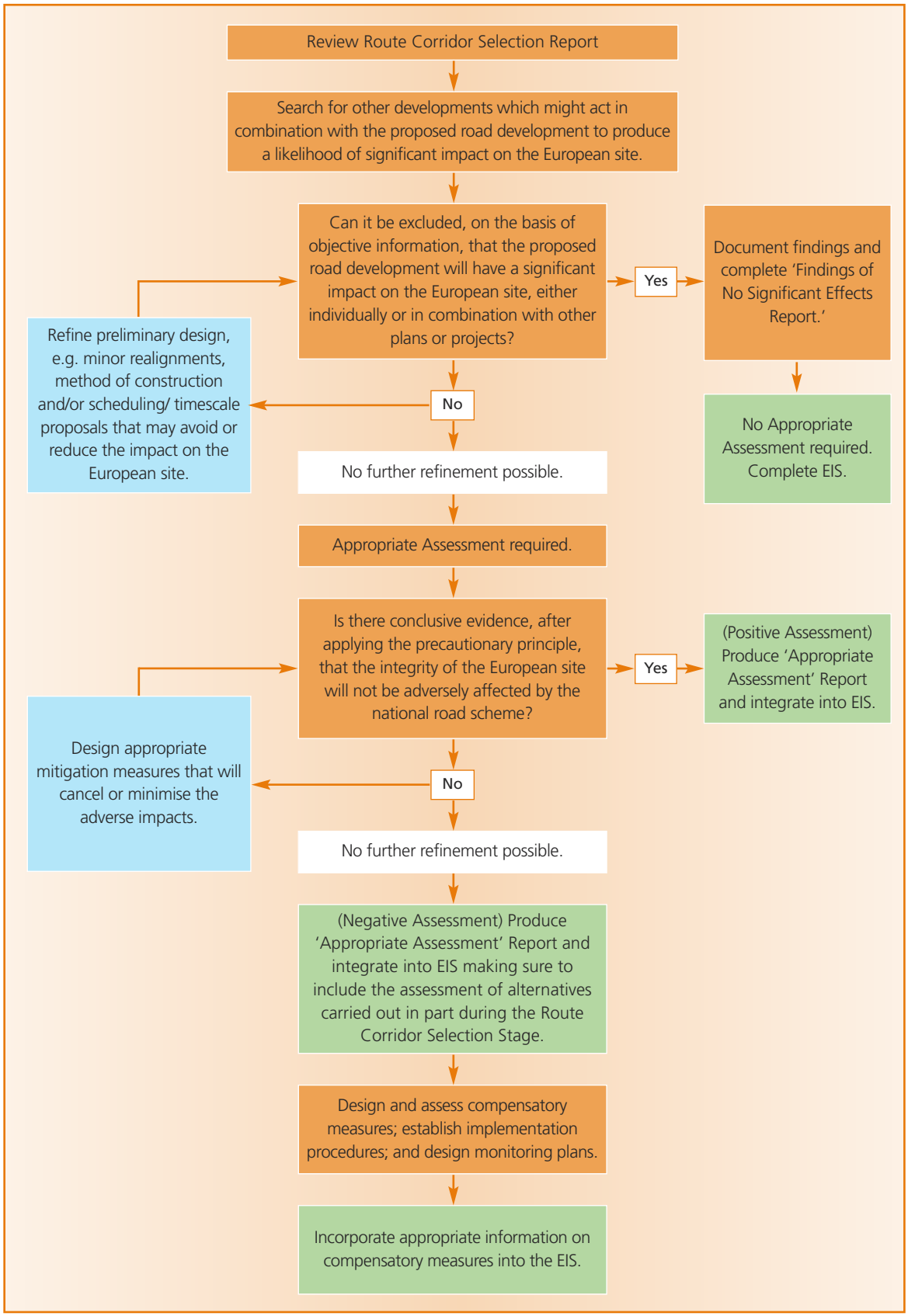

Figure 7: *Consideration of European sites during Environmental Impact Assessment*

6.3 Approach

In terms of the Natural Environmental section, the EIS has several important roles. The first is to present, within a single document, information that underpins the assessment of the impacts that the construction and operation of a road project will have. The second is to provide information to the general public on the findings of ecological surveys and to interpret for them the likely impacts of the road project in question. Therefore, the EIS needs to include all relevant information to allow the reader to fully understand why particular ecological features have been valued in accordance with the advice in Section 3.3, what the anticipated impacts of the scheme are, in terms of their magnitude, intensity and duration, and what the consequences of these impacts are upon the key ecological receptors and/or protected species that have been identified. It should be clear to the reader how the conclusions have been reached following the guidance set out in Section 3.4.

The natural environment section of the EIS builds on the information contained in the earlier CS and the RCS Study and should involve the following:

- Scoping,
- Consultations,
- Desk study, including review of published/unpublished sources/literature,
- Field/walkover survey with habitat mapping of entire route, link roads, realigned roads and any other areas likely to be affected,
- Further surveys of ecological receptors,
- Assessment and valuation of ecological resources,
- Impact characterisation and assessment,
- Mitigation measures to address significant adverse impacts,
- Measures to off-set significant residual impacts,
- Enhancement measures (where required).

The approach to scoping the EIS should accord with the guidance presented in Section 3.2; this should be followed by a general description of ecological resources in the zone of influence and a clear description of baseline conditions for each of the key ecological resources selected for detailed assessment. Valuation of these key resources should follow the guidance set out in Section 3.3. Impact assessment, the development of mitigation and the treatment of residual impacts should also be undertaken in accordance with Sections 3.4, 3.5 and 3.6.

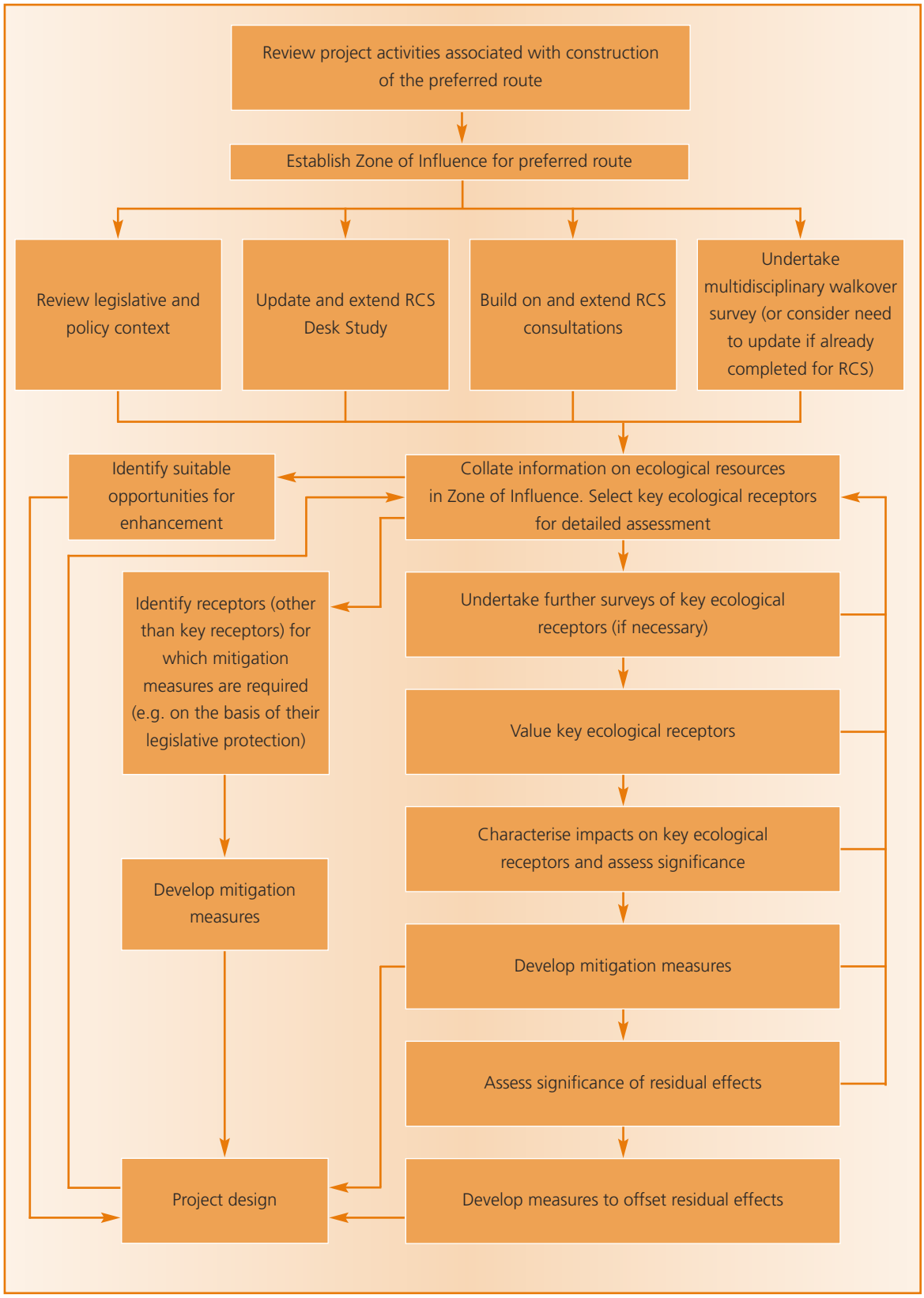

Figure 8: *Overview of Ecological Impact Assessment Procedure*

6.4 Methodology

6.4.1 Desk study

The desk studies undertaken for the CS and RCS study should be reviewed and up-dated, with further specialist sources of information approached as necessary, depending upon the results of the on-going scoping exercise. Further guidance on refining the scope of desk studies and a list of suggested contacts, is presented in the 'Survey Guidelines'.

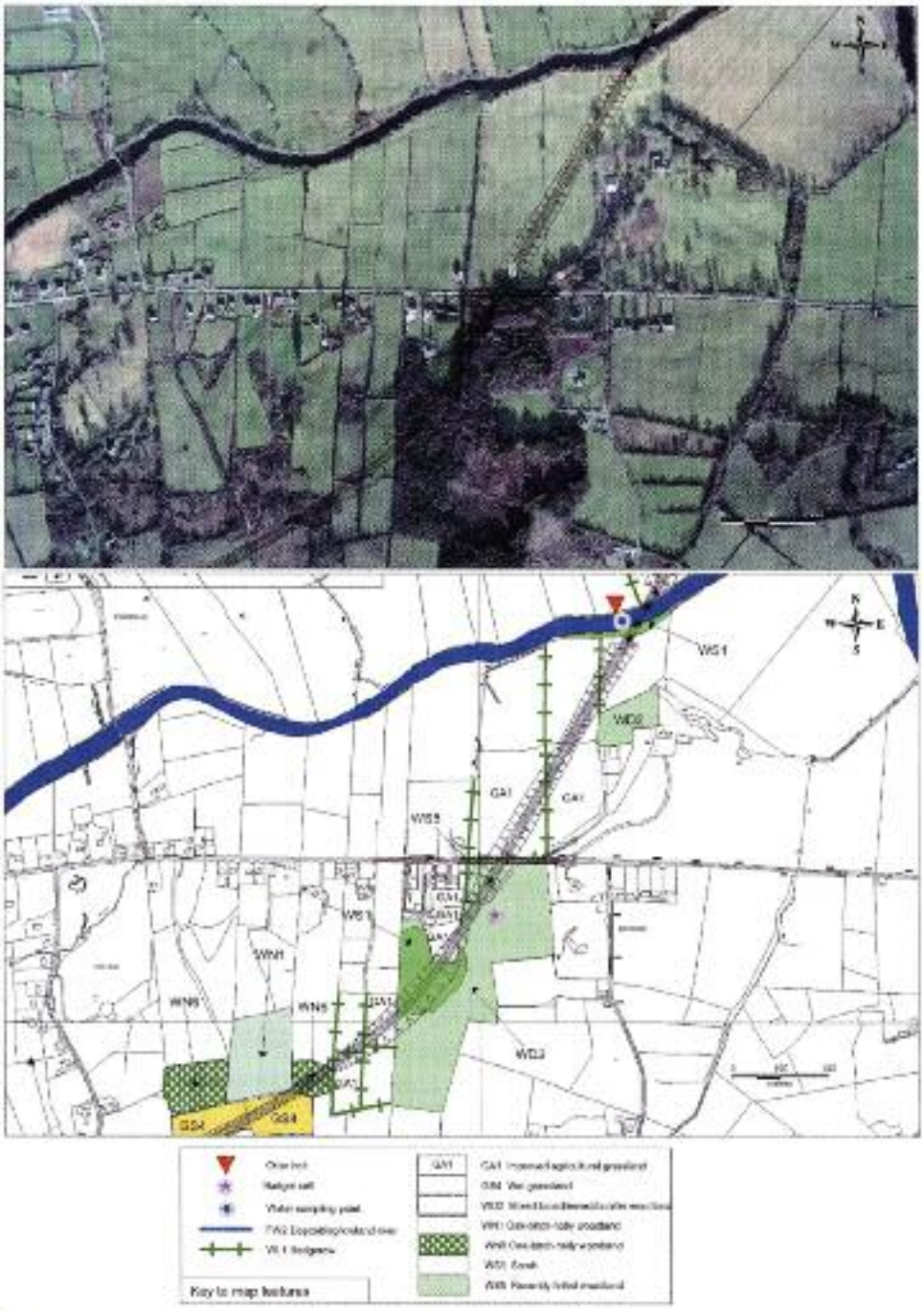

Figure 9: *Example of habitat mapping using aerial photography for an EIS on a road scheme (Habitat codes from Fossitt (2000))*

6.4.2 Field survey

6.4.2.1 Multi-disciplinary walkover survey

If a multi-disciplinary walkover survey has not already been undertaken as part of the RCS study, this should be undertaken at the outset, to help refine the scope of any further surveys, and to underpin the selection of the 'key ecological receptors'. Guidance on undertaking multi-disciplinary walkover surveys is presented in the 'Survey Guidelines'. For many receptors, sufficient information will be collected from this survey to inform the remainder of the impact assessment.

6.4.2.2 Further Surveys

In the case of some key receptors, further habitat-, group-, or species-specific surveys may be necessary in order reliably to confirm their presence, their value and/or to help characterise the impacts upon them. Guidance on survey techniques for flora and fauna in the context of EISs for National Road Schemes is presented in the 'Survey Guidelines'.

6.4.3 Impact Assessment and mitigation

The impact assessment methodology and approach to mitigation should follow the procedures detailed in Sections 3.4 and 3.5.

6.4.4 Non-technical summary (natural environment section)

This is required under the EIA legislation. The natural environment section of the non-technical summary may comprise just a few paragraphs and should be laid out in a similar but condensed format to that in the main EIS. It should be short and avoid technical terms but should make reference to all the above information. It may be produced as a separate and self-contained document that can be widely distributed to the general public.

Checklist for Environmental Impact Assessment

Includes desk study and field survey of entire route

- Updated desk study,
- Multi-disciplinary walkover survey (including habitat survey of entire route),
- Further surveys of key ecological receptors (if required),
- Selection of key ecological receptors for detailed assessment,
- Presentation of baseline conditions, incorporating collated results of desk study, walkover survey and further surveys (summary in EIS text, detail in Technical Appendices),
- List survey/assessment limitations,
- Comprehensive impact assessment,
- List of significant impacts,
- Mitigation measures,
- List of significant residual impacts,
- Measures to off-set residual impacts,
- Enhancement measures (where required).

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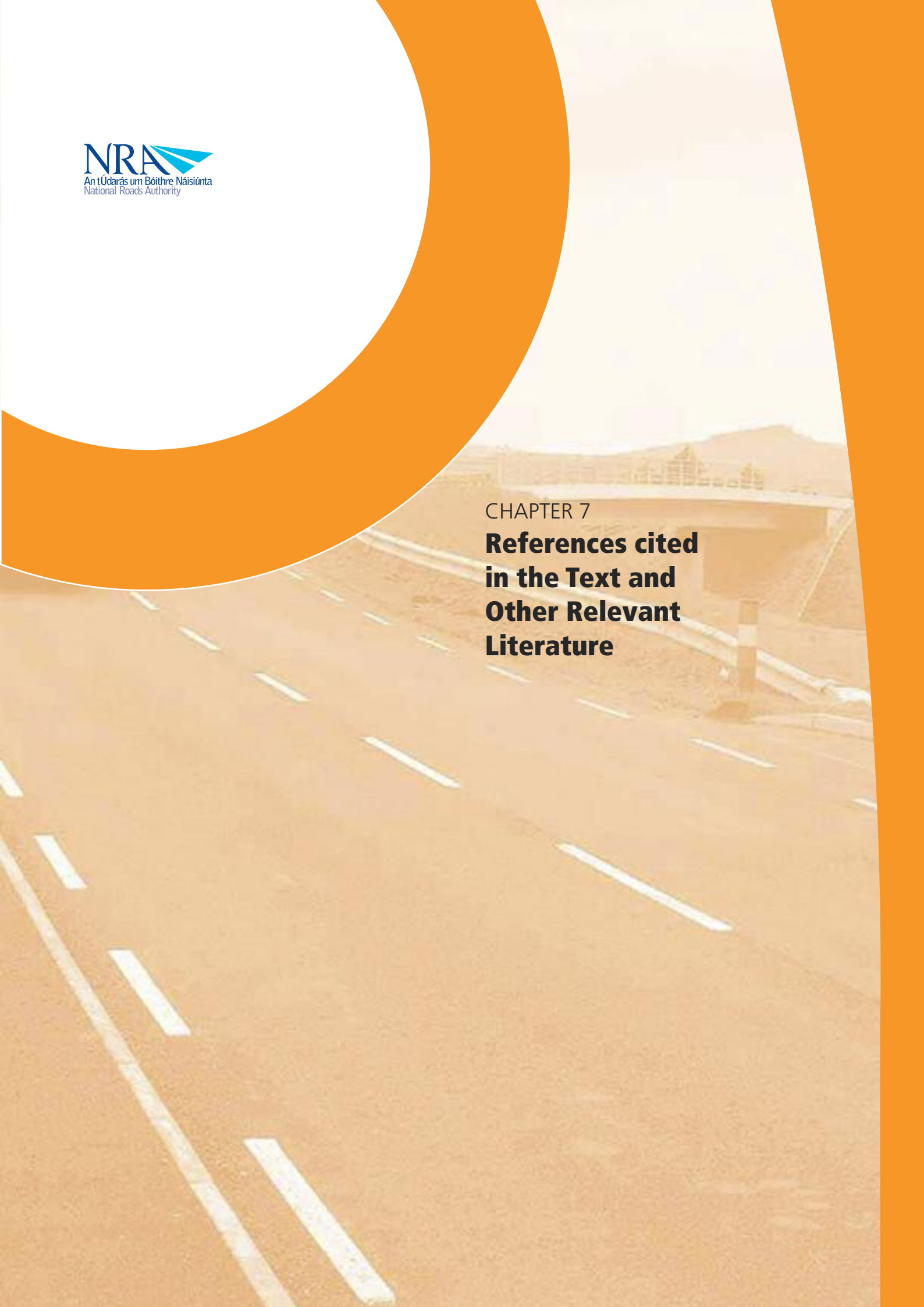

CHAPTER 7

References cited in the Text and Other Relevant Literature

CHAPTER 7 REFERENCES CITED IN THE TEXT AND OTHER RELEVANT LITERATURE

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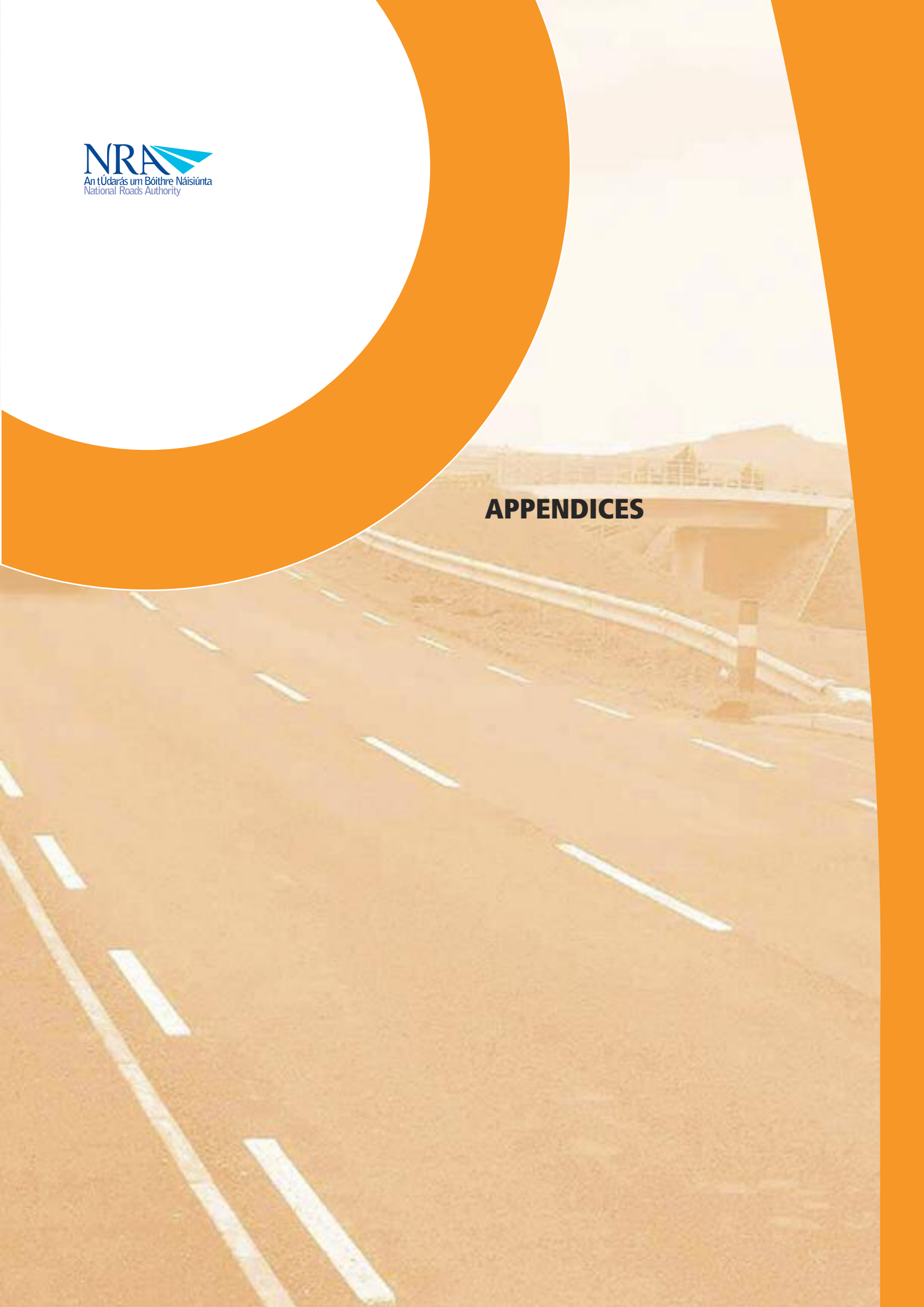
APPENDICES



APPENDIX I DESIGNATED CONSERVATION AREAS IN THE REPUBLIC OF IRELAND

For more information on these designations see Hickie (1996) and/or consult the Department of Environment, Heritage and Local Government.

Abbreviation	Full title	Status	Supporting legislation or convention (if any)
SAC	Special Area of Conservation	International	EU Habitats Directive (92/43/ECC)/Habitats Regulations, 1997 to 2005
SPA	Special Protection Area	International	EU Birds Directive (79/409/ECC)/Habitats Regulations, 1997 to 2005
None	Ramsar Site	International	Ramsar Convention on Wetlands
None	Biogenetic Reserve	International	None
None	UNESCO Biosphere Reserve	International	None
None	Salmonid Water	International	EU Freshwater Fish Directive (78/659/EEC)/European Communities (Quality of Salmonid Waters) Regulations, 1988
NHA	Natural Heritage Area	National	Wildlife Act, 1976 and Wildlife (Amendment) Act, 2000
SNR	Statutory Nature Reserve	National	Wildlife Act, 1976 and Wildlife (Amendment) Act, 2000
NP	National Park	National	none
None	Refuge for Fauna and Flora	National	Wildlife Act, 1976 and Wildlife (Amendment) Act, 2000
None	Wildfowl Sanctuary	National	none

APPENDIX II APPROPRIATE ASSESSMENT

App.II.i Introduction

The Habitats Directive[16] requires an 'appropriate assessment' to be carried out where a development, such as a national road project, is likely to have significant impacts on SACs, SPAs and/or Sites of Community Importance (SCIs).[17] With regard to proposed road developments, the requirements of Articles 6(3) and 6(4) of the Habitats Directive have been transposed into Irish legislation by means of Regulations 30 and 33 of the Habitats Regulations, 1997 (S.I. No. 94 of 1997). It is important that Regulations 30 and 33 be interpreted having regard to the Habitats Directive and all relevant national and European case law.

The texts of Articles 6(3) and 6(4) of the Habitats Directive and Regulations 30 and 33 of the Habitats Regulations, 1997, are reproduced in Box 5, Box 6 and Box 7 respectively.

Article 6 (3)

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.

Article 6 (4)

If, in spite of a negative assessment of the implications for the 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, the Member State shall take all compensatory measures necessary to ensure that the overall coherence of Natura 2000 is protected. It shall inform the Commission of the compensatory measures adopted.

Where the site concerned hosts a priority natural habitat type and /or a priority species the only considerations which may be raised are those relating to human health or public safety, to beneficial consequences of primary importance for the environment or, further to an opinion of the Commission, to other reasons of overriding public interest.

Box 5: *Text of Articles 6(3) and 6(4) of the Habitats Directive*

[16] Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora.
[17] (European Commission 2007a, 3n)

(1) Where a proposed road development in respect of which an application for the approval of the Minister for the Environment has been made in accordance with section 51 of the Roads Act, 1993, is neither directly connected with nor necessary to the management of a European site but likely to have a significant effect thereon either individually or in combination with other developments, the Minister for the Environment shall ensure that an appropriate assessment of the implications for the site in view of the site's conservation objectives is undertaken.

(2) An environmental impact assessment as required under subsection (2) of section 51 of the Roads Act, 1993, in respect of a proposed road development referred to in paragraph (1) shall be an appropriate assessment for the purposes of this Regulation.

(3) The Minister for the Environment shall, having regard to the conclusions of the assessment undertaken under paragraph (1), agree to the proposed road development only after having ascertained that it will not adversely affect the integrity of the European site concerned.

(4) In considering whether the proposed road development will adversely affect the integrity of the European site concerned, the Minister for the Environment shall have regard to the manner in which the proposed development is being carried out or to any conditions or restrictions subject to which the approval is given.

(5) The Minister for the Environment may, notwithstanding a negative assessment and where that Minister is satisfied that there are no alternative solutions, decide to agree to the proposed road development where the proposed road development has to be carried out for imperative reasons of overriding public interest.

(6) (a) Subject to paragraph (b) imperative reasons of overriding public interest shall include reasons of a social or economic nature;

(b) If the site concerned hosts a priority natural habitat type or a priority species, the only considerations of overriding public interest shall be—

(i) those relating to human health or public safety,

(ii) beneficial consequences of primary importance for the environment, or

(iii) further to an opinion from the Commission to other imperative reasons of overriding public interest.

Box 6: *Text of Regulation 30 of the Habitats Regulations, 1997*

Where in accordance with Regulations 27 (5), 28 (5), 29 (4), 30 (5), 31 (5) or 32 (5) an operation or activity is agreed to, notwithstanding a negative assessment of the implications for a European site, the Minister shall ensure that the necessary compensatory measures are taken to ensure that the overall coherence of Natura 2000 is protected.

Box 7: *Text of Regulation 33 of the Habitats Regulations, 1997*

App.II.ii Definition of a 'European site'

Article 6(3) and 6(4) of the Habitats Directive only apply in relation to SACs, SPAs and Sites of Community Importance (SCIs).[18] However, it is important to note that the definition of a 'European site' under the transposing regulations includes *proposed* SACs.[19] Notably, however, the definition does not include *proposed* SPAs. Notwithstanding this, it is recommended that a procedure identical to that required under Regulation 30 should be followed in relation to *proposed* SPAs.

App.II.iii General Approach to Appropriate Assessment

The following general approach to appropriate assessment has been derived having regard to the published guidance from the European Commission (2000b, 2001 and 2007a), case law of the European Court of Justice and other relevant material. Project managers and relevant experts involved in the planning of national road projects should be familiar with this material. Recommended reading is outlined in Box 8.

Managing Natura 2000 sites: The provision of Article 6 of the 'Habitats' Directive 92/43/EEC (European Commission, 2000b).

Assessment of plans and projects significantly affecting Natura 2000 sites: Methodological guidance on the provisions of Articles 6(3) and (4) of the Habitats Directive 92/43/EEC (European Commission, 2001).

Guidance document on Article 6(4) of the 'Habitats Directive' 92/43/EEC. Clarification of the concepts of: alternative solutions, imperative reasons of overriding public interest, compensatory measures, overall coherence, opinion of the Commission (European Commission, 2007a).

Methodological Guideline for Impact Assessment of Transportation Infrastructure Significantly Affecting Natura 2000 Sites (Guideline for IA) Guidance on the provisions of Article 6(3, 4) of the Habitats Directive (Ministry of Transport, Building and Housing of the Federal Republic of Germany, 2004)

Nature and Biodiversity Cases – Ruling of the European Court of Justice (European Commission, 2006).

Box 8: *Recommended Reading*

It is important to recognise from the outset that the general approach outlined by the European Commission in its guidelines relates to the decision-making flow path for competent authorities, e.g. of An Bord Pleanála. However, it is recommended that those involved in the planning of national road projects should be familiar with the content of these guidelines. As the Commission's guidance is directed at competent authorities, it was necessary to integrate this recommended approach into NRA Project Management Phases. This integration is illustrated in Figure 3, Figure 5 and Figure 7.

[18] (European Commission 2007a, 3n)
[19] See Article 2 of the Habitats Regulations, 1997, as substituted by section 75 of the Wildlife (Amendment) Act, 2000.

App.II.iii.a Consultation

There should be consultation with National Parks and Wildlife Service (NPWS) of the Department of the Environment, Heritage and Local Government at all phases of national road development planning.

App.II.iv Stage 1: Screening

Regulation 30 of the Habitats Regulations, 1997, indicates that appropriate assessment is only required where a project, either individually or in combination with other developments, is likely to have a significant effect on a 'European site'. Therefore, where there is no likelihood of a significant effect a project does not fall within the realms of Regulation 30.

App.II.iv.a The Precautionary Principle

The precautionary principle is a principle of EU law.[20] It has been defined as the principle that if an action might cause severe or irreversible harm to the public or to the environment, then in the absence of a scientific consensus that harm would not ensue, the burden of proof falls on those who would advocate taking the action (Raffensberger & Tickner, 1999). The ECJ applied the precautionary principle in their interpretation of Article 6(3) when they stated in the *Waddenzee* case that '*any plan or project not directly connected with or necessary to the management of the site is to be subject to an appropriate assessment of its implications for the site in view of the site's conservation objectives if it cannot be excluded, on the basis of objective information, that it will have a significant effect on that site, either individually or in combination with other plans or projects*.'[21] Thus, if it cannot be demonstrated at the screening stage, on the basis of objective information, that the project will not have a significant effect on the site, either individually or in combination with other developments, then an appropriate assessment must be undertaken.

App.II.iv.b Cumulative Effects

It should be noted from the wording of Regulation 30 of the Habitats Regulations, 1997, that it is necessary to consider whether the national road project is likely to have a significant effect alone *or in combination with other developments*. Therefore, it is important to consider all existing developments, as well as all proposed projects or activities which have received the required consent, but are not yet in existence.

App.II.iv.c In the Absence of any Consideration of Mitigation Measures

The Commission has advised:

> *[I]t is important to recognise that the screening assessment should be carried out in the absence of any consideration of mitigation measures that form part of a project or plan and are designed to avoid or reduce the impact of a project or plan on a Natura 2000 site*.[22]

[20] See, generally, European Commission (2000a, p.1)
[21] C-127/02 *Landelijke Vereniging tot Behoud van de Waddenzee, Nederlandse Vereniging tot Bescherming van Vogels v Staatssecretaris van Landbouw, Natuurbeheer en Visserij* [2005] 2 CMLR 31, 31
[22] (European Commission 2001, p. 14)

Further, the Commission has defined mitigation as:

> *[M]easures aimed at minimising or even cancelling the negative impact of a plan or project, during or after its completion.*[23]

However, care is needed to distinguish mitigation measures from elements that would be more correctly defined as forming an integral part of the 'alternative solution.' For example, the Commission has indicated that the route, method of construction (e.g. silent piling) and scheduling & timescale proposals may constitute parts of the 'alternative solution.' (See Section 3.4.1 generally).

App.II.iv.d Assessment of Significance

It is recommended that the Commission's Guidance be followed in determining and documenting the likelihood of significant effects. In summary, this involves initially describing the development (and other developments, where cumulative impacts are relevant). Next, the 'Qualifying Interests' of the site should be determined and the site's 'Conservation Objectives' should be reviewed. The 'Qualifying Interests' are the reasons the site has been designated. In relation to SACs, these will be Annex I habitats and/or Annex II species listed in the Habitats Directive. For SPAs, these will be bird species listed in Annex I and/or referred to in Article 4(2) of the Birds Directive, as well as the habitats of those species of bird. Where they are defined, the 'Conservation Objectives' detail the aims for the protection and management of the 'Qualifying Interests'. The environmental conditions which support site integrity should then be established. The possible impacts on the 'Qualifying Interests' or implications for the achievement of the site's 'Conservation Objectives', arising from the development (or other developments where this is relevant), should then be assessed. Finally, there should be an assessment as to whether there is a likelihood of significant effects either alone or in combination with other developments.

So, for example, if the site has been designated due to the presence of a groundwater dependent species listed in Annex II of the Habitats Directive, then this is one of the site's qualifying interests. The environmental specialist must establish the key environmental conditions which support this species. A possible condition could be the maintenance of the hydrogeological regime, both in terms of quality and quantity of groundwater, supporting this species. It should be considered whether the project has the potential to impact the hydrogeological regime for example, by affecting the aquifer which supplies the European Site. If so, then an assessment as to whether this impact is likely to be significant should be made. If the likelihood of significant impacts cannot be ruled out, then the project should be subject to appropriate assessment.

App.II.iv.e Finding of No Significant Effects Report

Where it is concluded that there are unlikely to be significant environmental effects on the 'European site' it is recommended that this be documented in 'a finding of no significant effects report.' Such 'a finding of no significant effects report' should be made available to all relevant stakeholders, including the public and should be included as an appendix to the EIS.[24]

[23] (European Commission 2000b, para. 4.5.2); *Cf. Hart District Council v. Secretary of State for Communities and Local Government* [2008] All ER (D) 21 (May)

[24] Where an EIS is not being prepared the 'finding of no significant effects' report should be included as an appendix to a report prepared pursuant to Part 8 of the Planning and Development Regulations, 2001 (S.I. No. 600 of 2001), as appropriate

App.II.iv.f Application of Article 6(3) screening in relation to national road projects

In terms of the planning of national road projects, Article 6(3) screening should be carried out in relation to all route corridors being considered at RCS (see Figure 5) and in relation to the Preliminary Design during the Preliminary Design/EIA phase (see Figure 7).

App.II.v Stage 2: Appropriate Assessment

Appropriate assessment involves the consideration of the impact of the national road project on the integrity of the European site, either alone or in combination with other projects or plans, with respect to the European site's structure and function and its conservation objectives (See Section 3.4.4 concerning 'determining impact significance' which defines terms such as 'integrity,' 'conservation status,' etc.). Additionally, where there are adverse impacts, appropriate assessment involves an assessment of the potential mitigation of those impacts.

Again, the precautionary principle flows through the appropriate assessment procedure. The *Waddenzee* case highlights the need for '*best scientific knowledge in the field*' in appropriate assessment.[25] It is, therefore, important that ecologists with sufficient training, expertise and knowledge in the relevant areas are employed in the appropriate assessment of national road development projects.

Waddenzee also highlights that the onus of proof is on the project proponent to demonstrate whether the project is not having an adverse affect. Additionally, *Waddenzee* indicates that the burden of proof is high, suggesting that where 'reasonable scientific doubt' remains, then a negative assessment must be presumed.[26]

In relation to the planning of national road development projects, appropriate assessment will be required at the EIA stage where the likelihood of significant effects on a European site, either alone or in combination with other development, cannot be disproved (see Figure 7). At RCS stage it will be necessary for national road developers to determine, as far as it is practicable to determine at this stage, whether any of the feasible route corridors adversely affect the integrity of the European site, either alone or in combination with other developments, where the likelihood of significant effects on a European site cannot be disproved for the respective route corridors (see Figure 5). This latter assessment is not an appropriate assessment as it is made by the developer and not the competent authority. However, the same principles and guidance should apply in making the determination.

Appropriate assessment will involve the gathering and consideration of information from many sources. Communication with other members of the National Road design team is extremely important. Consultation with National Parks and Wildlife Service should be undertaken. Ecological interest groups, such as BirdWatch Ireland, Bat Conservation Ireland, Coast Watch, Irish Peatland Conservation Council, Irish Wildlife Trust, may be useful sources of information and expert opinion.

[25] C-127/02 *Landelijke Vereniging tot Behoud van de Waddenzee, Nederlandse Vereniging tot Bescherming van Vogels v Staatssecretaris van Landbouw, Natuurbeheer en Visserij* [2005] 2 CMLR 31, 31

[26] *Ibid* at 31

App.II.v.a Who carries out the Appropriate Assessment?

The European Commission guidance (EC, 2001) states '*it is the competent authority's responsibility to carry out the appropriate assessment*.' In the case of national road projects the competent authority is An Bord Pleanála.[27] It is in fact the Board who carry out the appropriate assessment. Notwithstanding this, the reports which form the basis for this assessment should be prepared by the proponent of the national road project. It is therefore recommended that any information within an EIS being provided in relation to an appropriate assessment specifically state that this information is being provided to assist An Bord Pleanála in performing an appropriate assessment pursuant to Regulation 30 of the Habitats Regulations, 1997.

App.II.v.b Format of the Appropriate Assessment

When an appropriate assessment is required, the question arises as to the format in which the road developer should provide finalised information to the competent authority. Regulation 30(2) of the Habitats Regulations, 1997, provides '*An environmental impact assessment as required under subsection (2) of section 51 of the Roads Act, 1993, in respect of a proposed road development referred to in paragraph (1) shall be an appropriate assessment for the purposes of this Regulation*.' Thus, it is entirely acceptable that information provided by the road project developer pursuant to a Regulation 30 appropriate assessment should be contained within the EIS. Having regard to the Commission's guidance on this matter,[28] this information should be clearly distinguishable from other elements of the EIS. It is recommended that the information should preferably be contained within an Appendix to the EIS and cross-referenced to the main text.

App.II.vi Stage 3: Overriding Public Interest and the Assessment of Alternative Solutions

Article 6(4) of the Habitats Directive (see Regulation 30(5) of the Habitats Regulations, 1997) states that in spite of a '*negative assessment of the implications for the site,*' and where an '*absence of alternative solutions*' exists, a project may still be granted consent where it '*must nevertheless be carried out for imperative reasons of overriding public interest*.' In essence, in order to grant consent for a national road development project which adversely affects the integrity of a European site, the competent authority, An Bord Pleanála, must decide that imperative reasons of overriding public interest (IROPI) exist (see Section App.II.vi.a) and that there is an absence of alternative solutions (see Section App.II.vi.b). National road developers will require an understanding of these concepts during RCS (see Section 5.2) and EIA phases (see Section 6.2).

App.II.vi.a An Introduction to Imperative Reasons of Overriding Public Interest (IROPI)

As will be seen in Section App.II.vi.b, IROPI are also considered in assessing alternative solutions.

[27] Regulation 30 of the Habitats Regulations, 1997, (S.I. No. 94 of 1997); Regulation 4 of the Environment (Alteration of Name of Department and Title of Minister) Order, 1997 (S.I. No. 322 of 1997); Section 215 of the Planning and Development Act, 2000

[28] (European Commission 2001, Section 2.4)
'the assessment required by Article 6 should be clearly distinguishable and identified within an environmental statement or reported separately.'

IROPI are deemed to exist when reasons of public interest in carrying out the project can imperatively override the protection of a European site.[29] Whilst each case is judged on its own merits, the following guiding principles may be relevant in deciding whether IROPI are demonstrated (Scottish Government, 2000):

- a need to address a serious risk to human health and public safety;
- national security and defence considerations; or
- a clear and demonstrable direct environmental benefit on a national or international scale; or
- a vital contribution to strategic economic development or regeneration; or
- where failure to proceed would have unacceptable social/economic consequences.

It is extremely important to note that the elements which constitute IROPI may depend on whether the habitats or species affected are *priority* or not (see Article 6(4) of the Habitats Directive and Regulation 30(6) of the Habitats Regulations, 1997). 'Priority natural habitat types' means natural habitat types in danger of disappearance; these priority natural habitat types are indicated by an asterisk (*) in Annex I of the Habitats Directive.[30] 'Priority species' are endangered species or those at the edge of their geographic range; these priority species are indicated by an asterisk (*) in Annex II of the Habitats Directive. It should be noted, however, that none of the species listed as priority in Annex II of the Habitats Directive are known to occur in Ireland. Where priority habitat types are affected, then IROPI can only relate to human health or public safety, or to beneficial consequences of primary importance for the environment, unless the European Commission has forwarded its Opinion identifying other IROPI.[31] If no priority habitats are affected, then IROPI may also include, *inter alia*, social or economic considerations.

For a fuller understanding of the concept of IROPI the following documents should be consulted:

- *Guidance document on Article 6(4) of the 'Habitats Directive' 92/43/EEC – Clarification of the concepts of: alternative solutions, imperative reasons of overriding public interest, compensatory measures, overall coherence, opinion of the Commission* (European Commission, 2007a); and
- "European Commission's Opinions under Article 6(4) of the Habitats Directive" (Kramer, 2009).

App.II.vi.b Assessment of Alternative Solutions

In relation to national road developments, the Commission (2001, p.35) states that alternative solutions may be composed of, *inter alia*, alternative:

- routes;
- methods of construction; and
- scheduling and timescale proposals.

It should be noted that a national road developer will consider alternative solutions during both the RCS and EIA phases (see Sections 5.2 and 6.2).

[29] See the Opinion of Advocate General Kokott delivered on the 27th of April, 2006, in relation to Case C-239/04 *Commission of the European Communities v. Portuguese Republic* Para. 45.

[30] Article 1(d) of the 'Habitats Directive.'

[31] The Commission have provided a number of Opinions under Article 6(4), including: Commission Opinion (EC) 96/15 of 18 December 1995 [1996] OJ L6/14; Commission Opinion (EC) of 27 April 1995 [1995] OJ C178/3; Commission, C(2000) 1079 of 14 April 2000; Commission, C(2003) 1303 of 24 April 2003; Commission, C(2003) 1304 of 24 April 2003; Commission, K(2003) 1309 of 24 April 2003; Commission, C(2004) 3460 of 17 September 2004; Commission, C(2004) 1797 of 14 May 2004; Commission K(2005) 1641 of 6 June 2006; and Commission, C(2006) 5190 of 6 November 2006.

The phrase 'absence of alternative solutions' could be interpreted as requiring that the infinite number of alternative solutions, feasible and unfeasible, be assessed. However, only feasible alternative solutions should be assessed (European Commission, 2007a, p.4), with manifestly unfeasible alternative solutions needing no further examination.[32] Of the feasible alternative solutions, Kramer (2009) states, '*It simply does not make sense to ask for an examination of all of them, with an environmental impact assessment made for each of them*.' Therefore, only reasonably alternative solutions representative of the infinite number of feasible alternative solutions should be assessed. It is important that this assessment is documented. In essence, the notion of '*absence of alternative solutions*' in Article 6(4) of the Habitats Directive and in Regulation 30(5) of the Habitats Regulations, 1997, has to be read as meaning '*absence of reasonably alternative solutions*' (Kramer, 2009).

In the 'Castro Verde' case, Advocate General Kokott stated that the alternative solution selected does not '*inevitably have to be determined by which alternative least adversely affects the site concerned*.'[33] Instead, she suggests '*the choice requires a balance to be struck between the adverse effect on the integrity of the* [European site] *and the relevant reasons of overriding public interest*.'[34] The Advocate General continues '*The decisive factor is therefore whether imperative reasons of overriding public interest require the implementation of specifically that alternative or whether they can also be satisfied by another alternative with less of an adverse effect on the* [European site].'[35]

The following points may be derived from: Advocate General Kokott's Opinion in the 'Castro Verde' case; relevant ECJ case law; European Commission guidance; and relevant academic literature:

1. It is important to ensure that there has been sufficient examination of feasible alternative solutions and that this examination has been documented;
2. Where feasible alternative solutions exist which would not have an adverse affect on the integrity of a European site, then any feasible alternative solutions which do should not be considered further;
3. Where there are no feasible alternative solutions which would not have an adverse affect on the European site, then strong consideration should be given to choosing the feasible alternative solution which has the least adverse effect on the European site;
4. Where the IROPI requires the choice of a feasible alternative solution other than that having the least effect only then may the feasible alternative solution having least effect not be chosen.

The importance of demonstrating that there has been sufficient examination of feasible alternative solutions and documenting this examination during these phases is highlighted. Where feasible alternative solutions exist which do not have an adverse effect on the integrity of a European site, then those which do should be eliminated. Where no feasible alternative solutions exist which do not adversely affect the integrity of a European site, then priority should be given to the feasible alternative solution having the least adverse impact. It is only in exceptional circumstances that

[32] C-239/04 *Commission of the European Communities v. Portuguese Republic* Para. 38.
[33] Opinion of Advocate General Kokott delivered on the 27th of April, 2006, in relation to Case C-239/04 *Commission of the European Communities v. Portuguese Republic* Para. 44.
[34] Opinion of Advocate General Kokott delivered on the 27th of April, 2006, in relation to Case C-239/04 *Commission of the European Communities v. Portuguese Republic* Para. 44.
[35] Opinion of Advocate General Kokott delivered on the 27th of April, 2006, in relation to Case C-239/04 *Commission of the European Communities v. Portuguese Republic* Para. 46.

IROPI will dictate the choice of a feasible alternative solution that does not have the least adverse impact. The principle of proportionality should be applied.

App.II.vii Stage 4: Assessment where no alternative solutions exist and where adverse impacts remain

Regulation 33 of the Habitats Regulations, 1997, states that where a national road development is agreed to, notwithstanding a negative assessment of the implications for a European site, the competent authority, An Bord Pleanála, '*shall ensure that the necessary compensatory measures are taken to ensure that the overall coherence of Natura 2000 is protected*.'

ATECMA (2005), in its *Study to provide guidelines for application of compensatory measures under Article 6(4) of the Habitats Directive 94/43/EEC*, state compensatory measures:

1. involve independent actions intended to offset the negative effects of the plan or project that would remain owing to the limited effectiveness of mitigation, so that the overall ecological coherence of the Natura 2000 network is maintained;
2. are an option when residual impacts of a plan or project are still deemed significant after relocation, redesign or mitigation options have been implemented; and
3. are independent measures adopted to offset these impacts.

Compensatory measures may include (European Commission, 2007, p.14):

1. Restoration or enhancement in existing sites; and/or
2. Habitat recreation in existing or new sites.

If compensatory measures are required, significant time and expert advice will be required by the project planning team to ensure that the measures are adequate and are properly planned and implemented. Some guidance on ecological restoration and creation of habitats is given in Gilbert and Anderson (1998).

In designing and assessing compensation measures, establishing implementation procedures, and designing monitoring plans, consultation with the National Parks and Wildlife Service is required.

APPENDIX III DEROGATION LICENSING PROCEDURES IN RELATION TO PROTECTED SPECIES

As indicated in Section 1.6 the Authority has published *Ecological Surveying Techniques for protected flora and fauna during the planning of National Road Schemes* (the 'Survey Guidelines') (National Road Authority, 2008b), which supplement these guidelines by providing advice on procedures and survey techniques for rare and protected habitats and species.

Special consideration must be given in the planning of national road schemes to any species of flora or fauna that are protected by national or international legislation or that are considered to be rare in a national or international context. Legally protected flora or fauna are normally specified in a schedule or Annex to the legislation. The main legal instruments for the protection of species are listed in Appendix III of the 'Survey Guidelines'.

In some cases, a licence may be required to remove, or disturb the habitat of, these protected species. The principal licensing authority is the Department of Environment, Heritage and Local Government.

App.III.i Derogation licences

The European Court of Justice has indicated that the practice of requiring information on protected species only after development consent has been granted undermines the EIA process.[36] In order to rectify this situation the Department of Environment, Heritage and Local Government has advised that '[a]n *application for* [a derogation licence] *should be made in advance of seeking any necessary approval for development/planning permission for works. This will ensure that full consideration can be given to the impacts of the proposed project on the species and to avoid the possibility of delay to the proposed project or of a refusal of a derogation licence which would prevent the works being carried out as planned*.'[37] Therefore, it is recommended that, where feasible, derogation licences be applied for in advance of the granting of EIA consent. Whilst this is particularly the case in relation to species protected under EU law, e.g. species protected under Annex IV (A) of the Habitats Directive requiring a derogation licence pursuant to Regulation 25 of the Habitats Regulations, 1997,[38] this recommendation also applies in relation to species protected under national legislation such as the Wildlife Acts, 1976 and 2000.

App.III.i.a Regulation 25 Derogation Licences

Readers are directed to *Guidance document on the strict protection of animal species of Community interests under the Habitats Directive 92/42/EEC* (European Commission, 2007b) for more detailed information on Regulation 25 derogation licences.

[36] Case C-183/05 *Commission of the European Communities v. Ireland* [2007] ECR I-0000 para. 51
[37] (Department of the Environment, Heritage and Local Government, 2008d)
[38] See, generally, (European Commission, 2007b)

Regulation 23(3) of the Habitats Regulations, 1997, provides:

A person who in respect of the species set out in Part I of the First Schedule—

(a) deliberately captures or kills any specimen of these species in the wild,

(b) deliberately disturbs these species particularly during the period of breeding, rearing, hibernation and migration,

(c) deliberately takes or destroys the eggs from the wild, or

(d) damages or destroys a breeding site or resting place of such an animal,

shall be guilty of an offence.

Part I of the First Schedule of the Habitats Regulations, 1997, lists all species specified in Annex IV (A) of the Habitats Directive.[39] Regulation 25 of the Habitats Regulations, 1997, allows the Minister for Environment, Heritage and Local Government to permit derogation from complying with the provisions of Regulation 23. Regulation 25(1) of the Habitats Regulations, 1997, may be broken down into the following three tests:[40]

1) the demonstration of one or more of the reasons listed in Regulation 25(1) (a)-(e);

2) the absence of a satisfactory alternative; and

3) the assurance that a derogation is not detrimental to the maintenance of populations at a favourable conservation status.

It is apparent that the tests here are similar/analogous to those applied in relation to Article 6(4) of the Habitats Directive. Appropriate regard should, therefore, be had to Appendix II and Sections 4.3.3, 5.2 and 6.2 in the planning of national road projects and in the making of Regulation 25 derogation licence applications. The three tests are outlined in more detail below.

Test One: of one or more of the reasons listed in Regulation 25(1) (a)-(e)

Given that the ECJ has indicated that the grounds for derogation should be construed narrowly, generally the primary ground under which a national road scheme may be granted a derogation is under Regulation 25(1)(c), namely: '*in the interests of public health and public safety, or for other imperative reasons of overriding public interest, including those of a social or economic nature and beneficial consequences of primary importance for the environment*.' Section App.II.vi.a should be consulted for a fuller understanding of the concept of imperative reasons of overriding public interest (IROPI).

Test Two: Absence of a satisfactory alternative

Regulation 25(1) requires that there be an absence of a satisfactory alternative. Again, whilst Appendix II and Sections 4.3.3, 5.2 and 6.2. deal specifically with Articles 6(3) and 6(4) of the Habitats Directive/Regulations 30 and 33 of the Habitats Regulations, 1997, these sections contain useful information on this test.

[39] Regulation 3(12) of the European Communities (Natural Habitats) (Amendment) Regulations, 2005
[40] (European Commission 2007b, p. 54)

Test Three: Not detrimental to the maintenance of populations at a favourable conservation status

Regulation 25(1) provides that the granting of the derogation licence must not be detrimental to the maintenance of populations at a favourable conservation status. The conservation status of all EU protected habitats and species is outlined in DoEHLG's (2008a) *The Status of EU Protected Habitats and Species in Ireland*. This document indicates that many habitats and species are not currently at favourable conservation status. Thus, the question arises whether or not the granting of a derogation licence can be justified in such circumstances. In this regard the Commission suggest that '*the less favourable the conservation status and trends, the less likely will the granting of derogations be justified apart from in the most exceptional circumstances*.'[41] However, the Commission also suggest that '[c]*ompensation measures may, under certain circumstances, be used to offset the impact of a derogation on breeding sites and resting places...*'[42]

[41] (European Commission 2007b, p. 65)
[42] Ibid at 65

APPENDIX IV DAMAGE TO PROTECTED HABITATS AND SPECIES: THE ENVIRONMENTAL LIABILITY DIRECTIVE

App.IV.i Introduction

As of April, 2009, Ireland is in the process of preparing legislation to transpose the Environmental Liability Directive (ELD).[43] The European Communities (Environmental Liability) Regulations, 2008 (S.I. No. 547 of 2008) ('Environmental Liability Regulations'), were published in *Iris Oifigiúil* of the 23rd of December, 2008. The Environmental Liability Bill is listed in Section A ('Bills expected to be published from the start of the Dáil Session up to the beginning of the next Session') of the Government Legislation Programme.[44]

The following guidance is written having regard to the contents of the ELD, and to existing and proposed transposing measures and associated documentation.[45]

The Environmental Liability Directive specifies that Member States should, *inter alia*, establish a civil liability regime whereby operators of specified activities which cause environmental damage are financially liable for remedying this damage. The Directive also aims to hold those responsible for certain activities which have caused an imminent threat of environmental damage liable for taking preventive actions.

[43] Directive 2004/35/CE of the European Parliament and of the Council of 21 April 2004 on environmental liability with regard to the prevention and remedying of environmental damage

[44] http://www.taoiseach.gov.ie/index.asp?docID=2579

[45] See *Environmental Liability Directive – Screening Regulatory Impact Analysis* (DoEHLG, 2008b); *Guidance – Draft Legislation transposing the Environmental Liability Directive* (DoEHLG, 2008c)

App.IV.ii Environmental Damage

A significant feature of the Directive is that it defines 'environmental damage' as damage to protected species and natural habitats, 'water damage'[46] and 'land damage.'[47] In the context of damage to protected species and natural habitats, damage occurs where there is a significant adverse effect on reaching or maintaining the favourable conservation status of such habitats or species.

App.IV.iii Species and Habitats Protected

The species and habitats protected under the ELD include the following:

- Species of bird, listed in Annex I and referred to in Article 4(2) of the Birds Directive;[48]
- Species of animals and plants listed in Annex II and IV of the Habitats Directive;[49]
- Habitats of species of bird, listed in Annex I and referred to in Article 4(2) of the Birds Directive;
- Habitats of species of animals and plants identified in the Habitats Directive (listed in Annex II);
- Natural habitats listed in Annex I of the Habitats Directive; and
- The breeding sites or resting places of the species, listed in Annex IV of the Habitats Directive.

The proposed Bill also provides that the Minister for the Environment, Heritage and Local Government may, by way of Regulation, extend the species and habitats protected to include those other species or habitats protected under the Wildlife Acts and Habitats Regulations.[50] It is important to note that the protection regime applies to protected habitats and species both inside and outside of European sites.

App.IV.iv Assessment of Damage to Protected Species and Habitat

Schedule I to the Environmental Liability Regulations outlines the proposed criteria in assessing damage to protected species and habitat. The schedule states:

> *The significance of any damage that has adverse effects on reaching or maintaining the favourable conservation status of habitats or species has to be assessed by reference to the conservation status at the time of the damage, the services provided by the amenities they produce and their capacity for natural regeneration.*

[46] Regulation 2(1) of the Environmental Liability Regulations defines "water damage:"
"water damage" means any damage that significantly adversely affects the ecological, chemical or quantitative status or ecological potential, as defined in the Water Framework Directive, of the waters concerned, with the exception of adverse effects where Article 4(7) of the Water Framework Directive applies;

[47] Regulation 2(1) of the Environmental Liability Regulations defines "land damage:"
"land damage" means any land contamination that creates a significant risk of human health being adversely affected as a result of the direct or indirect introduction, in, on or under land, of substances, preparations, organisms or micro-organisms;

[48] Council Directive of 2 April 1979 on the conservation of wild bird (79/409/EEC)

[49] Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora

[50] Head 3 – Extension of Habitats and Species

The Schedule further indicates that significant adverse changes to the baseline condition should be determined by means of measurable data, such as:

- the number of individuals, their density or the area covered;
- the role of the particular individuals or of the damaged area in relation to the species or to the habitat conservation, the rarity of the species or habitat (assessed at local, regional and higher level including at Community level);
- the species' capacity for propagation (according to the dynamics specific to that species or to that population), its viability or the habitat's capacity for natural regeneration (according to the dynamics specific to its characteristic species or to their populations); and
- the species' or habitat's capacity, after damage has occurred, to recover within a short time, without any intervention other than increased protection measures, to a condition which leads, solely by virtue of the dynamics of the species or habitat, to a condition deemed equivalent or superior to the baseline condition.

App.IV.v Permit Defences

Article 2(1)(a) of the ELD states:

> *Damage to protected species and natural habitats does not include previously identified adverse effects which result from an act by an operator which was expressly authorised by the relevant authorities in accordance with provisions implementing Article 6(3) and (4) or Article 16 of Directive 92/43/EEC or Article 9 of Directive 79/409/EEC or, in the case of habitats and species not covered by Community law, in accordance with equivalent provisions of national law on nature conservation.*

This provision has the effect of providing a "permit defence." So, for example, the holding of a derogation licence under Regulation 25 of the Habitats Regulations, 1997, (the provision transposing Article 16 of Directive 92/43/EEC) may exempt the holder from liability in relation to environmental damage to the Annex IV (A) species in question. Similarly, a development consent or approval given by An Bord Pleanála in circumstances where the development concerned is subject to EIA and the EIA is an appropriate assessment for the purposes of the Habitats Regulations, 1997, may exempt the development from liability in relation to environmental damage on a European site. Such possible exemption from liability is, of course, subject to the conditions of licences or consent being complied with.

APPENDIX V LOCAL AUTHORITY WORKS AFFECTING NATURE RESERVES, NATURE REFUGES AND NATURAL HERITAGE AREAS (NHAS)

Scannell (2006, p. 282) indicates that the Wildlife Acts provide, *inter alia*, that a local authority and other defined public authorities, shall: (1) consult with the Minister for the Environment, Heritage and Local Government before anything which (in the opinion of the Minister, other Minister or the authority/body in question) is likely or liable to affect, or to interfere with a Nature Reserve, Nature Refuge or Natural Heritage Area; and (2) take all practicable steps to avoid or minimise such effect or interference.[51]

[51] Section 12 of the Wildlife Act, 1976, and Section 24(1) of the Wildlife (Amendment) Act, 2000.

Appendix 6.4

Tree Survey Report

DixonBrosnan
environmental consultants
dixonbrosnan.com

Project

Tree Survey for the Douglas and Togher Flood Relief Scheme.

Client

ARUP

Project no	No pages	Client reference
1653	-	-

v010111

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Report no	Date	Edit	Prepared by	
1666	18/04/17	0 – Issue to client	Mark Donnelly	
			Carl Dixon	

1. Introduction

DixonBrosnan were commissioned to carry out a tree survey as part of the assessment procedure for the Douglas and Togher Flood Relief scheme. The survey was carried out along the lower reaches of the Ballybrack River and along the Togher River within the proposed works area. The purpose of the survey was as follows:

- Within the main works area there is very little scope to retain trees and therefore the focus in this area is to assess the number and type of trees affected.
- The survey identifies trees within 10m of the works area which could be potentially affected. Management recommendations are provided where required.
- All the trees are tagged and described.
- Management prescriptions are provided where required.

2. Statement of authority

Carl Dixon M.Sc. is senior ecologist who has experience in ecological and woodland surveys. Mark Donnelly holds a BSc. (Hons) in Forestry from Bangor University, Wales and is a member of the Institute of chartered Foresters Society of Irish Foresters and is a registered Forester with the Irish Forest Service. He worked as an arboriculture consultant for The National Trust in Wales for 22 years and has worked as a lecturer in Forest Ecology at Bangor University. In Ireland, he has undertaken a range of arboriculture and ecological surveys for projects including windfarms, quarries, housing developments, roads and pipelines.

3. Report limitations

The statements, findings and recommendations made within the report do not take into account any effects of extreme climate and weather incidences, vandalism, changes in the natural and built environment around the trees after the date of this report nor any damage whether physical chemical or otherwise. DixonBrosnan, Environmental Consultants cannot accept any liability in connection with the above factors, nor where recommended tree management is not carried out in accordance with modern tree care techniques.

4. Site description

The proposed flood relief scheme areas will be located in Togher along the Tramore River and in Douglas along the Grange Stream and Ballybrack Stream. The Grange and Ballybrack streams are tributaries to the Tramore River, which ultimately flows to Lough Mahon in Cork Harbour. The proposed works area in Togher is approximately 2.8km south of Cork city centre. The proposed works area in Douglas is to the south and within Douglas village and approximately 3.4km southeast of Cork city centre.

There are sections of treelines at various locations within the proposed works area. A short but well developed treeline with a diverse mix of species occurs along part of the boundary of the Ballybrack River adjacent to the ICA Hall. The western boundary of the Ballybrack Stream, as it flows through the Douglas Community Park, is vegetated and supports a mixture of trees including Sycamore and Ash, Elder and Alder. The trees do not form a long continuous line as

sections of bank and buildings break up the treeline. There is a short section of treeline adjoining an area of open channel adjoining the Togher Road. It includes one large mature Horse Chestnut. There is a patchy treeline along the pedestrian/cycle path which runs south from Douglas village into broadleaved woodland.

Woodland occurs at several locations. Wet willow-alder-ash woodland WN6 north of the Lehenaghmore Industrial Estate blends into broadleaved woodland on a steep escarpment. The trees are generally semi-mature. Species noted include Sycamore, Alder, Willow, Ash, Elder, Hawthorn. A section of broadleaved woodland occurs at the upstream boundary of the works on the Ballybrack Stream. A coarse trash screen is proposed. This woodland area has a relatively natural woodland structure but with a mixture of native and non-native species. Laurel is dominant in places and blocks light and suppresses ground flora. Species noted include Beech, Sycamore, Alder, Laurel, Holly, Ash, Sweet Chestnut, Oak, Lime and Plane. Ground flora is limited due to the heavy shade.

Within the Douglas Community Park ornamental trees have been planted with a wide spacing in amenity grassland. Species noted include Field Maple, Norway Maple, Ash, Lime, Aspen, Birch, Rowan, Horse Chestnut, Oak and Sycamore. Most of the trees are semi-mature. A smaller area occurs at Westbrook Gardens, south of the Douglas Community Park. Trees noted here include Horse Chestnut, Alder, Ash, Poplar, Elder, Sycamore, Rowen, Lime, Red Oak, Birch, Norway Maple, Beech, Western Red Cedar and Atlantic Cedar. A linear group of Lime, Ash, Alder and Horse Chestnut occur within the proposed works area upstream of the Donnybrook Industrial Estate.

5. Survey Methodology

The survey was carried out during October and November, 2016 and March 2017. All trees within the proposed works area were recorded. The survey was also carried out within a 10m zone from the proposed works area. This was carried out to assess the possible impacts on trees on the periphery of the works area which could be inadvertently damaged.

All trees in excess of 150mm, at approximately 1.3m height, were included in the survey. Recorded trees were numbered with plastic tags. Where possible the tag was placed at the downstream side of the tree at 1-2m height. All individual trees and groups are recorded on tree condition record forms and marked on the Proposed Flood Defences, Plan Layout (**Appendix 2**).

Where detailed recommendations are provided they include specific advice on the value of each tree and protection measures, specifically the Root Protection Areas which must be protected from construction activity. This is defined as the radius of root activity which extends beyond the tree as its diameter multiplied by 12 or the equivalent resultant combined stem diameter for multi stemmed trees (See **Table 1**). It is noted that the Root Protection Area defines the extent of the root mass, however works within this radius may not necessarily impact dramatically on tree mortality or health. The survey key utilised for the survey, which is based on the guidelines outlined in the British Standard *BS 5837:2012 Trees in relation to design, demolition and construction – Recommendations* as detailed below in **Table 2.**

Table 1. Root Protection area – to be used for single stem trees and the equivalent resultant combined stem diameter for multi-stemmed trees.

Single stem diameter (mm)	Radius of nominal circle	RPA
75	0.90	3
100	1.20	5
125	1.50	7
150	1.8	10
175	2.1	14
200	2.4	18
225	2.7	23
250	3.0	28
275	3.3	34
300	3.6	41
325	3.9	48
350	4.2	55
375	4.5	64
400	4.8	72
425	5.1	81
450	5.4	92
475	5.7	102
500	6.0	113
525	6.3	124
550	6.6	137
575	6.9	150
600	7.2	163
625	7.5	177
650	7.8	191

Single stem Diameter (mm)	Radius of nominal circle	RPA
675	8.10	206
700	8.4	222
725	8.7	238
750	9.0	255
775	9.3	272
800	9.6	290
825	9.9	308
850	10.20	327
875	10.50	346
900	10.80	366
925	11.10	387
950	11.40	408
975	11.70	430
1000	12.00	452
1025	12.30	475
1050	12.60	499
1075	12.90	519
1100	13.20	547
1125	13.50	573
1150	13.80	598
1175	14.10	625
1200	14.40	652
1225	14.70	679
1250	15.00	707

Table 2. Survey Key

Attribute	Description
Species	Recorded as common name. A full list is in **Appendix 1.**
Age	IM - An immature tree greater than 150mm diameter but regarded as a sapling SM - Semi mature tree – A young tree but less than 50% of its ultimate size. M - Mature – A tree having attained dimensions typical of a fully grown specimen of its species. OM – Over mature – An old specimen of a species showing signs of decline in health. Usual symptoms include crown starting to break up and decreasing in size.
Girth	Measured in mm. An average diameter was recorded for multi-stemmed stools and number of stems recorded
Height	Approximate tree height in metres.
Spread	Approximate tree canopy diameter in meters. Where a crown is unbalanced, approximate dimensions for the crown are given for North, East, South and West directions.
Condition:	Good : Full healthy canopy with good form and health Fair: A specimen whose overall condition is typical of the site and may exhibit slightly reduced leaf cover/minor deadwood or maybe predisposed to defects e.g. Coppice re-growth, but otherwise in good health. Poor: A specimen which through defect or disease has a limited longevity, dead or may be un-safe.
Risk code - Risk Assessment (Adapted from International Society of Arboriculture (*ISA)*Tree Risk Accepted Methodology)	**A:** High Risk – Failure likely to, or very likely to occur with severe consequences/impacts on people and or property. **B:** Medium risk – Failure could occur but is unlikely during normal weather conditions within short to medium term (0-5yrs). Regular monitoring is necessary. **C:** Low Risk – Failure unlikely during Short- Medium term (0-5 years). Regular monitoring is necessary.
Value Recommendations Tagged trees	1 = retain as a valuable tree 2= retain if possible – generally refers to trees within 'Works Areas' 3= removal recommended.
RPA	Root protection areas for all trees with value recommendation 1 and 2.

6. Survey results

A species list is provided in **Appendix 1.** Tree Condition Record Forms and figures are presented, showing the locations of individual trees **Appendix 2 (Sheets 1 – 16).** It is noted that tables associated with the each sheet overlap.

7. Conclusions

7.1 History and general conclusions

Trees along the Ballybrack River are generally amenity trees that have been planted. This is most obvious of these are in the Douglas Community Park where there is a mixture of even aged, semi-mature trees including Norway Maple, Aspen and Horse Chestnut. With the exception of some Alder along the river, most are non-native. There is a small area at Ravensdale, upstream of the Douglas Community Park that has been planted with Poplar, Alder and Rowan.

A treeline runs along the river on the northern side of the ICA building. It is dominated by mature Beech with some Western Red Cedar also recorded. These trees are prominent features in the local landscape. It is considered unlikely that all of these trees can be retained.

Further upstream Ballybrack Woods is a mixed semi-natural woodland with some recreational usage. No extensive works are proposed within this wood. A riverside treeline above the Donnybrook Industrial Estate is within a proposed works area and it is unlikely it can be retained.

The Togher River is largely culverted in the upper sections. Some planted amenity trees were recorded and some mixed broadleaved woodland occurs. One prominent Horse Chestnut is located in proximity to a small section of open channel adjoining the Togher Road. It is unlikely this tree can be retained. There is a mature veteran Ash (Tree no. 873) within woodland adjoining the Lehenaghmore Industrial Estate. This should be retained if possible.

Elm is a significant constituent of established woodland throughout the survey area. All Elm trees are all less than 40 years old and have developed since the Elm Disease epidemic of the 1970/1980s, which killed all mature Elms. However, the disease is currently re-infecting trees and it is unlikely any semi-mature and mature Elm will survive beyond 2020. Accordingly, all elms recorded within the survey area are rated as a high safety risk and low priority for retention.

There is a paucity of mature and veteran trees within the survey area which have the potential to be of high value as bat roosts. Trees with significant potential as bat roosts include the following: two older beech trees close to the ICA Hall in Douglas (Tree no. 812 and 813) and a sycamore (Tree no. 863), and a veteran Ash (Tree no. 873) adjoining the Lehanaghmore Industrial Estate. These trees should be checked for bats prior to the commencement of works.

Appendix 1. Species list

Elm	*Ulmus spp.*
Grey Alder	*Alnus incarna*
Oak	*Quercus robur*
Sycamore	*Acer pseudoplatanus*
Lime	*Tilia spp.*
Wild Cherry	*Prunus avium*
Hornbeam	*Carpinus betulus*
European Larch	*Larix decidua*
White Poplar	*Populus alba*
Willow	*Salix caprea*
Red Oak	*Quercus rubra*
Horse Chestnut	*Aesculus hippocastanum*
Laurel	*Prunus Laurocerasus*
Aspen	*Populus tremula*
London Plane	*Platanus x hispanica*
Western Red Cedar	*Thuja plicata*

Alder	*Alnus glutinosa*
Ash	*Fraxinus excelsior*
Turkey Oak	*Quercus cerris*
Norway Maple	*Acer platanoides*
Elderberry	Sambucus nigra
Rowan	*Sorbus aucuparia*
Monterey Cypress	*Cupressus macrocarpa*
Black Poplar	*Populus nigra*
Beech	*Fagus sylvatica*
Crack Willow	*Salix fragilis*
Birch	*Betula pendula*
Holly	*Ilex aquilifolium*
Black Poplar (hybrid)	*Populus x canadensis*
Callery Pear	*Pyrus calleryana*

ARBORIST SURVEY

DOUGLAS- Flood Relief Scheme

(including Togher Culvert) 04/04/2017

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DIXON BROSNAN
ENVIRONMENTAL CONSULTANTS

Douglas FRS - Arborist Survey

Brook Avenue

Industrial Estate

20.4

24.9

HEDGE 854

HEDGE 854

5200

5250

5300

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5350

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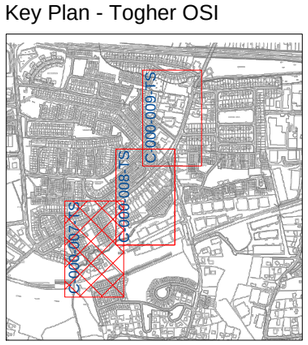
Key Plan - Togher OSI



Key to Plan

Recommendations

- Retain (1)
- Retain if possible (2)
- Remove (3)

171 — Location of groups of trees (Colour reflects category unless otherwise stated)

Watercourse

Channel centre line & chainage

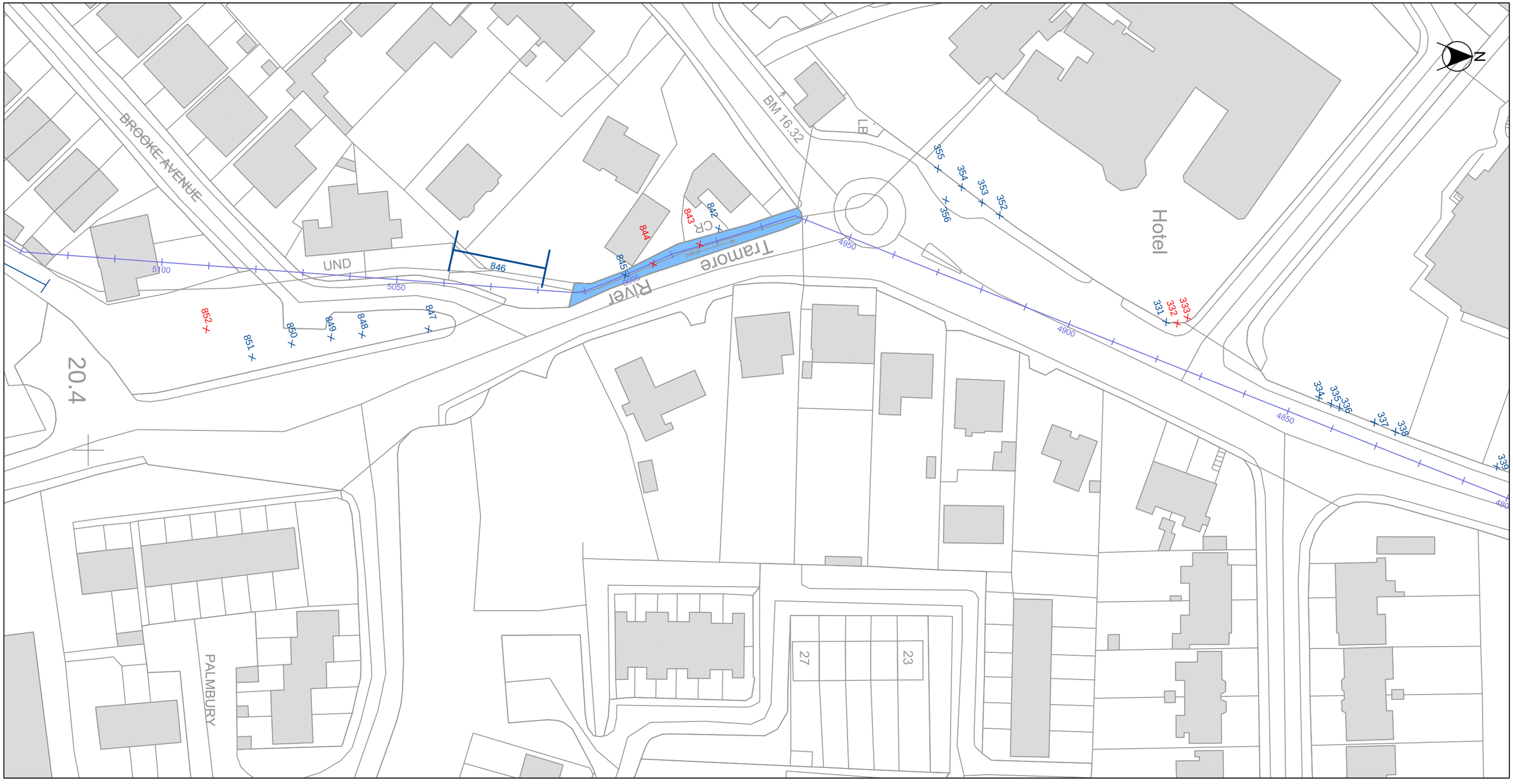
Drawing No.: C-000-007-TS (04/04/2017)-Tree Survey (Not to Scale)

DIXON BROSNAN
ENVIRONMENTAL CONSULTANTS

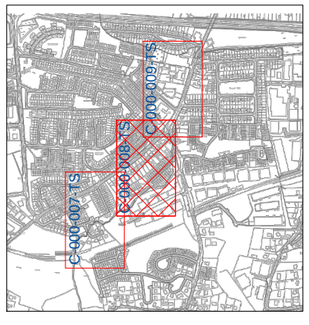
Read in conjunction with drawing C_000_007_TS Plastic Tag Colour - Green

No.	Species	Age Class	Girth (mm)	Height (m)	Spread (m)					Condition	Risk Code	Comments	Rec	RPA (m)
					N	E		S	W					
853	Sycamore	M	400	12			10			Fair	B	4 stems	3	-
854	Western Red Cedar	SM	200	4						Good	C	Hedge (and *Cypressus macrocarpa*)	2	2.4
855	Alder	SM	250	12			5			Good	C	GROUP of 20 trees	2	3.0
856	Elm	M	500	15			10			Poor	A	Dead 2 trees	3	-
857	Willow	M	250	9			8			Good	C	GROUP of 5 trees	2	3.0
858	Elm	M	350	10		5				Poor	A		3	-
859	Elm	M	380	20			10			Poor	A	GROUP of 4 trees	3	-
860	Sycamore	SM	300	18			10			Fair	B	5 stems	2	3.6
861	Elm	M	500	20			9			Poor	C	2 dead Elm	3	-
862	Sycamore	SM	300	15			9			Good	C	2 trees (1 ash)	1	3.6
863	Sycamore	M	900	20			20			Good	C	2 stems	1	10.8
864	Ash	M	350							Poor	B	Poor tree. 2 stems	3	-
865	Sycamore	M	380	18			10			Good	C		1	4.2
866	Alder	M	280	14			8			Good	C	1 tree	2	3.3
867	Alder	M	200	15			8			Fair	C	3 trees	2	2.4
868	Alder	M	300	18			8			Fair	B		3	-
869	Beech	SM	350	18			8			Poor	A	Rot at base	3	-
870	Alder	M	300	18			8			Poor	A	Rot at base	3	-
871	Elm	M	350	15			6			Poor	A	Dead	3	-
872	Elm	SM	300	12			6			Poor	A	Dead	3	-
873	Ash	M	1000	18			15			Poor	B	Veteran tree. Dead top. Rot at base. POLLARD	1	12.0
874	Evergreen Oak	M	450	13			10			Good	C	Specimen tree - RETAIN	1	5.4
875	Elm	M	450	13			10			Poor	A	2 trees dead	3	-

Douglas FRS - Arborist Survey



Key Plan - Togher OSI



Key to Plan

Recommendations

- Retain (1)
- Retain if possible (2)
- Remove (3)

- 171 — Location of groups of trees (Colour reflects category unless otherwise stated)
- Watercourse
- Channel centre line & chainage

Drawing No.: C-000-008-TS (04/04/2017)-Tree Survey (Not to Scale)

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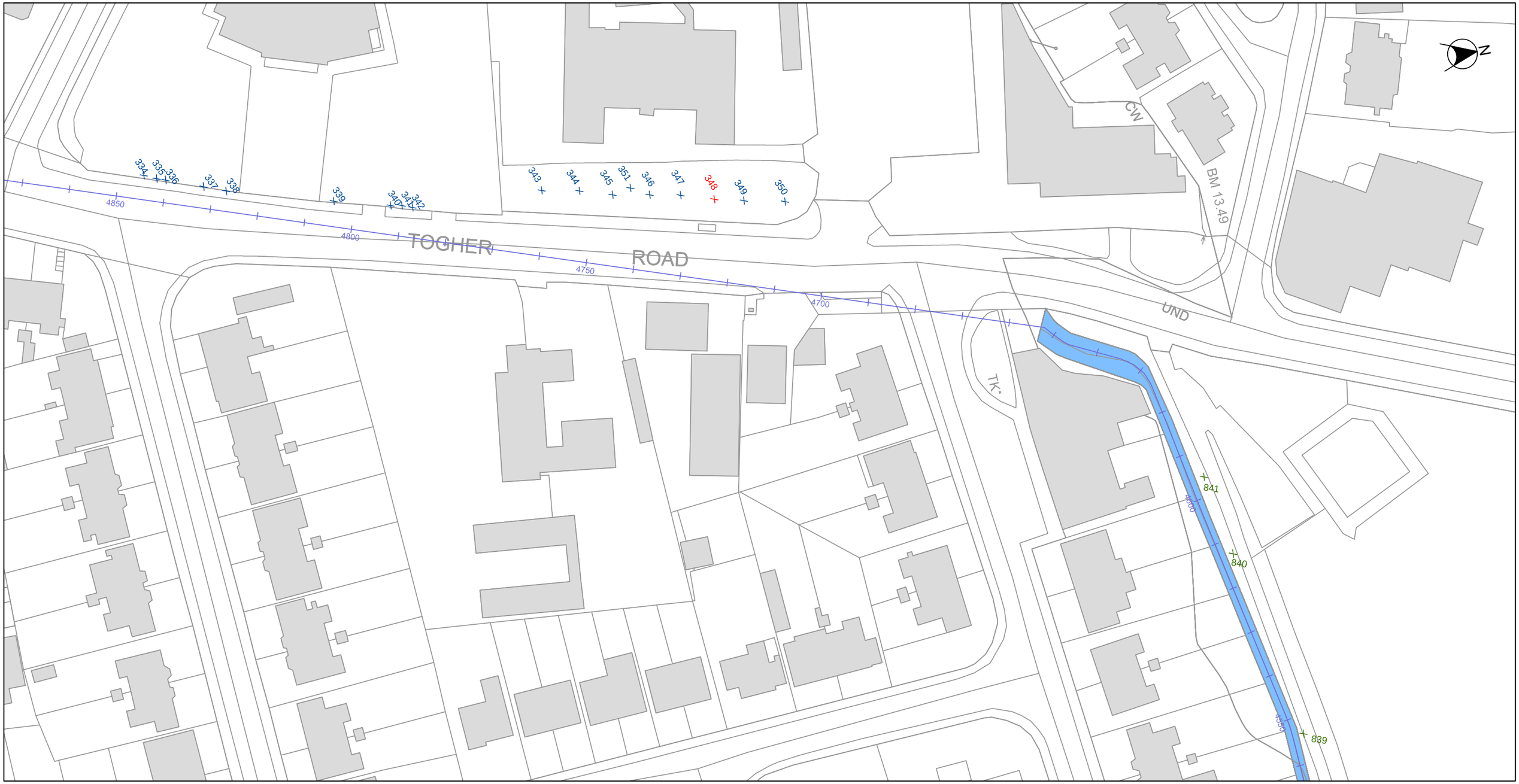
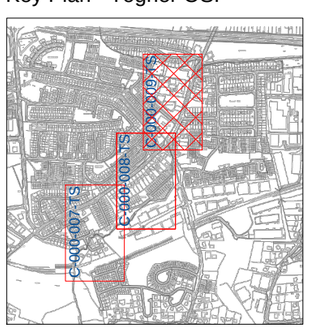
Read in conjunction with drawing C_000_008_TS Plastic Tag Colour - Green

No.	Species	Age Class	Girth (mm)	Height (m)	Spread (m)				Condition	Risk Code	Comments	Rec	RPA (m)
					N	E	S	W					
842	Horse Chestnut	M	450	23		18			Fair	B	Poor form. 3 stems. 30 % crown reduction if compromised by excavations	2	5.4
843	Ash	M	450	18	10				Fair	B		3	-
844	Elm	M	450	8		5			Fair	B		3	-
845	Lime	M	300	13		10			Fair	B	4 stems - Will need leaning stem removed	2	3.6
846	Ash & Elm	M	450	18		9			Good	B	GROUP of 10 trees	2	5.4
847	Ash	SM	400	9		8			Good	C		2	4.8
848	Ash	SM	500	9		8			Good	C	Over culvert	2	6.0
849	Ash	SM	500	9		8			Poor	A	Poor form	2	6.0
850	Ash	SM	300	9		8			Poor	A	Cankered	2	6.0
851	Ash	SM	400	9		8			Fair	B	Forked	2	4.8
852	Ash	SM	580	12		10			Fair	B	Poor health	3	-
338	Norway Maple	IM	200	8		4			Good	C	Retain if possible	2	2.4
337	Norway Maple	IM	200	8		4			Good	C	Retain if possible	2	2.4
336	Birch	IM	150	5		4			Good	C	Retain if possible	2	1.8
335	Birch	IM	150	5		4			Good	C	Retain if possible	2	1.8
334	Birch	IM	150	5		4			Good	C	Retain if possible	2	1.8
333	Norway Maple	IM	250	9		4			Poor	A	Damaged	3	-
332	Norway Maple	IM	230	9		5			Poor	A	Damaged	3	-
331	Norway Maple	SM	300	10		6			Good	C	Retain if possible	2	3.6
352	Lime	IM	200	8		5			Good	C	Retain if possible	2	2.4
353	Lime	IM	200	8		5			Good	C	Retain if possible	2	2.4
354	Lime	IM	250	8		5			Good	C	Retain if possible	2	3.0
355	Lime	IM	300	8		5			Good	C	Retain if possible	2	3.6
356	Callery Pear	IM	200	8		4			Good	C	Retain if possible	2	2.4

Douglas FRS - Arborist Survey



Key Plan - Togher OSI



Key to Plan

Recommendations

- Retain (1)
- Retain if possible (2)
- Remove (3)

171 — Location of groups of trees (Colour reflects category unless otherwise stated)

Watercourse

Channel centre line & chainage

Drawing No.: C-000-009-TS (04/04/2017)-Tree Survey (Not to Scale)

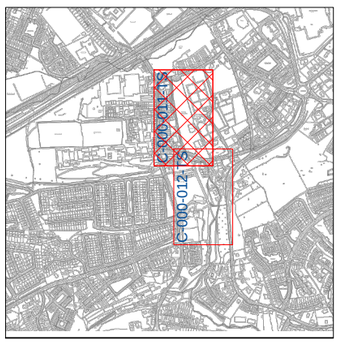
DIXON BROSNAN
ENVIRONMENTAL CONSULTANTS

Read in conjunction with drawing C_000_009_TS Plastic Tag Colour - Green

No.	Species	Age Class	Girth (mm)	Height (m)	Spread (m)					Condition	Risk Code	Comments	Rec	RPA (m)
					N	E		S	W					
839	Lime	SM	300	8			5			Good	C		1	3.6
840	Lime	SM	200	8			5			Fair	C	Suppressed and damaged at base	1	2.4
841	Beech	SM	360	10			10			Good	C		1	4.2
350	Silver Birch	IM	150	5			3			Good	C	Commemorative Tree (Priority Tree)	2	1.8
349	Cherry	SM	350	8			6			Good	C		2	4.2
348	Ash	IM	200	5			4			Poor	B	Poor Health - Cankered	3	-
347	Cherry	SM	300	6			4			Good	C		2	3.6
346	Rowan	M	350	9			4			Good	C		2	4.2
351	Silver Birch	SM	250	9			5			Good	C		2	3.0
345	Cherry	SM	300	8			5			Good	C		2	3.6
344	Ash	SM	350	9			8			Good	B		2	4.2
343	Oak	SM	250	9			6			Fair	C	Poor Form	2	3.0
342	Birch	SM	200	8			4			Good	C	Good form - Retain if at all possible	2	2.4
341	Birch	SM	200	8			4			Good	C	Retain if possible	2	2.4
340	Birch	SM	200	8			4			Good	C	Retain if possible	2	2.4
339	Norway Maple	IM	150	5			2			Good	C	Retain if possible	2	1.8
338	Norway Maple	IM	200	8			4			Good	C	Retain if possible	2	2.4
337	Norway Maple	IM	200	8			4			Good	C	Retain if possible	2	2.4
336	Birch	IM	150	5			4			Good	C	Retain if possible	2	1.8
335	Birch	IM	150	5			4			Good	C	Retain if possible	2	1.8
334	Birch	IM	150	5			4			Good	C	Retain if possible	2	1.8

Douglas FRS - Arborist Survey

Key Plan - Douglas OSI



Key to Plan

Recommendations

- Retain (1)
- Retain if possible (2)
- Remove (3)

171 — Location of groups of trees (Colour reflects category unless otherwise stated)

Watercourse

Channel centre line & chainage

Drawing No.: C-000-011 TS (04/04/2017)-Tree Survey (Not to Scale)

DIXON BROSNAN
ENVIRONMENTAL CONSULTANTS

Read in conjunction with drawing C_000_011_TS Plastic Tag Colour - Green

No.	Species	Age Class	Girth (mm)	Height (m)	Spread (m)					Condition	Risk Code	Comments	Rec	RPA (m)
					N	E		S	W					
681	Sycamore	SM	300	8			7			Good	C		1	3.6
682	Ash	SM	400	9			8			Good	C		1	4.8
683	Norway Maple	SM	350	8			8			Good	C		1	4.2
684	Norway Maple	SM	260	7			7			Good	C		2	4.2
685	Ash	SM	300	7			7			Good	C		2	3.6
686	Norway Maple	SM	300	7			6			Good	C		2	3.6
687	Birch	IM	150	6			3			Good	C		2	1.8
688	Birch	IM	200	6			4			Good	C		2	2.4
689	Birch	IM	190	6			4			Good	C		2	2.4
690	Norway Maple	SM	400	8			9			Poor	B	Poor form	3	-
691	Norway Maple	SM	300	9			8			Good	C		2	3.6
692	Norway Maple	SM	320	8			7			Good	C		2	3.9
693	Norway Maple	SM	300	8			7			Good	C	Could remove or thin	3	3.6
694	Norway Maple	SM	290	9			9			Good	C		2	3.6
695	Norway Maple	SM	400	8			7			Poor	B	Poor form	2	4.8
696	Norway Maple	SM	280	8			7			Poor	B	Poor form/fork	3	-
697	Norway Maple	SM	290	7			6			Good	C		1	3.3
698	Norway Maple	IM	280	7			6			Good	C		2	3.3
699	Field Maple	M	320	8			6			Good	C	Good tree	2	3.9
700	Field Maple	M	300	8			6			Good	C	Good tree	2	3.6
701	Norway Maple	SM	280	7			7			Good	C	Could thin	2	3.3
702	Norway Maple	SM	300	7			7			Poor	B	Poor form	3	-
703	Norway Maple	SM	250	7			7			Good	C		2	3.0
704	Norway Maple	SM	260	8			7			Good	B	Good form. Could thin	2	3.3
705	Norway Maple	SM	250	8			6			Good	C		2	3.0
706	Lime	SM	350	10			8			Good	C		2	4.2
707	Birch	SM	250	8			3			Good	C		2	3.0
708	Lime	SM	350	8			7			Fair	B	Close to bank. Leaning	3	-
709	Lime	SM	320	8			7			Good	C	Good form	2	3.9
710	Lime	SM	320	8			7			Good	C		2	3.9
711	Lime	SM	300	8			7			Fair	C	Forked	3	-

Read in conjunction with drawing C_000_011_TS Plastic Tag Colour - Green

No.	Species	Age Class	Girth (mm)	Height (m)	Spread (m)					Condition	Risk Code	Comments	Rec	RPA (m)
					N	E		S	W					
712	Lime	SM	450	9			7			Poor	A	Rot at base	3	-
713	Lime	SM	150	5			3			Poor	B	Suppressed	2	1.8
714	Aspen	M	400	11			8			Good	C	Good tree	1	4.8
715	Ash	SM	250	6			4				B	Suppressed	2	3.0
716	Lime	SM	280	9			5			Good	C		2	3.3
717	Lime	SM	350	10			6			Good	C		2	4.2
718	Lime	SM	250	7			5			Fair	B	Suppressed	3	-
719	Aspen	IM	440	11			8			Good	C		2	5.4
720	Aspen	M	400	12			8			Good	C		2	4.8
721	Norway Maple	SM	400	10			8			Good	C		2	4.8
722	Lime	M	450	11			9			Good	C		2	5.4
723	Lime	SM	400	10			8			Fair	B	Forked	2	4.8
724	Rowan	M	250	7			6			Good	C		1	3.0
725	Rowan	M	250	7			6			Good	C		1	3.0
726	Maple	SM	350	9			7			Poor	B	Damaged base	3	-
727	Maple	SM	360	9			7			Poor	B	Damaged base	3	-
728	Lime	M	680	12			10			Good	C		1	8.1
729	Norway Maple	SM	360	9			8			Good	C		1	4.2
730	Rowan	M	240	7			6			Good	C		1	2.7
731	Norway Maple	SM	380	11			8			Good	C		1	4.5
732	Norway Maple	SM	400	10			8			Fair	B		3	-
733	Ash	SM	400	11			9			Good	C		1	4.8
734	Norway Maple	SM	380	11			9			Fair	B	Forked. Poor form	3	-
735	Field Maple	SM	420	11			9			Fair	B	Damaged stem	3	-
736	Oak	SM	320	9			5			Fair	B	Poor form	2	3.9
737	Horse Chestnut	SM	280	9			4			Good	B	Thin out	3	-
738	Horse Chestnut	SM	330	9			6			Fair	B	Thin out/Damaged stems	3	-
739	Norway Maple	SM	250	9			6			Good	C		2	3.0
740	Norway Maple	SM	340	10			8			Good	C		2	4.2
741	Field Maple	SM	300	9			5			Good	C		2	3.6
742	Norway Maple	SM	280	8			5			Good	C		2	3.3

Read in conjunction with drawing C_000_011_TS

Plastic Tag Colour - Green

No.	Species	Age Class	Girth (mm)	Height (m)	Spread (m)					Condition	Risk Code	Comments	Rec	RPA (m)
					N	E		S	W					
743	Norway Maple	SM	200	9			6			Good	C		2	2.4
744	Norway Maple	M	500	11			10			Poor	B	Poor form	3	-
745	Norway Maple	SM	240	10			5			Good	C		2	3.0
746	Norway Maple	SM	230	10			5			Good	C		2	2.7
747	Horse Chestnut	SM	350	11			8			Poor	B	Poor form	3	-
748	Field Maple	M	320	11			8			Good	C		2	3.9
749	Norway Maple	SM	380	10			8			Poor	B	Poor form	3	-
750	Lime	SM	280	10			9			Good	C		2	3.3
751	Norway Maple	SM	480	12			10			Poor	B	Poor form	3	-
752	Field Maple	M	320	10			7			Good	C		2	3.9
753	Field Maple	M	480	11			8			Good	C		1	5.4
754	Horse Chestnut	SM	360	9			9			Good	C		2	4.2
755	Field Maple	M	440	10			8				C		1	5.4
756	Field Maple	M	400	10			9			Good	C		1	4.8
757	Norway Maple	SM	400	12			10			Good	C		2	4.8
758	Norway Maple	SM	400	12			10			Poor	B		3	-
759	Norway Maple	SM	400	12			10				C		1	4.8
760	Norway Maple	SM	430	11			8			Fair	B	Poor form	3	-
761	Norway Maple	SM	380	10			6			Fair	C	Close to facilities	3	-
762	Norway Maple	SM	380	10			8			Good	C		1	4.5
763	Norway Maple	SM	350	10			6			Good	C		1	4.2
764	Lime	SM	400	9			8			Good	C		1	4.8
765	Norway Maple	SM	360	10			8			Fair	B	Poor form	2	4.2
766	Norway Maple	SM	300	10			6			Fair	B	Close to river	2	3.6
767	Norway Maple	SM	250	10			8			Fair	B	Damaged. NO TAG	2	3.0
768	Alder	M	400	10			10			Good	C	3 stems (1 sycamore). NO TAG	2	4.8
769	Sycamore	SM	280	10			3			Poor	B	Poor form	3	-
770	Ash	M	450	5			3			Fair	C	Pollarded	2	5.4
771	Ash	IM	300	10			4			Good	B	Can't reach potential	3	-
772	Ash	IM	200	9			4			Good	B	Can't reach potential	3	-
773	Ash	IM	350	10			8			Fair	B	Won't reach potential	3	-

Read in conjunction with drawing C_000_011_TS

Plastic Tag Colour - Green

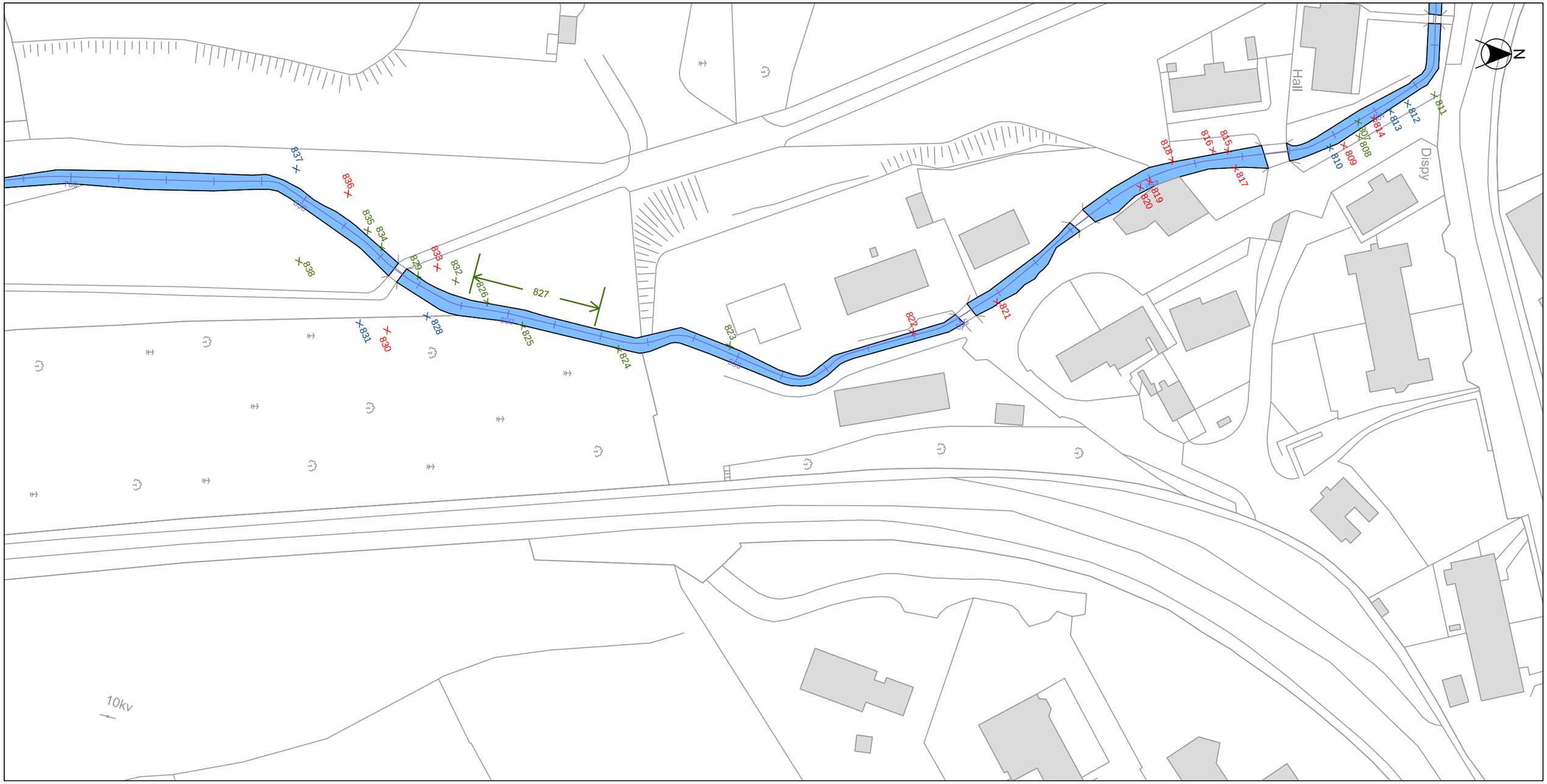
No.	Species	Age Class	Girth (mm)	Height (m)	Spread (m)					Condition	Risk Code	Comments	Rec	RPA (m)
					N	E		S	W					
774	Sycamore	IM	350	11			9			Fair	B	Won't reach potential	3	-
775	Sycamore	IM	150	7			3			Fair	B	Won't reach potential	3	-
776	Ash	IM	200	7			5			Fair	B	Won't reach potential	3	-
777	Ash	IM	200	8			5			Fair	B	Won't reach potential	3	-
778	Sycamore	M	400	15			10			Fair	B	4 stems	3	-
779	Alder	M	400	15			10			Fair	C	4 stems	1	4.8
780	Alder	M	800	15			15			Good	C	2 stems	1	9.6
781	Alder	M	500	15			10			Good	C		1	6.0
782	Alder Sycamore Elder	M SM M	300 300 150	15			10			Fair		Could be retained but not if RPA is compromised	2	3.6
783	Sycamore	SM	230	12			10			Fair		4 stems	2	2.7
784	Alder	M	320	10			8			Fair		2 stems	2	3.9
785	Red Oak	SM	320	10			10			Good	C		2	3.9
786	Rowan	M	250	8			6			Fair	B	End of lifespan	2	3.0
787	Lime	SM	350	10			10			Good	C	Poor form	2	4.2
788	Beech	SM	360	10			10			Good	C	Poor form	2	4.5
789	Horse Chestnut	SM	480	10			12			Poor	B	Poor health (Cankered)	3	-
790	Horse Chestnut	SM	300	6			10			Poor	C	Poor form	3	-
791	Western Red Cedar	M	900	20						Fair	B	Reduce crown SURGERY	1	10.8
792	Western Red Cedar	M	840	20			6			Fair	B	Reduce crown SURGERY	1	10.2
793	Ash	SM	280	9			5			Good	C		3	-
794	Elder	M	450	8			5			Good	C		3	-
795	Ash	SM	300	8			6			Poor	B	Cankered. Poor form	3	-
796	Birch	M	300	10			9			Good	C		2	3.6
797	Alder	SM	240	8			7			Good	C	3 stems	2	3.0
798	Alder		320							Fair	B		2	3.9
799	Black Poplar	M	600	25			8			Good	C	SURGERY Reduce crown 30 %	2	7.2
800	Black Poplar	M	500	25			10			Fair	B	GROUP of 3 trees (1 poor tree) SURGERY reduce 30 %	2	6.0
801	Alder	SM	200	8			5			Good	C	3 stems	2	2.4
802	Atlantic Cedar	SM	230	10			5			Fair	C		2	2.7

Read in conjunction with drawing C_000_011_TS

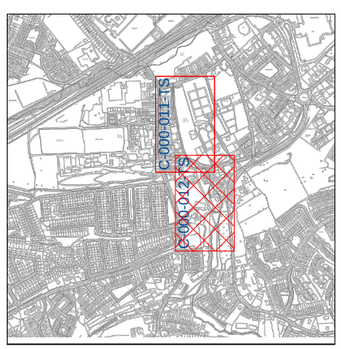
Plastic Tag Colour - Green

No.	Species	Age Class	Girth (mm)	Height (m)	Spread (m)					Condition	Risk Code	Comments	Rec	RPA (m)
					N	E		S	W					
803	Beech	M	850	20			15			Good	C	Damage to stem (Reduce crown 30 % - SURGERY)	1	10.2
804	Rowan	M	350	8			5			Good	C		2	4.2
805	Norway Maple	SM	300	10			9			Good	C		1	3.6
806	Horse Chestnut	SM	400	10			9			Good	C		2	4.8
811	Beech	M	700	22			10			Fair	B	Not tagged. On corner. Crown reduction 30 %	1	8.4

Douglas FRS - Arborist Survey



Key Plan - Douglas OSI



Key to Plan

Recommendations

- Retain (1)
- Retain if possible (2)
- Remove (3)

- 171 — Location of groups of trees (Colour reflects category unless otherwise stated)
- Watercourse
- Channel centre line & chainage

Drawing No.: C-000-012 TS (04/04/2017)-Tree Survey (Not to Scale)

DIXON BROSNAN
ENVIRONMENTAL CONSULTANTS

Read in conjunction with drawing C_000_012_TS Plastic Tag Colour - Green

No.	Species	Age Class	Girth (mm)	Height (m)	Spread (m)					Condition	Risk Code	Comments	Rec	RPA (m)
					N	E		S	W					
807	Holly	M	200	8			4			Good	C	2 stems	1	2.4
808	Ash	SM	300	15			10			Fair	B	2 trees - Over stream and road	1	3.6
809	Holly	M	280	10			8			Fair	B	Undermined. 3 stems	3	-
810	Sycamore	IM	200	6			3			Fair	B		2	2.4
811	Beech	M	700	22			10			Fair	B	Not tagged. On corner. Crown reduction 30 %	1	8.4
812	Beech	M	750	22			10			Fair	B	Thin crown or fell.	2	9.0
813	Beech	M	400	18				8		Fair	B	Thin crown or fell	2	4.8
814	Elm	SM	300	15				8		Dead	A	Dead	3	-
815	Alder	M	430	12			8			Good	A	In retaining wall	3	-
816	Sycamore	SM	350	12		8				Fair	A	In retaining wall	3	-
817	Alder	IM	200	5			5			Por	A	Remove	3	-
818	Alder	IM	200	9			5			Fair	A	In retaining wall	3	-
819	Willow	SM	150	7			5			Fair	B		3	-
820	Sycamore	IM	200	7			5			Fair	B		3	-
821	Sycamore	SM	300	12			10			Fair	B	6 stems, In retaining	3	-
822	Alder	IM	150	6			4			Fair	B	4 stools	3	
823	Sycamore	M	400	6			4			Fair	B	3 stools (1 sycamore) Pollarded	1	6.6
824	Sycamore	M	550	18					10	Good	C	In bank	1	7.2
825	Beech	M	600	20			12			Good	C		1	4.8
826	Sycamore	M	400	20			12			Good	C		1	3.6
827	Alder	SM	300	15			10			Good	C	GROUP of 25 trees	1	9.0
828	Beech	M	750	25			12			Good	B	Reduce crown by 20% - SURGERY	2	7.2
829	Alder	M	600	20			10			Good	C		1	4.8
830	Oak	M	800	20	15					Poor	A	Leaning over river	3	
831	Sycamore	M	550	18					15	Good	C	2 stems	2	2.7
832	Plane	SM	220	12					8	Good	C		1	2.4
833	Plane	IM	190	10			5			Poor	C	Damaged stem	3	3.0
834	Alder	SM	250	15			10			Good	C	5 stems	1	3.6
835	Alder	M	300	18			10			Good	C	5 stems	1	3.8
836	Laurel	M	480	5				10		Poor	B	Fallen	3	
837	Lime		840	25		15				Fair	B	Remove trunk over river - SURGERY	2	3.6

Read in conjunction with drawing C_000_012_TS

Plastic Tag Colour - Green

No.	Species	Age Class	Girth (mm)	Height (m)	Spread (m)					Condition	Risk Code	Comments	Rec	RPA (m)
					N	E		S	W					
838	Alder	M	300	15			12			Good	C	Bat boxes present	1	3.8
												GROUP of Alder and Willow		-

Douglas FRS - Arborist Survey

Key Plan - Donnybrook OSI

Key to Plan

Recommendations

- Retain (1)
- Retain if possible (2)
- Remove (3)

171 — Location of groups of trees (Colour reflects category unless otherwise stated)

Watercourse

Channel centre line & chainage

Drawing No.: C-000-0013-TS (04/04/2017)-Tree Survey (Not to Scale)

DIXON BROSNAN
ENVIRONMENTAL CONSULTANTS

Read in conjunction with drawing C_000_013_TS Plastic Tag Colour -Green

No.	Species	Age Class	Girth (mm)	Height (m)	Spread (m)					Condition	Risk Code	Comments	Rec	RPA (m)
					N	E		S	W					
521	Lime	M	400	15			8			Good	C	Muti-Stem 3 Minor	2	6.9
522	Alder	M	300	14			6			Good	C	2 Stems	2	5.1
523	Horse Chestnut	M	420	18			10			Good	C	2 Stems	2	5.1
524	Alder	M	300	15	6					Good	C	-	2	3.6
525	Lime	SM	180	16			4			Fair	C	-	2	2.1
526	Alder	M	420	16	8					Fair	B	Over River(1)	3	-
527	Horse Chestnut	SM	300	15			8			Fair	B	Multi-Stemmed- Cavity	3	-
528	Lime	SM	490	20			10			Good	C	Multi stemmed	2	8.5
529	Alder	M	400	19			9			Fair	B	2 stems	3	-
530	Horse Chestnut	M	420	20			10			Good	B	Multi-stemmed (5)	3	-
531	Alder	M	370	18			1			Poor	A	-	3	-
532	Alder	M	430	17	12					Fair	A	Over River	3	-
533	Lime	M	400		8					Good	B	2 Stems	3	-
534	Alder	M	460	16			10			Good	C	3 Stems	2	8.1
535	Alder	M	300	17			10			Good	C	-	2	3.6
536	Holly	M	1470	12	8					Fair	B	Over River	3	-
537	Alder	M	420	18			10			Good	C	-	2	5.1
538	Ash	M	200	17			8			Good	C	-	2	2.4
539	Ash	M	300	18			10			Good	C	2 Stems	2	4.2
540	Ash	M	370	18			12			Good	C	2 Stems	2	3.0
541	Alder	M	330	18			10			Fair	B	-	3	-
542	Alder	M	400	18			10			Poor	A	Multi-stemmed - Isolated	3	-
543	Alder	SM	250	15			5			Good	C	Surrounded by IM Alder	2	3.0

Appendix 6.5

Screening Report for

Appropriate Assessment

DixonBrosnan

environmental consultants

Project	**Appropriate Assessment Screening Provision of Information for AA Screening for the Douglas Flood Relief Scheme, Co. Cork**
Client	Arup

Project ref	Report no	Client ref	
1722	1722	-	

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Date	Rev	Status	Prepared by	
04/05/17	o	Issue to client	Carl Dixon M.Sc.	

v180907

1. Introduction

The purpose of Appropriate Assessment Screening is to determine, the appropriateness, or otherwise, of the proposed development with respect to the likelihood of significant impacts on any European sites (in view of their conservation objectives, either individually or in combination with other plans or projects, and on the basis of objective information)

This report, contains information to assist the competent authority to undertake screening for AA in respect of the Douglas Flood Relief Scheme (including Togher culvert). This report identifies whether the proposed Douglas Flood Relief Scheme (including Togher culvert) is likely to have a significant effect on Natura 2000 site(s) (European sites). The project is not directly connected with or necessary to the management of any Natura 2000 sites. This report provides information on and appraises the potential for, in view of best scientific knowledge the proposed development to have significant effects, either individually or in combination with other plans or projects, on any European Sites.

The report was prepared by Dixon Brosnan Environmental Consultants.

This report should be read in conjunction with all documentation accompanying the application for consent for the proposed development.

2. Background and legislative context

Article 6(3) of *Council Directive 92/43/EEC of 21 May 1992 on the Conservation of Natural Habitats and of Wild Fauna and Flora* (as amended) (hereafter 'the Habitats Directive') requires that, any plan or project not directly connected with or necessary to the management of a designated 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. For the purposes of the application for permission in respect of the proposed project, the requirements of Article 6(3) have been transposed into Irish law by Part XAB of the Planning and Development Act 2000, as amended.

The possibility of there being a significant effect on a designated or "European" site will generate the need for an appropriate assessment to be carried out by the competent authority for the purposes of Article 6(3). As set out in Section 177U of the Planning and Development Act 2000 as amended, a screening for appropriate assessment of an application for consent for the proposed development must be carried out by the competent authority to assess, in view of best scientific knowledge, if the proposed development, individually or in combination with another plan or project is likely to have a significant effect on any European site. A Stage Two Appropriate Assessment is required if it cannot be excluded, on the basis of objective information, that the proposed development, individually or in combination with other plans or projects, will have a significant effect on a European site. The first (Screening) Stage for appropriate assessment operates merely to determine whether a (Stage Two) Appropriate Assessment must be undertaken on the implications of the plan or project for the conservation objectives of relevant European sites.

2.2 Appropriate Assessment Procedure

The assessment requirements of Article 6(3) establish a stage-by-stage approach. This assessment follows the stages outlined in the 2001 European Commission publications "*Assessment of plans and projects significantly affecting Natura 2000 sites: methodological*

guidance on the provisions of Articles 6(3) and 6(4) of the Habitats Directive 92/43/EEC" (2001) and *Managing Natura 2000 Sites: the provisions of Article 6 of the 'Habitats' Directive 92/43/EEC (Draft)* Office for Official Publications of the European Communities, Luxembourg (EC, 2015);

The stages are as follows:

Stage One: Screening — the process which identifies any appreciable impacts upon a Natura 2000 site of a project or plan, either alone or in combination with other projects or plans, and considers whether these impacts are likely to be significant;

Stage Two: Appropriate assessment — the consideration of the impact on the integrity of the Natura 2000 site of the project or plan, either alone or in combination with other projects or plans, with respect to the site's structure and function and its conservation objectives. Additionally, where there are adverse impacts, an assessment of the potential mitigation of those impacts;

Stage Three: Assessment of alternative solutions: The process which examines alternative ways of achieving the objectives of the project or plan that avoid adverse impacts on the integrity of the Natura 2000 site. It is confirmed that no reliance is placed by the developer on Stage Three in the context of this application for development consent;

Stage Four: Assessment where no alternative solutions exist and where adverse impacts remain — an assessment of compensatory measures where, in the light of an assessment of imperative reasons of overriding public interest (IROPI), it is deemed that the project or plan should proceed (it is important to note that this guidance does not deal with the assessment of imperative reasons of overriding public interest). Again, for the avoidance of doubt, it is confirmed that no reliance is placed by the developer on Stage Four in the context of this application for development consent

Documentation/guidelines of relevance to this report include the following:

- European Commission, 2001. *Assessment of plans and projects significantly affecting Natura 2000 sites: Methodological guidance on the provisions of Articles 6(3) and (4) of the Habitats Directive 92/43/EEC.* Office for Official Publications of the European Communities, Brussels (EC, 2001);
- European Commission, 2000a. *Communication from the Commission on the Precautionary Principle.*, Office for Official Publications of the European Communities, Luxembourg (EC, 2000a);
- *Managing Natura 2000 Sites: the provisions of Article 6 of the 'Habitats' Directive 92/43/EEC (Draft)* Office for Official Publications of the European Communities, Luxembourg (EC, 2015);
- *Managing Natura 2000 Sites: the provisions of Article 6 of the 'Habitats' Directive 92/43/EEC (EC, 2000)*
- Guidance document on Article 6(4) of the 'Habitats Directive' 92/43/EEC – Clarification of the concepts of: alternative solutions, imperative reasons of overriding public interest, compensatory measures, overall coherence, opinion of the commission; (EC, 2007);
- *Appropriate Assessment of Plans and Projects in Ireland. Guidance for Planning Authorities*. Department of the Environment, Heritage and Local Government, Dublin (DEHLG, 2010a);

- Department of Environment Heritage and Local Government Circular NPW 1/10 and PSSP 2/10 on Appropriate Assessment under Article 6 of the Habitats Directive – Guidance for Planning Authorities (DEHLG, 2010b);
- *Interpretation Manual of European Union Habitats. Version EUR 28*. European Commission (EC, 2013);
- Guidelines for Ecological Impact Assessment in the United Kingdom (Institute of Ecology and Environmental Assessment, 2006)

This AA screening report provides the relevant ecological information on the proposed project to assist the planning authority to screen the project, to determine if an Appropriate Assessment is required and ultimately to make a determination in relation to the likely impact on Natura 2000 sites. This report was prepared by Carl Dixon MSc. (Ecological Monitoring) who has prepared Screening/NIS's for a range of small and large scale projects.

The screening for AA test has been addressed in this report as follows:

- Establishing whether the proposed development is directly connected with or necessary to the conservation management of any European Sites;
- Describing the proposed development;
- Defining the Zone of Influence (ZoI) of the proposed development. The ZoI is defined through identifying potential impact pathways between the proposed development and any European Sites, in consideration of the nature of the proposed development and how it could affect European Sites' conservation objectives.
- Identifying the European Sites which lie within the ZoI of the proposed development and are potentially, or likely, to be subject to significant effects in view of their conservation objectives which, in general terms, relate to maintaining or restoring the favourable conservation condition of the species and habitats for which the European Sites are designated; and
- Identifying any other plans or projects that may act in-combination to significantly affect any European Sites

2.3 Desktop Study

A desktop review facilitates the identification of the baseline ecological conditions and key ecological issues relating to Natura 2000 sites and facilitates an assessment of potential in-combination impacts. Sources of information used for this review include information from statutory and non-statutory bodies. The sources of information and relevant documentation which were utilised are as follows:

- National Parks & Wildlife Service (NPWS) - www.npws.ie including qualifying interests and conservation objectives for Natura 2000 sites.
- Environmental Protection Agency (EPA) – www.epa.ie
- Cork City Council Cork City Development Plan 2015-2021
- National Biodiversity Data Centre – www.biodiversityireland.ie
- Google Maps aerial photography
- Douglas Flood Relief Scheme (including Togher Culvert) EIS (Arup May 2017)
- County Cork Biodiversity Action Plan 2009-2014 (Cork County Council, 2009);

3. Screening of proposed development

The proposed development is not directly connected with or necessary to the conservation management of any European Sites.

3.1 Proposed development

The proposed flood relief scheme areas will be located in Togher along the Tramore River and in Douglas along the Grange Stream and Ballybrack Stream. The Grange and Ballybrack streams are tributaries to the Tramore River, which flows to Lough Mahon in Cork Harbour. Refer to **Figure 1.1.** The proposed works area in Togher is approximately 2.8km south of Cork city centre. The proposed works area in Douglas is to the south and within Douglas village and approximately 3.4km southeast of Cork city centre. All of these waterways flow through heavily urbanised areas with residential housing estates, industrial estates, shopping centres, sports facilities and public parks. The proposed scheme drawings are presented in **Appendix 3.1** of the EIS.

The proposed works will impact on existing structures including river bank walls, culverts, bridges and roads and will impact on bankside vegetation. Excavation of soil and river bank material will be required for foundations, regrading, river widening and deepening, and trash screen construction. Channel realignment will require excavation and regrading of the existing channel. Excavated material will be reused on-site or in the wider flood relief works areas where possible, for example in embankments. A detailed description of the scheme is presented in **Chapter 3 (Description of the Proposed Scheme)** in the EIS prepared for this project.

The main aspects of the proposed flood relief scheme comprise construction works entailing the following:

- Construction of new flood defence walls and/or replacement of existing walls with new flood defence walls
- Replacement of and/or extension of existing culverts
- Removal of and/or replacement of bridges
- Removal of existing trash screens and construction of new coarse screens
- Local channel widening, deepening, realignment and regrading of river channel
- Construction of new earthen flood defence embankment
- Provision of civil works such as road/footpath re-grading at a number of locations;
- Removal of vegetation and trees to facilitate construction works
- Protecting drainage outlets along the line of flood defence works with non-return flap valves;
- Once construction is completed, ongoing maintenance of the river channel, trash screens etc.

The following precautionary measures will be implemented as part of the project design. These measures are implemented as standard for construction projects of this type. This will be developed further prior to construction into a detailed Construction and Environmental Management Plan (CEMP) by the appointed Contractor. No impediments to the effective implementation of these measures have been identified.

Protection of habitats

- To prevent incidental damage by machinery or by the deposition of spoil during the site clearance stage, any trees earmarked for retention will be securely fenced early

in the construction phase. A tree survey has been carried out for the site which specifies which trees should be retained where it is feasible to do so. All of the trees which can be retained will be clearly marked with hazard tape and the contractor will be made aware of the necessity of protecting the root structure from machinery damage.

- Inadvertent damage to river banks on the margins of the works area or damage to vegetation can destabilise river banks and result in long term erosion and siltation. It is important therefore that the works area is adequately fenced and that works are confined to the works area. Access routes will also be clearly defined.

Invasive species

- The preferred treatment method for Japanese Knotweed is to treat an infestation in situ as this minimises the risk of spreading the plant. Surveys in 2016 and 2017 indicate that the initial treatments did not kill off this species where it occurs, with some regrowth noted. However, further treatments would be expected to significantly reduce the vigour of this species and may be sufficient to eradicate it from the works area before works commence.

- To minimise risks in the longer term a monitoring programme will be put in place for three years following the completion of site works. Where Japanese Knotweed re-emerges within the works area an in-situ herbicide treatment programme will be implemented.

- The required measures for prevention of the spread of this species will be specified by an invasive species management plan based on the most up to date information prior to the commencement of treatment.

- The management plan will make reference to and use of relevant guidelines including Best Practice Management Guidelines – Invasive Species Ireland (Maguire et al. 2008), NRA (2010), Best Practice Management Guidelines Japanese knotweed Fallopia japonica (2008) prepared for NIEA and NPWS as part of Invasive Species Ireland. Appropriate methods are also outlined in Irish Water guidelines, (Irish Water Report Information and Guidance Document on Japanese Knotweed Asset Strategy and Sustainability).

- The management plan will take account of a range of factors including the timeframe in which the work needs to be completed, structural or environmental/ecological features (e.g. watercourses, treelines nesting birds), designated sites, availability of storage areas for contaminated spoil on or off site, access issues and agreement with landowners, seasonal restrictions to work and financial constraints.

Protection of water quality

The employment of good construction management practices will minimise the risk of pollution of soil, storm water run-off, seawater or groundwater. The Construction Industry Research and Information Association (CIRIA) in the UK has issued a guidance note on the control and management of water pollution from construction sites, *Control of Water Pollution from Construction Sites, guidance for consultants and contractors (Masters-Williams et al 2001).* Additional guidance is provided in the CIRIA technical guidance on *Control of Water Pollution from Linear Construction Projects* (Murnane *et al* 2006). Measures

that will be implemented to minimise the risk of spills and contamination of soils and waters, include:

- Training of site managers, foremen and workforce, including all subcontractors, in pollution risks and preventative measures,

- Careful consideration will be given to the location of any fuel storage facilities. These will be designed in accordance with guidelines produced by CIRIA, and will be fully bunded.

- Vehicles will not be left unattended during refuelling.

- All vehicles and plant will be regularly inspected for fuel, oil and hydraulic fluid leaks. Suitable equipment to deal with spills will be maintained on site.

- Where feasible, soil excavation will be completed during dry periods and undertaken with excavators and dump trucks. Topsoil and subsoil will not be mixed together.

- Adequately size spill kits will be provided.

- Silt curtains will be installed within the works area during instream works. These silt curtains must be effectively installed and must be monitored and maintained during works to ensure they are operating effectively.

- Ensure that all staff are trained and follow vehicle cleaning procedures. Wash down from machinery and concrete trucks must be prevented from entering watercourses. Wash-down should take place well away from the river or in the site compound area provided a sedimentation area is provided.

- Construction works, especially works that involve the pouring of concrete must be conducted under dry conditions.

- Any stripping of areas of topsoil is to be avoided unless absolutely necessary and if unavoidable, the areas concerned are to be kept to a minimum.

- Where temporary stockpiling of topsoil or riverbed material is required, the material should be stockpiled in areas which are not liable to flood and where the risk to water quality is minimised. Geotextile should be used to cover stockpiles to prevent erosion.

- Weather forecasts will be checked daily to allow appropriate measures to be taken to mitigate against any negative impact resulting from heavy rainfall.

- Works will be carried out in line with the specifications of detailed method statements.

- The works will be supervised by a suitably qualified ecologist who will ensure that adequate mitigation is being implemented and who can advise on changes to same where required.

Waste management

- A construction and demolition waste management plan will be developed and maintained by the main contractor prior to construction works commencing on site.

The Plan will meet the requirements of the DoEHLG *Best Practice Guidelines on the Preparation of Waste Management Plans for Construction & Demolition Projects*.

3.2 Natura 2000 sites

The proposed development is not directly connected with, or necessary for, the management of any Natura 2000 site. No habitat loss will occur within any Natura 2000 site as a result of this proposed development.

Natura 2000 sites (European sites) are only at risk from significant effects where a source-pathway-receptor link exists between a proposed development and a Natura 2000 site(s). This can take the form of a direct impact (e.g. where the proposed development and/or associated construction works are located within the boundary of the Natura 2000 site(s) or an indirect impact where impacts outside of the Natura 2000 site(s) affect ecological receptors within (e.g. impacts to water quality which can affect riparian habitats at a distance from the impact source).

Considering the Natura 2000 sites present in the region, their Qualifying Interests (QIs) and conservation objectives, and any potential impact pathways that could link those sites to the proposed development area, a distance of 15km was considered appropriate to encompass all Natura 2000 sites potentially within the Zone of Influence (ZoI) of the proposed development.

Thus any appreciable direct, indirect or cumulative impacts which could arise from the proposed development in relation to the designated sites within this zone were considered. Given the limited scale of this proposed development, any adverse impacts on Natura 2000 sites are considered highly unlikely. It is noted that local potential ecological impacts within the development site itself, which is not designated as a European site, are considered in detail by Chapter 6 (Biodiversity) of the EIS which was submitted for this project.

The closest Natura 2000 site to the proposed works are the Cork Harbour SPA (Site code 004030) and Great Island Channel SAC (Site code 001058). Site synopses for these sites are included in **Appendix 1**. There is a direct hydrological connection between the proposed works and these designated sites. A list of the Natura 2000 sites within 15km of the proposed development area is given below in **Table 2**. The approximate location of the proposed works area, in relation to the closest designated sites, is shown in **Figure 1.**

Table 2 Designated areas and their location relative to the proposed works area.

Site Name	Designation	Code	Distance from Togher works area	Distance from Douglas works area	Distance from closest works area
Special Protection Area (SPA)					
Cork Harbour	SPA	004030	3.8km E	0.4km E	0.4km E
Special Area of Conservation (SAC)					
Great Island Channel	SAC / pNHA	001058	10.5km E	6.9km E	6.9km E

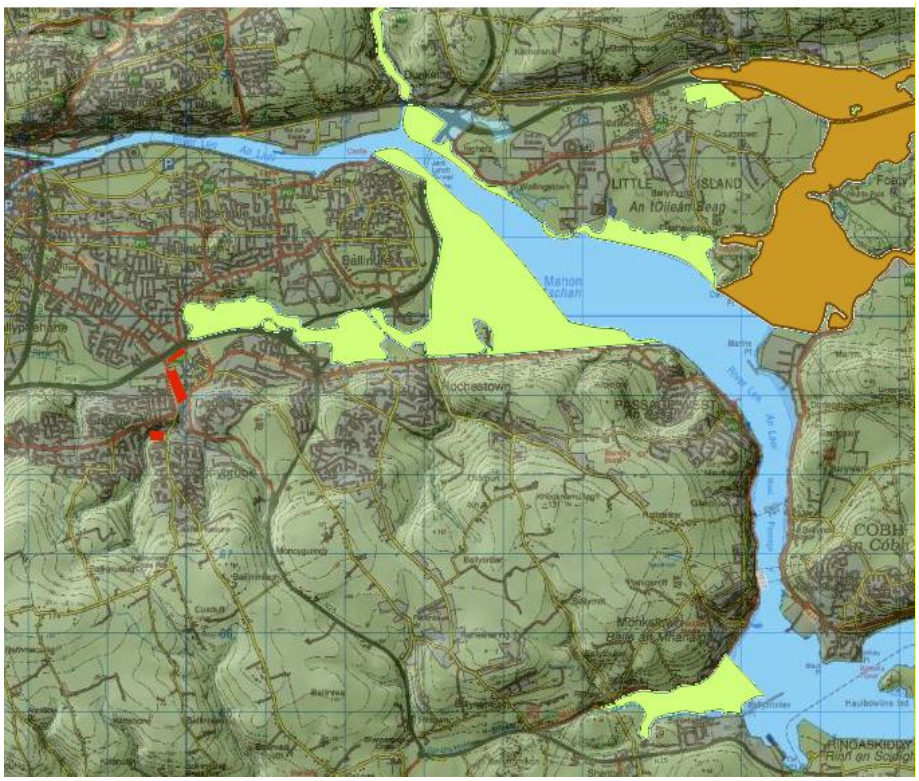

Figure 1 shows the approximate location of the closest works area in Douglas (shaded red, not to scale) in relation to the Cork Harbour SPA (shaded yellow) and Great Island Channel SAC (shaded orange).

3.3 Natura 2000 sites – Features of interests and conservation objectives.

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 at favourable conservation status sites designated as Special Areas of Conservation and Special Protection Areas. 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, is stable or increasing, and the ecological factors that 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 data on the species concerned indicate that it is maintaining itself, and the natural range of the species is neither being reduced or 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. The species listed as qualifying interests for the Cork Harbour SPA and specific

conservation objectives are included in **Table 2** below. The qualifying interests for the Great Island Channel SAC and the relevant conservation objectives are listed in **Tables 3** below.

Table 2: Qualifying Species and Conservation Objectives.

Name	Species		Conservation Objective
Cork Harbour SPA	Little Grebe	*Tachybaptus ruficollis*	Maintain
Cork Harbour SPA	Great Crested Grebe	*Podiceps cristatus*	Maintain
Cork Harbour SPA	Cormorant	*Phalacrocorax carbo*	Maintain
Cork Harbour SPA	Grey Heron	*Ardea cinerea*	Maintain
Cork Harbour SPA	Shelduck	*Tadorna tadorna*	Maintain
Cork Harbour SPA	Wigeon	*Anas penelope*	Maintain
Cork Harbour SPA	Teal	*Anas crecca*	Maintain
Cork Harbour SPA	Pintail	*Anas acuta*	Maintain
Cork Harbour SPA	Shoveler	*Anas clypeata*	Maintain
Cork Harbour SPA	Red-breasted Merganser	*Mergus serrator*	Maintain
Cork Harbour SPA	Oystercatcher	*Haematopus ostralegus*	Maintain
Cork Harbour SPA	Golden Plover	*Pluvialis apricaria*	Maintain
Cork Harbour SPA	Grey Plover	*Pluvialis squatarola*	Maintain
Cork Harbour SPA	Lapwing	*Vanellus vanellus*	Maintain
Cork Harbour SPA	Dunlin	*Calidris alpina*	Maintain
Cork Harbour SPA	Black-tailed Godwit	*Limosa limosa*	Maintain
Cork Harbour SPA	Bar-tailed Godwit	*Limosa lapponica*	Maintain
Cork Harbour SPA	Curlew	*Numenius arquata*	Maintain
Cork Harbour SPA	Redshank	*Tringa totanus*	Maintain
Cork Harbour SPA	Black-headed Gull	*Chroicocephalus ridibundus*	Maintain
Cork Harbour SPA	Common Gull	*Larus canus*	Maintain
Cork Harbour SPA	Lesser Black-backed Gull	*Larus fuscus*	Maintain
Cork Harbour SPA	Common Tern	*Sterna hirundo*	Maintain
Cork Harbour SPA	Wetland and Waterbirds		Maintain

Table 3. Qualifying interests for the Great Island Channel SAC (001058)

Habitat Code	Habitat	Conservation objectives
1140	Mudflats and sandflats not covered by seawater at low tide	Maintain
1330	Atlantic salt meadows (Glauco-Puccinellietalia maritimae)	Restore

4. Water Quality Data

There is no biological data available for the Tramore River, Grange Stream and Ballybrack stream (i.e EPA Q values) as these watercourses are not included in the standard EPA water monitoring programme. However, the Tramore River is believed to have suffered a degree of water quality impairment in the past. An overview of the hydrological features within the study area is shown below in **Figure 2.**

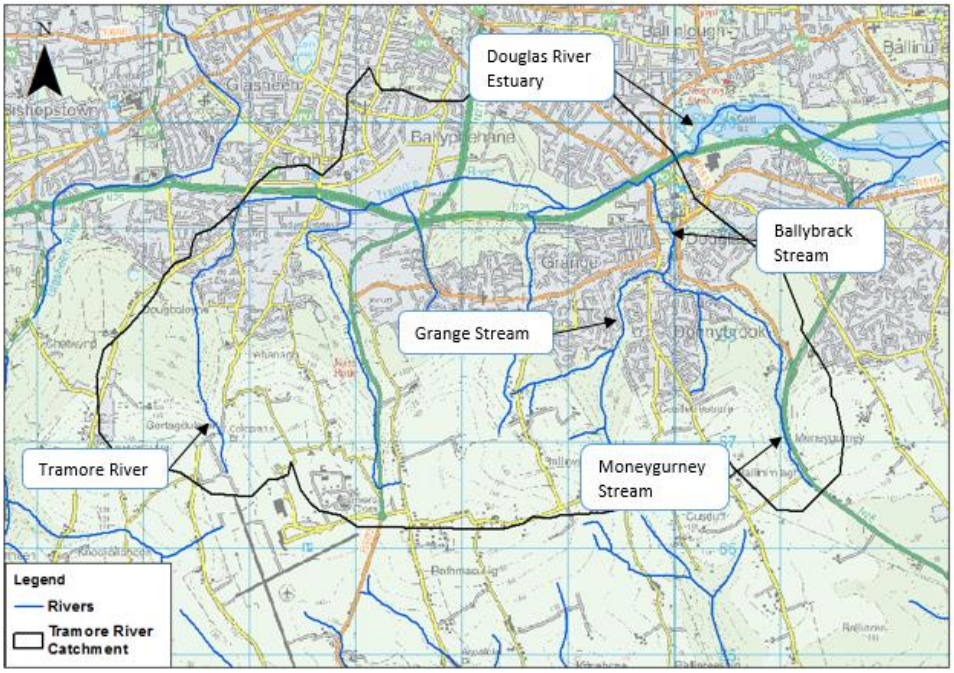

Figure 2 Hydrological Features

The Kinsale Road Landfill is located at the Tramore Valley Park, off the Kinsale Road and the Tramore River flows around the southern section of the site before flowing through Douglas. Information from three sampling events at three locations in 2015 is generally indicative of satisfactory water quality with only one slightly elevated BOD reading (4.3 mg/l). A high degree of variation was recorded in pH levels, however results do not indicate significant water quality issues.

Table 4. Surface water quality results (summarised). Source: Kinsale Road Landfill AER (2015) under the EPA waste licence No. W0012-03.

Sampling Point	Sampling Date	pH	BOD (mg/l)
EM2	11/03/2015	7.67	1
	08/09/2015	8.06	1.7
	01/12/2015	7.71	1.2
EM10	11/03/2015	7.71	2.5
	08/09/2015	8.33	2.9
	01/12/2015	7.53	1.6
EM11	11/03/2015	7.22	4.3
	08/09/2015	8.41	1.1
	01/12/2015	8.11	1.2

In estuarine waterways, the EPA rates water quality as Unpolluted, Intermediate, Potentially Eutrophic and Eutrophic. The former two are indicative of acceptable estuarine water quality, while the latter two water quality ratings are considered as unsatisfactory. **Table 5** displays the results for Lough Mahon into which the relevant watercourses ultimately discharge.

Table 5. EPA Water Quality Status

Area	Water quality status
Lough Mahon	Estuarine & coastal water quality – Intermediate

Source: EPA Envision map system

The Water Framework Directive (WFD) is a key initiative aimed at improving water quality throughout the EU. It applies to rivers, lakes, groundwater, and coastal waters. The Directive requires an integrated approach to managing water quality on a river basin basis; with the aim of maintaining and improving water quality. The Directive requires that management plans be prepared on a river basin basis and specifies a structured approach to developing those plans. It requires that a programme of measures for improving water quality be brought into effect.

Specifically, the WFD aims to: protect/enhance all waters (surface, ground and coastal waters); achieve "good status" for all waters, manage water bodies based on river basins (or catchments); involve the public; and streamline legislation.

The Water Frameworks Directive assesses the water quality of rivers and ranks their status as follows: High, Good, Moderate, Poor, Bad and Yet to be determined. The Water Frameworks Directive also determines the "Risk" level of a river as follows: 1a – At risk of not achieving Good Status, 1b – Probably at risk of not archiving Good Status, 2a – Expected to achieve Good Status and 2b – strongly expected to achieve Good Status. Relevant data for surface waters within the study area, where available, are given in **Table 6.**

Table 6. WFD data

Watercourse	Status	Risk
Lough Mahon	Moderate	1a – At risk of not achieving Good Status
SW_Coastalt2_Tramore_1Lower (Includes the lower sections of the Tramore River and the Ballybrack River)	Moderate	1a – At risk of not achieving Good Status

(Source: EPA Envision map system**)**

5. Site inspections

5.1 Habitat mapping

Terrestrial habitat mapping was carried out in line with the methodology outlined in the Heritage Council Publication *Best Practice Guidance for Habitat Survey and Mapping* (Heritage Council, 2011). All habitats within the study area were classified to level 3 of the classification scheme outlined in *A Guide to Habitats in Ireland* (Fossit, 2000) and cross-referenced with habitats listed under Annex I of the Habitats Directive. More detail on the habitats recorded during site surveys are including in **Chapter 6 (Ecology)** of the EIS for this project. No rare or threatened floral species were recorded on, or in the vicinity of the site, nor are they expected to occur given that the habitats within the study area are common and highly modified. All of the terrestrial habitats which were recorded within the construction

area are relatively common and are not of high ecological value. The following habitats were recorded:

- Treelines WL2
- Hedgerow WL1
- Dry meadow and grassy verge GS2
- Stonewalls and other stonework BL1
- Wet willow-alder-ash woodland WN6
- Mixed broadleaved woodland WD1
- Amenity grassland GA2
- Scattered trees and parkland WD5
- Buildings and artificial surfaces BL3
- Immature woodland WS2

Impacts on these habitats, which range from minor to moderate, will not have a perceptible impact on the qualifying interests and conservation objectives for Natura 2000 sites.

5.2 Invasive species

Detailed surveys for invasive species were carried out in 2015 and survey results were updated in 2016. Japanese Knotweed, which was recorded within part of the works area is listed on both the "Most Unwanted: Established Threat" and on the "High Risk: Recorded Species" list compiled by Invasive Species Ireland a joint initiative by the Northern Ireland Environment Agency and NPWS. It is listed under Regulations 49 and 50 of the European Communities (Birds and Natural Habitats) Regulations 2011.

Japanese Knotweed, which was recorded within part of the works area is listed on both the "Most Unwanted: Established Threat" and on the "High Risk: Recorded Species" list compiled by Invasive Species Ireland a joint initiative by the Northern Ireland Environment Agency and NPWS.

Japanese Knotweed is a highly invasive, non-native species which was originally introduced as an ornamental plant but has since spread along transport routes and rivers to become a serious problem. From an ecological viewpoint, it out-competes native species by forming dense stands which suppresses growth of other species. It grows extremely vigorously and can penetrate through small faults in tarmac and concrete and thus can damage footpaths, roads and flood defence structures. As it can survive in poor quality soils, including spoil, it often thrives in brownfield sites and in urban areas.

Herbicide treatment of Japanese Knotweed within the proposed works area has been carried out in proximity to the Ballybrack River within and upstream of the Douglas Community Park. This area was sprayed twice during 2015 as part of a specialised management programme in line with the relevant guidelines. Observations by DixonBrosnan in October 2016 and April 2017 indicate that regrowth has occurred but is less vigorous. An additional area of Japanese Knotweed was also recorded within the works area upstream of the Donnybrook Commercial Centre. The treatment programme will be continued via two treatments in 2017. Refer also to Appendix 4.1 of the EIS which details an outline invasive species management plan for the construction phase.

5.3 Aquatic habitats

The Tramore is a small river, approximately 7.5km in length, which discharges to Cork Harbour in via the Douglas River estuary. Most of its 21km^2 catchment area lies with urban/suburban areas on the outskirts of Cork City and the river has been extensively culverted in Togher. The main channel runs west to east with a low gradient and is joined by a number of tributaries flowing from higher agricultural grassland to the north. Due to a low

gradient, it has a relatively sluggish flow along most of its length. The Grange and Ballybrack streams are tributaries to the Tramore River, which flows to Lough Mahon in Cork Harbour.

Works at St Patrick's Mills will occur adjacent to a tidal section of the river which is characterised by softer substrate with some areas of gravel. Fluctuating silt levels are typical of the tidal sections of rivers. An electrofishing survey of sections of the Tramore River was carried out by DixonBrosnan in 2014. It recorded Brown Trout, European Eel and Three-Spined Stickleback within the main channel.

The Ballybrack Stream is formed by the confluence of the Grange and Moneygurney Streams. It has a relatively natural flow pattern with areas of gravel suitable for salmonid spawning and a well-developed riparian zone. It supports a population of brown trout.

The Grange stream is a small watercourse which runs through a narrow and wooded valley before joining the Ballybrack Stream. Due to its limited size and depth and culverting along part of its length, it has limited fisheries potential.

Aquatic habitats within the study area were classified to level 3 of the classification scheme outlined in *A Guide to Habitats in Ireland* (Fossit, 2000) and cross-referenced with habitats listed under Annex I of the Habitats Directive. The Tramore River is classified as Depositing Lowland River FW1/Tidal River CW2. The Ballybrack Stream and Grange Stream are classified as Depositing Lowland River FW1.

5.4 Bird surveys

Bird surveys were carried out by DixonBrosnan during the period from June to October 2016 in conjunction with habitat surveys. Additional observations were made in April 2017. The bird species noted within the study area consist of a mix of common terrestrial bird species which typically occur in a suburban landscape and more specialised species associated with aquatic habitats. Common bird species recorded during site surveys included Bullfinch, Hooded Crow, Rook, Jackdaw, Magpie, Woodpigeon, Swallow, Dunnock, Great Tit, Long Tailed Tit, Song Thrush, Blue Tit, Greenfinch, Goldfinch, Wren, Robin, Pied Wagtail, Grey Wagtail, Mallard and Blackbird. Overall, the study area is of local value for a range of terrestrial bird species that are relatively common in the Irish countryside. The presence of watercourses provides additional habitat for more specialised species.

Two species were recorded which are listed as qualifying interests for the Cork Harbour SPA, namely Grey Heron and Cormorant. Cormorant was recorded over flying the study area and the relatively shallow watercourses affected by the proposed works are of low value for this species. Heron feed on fish stocks within the Ballybrack Stream and Tramore Rivers.

7. Assessment of Potential Impacts

The potential impacts associated with the proposed development are discussed in the following section with respect to their likelihood to have significant impacts on Natura 2000 sites. As part of the assessment direct, indirect and cumulative impacts were considered. Direct impacts refer to habitat loss or fragmentation arising from land-take requirements for development. Indirect and secondary impacts do not have a straight-line route between cause and effect, and it is potentially more challenging to ensure that all the possible indirect impacts of the project/plan - in combination with other plans and projects have been established. As part of the assessment the potential for impacts associated with the development were reviewed as outlined below:

- Direct Impact-Loss of Habitat

- Indirect impacts from noise and disturbance
- Direct Impact / Indirect -Impacts on water quality and aquatic ecology
- Impacts from the spread of invasive species.
- Cumulative Impacts

7.1 Loss of habitat

Any habitat loss of Natura 2000 sites or deterioration in habitat quality would reduce the extent of habitat available for species. This would decrease the viability of existing habitats and increase the pressure on existing habitat and may result in further deterioration.

The works will be located on small watercourses upstream of Cork Harbour. Thus, there will be no direct impacts on Annex 1 Habitats or habitats listed as qualifying interests for the Great Island Channel SAC. The works will not result in any loss of habitat within Natura 2000 sites.

During works, there will a short-term net loss of feeding habitat for Grey Heron within the works area. However, the loss of habitat is not considered significant in the context of available habitat elsewhere within the same watercourses and within Cork Harbour. Following completion of works fish populations are expected to recover thus restoring habitat value for piscivorous bird species. Therefore, the short-term impact on Grey Heron is predicted to be minor and the long term impact is predicted to be negligible. The overall impact on bird populations within the Cork Harbour SPA is predicted to be negligible.

7.2 Impacts from noise and disturbance

Potentially increased noise and disturbance associated with the site works could cause disturbance/displacement of bird species. If of sufficient severity, there could be impacts on reproductive success.

Theoretically disturbance of important qualifying bird species could occur during construction works. Predicting potential impacts on birds from disturbance can be problematic. Although there are many instances where waterfowl and people appear to co-exist on estuaries, there are widespread examples where effects and impacts of varying severity have been described. Optimal foraging theory is a useful basis from which to understand likely effects of disturbance on feeding. Many studies have shown that birds concentrate where feeding is best. If birds are forced temporarily or permanently to leave these places then there is an increased risk that their foraging ability will suffer. However, the severity of this type of situation and the way is which birds respond; vary in a very complex way. The multiplicity of variables underlying the observed interactions between birds and people makes it difficult to assess the cause and implications of a particular instance of disturbance. The magnitude of disturbance to birds may arise from synergistic effects of more than one activity.

The potential effects and impacts of disturbance have been widely recognised in wildlife conservation legislation, as has the need to develop conservation measures for birds whilst taking human activities into account. Article 4.4 of the Bird's Directive (79/409/EEC) requires member states to "*take appropriate steps to avoid… any disturbances affecting the birds, in so far as these would be significant having regard to the objectives of this Article*". This specifically relates to conservation measures concerning Annex I species.

During the construction stage, there will be short-term increases in noise and activity.

It is noted that the works areas are located in a built-up environment with relatively high existing levels of background noise. The closest works area is located 0.4km from the Cork Harbour SPA. There may be short-term disturbance/displacement of Grey Heron feeding within the Tramore River and Ballybrack Stream, however any such impact will be minor in the short-term and negligible in the long-term.

Given the distance of the proposed development from the Cork Harbour SPA and the background levels of noise to which birds will have become habituated, no impact on bird species listed as qualifying interests for the Cork Harbour SPA will occur.

7.3 Impacts on Water Quality

Potential impacts on aquatic habitats which can arise from this type of development consist of increased silt levels in surface water run-off and inadvertent spillages of hydrocarbons from fuel and hydraulic fluid. Impacts can also arise from cement contamination.

A range of standard environmental control measures will be implemented as part of the project design to reduce the levels of silt reaching the aquatic environments and the levels of silt generated by works will be not be significant in the context of the dilution provided in with the estuary. Estuarine habitats are robust and naturally encounter extreme fluctuations in silt levels to which flora and fauna are naturally habituated.

Given the distance of the Great Island Channel SAC from the proposed works area (6.9km), robust nature of qualifying habitats for this Natura 2000 site (Mudflats and sandflats not covered by seawater at low tide, Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) and the dilution provided in the estuary environment the ecological impact on this SAC is predicted to be negligible.

If of sufficient severity, high levels of silt in surface water run-off can impact on fish species. If of sufficient severity, adult fish which provide food for piscivorous fish listed as qualifying interests for the Cork Harbour SPA (Little Grebe, Great Crested Grebe, Cormorant, Grey Heron, Red Breasted Merganser, Common Tern) could theoretically be affected. Hunting success for piscivorous birds could also potentially be affected by increased turbidity associated with silt run-off from the proposed works. Algal plant communities may also be affected by increased siltation and photosynthesis may be reduced. Given the limited nature of the works however, the robust nature of qualifying habitats and the dilution provided in the estuarine environment any impacts on the Cork Harbour SPA due to elevated silt levels is considered negligible.

High turbidity levels during construction may impact on feeding success for Grey Heron within the Tramore River and Ballybrack Stream. Such an event is unlikely and standard precautionary measures will be implemented during site works. Any such impact will be temporary and minor and will not have a long-term impact on feeding resources for Grey Heron within these watercourses.

Inadvertent spillages of hydrocarbons or other substances during construction could introduce toxic chemicals into the aquatic environment. However, given the distance from estuarine environment, the robust nature of qualifying habitats and the dilution provided in the estuarine environment, any impacts on water quality due to such spills during construction is considered negligible. Nonetheless best practice environmental control measures will be employed as standard during the construction phase of the development as part of the project.

It is concluded therefore that the proposed development will not result in a deterioration in water quality and will not impact on qualifying interests for the Great Island Channel SAC

(Mudflats and sandflats not covered by seawater at low tide Atlantic salt meadows (Glauco-Puccinellietalia maritimae)) or on habitats supporting bird species listed as qualifying interests for the Clonakilty Estuary SPA (Little Grebe, Great Crested Grebe, Cormorant, Grey Heron, Shelduck, Wigeon, Teal, Pintail, Shoveler, Red-breasted Merganser, Oystercatcher, Golden Plover, Grey Plover, Lapwing, Dunlin, Black-tailed Godwit, Bar-tailed Godwit, Curlew, Redshank, Black-headed Gull, Common Gull, Lesser Black-backed Gull, Common Tern and Wetland and Waterbirds).

7.4 Impacts from the spread of invasive species.

It is noted that the qualifying interests for the Great Island Channel SAC (Mudflats and sandflats not covered by seawater at low tide Atlantic salt meadows (Glauco-Puccinellietalia maritimae)) will not be affected by Japanese Knotweed. Similarly, Japanese Knotweed will not become established on mudflat habitat within the Cork Harbour SPA on which important bird populations feed. Although potentially fragments of Japanese Knotweed could become established on the peripheral terrestrial areas of the Cork Harbour SPA this is considered a low risk. A treatment programme is being implemented to control Japanese Knotweed within the works are and this will be continued in 2017. The entire works area will be resurveyed immediately prior to the commencement of works. Refer to Appendix 4.1 of the EIS which details an outline invasive species management plan for the construction phase. The long-term impact from invasive species is predicted to be negligible.

7.5 Cumulative Impacts

Cumulative impacts refer to a series of individually impacts that may, in combination, produce a significant impact. The underlying intention of this in combination provision is to take account of cumulative impacts from existing or proposed plans and projects and these will often only occur over time.

The area surrounding the proposed development is heavily populated with a mixture of residential estates, shops and dwellings. However, in the absence of any significant impact associated with this project due to impacts on water quality or increased noise and disturbance, no potential cumulative impacts have been identified.

8. Conclusions

The proposed works area does not support the habitats or significant numbers of the species for which the Natura 2000 sites were selected. Based on the above, the project does not present any risk of a direct adverse impact on the habitats for which the relevant Natura 2000 sites were selected.

The habitats recorded within the proposed development site boundary are not of significant value for birds listed as qualifying interests for the Cork Harbour SPA. There may be some short-term minor disturbance of Grey Heron along the Tramore River and Ballybrack Stream outside the boundary of the SPA. However, the long-term impact will be negligible.

Given the limited scope of the proposed works, the distance from designated sites, the implementation of standard environmental control measures and the dilution provided in the estuary the impact on water quality is predicted to be negligible.

It is therefore the opinion of Dixon Brosnan Environmental Consultants that it is possible to rule out likely significant impacts on any Natura 2000 site. It is concluded by the authors of this report therefore that the proposed development will not have a significant impact on qualifying interests and conservation objectives for Natura 2000 sites, and that the integrity of these sites will not be adversely affected. No significant direct, indirect or cumulative

impacts on Natura 2000 sites have been identified. It is the opinion of Dixon Brosnan Environmental Consultants that is it is not necessary to undertake any further stage of the Appropriate Assessment process.

Appendix 1 Site Synopses

Cork Harbour Special Protection Area (Site Code 004030)

Cork Harbour is a large, sheltered bay system, with several river estuaries - principally those of the Rivers Lee, Douglas, Owenboy and Owennacurra. The SPA site comprises most of the main intertidal areas of Cork Harbour, including all of the North Channel, the Douglas River Estuary, inner Lough Mahon, Monkstown Creek, Lough Beg, the Owenboy River Estuary, Whitegate Bay and the Rostellan and Poulnabibe inlets.

Owing to the sheltered conditions, the intertidal flats are often muddy in character. These muds support a range of macro-invertebrates, notably *Macoma balthica*, *Scrobicularia plana*, *Hydrobia ulvae*, *Nepthys hombergi, Nereis diversicolor* and *Corophium volutator*. Green algae species occur on the flats, especially *Ulva lactua* and *Enteromorpha* spp. Cordgrass (*Spartina* spp.) has colonised the intertidal flats in places, especially where good shelter exists, such as at Rossleague and Belvelly in the North Channel. Salt marshes are scattered through the site and these provide high tide roosts for the birds. Salt marsh species present include Sea Purslane (*Halimione portulacoides*), Sea Aster (*Aster tripolium*), Thrift (*Armeria maritima*), Common Saltmarsh-grass (*Puccinellia maritima*), Sea Plantain (*Plantago maritima*), Laxflowered Sea-lavender (*Limonium humile*) and Sea Arrowgrass (*Triglochin maritima*). Some shallow bay water is included in the site. Cork Harbour is adjacent to a major urban centre and a major industrial centre. Rostellan Lake is a small brackish lake that is used by swans throughout the winter. The site also includes some marginal wet grassland areas used by feeding and roosting birds.

The site is designated as a Special Protection Area (SPA) under the E.U. Birds Directive, of special conservation interest for the following species: Little Grebe, Great Crested Grebe, Cormorant, Grey Heron, Shelduck, Wigeon, Teal, Pintail, Shoveler, Red-breasted Merganser, Oystercatcher, Golden Plover, Grey Plover, Lapwing, Dunlin, Blacktailed Godwit, Bar-tailed Godwit, Curlew, Redshank, Black-headed Gull, Common Gull, Lesser Black-backed Gull and Common Tern. The site is also of special conservation interest for holding an assemblage of over 20,000 wintering waterbirds. The E.U. Birds Directive pays particular attention to wetlands and, as these form part of this SPA, the site and its associated waterbirds are of special conservation interest for Wetland & Waterbirds.

Cork Harbour is an internationally important wetland site, regularly supporting in excess of 20,000 wintering waterfowl, for which it is amongst the top five sites in the country. The two-year mean of summed annual peaks for the entire harbour complex was 55,401 for the period 1995/96 and 1996/97. Of particular note is that the site supports internationally important populations of Black-tailed Godwit (905) and Redshank (1,782) - all figures given are average winter means for the two winters 1995/96 and 1996/97. At least 18 other species have populations of national importance, as follows: Little Grebe (51), Great Crested Grebe (204), Cormorant (705), Grey Heron (63), Shelduck (2,093), Wigeon (1,852), Teal (922), Pintail (66), Shoveler (57), Red-breasted Merganser (88), Oystercatcher (1,404), Golden Plover (3,653), Grey Plover (84), Lapwing (7,688), Dunlin (10,373), Bartailed Godwit (417), Curlew (1,325) and Greenshank (26). The Shelduck population is the largest in the country (over 10% of national total). The site has regionally or locally important populations of a range of other species, including Whooper Swan (10), Pochard (145) and Turnstone (79). Other species using the site include Gadwall (13), Mallard (456), Tufted Duck (113), Goldeneye (31), Coot (53), Mute Swan (38), Ringed Plover (34) and Knot (38). Cork Harbour is a nationally important site for gulls in winter and autumn, especially Black-headed Gull (4,704), Common Gull (3,180) and Lesser Black-backed Gull (1,440).

A range of passage waders occurs regularly in autumn, including such species as Ruff (5-10), Spotted Redshank (1-5) and Green Sandpiper (1-5). Numbers vary between years and usually a few of each of these species over-winter.

The wintering birds in Cork Harbour have been monitored since the 1970s and are counted annually as part of the I-WeBS scheme.

Cork Harbour has a nationally important breeding colony of Common Tern (3-year mean of 69 pairs for the period 1998-2000, with a maximum of 102 pairs in 1995). The birds have nested in Cork Harbour since about 1970, and since 1983 on various artificial structures, notably derelict steel barges and the roof of a Martello Tower. The birds are monitored annually and the chicks are ringed.

Extensive areas of estuarine habitat have been reclaimed since about the 1950s for industrial, port-related and road projects, and further reclamation remains a threat. As Cork Harbour is adjacent to a major urban centre and a major industrial centre, water quality is variable, with the estuary of the River Lee and parts of the Inner Harbour being somewhat eutrophic. However, the polluted conditions may not be having significant impacts on the bird populations. Oil pollution from shipping in Cork Harbour is a general threat. Recreational activities are high in some areas of the harbour, including jet skiing which causes disturbance to roosting birds.

Cork Harbour is of major ornithological significance, being of international importance both for the total numbers of wintering birds (i.e. > 20,000) and also for its populations of Black-tailed Godwit and Redshank. In addition, there are at least 18 wintering species that have populations of national importance, as well as a nationally important breeding colony of Common Tern. Several of the species which occur regularly are listed on Annex I of the E.U. Birds Directive, i.e. Whooper Swan, Golden Plover, Bar-tailed Godwit, Ruff and Common Tern. The site provides both feeding and roosting sites for the various bird species that use it. (NPWS, 2008).

Site synopsis Great Island Channel SAC (Site Code: 001058)

The Great Island Channel stretches from Little Island to Midleton, with its southern boundary being formed by Great Island. It is an integral part of Cork Harbour which contains several other sites of conservation interest. Geologically, Cork Harbour consists of two large areas of open water in a limestone basin, separated from each other and the open sea by ridges of Old Red Sandstone. Within this system, Great Island Channel forms the eastern stretch of the river basin and, compared to the rest of Cork Harbour, is relatively undisturbed. Within the site is the estuary of the Owennacurra and Dungourney Rivers. These rivers, which flow through Midleton, provide the main source of freshwater to the North Channel.

The site is a Special Area of Conservation (SAC) selected for the following habitats and/or species listed on Annex I / II of the E.U. Habitats Directive (* = priority; numbers in brackets are Natura 2000 codes):

[1140] Tidal Mudflats and Sandflats
[1330] Atlantic Salt Meadows

The main habitats of conservation interest in Great Island Channel SAC are the sheltered tidal sand and mudflats and the Atlantic salt meadows. Owing to the sheltered conditions, the intertidal flats are composed mainly of soft muds. These muds support a range of macro-invertebrates, notably Macoma balthica, Scrobicularia plana, Hydrobia ulvae, Nepthys hombergi, Nereis diversicolor and Corophium volutator. Green algal species occur on the flats, especially Ulva lactua and Enteromorpha spp. Cordgrass (Spartina spp.) has colonised the intertidal flats in places, especially at Rossleague and Belvelly.

The saltmarshes are scattered through the site and are all of the estuarine type on mud substrate. Species present include Sea Purslane (Halimione portulacoides), Sea Aster (Aster tripolium), Thrift (Armeria maritima), Common Saltmarsh-grass (Puccinellia maritima), Sea Plantain (Plantago maritima), Greater Sea-spurrey (Spergularia media), Lax-flowered Sea-lavender (Limonium humile), Sea Arrowgrass (Triglochin maritimum), Sea Mayweed (Matricaria maritima) and Red Fescue (Festuca rubra).

The site is extremely important for wintering waterfowl and is considered to contain three of the top five areas within Cork Harbour, namely North Channel, Harper's Island and Belvelly-Marino Point. Shelduck is the most frequent duck species with 800-1,000 birds centred on the Fota/Marino Point area. There are also large flocks of Teal and Wigeon, especially at the eastern end. Waders occur in the greatest density north of Rosslare, with Dunlin, Godwit, Curlew and Golden Plover the commonest species. A population of about 80 Grey Plover is a notable feature of the area. All the mudflats support feeding birds; the main roost sites are at Weir Island and Brown Island, and to the north of Fota at Killacloyne and Harper’s Island. Ahanesk supports a roost also but is subject to disturbance. The numbers of Grey Plover and Shelduck, as given above, are of national importance.

The site is an integral part of Cork Harbour which is a wetland of international importance for the birds it supports. Overall, Cork Harbour regularly holds over 20,000 waterfowl and contains internationally important numbers of Black-tailed Godwit (1,181) and Redshank (1,896), along with nationally important numbers of nineteen other species. Furthermore, it contains large Dunlin (12,019) and Lapwing (12,528) flocks. All counts are average peaks, 1994/95 – 1996/97. Much of the site falls within Cork Harbour Special Protection Area, an important bird area designated under the E.U. Birds Directive.

While the main land use within the site is aquaculture (oyster farming), the greatest threats to its conservation significance come from road works, infilling, sewage outflows and possible marina developments.

The site is of major importance for the two habitats listed on Annex I of the E.U. Habitats Directive, as well as for its important numbers of wintering waders and wildfowl. It also supports a good invertebrate fauna. (NPWS, 2013).

Appendix 7.1

Photomontages

PHOTOMONTAGES

for
Project No. 6074
Douglas FRS

for
Client: Arup

Date: 10 May 2017
Document Number: Appendix 7.1

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Project Name:	DOUGLAS FRS	Document Title:	PHOTOMONTAGES	Date:	10 May 2017

CONTENTS AMENDMENT RECORD

This report has been issued and amended as follows:

REVISION	DESCRIPTION	DATE	PREPARED BY	CHECKED BY
00	View Location and 5 no. of Photomontages	15 November 2016	BP	DBos
01	Revision to 4 no. of Photomontages	16 November 2016	BP	DBos
02	Revision to 4 no. of Photomontages	31 March 2017	RN	DBos
03	One Photomontage retaken from new location, revision to 3 no. of Photomontages	5 May 2017	RN	DBos
04	revision to 2 no. of Photomontages	8 May 2017	RN	DBos
05	revision to 1 Photomontage	10 May 2017	RN	DBos

PHOTOMONTAGE TABLE OF CONTENT

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Month:	11	11	03	05	05	05												
Year:	16	16	17	17	17	17												
FIGURE NUMBER	**REVISION**																	
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7.1.1.1	00	00	00	00	00	00												
7.1.1.2	00	01	02	03	03	04												
7.1.2.1	00	00	00	00	00	00												
7.1.2.2	00	00	00	00	00	00												
7.1.3.1	00	00	00	00	00	00												
7.1.3.2	00	01	02	03	04	04												
7.1.4.1	00	00	00	00	00	00												
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7.1.5.1	00	00	00	01	01	01												
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Project Number:	6074	Document Number:	Appendix 7.1	Revision:	05
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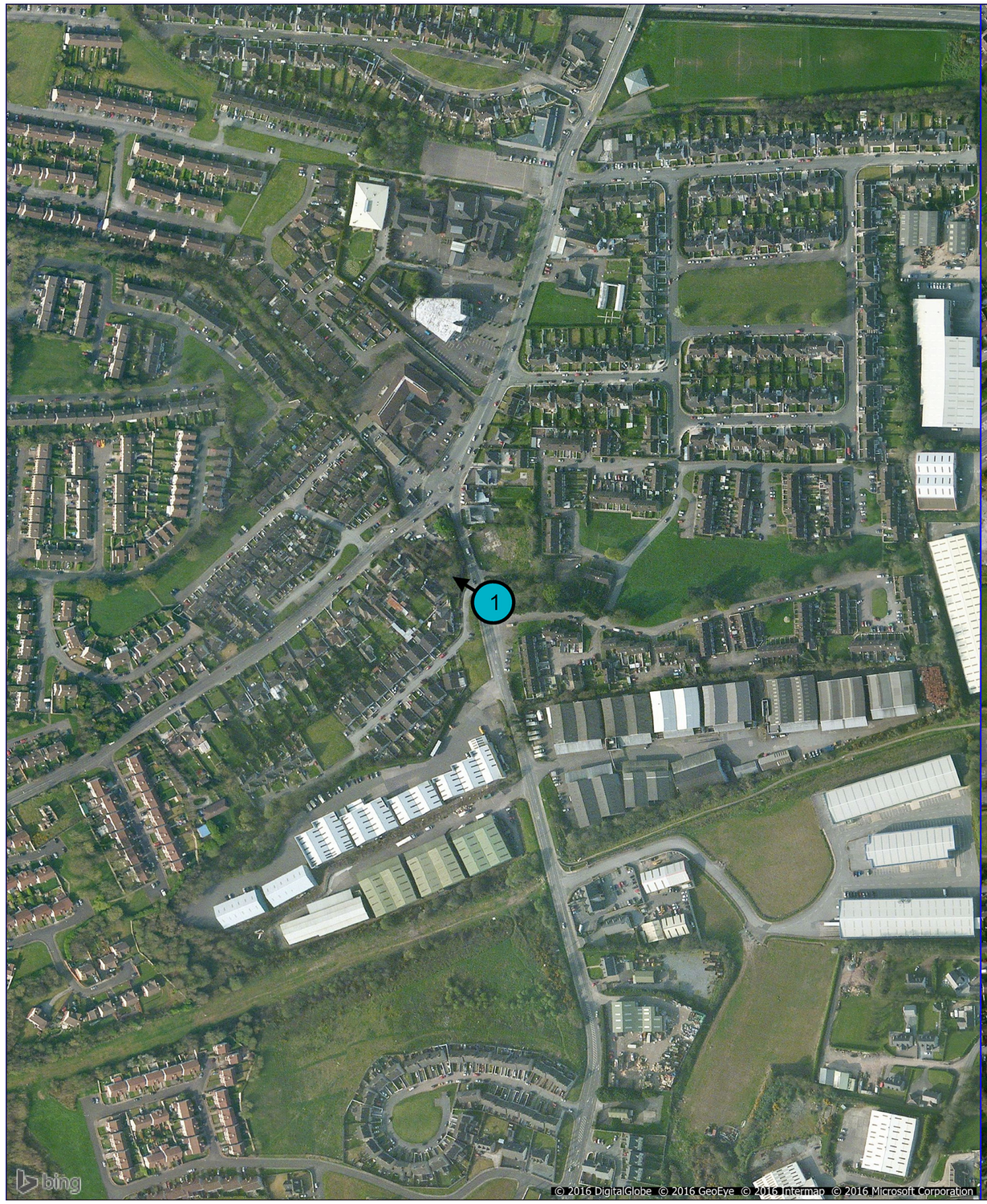

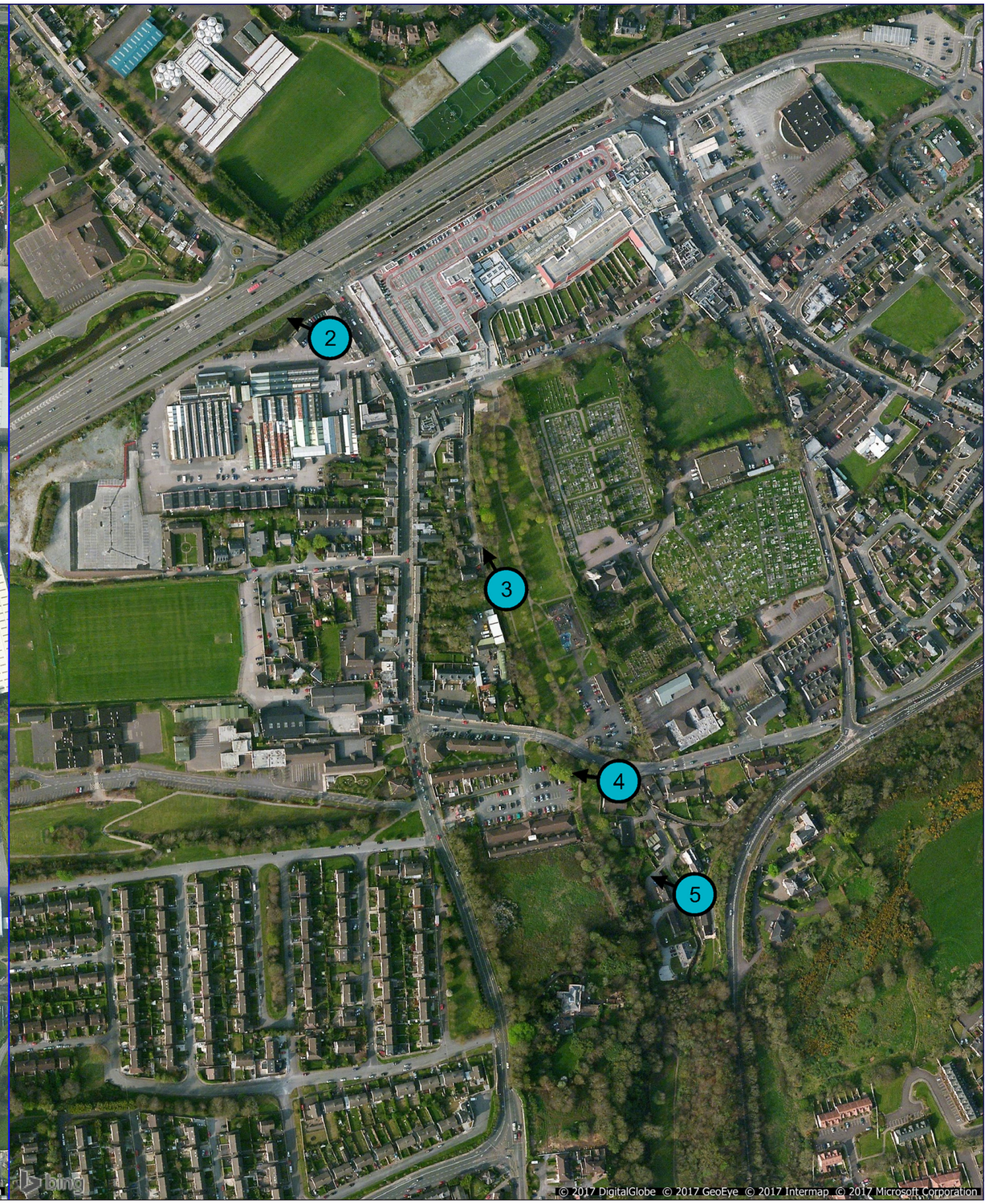

Figure: 7.1.0 View Location Map

Rev: 01

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< 73.7° / 24mm	< 65.5° / 28mm	< 54.4° / 35mm	< 39.6° / 50mm	< 28.8° / 70mm	ANGLE OF VISION / LENS FOCAL LENGTH	70mm / 28.8° >	50mm / 39.6° >	35mm / 54.4° >	28mm / 65.5° >	24mm / 73.7° >

Figure: 7.1.1.1 **Rev: 00**

View 1 - Lehenaghmore, Togher
As Existing

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Figure: 7.1.1.2 **Rev: 04**

View 1 - Lehenaghmore, Togher
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Figure: 7.1.2.1 **Rev: 00**

View 2 - St Patrick's Mills
As Existing

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Figure: 7.1.2.2 **Rev: 00**

View 2 - St Patrick's Mills
As Proposed

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Figure: 7.1.3.1 **Rev: 00**

View 3 - Douglas Community Park
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Figure: 7.1.3.2 **Rev: 04**

View 3 - Douglas Community Park
As Proposed

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Figure: 7.1.4.1 **Rev: 00**

View 4 - Church Road, Douglas
As Existing

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Figure: 7.1.4.2 **Rev: 03**

View 4 - Church Road, Douglas
As Proposed

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Figure: 7.1.5.1 **Rev: 01**

View 5 - Ravensdale, Douglas
As Existing

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Project Number:	6074	Document Number:	Appendix 7.1	Revision:	05
Project Name:	DOUGLAS FRS	Document Title:	PHOTOMONTAGES	Date:	10 May 2017

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Figure: 7.1.5.2 **Rev: 04**

View 5 - Ravensdale, Douglas
As Proposed

BSM Est. 1968 Brady Shipman Martin. Built. Environment.

Appendix 7.2

Policy Objectives Extracts

Appendix 7.2

The following extracts, policies and objectives are listed from the Cork County Development Plan 2014, the Carrigaline Electoral Local Area Plan 2016-2020, and the Douglas Land Use and Transportation Strategy 2013 for their relevance and implications of the proposed flood defence scheme in relation to landscape, townscape and amenity concerns.

Cork County Development Plan

Objective GI 6-1: Landscape

a) Protect the visual and scenic amenities of County Cork's built and natural environment.
b) Landscape issues will be an important factor in all land-use proposals, ensuring that a pro-active view of development is undertaken while maintain respect for the environment and heritage general in line with the principle of sustainability.
c) Ensure that new development meets high standards of siting and design
d) Protect skylines and ridgelines from development.
e) Discourage proposals necessitating the removal of extensive amounts of trees, hedgerows and historic walls or distinctive boundary treatments.

Objective GI 6-2: Draft Landscape Strategy: *Ensure that the management of development throughout the county will have regard for the value of the landscape, its character, distinctiveness and sensitivity as recognised in the Cork County Draft Landscape Strategy and its recommendations, in order to minimise the visual and environmental impact of development, particularly in areas designated as High Value Landscapes where higher development standards (layout, design, landscaping, materials used) will be required.*

Objective GI 7-1: General Views and Prospects: *Preserve the character of all important view and prospects, particularly sea views, river or lake views, views of unspoilt mountains, upland or coastal landscapes, views of historical or cultural significance (including buildings and townscapes) and views of natural beauty as recognised in the Draft Landscape Strategy.*

Objective HE 4-1 Record of Protected Structures:

f) *Ensure that development proposals are appropriate in terms of architectural treatment, character, scale and form to the existing protected structure and not detrimental to the special character and integrity of the protected structure and its setting.*

g) *Ensure high quality architectural design of all new developments relating to or which may impact on structures (and their settings) included in the Record of Protected Structures.*

Objective HE 4-5: Architectural Conservation Areas: *Conserve and enhance the special character of the Architectural Conservation Areas included in this plan. The special character of an area includes its traditional building stock and material finishes, spaces, streetscape, shop fronts, landscape and setting. This will be achieved by;*

c) *Ensure new development within or adjacent to an ACA respects the established character of the area and contributes positively in terms of design, scale, setting and material finishes to the ACA.*

g) *Protect and enhance the quality of open spaces within ACAs and ensure the protection and where necessary reuse of street furniture and use of appropriate materials during the course of public infrastructure schemes within ACAs.*

Carrigaline Electoral Local Area Plan

2.2.45 *The residential architecture of Douglas is of importance. The 'village' stems from a strong milling history, as is evident through its mills and associated cottages. It is dissected by a large green area, which includes the area's two churches, and is particularly picturesque. The areas of Church Street and West Douglas Street have been granted an Architectural Conservation Area designation to preserve and enhance the architectural and historical importance of these areas against the pressures for change arising from their suburban location.*

Environment Objective: LAS 2-4: *It is an objective to maintain where possible important features of the landscape which function as ecological corridors and areas of local biodiversity value and features of geological value within this planning area in accordance with ENV1-9, 1-10, 1-11 and 1-12 of the County Development Plan , 2009.*

Urban Design Policy*:*

UD5: *At St Patrick's Woollen Mills, there is an immense opportunity for increased public realm interventions that promote and enhance connectivity with the Douglas Village Shopping Centre. The redevelopment of this site will*

include the retention of all buildings of historic and architectural merit and any new build to enhance this precinct shall compliment the established building fabric. The entrance to West Douglas Street needs to have a raised paved area that encourages increased walking and cycling.

***UD7:** The [Douglas] Community Park should be at the centre of life in the village and should be an integral part of the population's lifestyle choice. Cork County Council in conjunction with the Tidy Towns should support a competition which will provide a fully integrated leisure and passive space in the village to the benefit of residents and visitors alike. Measures shall be implemented to improve north south and east west connectivity, enhance public safety and install suitable lighting.*

Transportation Policies – Walking and Cycling:

***WC3** Provide a high quality off-road walk and cycleway along the Ballybrack River from the Community Park to the Donnybrook Hill area.*

Specific Zoning Objectives

***U-03:** Provide pedestrian walk through stream valley connecting open spaces to Donnybrook.*

***U-04:** Provide pedestrian walk through stream valley to Douglas Village.*

Douglas Land Use and Transport Strategy (DLUTS)

It is also worth referring to The Douglas Land Use and Transport Strategy (DLUTS); an integrated land use, urban design and transport strategy that aims

"to secure a successful vibrant urban centre with a more efficient transport network for Douglas, that provides an improved public realm, reduces congestion encourages greater levels of walking and cycling, and improves the quality of life for the community, thereby enabling sustainable future growth"

Of particular interest in the Strategy are the Public Realm proposals and the focus on improving permeability and pedestrian/cycle movement within the DLUTS area with regard to the creation of more attractive routes. The following extracts have particular relevance for the study areas:

9.3.1 *On the basis of traffic and land use guidance and betterment, public realm improvements can be attached which will create a more pleasant and hospitable environment especially for the pedestrian and cyclist.*

9.3.3 *The Woollen Mills Complex is an underutilised asset that could become a major attraction to Douglas as a mixed use development if it was redeveloped sensitively taking into account its heritage and spatial value. The more minor intersections at, say, West Douglas Street and Church Road and West Douglas Street and Church Street should have a medium intervention to improve the streetscape to allow for easier pedestrian access and to encourage more retail activity.*

The river, the river bank and the park could be more meaningfully structured to give more of an amenity opportunity to the public. Enhanced access routes through and to the park will make it more user friendly and not merely to act as a thoroughfare.

Appendix 13.1

Wading and Metal Detection Survey, June 2016

Wading and Metal Detection Survey

at

Ballybrack Stream, Ardarrig, Ballybrack & Douglas, Douglas;

Grange Stream, Grange & Castletreasure, Douglas;

Tramore River, Lehenagh More, Deanrock and Doughcloyne, Togher

Licence Number 16D0048 & 16R0065

Avril Purcell MA MIAI

June 2016

Lane Purcell Archaeology,

64 Fr Mathew Road,

Turner's Cross,

Cork.

on behalf of

Cork County Council

1 Introduction

1.1 Cork County Council are undertaking the Douglas Flood Relief Scheme (including Togher Culvert). The scheme will include works at a number of locations along the Ballybrack Stream and Grange Stream in Douglas and the Tramore River in Douglas and Togher (Fig. 1). An Environmental Impact Assessment (EIA) is currently being prepared on the scheme. As part of this EIA, the Underwater Archaeological Unit at the Department of Arts Heritage and the Gaeltacht were consulted and they recommended archaeological wading and metal detector surveys at a number of locations where works are proposed for the scheme in order to assess the archaeological potential of the watercourses and their environs.

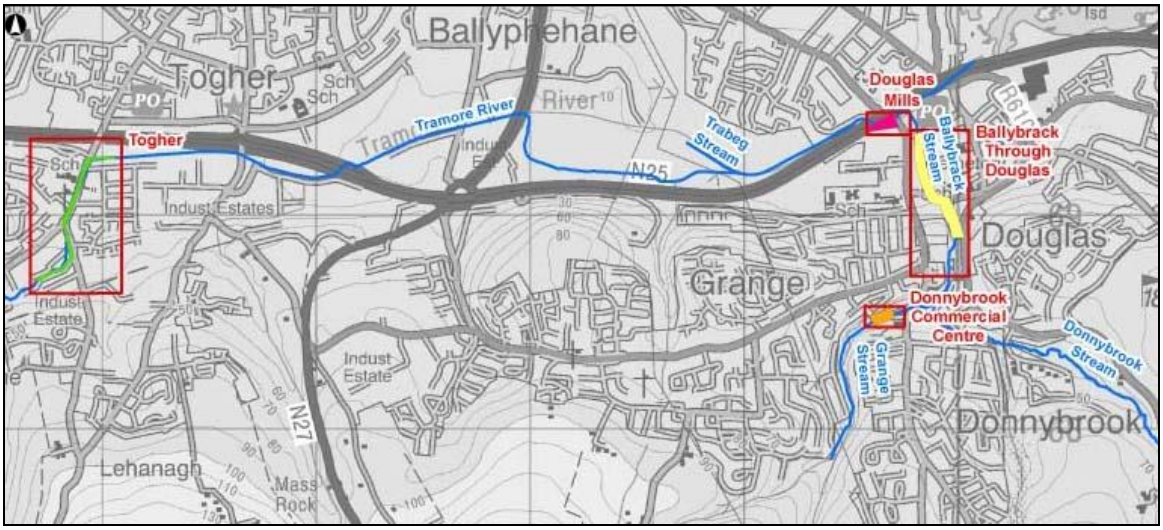


Figure 1: Proposed works areas for Douglas Flood Relief Scheme (including Togher Culvert)

1.2 The proposed scheme is designed to reduce the flood risk in the suburban villages of Douglas and Togher both on the southern side of Cork city (Fig. 2). Togher to the southwest of Cork city is on the Tramore River which flows east from Togher and discharges into the Douglas River in Cork harbour. A large portion of the river is culverted where it flows through Togher. Douglas is approximately 4km east of Togher on the southern bank of the Tramore River close to its confluence with the Douglas River where it enters Cork Harbour to form a wide estuarine mud flat. Two tributaries

flow through Douglas village and suburbs joining the Tramore River in the village. The Grange Stream comes from high ground to the southwest to join the Ballybrack Stream at Donnybrook. The Ballybrack Stream flows south through the village in an open channel except for one culverted portion where it joins the Tramore River under Douglas Village Shopping Centre.

1.3 The intertidal and metal detection surveys were carried out by the author on the 17th May 2016 under licence numbers 16D48 and 16R65. There are no sites listed in the Record of Monuments and Places (RMP) for Co Cork on the watercourses. The nearest is a mill in Grange (CO086-100) which is almost 100m east of proposed works to the Grange Stream within Donnybrook Commercial Park.

1.4 This report was compiled by Avril Purcell, Lane Purcell Archaeology, 64 Fr Mathew Road, Turner's Cross, Cork on behalf of Arup, 15 Oliver Plunkett St, Cork.

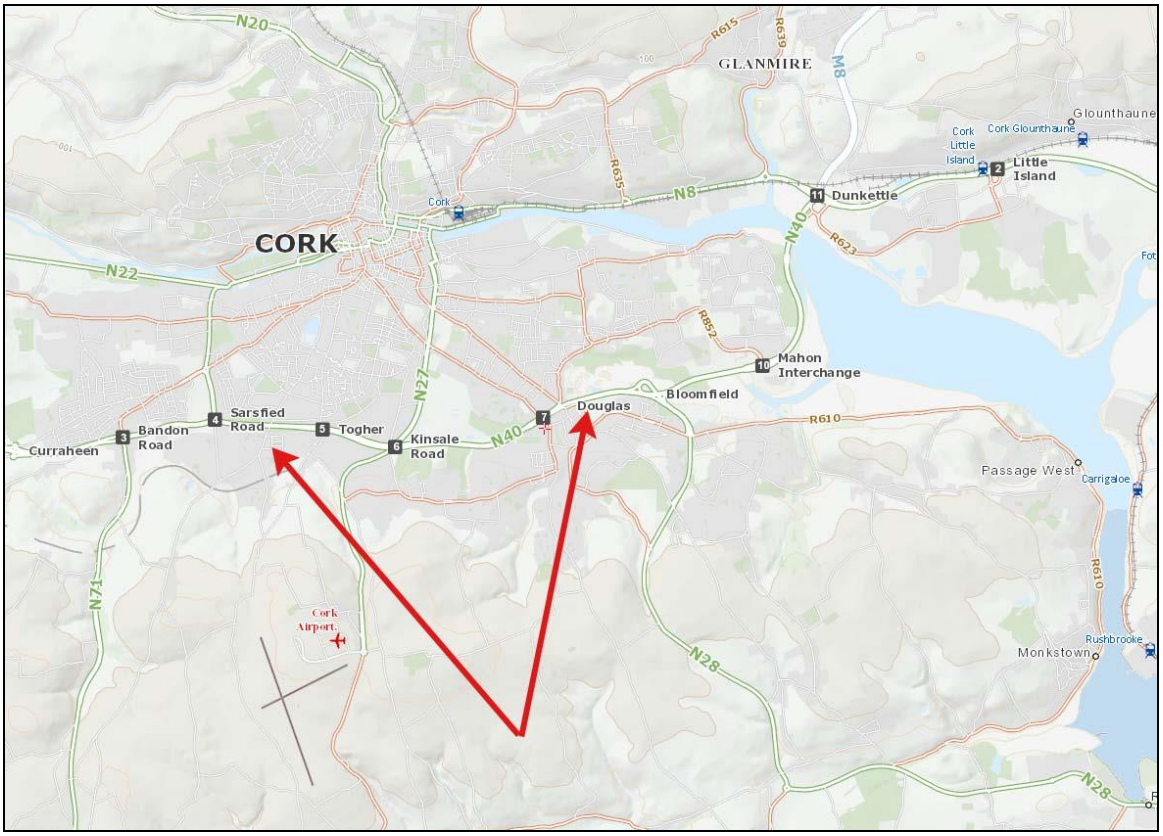


Figure 2: OSI map showing with arrows showing Togher to west and Douglas to east

2 Existing Site and Proposed Development

2.1 Flood relief works are proposed at a number of locations along the existing watercourses in Douglas and Togher. There is evidence that the existing channel has been significantly modified or culverted in some areas and these were not included in the wading and metal detector assessments. These include sections of the Tramore River in Douglas adjoining the N40 South Ring Road and the culverted sections of the river in Togher. Channels which appeared to be largely undisturbed on which works are proposed as part of the scheme were included in the wading and metal detector surveys. These areas of proposed works are as follows:

- *Grange Stream: Donnybrook Commercial Park, in Grange and Castletreasure townlands (chainage 252m – 262m and 277m – 292m) (Fig. 3)*
  Works will comprise the construction of a new 1.2m high flood defence wall at local low points to tie into higher ground.
- *Ballybrack Stream: Douglas Community Park, in Douglas townland (chainage 0 – 165) (Fig. 4)*
  Works will include local regrading along the right (east) bank of the stream in the northern half of the park to a maximum height of 0.71m above existing levels.
- *Ballybrack Stream: Douglas Community Park, in Douglas townland (chainage 165 – 290) (Fig. 4)*
  Works will comprise the widening and deepening of the channel in the southern half of the park. The widening will increase the width of the channel by approximately 2m and the deepening will increase the depth of the channel by 0.15m.
- *Ballybrack Stream: Ravensdale, Douglas, in in Ardarrig and Ballybrack townlands (chainage 310 – 467) (Fig. 5)*
  Works will comprise widening the existing channel by 2m and construction of a 1.2m high flood defence walls along both banks. The existing bridge at the ICA hall at chainage 374m will be removed and the existing Ravensdale Lower Bridge at chainage 422m to be replaced by a bridge with soffit level 0.3m above the soffit level of the existing bridge.
- *Ballybrack Stream: Ravensdale, Douglas, in Ardarrig and Ballybrack townlands (chainage 467 – 530) (Fig. 5)*

Work will comprise the construction of a new 1.2m high flood defence wall along the left (west) bank.

- *Ballybrack Stream: Ballybrack Woods, Douglas in Ardarrig and Ballybrack townland (chainage 623) (Fig. 5)*

  Works will comprise the replacement of the existing bridge and installation of a larger course trash screen.

- *Tramore River: Leheneghmore Industrial Estate, Togher at Doughcloyne and Lehenagh More townlands (chainage 5326) (Fig. 6)*

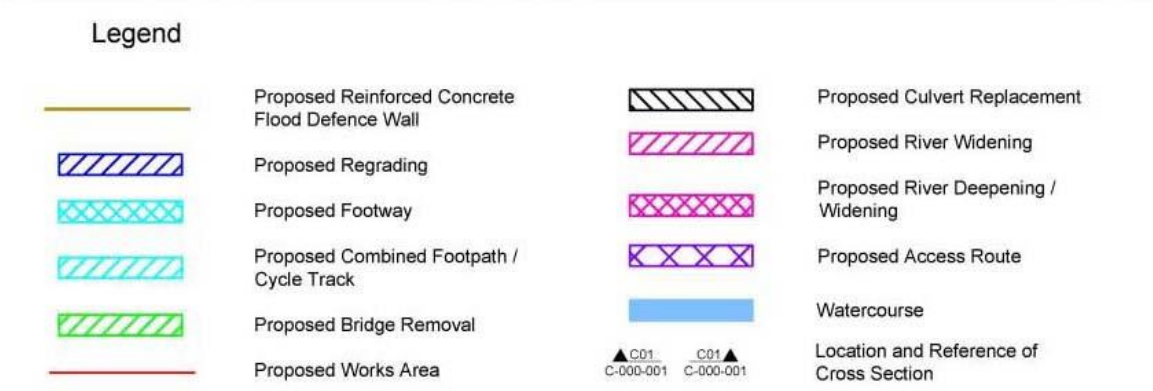
  Works will comprise the removal of the existing trash screen, construction of a new trash screen and a slight realignment of the channel. Structure will be 6.6m wide x 12.4m long and 2.4m high above bed level and the trash screen 56.4m².

- *Tramore River: upstream of Togher Road Roundabout, Togher, in Doughcloyne and Lehenagh More townlands (chainage 5013 – 4962) (Fig. 7)*

  Works will comprise the construction of a new 3m wide by 1.4m high concrete culvert to replace the existing 2.5m wide by 0.9m high open channel. In addition, Lehenaghmore Road will be regraded to fall to the west.

- *Tramore River: Togher Road, Togher, in Deanrock and Lehenagh More townlands (chainage 4653 – 4583) (Fig. 8)*

  Works will involve widening the existing channel by 1m over this 70m stretch and the construction of a new concrete retaining wall with 1.2m high railing on the south bank.



Legend for Figs 3 - 8 (after Arup)

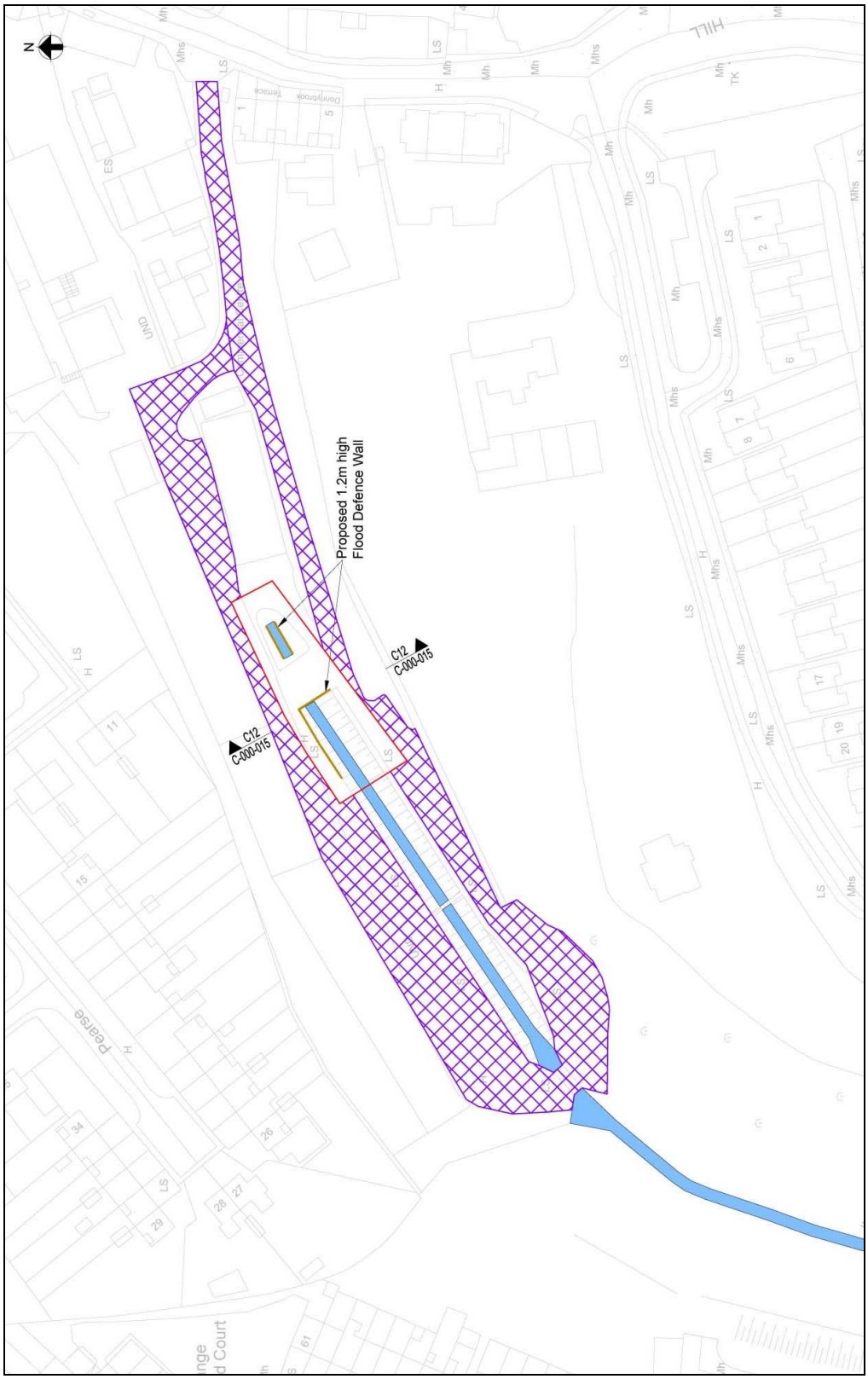


Figure 3: Proposed works to Grange Stream, Donnybrook Commercial Park (after Arup)

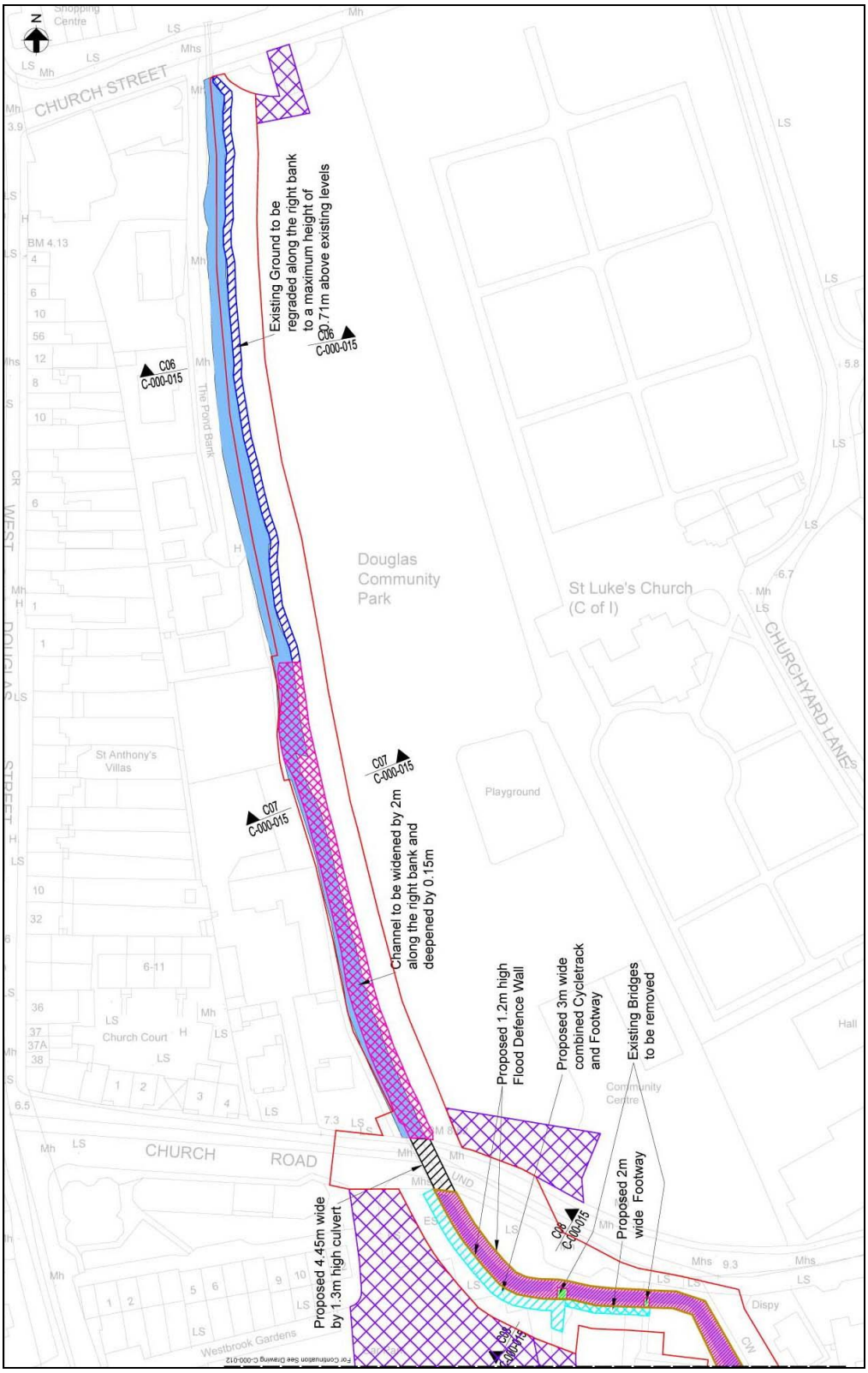


Figure 4: Proposed works to Ballybrack Stream, Douglas Community Park (after Arup)

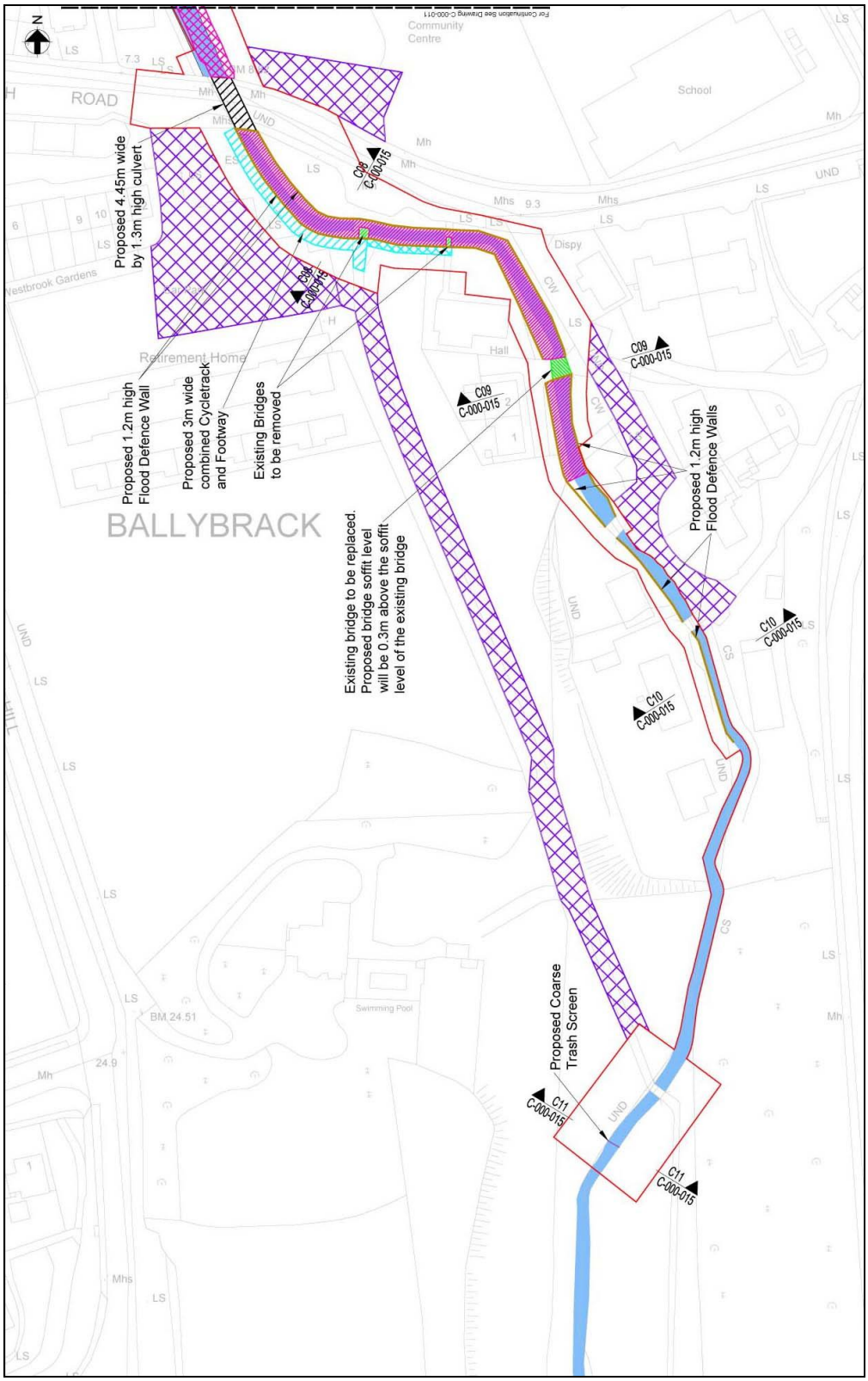


Figure 5: Proposed works to Ballybrack Stream, Ravensdale and Ballybrack Woods, Douglas (after Arup)

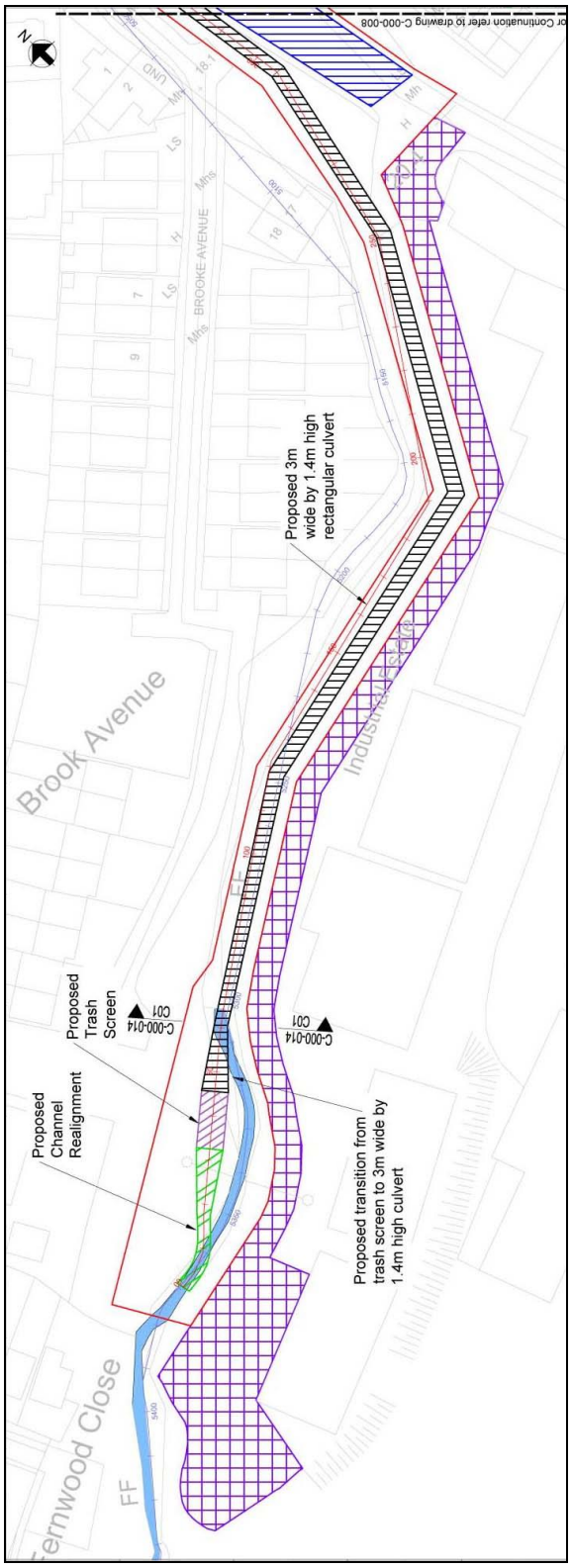


Figure 6: Proposed works to Tramore River, Lehenaghmore Industrial Estate, Togher (after Arup)

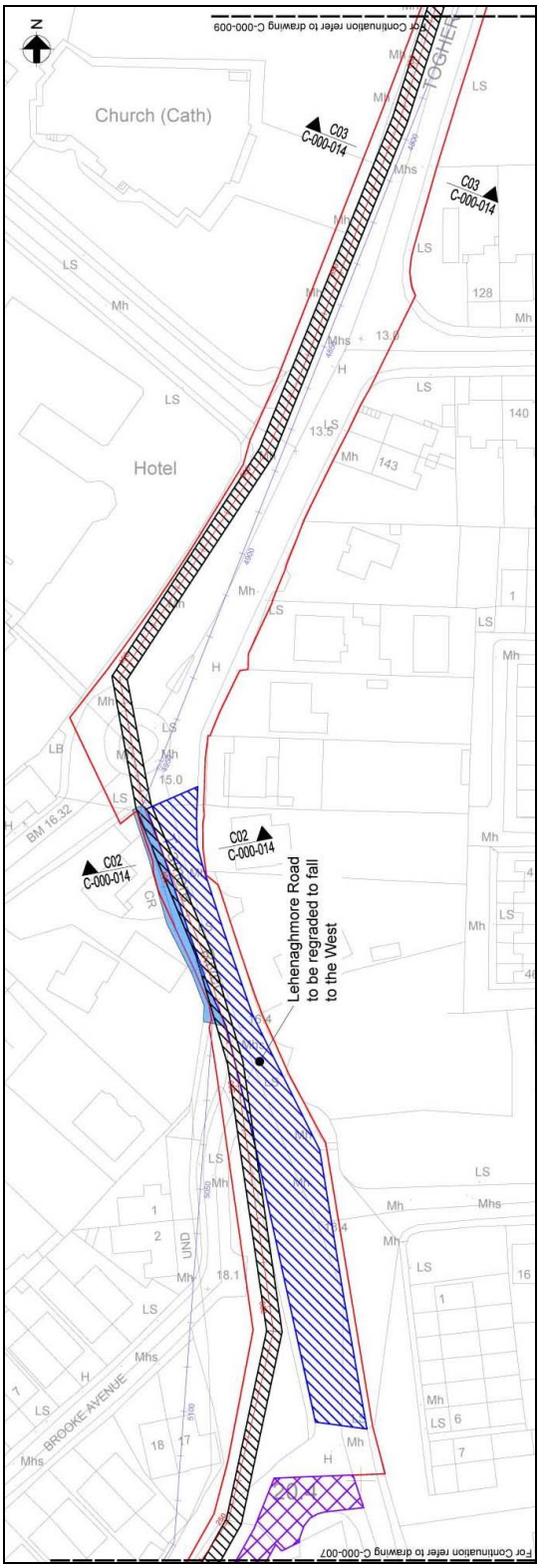


Figure 7: Proposed works to Tramore River, upstream of Togher Road Roundabout, Togher (after Arup)

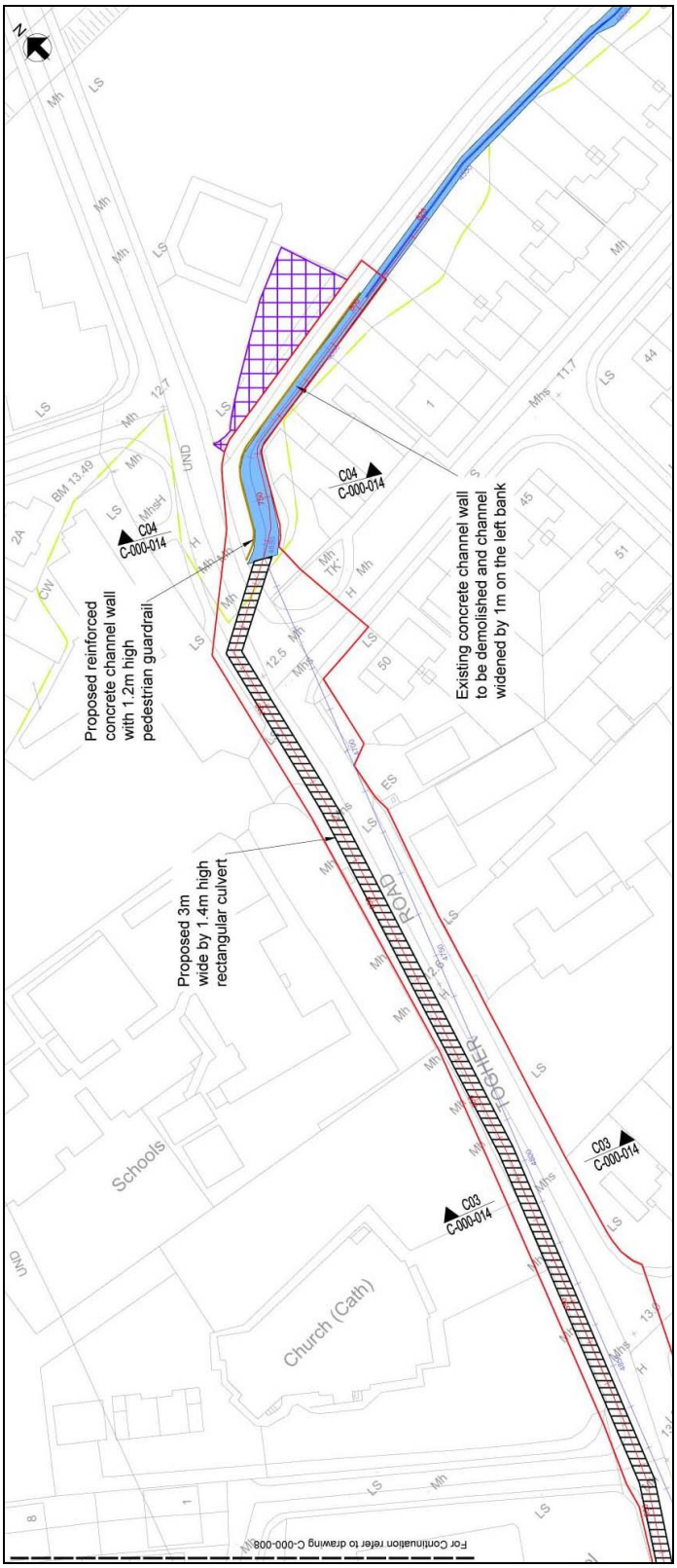


Figure 8: Proposed works to Tramore River, Togher Road, Togher (after Arup)

3 Historical Background

3.1 There are no recorded archaeological monuments listed in the RMP within the works area of the proposed Douglas Flood Relief Scheme (including Togher Culvert). There are a small number in the vicinity of the proposed works, all of which are late in date but which reflect the development of the area around the expansion of Cork city in the 18th and 19th centuries. There are two graveyards in Douglas (CO074-097 and CO074-098) to the east of Douglas Community Park (Fig. 9). The first, CO074-097---, is separated from the park by a random rubble wall and the second, CO074-098---, lies across the road from the first to the east. Both date from the mid 19th century onwards. Works to the stream which lies on the west side of the park will be at minimum 70m from the graveyard (CO074-097---) boundary wall.

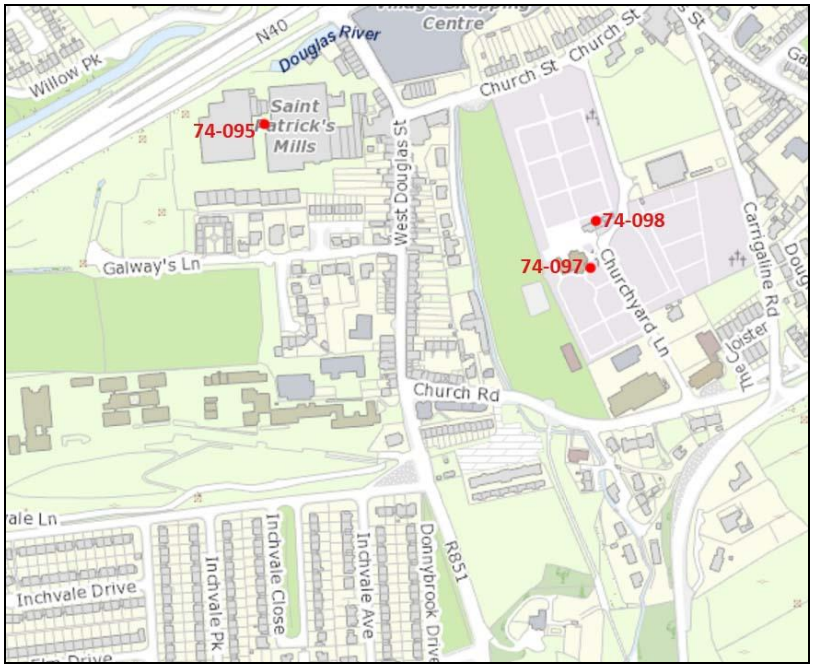


Figure 9: Extract from OSI map showing recorded archaeological sites in Douglas (www.archaeology.ie)

3.2 Donnybrook House is a mid 18th century country house (RMP No. CO086-102 and NIAH Reg. No.20908632), in Castletreasure approximately 75m south of the Grange Stream (Fig. 10). It is thought to have been the residence of The Rev. Boyle Davis, the dean of

Cloyne, in the mid 18th century and predates the Douglas Woollen Mills on the north side of the Grange Stream. Douglas was a thriving milling village from the 18th to the 20th century. The above mentioned Douglas Woollen Mills (now Donnybrook Commercial Centre) (CO086-100) was located in Donnybrook village (although in the townland of Grange) in the vicinity of an earlier sailcloth mill dating to 1726 and later associated with the Besnard family (Rynne 1999, 106). In 1863 this had been taken over by Wallis and Pollock and the largest ropeworks in the south of Ireland was established (ibid. 102). New buildings were erected in 1866 and when the mill was extended and this appears to have destroyed the earlier buildings on the site, of which nothing now remains (ibid. 102-3). In 1890 the mill was taken over by Morroghs and finally closed in 1971 (Foley 1991, 31). St Patrick's Woollen Mills (in Douglas village but also in Grange townland) (CO074-095) were located on the west side of Douglas village on the southern bank of the Tramore River and now form a large commercial centre in Douglas village. Works related to the flood relief scheme are proposed in this area but as extensive modifications were carried out in this area to the Tramore River during construction of the N40 South Ring Road it was not included in the wading and metal detector survey.

Figure 10: Extract from OSI map showing recorded archaeological sites in Donnybrook (www.archaeology.ie)

3.3 A flour mill is named and depicted on the 1842 OS 6-inch map at the eastern edge of Ballybrack townland in an area known as Ravensdale. The flour mill is shown on the map as a large, irregular, L-shaped building with what appears to be a mill race running directly west of the Ballybrack Stream. Several smaller buildings are shown nearby which may also be associated with the flour mill. It is not shown or named on any of the later OS map editions and no above ground remains of it now survives. Foley (1991, 26) mentions a mill at Ravensdale, known as "the scutching mill". It appears unlikely that two mills existed in the area of Ravensdale and is possible the flour mill building shown on the 1842 OS map may have accommodated both industries at different times. There is a mill pond shown and named on the 1842 OS map with a mill race on its eastern side between Church Street, Church Road, West Douglas Street and St Luke's Cemetery (CO074-087---), suggesting the location of another mill downstream of this location. The associated mill buildings are not named but may include a U-shaped building on the southeastern corner of Church Street and West Douglas Street. The Ballybrack Stream now runs mainly on the line of the tail race and works are proposed in this area.

3.4 The nearest recorded archaeological site to the proposed works in Togher is a holy well in Doughcloyne (CO086-006) approximately 500m away (Fig. 11). The OS maps give a picture of the Togher area and its development over the past 170 years or so. The village of Togher is depicted as a small settlement on the 1842 OS 6-inch map at a crossroads with a school, a smithy and a small cluster of houses. The entrance and lodge to Douglcloyne House (situated to the west) is depicted at this junction. The surrounding land is shown as largely agricultural, dotted with country houses and associated gardens. By the turn of the 20th century, the 25-inch OS map shows the cluster of houses, the lodge and the smithy remaining. The school, however, is now further to the north (along the Togher Road), houses are depicted along the road to the north of the school and the name Togher is now attached to a set of houses further north. The Cork & Macroom Direct Railway line is shown running east-west between the houses which is now the route of the N40 South Ring Road.

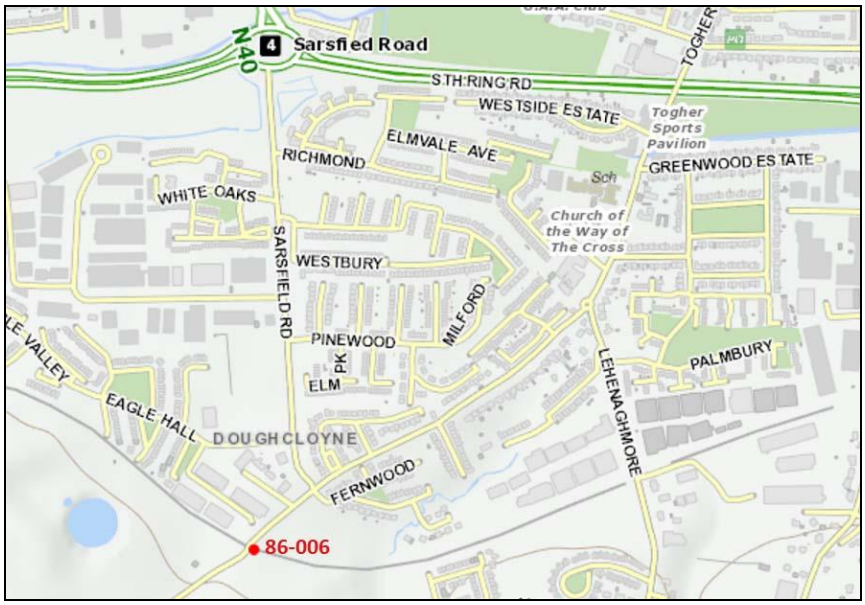


Figure 11: Extract from OSI map showing recorded archaeological sites in Togher (www.archaeology.ie)

3.5 The Underwater Archaeology Unit of the National Monuments Service maintains files on the Ports Piers and Harbours of Ireland and the Shipwreck Inventory of Ireland. There are no references in the files to the watercourses or settlements in the flood relief scheme areas. The nearest recorded shipwreck is for the *Grand Master* which was lost on the 18 Feb 1890 at Rochestown, River Lee (Appendix 1).

3.6 The National Museum of Ireland maintains topographic files containing reports, including correspondence, present location and occasionally, illustrations of archaeological material recovered throughout the country. There are no records of finds from any of the townlands within the scheme. The British Museum, however, holds an Early Bronze Age gold disc which was recovered from Castletreasure (the northern extent of which is defined by the Grange Stream) in the mid 19th century (Cahill 2006). A roman coin, minted during the reign of Philip the Arab who was the Roman Emperor from AD 244 – 249, was found at Cork Airport in the townland of Lehenagh More. It is uncertain whether this coin is genuine or possibly a Victorian fake and it is not possible to determine when the coin arrived in Ireland (McNamee no date).

4 The Intertidal and Metal Detection Survey

4.1 The wading and metal detector surveys were carried out in the proposed flood relief works areas to assess their archaeological potential on the 17th May 2016. The surveys were undertaken by the author under licence numbers 16D48 and 16R65. Water levels were low at the time after a period of dry weather and conditions were favourable for inspecting the water channels. Each watercourse was waded and metal detected and the banks and bed visually inspected. Surrounding ground was inspected for any evidence of modifications to the channel or evidence of original channel.

4.2 The Watercourses

4.2.1 Grange Stream: Donnybrook Commercial Park, in Grange and Castletreasure townlands (chainage 252m – 262m and 277m – 292m) (Plates 1 and 2)

The stream at this location runs within a modified channel separated into two over-ground sections by a culverted portion approximately 12m long. The western open section runs within a sloping earth-cut channel with large boulders along both banks at water level and smaller stones along the stream bed. Above the banks the sides of the channel slope steeply and are grass-covered. The surrounding grounds are laid out as an access road and car parking for the commercial park and a range of modern buildings suggest significant amounts of ground disturbance have been undertaken in the recent past. The upstanding building of the milling complex lie approximately 100m to the east of the proposed works area. The eastern open section is a stepped concrete channel which was visually inspected but not accessed or metal detected. The channels were both very clean and no features were apparent. No metal objects were detected.

Plate 1: Grange Stream western open section in Donnybrook Commercial Park, looking west

Plate 2: Grange Stream eastern stepped section emerging from culvert in Donnybrook Commercial Park, looking west

4.2.2 Ballybrack Stream: Douglas Community Park, Douglas townland (chainage 0 – 290) (Plates 3 – 5)

The stream runs along the western boundary of Douglas Community Park within a fenced area. The stream runs in an earth-cut channel with a stoney bed and occasional stones protrude above water level. Above the water level the banks are quite steep. The bank and the bed are heavily eroded in places with a narrow, deeper channel cut along

parts of the bed. The stream is quite fast flowing. At the southern end of the park the stream channel is lined in concrete which adjoins the culvert which carries the stream under Church Street. Stone gabions extend southwards along the western bank for a short distance from the concrete channel. A small number of pipes cross the stream and there are three outfall pipes discharging into it. Towards the southern end of the park a warehouse lies along the western bank of the stream and a concrete wall forms the western bank here. Elsewhere the bank is generally covered in low vegetation with some mature trees and tree stumps. At the southern end of the park the stream is again concrete-lined before entering a concrete culvert running under Church Road.

The channel was relatively clean with no large amounts of material present and according to local authority personnel it has been cleaned and maintained as such in recent times. No features associated with the nearby milling activity or other features of archaeological potential were noted. A number of metal objects were detected, all were modern in nature and of no archaeological significance. A number of individual properties lie on the eastern bank of the stream and there is no visible trace of the mill pond shown on the 1842 OS map in the area of these properties.

Plate 3: Ballybrack Stream, Douglas Community Park, looking south

Plate 4: Ballybrack Stream, Douglas Community Park, looking north

Plate 5: Ballybrack Stream, Douglas Community Park, looking north

4.2.3 Ballybrack Stream: Ravensdale, Douglas in Ardarrig and Ballybrack (chainage 310 – 530 & 623) (Plates 6 – 12)

On the southern side of the Church Road culvert the stream flows east within a stone and concrete lined channel for approximately 80m. Two modern bridges cross the stream, both opening from Church Road; the western one forms part of a recreational track south to Ballybrack Woods and the eastern one provides access to the ICA Hall. The stream was waded and visually inspected along this section but the concrete bed made the metal detector inoperable.

The stream turns south through Ravensdale where it appears to run in its original channel. The bed is stoney with some silty patches and the banks are generally earth-cut. There are, however, sections of wall along the banks and a small run of gabions supporting the western bank. A section of concrete path runs along the wall along the upper stretches of the eastern bank. The stream runs mainly along property boundaries with a public road along the eastern side, although at one point a warehouse/workshop lies along its eastern bank. The eastern bank is generally covered in low vegetation with some semi-mature trees where the concrete walls have not been constructed. The stream is crossed by three modern bridges (Lower, Middle and Upper Ravensdale Bridges) which provide access to the dwelling houses on the western bank and a large pipe crosses the stream bed between the middle and upper bridges.

The southern end of this section of stream, in Ballybrack Woods, is an earth cut channel crossed by a modern bridge with a trash screen below.

The stream is relatively clean along its course. No features associated with the nearby Ravensdale Mill shown on the 1842 OS map or other features of archaeological potential were noted. A number of metal objects, particularly pipes, were detected, none of which were considered to be of archaeological significance.

Plate 6: Ballybrack Stream, looking southeast with bridge to Ballybrack Woods in background

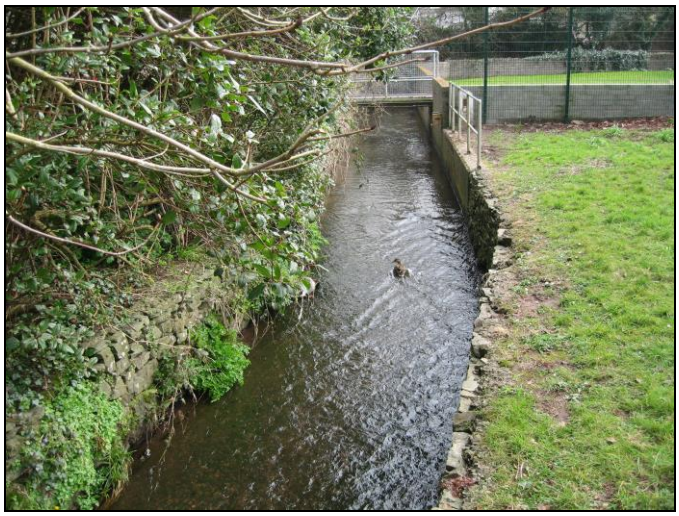


Plate 7: ICA Bridge on Ballybrack Stream eastern elevation

Plate 8: Lower Ravensdale Bridge on Ballybrack Stream, southern elevation

Plate 9: Middle Ravensdale Bridge on Ballybrack Stream, southern elevation

Plate 10: Upper Ravensdale Bridge on Ballybrack Stream, northern elevation

Plate 11: Ballybrack Stream in Ravensdale, looking south

Plate 12: Ballybrack Stream showing bridge and trash screen in Ballybrack Woods, looking south

4.2.4 Tramore River: Leheneghmore Industrial Estate, Togher, Doughcloyne and Lehenagh More townlands, (chainage 5326 – 5311) (Plate 13 – 14)

The river runs in a shallow, earth-cut channel with a stoney bed. The banks are overgrown with low vegetation and some mature trees. To the northeast the rivers runs into a concrete culvert closed by a large trash screen.

The river is quite clean with small amounts of rubbish caught in the trash screen. No features of archaeological potential were noted. A small number of modern metal objects were detected, none of which were considered to be of archaeological significance.

Plate 13: Tramore River at Lehenaghmore Industrial Estate, looking west

Plate 14: Existing trash screen Tramore River, Lehenaghmore Industrial Estate, looking east

4.2.5 Tramore River: upstream of Togher Road Roundabout, Togher, Doughcloyne and Lehenagh More townlands (chainage 5013 – 4962) (Plates 15 – 17)

The river emerges from a culvert under Brook Avenue and flows north in a relatively narrow channel along the western side of Lehenaghmore Road. A random rubble wall along the eastern bank of the river separates it from the road. The western bank is heavily overgrown and some occasional patches of random rubble wall were visible behind the undergrowth. Some erosion of the western bank is also apparent. The river bed is generally stoney with some silt. At the northern end of this stretch the river runs into a culvert, under the Togher Roundabout, which is closed with a large trash screen. The culvert runs along the western side of Togher Road.

This small open stretch of river is quite clean. No features of archaeological potential were noted. A small number of modern metal objects were detected, none of which were considered to be of archaeological significance.

Plate 15: Tramore River emerging from culvert under Brook Avenue, looking south

Plate 16: Tramore River beside Lehenaghmore Road, looking north

Plate 17: Tramore River beside Lehenaghmore Road, looking south

4.2.6 Tramore River: Togher Road north of Greenwood Estate, Togher, Deanrock and Lehenagh More townlands (chainage 4653m – 4545m) (Plates 18 – 19)

The river emerges from a culvert under the Togher Road and runs east in a concrete channel to the north (rear) of the houses in Greenwood Estate. Individual property boundaries line the southern river bank and there is a path and park along the northern bank.

The river is quite clean here. It was inspected and waded but the concrete bed made the metal detector inoperable. No features of archaeological potential were noted.

Plate 18: Tramore River emerging from culvert under Togher Road behind Greenwood Estate, looking west

Plate 19: Tramore River, behind Greenwood Estate, looking west

5 Conclusion

5.1 A wading and metal detector survey on sections of 2 streams and a river was carried out in May 2016 as part of the Douglas Flood Relief Scheme (including the Togher Culvert). The Grange Stream in Donnybrook Commercial Park, the Ballybrack Stream in Douglas Community Park and Ravensdale, the Tramore River in Lehenaghmore Industrial Estate, upstream of Togher Road Roundabout and at Togher Road north of Greenwood Estate formed the basis for the survey. Each section was waded, visually inspected and where a concrete channel was not present, metal detected to assess its archaeological potential.

5.2 No features or finds of archaeological potential were revealed. A number of modern metal objects were detected none were of archaeological significance. No features were noted in/on the banks, edges or surrounding ground.

5.3 Ground disturbance associated with the proposed works for the flood relief scheme include widening and deepening of the channels, construction of flood defence walls, regrading ground adjoining existing channels and construction of new culverts. Archaeological monitoring of the construction works at a number of locations is recommended given the archaeological potential of such watercourses. These are:

- Ballybrack Stream, Douglas townland, in Douglas Community Park (chainage 0 – 292m).
- Ballybrack Stream in Ardarrig and Ballybrack townlands, Ravensdale, Douglas (chainage 310 – 623).
- Tramore River at Doughcloyne and Lehenagh More townlands, Leheneghmore Industrial Estate (chainage 5326m – 5306m).
- Tramore River at Doughcloyne and Lehenagh More townlands upstream of Togher Road Roundabout, Togher (chainage 5013m – 4962m).

5.4 Due to the disturbed nature of the channel in which the Grange Stream, (Grange and Castletreasure townlands in Donnybrook Commercial Park, Douglas (chainage 252m – 262m and 277m – 292m)) now runs and the likely disturbance to the adjoining ground

intermittent archaeological monitoring/inspections of subsurface disturbance is recommended based on the low archaeological potential of such ground.

5.5 In the event that archaeological features are identified during archaeological monitoring, consultation will be undertaken with the National Monuments Service and the features will be fully resolved to professional standards of archaeological practice. Such material will be preserved *in situ* or preserved by record, as appropriate, as outlined in Policy and Guidelines on Archaeological Excavation – Department of Arts, Heritage, Gaeltacht and the Islands.

5.6 All recommendations are subject to the approval of the National Monuments Service and the planning authority.

Bibliography

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Files Consulted

National Museum of Ireland topographic files

The Shipwreck Inventory of Ireland at the Archive Unit of the National Monuments Service, Department of Arts Heritage and the Gaeltacht

The Ports, Piers and Harbours Inventory of Ireland at the Archive Unit of the National Monuments Service, Department of Arts Heritage and the Gaeltacht

Appendix 1 - Shipwrecks Inventory of Ireland Database

Site Name: *Grand Master*

Date of Loss: 18 Feb 1890

Place of Loss: Rochestown, River Lee

This 132 ton wooden schooner of Cork was 37 years old. The master was A.M. McDonald and the owner was A. Donovan of Cork. She had been moored at Rochestown, Cork, in ballast when she became stranded in an easterly force 7 wind.

CSP, 1890-91. Vol LXXVI, Appendix C, 159.

Appendix 13.2

Plates (Site Photographs)

Plate 13.1: Western section of Grange Stream, looking east

Plate 13.2: Western section of Grange Stream, looking west

Plate 13.3: Eastern section of Grange Stream, looking west

Plate 13.4: Ballybrack Stream in Douglas Community Park, looking south

Plate 13.5: Deeper eroded channel in Ballybrack Stream in Douglas Community Park, looking north

Plate 13.6: Concrete western bank of the Ballybrack Stream in Douglas Community Park, looking south

Plate 13.7: One of the outfall pipes discharging into Ballybrack Stream in Douglas Community Park, looking south

Plate 13.8: Ballybrack Stream running along Church Road with bridge to Ballybrack Wood in background, looking east

Plate 13.9: Ballybrack Stream running along Church Road with bridge to ICA visible, looking east

Plate 13.10: Ballybrack Stream in Ravensdale with Lower Ravensdale Bridge in background, looking south

Plate 13.11: Ballybrack Stream in Ravensdale between Lower and Middle Ravendale Bridges, looking south

Plate 13.12: Ballybrack Stream in Ravensdale showing Middle Ravendale Bridge with Upper Ravensdale Bridge in background, looking south

Plate 13.13: Ballybrack Stream in Ravensdale between Middle and Upper Ravendale Bridges, looking south

Plate 13.14: Ballybrack Stream in Ravensdale showing Upper Ravensdale Bridge, looking south

Plate 13.15: Ballybrack Stream in Ballybrack Wood showing bridge and trash screen, looking north

Plate 13.16: Tramore River at Douglas Mills/St Patrick's Mills, looking east

Plate 13.17: Tramore River emerging from culvert carrying it under the N40 road, looking west

Plate 13.18: Tramore River flowing into culvert carrying it under West Douglas Street

Plate 13.19: Tramore River in Lehenaghmore Industrial Estate, looking southwest

Plate 13.20: Trash screen on Tramore River in Lehenaghmore Industrial Estate, looking northeast

Plate 13.21: Tramore River adjacent to the Lehenaghmore Road, looking north

Plate 13.22: Tramore River adjacent to Lehenaghmore Road, looking south

Plate 13.23: Tramore River entering culvert running under Togher Roundabout

Plate 13.24: Tramore River emerging from under Togher Road to the north of Greenwood Estate, looking west

Plate 13.25: Tramore River running to the north of Greenwood Estate, looking west

Plate 13.26: Proposed compound for Togher area, looking northwest