

APPENDIX 10A

SITE PHOTOGRAPHS



Photo 1: Woodbrook Stream (Site 1)



Photo 2: Existing Culvert in Woodbrook Stream (Site 1)



Photo 3: Unnamed Stream (Site 2)

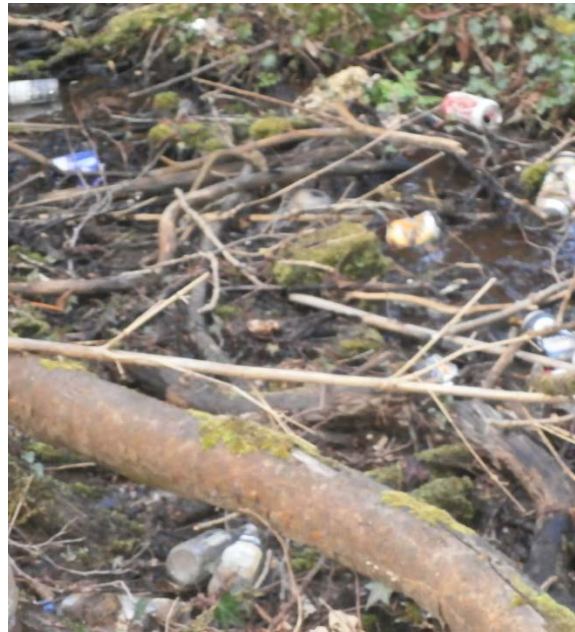


Photo 4: Channel of Unnamed Stream (Site 2)



Photo 5: Downstream View of Unnamed Stream (Site 3)



Photo 6: Upstream View of Unnamed Stream (Site 3)



Photo 7: Downstream View of Donnybrook Survey Site (Site 4)



Photo 8: Upstream View of Donnybrook Survey Site (Site 4)



Photo 9: Upstream of Donnybrook Survey Site (Site 5)



Photo 10: Downstream of Donnybrook Survey Site (Site 5)



Photo 11: Donnybrook Stream Survey Site (Site 6)

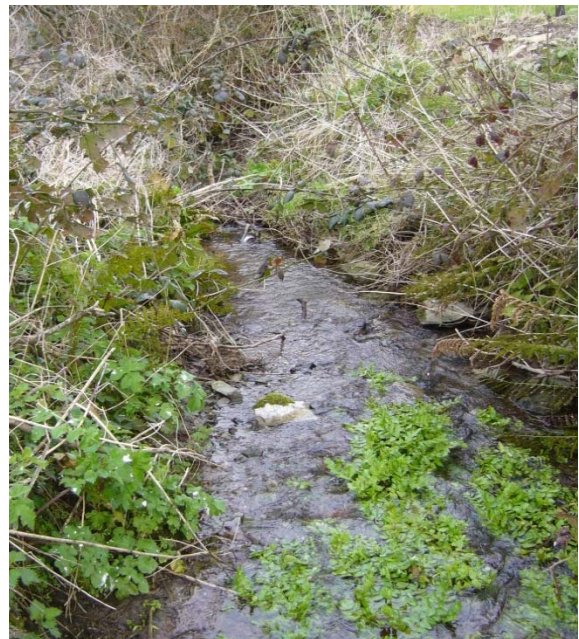


Photo 12: Donnybrook Stream Survey Site (Site 6)

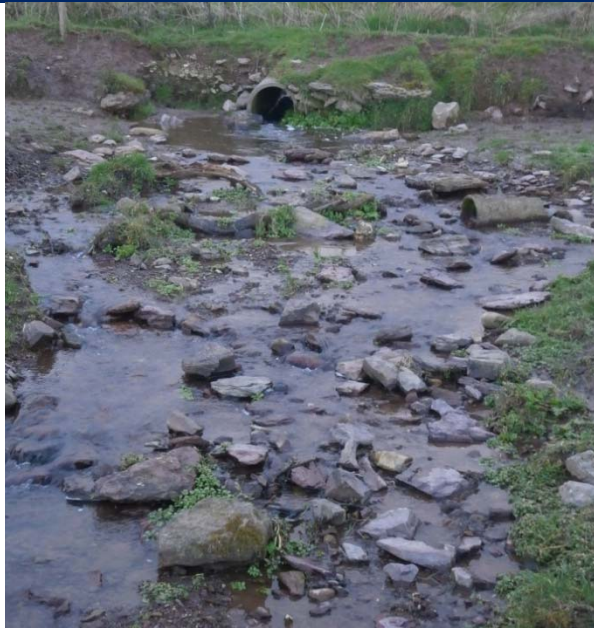


Photo 13: Upstream View of Shannon Park Cross Tributary with Existing Culvert (Site 7).



Photo 14: Downstream View of Shannon Park Cross Tributary (Site 7).



Photo 15: Location of Site 8 from the Western Side of the Existing N28 (Site 8)

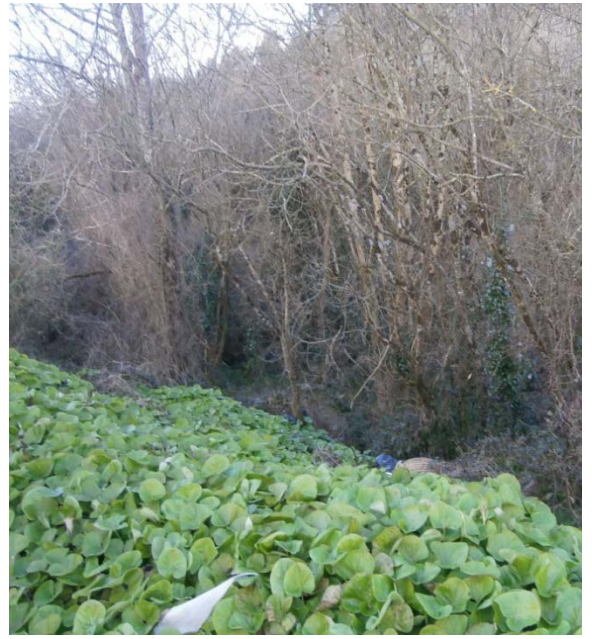


Photo 16: Location of Site 8 from the Eastern Side of the Existing N28 (Site 8)

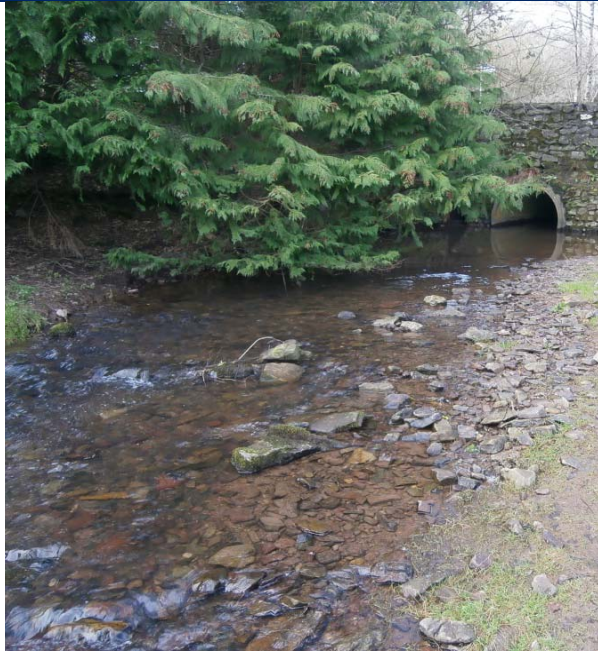


Photo 17: Upstream View of Glounatouig at Hilltown (Site 9)



Photo 18: Downstream View of Glounatouig at Hilltown (Site 9)

Electrofishing Survey Sites



Site 1: Woodbrook Stream Survey Site with Heavy Shade and Limited Flow



Site 2: Section of Donnybrook Stream Showing Unsuitable Conditions for Fish



Site 4: Section of Good Salmonid Habitat at Glounatouig Stream



Site 5: Section of Good Salmonid Habitat at Glounatouig Stream

APPENDIX 10B

HABITAT ASSESSMENT SURVEY RESULTS

WOODBROOK STREAM

Site 1

The Woodbrook Stream (**Table 10B.1**) is located at the northern end of the study area. The stream rises in the townland of Douglas and flows in a northerly direction. The stream is intersected by the existing N28 before veering east in direction and flowing into the Douglas River Estuary.

Table 10B.1: Site 1 Habitat Characteristics

LOCATION	IG 0571726 0568698 Sampling site is located 100m east of proposed M28 Road Project.	
PHOTOGRAPH NO.	1 & 2	
Part of EPA Monitoring Programme	No	
DESCRIPTION	<ul style="list-style-type: none"> ▪ Shallow, clear stream with a moderate to fast flow over a riffle type habitat and a compacted substratum comprised of predominantly cobble, boulder, gravel, sand and silt; ▪ No instream vegetation present. No filamentous algae or sewage fungus recorded; ▪ Existing culvert impeding fish passage. Stream sampled downstream of culvert. Bankside riparian vegetation is dominated by Rubus spp (Bramble) grasses and excessive Petasites fragrans (Winter Heliotrope) lining either side of the stream bank; ▪ Stream intersects a residential area; and ▪ No fish or protected species recorded. 	
WIDTH (m)	1.2	
DEPTH (m)	0.15	
SALMONID HABITAT	ADULT	Poor - Fair
	NURSERY	Poor - Fair
	SPAWNING	Poor - Fair
LAMPREY HABITAT	ADULT	Poor - Fair
	NURSERY	Poor - Fair
	SPAWNING	Poor - Fair

Site 2

At the request of IFI, an ephemeral stream located at the northern end of the 'The Heights' housing estate in Mount Oval was visited and assessed during the field survey (**Table 10B.2**). These streams were not visible on the OSI mapping nor did they form part of the EPA's River Segment GIS layers.

Table 10B.2: Site 2 Habitat Characteristics

LOCATION	IG 0571791 0567758 Sampling site is located approximately 200m east of the proposed M28 Road Project.	
PHOTOGRAPH NO.	3 & 4	
Part of EPA Monitoring Programme	No	
DESCRIPTION	<ul style="list-style-type: none"> ▪ Excessive silt/mud substrate with little surface water except for discrete areas of pooling; ▪ Potential for the stream to discharge downstream during periods of heavy rainfall; ▪ Excessive bankside shading that includes Corylus spp (Hazel with overhanging sections of Rubus spp (Bramble) and Pteridium spp (Bracken); ▪ Stream intersects a residential area; ▪ No fish or protected species recorded; and ▪ No instream vegetation present. No filamentous algae or sewage fungus recorded. 	
WIDTH (m)	1	
DEPTH (m)	-	
SALMONID HABITAT	ADULT	None
	NURSERY	None
	SPAWNING	None
LAMPREY HABITAT	ADULT	None
	NURSERY	None
	SPAWNING	None

Site 3

A second ephemeral stream located at the southern end of the 'The Heights' housing estate was also surveyed (**Table 10B.3**). This stream is not visible on the OSI mapping nor did it form part of the EPA's River Segment GIS layers.

Table 10B.3: Site 3 Habitat Characteristics

LOCATION	IG 0571791 0567758 Sampling site is located approximately 180m east of the proposed M28 Road Project.	
PHOTOGRAPH NO.	5 & 6	
Part of EPA Monitoring Programme	No	
DESCRIPTION	<ul style="list-style-type: none"> ▪ Very shallow with a slow to moderate flow over slight riffle/glide habitat and a compacted substratum comprising predominantly cobble, with gravel, fine gravel and sand/silt on bank edge; ▪ Moderate siltation recorded; ▪ Excessive Rubus spp (Bramble) and Ilex spp (Holly) encroaching the stream channel. Dead and decaying leaves were observed along the edge of the channel; ▪ Stream intersects a residential area; ▪ No fish or protected species recorded; and ▪ No instream vegetation present. No filamentous algae or sewage fungus recorded. 	
WIDTH (m)	1	
DEPTH (m)	0.1	
SALMONID HABITAT	ADULT	None
	NURSERY	Poor
	SPAWNING	Poor
LAMPREY HABITAT	ADULT	Poor
	NURSERY	Poor
	SPAWNING	Poor

DONNYBROOK STREAM

The Donnybrook Stream drains the northern side of Carr’s Hill before flowing in a northerly direction adjacent to the western margins of the existing N28. The stream intersects the proposed M28 Road Project at Moneygourney and flows directly along the route before flowing west adjacent to the R609 through the suburbs of Donnybrook and Douglas. Similar to the Woodbrook Stream, it also discharges to the Douglas River Estuary or Lough Mahon transitional water body.

Site 4

Survey site 4 was located immediately upstream of a culvert crossing point (**Table 10B.4**). The existing N28 runs directly adjacent to this site and while the proposed road project does not cross the Donnybrook Stream at this location, the proposed works will take place in the immediate vicinity of the site.

Table 10B.4: Site 4 Habitat Characteristics

LOCATION	IG 0570997 0567038	
PHOTOGRAPH NUMBER	7 & 8	
Part of EPA Monitoring Programme	No	
DESCRIPTION	<ul style="list-style-type: none"> ▪ Shallow, clear stream with a moderate flow over a riffle type habitat and a compacted substratum comprised of predominantly cobble, coarse gravel, sand and silt; ▪ Slight siltation recorded; ▪ Existing culvert in place downstream of sampling location where a local access road crosses the stream; ▪ Moderate shading along bank of <i>Alnus</i> spp (Alder)/ <i>Corylus</i> spp (Hazel); ▪ Stream intersects agricultural pasture lands approximately 80m west of the existing N28; ▪ No fish or protected species recorded; and ▪ No instream vegetation present. No filamentous algae or sewage fungus recorded. 	
WIDTH (m)	1	
DEPTH (m)	0.1	
SALMONID	ADULT	Poor
	NURSERY	Fair - Good
	SPAWNING	Fair - Good
LAMPREY	ADULT	Poor
	NURSERY	Poor - Fair
	SPAWNING	Fair - Good

Site 5

The proposed road project intersects the Donnybrook Stream at two locations. Survey site 5 is the northernmost point of intersection of the stream (**Table 10B.5**), and is considered to be representative of both crossing locations.

Table 10B.5: Site 5 Habitat Characteristics

LOCATION	IG 0570954 0566803 Sampling site is located at the point on which the proposed road project intersects the Donnybrook Stream.	
PHOTOGRAPH NO.	9 & 10	
Part of EPA Monitoring Programme	No	
DESCRIPTION	<ul style="list-style-type: none"> ▪ Shallow, clear stream with a moderate to fast flow over a riffle type habitat and a compacted substratum comprised of predominantly cobble, coarse gravel, sand and silt; ▪ Heavy siltation recorded; ▪ Existing culvert in place downstream of sampling location where a local access road crosses the stream; ▪ Very heavy shading of <i>Alnus</i> spp (Alder), <i>Corylus</i> spp (Hazel) and <i>Prunus spinosa</i> (Sloe bush). Extensive wind blow impeding fish passage; ▪ Stream intersects agricultural pasture lands approximately 70m west of the existing N28; ▪ No fish or protected species recorded; and ▪ No instream vegetation present. No filamentous algae or sewage fungus recorded. 	
WIDTH (m)	1.5	
DEPTH (m)	0.2	
SALMONID	ADULT	None-Poor
	NURSERY	Poor - Fair
	SPAWNING	Fair
LAMPREY	ADULT	None-Poor
	NURSERY	Poor-Fair
	SPAWNING	Fair

Site 6

Survey site 6 on the Donnybrook Stream is located adjacent to the proposed road project and the existing N28 at Moneygourney (**Table 10B.6**). The survey site is located upstream of Site 5 and Site 4.

Table 10B.6: Site 6 Habitat Characteristics

LOCATION	IG 0570954 0566803 Sampling site is located approximately 90m east of the proposed road project.	
PHOTOGRAPH NO.	11 & 12	
Part of EPA Monitoring Programme	No	
DESCRIPTION	<ul style="list-style-type: none"> ▪ Shallow, with a moderate flow over a compacted substratum comprised predominantly of boulder down the central channel, with areas of cobble, fine gravel and sand along the bank edges; ▪ Heavy siltation recorded; ▪ Existing culvert in place downstream of sampling location where a local access road crosses the stream; ▪ Heavy shading of <i>Corylus</i> spp (Hazel) , <i>Prunus spinosa</i> (Sloe bush) and <i>Ilex</i> spp (Holly); ▪ Stream intersects agricultural pasture lands approximately 20m west of the existing N28; ▪ No fish or protected species recorded; and ▪ No instream vegetation present. No filamentous algae or sewage fungus recorded. 	
WIDTH (m)	1.5	
DEPTH (m)	0.1	
SALMONID	ADULT	None-Poor
	NURSERY	None - Poor
	SPAWNING	Poor - Fair
LAMPREY	ADULT	None-Poor
	NURSERY	None-Poor
	SPAWNING	None-Poor

GLOUNATOUIG STREAM

The Glounatouig Stream drains the southern section of the proposed M28 Road Project. The Glounatouig Stream has four tributaries. The Glounatouig Stream flows in a southerly direction adjacent to the existing N28. The Shannonpark Cross tributary, flowing in an easterly direction intersects the N28 to also join the stream. From here, the stream continues to flow south adjacent to the N28 eventually veering east in line with the road towards Hilltown. From here the Glounatouig Stream continues flowing east past Raffeen Bridge into Monkstown Creek to the north east of Ringaskiddy, i.e. discharging into Cork Harbour CWB.

Site 7

Survey site 7 is located on agricultural lands approximately 500m west of the existing N28 (**Table 10B.7**).

Table 10B.7: Site 7 Habitat Characteristics

LOCATION	IG 0572214 0564900 The proposed road project intersects this stream known as the Shannonpark Cross tributary. It is a tributary of the Glounatouig Stream.	
PHOTOGRAPH NO.	13 & 14	
Part of EPA Monitoring Programme	No	
DESCRIPTION	<ul style="list-style-type: none"> ▪ Shallow with fast flowing riffles over a predominantly coarse gravel substrate with occasional boulder and cobble. Sand and silt recorded alongside bank edges where extensive erosion was observed; ▪ Heavy siltation recorded due to bank erosion; ▪ Existing culvert in place; ▪ No vegetative shading. Stream intersects an open agricultural pasture site; ▪ No fish or protected species recorded; and ▪ No instream vegetation present. No filamentous algae or sewage fungus recorded 	
WIDTH (m)	1.5	
DEPTH (m)	0.1	
SALMONID	ADULT	Poor - Fair
	NURSERY	Good
	SPAWNING	Fair
LAMPREY	ADULT	Poor - None
	NURSERY	Poor
	SPAWNING	Fair

Site 8

Survey site 8 is located at the point at which the proposed road project intersects the Shannonpark tributary before it joins the Glounatouig Stream (see Error! Reference source not found.). While efforts were made to locate the point of intersection in order to survey it, dense vegetation prevented access to the tributary on the western side of the existing N28 and steep slopes prevented access to the tributary from the eastern side of the road. The tributary was therefore not surveyed.

Site 9

Survey site 9 is immediately adjacent to the existing N28 and approximately 180m from the proposed road project in the townland of Hilltown (**Table 10B.8**). The sampling site is located downstream of an existing culvert under a third class road (L6469).

Table 10B.8: Site 9 Habitat Characteristics

LOCATION	IG 0572932 0564042 Sampling site is immediately adjacent to the existing N28 and 180m from the proposed road project.	
PHOTOGRAPH NO.	15 & 16	
Part of EPA Monitoring Programme	No	
DESCRIPTION	<ul style="list-style-type: none"> ▪ Shallow with fast flowing riffles over a predominantly boulder and cobble substrate. Interstitial coarse and fine gravel recorded. Coarse and fine gravel recorded as the dominant substrate 50 - 100m downstream of sampling site. ▪ Moderate bank erosion was observed; ▪ Slight siltation recorded due to bank erosion; ▪ Existing culvert in place where third class road crosses the Glounatouig stream; ▪ Low shading. Section of overhanging <i>Leylandii</i> spp upstream of sampling point at culvert location; ▪ No fish or protected species recorded; and ▪ No instream vegetation present. No filamentous algae or sewage fungus recorded. 	
WIDTH (m)	2	
DEPTH (m)	0.2	
SALMONID	ADULT	Fair
	NURSERY	Good - Very Good
	SPAWNING	Fair
LAMPREY	ADULT	Fair
	NURSERY	Poor
	SPAWNING	Fair

Site 10

Survey site 10 on the Glounatouig Stream is located within the grounds of Raffeen Quarry at Ballyhemiken (**Table 10B.9**). The site is immediately adjacent to the existing N28 and approximately 400m from the proposed road project. The site is located approximately 520m downstream from where the proposed upgrade works to the existing N28 terminates.

Table 10B.9: Site 10 Habitat Characteristics

LOCATION	IG 0574059 0564100 The site is approximately 520m downstream from where the proposed upgrade works to the existing N28 terminates and approximately 400m from the proposed road project.	
PHOTOGRAPH NO.	17 & 18	
Part of EPA Monitoring Programme	No	
DESCRIPTION	<ul style="list-style-type: none"> ▪ Shallow with slow to moderate flow over predominantly loose silt/coarse gravel substrate. Occasional cobble and boulder observed upstream; ▪ Moderate bank erosion was observed. Slight siltation recorded due to bank erosion; ▪ Moderate to high shading with overhanging <i>Corylus</i> spp (Hazel), <i>Prunus spinosa</i> (Sloe bush) recorded. Extensive grasses, <i>Pteridophyta</i> spp (Fern) and <i>Urtica</i> spp (Nettle) lining channel upstream of sampling point. ▪ No fish or protected species recorded; and ▪ No instream vegetation present. No filamentous algae or sewage fungus recorded. 	
WIDTH (m)	2.5	
DEPTH (m)	0.2	
SALMONID	ADULT	Poor-Fair
	NURSERY	Fair
	SPAWNING	Poor-Fair
LAMPREY	ADULT	Poor-Fair
	NURSERY	Fair-Good
	SPAWNING	Poor-Fair

APPENDIX 10C

MACROINVERTEBRATE SURVEY RESULTS

Macroinvertebrates	EPA Quality Category	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7	Site 8	Site 9	Site 10
Plecoptera											
Perlodidae	A				2			1		1	
Nemouridae	A										
Taeniopterigidae	A						2				
<i>Leuctra</i> sp.	B				1						
Ephemeroptera											
Heptageniidae	A				7	2					
<i>Baetis rhodani</i>	C	4			10+	3	4	*		20+	5
Ephemerella	C	2									
Trichoptera											
Limnephilidae	B	2		5			6	1		2	3
Hydroptilidae	B	1									
Sericostomatidae	B							1			1
Polycentropodidae	C			2	3	2	3				
Hydropsychidae	C				2	2					
Rhyacophilidae	C							1			
Diptera											
Chironomidae	C			1							
<i>Chironomus</i> spp.	E	1		1							
Simuliidae	C	3			3	2	7	1			
Tipulidae	C				1	1					
Crustacea											
<i>Gammarus</i> spp.	C	15+		10+	10+	1	2				3
<i>Asellus</i> spp.	D										1
Gastropoda											
<i>Potomapyrgus</i> spp.	C	1									
Hirudinea											
Hirudinea	D			5+	1						
EPA Q-Value		3		3	3-4	3-4	3-4	3-4		3-4	3