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Appendix 9.3

Aquatic Surveys

FLYNN FURNEY
ENVIRONMENTAL CONSULTANTS

Baseline Aquatic Ecology Assessment
Black (Shrule) River, Co. Galway/Mayo

Project: Shancloon Windfarm

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For: Fehily Timoney & Company

Date: October 2022

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1. Introduction

Flynn Furney Environmental Consultants have been commissioned by Fehily Timoney & Company to carry out a baseline aquatic ecological assessment of 12 different sites, pre-selected by Fehily Timoney, in the Black (Shrule) River catchment, which is located in Co. Mayo and Co. Galway.

The 12 sites investigated have been selected based on their proximity to the windfarm development and likelihood of potentially receiving surface run-off.

The surveys required for each site consisted of the following:

- River habitat assessment and hydromorphology assessment
- Assessment of correlation to Annex I habitat 'Watercourses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation'.
- Visual assessment for the presence of aquatic invasive alien species
- Fishery habitat appraisal
- Water quality biological analysis
- General observations for other protected aquatic species, such as otter and kingfisher.

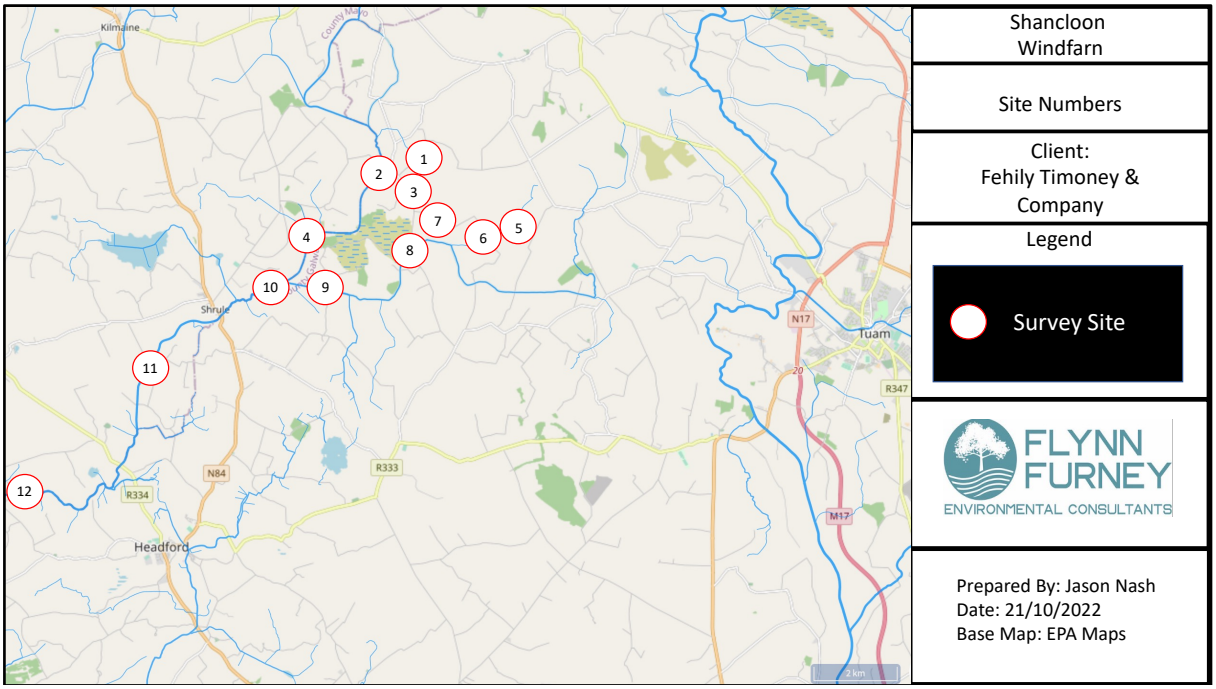

Figure 1: Site Numbers

Table 1: Site Locations

Site	Location
1	53.55091170851717, -9.013311498071124
2	53.54968786552754, -9.027902714461698
3	53.54289234347834, -9.017034404013202
4	53.53526042407401, -9.05502521028497
5	53.53870356550139, -8.971361750572374
6	53.53667597156127, -8.986832732058598
7	53.53782367811321, -9.006015890675378
8	53.53256947763653, -9.017604603129655
9	53.52411292671847, -9.046722663477405
10	53.52533967383847, -9.067772101412713
11	53.5071777827634, -9.111899804267463
12	53.48112872856678, -9.160722770594738

2. Methodology

A walkover survey of riverbanks and watercourses was conducted by two experienced ecologists on July 26th & 28th, 2022. Riverbanks were walked and watercourses were assessed by wading with a bathyscope where appropriate.

The following surveys conformed to the following standards:

- River habitat assessment and hydromorphology assessment in accordance with BS EN 14614:2004 & RHS Manual 2003 Version 1 (2018)

- Assessment of correlation to Annex I habitat 'Watercourses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation'.

- Visual assessment for the presence of aquatic invasive alien species listed on the Third Schedule of the European Communities (Birds & Natural Habitats) Regulations 2011 (S.I. No. 477 of 2011)

- Fishery habitat appraisal, specifically focusing on Salmonids, Salmo spp., (Hendry & Cragg-Hine, 2003); Lamprey Lampetra spp., (Maitland, 2003); White-Clawed Crayfish, Austropotamobius pallipes, (Holdich, 2003 & Peay, 2003) and Freshwater Pearl Mussel, Margaritifera margaritifera, (Skinner et al., 2003).

- Water quality biological analysis (Toner et al., 2005)

2.1. Biological Assessment – Sample Collection

At each station, the surrounding habitats were noted along with other parameters such as water flow and the predominance of vegetation. All samples were taken with a Freshwater Biological Association approved hand held sweep net with a mesh diameter of 500µm. At all stations, a three minute kick sample (the travelling kick) method was taken, which ensures that all habitats within a riffle area are sampled. In areas not suitable for this method, a sweep was taken if possible. Samples were deposited in a tray on the bank of the river. Bigger stones were washed and any macro-invertebrates clinging to the stones were removed and placed in the tray. Once the debris in the sample was removed, the sample containing the macro-invertebrates and the finer substrates were placed into containers and preserved with isopropyl alcohol.

Once the samples were collected, all macro-invertebrates were removed from the sample boxes in a lab, identified to the appropriate taxonomic level and then counted.

2.2. Biological Assessment – Q Value

Based on the relative abundance of indicator species, the Q value was determined for the sites in accordance with the biological assessment procedure used by the EPA (Toner et al. 2005). The method categorises invertebrates into one of five different groups based on their sensitivity or tolerance to pollution. Group A are the most sensitive forms, Group B are less sensitive, Group C are tolerant, Group D are very tolerant and Group E are the most tolerant. Overall, the higher the biological diversity and the greater the abundance of invertebrate species that are sensitive to organic pollution, then the higher the water quality is assumed to be and the higher the Q value assigned to that sampling station.

The relative abundance of each group of invertebrates in the samples was assigned as follows:

- Present (1/2 individuals)
- Scarce/Few (<1%)
- Small Numbers (<5%)
- Fair Numbers (5-10%)
- Common (10-20%)
- Numerous (25-50%)
- Dominant (50-75%)
- Excessive (>75%)

3. Results

3.1. Site 1

Channel width: 2m

Physical attributes: This site is located at Grid Reference 53.55091170851717, -9.013311498071124. This watercourse is recognised as the Kilshanvy, according to the Environmental Protection Agency (EPA). Water flows were low at the time of surveying and extremely slow. A low water glide was present upstream and downstream of the bridge. The river flows through a concrete pipe under the road. Stream tunnelling was present upstream and downstream of the bridge crossing point. All substrates were composed of soft mud.

Land-use: Riparian woodland, containing deciduous trees, is the dominant habitat typealong this site, which is very overgrown. Upstream of the bridge, along the left hand bank (LHB), is recolonising bare ground and bog.

Riparian vegetation: Tree species observed included Willow (*Salix* spp.), Alder (*Alnus glutinosa*) and Silver Birch (*Betula pendula*). Plant and shrub species included Gorse (*Ulex europaeus*), Coltsfoot (*Tussilago farfara*), Royal Fern (*Osmunda regalis*), Male Fern (*Dryopteris filix-mas*), Yellow Flag Iris (*Iris pseudacorus*), Ragwort (*Jacobaea vulgaris*), Pennyroyal (*Mentha pulegium*), Common Spotted Orchid (*Dactylorhiza fuchsii*) Bramble (*Rubus fruticosus*) and Lesser Knapweed (*Centaurea nigra*).

Instream vegetation: Watercress (*Nasturtium officinale*), Water Mint (*Mentha aquatica*), Duckweed (*Lemnoideae*)

This watercourse does not match the criteria set out for 'Watercourses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation'.

Aquatic invasive alien species listed on the Third Schedule are absent.

It is considered that this site has only 'Low' fisheries potential. Three-spined stickleback (*Gasterosteus aculeatus*) were observed and European eel (*Anguilla anguilla*) may also be present. It is considered to be unsuitable for Salmonids (*Salmo* spp.), Lamprey (*Lampetra* spp.), White-Clawed Crayfish (*Austropotamobius pallipes*) and Freshwater Pearl Mussel (*Margaritifera margaritifera*).

A sweep sample for macroinvertebrates was taken below the bridge. Water quality biological analysis indicates that this site has a Q3 value. This means it has a 'Poor' Water Framework Directive Status, is 'Moderately polluted' and 'Unsatisfactory'. A detailed breakdown of the sample results is available in Appendix 1.

No other protected aquatic species were recorded.

Pennyroyal is listed as a plant species protected by Section 21 of the Wildlife Act, 1976 is set out in the Flora (Protection) Order, 2022, which supercedes orders made in 1980, 1987, 1999 and 2015.

Figure 2: Site 1, watercourse upstream of bridge.

Figure 3: Site 1 containing Pennyroyal.

3.2. Site 2

Channel width: 5-6m

Physical attributes: This site is located at Grid Reference 53.54968786552754, -9.027902714461698. This watercourse is recognised as the Black (Shrule) River, according to the Environmental Protection Agency (EPA). Water flows were low at the time of surveying. This river was historically dredged and straightened at this point. Riffle, pool and glide habitat was present, with glide and pool dominating. A good mix of gravel and cobble were present, along with some boulder. Cattle poaching was evident along the right hand bank (RHB) below the bridge.

Land-use: Improved agricultural grassland was present upstream and downstream of the bridge.

Riparian vegetation: Tree species observed included Sycamore (*Acer pseudoplatanus*), Willow, Blackthorn (*Prunus spinosa*), Ash (*Fraxinus* excelsior), Alder and Hawthorn (*Cretaegus monogyna*). Plant and shrub species included Canary reed grass (*Phalaris arundinacea*) and Thistle (*Cirsium* spp.).

Instream vegetation: Curly Leaved Pondweed (*Potamogeton* crispus), Water Dropwort (*Oenanthe crocata*), European Bur-Reed (*Sparganium emersum*), Vernal Starwort (*Calatriche palustris*), Filamentous Green Algae (*Pleurastrum terricola*), Watercress, Water Mint, Star Duckweed (*Lemna triscula*), Freshwater Moss (*Fontinalis antipyretica*), an unidentified species of brown algae and Canadian Pondweed (*Elodea canadensis*).

This watercourse does not match the criteria set out for 'Watercourses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation'.

Aquatic invasive alien species listed on the Third Schedule are present, with Canadian pondweed (*Elodea canadensis*) present. It should also be noted that Bohemian Knotweed (*Fallopia x Bohemica*) was recorded along the RHB upstream of the bridge.

It is considered that this site has 'High' fisheries potential. Three-spined stickleback and Brown trout (*Salmo* trutta) were observed. Atlantic salmon (*Salmo salar*) and European eel may also be present. 'Good' salmonid nursery habitat is present. Adult habitat is deemed to be of 'Moderate' value whilst spawning habitat is 'Poor'. It is considered to be unsuitable for Lamprey due to a lack of spawning substrates for adults and soft sediment for ammocoetes. There is 'High' potential for White-Clawed Crayfish to be present due to habitat suitability and suitable geology. Whilst the immediate subsoil is dictated by peat and alluvium, large areas are dominated by limestone and karstified limestone bedrock is present at the surface a short distance upstream of this site. No crayfish or evidence of crayfish were observed during this survey. It is considered this site is unsuitable for Freshwater Pearl Mussel due inadequate water quality and habitat.

A kick sample for macroinvertebrates was taken below the bridge. Water quality biological analysis indicates that this site has a Q3 value. This means it has a 'Poor' Water Framework Directive Status, is 'Moderately polluted' and 'Unsatisfactory'. A detailed breakdown of the sample results is available in Appendix 1.

A Kingfisher (*Alcedo atthis*) was recorded flying multiple times along this site. There is a potential nest along the RHB above the bridge.

Figure 4: Site 2, upstream of bridge.

Figure 5: Site 2, downstream of bridge.

3.3. Site 3

Channel width: 1m

Physical attributes: This site is located at Grid Reference 53.54289234347834, -9.017034404013202. This watercourse does not have a recognised name, according to the Environmental Protection Agency (EPA), and is not shown as a recognised watercourse on the EPA GIS maps website. This stream has been historically drained and straightened. Water flows were low at the time of surveying. A low water glide was present upstream and downstream of the bridge, with a small amount of riffle habitat. A shallow pool was present downstream of the bridge. Upstream of the bridge was slightly impounded due to the presence of a concrete box culvert. Stream tunnelling was present upstream and downstream of the bridge crossing point. Gravel substrates were present, with silt and mud also prevalent. Water flows were extremely slow. Bank elevation was high upstream and downstream of bridge.

Land-use: Improved agricultural grassland was present upstream and downstream of the bridge. A house and garden (horticultural land) was situated on the RHB below the bridge.

Riparian vegetation: Tree species observed included Ash, Sycamore, Hawthorn (*Cretaegus monogyna*), Willow and Alder. Plant and shrub species included Cow Parsnip (*Heracleum maximum*), Ryegrass (*Lolium* spp.), Lesser Burdock (*Arctium minus*), Bindweed (*Convolvus*), Ragwort (*Jacobaea vulgaris*), Dock (*Rumex obtusifolius*), Nettle (*Urtica dioica*), Bramble (*Rubus fruticosus*), Meadowsweet (*Filipendula ulmaria*), Creeping Buttercup (*Ranunculus repens*), Plantain (*Plantago* spp.), Hart's Tongue Fern (*Asplenium scolopendrium*), Fern (*Tracheophyta* spp.), Ivy (*Hedera helix*), Yorkshire Fog (*Holcus* lanatus), Clover (*Trifolium* repens), Common Selfheal (*Prunella vulgaris*) and Yellow Flag Iris (*Iris* pseudacorus).

Instream vegetation: Watercress.

This watercourse does not match the criteria set out for 'Watercourses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation'. Aquatic invasive alien species listed on the Third Schedule are absent.

It is considered that this site has only 'Low' fisheries potential. Fish species were not seen. Three-spined stickleback and European eel may occasionally be present during times of higher flows. It is considered to be unsuitable for Salmonids, Lamprey, White-Clawed Crayfish and Freshwater Pearl Mussel.

A kick sample for macroinvertebrates was taken below the bridge. Water quality biological analysis indicates that this site has a Q3 value. This means it has a 'Poor' Water Framework Directive Status, is 'Moderately polluted' and 'Unsatisfactory'. A detailed breakdown of the sample results is available in Appendix 1.

No other protected aquatic species were recorded.

Figure 6: Site 3, upstream of bridge.

Figure 7: Site 3, downstream of bridge.

3.4. Site 4

Channel width: 9m

Physical attributes: This site is located at Grid Reference 53.53526042407401, -9.05502521028497. This watercourse is recognised as the Black (Shrule) River, according to the Environmental Protection Agency (EPA). A tributary, called the Lisheenielagaun, flows into this site from the RHB below the bridge. This stream has been historically drained. Water flows were low and very slow at the time of surveying. Deep pools were present upstream and downstream of the bridge, with a small amount of riffle habitat under the bridge and glide above it. This site was relatively open, particularly upstream of the bridge. Boulder dominated substrate composition, with gravel and cobble present also. Bank elevation was high upstream and downstream of bridge.

Land-use: Improved agricultural grassland was present upstream and downstream of the bridge.

Riparian vegetation: Tree species observed included Ash, Sycamore, Elm (*Ulmus* ep.), Alder and Hawthorn. Plant and shrub species included Ryegrass, Bramble and Canary reed grass.

Instream vegetation: Watercress, Narrow-Leaved Bur-Reed (*Sparganium angustifolium*), European Bur-Reed, Vernal Starwort (*Callitriche palustris*), Curly-Leaf Pondweed (*Potamogeton crispus*), Water Mint, Water Dropwort (*Oenanthe crocata*), Pedunculate Water Starwort (*Callitriche brutia*), Filamentous Green Algae, True Forget-Me-Not (*Myosotis scorpioides*), Floating Pondweed (*Potamogeton natans*), Greater Spearwort (*Ranunculus lingua*) and Varigated Yellow Pond-Lily (*Nuphar lutea*).

This watercourse does not match the criteria set out for 'Watercourses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation'.

Aquatic invasive alien species listed on the Third Schedule are absent.

It is considered that this site has 'High' fisheries potential. Salmonids were observed actively feeding, most likely Brown trout. Stickleback were also recorded. 'Good' salmonid holding habitat, 'Moderate' nursery habitat and 'Poor' spawning habitat was present. This site is considered to be mostly unsuitable for Lamprey as spawning habitat is absent. Soft substrate is present for ammocoetes if spawning habitat is available upstream. There is potential for crayfish to be presen due to suitable habitats being present and the local geology being limestone based. It is considered to be unsuitable Freshwater Pearl Mussel.

A kick sample for macroinvertebrates was taken below the bridge. Water quality biological analysis indicates that this site has a Q3-4 value. This means it has a

'Moderate' Water Framework Directive Status, is 'Slightly polluted' and 'Unsatisfactory'. A detailed breakdown of the sample results is available in Appendix 1.
A single Kingfisher (*Alcedo atthis*) was recorded flying downstream. A bank offering nesting potential is present upstream on the LHB. Otter activity was also recorded as a slide and spraint was present upstream of the bridge.

Figure 8: Site 4, upstream of bridge.

Figure 9: Site 4, downstream of bridge.

3.5. Site 5

Channel width: 1m

Physical attributes: This site is located at Grid Reference 53.53870356550139, -8.971361750572374, downstream of a small road bridge. This watercourse does not have a recognised name, according to the Environmental Protection Agency (EPA), and flows through a piped culvert under the road bridge. This stream has been historically drained. Water flows were absent with just one pool of shallow water present below the bridge. This pool contained mud and silt substrates only. Another pipe crossing is present 75m below the bridge. Instream physical features, such as riffle/pool/glide configurations, were absent.

Land-use: Improved agricultural grassland along both sides of this watercourse.

Riparian vegetation: Tree species observed included Alder, Willow and Hawthorn. Plant and shrub species included Gorse (*Ulex europaeus*), Bramble, Willowherb (*Epilobium hirsutum*), Dock (*Rumex obtusifolius*) and Hart's Tongue Fern, Thistle (*Cirsium* spp.), Ryegrass (*Lolium* spp.), Nettle (*Urtica dioica*) and Creeping Buttercup recorded.

Instream vegetation: Watercress and Duckweed (*Lemnoideae*) were present in a single pool. The remainder of watercourse was dry with grass and Bramble present.

This watercourse does not match the criteria set out for 'Watercourses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation'.

Aquatic invasive alien species listed on the Third Schedule are absent.

It is considered that this site has only 'Low' fisheries potential. Fish species were not seen. Three-spined stickleback and European eel may occasionally be present during times of higher flows. It is considered unsuitable for Salmonids, Lamprey, White-Clawed Crayfish and Freshwater Pearl Mussel.

A sample for macroinvertebrates was taken in the single pool below the bridge. Water quality biological analysis indicates that this site has a Q3 value. This means it has a 'Poor' Water Framework Directive Status, is 'Moderately polluted' and 'Unsatisfactory'. A detailed breakdown of the sample results is available in Appendix 1.

No other protected aquatic species were recorded.

Figure 10: Lower end of Site 5.

Figure 11: Pool below bridge at Site 5.

3.6. Site 6

Channel width: 2m

Physical attributes: This site is located at Grid Reference 53.53667597156127, -8.986832732058598. This watercourse does not have a recognised name, according to the Environmental Protection Agency (EPA), and is upstream of Site 5. This stream has been historically drained. Water flows were very slow with a discernible flow only seen in shallow areas. Soft, mud substrates were present throughout the 100m section. Instream physical features were dominated by pool habitat.

Land-use: Improved agricultural grassland was present along the RHB, which is reclaimed cut-over bog. Along the LHB an access track is located within close proximity to the stream. Adjacent to this, drained cut-over bog is present. These are connected to the stream at Site 6.

Riparian vegetation: Tree species observed included Willow and Alder. Plant and shrub species included Gorse, Ryegrass, Bramble, Meadowsweet (*Filipendula ulmaria*), Fern, Horsetail (*Equisetum arvense*), Hairy Buttercup (*Ranunculus sardous*), Garden valerian (*Valeriana officinalis*), Bur Marigold (*Bidens laevis*), Common Marsh Bedstraw (*Galium palustre*), Lesser Knapweed (*Centaurea nigra*), Lady's Bedstraw (*Galium verum*), Common Rush (*Juncus effusus*) and Purple Loosestrife (*Lythrum salicaria*).

Instream vegetation: Water starwort (*Callitiche stagnalis*), Water Mint, Water Horsetail (*Equisetum fluviatile*), Yellow Marsh Marigold (*Caltha palustris*), Bulrush (*Typha latifolia*) and Broad-leaved Pondweed (*Potamogeton natans*).

This watercourse does not match the criteria set out for 'Watercourses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation'.

Aquatic invasive alien species listed on the Third Schedule are absent.

It is considered that this site has only 'Low' fisheries potential. Fish species were not seen. Three-spined stickleback and European eel may be present. It is unsuitable for Salmonids, Lamprey, White-Clawed Crayfish and Freshwater Pearl Mussel.

A kick sample for macroinvertebrates was not acquired due to the unsuitability of the site as it contained mud only.

No other protected aquatic species were recorded.

Figure 12: Site 6 adjacent to access track.

Figure 13: Site 6 where drain from cut-over bog enters.

3.7. Site 7

Channel width: 1.5m

Physical attributes: This site is located at Grid Reference 53.53782367811321, -9.006015890675378. This watercourse does not have a recognised name, according to the Environmental Protection Agency (EPA), and is not shown on the EPA GIS maps website. This stream has been historically drained and straightened. Water flows were low at the time of surveying. A low water glide was present downstream of the bridge. A short section of riffle habitat was present directly below the bridge. Upstream of the bridge was impounded due to the presence of a circular concrete culvert. Stream tunnelling was present upstream and downstream of the bridge crossing point. Gravel, cobble and boulder substrates were present, with silt and mud also prevalent. A cattle access point was present below the bridge along the RHB. A low level bund was present along the stream bank on the LHB upstream of the bridge.

Land-use: Improved agricultural grassland was present along both banks. The stream was fenced off upstream of the bridge on the LHB and downstream of the bridge on the LHB. Cattle were present downstream along RHB and sheep were present upstream along LHB.

Riparian vegetation: Tree species observed included Ash, Holly (*Ilex* aquifolium), Field Maple (*Acer campestre*), Willow and Alder. Plant and shrub species included Gorse, Ryegrass, Bramble, Cleavers (*Galium aparine*), Meadowsweet, Wild Privet (*Ligustrum* vulgare), Thistle, Common Rush, Yellow Flag Iris (*Iris* pseudacorus), Herb Robert (*Geranium robertianum*) and Purple Loosestrife.

Instream vegetation: Water Mint and Watercress.

This watercourse does not match the criteria set out for 'Watercourses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation'.

Aquatic invasive alien species listed on the Third Schedule are absent.

It is considered that this site has 'Moderate' fisheries potential. Three-spined stickleback were observed below the bridge. European eel may be present and there is also some potential for Brown Trout (*Salmo trutta*) and Brook Lamprey (*Lampetra planeri)*. Brown Trout spawning potential is present in gravels below the bridge, whilst the same gravels present Brook Lamprey with spawning potential also. Depositing mud substrates downstream are suitable for Brook Lamprey ammocoetes. It is deemed to be unsuitable for Atlantic Salmon (*Salmo salar*), River Lamprey (*Lampetra fluviatilis*), Sea Lamprey (*Petromyzom marinus*), White-Clawed Crayfish and Freshwater Pearl Mussel. It appears a fish passage type structure may be present downstream of the bridge to aid fish passage through the culvert under the road.

A kick sample for macroinvertebrates was taken below the bridge. Water quality biological analysis indicates that this site has a Q3 value. This means it has a 'Poor'

Water Framework Directive Status, is 'Moderately polluted' and 'Unsatisfactory'. A detailed breakdown of the sample results is available in Appendix 1.

No other protected aquatic species were recorded.

Figure 14: Site 7, downstream of bridge.

Figure 15: Lower end of Site 7.

3.8. Site 8

Channel width: 5-6m

Physical attributes: This site is located at Grid Reference 53.53256947763653, -9.017604603129655. This watercourse is recognised as the Togher River, according to the Environmental Protection Agency (EPA), which is a tributary of the Black (Shrule) River. It is located upstream of Site 9. This stream has been historically drained and straightened. Water flows were low and slow at the time of surveying. This section of the river was classified as a pool with deep sections c.2m located below the bridge. Large rock armour stones are present along the RHB below the bridge. Steep banks were present throughout the site. Substrates were soft with only low amounts of hard substrates present. This section was too deep to wade and it is likely that depths in excess of 2m are present.

Land-use: Improved agricultural grassland dominated both banks. Cut-over bog was also present.

Riparian vegetation: Tree species observed included Willow and Alder only. Plant and shrub species included Ryegrass, Bramble, Meadowsweet, Thistle, Common Rush, Redshank (*Persicaria maculosa*), Willowherb, Creeping Buttercup, Bindweed, Nettle and Cow Parsnip.

Instream vegetation: Water Mint, Watercress, Varigated Yellow Pond-Lily, European Bur-Reed, Common Reedgrass (*Phragmites australis*), Broadleaved Pondweed, Mare's-Tail.

This watercourse does not match the criteria set out for 'Watercourses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation'.

Aquatic invasive alien species listed on the Third Schedule appeared to be absent. A constraint of this site was poor visibility and deep water which may result in an aquatic invasive alien species not being detected.

It is considered that this site has 'Moderate-High' fisheries potential. Fish species were not observed due to poor visibility and deep water. Salmonid habitat is present which is mostly suited to adults. Nursery habitat is moderate and spawning habitat is absent. Potential for lamprey is 'Low' due to the absence of spawning areas. If spawning areas are present a short distance further upstream, lamprey ammocoetes may be present in depositing areas containing mud and silt. It is deemed to be unsuitable for Freshwater pearl mussel. Some suitable habitat is present for White-clawed crayfish due to the presence of burrowing habitat, large stones and instream vegetation. However, this river has been historically dredged. Taking this into account, crayfish potential is 'Low-Moderate'.

A kick sample for macroinvertebrates was not acquired due to the unsuitability of substrates and deep water.

No other protected aquatic species were recorded.

Figure 16: Lower end of Site 8.

Figure 17: Downstream of bridge at Site 8.

3.9. Site 9

Channel width: 6-7m

Physical attributes: This site is located at Grid Reference 53.52411292671847, -9.046722663477405. The survey encompassed 50m sections above and below the bridge. This watercourse is recognised as the Togher River, according to the Environmental Protection Agency (EPA), which is a tributary of the Black (Shrule) River. This stream has been historically drained and straightened. Water flows were low and slow at the time of surveying. This section of the river was classified as a pool with deep sections c.1.5m located below the bridge. The stone bridge is underpinned with concrete and a concrete plinth is present. Substrates upstream and downstream are dominated by cobbles which are heavily silted. The river upstream and downstream of the bridge is relatively open.

Land-use: Improved agricultural grassland was present along both banks. Good buffer zones are present.

Riparian vegetation: Tree species observed included Ash, Hawthorn, Blackthorn, Willow and Alder. Plant and shrub species included Ryegrass, Bramble, Meadowsweet, Common Vetch (*Vicia sativa*), Thistle and Common rush.

Instream vegetation: Water Mint, Watercress, Water Starwort, Mare's-Tail (*Hippuris vulgaris*), Marsh Marigold, Long-Leaf Pondweed (*Potamogeton nodosus*), Varigated Yellow Pond-Lily, Common Water-Plantain (*Alisma plantago-aquatica*), Water Fern (*Azolla filiculoides*), Filamentous Green Algae, Water Forget-Me-Not, Water Dropwort, Water Horsetail (*Equisetum fluviatile*), Star Duckweed, European Bur-Reed, Common Clubrush (*Schoenoplectus lacustris*) and Canadian Pondweed.

This watercourse does not match the criteria set out for 'Watercourses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation'.

Aquatic invasive alien species listed on the Third Schedule are present in the form of Water fern and Canadian pondweed.

It is considered that this site has 'High' fisheries potential. Three-spined stickleback and unidentified coarse fish were observed below the bridge. Salmonid holding habitat is present which is mostly suited to adults. Nursery habitat is moderate and spawning habitat is absent. Potential for lamprey is 'Low' due to the absence of spawning areas. If spawning areas are present a short distance further upstream, lamprey ammocoetes may be present in depositing areas containing mud and silt. It is deemed to be unsuitable for Freshwater pearl mussel. Some suitable habitat is present for White-clawed crayfish due to the presence of burrowing habitat, large stones and instream vegetation. However, this river has been dredged. Taking this into account, crayfish potential is 'Low-Moderate'.
A kick sample for macroinvertebrates was taken below the bridge. Water quality biological analysis indicates that this site has a Q3-4 value. This means it has a

'Moderate' Water Framework Directive Status, is 'Slightly polluted' and 'Unsatisfactory'. A detailed breakdown of the sample results is available in Appendix 1.

A single Kingfisher (*Alcedo atthis*) was recorded flying downstream.

Figure 18: Site 9, upstream of bridge.

Figure 19: Site 9, downstream of bridge.

3.10. Site 10

Channel width: 8m

Physical attributes: This site is located at Grid Reference 53.52533967383847, -9.067772101412713. This watercourse is recognised as the Black (Shrule) River, according to the Environmental Protection Agency (EPA). Water levels were low at the time of survey. This section of the river has been historically dredged. It was very open with abundant growths of aquatic macrophytes present. The entire section was very deep and can be classified as a pool. Substrates were not visible due to depth and clarity but were most likely soft with mud.

Land-use: Improved agricultural grassland was present along both banks. A good buffer area was present on both banks, particularly the southern bank.

Riparian vegetation: Tree species observed included Ash. Plant and shrub species included Meadowsweet, Bramble, Gorse and Canary reed grass.

Instream vegetation: Common Clubrush, Cow Parsley (*Anthriscus sylvestris*), Shining Pondweed (*Potamogeton lucens*) Water Mint, Watercress, European Bur-reed, Varigated Yellow Pond-Lily, Filamentous Green Algae and Narrowleaf Bur-Reed (*Sparganium angustifolium*).

This watercourse does not match the criteria set out for 'Watercourses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation'.

Aquatic invasive alien species listed on the Third Schedule were not recorded.

It is considered that this site has 'High' fisheries potential. Whilst fish species were not observed at the site, a short distance upstream juvenile salmonids were seen in a shallow, slow flowing riffle. 'Moderate' nursery and 'Good' adult holding salmonid habitat is present whilst spawning potential is considered to be absent. Potential for lamprey is 'Moderate' due to the absence of spawning areas but areas of deposition are present which may be suitable for ammocoetes if suitable spawning areas are located upstream. It was deemed to be entirely unsuitable for Freshwater pearl mussel. Some suitable habitat is present for White-clawed crayfish due to the presence of burrowing habitat and instream vegetation. However, this river has been dredged. Taking this into account, crayfish potential is 'Moderate'.

A kick sample for macroinvertebrates was not acquired due to the unsuitability of substrates and deep water.

No other protected aquatic species were recorded.

Figure 20: Site 10.

Figure 21: Close-up of Site 10.

3.11. Site 11

Channel width: 7m

Physical attributes: This site is located at Grid Reference 53.5071777827634, -9.111899804267463. The survey encompassed 50m sections above and below the bridge. This watercourse is recognised as the Black (Shrule) River, according to the Environmental Protection Agency (EPA). Water flows were moderate at the time of survey. This section of the river has been historically dredged and straightened. Sheer bedrock banks are present indicating bedrock was broken out during the dredging process. The 50m section upstream of the bridge was dominated by pool and glide. Substrates upstream and downstream are dominated by cobbles with boulder and bedrock also present. Some gravel was present and a gravel/cobble shoal is present below the bridge which appears have been placed in the river as part of a salmonid habitat enhancement measure. Upstream of the bridge, a long pool is present. Below the bridge, riffle, pool and glide habitat is present.

Land-use: Improved agricultural grassland was present along both banks.

Riparian vegetation: Tree species observed included Ash, Willow, Sycamore, Blackthorn, Hawthorn and Elder. Plant and shrub species included Ryegrass, Nettle, Bramble, Canary reed grass and Thistle.

Instream vegetation: Water Mint, Watercress, Water Dropwort, European Bur-Reed, Freshwater Moss, Yellow Marsh Marigold, Filamentous Green Algae, Varigated Yellow Pond-Lily, Common Water-Plantain, Vernal Starwort, Narrowleaf Bur-Reed & Water-Crowfoot (*Ranunculus* sp.).

This watercourse does not match the criteria set out for 'Watercourses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation'.

Aquatic invasive alien species listed on the Third Schedule were not recorded.

It is considered that this site has 'High' fisheries potential. Brown trout were present in modest numbers. 'Good' nursery and adult salmonid habitat is present whilst spawning potential is considered to be 'Moderate'. As previously mentioned, one small spawning area is present below the bridge. Potential for lamprey is 'Low' due to the absence of areas of deposition and spawning areas with suitable sized gravels. It is deemed to be unsuitable for Freshwater pearl mussel. Some suitable habitat is present for White-clawed crayfish due to the presence of burrowing habitat upstream of the bridge, large stones and instream vegetation. However, this river has been dredged. Taking this into account, crayfish potential is 'Low'.

A kick sample for macroinvertebrates was taken below the bridge. Water quality biological analysis indicates that this site has a Q3-4 value. This means it has a 'Moderate' Water Framework Directive Status, is 'Slightly polluted' and 'Unsatisfactory'. A detailed breakdown of the sample results is available in Appendix 1.

No other protected aquatic species were recorded here.

Figure 22: Site 11, upstream of bridge.

Figure 23: Site 11, downstream of bridge.

3.12. Site 12

Channel width: 11m

Physical attributes: This site is located at Grid Reference 53.48112872856678, -9.160722770594738. The survey encompassed 50m sections above and below the bridge. This watercourse is recognised as the Black (Shrule) River, according to the Environmental Protection Agency (EPA). Water flows were moderate at the time of survey. This section of the river displayed high levels of heterogeneity with a mosaic of riffle, pool and glide habitats present below the bridge. The 50m section upstream of the bridge was dominated by pool and glide. Substrates upstream and downstream are dominated by cobbles with boulder and bedrock also present. The river downstream of the bridge is tunnelled with deciduous trees and this is also seen above the bridge but to a lesser degree.

Land-use: Improved agricultural grassland was present along both banks.

Riparian vegetation: Tree species observed included Ash, Willow, Sycamore, Blackthorn, Alder, Hawthorn and Elder. Plant and shrub species included Ryegrass, Plantain, Nettle, Bramble, Canary reed grass, Thistle, Willowherb, Bindweed and True forget-me-not.

Instream vegetation: Water Mint, Watercress, Water Dropwort, Fine-Leaved Water Dropwort (*Oenanthe aquatica*) European Bur-Reed, Freshwater Moss, Yellow Marsh Marigold, Three Stamen Waterwort (*Elatine triandra*), Long-Leaf Pondweed and an unidentified black algae.

This watercourse does not match the criteria set out for 'Watercourses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation'.

Aquatic invasive alien species listed on the Third Schedule were not recorded.

It is considered that this site has 'High' fisheries potential. Juvenile Atlantic salmon and Brown trout were present in high numbers. 'Good' nursery and adult salmonid holding habitat is present whilst spawning potential is considered to be 'Poor'. This was mostly due to lack of gravels and calcification of riverbed substrates. Potential for lamprey is 'Low' due to the absence of spawning areas, presence of bedrock and areas of deposition. It was deemed to be suitable for Freshwater pearl mussel due to the stability of riverbed substrates. However, previous instream modifications upstream and inadequate water quality most likely means they are absent. Suitable habitat is present for White-clawed crayfish due to the presence of burrowing habitat, large stones and instream vegetation. Limestone geology is also present which adds to the suitability of this area for the species.

A kick sample for macroinvertebrates was taken below the bridge. Water quality biological analysis indicates that this site has a Q3 value. This means it has a 'Poor'

Water Framework Directive Status, is 'Moderately polluted' and 'Unsatisfactory'. A detailed breakdown of the sample results is available in Appendix 1.

No other protected aquatic species were recorded. However, this site is highly suitable for Otter (*Lutra lutra*).

Figure 24: Site 12, downstream of bridge.

Figure 25: Site 12, upstream of bridge.

4. Reference List

- Technical Committee CEN/TC 230. (2005). Water Quality - Guidance standard for assessing the hydromorphological features of rivers, (EN 14614:2004)

- https://www.riverhabitatsurvey.org/wp-content/uploads/2018/04/RHS_Manual_2003_V1_opt.pdf

- https://eunis.eea.europa.eu/habitats/10077

- European Communities (Birds and Natural Habitats) Regulations 2011

- Hendry, Keith & Cragg-Hine, D & O'Grady, M & Sambrook, H & Stephen, A. (2003). Management of Habitat for Rehabilitation and Enhancement of Salmonid Stocks. Fisheries Research. 62. 171-192. 10.1016/S0165-7836(02)00161-3.

- Maitland PS (2003). Ecology of the River, Brook and Sea Lamprey. Conserving Natura 2000 Rivers Ecology Series No. 5. English Nature, Peterborough.

- Holdich, D. (2003). Ecology of the White-clawed Crayfish. Conserving Natura 2000 Rivers Ecology Series No. 1. English Nature, Peterborough.

- Peay S (2003) Guidance on habitat for white-clawed crayfish and how to restore it. R&D Technical Report W1-067/TR. Environment Agency, Bristol.

- Skinner, A., Young, M. & Hastie, L. (2003) Ecology of the Freshwater Pearl Mussel. Conserving Natura 2000 Rivers Ecology Series No. 2 English Nature, Peterborough.

- Toner, P., Bowman, K., Clabby, K., Lucey, J., McGarrigle, M, Concannon, C., Clenaghan, C., Cunningham, P., Delaney, J., O'Boyle, S., MaCarthaigh, M., Craig, M., and Quinn, R. 2005. Water Quality in Ireland 2001-2003. Environmental Protection Agency, Wexford.

5. Appendices

Appendix 1 – Kick Sampling Results

Taxa	S4	S2	S1*	S7
Group A (Very Sensitive)				
Plecoptera				
Ephemeroptera	*Ephemera* sp./few			
Group B (Less Sensitive)				
Plecoptera	Leuctridae/few	Leuctridae/few		
Trichoptera	Glossossomatidae/few	Glossossomatidae/few	Limnephilidae/few	Sericostomatidae/few
Group C (Tolerant)				
Ephemeroptera	Ephemerellidae/common	Ephemerellidae/numerous Caenidae/few		
Trichoptera	Hydropsychidae/few	Rhyacophilidae/few		
Diptera	Pediciidae/few Chironomidae/few Limoniidae/few	Chironomidae/common Simuliidae/common	Chironomidae/numerous	Chironomidae/dominant Pediciidae/few
Coleoptera	Haliplidae/few Elmidae/few	Elmidae/numerous	Haliplidae/few	Elmidae/common
Gastropoda	Hydrobiidae/few	Lymnaeidae/few	Hydrobiidae/few	Hydrobiidae/few Planorbidae/few
Crustacea	Gammaridae/dominant	Gammaridae/dominant	Gammaridae/numerous	Gammaridae/numerous
Group D (Very Tolerant)				
Lamellibranchiata				
Gastropoda	*Lymnaea stagnalis*			
Hirudinea			Glossiphonidae/few	
Crustacea			Asellidae/common	Asellidae/few
Group E (Most Tolerant)				
Oligochaeta	Lumbriculidae/few			
Taxon Richness	14	10	7	8
Q-value	**3-4**	**3**	**3**	**3**

Taxa	S12	S5*	S3*	S9
Group A (Very Sensitive)				
Plecoptera				
Ephemeroptera				Ephemeridae/few
Group B (Less Sensitive)				
Plecoptera				
Trichoptera	Glossossomatidae/few Rhyacophilidae/few			
Ephemeroptera	Baetidae/few			
Group C (Tolerant)				
Ephemeroptera	*B.rhodani*/common Ephemerellidae/common			Ephemerellidae/common Caenidae/few
Trichoptera	Hydrospychidae/numerous			Psychomyiidae/few
Diptera	Chironomidae/numerous Simuliidae/few	Chironomidae/common Limoniidae/few Psychodidae/few Simuliidae/numerous Stratiomyidae/few		Chironomidae/Numerous
Coleoptera	Elmidae/numerous	Elmidae/common	Elmidae/dominant	Dytiscidae/few Haliplidae/few
Gastropoda	Lymnaeidae/few	Planorbidae/few	Hydrobiidae/common	Lymnaeidae/few
Crustacea	Gammaridae/numerous	Gammaridae/common		Gammaridae/dominant
Group D (Very Tolerant)				
Lamellibranchiata	Sphaeridae/few	Sphaeridae/few		
Gastropoda				
Hirudinea				
Crustacea		Asellidae/numerous		Asellidae/few
Group E (Most Tolerant)				
Oligochaeta				
Taxon Richness	12	10	2	10
Q-value	**3**	**3**	**3**	**3-4**

Taxa	**S11**			
Group A (Very Sensitive)				
Plecoptera	Perlodidae/few			
Ephemeroptera	Heptageniidae/few			
Group B (Less Sensitive)				
Plecoptera	Leuctridae/few			
Trichoptera	Limnephilidae/few			
Ephemeroptera	Baetidae/common			
Group C (Tolerant)				
Ephemeroptera	Ephemerellidae/common *B.rhodani*/common			
Trichoptera	Hydrospychidae/numerous Rhycophilidae/few			
Diptera	Simuliidae/common Chironomidae/numerous			
Coleoptera	Elmidae/common			
Gastropoda	Planorbidae/few Lymnaeidae/common			
Crustacea	Gammaridae/numerous			
Group D (Very Tolerant)				
Lamellibranchiata				
Gastropoda				
Hirudinea				
Crustacea				
Group E (Most Tolerant)				
Oligochaeta				
Taxon Richness	15			
Q-value	**3-4**			