

MALACHY WALSH AND PARTNERS



An Ecological Impact Assessment of River Lee Riverwalk

Ballymullen to Ballyseedy Wood

12292

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MWP ENVIRONMENT AND PLANNING

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1 INTRODUCTION

Malachy Walsh and Partners were commissioned by Kerry County Council (KCC) to undertake an ecological impact assessment of a proposed riverwalk along the River Lee for amenity purposes, from the townlands of Ballymullen to Ballyseedy Wood, in Tralee.

1.1 Project description

The development of the riverwalk is a key element of the Lee Valley Master Plan (2000). The project will comprise a River Lee walk from the eastern side of the bridge at Ballymullen, which bridges the River Lee, to the eastern edge of Ballyseedy Wood, close to the southern edge of Tralee town, with an additional branch from the northern bank of the R. Lee at to Manor West Retail Park. The proposed walk will pass through the townlands of Camp, Manor West and Curaghleha West. At Curaghleha West the walk has two route options to Ballyseedy Woods as follows (see Figure 1 in section 3 below):

1. Option 1: Along the northern bank that would comprise 3 clear-span bridge crossings and a raised boardwalk, to elevate the walk above wetland to Ballyseedy Wood.
2. Option 2: Along the southern bank deviating away from the river, between deciduous woodland and agricultural grassland, to Ballyseedy Wood with one clear-span bridge crossing to Manor West section of riverwalk.

The new walkway will connect with an existing recently constructed riverwalk from Ballyard road, along the River Lee, to the west side of the bridge at Ballymullen. This will provide a complete riverwalk from Ballyard to Ballyseedy wood, which in effect would link the south-western periphery of the town to the south-eastern.

The walk will comprise a 3m wide tar and stone chip path with a cycle lane provision, in addition to a 3m buffer strip between the walk and the river bank to the north, and a further 3m buffer strip between the riverwalk and the respective landowners to the south. The buffers will be open and not fenced from the path. A fence will be erected between the respective landowners and the southern buffer strip. Much of the river bankside is currently wire fenced and a new wire fence will be erected along stretches where fencing is absent.

1.2 Study objectives

The objectives of the ecological impact assessment were to:

- Undertake a baseline ecological survey of the site and evaluate the nature conservation importance of the site;
- Assess the direct, indirect and cumulative ecological implications or impacts of the project during its lifetime;

- Where possible propose mitigation measures to remove or reduce those impacts through sustainable design; and
- Achieve the best possible biodiversity outcome from a change in current land use.

2 METHODOLOGY

2.1 Desk study

A desk study was carried out to collate available information on the sites natural environment. The ecological assessment comprised a review of the following publications and datasets:

- OSI Aerial photography and 1:50000 mapping;
- National Parks and Wildlife Service (NPWS);
- Teagasc Soil area maps;
- Geological Survey Ireland (GSI) area maps;
- Environmental Protection Agency (EPA) water quality data;
- South Western River Basin District (ShRBD) datasets (Water Framework Directive); and
- Other relevant publications.

2.2 Field survey

The study area was visited on the 5th, 6th, 8th and 22nd of August, 2008 by ecologists Elaine Keegan, Caroline Hurley and Monica Reidy. A further site visit was carried out on the 10th of December to assess the ecology of the additional branch of the riverwalk from the River Lee north to Manor West Retail Park. The study area was walked in order to establish the habitats present within the study area. Habitats were categorised and coded according to the Heritage Council's *A Guide to Habitats in Ireland* (Fossitt, 2000). The habitats up to 20m from the river, on the riverside of the proposed walk route were classified. In the habitat descriptions in section 3 below, a list of common species and any species of note are included in the text. Where a large number of species was recorded within a habitat, a species list is provided in table format following the habitat description.

During the habitat survey observed fauna were noted and a list of these is included.

Target notes were made in the field for any species or ecological feature of note. Details on these target notes are given in section.

Scientific and common names for plants follow Webb *et al.* (1996) and Blamey *et al.* (2003) respectively. Scientific names and Common English names for mosses follow Smith (2004).

A habitat map was generated using ArcView 9.2, GIS mapping software, illustrating habitats, target notes and plot numbers.

2.3 Consultation

Mr. Tim O'Donoghue, NPWS Local Wildlife Ranger, and Karen Griffin, Assistant Environmental Officer (AEO) with South Western Regional Fisheries Board (SWRFB), was consulted regarding ecological information pertaining to the site and any concerns regarding the sites sensitivity.

2.4 Ecological evaluation criteria

The ecological significance of the site was determined using the site evaluation scheme provided by the National Roads Authority (NRA) Ecological Assessment Guidelines as outlined in Table 1 (NRA, 2006).

Table 1. NRA Site Evaluation Scheme (NRA, 2006)

Rating	Qualifying Criteria
A	Internationally important Sites designated (or qualifying for designation) as SAC* or SPA* under the EU Habitats or Birds Directives. Undesignated sites containing good examples of Annex I priority habitats under the EU Habitats Directive. Major salmon river fisheries. Major salmonid (salmon, trout or char) lake fisheries.
B	Nationally important Sites or waters designated or proposed as an NHA* or statutory Nature Reserves. Undesignated sites containing good examples of Annex I habitats (under EU Habitats Directive). Undesignated sites containing significant numbers of resident or regularly occurring populations of Annex II species under the EU Habitats Directive or Annex I species under the EU Birds Directive or species protected under the Wildlife (Amendment) Act 2000. Major trout river fisheries. Water bodies with major amenity fishery value. Commercially important coarse fisheries.
C	High value, locally important Sites containing semi-natural habitat types with high biodiversity in a local context and a high degree of naturalness, or significant populations of locally rare species. Small water bodies with known salmonid populations or with good potential salmonid habitat. Sites containing any resident or regularly occurring populations of Annex II species under the EU Habitats Directive or Annex I species under the EU Birds Directive. Large water bodies with some coarse fisheries value.
D	Moderate value, locally important Sites containing some semi-natural habitat or locally important for wildlife. Small water bodies with some coarse fisheries value or some potential salmonid habitat. Any water body with unpolluted water (Q-value rating 4-5).
E	Low value, locally important Artificial or highly modified habitats with low species diversity and low wildlife value. Water bodies with no current fisheries value and no significant potential fisheries value.

*SAC = Special Area of Conservation

SPA= Special Protection Area

NHA= Natural Heritage Area

2.5 Impact assessment significance criteria

Once the value of the ecological receptors (features and resources) was established, the next step was to assess the potential effect or impact of the proposed riverwalk development on the valued ecological receptors and this was carried out on the basis of the criteria outlined in the impact significance matrix

in Tables 2 below. The magnitude of the effect (or impact level) is considered here in terms of the spatial and temporal duration of the effect. The spatial character refers to the geographical extent and location as well as habitat function (corridors, habitat fragmentation), while the temporal duration refers to the length of time that the ecological receptors will be effected by the change. The cumulative impact of the riverwalk was also assessed.

Table 2. Criteria for assessing impact significance – impact significance matrix (Source NRA, 2006)

Site category	A sites Internationally important	B sites Nationally important	C Sites High value, Locally important	D sites Moderate value, locally important	E Sties Low value, locally important
Impact level ↓					
Severe negative	Any permanent impacts	Permanent impacts on a large part of a site			
Major negative	Temporary impacts on a large part of a site	Permanent impacts on a small part of a site	Permanent impacts on a large part of a site		
Moderate negative	Temporary impacts on a small part of a site	Temporary impacts on a large part of a site	Permanent impacts on a small part of a site	Permanent impacts on a large part of a site	
Minor negative		Temporary impacts on a small part of a site	Temporary impacts on a large part of a site	Permanent impacts on a small part of a site	Permanent impacts on a large part of a site
Neutral	No impacts	No impacts	No impacts	No impacts	Permanent impacts on a small part of a site
Minor positive				Permanent beneficial impacts on a small part of a site	Permanent beneficial impacts on a large part of a site
Moderate positive			Permanent beneficial impacts on a small part of a site	Permanent beneficial impacts on a large part of a site	
Major positive		Permanent beneficial impacts on a small part of a site	Permanent beneficial impacts on a large part of a site		

Table 3. Criteria for assessing impact significance of aquatic sites (NRA, 2006)

A Sites		
	Temporary	Permanent
Extensive	Major	Severe
Localised	Major	Severe
B Sites		
	Temporary	Permanent
Extensive	Major	Severe
Localised	Moderate	Major
C Sites		
	Temporary	Permanent
Extensive	Moderate	Major
Localised	Minor	Moderate
D Sites		
	Temporary	Permanent
Extensive	Minor	Moderate
Localised	Not significant	Minor
E Sites		
	Temporary	Permanent
Extensive	Not significant	Minor
Localised	Not significant	Not significant

Localised impacts on rivers are loosely defined as impacts measurable no more than 250m from the impact source. Extensive impacts on rivers are defined as impacts measurable more than 250m from the impact source. Any impact on salmonid spawning habitat, or nursery habitat, where it is in short supply, would be regarded as an extensive impact as it is likely to have an impact on the salmonid population beyond the immediate vicinity of the impact source (NRA, 2006).

The ecological impact assessment was carried out on the basis of NRA criteria outlined in Table 3 below.

Table 4. Criteria for assessing impact significance (NRA, 2006)

Site category	A sites Internationally important	B sites Nationally important	C Sites High value, Locally important	D sites Moderate value, locally important	E Sites Low value, locally important
Impact level ↓					
Severe negative	Any permanent impacts	Permanent impacts on a large part of a site			
Major negative	Temporary impacts on a large part of a site	Permanent impacts on a small part of a site	Permanent impacts on a large part of a site		
Moderate negative	Temporary impacts on a small part of a site	Temporary impacts on a large part of a site	Permanent impacts on a small part of a site	Permanent impacts on a large part of a site	
Minor negative		Temporary impacts on a small part of a site	Temporary impacts on a large part of a site	Permanent impacts on a small part of a site	Permanent impacts on a large part of a site
Neutral	No impacts	No impacts	No impacts	No impacts	Permanent impacts on a small part of a site
Minor positive				Permanent beneficial impacts on a small part of a site	Permanent beneficial impacts on a large part of a site
Moderate positive			Permanent beneficial impacts on a small part of a site	Permanent beneficial impacts on a large part of a site	
Major positive		Permanent beneficial impacts on a small part of a site	Permanent beneficial impacts on a large part of a site		

3 DESCRIPTION OF EXISTING ENVIRONMENT

3.1 Site location, land use, topography and geology

As aforementioned, the study area stretches from the bridge at Ballymullen to the eastern edge of Ballyseedy wood and is located in the townlands of Camp, Manor West and Curaghleha West close to the southern edge of Tralee town in County Kerry. The study area is to the east of Tralee town, following the River Lee from the outskirts of the town to Ballyseedy Woods (see Figure 1 below). It is a long narrow area and dominantly habitats include the River Lee, a Lowland Depositing River (FW2), Treelines (WL2) adjacent the river and Improved Agricultural Grassland (GA1). Most of the river and treelines are fenced off and the grassland is currently grazed by cattle.

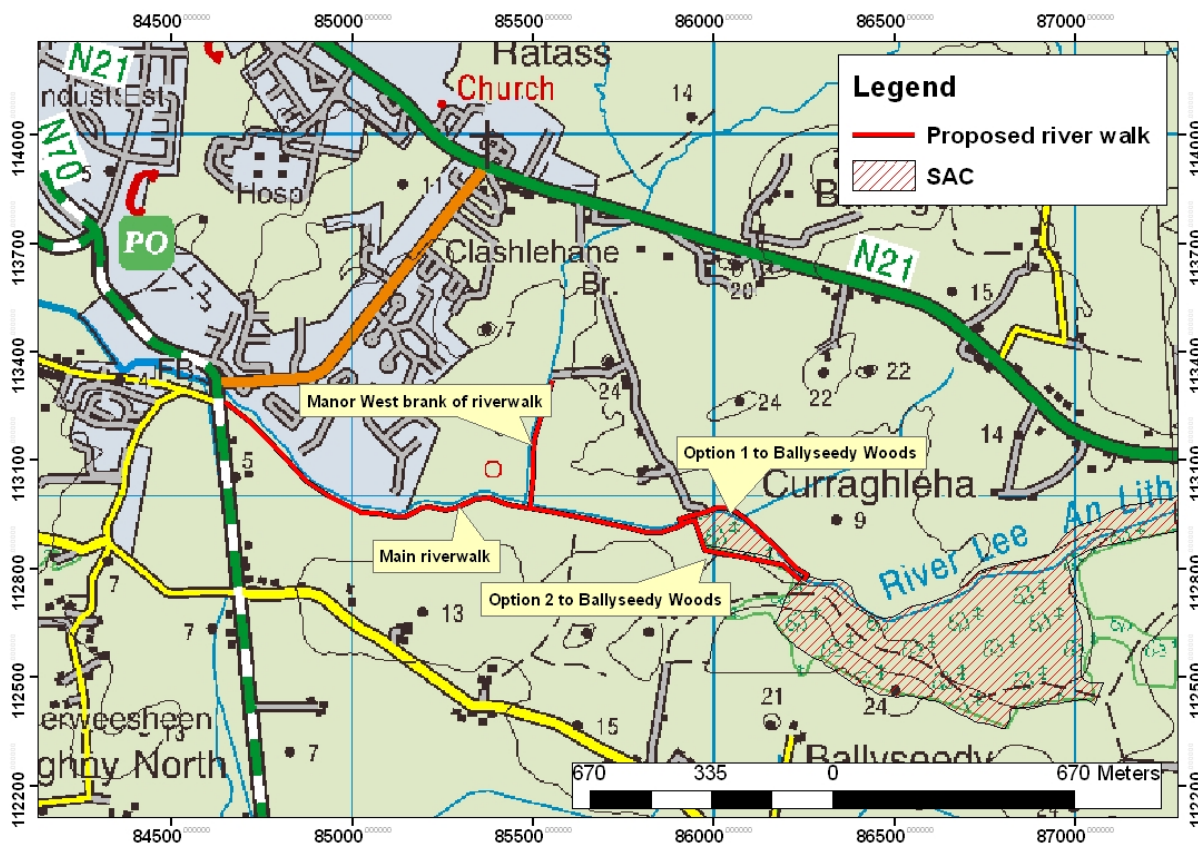


Figure 1. OSI Discovery Series map illustrating the relative locations of the proposed riverwalk, nearby designated areas - namely Ballyseedy Wood SAC - and Tralee town.

3.2 Proximity to designated conservation sites

Designated conservation sites are sites recognised for their distinctive flora, fauna and habitats. These sites are protected under European and national legislation and the relevant nature conservation designations and associated legislation. Special Area of Conservation (SAC) is based in the EU Habitats Directive (92/43/EEC) as transposed into Irish law through the European Communities (Natural Habitats) Regulation, 1997 (S.I. 94 of 1997).

The eastern end of the study area borders Ballyseedy Wood SAC (site code 002112) (see Figure 1 above), which is an area of woodland of importance due to the Alder/Ash woodland that is a listed Priority Habitat ‘*Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior*’ under the EU Habitats Directive. Ballyseedy also contains Ash-Hazel and Alder-Grey Willow woodland as well as some rare plant species (see Appendix 5 for NPWS Ballyseedy Wood SAC site synopsis). Ballyseedy Wood SAC was opened to the public as a recreational resource for the people of Tralee and its surrounds, with designated paths and routes for walkers.

3.3 Consultation outcome

Mr. Tim O’Donoghue, National Parks and Wildlife Service (NPWS) Wildlife Ranger had concerns regarding the possible presence of otter, salmon and badger as well as the time of year of construction. These concerns have been addressed in this report.

Karen Griffin, (AEO) with South Western Regional Fisheries Board (SWRFB) made a number of recommendations regarding improvement works along the River Lee bankside in order to enhance the aquatic flora, invertebrate and fish communities (see section 5). She also proposed a number of measures to mitigate construction impacts, which have been integrated into the report.

3.4 Habitat descriptions

The main habitats in the study area are a Depositing/Lowland River (FW2), Treelines (WL2), Wet Grassland (GS4) and Improved Agricultural Grassland (GA1). There are also small areas of Riparian Woodland (WN5) and Wet Pedunculate Oak-Ash Woodland (WN4). See Table 4 below for a list of all the habitats present in the study area and see habitat map containing habitats and plot labels in Appendix 1. All photographic plates can be viewed in Appendix 4.

Table 5. Habitats recorded in the area of the Proposed River Lee Riverwalkway.

Habitat	Code	Annex I Habitats Present
Wet Pedunculate Oak-Ash Woodland	WN4	Priority habitat ‘* Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (Alno-Pandion, Alnion incanae, Salicion albae)’.
Depositing/Lowland River	FW2	None
Riparian Woodland	WN5	None

Treelines	WL2	None
Scrub	WS1	None
Hedgerows	WL1	None
Wet grassland	GS4	None
Stone Walls and other Stonework	BL1	None
Improved Agricultural Grassland	GA1	None
Amenity Grassland (Improved)	GA2	None
Buildings and Artificial Surfaces	BL3	None

*Priority habitats are habitats that are in serious decline and threatened with disappearing

3.4.1 Wet Pedunculate Oak-Ash Woodland – WN4

The wet woodland in the study area is dominated by Common Alder (*Alnus glutinosa*) and oak is not present. While this does not strictly conform to The Heritage Council's (Fossitt, 2000) description of this type of woodland, it was deemed to best fit this category based on its soil, flooding regime and the ground flora. In addition, the Heritage Council's (Fossitt, 2000) description of this category does allow for Common Alder to be 'locally abundant'. This habitat also fits the description of the Annex I Priority Habitat '*Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Pandion*, *Alnion incanae*, *Salicion albae*).'

This category of woodland was identified at both the western and eastern sections of the study area. In the west, it merges with the Riparian Woodland (WN5) along the river bank. The wet woodland is located further away from the river bank than the riparian woodland and higher up on dryer ground that is not regularly flooded. It has an average width of 2.5m and an average tree height of 8m. In the eastern section, there is a strip of woodland (WN4) approximately 25m in length along the river bank, although this is interrupted by scrub for about 5m within this stretch. The average width of this woodland is 8m. Another linear strip of this habitat occurs along a stream which merges with the wet woodland along the river at Target Note (a).

The tree layer is dominated by Alder (*Alnus glutinosa*) with some Grey Willow (*Salix cinerea*) and Crack Willow (*Salix fragilis*). Elder (*Sambucus nigra*), Holly (*Ilex aquifolium*), Sycamore (*Acer pseudoplatanus*) and Hazel (*Corylus avellana*) are occasional. The herb layer is diverse with species including Creeping Thistle (*Cirsium arvense*), Germander Speedwell (*Veronica chamaedrys*), Yellow Flag (*Iris pseudacorus*), Herb Bennet (*Geum urbanum*), Pendulous Sedge (*Carex pendula*), Golden Saxifrage (*Chrysosplenium oppositifolium*), Wood Sedge (*Carex sylvatica*), Remote Sedge (*Carex remota*), Great Willowherb (*Epilobium hirsutum*) and Enchanter's Nightshade (*Circaea lutetiana*). Other commonly occurring species include Bramble (*Rubus fruticosus* agg.), Cleavers (*Galium aparine*), Ivy (*Hedera helix*) and Bindweeds (Convolvulaceae). Species in the moss layer include Fox-tail Feather-moss (*Thamnobryum alopecurum*) and Common Tamarisk-moss (*Thuidium tamariscinum*). See Plate 1, Appendix 4.

3.4.2 Depositing/Lowland River – FW2

R1 (River Lee): In the study area the River Lee is a Depositing/Lowland River meandering with high banks. The banks are generally 1m in height and are 2m in height in the Eastern end of the study area near Ballyseedy Woods and are a mixture of boulder, cobble, coarse sand and silt. The average width of the river is 5m and there is a small amount of submergent vegetation dominated by a Crowfoot species (*Ranunculus* spp.) while most of the river is strongly shaded with treelines or woodlands on the bank. See Target Note C regarding the wide section of the river. See Plate 3 and 4, Appendix 4.

R2 (Small stream): There is a small stream leading from a spring to the river on the South side of the River Lee (See map Appendix 1). The banks of this stream are up to 1.5m high and the stream is less than 1m wide. A hedgerow occurs on the western bank and Improved Agricultural Grassland occurs on the eastern bank. There is some emergent vegetation in-stream which is predominantly Fools Water Cress (*Apium nodiflorum*). See Plate 5, Appendix 4.

R3 (Clashlethane Stream): A small river approximately 2.5m in width runs on the west side of the proposed Manor West branch of the riverwalk. The river was relatively fast flowing at the time of survey and averaged 30-40 cm in depth. The substrate consisted of pebbles and larger cobbles with sediment in places.

3.4.3 Riparian Woodland – WN5

A small stretch of riparian woodland was recorded in the western section of the Riverwalk Survey Area. This is a narrow stretch of woodland along the bank of the River Lee. At the time of the survey, there was evidence that this area of woodland is subject to flooding as there was an accumulation of river-borne debris on the river bank including twigs and other woody material in addition to discarded plastic. Some of the vegetation in the field layer of the riparian woodland was also covered in a fine layer of silt or mud. The riparian woodland has an average width of 2m and a tree height average of 8m. It is mostly located on gently sloping ground. It merges with Wet Pedunculate Oak-Ash Woodland which is located higher up the river bank, on a steeper slope. Some of the tree branches within the riparian woodland overhang the river.

The tree layer of the riparian woodland is dominated by Crack Willow, Grey Willow and other willows (*Salix* spp.). Common Alder also occurs. The herb layer includes Hogweed (*Heracleum sphondylium*), Fool's Watercress, Hemlock Water Dropwort (*Oenanthe crocata*), Golden Saxifrage (*Chrysosplenium oppositifolium*), Common Nettle (*Urtica dioica*), False Brome (*Brachypodium sylvaticum*), Himalayan Balsam (*Impatiens glandulifera*), Water Figwort (*Scrophularia auriculata*) and Creeping Buttercup (*Ranunculus repens*). Mosses and liverworts are common in this habitat with most tree trunks covered with mosses at their base.

Himalayan Balsam (*Impatiens glandulifera*) is an invasive, non-native species and any works that are likely to cause further spread of this species should be avoided. Guidelines for Best Practice for the management and control of this species can be found on the Invasive Species Ireland website at

<http://www.invasivespeciesireland.com/downloads/BPM.asp>. See Plate 6, Appendix 4. See below for full species list for this habitat.

3.4.4 Scrub – WS1

One area of scrub occurs on the western end and two areas of scrub occur along the northern riverbank in the east, of the study area. The western area of scrub is dominated by Gorse (*Ulex europaeus*) and Bramble. Other species include Bush Vetch (*Vicia sepium*) and Coltsfoot (*Tussilago farfara*).

The eastern areas are dominated by Bramble and Common Nettle. The scrub has an average width of 2m. Other species include Yellow Flag, Soft Rush (*Juncus effusus*), Great Willowherb (*Epilobium hirsutum*), Common Ragwort (*Senecio jacobaea*), Marsh Ragwort (*Senecio aquaticus*), Cleavers (*Galium aparine*) and Meadowsweet (*Filipendula ulmaria*). Mosses grow on the bark of the tree species. See Plate 7, Appendix 4.

A small area of scrub borders the stream in the northern-most field of the Manor West riverwalk branch where there is a gap in the treeline. The scrub here is dominated by Gorse, Bramble and Common Couch Grass (*Elymus repens*). The scrub occurs on the upper slopes of the river bank, approximately 3m distant from the river and it varies in width from 1–2m.

3.4.5 Hedgerows – WL1

Three different hedgerows were recorded in the study area and these have been annotated H1, H2 and H3 on the accompanying map. They are described separately below.

H1: This hedgerow occurs in the eastern section of the study area, just east of the new foot bridge. It runs from north to south and joins the treeline along the River Lee at a right angle on the northern bank. It has an average width of 2.5m and an average height of 8m and is growing on an earthen bank. It is comprised of Ash (*Fraxinus excelsior*), Willow, Alder and Hawthorn (*Crataegus monogyna*). See Plate 8, Appendix 4.

H2: H2 is a hedgerow that runs north-south and joins the treeline along the River Lee at a right angle on the southern bank. It is a low hedgerow up to 2m in height. Species include Bramble, Hawthorn, Creeping Thistle, Yellow Flag and Hedge Bindweed (*Calystegia sepium*). There is also one tall Ash tree. See Plate 9, Appendix 4.

H3: This hedgerow also occurs on the south bank of the River Lee. It joins the treeline along the river bank from the south-east. It is located on the west side of a small stream (R2) which seems to have been modified and which emerges from a spring to the south of the river. This hedgerow is up to 3m wide and up to 8m high. The tree layer is composed of Holly, Ash, Hawthorn and Alder. Species in the field layer include Yorkshire Fog (*Holcus lanatus*), Creeping Bent (*Agrostis stolonifera*), Marsh Thistle (*Cirsium palustre*), Self-heal (*Prunella vulgaris*), False Oat-grass (*Arrhenatherum elatius*), Fescue species (*Festuca* spp.), Brambles, Cocksfoot (*Dactylis glomerata*), Ivy, Pendulous Sedge (*Carex pendula*) and Hartstongue fern (*Asplenium scolopendrium*). See Plate 10, Appendix 4.

H4: This hedgerow occurs along the Manor West riverwalk branch and is dominated by Bramble. Other species include Gorse, Creeping Bent, Thistle (*Cirsium* spp.). In the southern end of the proposed extension the hedgerow is best developed at 2m in width and 1-2m in height. However, in the northern field the hedgerow is scrubbier with similar species composition including Yellow Iris and Common Couch Grass (*Elymus repens*).

3.4.6 Treelines – WL2

Relatively uniform treelines run along the southern bank of the River Lee within the study area and also in the eastern section where the study area switches to the northern bank. The treelines on the southern bank are interrupted for short distances by areas of grassland. There are some changes in species composition between the treeline in the eastern section on the north bank and the treelines in the western section on the southern bank. Hence, they have been described separately below as TL1 and TL2.

TL1: This treeline runs almost continuously along the southern bank of the River Lee from the bridge at Ballymullen in the west as far as Ballyseedy Wood SAC. It is interrupted twice for short stretches along its length and in both instances the Improved Agricultural Grassland (GA1) occurs up to the bank of the river. These interrupted stretches occur from Q 85514 12969 to Q 85625 12957 and again from Q 85784 12923 to Q 85811 12913.

A treeline occurs along the southern bank of the River Lee between 1 and 2m from the river bank at the western edge of the riverwalk, close to the bridge at Ballymullen. The river bank is sloping and the treeline occurs between 1 and 2m above the water level. The treeline is dominated by Alder with some Willow and Dogwood (*Cornus* spp.). In one section, the treeline is dominated by Crack Willow, which is spreading across the river. Under the trees and along the river bank, species include Pendulous Sedge, Creeping Buttercup, Bramble, Ivy, Common Nettle, Yorkshire Fog, Rushes (*Juncus* spp.) and Figwort (*Scrophularia* spp.).

The remainder of the treeline is up to 4m in width and has an average height of 8m. It is dominated by Crack Willow and other willow species and Alder, which is quite dominant in places. There is also occasional Hawthorn, Ash and Sycamore. Spindle (*Euonymus europaeus*) (see Target Note d) and Dogwood also occur within the hedge layer of the treeline. The hedge layer also includes Bramble, and wild rose (*Rosa* spp.). The herb layer is diverse and includes species such as Hedge Bindweed (*Calystegia sepium*), Yellow Flag, Ivy, Cleavers, Creeping Thistle, Hemlock Water Dropwort, Himalayan Balsam and Hedge Woundwort (*Stachys sylvatica*). Tree branches, in places overhang the river. See Plate 11, Appendix 4.

TL2: This treeline occurs in the eastern section of the study area along the northern bank of the River Lee. It is a relatively short stretch of treeline of approximately 8m in length. This treeline differs from TL1 in that it consists mainly of Alder growing out of the river bank and there is very little associated hedge layer or field layer species. Indeed the only two species recorded here are Alder and a Polypody fern (*Polypodium* spp.) Underneath the trees, the Wet Grassland habitat grows right up to the river bank.

Himalayan Balsam is an invasive, non-native species and any works that are likely to cause further spread of this species should be avoided. The same Guidelines for Best Practice in relation to Himalayan Balsam should be consulted as outlined above for Riparian Woodland. See Plate 12, Appendix 4.

TL3: A treeline occurs alongside both sides of the river along the Manor West riverwalk branch. The treeline is dominated by Common Alder with Crack Willow and occasional Dogwood (*Cornus* spp.). The treeline varies from approximately 1 – 2m in width and is greater than 5m in height. There are two small gaps along the treeline. The southern-most gap is a field where machines have been accessing the site and a large gate is now in place. The second gap is a northern field and the treeline in this gap is replaced by scrub habitat.

3.4.7 Wet Grassland – GS4

At the east end of the study area most of the grassland to the north of the river is Wet Grassland (GS4) (see map, Appendix 1). This predominantly contains Rush species, Yellow Iris and various grasses. There is a good moss layer present including species such as *Rhytidiadelphus* spp. See Plate 13, Appendix 2.

3.4.8 Drainage ditch – FW4

There are a number of drainage ditches leading into the river at various points along the study area.

DD1: At the eastern side of the study area there are two drainage ditches running from the North East leading into the River Lee. These drainage ditches have not been cleared recently. The ditches run through Wet Grassland which borders the ditches. There are also some Grey Willow (*Salix cinerea*), Alder, Bramble, Honeysuckle (*Lonicera periclymenum*) and Common Nettle on the banks. See Plate 14, Appendix 4.

DD2: At the western side of the study area there is a drainage ditch flowing into the River Lee from the South. It appears that this may originally have been a natural stream however it shows evidence of modification. A pipe has been placed at the end of the drainage ditch where it flows into the River Lee. It is very densely overgrown, resulting in the ditch not being visible other than at the end where the pipe leads to the River. The dense growth consists predominantly of Bramble and Bindweed. On the west side of the ditch is a hedgerow containing Alder, Hawthorn and Leylandii species. See Plate 15, Appendix 4.

3.4.9 Stone walls and other stonework – BL1

Towards the eastern end of the study area to the south of the river there is a large old stone wall running along the boundary of Tommy Moynihan's and Tom O'Loughlan's land. The wall is up to 2m high and has been built with some mortar. There is some vegetation on the side and top of the wall. Vegetation includes Ivy, Hartstongue Fern, a young Ash tree, Silky Wall Feather-moss (*Homalothecium sericeum*), Brambles and Dandelion species (*Taraxacum* spp.). See Plate 16, Appendix 4.

3.4.10 Improved agricultural grassland – GA1

Most of the grassland to the south of the river is Improved Agricultural Grassland (see map, Appendix 1). These grasslands consist of grasses such as Rye Grass (*Lolium perenne*) and abundant of Ragwort (*Senecio* spp.). Patches of the grasslands have a large quantity of Yellow Iris and Thistles (*Cirsium* spp.); the former species in particular would indicate the presence of a wet grassland element. See Plate 17, Appendix 4.

3.4.11 Amenity Grassland (Improved) – GA2

At the western end of the study area there is an entrance to a new housing estate part of which is still under construction. This entrance includes a very recently landscaped lawn. The grassland strip is approximately 4m in width and the sward is dominated by Meadow-grass (*Poa* spp.), Daisy (*Bellis perennis*) and Creeping Buttercup. Other species include Clover (*Trifolium* spp.), Dandelion (*Taraxacum* spp.), Ribwort Plantain (*Plantago lanceolata*) and Sheep's Sorrel (*Rumex acetosella*). See Plate 18, Appendix 4.

3.4.12 Dry neutral grassland/wet grassland – GS1/GS4

This area of grassland is difficult to classify into one Fossitt category. There are wet patches within the field and there is a mix of species, some of which fit into the neutral grassland category and others which fit the wet grassland category.

Some of the dominant species include Yorkshire Fog, Clover (*Trifolium* spp.), Creeping Buttercup, Creeping Bent. Other species include Greater Birdsfoot Trefoil (*Lotus uliginosus*), Yellow Iris, Yarrow (*Achillea millefolium*) and Common Ragwort. In the wet patches, mint (*Mentha* spp.), Sedges (*Carex* spp.) and mosses occur. See Plate 19, Appendix 4.

3.4.13 Recolonising bare ground – ED3

Recolonising bare ground occurs on the eastern section of Griffin Bros construction site adjacent TL1 treeline habitat. Rushes such as Hard Rush (*Juncus inflexus*) and Jointed Rush (*Juncus articulatus*), are abundant with other species such as Sweet Grass (*Glyceria* sp.), Red Clover (*Trifolium pratense*), Greater Plantain (*Plantago major*) and Creeping Buttercup. Within this habitat, there is a stockpile of soil from construction-related excavations, which occurs adjacent the River Lee bank and DD3 and is dominated by Redshank (*Persicaria maculosa*).

3.4.14 Buildings and artificial surfaces – BL3

At the western end of the study area there is an entrance to a new housing estate part of which is still under construction. This entrance includes a recently built road, which is devoid of any vegetation.

3.5 Target Notes

Target Note (a)

This target note refers to the Wet Pedunculate Oak-Ash Woodland (WN4) as it gradually tapers from 10m to 6m in width in an east-west direction. At this location, the woodland along the river bank also supports a strip of Wet Pedunculate Oak-Ash Woodland (WN4), which runs from the north-east to here, where it occurs on the bank of a drain.

Target Note (b)

A small patch of Japanese Knotweed (*Fallopia japonica*) was noted across the river from Q 85990 12966. The Japanese Knotweed is not located within the study area, but because of its close proximity to the river and because of its aggressive invasive capabilities, the presence of this species should be taken into consideration before any works are undertaken. Efforts should be made to ensure that any works do not contribute to its spread. Guidelines for Best Practice for the management and control of this species can be found on the Invasive Species Ireland website at <http://www.invasivespeciesireland.com/downloads/BPM.asp>.

Target Note (c)

The river is 6m wide at this location. Gravel has deposited on a bend which has produced a gravel shore. Submergent vegetation here included Sweet-grass (*Glyceria* spp.).

Target Note (d)

Spindle occurs at this location within a stretch of treeline (WL2) on the river bank. The grid reference is Q 85282 12970.

3.6 Fauna

The fauna observed during the site visits in August are listed in Table 5 below. While no Otter was observed on site, Otter are known to occur along the bank of the River Lee and Bailey and Rochford (2006) observed evidence of Otter along the lower reaches of the River Lee. For this reason, the precautionary principle is adopted and it is thus assumed for the purposes of this study that otter occur and/or use this stretch of riverbank. Bats are known to occur in Ballyseedy Woods and may use the River Lee corridor for commuting and foraging. Pheasant are also known to occur along the proposed riverwalk area.

Table 6. Fauna observed on site along the River Lee proposed walk way, Tralee, Co. Kerry during site visits.

Fauna	Common Name	Latin Name	Annex Species / Species Of Conservation Concern
Amphibians	Common Frog	<i>Rana temporaria</i>	
Birds (*Birds observed flying over site)	Kingfisher	<i>Alcedo atthis</i>	EU Birds Directive Annex I and Amber list (Birds of Conservation Concern in Ireland 2008-20013)
	Heron Grey	<i>Ardea cinerea</i>	
	Swallow	<i>Hirundo rustica</i>	
	Wood pigeon	<i>Columba palumbus</i>	
	*Raven	<i>Corvus corax</i>	
	Long-tailed Tit	<i>Aegithalos caudatus</i>	
	Grey Wagtail	<i>Motacilla cinerea</i>	
	Bullfinch	<i>Pyrrhula pyrrhula</i>	
	Blackbird	<i>Turdus merula</i>	
	Goldcrest	<i>Regulus regulus</i>	
Lepidoptera (Butterflies & Moths)	Green-veined White	<i>Pieris napi</i>	
	Large White	<i>Pieris brassicae</i>	
	Meadow Brown	<i>Maniola jurtina</i>	
	Speckled Wood	<i>Pararge aegeria</i>	
	Peacock	<i>Inachis io</i>	
Other Insects	A Dragonfly species		

3.7 Fisheries

The River Lee is a salmonid river supporting salmon (*Salmo salar*) and trout (*Salmo trutta*). Spawning salmon occur along the lower reaches on gravel beds and suitable spawning sites occur along the stretch of the river where the proposed riverwalk will be constructed. The River Lee does not support many salmon and this may be because of past arterial drainage programmes that altered and streamlined the river profile, past salmon drift netting at sea and past and present water pollution. A comparison of the 1840 and 1938 six inch maps showed that the channel was significantly longer and wider in 1840, supporting far more kinks and bends, which would have been the natural morphology and course of the River Lee. By 1938 the channel had been considerably straightened. The current physical and biological conditions of the river for salmonids may be less than favourable. The river may not host a rich population of macroinvertebrates, an important food resource for fish. In addition, the river has

insufficient gravel deposits for spawning, does not support a favourable riparian (bankside vegetation) zone, and nor does it support sufficient or adequate lies (pools) for salmon and trout.

Currently, the SWRFB are seeking to improve and encourage physical recovery of the River Lee channel profile in order to improve the river for salmon. Without enhancement programmes the River Lee channel is unlikely to physically recover for hundreds of years.

3.8 Water quality

3.8.1 River Lee Water Quality

The EPA has a number of biological water quality monitoring locations along the River Lee. Changes in macroinvertebrate populations in rivers with organic pollution are well documented where more pollution sensitive species are replaced by more tolerant species. Biological water quality monitoring refers to Q Value system where the relationship between water quality and macroinvertebrate community is described in numerical terms. A Q value of 5 indicates very high water quality while a Q value of 1 indicates poor water quality.

The EPA has three biological monitoring points on the River Lee. The first occurs upstream at Lissooleen 1.5km north of the N21, the second on Ballyseedy Bridge and the third downstream at the bridge at Ballymullen. Lissooleen, Ballyseedy and Ballymullen sampling points support moderate, poor and poor water quality, respectively.

3.8.2 The Water Framework Directive

The goal of the Water Framework Directive is to maintain 'high status' of waters where it exists, prevention of any deterioration in the existing status of waters and achieve at least 'good status' by 2015 for all water bodies. Under the Water Framework Directive all water bodies including rivers have been categorised according to a four-risk category risk classification scheme:

- 1a at risk,
- 1b possibly at risk,
- 2a probably not at risk, and
- 2b not at risk, of achieving good status by 2015.

The Shannon River Basin District Project undertook risk assessments of stretches of the River Lee. The middle and lower reaches of the River Lee, which encompass the riverwalk stretch, were found to be in the '1a, at risk' category, the highest category, with the main risk from diffuse pollution.

For this reason, a programme of basic measures that implement existing water quality related Directives in full, and a programme of additional measures that will be implemented at a local level, is proposed to improve water quality. Implementation will begin in 2009 in order to achieve 2015 targets. Additional measures for achieving 'good status' for the River Lee include control of point and diffuse source

pollution and control of physical modifications to surface waters. The latter measure, which stipulates the control of morphological and structural alterations of the river, would suggest that the riverwalk associated elements, namely the bridges and path, would need to maintain an appropriate distance from the bankside to ensure it does not constrict the river channel.

3.9 Site evaluation

The habitats occurring in the study area were evaluated based on the evaluation scheme in the *NRA Guidelines for Assessment of Ecological Impacts of National Road Schemes* (see table 1 above).

Table 7. Summary of the Habitat Evaluation for each of the habitats recorded in the area of the proposed walkway along the River Lee

Habitat	Code	Evaluation Rating	Rationale
<i>Wet Pedunculate Oak-Ash Woodland</i>	WN4	A – Internationally Important	This habitat corresponds to an Annex I Priority Habitat of the EU Habitats Directive. Despite its narrow extent within the survey site it is part of a more extensive WN4 woodland within the Ballyseedy Wood SAC (002112), which occurs directly along the lowland river for part of the stretch of WN4 in the eastern section of the study area. In this regard, it may be important as a buffer to the SAC and also as an extension of suitable habitat for species that may use the woodland e.g. otters and bats. The flora species recorded within this habitat are representative of this priority habitat.
<i>Lowland/Depositing River –</i>	FW2	A – Internationally Important	The River Lee is a poor salmonid river with a moderately healthy riparian habitat. Water quality is moderate to poor. It may act as an ecological corridor in the landscape, especially in areas where it has an associated hedgerow or treeline on its bank.
<i>Riparian Woodland</i>	WN5	C – High Value, Locally Important	This stretch of woodland is dominated by native species and is an integral part of the riparian zone of the river. It is important for local wildlife and may also support the ecological functioning of the river.
<i>Scrub</i>	WS1	C – D High – Medium Value, Locally Important	This scrub to the east consists of native species and is an increasingly declining habitat in Ireland. It is ecologically important, providing foraging for small mammals including bats. Scrub is also important for providing feeding and nesting sites for small birds and for invertebrates. The scrub within the western survey area and along the Manor West branch of the riverwalk is patchy and relatively species poor and hence does not merit a high value, locally important rating.
<i>Hedgerow</i>	WL1	C – D High Value, Locally Important	These hedgerows are well established and consist mostly of native species. Hedgerows are an increasingly declining habitat in Ireland. They are ecologically very important as foraging and commuting corridors for small mammals including bats. Hedges are very important as feeding and nesting sites for small birds. They are also important for invertebrates. The hedgerow along Manor West branch of the riverwalk is relatively poorly developed and species poor and thus rated of moderate value.
<i>Treelines</i>	WL2	C – D High – Medium Value, Locally Important	The treelines within the survey site are dominated by native species and in the case of TL1, the herb layer is rich and resembles that of the wet woodland (WN4) on the site. The treelines are important habitats for local wildlife such as birds, insects and possibly badgers and bats. They may also function as an extension of suitable habitat from the WN4 habitat along the river and are likely to act as ecological corridors for many

			species. The treeline to the western edge of the riverwalk is dominated by native species and may provide important habitats for local wildlife such as birds, insects and possibly badgers and bats. However, the treeline here is less species-rich than other treelines along the River Lee and so has been evaluated as a rather than a C-rating. The treeline along the Manor West branch is dominated by Alder and Crack Willow and is not as diverse as other treelines surveyed along the main riverwalk.
<i>Wet Grassland</i>	GS4	C- High Value and Locally Important	The wet grassland on the site is an example of a semi-natural habitat which has a potentially high value for local wildlife. It also has a role to play in water retention and water purification.
<i>Improved Agricultural Grassland</i>	GA1	D – Moderate Value, Locally Important	This improved grassland is relatively species poor due to management practices for agriculture. However, it is not as intensively managed as some other agricultural grassland and it does have some value for local wildlife, most noticeably for birds, lepidopteran species and other nectaring insects.
<i>Amenity Grassland</i>	GA2	E – Low Value, Locally Important	This is an example of a recent highly modified habitat with limited value for local wildlife.
<i>Dry neutral grassland/wet grassland</i>	GS1/GS4	C – High Value, Locally Important	This relatively species-rich field of semi-natural grassland is the only such patch of this grassland type along the River Lee that has been surveyed as part of the proposed River Lee Nature Way. It is likely that the wildflowers and grasses within this grassland provide food and shelter for a variety of insects and other invertebrates and also perhaps for larger animals.
<i>Stone Walls and other Stoneworks –</i>	BL1	D – Moderate Value, Locally Important	This is an artificial habitat, however it has been unmodified for a long time and thus provides a habitat for plants, mosses and lichens and is likely to provide a habitat for many insects, small birds and small mammals.
<i>Buildings and Artificial Surfaces</i>	BL3	E – Low Value, Locally Important	This is a highly modified habitat with low species diversity and little value for wildlife.

Table 8. Summary of the Fauna Evaluation for each of the species/groups recorded or known to exist along River Lee corridor.

Fauna	Evaluation Rating	Rationale
Otter	A - Internationally Important	While no evidence of Otter was observed on site, Otter is known to occur along the banks of the River Lee. Otter is listed in Annex II of the Habitats Directive.
Bats	B – Nationally important	Bats are protected under the Wildlife Act (1976) as amended 2000.
Amphibians	B – Nationally important	Amphibians are protected under the Wildlife Act (1976) as amended 2000.
Birds	C – Locally important	Most common birds are protected under the Wildlife Act (1976) as amended 2000.
Lepidoptera	C - Locally important	

4 ANALYSIS OF THE POTENTIAL IMPACTS

4.1 Introduction

Riverwalk developments are typically small developments that may have potential impacts on the natural environment (habitats, flora, fauna, water quality and fisheries). This section will identify the impact of the construction and operational phases of the riverwalk development on the natural environment along the River Lee from Ballingowan Bridge to Ballyseedy Wood.

4.2 Construction impacts

4.2.1 Main construction elements

The following are the main elements of the construction of the riverwalk path:

1. Topsoil will be stripped from a linear area to ~150mm depth and to between 3-5m in width along the proposed riverwalk. Excavated material will be stockpiled away from drains or watercourses and used to landscape the path boundaries once path construction is complete.
2. A sub-base comprising limestone hardcore will be positioned on top of the excavated area, to a depth of 300-450mm.
3. Blinding will be placed on top of hardcore and compacted with vibrating rollers.
4. Finally, tarmacadam chip will be poured on to complete the riverwalk path construction.

Other elements of construction of the riverwalk include:

5. Clear-span bridges that are placed back from the bankside at a minimum of 2m on either side.
6. A land drain ditch, ~1-1.5m in width and ~1m depth, will be constructed parallel to the riverwalk on the landward side to accommodate natural runoff from the land. The linear riverwalk corridor will now be raised ~600mm and may impede runoff thus necessitating a land drain. The land drain will further alleviate flooding and reduce ponding on the low-lying areas of agricultural land. The land drain will have branching outfalls, equipped with valves at right angle intervals that will drain directly into the River Lee.

4.2.2 Designated conservation sites

The construction phase of the riverwalk are likely to directly impact upon Ballyseedy Wood SAC through disturbance (noise) and has the potential to indirectly impact on Tralee Bay SAC through pollution run off during the construction phase into the River Lee, which enters the sea at Tralee Bay SAC.

4.2.3 Habitats

Habitats are dealt with in order of ecological importance i.e. 'A'-rated habitats will be dealt with followed by 'B'-rated habitats etc. Table 9 below assesses the impacts using NRA criteria (see Table 2 and 3 above) of the proposed riverwalk development on the sites habitats and species of value during construction phase. Estimated areas and lengths of habitat removal are given.

Table 9. Ecological impact assessment during the construction phase; includes for all route options (it is estimated that a linear width of 5m is removed to accommodate the 3m riverwalk path). Option 1 route habitats highlighted in green as these habitats mostly occur along this proposed section.

Habitat	Code	Rating	Construction impact	Estimated habitat length (m)/area (ha) to be removed	Impact significance
Wet Pedunculate Oak-Ash Woodland	WN4	A	Small areas WN4 habitat will be removed at 2 locations, namely on the north bank next to land drains that drain into River Lee (not mapped) and at the bridge crossing to Ballyseedy Woods.	0.016ha	Severe negative
Lowland/Depositing River	FW2	A	Construction work close to the river may cause runoff pollution	-	Major negative
Riparian Woodland	WN5	C	No riparian woodland will be removed	-	Neutral
Scrub	WS1	*C	Scrub habitat may need to be removed from northeast section	0.01ha	Moderate negative
Hedgerow	WL1	C	Some small lengths of WL1 will be removed	54m	Moderate negative
Treelines	WL2	*C	No WL2 will be removed to accommodate the riverwalk path	-	Minor negative
Wet Grassland	GS4	C	A boardwalk will be constructed over wet grassland	-	Minor negative
Improved Agricultural Grassland	GA1	D	A stretch of GA1 habitat will be removed to accommodate riverwalk	1ha	Minor negative
Stone Walls and other Stoneworks	BL1	D	Small sections of stone wall will be removed to accommodate riverwalk	8m	Minor negative
Amenity Grassland (Improved)	GA2	E	A stretch of GA2 habitat will be removed to accommodate riverwalk	0.077ha	Neutral
Dry neutral grassland/wet grassland	GS1/GS4	C	A stretch of GS1/GS4 habitat will be removed	0.075ha	Moderate negative
Buildings and Artificial Surfaces	BL3	E	-	-	Neutral
Fauna	Code	Rating	Construction impact		Impact significance
Otter	-	A	Some physical (fencing) and non-physical bankside disturbance (noise) from construction		Moderate negative
Bats	-	B	Some non-physical disturbance (noise) during construction		Moderate negative
Amphibians	-	B	Some non-physical disturbance (noise) during construction		Moderate – minor negative
Birds	-	C	Some physical disturbance in the form of minor hedge removal and temporary non-physical disturbance (noise) during construction		Moderate negative
Lepidoptera	-	C	Some physical disturbance in the form of minor hedge removal and temporary non-physical disturbance (noise) during construction		Minor negative

* For the assessment of impacts, all scrub and treeline habitat is rated as C to assess a worst case scenario.

4.3 Operational impacts

4.3.1 Designated conservation sites

The operation phase of the riverwalk is likely to directly impact upon Ballyseedy Wood SAC through increased disturbance from pedestrians/cyclists (noise).

4.3.2 Habitats

Habitats are dealt with in order of ecological importance i.e. 'A'-rated habitats will be dealt with followed by 'B'-rated habitats etc. Table 9 below assesses the impacts using NRA criteria (see Table 2 and 3 above) of the proposed riverwalk development, on the sites habitats and species of value during operation of the riverwalk.

Table 10. Ecological impact assessment during the operational phase of the project

Habitat	Code	Rating	Operation impact	Impact significance
Wet Pedunculate Oak-Ash Woodland	WN4	A	None expected	Moderate negative
Lowland/Depositing River	FW2	A	None expected	Neutral
Riparian Woodland	WN5	C	None expected	Neutral
Scrub	WS1	C	None expected to remainder of WS1	Neutral
Hedgerow	WL1	C	None expected to remainder of WL1	Neutral
Treelines	WL2	C	None expected	Neutral
Wet Grassland	GS4	C	None expected to remainder of GS4	Neutral
Improved Agricultural Grassland	GA1	D	None expected to remainder of GA1	Neutral
Stone Walls and other Stoneworks	BL1	D	None expected to remainder of BL1	Neutral
Amenity Grassland	GA2	E	None expected to remainder of GA2	Neutral
Dry neutral grassland/wet grassland	GS1/ GS4	C	None expected to remainder of GS1/GS4	Neutral
Buildings and Artificial Surfaces	BL3	E	-	Neutral
Fauna	Code	Rating	Construction impact	Impact significance
Otter	-	A	Increased disturbance from riverwalk pedestrians/cyclists	Moderate negative
Bats	-	B	Increased disturbance generated from riverwalk pedestrians/cyclists	Minor negative
Amphibians	-	B	Increased disturbance generated from riverwalk pedestrians/cyclists	Minor negative
Birds	-	C	Increased disturbance generated from riverwalk pedestrians/cyclists	Minor negative
Lepidoptera	-	C	Increased disturbance generated from riverwalk pedestrians/cyclists	Minor negative

4.4 Cumulative impact

A cumulative impact arises from incremental changes caused by other past, present or reasonably foreseeable actions together with the proposed riverwalk.

4.4.1 Relevant existing and planned developments

4.4.1.1 Ballyseedy Recreational Wood

Ballyseedy Wood has been developed by Kerry County Council as a recreational resource for the people of Tralee and surrounding areas. It comprises designated routes and paths for walkers.

4.4.1.2 N22 Tralee Bypass

An N22 Tralee Bypass/Bealagrellagh Road Improvement Scheme of Tralee has two components. The first links the N69 Listowel Road with the N70 Killorglin Road via the N21 Limerick Road, and the second is the N22 Tralee to Bealagrellagh road that will provide a separate access route to Tralee from the N22 from Killarney. The section of the N22 Tralee Bypass planned for the area of the proposed River Lee riverwalk is described below as extracted from the Non-Technical Summary of the 'N22 Tralee Bypass to Bealagrellagh Environmental Impact Statement'.

"N22 Tralee Bypass Section C (N21 Ballingowan Roundabout to N22 Camp Roundabout)"

N21 Ballingowan Roundabout marks the changeover from Section B to Section C of the N22 Tralee Bypass. Section C commences at the southern arm of Ballingowan roundabout and continues in a southerly direction through the townland of Manor East before turning in a more westerly direction, passing north of Ballyseedy Wood cSAC and intersecting the River Lee in the townland of Camp. The bypass will pass over the river Lee by means of a river bridge. The route continues west of the river Lee for approximately 150 metres before intersecting the proposed N22 Access Route in the townland of Camp. A Roundabout junction will be provided at this intersection (N22 Camp Roundabout)."

4.4.2 Cumulative impact on designated sites

There will be an increased pressure on Ballyseedy Woods SAC through the increase in the numbers of pedestrians/cyclists accessing the wood from the proposed riverwalk. However, Ballyseedy Wood has intentionally been developed and is used and managed both as a recreational resource for the people of Tralee and surrounding areas. It is also managed as an ecological resource (SAC) by the NPWS. Any additional recreational users at Ballyseedy Wood are likely to keep to existing designated recreational paths and routes, so any adverse impact to the sites ecology is expected to be a minor negative one.

4.4.3 Cumulative impact on identified habitats

The proposed Tralee Bypass/ Tralee to Bealagrellagh Road Improvement Scheme is expected to cross the River Lee at Camp townland, where the proposed riverwalk is planned. There is likely to be a cumulative effect, however, the impact from the construction and operation of the Bypass is far greater

than that expected from the riverwalk. Therefore the cumulative impact is expected to be minor negative.

5 MITIGATION MEASURES

5.1 Construction phase

Construction of the riverwalk is expected to cause a permanent (habitat removal) and temporary (disturbance) adverse impact on the local ecology as outlined in section 4.2 above. A number of planned mitigation measures detailed below will reduce these impacts significantly. Furthermore, a series of positive ecological management actions will be undertaken by KCC to enhance the river bankside habitat which will have positive impacts on the health of the river channel. These positive impacts are detailed below.

5.1.1 Positive impacts

One of the objectives of this study was to achieve the best possible biodiversity outcome from a change in current land use. Further to consultation with the SWRFB, the following actions will be undertaken in order to improve the River Lee bankside, which in turn will enhance the quality of the river corridor by increasing the diversity and/or abundance of aquatic flora, aquatic invertebrates and fish. The objective of these actions is to have a very positive effect on the ecology of the river corridor.

Positive Ecological Management Action 1:

Remove and thin stretches of alder dominated treeline along the river bank that colonised subsequent to dredging works some decades ago - approximately half the alder treeline along appropriate stretches as specified by the SWRFB. Proposed strips for clearing and thinning are indicated in the habitat map (Appendix 1). This action will allow more light to penetrate into the channel removing the tunnelling effect (excessive shading of river channel by bankside vegetation), which reduces bankside and aquatic flora, lowers invertebrate diversity and abundance, and specifically reduces the salmonid carrying capacity of the river (O' Grady, 2006). Removing the tunnelling effect will reduce bank erosion by enhancing bankside herbaceous plants and thus increasing pool and river depths. Aquatic mosses will regenerate along with greater macroinvertebrate (food source for fish) biomass and become more attractive to salmonids (salmon and trout). Once a tunnelled channel reaches >100m in length, a reduced salmonid carrying capacity is likely (O'Grady, 1993) while removing alder treeline on the southern river bank allows maximum light penetration. See Appendix 1 for indicative areas for Alder clearance and thinning along the proposed river walk.

Positive Ecological Management Action 2:

Retain Willow species and other non-alder species. Currently, Crack Willow (*Salix fragilis*) and Grey Willow (*Salix cinerea*) along with other willows (*Salix* spp.) are present along the river bank. Once the alder is removed, retained species will provide a mixed assemblage of deciduous plants, which have different profiles and vary in height. A broken canopy will usually allow sufficient incident light to reach the bed and banks of the channel, thereby preventing a tunnelling problem (O' Grady, 2006).

Positive Ecological Management Action 3:

Inject cut alder with roundup to prevent/slow down recolonisation by new alder. Even with the injection of cut shoots with roundup some recolonisation is likely to occur from neighbouring alder stands.

Positive Ecological Management Action 4:

It is proposed to remove the Japanese Knotweed, an invasive species that occurs along river banks, which colonises new areas with vigour and rapidity and outcompetes native plant species. It can also damage infrastructure, concrete and tarmac. It can also provide a barrier to important wildlife movement along corridors. Target note (b) (see section 3.5 above) describes the occurrence of Japanese Knotweed on the northern bank of the River Lee near Ballyseedy Woods. It is proposed to remove this with landowner consent as part of the riverwalk.

5.1.2 Boardwalk

If Option 1, along the northern bank of the river, is selected, a boardwalk will be constructed to minimise the construction impact of the riverwalk.

5.1.3 Buffer strip

A buffer strip of vegetation between the river bank and tar and chip walk will be retained alongside the river to help filter silty runoff resulting from the construction phase. This strip will be marked out adjacent to the path and machinery will be excluded. This will also prevent access to river banks by machinery and avoid any erosion of the bank or the buffer.

5.1.4 Runoff and sediment control

Erosion control where runoff is prevented from flowing across exposed ground and sediment control where runoff is slowed in order to allow suspended sediment to settle, are important elements in runoff and sediment control. It is proposed to prepare and implement an erosion and sediment control plan to prevent sediment and pollutant runoff into the river during the construction phase. The plan should provide for the following:

- Minimise the area of exposed ground by retaining as much existing vegetation in the vicinity of the path and keeping excavated areas to a minimum;
- Designated stockpiling area located away from drains and the river. Additional protection by silt trapping apparatus such as a geotextile silt fence to prevent contaminated runoff,
- Temporary silt fences should be erected on the river side buffer strip to trap sediment particles when work is taking place during a prolonged wet weather period or intense rainfall event; and
- Land drain is to be stabilised and revegetated prior to use of outfalls.

5.1.4.1 *Fuel and oil*

It is also recommended to implement a fuel management plan which should incorporate the following elements:

- Mobile bowsers, tanks and drums should be stored in a secure, impermeable storage area, away from drains and open water;
- Fuel containers must be stored within a secondary containment system e.g. bund for static tanks or a drip tray for mobile stores;
- Ancillary equipment such as hoses, pipes must be contained within the bund;
- Taps, nozzles or valves must be fitted with a lock system;
- Fuel and oil stores including tanks and drums should be regularly inspected for leaks and signs of damage;
- Only designated trained operators should be authorised to refuel plant on site;
- Procedures and contingency plans need to be set up to deal with emergency accidents or spills; and
- An emergency spill kit with oil boom, absorbers etc. is to be kept on site, in the event of an accidental spill.

5.1.5 **Wheel wash, dewatering and concrete**

It is recommended that a designated bunded and impermeable wheel wash area be provided. Resultant waste water is to be diverted to siltation pond for settling out of solids, prior to release.

It is important that a pumping / dewatering system is well planned. Pumped water will need to be treated in the adequate settlement pond and silt trap before it can enter the River Lee.

It is important to prevent concrete from entering water on-site and entering watercourses. Concrete may be used to fix posts on site and for the clear span bridge abutment and the following measures should be implemented:

- Designate a concrete washout area away from drains and watercourses;
- Washout of concrete trucks should occur off-site at a designated, contained impermeable area;
- A designated trained operator experienced in working with concrete will be employed during the concrete pouring phase; and
- Large volumes of concrete water to be pumped into a skip to settle out; settled solids will need to be appropriately disposed off-site.

5.1.6 **Replanting**

Replanting of native scrub vegetation will be undertaken along the bankside buffer strips at suitable areas in order to replace removed habitat, provide heterogeneity to additional bankside habitat, as well as providing visual enhancement for riverwalk users.

5.2 Operational phase

The operation of the riverwalk is expected to cause a permanent but moderate to minor negative impact on the local fauna, while it is expected that there will be no impact to identified habitats (see section 4.3 above). A number of planned mitigation measures detailed above is expected to significantly reduce the impact to habitats and fauna.

5.2.1 Operation phase mitigation

5.2.1.1 Habitats and fauna

Removal of alder to allow light penetration is expected to enhance the river ecology over time. Newly planted native scrub habitat along the buffer strip is expected to improve the area for local wildlife.

6 RESIDUAL IMPACTS

Residual impacts are impacts that remain once mitigation has been implemented, or impacts that cannot be mitigated. Table 11 below provides a summary of the impact assessment for identified A-C rated habitats, which are the most ecologically valuable. While removal of Wet Pedunculate Oak-Ash Woodland, an internationally important habitat, was categorised as 'severe negative' using NRA classification, the actual impact is expected to be less severe as only a small portion of this habitat will be removed relative to what is present in Ballyseedy Woods. Providing construction phase mitigation is implemented, the major negative impact expected for the River Lee will be reduced to neutral while the removal of stretches of alder dominated treeline is expected to result in a major positive impact for the ecology of the River Lee. Planting of native scrub species along the bankside buffer strip will increase the attractiveness of the bank for local wildlife.

Table 11. Summary of impact assessment for C and D rated habitats and includes for all route options. Option 1 route habitats highlighted in green as these habitats mostly occur along this proposed section.

Habitat	Rating	Estimated habitat length (m)/area (ha) to be removed	Impact significance	Mitigation	Resident impact rationale	Residual impact
Wet Pedunculate Oak-Ash Woodland –WN4	A	0.016ha	Severe negative	Construction of a boardwalk for Option 1 will maintain some ground flora.	As only 0.16ha is estimated to be removed; this is a very small area relative to the area of habitat supported in Ballyseedy Wood. The 'severe negative' impact is not expected, thus actual impact is reduced to moderate negative. Construction of a boardwalk for Option 1 will maintain some ground flora.	Moderate negative
Lowland/Depositing River - FW2	A	-	Major negative	Manage construction phase to ensure no pollution enters river.	It is proposed to remove alder to allow sunlight to penetrate into the channel which will enhance the ecology of river corridor by increasing the diversity and/or abundance of aquatic flora, aquatic invertebrates and fish	Major positive
Riparian Woodland – WN5	C	-	Neutral	None proposed.	No riparian woodland will be removed and operational impacts expected to be neutral.	Neutral
Scrub – WS1	C	0.01ha	Minor negative	Replanting of native scrub species.	A minimal area of scrub will be removed and replanting of native scrub species reduces impact to neutral while operational impacts are expected to be neutral.	Neutral

Hedgerow – WL1	C	54m	Moderate negative	None proposed.	A minimal area of hedgerow will be removed, thus actual impact is expected to be minor and operational impacts are expected to be neutral.	Minor negative - neutral
Treelines –WL2	C	-	Minor negative	Removal of thick uniform alder growth.	While the continuous nature of the treeline, a beneficial feature for commuting and feeding bats, will be removed, the potential benefits for the ecology of the River Lee are substantial, thus the impact is considered minor negative. Operational impacts are expected to be neutral.	Minor negative - neutral
Wet Grassland – GS4	C	0.087ha	Moderate negative	None proposed.	Construction of boardwalk will minimise the construction impact that would otherwise be expected.	Minor negative - neutral.
Dry neutral grassland/wet Grassland – GS1/SS4	C	0.077ha	Moderate negative	None proposed.	A relatively small area of this habitat will be removed to accommodate the riverwalk (approximately 10% of what currently exists in the site), thus actual impact of habitat removal expected to be minor.	Minor negative - neutral.
Fauna	Rating	Impact significance	Impact significance	Mitigation	Resident impact rationale	Residual impact
Otter	A	-	Moderate negative	Replanting of native scrub species and removal of alder.	Replanting of native scrub and improvement of river ecology will, in time, enhance the river bank, fish and invertebrate populations of the river.	Positive impact
Bats	B	-	Moderate negative	Retaining non-alder species will retain much of the treeline.	Willow and other non-alder will be maintained. Improvement of the river ecology through alder removal will improve the habitat for bats in time.	Minor negative-neutral
Amphibians	B	-	Moderate – minor negative	Replanting of native scrub species.	Replanting of native scrub species will, in time, enhance the site for amphibians by providing variety of plants and habitat heterogeneity.	Neutral
Birds	C	-	Moderate negative	Replanting of native scrub species and removal of alder.	Replanting of native scrub and improvement of river ecology will, in time, enhance the local bird population.	Neutral
Lepidoptera	C	-	Minor negative	Replanting of native scrub species.	Replanting of native scrub species will, in time, enhance the site for lepidoteran by providing a variety of plants and habitat heterogeneity.	Neutral

7 SUMMARY

The following summarises the findings of the Ecological Impact Assessment of the River Lee Riverwalk: Ballymullen to Ballyseedy Woods:

- The residual ecological impact of the construction and operation of the riverwalk is considered to range from *moderate negative to major positive*. The only significant negative impact is considered to be the removal of some sections of wet pedunculate oak-ash woodland during the construction of Option A. However the amount of habitat to be removed is a small fraction of what occurs in the neighbouring Ballyseedy Woods.
- Removal and thinning of alder along sections of the southern bank of the River Lee is expected to result in a *positive impact* to the river with supplementary light penetration into the water column, resulting in an increase in aquatic flora and associated macroinvertebrates and fish.
- The residual impact to the remainder of the habitats and fauna is expected to range from *minor negative to positive impact*.
- Overall, it is expected that the River Lee riverwalk will enhance the ecology of the area.

8 REFERENCES

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Appendix 1

(1) Habitat map and (2) Alder management map

Appendix 2

Full list of Scientific and Common English names of plant species

Full list of Scientific and Common English names of plant species recorded within the study area along the River Lee, Tralee, Co. Kerry in August 2008. Scientific names for vascular plants are from Webb *et al.* (1996) and Common English names are from Blamey *et al.* (2003). Scientific and Common English names for mosses follow Smith (2004).

Scientific Name	Common English Name	Scientific Name	Common English Name
<i>Acer pseudoplatanus</i>	Sycamore	<i>Hypochoeris radicata</i>	Catsear
<i>Achillea millefolium</i>	Yarrow	<i>Ilex aquifolium</i>	Holly
<i>Agrostis</i> spp.	Bent species (Grass)	<i>Impatiens glandulifera</i>	Himalayan Balsam
<i>Agrostis stolonifera</i>	Creeping Bent (Grass)	<i>Iris pseudacorus</i>	Yellow Iris
<i>Alnus glutinosa</i>	Alder	<i>Juncus articulatus</i>	Jointed Rush
<i>Angelica sylvestris</i>	Wild Angelica	<i>Juncus effusus</i>	Soft Rush
<i>Apium nodiflorum</i>	Fool's Watercress	<i>Lapsana communis</i>	Nipplewort
<i>Arrhenatherum elatius</i>	False Oat-grass	<i>Leylandii</i> spp.	Leylandii
<i>Arum maculatum</i>	Lords-and-Ladies	<i>Lotus uliginosus</i>	Greater Birdsfoot Trefoil
<i>Asplenium scolopendrium</i>	Hartstongue Fern	<i>Lysimachia nemorum</i>	Yellow Pimpernel
<i>Athyrium filix-femina</i>	Lady Fern	<i>Montbretia</i>	Montbretia
<i>Brachypodium sylvaticum</i>	False Brome	<i>Oenanthe crocata</i>	Hemlock Water Dropwort
<i>Calystegia sepium</i>	Hedge Bindweed	<i>Persicaria hydropiper</i>	Water-pepper
<i>Carex hirta</i>	Hairy Sedge	<i>Plantago lanceolata</i>	Ribwort Plantain
<i>Carex pendula</i>	Pendulous Sedge	<i>Polypodium</i> spp.	Polypody Fern
<i>Carex remota</i>	Remote Sedge	<i>Polystichum setiferum</i>	Soft Shield Fern
<i>Carex sylvatica</i>	Wood Sedge	<i>Polytrichum commune</i>	Common Haircap (moss)
<i>Cerastium fontanum</i>	Common Mouse-ear	<i>Prunella vulgaris</i>	Self-heal
<i>Chrysosplenium oppositifolium</i>	Golden Saxifrage	<i>Ranunculus acris</i>	Meadow Buttercup
<i>Circaea lutetiana</i>	Enchanter's Nightshade	<i>Ranunculus flammula</i>	Lesser spearwort
<i>Cirsium arvense</i>	Creeping Thistle	<i>Ranunculus repens</i>	Creeping Buttercup
<i>Cirsium palustre</i>	Marsh Thistle	<i>Ranunculus</i> spp.	Crowfoot species
<i>Cirsium vulgare</i>	Spear Thistle	<i>Rhytidadelphus</i> spp.	Moss species
<i>Convolvulaceae</i>	Bindweed species	<i>Rosa</i> spp.	Wild Rose species
<i>Cornus</i> spp.	Dogwood species	<i>Rubus fruticosus</i> agg.	Bramble
<i>Crataegus monogyna</i>	Hawthorn	<i>Rumex</i> spp.	Dock species
<i>Dactylis glomerata</i>	Cocksfoot (Grass)	<i>Salix cinerea</i>	Grey Willow
<i>Deschampsia caespitosa</i>	Tufted Hair-grass	<i>Salix fragilis</i>	Crack Willow
<i>Epilobium hirsutum</i>	Great Willowherb	<i>Salix</i> spp.	Willow species
<i>Equisetum fluviatile</i>	Water horsetail	<i>Sambucus nigra</i>	Elder
<i>Equisetum</i> spp.	Horsetail species	<i>Scophularia</i> spp.	Figwort species
<i>Euonymus europaeus</i>	Spindle	<i>Scrophularia auriculata</i>	Water Figwort
<i>Fallopia japonica</i>	Japanese Knotweed	<i>Senecio aquaticus</i>	Marsh Ragwort
<i>Festuca gigantea</i>	Giant Fescue	<i>Senecio jacobaea</i>	Common Ragwort
<i>Festuca</i> spp.	Fescue species	<i>Stachys sylvatica</i>	Hedge Woundwort
<i>Filipendula ulmaria</i>	Meadowsweet	<i>Taraxacum</i> spp.	Dandelion species
<i>Fraxinus excelsior</i>	Ash	<i>Thamnobryum alopecurum</i>	Fox-tail Feather-moss
<i>Galium aparine</i>	Cleavers	<i>Thuidium tamariscinum</i>	Common Tamarisk-moss
<i>Galium palustre</i>	Marsh Bedstraw	<i>Trifolium</i> spp.	Clover species
<i>Geranium robertianum</i>	Herb Robert	<i>Ulex europaeus</i>	Gorse
<i>Geum urbanum</i>	Herb Bennet	<i>Ulex</i> spp.	Gorse
<i>Glyceria</i> spp.	Sweet-grass speices	<i>Ulmus glabra</i>	Wych Elm
<i>Hedera helix</i>	Ivy	<i>Urtica dioica</i>	Common Nettle
<i>Heracleum sphondylium</i>	Hogweed	<i>Valeriana officinalis</i>	Common Valerian
<i>Holcus lanatus</i>	Yorkshire Fog (Grass)	<i>Veronica beccabunga</i>	Brooklime
<i>Homalothecium sericeum</i>	Silky Wall Feather-moss	<i>Veronica chamaedrys</i>	Germander Speedwell

Appendix 3

Extract from the Interpretation Manual of European Union Habitats – EUR25 (European Commission, 2003) describing the Annex I Priority Habitat ‘*Alluvial Forests with *Alnus glutinosa* and *Fraxinus excelsior*.

91E0 * Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Pandion*, *Alnion incanae*, *Salicion albae*)

PAL.CLASS.: 44.3, 44.2 and 44.13

1) Riparian forests of *Fraxinus excelsior* and *Alnus glutinosa*, of temperate and Boreal Europe lowland and hill watercourses (44.3: *Alno-Padion*); riparian woods of *Alnus incanae* of montane and sub-montane rivers of the Alps and the northern Apennines (44.2: *Alnion incanae*); arborescent galleries of tall *Salix alba*, *S. fragilis* and *Populus nigra*, along medio-European lowland, hill or sub-montane rivers (44.13: *Salicion albae*).

All types occur on heavy soils (generally rich in alluvial deposits) periodically inundated by the annual rise of the river (or brook) level, but otherwise well-drained and aerated during low-water. The herbaceous layer invariably includes many large species (*Filipendula ulmaria*, *Angelica sylvestris*, *Cardamine* spp., *Rumex sanguineus*, *Carex* spp., *Cirsium oleraceum*) and various vernal geophytes can occur, such as *Ranunculus ficaria*, *Anemone nemorosa*, *A. ranunculoides*, *Corydalis solida*.

This habitat includes several sub-types: ash-alder woods of springs and their rivers (44.31 – *Carici remotae-Fraxinetum*); ash-alder woods of fast-flowing rivers (44.32 - *Stellario-Alnetum glutinosae*); ash-alder woods of slow-flowing rivers (44.33 - *Pruno-Fraxinetum*, *Ulmo-Fraxinetum*); montane grey alder galleries (44.21 - *Calamagrosti varia-Alnetum incanae* Moor 58); sub-montane grey alder galleries (44.22 - *Equiseto hyemalis-Alnetum incanae* Moor 58); white willow gallery forests (44.13 - *Salicion albae*). The Spanish types belong to the alliance *Osmundo-Alnion* (Cantabric atlantic and southeast Iberia peninsula).

2) Plants:

Tree layer - *Alnus glutinosa*, *Alnus incanae*, *Fraxinus excelsior*; *Populus nigra*, *Salix alba*, *S. fragilis*; *Betula pubescens*, *Ulmus glabra*;

Herb layer - *Angelica sylvestris*, *Cardamine amara*, *C. pratensis*, *Carex acutiformis*, *C. pendula*, *C. remota*, *C. strigosa*, *C. sylvatica*, *Cirsium oleraceum*, *Equisetum telmateia*, *Equisetum* spp., *Filipendula ulmaria*, *Geranium sylvaticum*, *Geum rivale*, *Lycopus europaeus*, *Lysimachia nemorum*, *Rumex sanguineus*, *Stellaria nemorum*, *Urtica dioica*.

3) Corresponding categories

United Kingdom classification: "W5 *Alnus glutinosa*-*Carex paniculata* woodland", "W6 *Alnus glutinosa*-*Urtica dioica* woodland)" and "W7 *Alnus glutinosa*-*Fraxinus excelsior*-*Lysimachia nemorum* woodland".

German classification: "43040401 Weichholzaueuwald mit weitgehend ungertörter Überflutungsdynamik", "43040402 Weichholzaueuwald ohne Überflutung", "430403 Schwarzerlenwald (an Fließgewässern)", "430402 Eschenwald (an Fließgewässern)", "430401 Grauerlenauwald (montan, Alpenvorland, Alpen).

Nordic classification: "2234 *Fraxinus excelsior*-typ" and "224 Alskog".

4) Most of these forests are in contact with humid meadows or ravine forests (*Tilio-Acerion*). A succession towards *Carpinion* (*Primulo-Carpinetum*) can be observed.

5) Brunet, J. (1991). Vegetation i Skånes alm- och askskogar. *Sven. Bot. Tidskr.* 85:377-384.

Appendix 4

Photographic plates from field survey

Plate 1: WN4 Wet Woodland. Western end	Plate 2: WN4 Wet Woodland. Eastern end
Plate 3: FW2 Depositing River. The River Lee	Plate 4: FW2 Depositing River. The River Lee
Plate 5: FW2 Depositing River. The small steam	Plate 6: WN5 Riparian woodland



Plate 7: WS1 Scrub



Plate 8: WL1 Hedgerow (H1)



Plate 9: WL1 Hedgerow (H2)



Plate 10: WL1 Hedgerow (H3)



Plate 11: WL2 Treeline (TL1)



Plate 12: WL2 Treeline (TL2)



Plate 13: GS4 Wet Grassland



Plate 14: FW4 Drainage Ditch (DD1)



Plate 15: FW4 Drainage Ditch (DD2)



Plate 16: BL1 Stone Wall



Plate 17: GA1 Improved Agricultural Grassland (with patches of wet grassland element)



Plate 18. GA2 Amenity Grassland adjacent to the WN4 and WN5 woodland near the Griffin Brother's Construction site.



Plate 19: GS1/GS4 adjacent to treeline
along River Lee.

Appendix 5

Ballyseedy Woods SAC Site Synopsis (Source: National Parks and Wildlife)