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COMBER GREENWAY

Bat Survey and Ecology Assessment

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Executive Summary

DfI are currently in the process of widening sections of the Greenway such that it will be 4m wide across its length and hence suitable for conflicting uses (cyclists, dog walkers etc). In association with the current widening DfI are now considering lighting the greenway from Ravenscroft Avenue to the Billy Neil playing fields to increase its overall usability and attractiveness to both recreational and commuter users.

In order to identify if there are any ecological constraints to the proposed widening works a Bat Activity survey and a Phase 1 Habitat survey and assessment have been undertaken to inform the design of the scheme going forward.

Bat Survey Report

A series of bat transect surveys were completed along the entire length of the Greenway. The surveys were required to:

- establish an understanding of the bat assemblage and utilisation of the study area;
- establish the likely presence / absence of roosting bats within predefined features highlighted during a preliminary walkover survey;
- to provide an indication of the spatial and temporal distribution of activity for different species;

This survey data was subsequently interrogated to determine if the level of bat activity on the Greenway would be a constraint to lighting the Greenway. The results presented in the report firstly confirm that the habitats present along the Greenway are of high suitability for bats. This is subsequently corroborated by the transect survey results which recorded relatively high bat activity for a number of different species along the vast majority of the Greenway.

On the basis of these results, the report confirms that the application of standard lighting along the Greenway will not be acceptable with regard the likely significant effect on the local bat population.

However, it is anticipated that the potential impacts of a lighting scheme on the local bat population can be mitigated for through the application of a 'bat sensitive' lighting scheme. The report provides some consideration of low level lighting and on/off lighting. The report recommends that the next step is the development of a number of detailed lighting design options and presenting these to NIEA for consideration with night time photomontages presenting illumination and light spill.

Phase 1 Habitat Survey and Assessment

The primary value of the Comber Greenway in nature conservation terms is the provision of a significant local wildlife corridor. This function will not be affected by either the widening of the existing path or the application of low level bat friendly lighting.

The extended phase 1 habitat survey completed for the entire length of the Greenway identified several habitats of nature conservation value; most notable of these are woodland and scrub. The widening will primarily impact the grass and ruderal verge present alongside the existing Greenway path. These habitats are not of nature conservation significance. The effects on habitats and Dundonald Old Railway SLNCI are hence considered to be not significant.

The desk study and survey did confirm the presence of badgers on the section of Greenway between Millmount and Comber. This includes potential setts within the railway embankment. Should this section of Greenway be brought forward for widening it is possible that the works could disturb badgers and badger setts. As such a specific detailed badger survey will be required and a licence application to close a badger sett may need to be made to NIEA.

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Introduction

1.1. Background

1.1.1 The Comber greenway is a traffic free route that runs from Ravenscroft Avenue in Belfast (J3662674107) to Comber (J4500770071) and is 7 miles in total. The route is heavily used by both cyclists and pedestrians. The Greenway location and extents are presented in **Figure 1** (Volume 2). From Ravenscroft Avenue in east Belfast to Dundonald the route runs through the city and is hence predominantly urban, traversing dense residential development, providing a significant wildlife corridor. From Dundonald to Comber, at Millmount the route enters open countryside with sections of urban fringe at the outskirts of Dundonald and Comber.

1.1.2 DfI are currently in the process of widening sections of the Greenway such that it will be 4m wide across its length and hence suitable for conflicting uses (cyclists, dog walkers etc) thereby further enhancing the facility for both cycling and walking. In association with the current widening DfI are now considering lighting the greenway from Ravenscroft to the Billy Neil playing fields to increase its overall usability and attractiveness to recreational and commuter users. The construction contract for the widening is providing ducting to allow for this future lighting should it be deemed appropriate.

1.1.3 Following implementation of the widening project local residents and users of the path expressed concern to Northern Ireland Environment Agency (NIEA) Wildlife Officer on the scope of the current construction works and the potential to affect the wildlife in the area, with particular regard to badgers and bats. Following initial consultation with NIEA whereby DfI identified to NIEA that they were also considering lighting the greenway, DfI issued a brief to undertake a 'Bat Survey of Comber Greenway'. The brief requested a bat survey in accordance with the Bat Conservation Trust's 'Bat Surveys for Professional Ecologists – Good Practice Guidelines (3rd Edition)' be carried out encompassing the entirety of the Comber Greenway from Ravenscroft Avenue to the Billy Neil Playing Fields.

1.2. NIEA Consultation and agreed Survey Scope

1.2.1 Given the potentially extensive nature of bat surveying required under the BCT guidance and to further inform the DfI's request for a robust ecological assessment, consultation with NIEA's Wildlife Officer (Dr Jon Lees) was undertaken on Tuesday 12th June. During this meeting it was agreed that the majority of the Greenway is likely to be of High potential for bats, however as the extent of intervention is limited to the lighting the survey effort should be proportionate (as per BCT guidance). As a result a relaxation of the precise requirements of the BCT Bat activity survey guidance was proposed and the methodology presented has been agreed with NIEA.

1.2.2 It was also agreed with NIEA that to ensure a robust assessment of potential ecological effects that the surveys being proposed should now include a Phase 1 habitat survey and a badger survey.

1.2.3 Following the scoping meeting and subsequent consultation with the NIEA Wildlife Officer the following project scope has been implemented from Ravenscroft Avenue to the termination of the Greenway at Comber:

- Bat activity survey and assessment
- Phase 1 Habitat survey (incorporating badger survey)
- Review of potential lighting options

1.3. Survey Methodology – summary

Phase 1

The Phase 1 habitat survey will follow the guidance laid out in the JNCC 'Handbook for Phase 1 Habitat Survey – a technique for environmental audit':

http://jncc.defra.gov.uk/PDF/pub10_handbookforphase1habitatsurvey.pdf

Badger Survey

The badger survey will apply the NIEA Guidance detailed in the Badger Survey Specific Requirements document:

https://www.daera-ni.gov.uk/sites/default/files/publications/daera/badger-survey-specifications.pdf

Bat Activity

The bat activity surveys will apply the guidance within the Bat Conservation Trust 'Bat Surveys for Professional Ecologists – Good Practice Guidelines (3rd Edition)'.

http://www.bats.org.uk/pages/batsurveyguide.html

Table 8.3 of the BCT Guidance for bat activity recording, for high bat potential habitat, requires transects to be repeated twice per month from April to October inclusive. The transects are often supported by static monitoring. As referred in section 1.3 as the proposed works are limited in the extent of physical intervention it has been agreed with NIEA that it is appropriate to relax this somewhat to be proportionate to the potential effects. The methodology now agreed is summarised below. Static monitoring was ruled out as an option due to likely vandalism or loss of static detectors.

- Complete bat habitat review of entire Greenway to grade the habitat (low, moderate, high) as per BCT Guidance (completed – majority as expected has been graded as possessing High potential; refer drawings - Appendix B)
- Complete bat activity transect survey; transects to be completed by bicycle with identified repeated monitoring stops; anabat walkabout and bat box duet with roland RO5 mounted on the bicycles; each survey – two teams of two from the centre of the Greenway to either end and back again. Each survey to begin at dusk;
- The bat activity results will be plotted on GIS to demonstrate species present and extent of activity along each section of the Greenway. This data will be interrogated to assess the potential effect of lighting the Greenway.

1.4. Purpose and Structure of the Report

1.4.1 The Comber greenway is currently being widened to 4m across along its length from Ravenscroft Avenue to the Billy Neil Playing Fields, between Dundonald and Millmout. DfI are also considering the installation of lighting along the greenway.

1.4.2 The purpose of this report is to identify if there are any ecological constraints to the proposed widening works. In addition as a result of the potential concern with regard the impact of lighting on bat populations and bat usage of the Greenway, DfI have requested that the scope of the output of the bat surveys is sufficient to justify a potential sectional grading of the Greenway to the extent that lighting options ranging from no lighting – bat friendly low level lighting – standard street lighting and then potential on / off timed lighting can be considered for application across the length of the Greenway.

1.4.3 To address these requirements the report is set out as follows:

- **PART 1: BAT SURVEY REPORT**
- **PART 2: PHASE 1 HABITAT SURVEY AND ASSESSMENT**

1.4.4 In addition, the project drawings (Figures) for both Parts are set out in a separate A3 Volume:

- **VOLUME 2: FIGURES**

PART 1: BAT SURVEY REPORT

1. Introduction

1.1. Survey Background

1.1.1 Amey Consulting were commissioned by DfI Roads: Eastern Division (DfI) on 31 July 2018 to undertake surveys to establish the environmental baseline conditions regarding bats to inform the proposed lighting scheme.

1.1.2 As a result of the extensive nature of the bat survey request a scoping meeting was held with Dr. Jon Lees (Northern Ireland Environment Agency) on Thursday 7th June 2018. DfI outlined the desire to light the Greenway from Ravenscroft to Billy Neill to expand its usability and attractiveness.

1.1.3 As a result of the potential concern with regard the impact of lighting on bat populations and bat usage of the Greenway, DfI have requested that the scope of the output of these surveys is to be sufficient to justify a potential sectional grading of the Greenway to the extent that lighting options ranging from no lighting – bat friendly low level lighting – standard street lighting and then potential on / off timed lighting be considered for application across the length of the Greenway.

1.2. Objectives of the Report

1.2.1 The following terms are used throughout the report:

- **scheme** – Comber Greenway;
- **study area** – area of focused survey effort along the Comber Greenway between Ravenscroft Avenue and Comber.

1.2.2 Surveys were commissioned in order to:

- establish an understanding of the bat assemblage and utilisation of the study area;
- establish the likely presence / absence of roosting bats within predefined features highlighted during a preliminary walkover survey;
- to provide an indication of the spatial and temporal distribution of activity for different species; and

1.2.3 This survey data is to be interrogated and assessed to:

- determine if the level of bat activity on the Greenway would be a constraint to lighting the Greenway; and
- if bat activity is identified as a constraint to lighting the Greenway, what type of lighting could be considered and employed.

1.2.4 This report provides the results of the surveys undertaken during the month August to October 2018, drawing conclusions from the findings of the surveys. The report further makes recommendations to influence the proposed lighting scheme as a result of bats being potentially affected by the scheme. It represents a snapshot of conditions at the time of survey and it should be noted that the findings may be subject to change following further survey (if required).

1.2.5 This report is intended to be read with reference to **Figures 2 – 7** inclusive (see Volume 2).

2. Legislation

2.1.1 Many species of animal and plant receive some degree of legal protection. For the purpose of this survey, legal protection primarily refers (but may not be limited) to:

- Species included under 'The Wildlife (Northern Ireland) Order 1985';
- Species included within The Conservation (Natural Habitats, etc.) Regulations (Northern Ireland) 1995;
- Species included within the Wildlife and Natural Environment Act (Northern Ireland) 2011;
- Species included under 'The Wildlife (Amendment) (Northern Ireland) Order 1985';
- Environment (Northern Ireland) Order 2002'; and
- Species included on Schedules 2 and 5 of (the 'Habitats Regulations').

Legislation Relating to Bats

2.1.2 All bat species in Northern Ireland are listed on Annex IV of the EC Habitats Directive (92/43/EEC) and are protected under the Conservation (Natural Habitats etc.) Regulations (Northern Ireland) 1995 (as amended), known as the Habitat Regulations. Under the Regulations it is an offence:

- *Deliberately to capture, injure or kill a wild animal of a European protected species;*
- *Deliberately to disturb such an animal while it is occupying a structure or place which it uses for shelter or protection;*
- *Deliberately to disturb such an animal in such a way as to be likely to;*
  - *affect the local distribution or abundance of the species to which it belongs;*
  - *Impair its ability to survive, breed or reproduce, or rear or care for its young; or*
  - *Impair its ability to hibernate or migrate;*
- *Deliberately to obstruct access to a breeding site or resting place of such an animal; or*
- *To damage or destroy a breeding site or resting place of such an animal.*

2.1.3 In addition, five British bat species are listed on Annex II of the Habitats Directive. These are:

- Greater horseshoe bat *Rhinolophus ferrumequinum*;
- Lesser horseshoe bat *Rhinolophus hipposideros;*
- Bechstein's bat *Myotis bechsteinii*;
- Barbastelle *Barbastella barbastellus*; and
- Greater mouse-eared bat *Myotis myotis*.

2.1.4 In certain circumstances where these species are found the Directive requires the designation of Special Areas of Conservation (SACs) by EC member states to ensure that their populations are maintained at a favourable conservation status. Outside SACs, the level of legal protection that these species receive is the same as for other bat species.

3. Methodology

3.1. Introduction

3.1.1 Bat surveys were undertaken by suitably experienced ecologists and supervised by an experienced, licensed bat worker in accordance with practices detailed in both the Bat Conservation Trusts (BCT) Bat Surveys for Professional Ecologists, Good Practice Guidelines (3nd Ed.) and Joint Nature Conservation Committee Bat Workers Manual (3rd Ed.), as from the time of appointment on 31 July 2018 by DfI.

3.2. Desk-Based Assessment

3.2.1 A desk study has been carried out to identify nature conservation designations, designations for bats, and to obtain existing records of bat species potentially relevant to the scheme. Data was obtained from online publicly available sources and from the organisations detailed below:

- NIEA protected sites map viewer;
- Belfast City Council website;
- Ards and North Down Borough Council website;
- Biological records from Centre for Environmental Data and Recording; and
- Records from the Northern Ireland Bat Group.

3.2.2 The desk study included a search for:

- International nature conservation designations (Special Areas of Conservation (SACs) or Area of Special Scientific Interest (ASSIs)) within 30km of the proposed scheme to identify sites where bats are a primary reason for designation.
- National statutory nature conservation designations within 2km of the proposed scheme where bats are a primary reason for designation.
- Bat species within 2km of the proposed scheme.
- Reference was also made to Ordnance Survey maps of the wider area and online aerial images (www.google.co.uk/maps) in order to determine any habitat features of potential interest for bats in the area.

Personnel

3.2.3 Surveys were undertaken by suitably qualified and experienced ecologists;

- Mr. S. A. Graham BSc (Hons). MSc. CEcol, CEnv, MCIEEM, FLS (Lead Ecologist and Survey Director; licensed bat worker: Natural England registration No. CL 15 & CL18: 2015-1147-CLS-CLS, 2015-13792-CLS-CLS, Scottish Natural Heritage No. 21939 and Natural Resources Wales No. OTH:CSAB:2015);
- Mr. D. Cordell BSc (Hons). GradCIEEM; (Bat sound analysis was undertaken by Mr. D. Cordell who has experience in sonogram analysis and an in-depth knowledge of bat ecology. Mr. Cordell has also completed specific training on bat sound analysis and worked on sonogram analysis for numerous development sites across the uk).
- Mr. N. Lutton FdSc – assistant;
- Mr. A. Warwick BSc (Hons). MSc. CEnv, MCIEEM – assistant;
- Miss. K. McClung BSc (Hons) – assistant; and
- Mr. A. Ferguson BSc (Hons) – assistant.

Relevant Guidance

3.2.4 The survey methodology makes reference to the following guidance documents:

- Bat Tree Habitat key. (2018). Bat Roosts in Trees: A guide to identification and assessment for tree-care and ecology professionals. Pelagic Publishing, Exeter (Ref: 2).
- Collins, J. (ed.) (2016). *Bat Surveys for professional Ecologists: Good Practice Guidelines* (3rd edn). The Bat Conservation Trust, London (Ref: 3).
- Mitchell-Jones, A. J. & McLeish, A. P. (2004). *Bat Workers Manual.* 3rd Edition. Joint Nature Conservation Committee, Peterborough (Ref: 7).

3.3. Preliminary Walkover Survey

3.3.1 An initial walkover assessment was undertaken to determine the suitability of features and habitats along or immediately adjacent to the scheme to support bat species on 12th & 13th June 2018. Particular attention was paid to areas that incorporated habitat features with potential for use by foraging and commuting bats (woodland, woodland edge, mature trees, lines of trees, stream corridors, ponds / lakes, scrub margin, grassland and built structures); also considering areas of the scheme which may be subject to the highest impact of any proposed future lighting.

3.3.2 Areas of the scheme representing 'low', 'medium' and 'high' suitability for bats were colour coded. Habitats were ranked in accordance with BCT guidance on the following criteria;

- **Low**

  Habitats with little vegetation structure, no obvious roosting, commuting or foraging opportunity within close proximity to the scheme and / or experiences a high level of existing light exposure.

- **Medium**

  Habitats with a uniform vegetation structure, little opportunity for commuting or foraging opportunity within proximity to the scheme and / or experiences lower levels of existing light exposure.

- **High**

  Habitats with a uniform vegetation structure, little opportunity for commuting or foraging opportunity within close proximity to the scheme and / or experiences lower levels of existing light exposure.

3.3.3 Scope and survey designs were formulated and areas which were considered to provide suitable bat roosting potential and potentially be subject to a high level of disturbance during any proposed future lighting within the study area, were targeted during the survey.

3.3.4 The results of this initial habitat suitability survey are presented in **Figure 2** and in more detail on **Figures 4a – 4e.**

Consultation

3.3.5 To further inform the DfI's request for a robust ecological assessment, consultation with Northern Ireland Environment Agency (NIEA) Wildlife Officer (Dr Jon Lees) was undertaken on Tuesday 12th June 2018. During this meeting, it was agreed that the majority of the Greenway is likely to be of High potential for bats (corroborated by Bat Habitat Suitability survey), however as the extent of intervention is limited to lighting, the survey effort should be proportionate (as per BCT guidance). As a result, a relaxation of the precise requirements of the BCT Bat activity survey guidance was agreed and the methodology presented in Section 4.4 has been agreed with NIEA.

Tree Inspection

3.3.6 Bat roosts can be found in many places such as trees, buildings, bridges, underground etc. Within the study area there are a number of trees with the potential to receive a high level of light disturbance as a consequence of the proposed lighting scheme, which were subject to ground based visual inspections. The most common recorded sites in trees include;

- Disease & Decay:
  - Woodpecker-holes;
  - Squirrel-holes;
  - Knot-holes;
  - Pruning-cuts;
  - Tear-outs;
  - Wounds;
  - Cankers;
  - Compression-forks; and
  - Butt-rots.
- Damage:
  - Lightning-strikes;
  - Subsidence-cracks;
  - Shearing-cracks;
  - Transverse-snaps;
  - Welds;
  - Lifting bark;
  - Desiccation-fissures; and
  - Frost-cracks.
- Association:
  - Fluting; and
  - Ivy.

3.3.7 Access to the above spaces need only be through a hole not exceeding 10 – 20mm in diameter.

3.3.8 Signs of roosting bats in trees may be indicated by one or more of the following:

- Staining, beneath or around the access point to a resting area, caused by the natural oils in bat fur;
- Scratch marks, around the access point to a resting area,
- Audible squeaking, from within the hole, especially on hot days or at dusk;
- Insects, especially flies, around a hole; and

- A characteristic odour of bats and / or their droppings.

3.3.9 The licensed bat ecologist along with another ecologist surveyed the whole study area to undertake a ground-based visual assessment of each tree, to identify potential access and egress and assess the suitability of any tree that may provide suitable roosting habitat. All appropriate horizontal and vertical surfaces were checked for signs of bats. The surveyors were equipped with torches, close focussing binoculars and bat detectors.

3.4. Cycled Transect Surveys

3.4.1 The cycled transect surveys were designed to investigate the use of the scheme by commuting and foraging bats whereby pre-determined transect routes were cycled to record bat activity (foraging or commuting bats). In accordance with the methodology agreed during NIEA consultation (for sites with high quality habitat, taking into account proportionality) five cycled transects surveys were undertaken across August, September and October 2018.

3.4.2 Two routes for cycled transects across the study area were identified during the preliminary walkover survey (based on the calculated timing to complete each transect), which were interspersed with 32 listening points (each listening point involved a period of static monitoring lasting five minutes). Transects were designed to target specific features likely to be of interest to bats (such as rivers, built structures, gardens and groups of large mature trees).

3.4.3 The pre-defined survey routes were cycled at a steady speed of 2 – 2.5 mph (3.2 - 4 km/h). The surveys were undertaken from 0.5 hours before sunset until 1.5 – 2 hours after sunset.

3.4.4 The cycled transect routes are shown on **Figure 3** and in more detail on **Figures 4a – 4e**. Transect-specific notes are provided in Table 1.

Table 1 Cycled Transect Features:

Transect Route	Location Feature
Blue	The Blue Transect begins at the approximate centre point of the Greenway, the East Link Road, where it runs west to Ravenscroft, east Belfast, at the Greenway start/finish. This section of the Greenway intersects mainly dense residential areas and is lined with broad-leaved plantation woodland. The transect travels past Dundonald cemetery and continues west where it intercepts Abbey Road (this area is a little more open with immediate connectivity to the surrounding countryside). The transect then travels due west to Kings Road and Knock Road where pedestrian crossings are present, past the Police Service Northern Ireland museum on the A55 Knock Road with sparse residential areas and then on to Sandown Road where plantation woodland is abundant. The transect then passes through a densely populated residential area and under North Road, a bridge is present here, to its termination point at Ravenscroft where amenity grassland is present.
Yellow	The Yellow Transect runs from East Link Road, south east to Comber village where the Greenway starts/finishes. This section of the Greenway begins in a dense residential area with residential housing bordering closely to the northern side of the path. Moving south eastward to the mid-section it then traverses through agricultural lands consisting of arable and improved grassland. The transect terminates in a rural landscape on the outskirts of Comber. The Greenway crosses over several small streams and the Elner River at various points between Dundonald and Comber.

3.4.5 The transects were cycled with activity recorded using both an Anabat Walkabout (Titley Scientific) and Batbox Duet & Roland RO5/RO7 bat detectors/recorders. The bat detectors were firmly secured to the front of the bicycles at a 45 degree angle to the horizontal, in the same direction of travel. All activity either observed or heard via audio output from the bat detectors was time referenced on a dictaphone and cross-referenced on to a field map.

3.4.6 Where possible, bats heard during the surveys were identified and contextual information on their behaviour was recorded if this could be ascertained (e.g. if foraging; height above ground; direction of flight).

3.5. Data Analysis and Assumptions of Bat Activity

3.5.1 Data analysis and interpretation of results followed the principles of the BCT guidance: Bat Surveys for professional Ecologists: Good Practice Guidelines, 3rd Edn (Ref: 3).

3.5.2 Acoustic monitoring produces a large amount of data recorded by the detectors in .WAC format. In order to eliminate all non-bat ultrasounds, Kaleidoscope Pro (Wildlife Acoustics Ltd.) software was used to separate out all bat calls. In this first step, all .WAC files were converted to Zero-Crossing (.##) files and filtered by inbuilt species filters. All files were then viewed through AnalookW (Titley Ltd.) with the data run through a further series of filters to confirm species or species group classification. The produced filters were cross validated by selecting a proportion of recordings in each survey to be analysed manually.

3.5.3 For analysis purposes, bat activity is recorded as 'registered calls' (a sequence of echolocation calls consisting of two or more call notes (pulse of frequency) from one bat, not separated by more than 1 second (Ref: 4, Ref: 12) with a minimum call note length of >= 2ms (Ref: 11)).

3.5.4 Bat species have been identified using characteristic features associated with species echolocation calls. Diagnostic features used in this analysis include:

- Characteristic Frequency;
- Slope (octaves per second);
- Call duration;
- Time between call;
- Body, minimum length of the body of the call, and;
- Smoothness (distance between successive points before they are not considered part of the same call).

3.5.5 A library of known species sonograms was also used to compare call characteristics and provide further confidence in assigning a recorded call to species. 'British Bat Calls, A guide to species identification' (Ref: 8), Acoustic Ecology of European Bats: Species Identification, Study of their Habitats and foraging Behaviour (Ref: 1) and Social Calls of the Bats of Britain and Ireland (Ref: 6) was also used to aid in the identification of species and species groups. Bat calls are identified to species level where possible; however, bat call structures are extremely flexible and in some cases, it was only possible to identify calls to species group, due to overlapping features of call characteristics. The following terms are used:

- 'Big bat' – refers to the three largest Irish bat species which are noctule *Nyctalus noctula*, Leisler's *N. leisleri* and serotine *Eptesicus serotinus* bats.
- *Pipistrellus* species – refers to bats from the pipistrelle genus. Three species occur in Ireland: common pipistrelle *Pipistrellus pipistrellus*, soprano pipistrelle *P. pygmaeus* and Nathusius' pipistrelle *P. nathusii*. For the purposes of this report the term refers to either soprano or common pipistrelle, due to calls with characteristics that made it difficult to distinguish between the two species.
- Myotis species – refers to bats from the Myotis genus. There are five species from this genus occurring in Ireland which display similar call characteristics: natterer's *Myotis nattereri*, Daubenton's *M. daubentonii*, whiskered *M. mystacinus*, Brandt's *M. brandtii*, and Bechstein's *M. bechsteinii* bat.

3.5.6 It was not possible to identify some species from the sonograms as the characteristics of the 'call' were not sufficient in length to assign to a species or species group. These have therefore been omitted from the analysis.

4. Results

4.1. Figure Breakdown

4.1.1 The results provided within Section 4 are to be read in conjunction with the corresponding Figures 2 – 7 inclusive (Volume 2) (3, 5, 6, 7, 8, 9 & 10, Appendix A), which incorporate the scheme and identified study area, areas highlighted as having bat roost potential, transects where surveys have been undertaken and survey results (Bat species distribution mapping).

4.1.2 A detailed breakdown of results is provided for each survey. The results provided within Section 4 are to be read in conjunction with the corresponding AppendiX, which details survey timings, weather conditions and / or bat registered calls recorded during surveys.

- **Appendix A:** **Cycled transect survey information**

4.2. Desk study

4.2.1 A review of all freely available information, biological records from CEDaR and the Northern Ireland Bat Group identified no statutory and / or non-statutory designated sites within a 30km radius of the proposed scheme where bats are the primary reason for designation.

4.2.2 Species specific records provided by CEDaR and the Northern Ireland Bat Group, for a 2km radius around the scheme, included 77 records from 1985 to 2015. The records show the presence of four confirmed species within the search radius: common and soprano pipistrelle bats, Leisler's and Daubenton's bats (refer **Figure 5**).

4.2.3 The records provide one confirmed common pipistrelle record from 1999 of individuals within a roost. Three confirmed soprano pipistrelle records from 2004, 2005 and 2015 of large colony roosts (50 – 100 individuals). 18 confirmed Leisler's records from between 1985 – 2001. The majority of the records represent single individual roosts although larger colonies of 20 – 80 individuals are present. Finally, the records provide one confirmed Daubenton's bat record from a single individual in 1994. The remaining records represent roosts of unknown species of bats and / species identified to the genus Pipistrellus.

4.2.4 Although many roost records indicate the location of roosts, numerous records relate to the presence of dead or dying bats found within buildings and their curtilage. The records do not provide the results of observations made during emergence / re-entry and / or activity surveys.

4.3. Preliminary Walkover Survey

4.3.1 An initial walkover assessment was made of the suitability of features and habitats along or immediately adjacent to the scheme to support bat species and establish the study area on 12 June 2018. The assessment process was completed in reverse on the 13 June 2018, to ground-truth the findings of the assessment undertaken on the 12 June 2018.

4.3.2 **Figure 2** (and Figures 4a – 4e), provides a visual representation of suitability for bats. Table 2 provides a description for each rating.

Table 2 Scheme Habitat features representing 'low', 'medium' and 'high' suitability for bats.

Bat Suitability Category	Percentage area	Habitat / Feature Description
Low	8.8%	Six small sections of the 'Greenway' which experienced significant amounts of existing light pollution. These areas predominantly focused around amenity areas or where the 'Greenway' crossed Roads.
Medium	7.6%	Seven small sections of the 'Greenway' which experienced some levels of light pollution and contained a uniform vegetation structure. These areas were found within or adjacent to residential areas.

High	83.6%	11 areas of the 'Greenway', where there was a diverse vegetation structure, some opportunities for roosting and no existing light pollution was experienced. These areas represent small sections, in the residential areas towards Belfast, between less suitable areas as well as large linear areas through open countryside towards Comber.

Tree Inspection

4.3.3 The majority of the trees present within the study area represent immature – mature individuals with an absence of features suitable for roosting bats. Three areas of trees within the study area were identified as potentially containing features suitable for roosting bats (Leisler's, Daubenton's, common and soprano pipistrelles). Refer Figures 4b – 4e for the location of these tree groups in relation to the study area. Table 3 provides a description of all trees which contain feature suitable for roosting bats.

Table 3 Trees present within study area containing bat roosting features.

Feature	Grid Ref.	Roosting Suitability	Description of Feature(s)
Group of mature trees	NW504285	Medium	Group of mature broad-leaved and deciduous trees to north of Greenway path. No specific features identified due to height and / or dense canopy. Age and size would suggest some suitability for roosting opportunity.
Group of mature trees	NW508285	Low - Medium	Group of mature broad-leaved trees with dense ivy cover to north of Greenway path. No specific features identified due to height and / or dense canopy. Age and size would suggest some suitability for roosting opportunity.
Group of mature trees	NW510285	Low - Medium	Group of mature broad-leaved trees to north of Greenway path. No specific features identified due to height and / or dense canopy. Age and size would suggest some suitability for roosting opportunity.

4.4. Cycled Transect Surveys

4.4.1 The location of the cycled transect routes are shown in Figure 3 (and 4a – 4e). The transect surveys incorporated 32 Listening Points (LPs) (B1-B16; Blue and Y1-Y16; Yellow) across the two transects (Blue and Yellow routes), described in Table 4 and Table 5. The LP's were evenly distributed as far as possible, amended to incorporate features of higher suitability for bats. Further detail regarding the habitats present at each listening point for each route are also provided in **Error! Reference source not found.**4 and Table 5.

Table 4 Habitat features at Listening Points on Blue transect route.

Transect Route	Listening Point	Habitat Description at each Listening Point (LP)
Blue	B1	On pavement 'along East Link Road'. LP in residential area.
	B2	345m west of B1. LP surrounded by tall grasses, scrub, shrubs and immature trees. LP in semi-rural area.
	B3	345m west of B2. LP surrounded by tall grasses, scrub, shrubs and immature trees. LP in semi-rural area.
	B4	245m west of B3. LP surrounded by tall grasses, scrub, shrubs and immature trees. LP in semi-rural area.

	B5	345m west of B4. LP surrounded by scrub, shrubs and immature trees. LP in residential area.
	B6	345m west of B5. LP surrounded by scrub, shrubs and immature trees. LP in residential area.
	B7	345m west of B6. LP surrounded by tall grasses, scrub, shrubs and immature trees. LP in residential area.
	B8	345m west of LB. LP surrounded by tall grasses, scrub, shrubs and immature trees. LP in residential area.
	B9	345m west of B8. LP surrounded by tall grasses, scrub, shrubs and mature trees. LP in residential area.
	B10	345m west of B9. LP surrounded by tall grasses, scrub, shrubs and mature trees. LP in residential area.
	B11	345m west of B10. LP surrounded by tall grasses, scrub, shrubs and immature trees. LP in residential area.
	B12	343m west of B11. LP surrounded by tall grasses, scrub, shrubs and mature trees. LP in residential area.
	B13	343m west of B12. LP surrounded by tall grasses, scrub, shrubs and immature and mature trees. LP in residential area.
	B14	343m west of B13. LP surrounded by tall grasses, scrub, shrubs and immature and mature trees. LP in residential area.
	B15	343m west of B14. LP surrounded by tall grasses, scrub, shrubs and immature trees. LP in residential area.
	B16	168m west of B15. LP surrounded by amenity grassland. LP in residential area.

Table 5 Habitat features at Listening Points on yellow transect route.

Transect Route	Listening Point	Habitat Features
Yellow	Y1	345m south-east of start point. LP surrounded by tall grasses, scrub, shrubs and immature trees. LP in residential area.
	Y2	345m south-east of Y1. LP surrounded by scrub and mature trees. LP in residential area.
	Y3	335m south-east of Y2. LP surrounded by newly modified habitat with some mature trees. LP in residential area.
	Y4	360m south-east of Y3. LP present adjacent to a small river, in an open recreational space. LP in semi-residential area.
	Y5	345m south-east of Y4. LP present adjacent to a small river, in an open recreational space. LP in semi-residential area.
	Y6	357m south-east of Y5. LP surrounded by shrubs and immature trees. LP in semi-residential area.
	Y7	345m south-east of Y6. LP surrounded by shrubs and immature trees. LP in semi-residential area.
	Y8	344m south-east of Y7. LP surrounded by shrubs, immature trees and open fields. LP in rural area, although well-lit by entrance to Billy Neill Soccer Centre of Excellence.
	Y9	366m south-east of Y8. LP located on small bridge over a river. LP in rural area.

	Y10	323m south-east of Y9. LP surrounded by shrubs and immature trees. LP in rural area.
	Y11	345m south-east of Y10. LP surrounded by shrubs and immature trees. LP in rural area.
	Y12	345m south-east of Y11. LP surrounded by shrubs and immature trees. LP in rural area.
	Y13	345m south-east of Y12. LP surrounded by shrubs and immature trees. LP in rural area.
	Y14	345m south-east of Y13. LP surrounded by shrubs and immature trees. LP in rural area.
	Y15	345m south-east of Y14. LP surrounded by tall grasses, scrub, shrubs and immature trees. Open fields to the east and open woodland to the west.
	Y16	Comber Greenway Start point

4.4.2 Ten individual transect surveys were undertaken between August and October 2018; five for each of the blue and yellow transects accounting for 20.16 hours of survey effort. Appendix A, Table A3.3 provides a summary of the dates, sunset/sunrise times and duration for surveys undertaken between August and October 2018.

4.4.3 Cycled transect surveys were conducted when weather conditions were generally conducive to bat activity surveys i.e. relatively mild and dry with low wind speeds. Full weather details are provided within Appendix A, Table A3.3 (with cross-reference to Appendix A, Table A3.1).

4.5. Species Distribution Mapping

4.5.1 **Figures 6a – 6i** (Bat Species Distribution Mapping) provide a visual representation of the observations and species registered calls throughout the blue and yellow transect routes. The graduated pie-charts (larger the pie-chart, larger the number of registered calls at that location) are only present where registered call / visual observations were made at a Listening Point or between Listening Points. The figures display how bats are utilising features present within and along the blue and yellow transects. Hotspots of activity have been identified across the study area, predominantly associated with areas of 'high' habitat suitability. Where the scheme passes through rural areas towards Comber, bat foraging, and therefore utilisation of the study area intensifies.

4.6. Bat species encountered

4.6.1 The following six bat species were encountered across the two transects during the 2018 activity bat surveys:

Soprano pipistrelle

4.6.2 By far the most frequent species encountered; indicated in Appendix A, Table A3.4. Soprano pipistrelle numbers were significantly greater across the whole length of the scheme, compared to other species encountered; representing 47% of all registered calls. High numbers of calls and observations were registered throughout August and September (163 & 144, respectively). Numbers were significantly reduced in October (89).

4.6.3 Found throughout all the habitats encountered across the study area, the species would appear to be more of a generalist utilising all opportunities for foraging and commuting within the landscape. Observations included both commuting and foraging activity along and adjacent to the study area. Areas identified as 'low' and 'medium' habitat suitability, as a result of lighting, did experience lower numbers of bat observations and registered calls compared to areas of 'high' habitat suitability; predominantly restricted to commuting individuals in these areas.

Common pipistrelle

4.6.4 The second most frequent species encountered; indicated in Appendix A, Table A3.4. Common pipistrelle numbers were high across the whole length of the scheme, compared to other species encountered; representing 39% of all registered calls. High numbers of calls and observations were registered throughout August and September (165 & 129, respectively). Numbers were significantly reduced in October (32).

4.6.5 Found throughout all the habitats encountered across the study area, the species would appear to be more of a generalist utilising all opportunities for foraging within the landscape, including around existing lighting columns. Observations included both commuting and foraging activity along and adjacent to the study area. Areas identified as 'low' and 'medium' habitat suitability, as a result of lighting, did experience numbers of bat observations and registered calls, although compared to areas of 'high' habitat suitability, these numbers were reduced. Common pipistrelle bat numbers were observed to be higher throughout the yellow transect.

Leisler's

4.6.6 The third most frequent species encountered; indicated in Appendix A, Table A3.4. A low, but consistent, level of activity was found throughout the 'high' level habitat within the study area between August and October 2018.

4.6.7 Registered calls and observations would suggest that the majority of records were from commuting bats emerging from residential areas, although some records indicate opportunistic foraging along and adjacent to the study area. Areas identified as 'low' and 'medium' habitat suitability, as a result of lighting, did not experience any numbers of bat observations or registered calls. Leisler's bat numbers were observed to be higher throughout the blue transect.

Myotis spp.

4.6.8 A low level of Myotis spp. bat activity was recorded throughout August – September (see Figures 6- 9); indicated in Appendix A, Table A3.4. No Myotis spp. bat activity was recorded in October. Registered calls were only recorded on the yellow transect, concentrated between LPs Y3 and Y9; with the highest concentration of recorded calls found at Y4.

4.6.9 All registered calls were located within proximity to a water feature (river and / or lake). Observations made at the time of survey indicate bats were foraging along / over the water. Although identification to a species level could not be established during analysis, survey information suggests the use of water features along the length of the rural area of the yellow transect are utilised by commuting and / or foraging Daubenton's bats.

Nathusius' pipistrelle

4.6.10 Nathusius' bats were recorded in August. Located between Y4 and Y5 on the yellow transect, the registered calls were recorded within an amenity area, adjacent to a small watercourse.

4.6.11 With only two records, recorded in one location, the only conclusion which can be drawn is that Nathusius' pipistrelle bats are present within the area in very low numbers.

Brown long-eared

4.6.12 Two brown long-eared bats were recorded in August and one in October. Located between three separate locations over the two transects (between blue B7 – B8 and yellow Y2 – Y3 & at Y12), the registered calls were recorded within predominantly built up areas, except for the record at yellow Y12.

4.6.13 Although no observation information was recorded, the only conclusion which can be drawn is that brown long-eared bats are present within the area in very low numbers and either crossing and / or commuting along the scheme.

5. Discussion – review of results

5.1.1 A total of 20.16 hours of activity surveys were undertaken between August and October 2018. The timing of the activity surveys was targeted to establish bat species utilisation during the period when young are starting to fly, mating and commuting to swarming roosts / bats present at swarming roosts. Although activity surveys had not been completed earlier in the year, surveys are considered representative of bat activity earlier in the year. It is anticipated that this level of survey effort along with the preliminary walkover survey and tree scoping surveys, combined with the desk top study have provided sufficient data to identify potential roosting features within the study area along with establishing how bats utilise the Comber Greenway and potential impact of the proposed lighting scheme.

5.1.2 The data search identified the presence of numerous bat roosts within the wider environment of the scheme for common and soprano pipistrelles, Leisler's and Daubenton's bats. The majority of the records represent low conservation status roosts of single bats. Large and potentially regionally important roosts of high conservation status have been identified for soprano pipistrelles and Leisler's within a 2km radius of the scheme. With the number of residential properties present within the immediate vicinity of the scheme, the Comber Greenway represents an important linear, commuting feature, further providing foraging opportunities for generalists such as pipistrelle species bats.

5.1.3 The preliminary walkover survey, undertaken prior to the commencement of activity surveys, identified that 83.6% of the study area represented habitats of 'high' habitat suitability for bats. These areas contained a diverse vegetation structure for foraging and commuting bats, some opportunities for roosting bats and received no light pollution. It is evident from the activity surveys that areas which do not currently receive light pollution have a higher utilisation compared to those areas which are well lit / receive a level of light pollution ('low' and 'medium' habitat suitability). These areas are currently limited to eleven small sections. The majority of the trees present within the study area represent immature – mature individuals with an absence of features suitable for roosting bats. Three areas of trees within the study area were identified as containing feature suitable for roosting bats (Leisler's, Daubenton's, common and soprano pipistrelles).

5.1.4 Leisler's bats, which typically feed over areas of open habitats, have been identified as utilising the Comber Greenway frequently for foraging (potentially opportunistically) and commuting; utilising the linear feature to access open areas of habitat towards Comber from roosts potentially located within the local surrounding area.

5.1.5 Soprano and common pipistrelle bats make up 87 percent of all registered calls and observations during the activity surveys. Found throughout all the habitats encountered across the study area, the species are known to be more of a generalist, utilising all opportunities for foraging and commuting within the landscape. Observations included both commuting and foraging activity along and adjacent to the study area, sometimes to a height of only 1.5m. Areas identified as 'low' and 'medium' habitat suitability, as a result of lighting, did experience lower numbers of bat observations and registered calls compared to areas of 'high' habitat suitability; predominantly restricted to commuting individuals in these areas.

5.1.6 Other species such as Daubenton's bats would appear to be utilising features present within and / or immediately adjacent to the study area, specifically rivers and lakes. Although not specifically utilising features of the Comber Greenway, any potential light spill from the proposed lighting scheme may impact these species ability to utilise these features. Brown long-eared bats and Nathusius' pipistrelles were rarely recorded, with the number and frequency of registered calls indicating that they were commuting over the Comber Greenway and not utilising the feature for foraging. It would be prudent to assume that they may use it infrequently on occasion, although it does not form an important aspect within their habitat requirements.

6. Conclusion

6.1.1 Habitats present across the study area generally provide a 'high' level of suitability for commuting and foraging bats. A diversity of bat species were observed and recorded utilising the study area, and areas immediately adjacent, during the surveys.

6.1.2 The Comber Greenway would appear to be an important feature for the local bat population. The 'Greenway' was identified as a feature consistently utilised by commuting bats, being a 'long-term' linear feature connecting Belfast with Comber, as well as foraging bats, providing a variable habitat structure which attracts prey; although this is only based on an estimation in the absence of baseline information from areas outside of the Greenway. It is evident from the analysis however, that observations and registered calls of bats from areas which currently receive a level of light pollution (areas classified as having 'Low' and 'medium' habitat suitability) compared to currently unlit areas (areas classified as having 'High' habitat suitability) is notably lower and absent for some species.

6.1.3 With lower numbers of bat registered calls and / or observations in areas currently experiencing lighting, it would be anticipated that if the Greenway were to be lit without considering bats that there may still be some use of the greenway by bats, but this would be significantly reduced compared to current levels. In the absence of detailed baseline information for bats from areas outside of the Greenway, it would have to be assumed that a lack of similar features is available to the local bat populations (for commuting and foraging) and the loss of the feature as a result of modification (standard lighting) would negatively impact the local bat populations.

6.1.4 A lighting scheme adopting 'standard' lighting for the Comber Greenway has the potential to significantly reduce the ability of numerous bats (of several species) to travel between roost sites and feeding grounds, and / or significantly reduce the ability to feed. This could result in a negative impact to the conservation status of local bat populations around Belfast and Comber. This is contrary to the legislation which protects bats and it is anticipated that NIEA would have significant concerns with and object to such a proposal.

6.1.5 With regard to the potential lighting options that it was requested be considered (no lighting, bat friendly low level lighting, standard street lighting and on / off timed lighting): no lighting would be the preferred outcome with regard potential impacts on the local bat population.

6.1.6 **Figure 7** presents a simplistic overview of the recorded bat activity. This was prepared to graphically illustrate that, other than at the scheme ends, bat activity along the Comber Greenway is considered to be high and as a consequence the implementation of 'standard' lighting anywhere along the length of the Greenway would negatively impact bat populations and hence be inappropriate. Furthermore, impacting foraging and commuting bats could result in the occurrence of an offence under the National or European legislation which is currently in place to protect bat populations. Therefore, standard street lighting should be ruled out as an option across the Greenway.

6.1.7 However, it is anticipated that the potential impacts on the local bat population, of a 'standard' lighting scheme, can be mitigated for through the modification to a 'bat sensitive' lighting scheme. Some consideration of low level lighting and on/off lighting is presented below: Section 8 outlines Options for consideration for a 'bat sensitive' lighting scheme, which is designed not to impact on commuting and / or foraging bats and therefore maintain the current conservation status of species in the area.

7. Review of Potential Lighting Options

7.1. Introduction

7.1.1 The following provides a review of possible lighting options that could be applied to the Greenway which it is considered would minimise the effect on bat populations to the extent that the lighting scheme would be permissible when examined against nature conservation legislation. Some additional bat monitoring would be required by NIEA to demonstrate & prove that the operational lighting was not affecting the utilisation of the Greenway by bat species.

7.1.2 It is not the intention of this section to make a formal recommendation with regard lighting design. This would require a full, detailed lighting design completed by a Lighting Engineer and consideration of construction cost, running and maintenance costs and potential vandalism costs. Therefore, the next step, if the Department decides to proceed with lighting of the Greenway, is to develop and cost lighting options in association with an experienced bat ecologist. It is recommended that these options be presented to NIEA with night time photomontages presenting illumination and light spill.

7.2. Lighting Options

7.2.1 The proposed lighting scheme should mitigate for the loss of foraging habitats and commuting habitats by inappropriate lighting through the implementation of a bat sensitive lighting scheme. Potentially sensitive receptors immediately adjacent to the scheme, such as mature trees containing potential bat roosting features and watercourses, should be considered and lighting designed as not to cause light spill additionally.

7.2.2 Considering the above, the following options have been provided;

Option A

- Sensitive, 'bat friendly' lighting installed along the whole length of the scheme.

Option B

- Sensitive 'bat friendly' lighting installed along those sections of the scheme not currently lit, with modifications undertaken to the existing lighting scheme present in areas across the Comber Greenway.

7.3. Option A

7.3.1 A precautionary approach has been proposed to keep light levels as low as possible for bat and insect species. Adopting guidelines prescribed by (Ref: 10) and information contained within (Ref: 5 & Ref: 9), it is proposed that a Variable Lighting Regime (VLR), managed by Central Management System (CMS) technology is adopted along the whole length of the scheme. This option includes the replacement of existing lighting columns present along the scheme.

Variable Lighting Regime

7.3.2 New generation lighting controlled by CMS systems are preferable to enable variable lighting regimes (VLR) to suit both human and wildlife use of a site. VLR involve switching off or dimming lights for periods of the night. Many county councils are now adopting VLR using CMS controlled units, switching off/dimming lights when human activity is low (e.g. 00.30 Hrs – 05.30 Hrs). This technology has also been used to create a lighting regime that switches off lights during periods of high bat activity, such as commuting or emergence. Lights can also be dimmed (e.g. to 30% power) for periods of the night to additionally reduce illumination and spill. The exact regime of lighting at a site can be amended, depending on the nature of public use and type and amount of bat activity. Lights could also be fitted with movement sensors which switch lights on as people walk by and switch them off as people pass. Such lights will reduce the overall lit time for the environment, potentially reducing the impact on bats and insects.

Central Management System

7.3.3 CMS are electronic monitoring systems that allow two-way communication with light units enabling the user to control and programme light units remotely. CMS enable remote switching or dimming to various degrees of brightness to facilitate part night lighting schemes.

7.3.4 CMS can save money through both dimming and switching off lights, and by automated performance monitoring. Automated monitoring enables identification of light unit failures and fault finding which reduces the requirement for onsite maintenance and night patrols, allowing operations managers to optimise their maintenance schedules. CMS is noted as giving considerable flexibility for wildlife managers, making it feasible to dim or switch off specific lights at selected times e.g. to avoid bat commuting or emergence times.

7.3.5 In addition to VLR and CMS systems being employed, it is recommended that the spacing between lighting columns is increased to the maximum permittable distance. Increased spacing further reduces the intensity and spread of light to minimise the area illuminated and give bats an opportunity to fly in relatively dark areas between lights. Reducing the height of light units will additionally keep the light as close to the ground as possible, reducing the volume of illuminated space. This will also give bats a chance to fly over the light units in the dark area above the light (if the light does not spill above the vertical plane). Lighting should specifically be directed onto the Comber Greenway to avoid trespass (spilling of light beyond the boundary of area being lit). Trespass can be minimised through the implementation of the aforementioned along with modifications 'post installation' using a range of lamp modifications to restrict and direct light to ensure a low beam angle of the lights (ideally less than 70° above the horizontal) and / or install full horizontal cut off units (with no light more than 90° above the horizontal).

7.3.6 Examples of low level lighting are provided below (examples below taken from mitigation examples presented in (Ref: 10) for pedestrian and cycle path lighting which minimise spill and reduce overall illumination including: down-lights (Plate 6.1) and low level illuminated bollards (Plate 6.2).

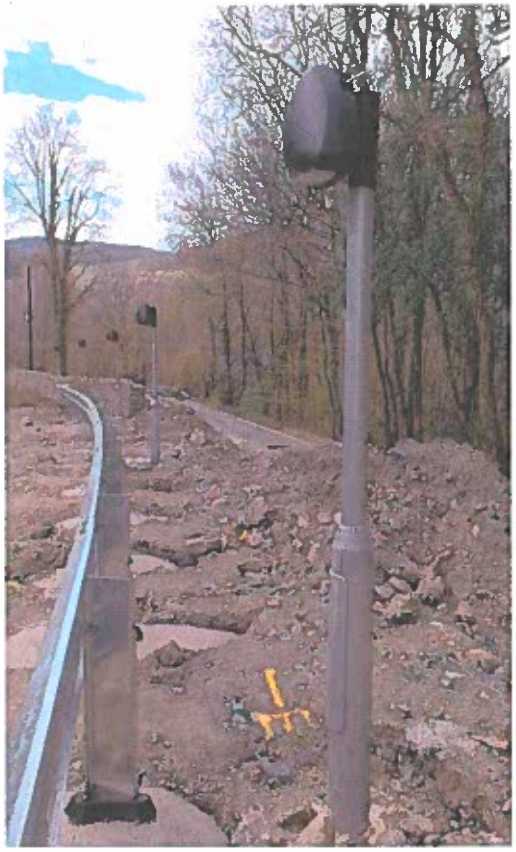

Plate 6.1: Example of scheme down lighting.

Plate 6.2: Example of scheme low level illuminated bollards.

7.4. Option B

7.4.1 Option B would see the implementation of prescriptions provided within Option A for currently 'un-lit' areas of the scheme along with modifications undertaken to the existing lighting scheme present in areas across the Comber Greenway.

7.4.2 For un-lit' areas of the scheme, see Option A. For modifications to the existing lighting scheme the recommendations within (Ref: 10) were adopted to achieve a reduction in ambient levels of lux. See recommendations below;

- Low pressure sodium; or
- 30 Watt 'warm' white LED (low relative attractiveness for insects, therefore minimal impacts on bats insect prey)

7.4.3 The following lighting types should be completely avoided;

- **Avoid blue-white short wavelength lights**: these have a significant negative impact on the insect prey of bats; and
- **Avoid lights with high UV content**: (e.g. metal halide or mercury light sources), or reduce/completely remove the UV content of the light. UV has a high attractiveness to insects leading to direct insect mortality at street lights thereby reducing the availability of insect prey. Use UV filters or glass housings on lamps which filter out a lot of the UV content.

8. Limitations

8.1.1 The information contained within this bat survey report relates to the surveys which have been undertaken between the date of commission being provided by DfI (13 July 2018) and October 2018. It must be noted that surveys have not been undertaken throughout the study area prior to DfI commission.

8.1.2 The suite of bat surveys undertaken throughout the study area were carried out during the optimal period (April to September / October; depending upon the survey methodology); in accordance with current survey guidance provided in Section 3.3. However, limitations on the identification of roost sites present within mature trees; especially groups of trees were encountered due to surveys being only a ground based visual inspection and visibility within the dense canopy of trees at individual localities. Further limitations were encountered due to a delayed start to the survey, on 13 August 2018 and a heavy rain shower encountered at the end of the activity survey on the 28 August, resulting in the early finish to the survey. Although limitations have been identified, surveys are designed to identify levels and locations of bat activity throughout the study area. It is considered that sufficient information was obtained during the surveys for the purpose of informing this bat survey report, therefore, these are considered unlikely to be a significant limitation in relation to the proposed lighting scheme.

8.1.3 Habitats and features of interest outside the study area and individual landownership boundaries were observed from within the scheme or from areas with public access, using binoculars where necessary. Therefore, adjacent land (where relevant) was not subject to a full walkover scoping survey, although broad habitat types were recorded.

8.1.4 In the event that the works show a demonstrable impact on a protected species, e.g. in the case of a protected species being found at any stage during the works, there may be a requirement to obtain a specific licence to allow works to proceed lawfully.

8.1.5 The recommendations in this report are based upon available knowledge of both the ecological constraints and the engineering works at the time of writing. As both the ecology and engineering works can change, in the light of new information and changes to the works programme, these recommendations and mitigation measures should be updated on a regular basis to reflect the latest information. Further monitoring and updated check surveys are required at some sites, while other surveys may be required in the event of a scope change or modification of an access route etc. Adherence to these mitigation measures cannot guarantee categorically that a feature of importance (i.e. notable habitat or protected species) will not be impacted upon. However, adherence to these measures can significantly reduce the risk of potentially impacting upon such a feature.

8.1.6 The lack of evidence of a protected species does not preclude their possible presence at a later date. This is particularly true for bats; their use of a feature can significantly vary, not only on a seasonal basis, but also from day to day. Any survey represents only a 'snapshot' of possible bat activity. Importantly, lack of activity / evidence of a bat roost does not guarantee their absence and therefore consideration should be given to the need to update the data in the future in the event of substantial delay to the implementation of proposed lighting scheme.

9. References

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Appendix A. Cycled Transect Survey Information

Table A3.1 provides a description of how environmental variables are measured during surveys.

Table A3.1: Weather variables

Wind speed		Wind Direction	Rain		Cloud Cover		Cloud Height	
Calm	0	16 point compass	None	0	In eights		<150m	0
Light air	1	N	Drizzle/Mist	1	e.g.	3/8	150-500m	1
Light breeze	2	NNE	Light showers	2			>500m	2
Gentle breeze	3	NE	Heavy showers	3				
Moderate breeze	4	ENE	Heavy rain	4				
Fresh breeze	5	E						
Strong breeze	6	Etc						
Moderate gale	7							
Fresh gale	8							
Strong gale	9							
Whole gale	10							
Storm	11							

Survey Dates

Table A3.2 provides a summary of the sunset/sunrise times and survey duration for surveys undertaken between August and October 2018.

Table A3.2: Cycled transect survey dates and timing

Period	Transect Route	Date	Sunset	Start	Finish	Total Time
August 2018	Blue	13/08/2018	21:00	21:23	23:14	01:51
	Yellow	13/08/2018	21:00	21:25	23:50	02:25
	Blue	28/08/2018	20:26	20:26	22:10	01:44
	Yellow	28/08/2018	20:26	20:26	22:30	02:04
September 2018	Blue	06/09/2018	20:04	20:04	22:04	02:00
	Yellow	06/09/2018	20:04	20:04	22:09	02:05
	Blue	27/09/2018	19:11	19:11	21:10	01:59
	Yellow	27/09/2018	19:11	19:11	21:12	02:01
October 2018	Blue	10/10/2018	18:38	18:38	20:39	02:01
	Yellow	10/10/2018	18:38	18:38	20:44	02:06
Grand Total						**20:16**

Survey Conditions

Table A3.3 below provides a summary of the environmental conditions encountered during the cycled transect surveys undertaken between August and October 2018.

Table A3.3: Cycled transect survey weather conditions

Period	Transect Route	Date		Wind Speed	Rain	Cloud Cover	Temperature (°C)
August 2018	Blue	13/08/2018	Start	0	0	8/8	18
			Finish	0	0	8/8	18
	Yellow	13/08/2018	Start	0	0	8/8	18
			Finish	0	0	8/8	18
	Blue	28/08/2018	Start	2	0	8/8	15.5
			Finish	2	4	8/8	14
	Yellow	28/08/2018	Start	2	0	8/8	15.5
			Finish	2	4	8/8	14
September 2018	Blue	06/09/2018	Start	2	0	3/8	12
			Finish	2	0	3/8	10
	Yellow	06/09/2018	Start	2	0	3/8	12
			Finish	2	0	3/8	10
	Blue	27/09/2018	Start	0	0	3/8	11
			Finish	2	0	2/8	9
	Yellow	27/09/2018	Start	0	0	3/8	11
			Finish	2	0	2/8	9
October 2018	Blue	10/10/2018	Finish	4	0	1/8	15
	Yellow	10/10/2018	Start	4	0	2/8	12

Survey results

Table A.4 (over page) provides a summary of the number of bat registered calls recorded during the cycled transect surveys undertaken between August and October 2018.

Table A.4: Cycled transect recorded calls for August - October 2014

Survey Period	Species	Survey Date				Total (survey)
		13/08/2018	13/08/2018	28/08/2018	28/08/2018	
		Blue	Yellow	Blue	Yellow	
August 2018	Common pipistrelle	33	66	44	22	165
	Soprano pipistrelle	12	57	4	90	163
	Nathusius' pipistrelle	0	0	0	2	2
	Myotis species	0	3	0	0	3
	Brown long-eared	1	0	1	0	2
	Leisler's	26	3	3	18	50
	Total	**72**	**129**	**52**	**132**	**385**
		Survey Date				Total (survey)
		06/09/2018	06/09/2018	27/09/2018	27/09/2018	
September 2018	Common pipistrelle	21	49	16	43	129
	Soprano pipistrelle	7	82	9	46	144
	Nathusius' pipistrelle	0	0	0	0	0
	Myotis species	0	11	0	0	11
	Brown long-eared	3	1	0	0	4
	Leisler's	7	1	11	2	21
	Total	**38**	**144**	**36**	**91**	**309**
		10/10/2018				Total (survey)
		Blue	Yellow			
October 2018	Common pipistrelle	9	23	n/a		32
	Soprano pipistrelle	8	81			89
	Nathusius' pipistrelle	0	0			0
	Myotis species	0	0			0
	Brown long-eared	0	1			1
	Leisler's	0	13			13
	Total	**17**	**118**			**135**

PART 2: PHASE 1 HABITAT SURVEY AND ASSESSMENT

1. Phase 1 Habitat Survey

1.1. Introduction

1.1.1 As has been referenced previously in the report DfI are currently widening the Comber Greenway to 4m along its length with the future possibility that the Greenway maybe lit. Following consultation with the NIEA Wildlife Officer it was agreed that a Phase 1 Habitat Survey and assessment be undertaken to assess the potential loss of habitat along the greenway and to determine if any effects on designated sites, protected species (in particular badgers) or priority habitats were likely to occur.

1.1.2 This section of the report therefore incorporates a desk study and phase 1 habitat survey covering the length of the greenway to map the habitats present and determine if significant effects are likely.

1.1.3 Given that the works are the widening of an existing 2.5m cycleway standard path with limited potential to have significant ecological effects during construction and with no change in current operational use this survey effort was considered sufficient to address potential impacts on habitats and species (other than bats – refer Part 1 of this report).

1.2. Relevant Legislation

European Legislation

1.2.1 The requirements of the Habitats Directive and Birds Directives are transposed into legislation through the Conservation (Natural Habitats, etc.) Regulations (Northern Ireland) 1995 and the Conservation (Natural Habitats, etc.) (Amendment) Regulations (Northern Ireland) 2012. Section 34 provides protection to wild animals of European protected species and states:

It is an offence-

(a) deliberately to take or kill a wild animal of a European Protected species;

(b) deliberately to disturb any such animal;

(c) deliberately to take or destroy the eggs of such an animal; or

(d) to damage or destroy a breeding site or resting place of such an animal.

1.2.2 Under the Habitats Directive all species of bats and otter *Lutra lutra* are European Protected Species.

Northern Ireland Legislation

1.2.3 The Wildlife (Northern Ireland) Order 1985 is the key piece of ecological legislation in Northern Ireland. It provides protection for fauna and flora by making certain activities an offence. Under the Order the nests and eggs of all wild birds are protected during the breeding season with the nests of birds listed in Schedule 1 protected at all times. Schedule 1 birds include heron *Ardea cinerea*, buzzard *Buteo buteo* and long-eared owl *Asio otus*.

1.2.4 Under the protection of wild animals, if any person intentionally -

- damages or destroys, or obstructs access to, any structure or place which any wild animal included in Schedule 5 uses for shelter or protection;
- damages or destroys anything which conceals or protects any such structure; or
- disturbs any such wild animal while it is occupying a structure or place which it uses for shelter or protection,

he shall be guilty of an offence.

1.2.5 Schedule 5 animals include badger *Meles meles*, common lizard *Zootoca vivipara*, pine marten *Martes martes* and red squirrel *Sciurus vulgaris*.

1.2.6 Schedule 8 lists plants which are protected from intentional picking, removal, uprooting or destruction. The schedule includes smooth cat's ear *Hypochoeris glabra*, cowslip *Primula veris*, and purple saxifrage *Saxifraga oppositifolia*.

1.2.7 The legislation also makes it an offence to introduce or cause to grow in the wild, non-native species, defined as a species that is not ordinarily resident in and is not a regular visitor to NI. These species include Japanese knotweed *Fallopia japonica* and Himalayan balsam *Impatiens glandulifera*.

1.2.8 The Wildlife and Natural Environment Act (Northern Ireland) 2011 updates and amends the Wildlife Order. Under the WANE Act recklessness now becomes an offence and the schedules are amended with updated species lists. The Act also places a duty on public bodies to further the conservation of biodiversity in the exercise of their functions.

1.3. Planning Policy

1.3.1 *Valuing Nature A Biodiversity Strategy for Northern Ireland to 2020* (Ref 1.1) sets out how Northern Ireland plans to meet its international obligations and local targets to protect biodiversity. It sets out the Aichi Targets agreed at the Convention of Biological Diversity in 2010 and actions to achieve those targets.

1.3.2 *The British Standard Biodiversity – Code of practice for planning and development* (Ref 1.2) was published in 2013 and sets out recommendations and guidance for planning and development which might have implications for conservation or enhancement of biodiversity.

1.3.3 The Northern Ireland Environment Agency (now part of the Department of Agriculture, Environment and Rural Affairs) has published a series of Standing Advice Notes (Ref 1.3) that apply to all planning applications. These include advice notes with respect to wild animals, pollution prevention guidance and discharges to the water environment. The advice contained in these documents are considered to be material considerations to inform decision making in the planning application process.

1.3.4 The Belfast Local Biodiversity Action Plan was published in 2013 (Ref 1.4) and highlights a number of species and habitats selected for action. Habitats include semi-natural broad-leaved woodland, species rich hedgerows and built environment. Action plan species include red squirrel, Leisler's bat, starling and house sparrow.

1.3.5 The Comber section of the greenway is located in the Ards and North Down Borough Council Area. To date the Council has not published an up to date Local Biodiversity Action Plan. The Down District Local Biodiversity Action Plan (Ref 1.5) was published in 2013. Species and habitats selected for action include: grassland and farmland, urban greenspace, species rich hedgerows, wall brown butterfly, red squirrel and bumblebee.

2. Methodology

2.1. Study Area and Zone of Influence

2.1.1 Baseline conditions were determined through a combination of desk study and site surveys. For the desk study a study area of 2km was used to identify any Natura 2000 sites or other statutory sites that potentially may be affected by the scheme. The study area was expanded to identify any sites that may have a hydrological connection with the greenway. In addition, any sites with birds as a qualifying feature were identified to account for potential effects on flight pathways or foraging areas beyond the designated site boundary.

2.1.2 Given the linear nature of the greenway and the limited extent of the works, the study area for the extended phase 1 habitat survey was taken to be the footprint of the works with a Zone of Influence (ZoI) of 50m.

2.2. Desk study

2.2.1 A desk study was undertaken comprising a review of the following sources:

- NIEA protected sites map viewer (Ref 2.1);
- Belfast City Council website (Ref 2.2);
- Ards and North Down Borough Council website (Ref 2.3);
- Biological records from Centre for Environmental Data and Recording; and
- Records from the Northern Ireland Bat Group.
- Protected Species Reports from the local area for planning application Y/2009/0454/F (RPS).

2.3. Field Surveys

Extended Phase 1 habitat survey

2.3.1 The site entire length of the Greenway was surveyed on 11th and 12th September 2018 by a suitably qualified ecologist; Helen Craig MSc (MCIEEM), assisted by an environmental studies student. Environmental conditions experienced during the surveys were noted as being warm and sunny, with moderate wind and occasional showers.

2.3.2 Habitats within and immediately adjacent to the site were recorded, and the potential for protected or otherwise notable species was assessed. Where any incidental sightings or indirect evidence of protected species presence was observed, this was recorded. The presence/absence of invasive plant species was also noted at the time of survey.

2.3.3 The habitat survey was carried out in accordance with the Joint Nature Conservation Committee (JNCC) Phase 1 Habitat Survey Methodology (JNCC, 2010) extended to include targeted searches for field signs of, and habitat suitability for protected species, focussing on badger signs.

2.3.4 Target notes were also made to provide supplementary information and the habitats mapped as shown on Figure 2.

Badger Survey

2.3.5 Following the requirement for badger survey identified by NIEA's Wildlife Officer during the Phase 1 Habitat Survey; the following was conducted.

2.3.6 The vegetation and hedgerows along the greenway were surveyed for the presence of badgers, this included any signs of the following:

- Fresh spoil heaps from digging

- Regularly walked paths
- Hairs (caught in wire or low-lying vegetation)
- Latrines
- Footprints
- Scratch marks (on trees)
- 'Snuffle holes' – small scrapes and holes in the ground where foraging has occurred.

2.4. Impact Assessment Methodology

2.4.1 The impact assessment was carried out in accordance with the Chartered Institute of Ecology and Environmental Management (CIEEM) '*Guidelines for ecological impact assessment in the UK and Ireland, Terrestrial, Freshwater, Coastal and Marine*' (Ref 2.4).

2.4.2 The key feature of ecological impact assessment is to identify which ecological features are important and which may potentially be affected by the project. Important ecological features are determined based on statutory requirements and policy objectives for biodiversity. The CIEEM guidelines recommend that important ecological features should be identified as follows:

- Designated sites such as Special Areas of Conservation, Special Protection Areas, Areas of Special Scientific Interest etc.
- Northern Ireland priority habitats and species
- Local Biodiversity Action Plan priority species and habitats
- Red listed, rare or legally protected species.

2.4.3 Important ecological features also include habitats that provide connectivity in the wider landscape such as water bodies and wetland habitats. They are considered within a geographical context as set out below:

- International and European
- National
- Regional
- County or District Council area
- Local

2.4.4 Where sites, habitats or species are important at more than one level, then the highest level of protection is used to assign importance.

2.4.5 Following the identification of important ecological features, the impact assessment considers impacts from construction and operation of the project. It considers direct, indirect, secondary and cumulative impacts and whether the effects are short, medium, long-term, permanent, temporary, reversible, irreversible, positive or negative.

2.4.6 Residual impacts are then determined taking into account the mitigation and control measures applied to avoid or reduce impacts.

2.4.7 In ecological impact assessment, a significant effect is defined in the CIEEM guidelines as '*an effect that either supports or undermines biodiversity conservation objectives for important ecological features or for biodiversity in general*.

3. Baseline Environment

3.1. Desk Study

Designated Sites

3.1.1 The following designated sites are located within the study area and/or zone of influence of the scheme:

- Strangford Lough Special Area of Conservation (SAC) – coastal and marine habitats, harbour seals.
- Strangford Lough Special Protection Area (SPA) – overwintering and breeding seabirds and waterfowl.
- Strangford Lough Ramsar – overwintering and breeding seabirds and waterfowl.
- Belfast Lough Open Water SPA – overwintering birds, namely Great Crested Grebe.
- Belfast Lough Ramsar – overwintering / shoreline birds.
- Craigantlet Woods Area of Special Scientific Interest (ASSI) – woodland habitat.
- Strangford Lough Part 1 ASSI – intertidal habitats.

3.1.2 The location of the site relative to these is shown on **Figure 8.** Given the separation, lack of connectivity and minor nature of the works it is considered that there will be **no impact** on any of these sites or their associated features.

Sites of Local Nature Conservation Importance

3.1.3 There are also Sites of Local Nature Conservation Importance (SLNCI) located within the study area – refer **Figure 9**. These are:

- Dundonald Old Railway Line
- Campbell College and Ormiston
- Stormont
- Moyard
- Ballyrainey

3.1.4 Of these, the greenway forms part of the Dundonald Old Railway Line SLNCI.

Dundonald Old Railway Line

3.1.5 The greenway is included within this site. It is described in the Belfast Metropolitan Area Plan 2015 as species rich waste land beside the old railway line with scattered willow and scrub and marshy grassland. The old railway has a hedgerow dominated by hawthorn and ash. The woodland around East Link Road has more scrub.

Campbell College and Ormiston

3.1.6 This site comprises the mature grounds of Campbell College and Cabin Hill school, which includes specimen trees, old lawn areas and a heronry. There is also a pond for further interest.

Stormont

3.1.7 The glens behind the Parliament Buildings contain mature woodland that is partly planted but has regained a natural character. The area is relatively undisturbed and contains patches of scrub, grassland and less mature woodland.

Moyard

3.1.8 This is a site designated for its geological features, no description of it is available in the Ards and Down Area Plan 2015.

Ballyrainey

3.1.9 There is no information available within the Area plans on the features of interest for this site, but it appears to be an area of grassland and hedgerow.

3.1.10 Of these SLNCI sites only Dundonald Old Railway Line may be potentially affected by the cycleway widening.

Biodiversity Records

3.1.11 Over 2000 records were received from CEDaR for the Comber greenway. These were reviewed for recent records (2016/18) for any priority or protected species. There were several records for the butterfly species, holly blue *Celastrina argiolus*, which is fully protected under Schedule 5 of the Wildlife (NI) Order 1985. Priority species recorded were house sparrow *Passer domesticus,* otter *Lutra lutra* and narrow-bordered bee hawk moth *Hemaris tityus.* There were also records of the NI scarce and rare plant Goat's-beard *Tragopogon pratensis.*

Northern Ireland Priority Species

3.1.12 These require conservation action because of their rarity, decline and importance in an all-Ireland and UK context. The list of species currently stands at 481 species. Potential priority species that may be found in the study area include:

- various invertebrate species such as beetles, Irish damselfly;
- birds such as pochard, scaup, curlew, lapwing;
- otter, red squirrel and bats;
- plants such as green-flowered helleborine, purple ramping-fumitory and meadow crane's-bill.

Northern Ireland Priority Habitats

3.1.13 Northern Ireland priority habitats are those habitats that require conservation action because of their rarity, decline or importance. Priority habitats within NI include the following, which may potentially be found in the vicinity of the greenway:

- lowland meadows
- arable field margins
- hedgerows
- open mosaic habitats on previously developed land
- rivers and lakes
- mixed ash-woods
- wet woodland.

3.2. Survey Results

Phase 1 Habitat Survey

3.2.1 The Comber Greenway follows the line of an abandoned railway and as such it is in-cutting or on embankment along most of its length. The habitats along the verge of the greenway are a mosaic of regenerating habitats on a small scale. The urban nature of the greenway between Belfast and Dundonald mean that wider habitats around the greenway are mostly amenity grassland or housing/gardens. Between Dundonald and Comber, habitats surrounding the greenway are dominated by agricultural land.

3.2.2 When the phase 1 habitat was carried out in September 2018, some sections of the greenway had already been widened, the sections from the Bloomfield walkway to the Comber Rd / Old Dundonald Rd junction had already been completed.

3.2.3 The habitats, presented on **Figures 10a – 10g**, along the Greenway include:

- broad-leaved plantation woodland
- improved grassland
- amenity grassland
- tall ruderal
- dense, continuous scrub
- scattered scrub
- continuous bracken
- semi-improved neutral grassland
- poor semi-improved neutral grassland
- arable
- improved grassland
- watercourses

Phase 1 Habitats

Broad-leaved plantation woodland

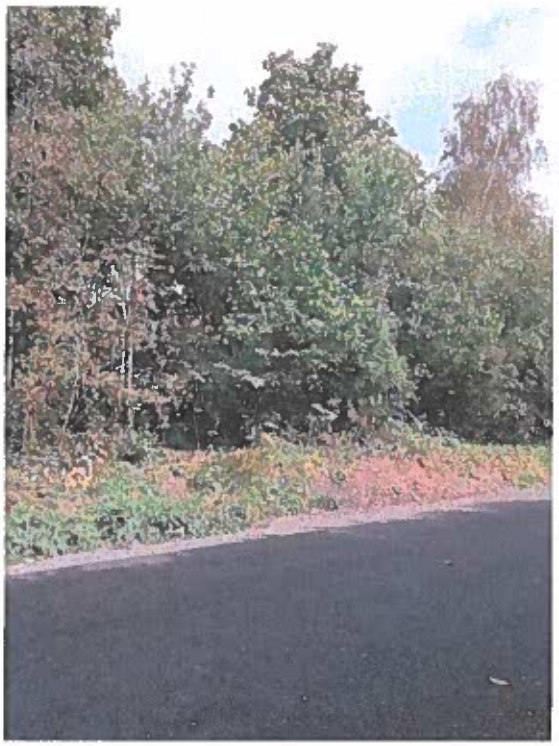
3.2.4 This habitat is found along the length of the greenway and is associated with the embankments of the old railway line. In most places, it has developed from the treeline along the boundary, with some species potentially self-seeding, e.g. willow and ash. It tends to be more dense in the built up areas where it has been retained for screening. The ground flora tends to grade into poor grassland. The list of species identified with this habitat is given in Table 1 below.

Table 1: Species list for broad-leaved plantation woodland

Common name	Scientific name
Scot's pine	*Pinus sylvestris*
Beech	*Fagus sylvatica*
Elder	*Sambucus nigra*
Ash	*Fraxinus excelsior*
Alder	*Alnus glutinosa*
Holly	*Ilex aquifolium*
Hawthorn	*Crataegus monogyna*
Ivy	*Hedera helix*
Silver birch	*Betula pendula*
Sycamore	*Acer pseudoplatanus*
Dog rose	*Rosa canina*

Common name	Scientific name
Pedunculate oak	*Quercus robur*
Goat willow	*Salix caprea*
White willow	*Salix alba*
Horse chestnut	*Aesculus hippocastanum*
Sweet chestnut	*Castanea sativa*
Blackthorn	*Prunus spinosa*
Crab Apple	*Malus sylvestris*
Norway maple	*Acer platanoides*

3.2.5 Photograph 1 below shows the typical woodland edge habitat along the slopes adjacent to the greenway.



Photograph 1: Typical woodland edge along the greenway

Amenity grassland

3.2.6 Amenity grassland is comprised of intensively managed and regularly mown grasslands, typical of lawns, playing fields and urban parks. Along the greenway this habitat is found at the start of the greenway beside Ravenscroft Avenue car park, a section between Abbey Road and East Link Road, adjacent to East Link Road, at the housing development at Millmount and Millmount Chase and at Billy Neill playing fields. On the day of the survey, the grass at Ravenscroft Avenue had been recently cut. The species associated with this habitat are listed in Table 2.

Table 2: Species list for amenity grassland

Common name	Scientific name
Perennial ryegrass	*Lolium perenne*
Ribwort plantain	*Plantago lanceolata*
Dandelion	*Taraxacum agg.*
Clover spp.	*Trifolium spp.*
Spear thistle	*Cirsium vulgare*
Creeping buttercup	*Ranunculus repens*
Daisy	*Bellis perennis*
Broad leaved dock	*Rumex obtusifolius*
Nettle	*Urtica dioica*
Japanese knotweed	*Fallopia japonica*
Cocksfoot	*Dactylis glomerata*
Horsetail	*Equisetum arvense*

Improved grassland

3.2.7 Improved grassland is defined as grassland which is so affected by heavy grazing, drainage or application of fertilisers etc., that they have lost much of the species associated with unimproved swards. This habitat is found between Millmount and Comber, beyond the greenway boundary. It is associated with fields used for grazing and is dominated by perennial ryegrass *Lolium perenne*.

Tall ruderal

3.2.8 This habitat is described as comprising stands of tall perennial or biennial dicotyledons, usually more than 25cm high of species such as rosebay willowherb and nettles. This habitat is found throughout the length of the greenway and often grades into or is associated with the woodland and scrub vegetation. The typical species found in this habitat are listed in Table 3.

Table 3: Species list for tall ruderal

Common name	Scientific name
Hedge bindweed	*Calystegia sepium*
Spear thistle	*Cirsium vulgare*
Bramble	*Rubus fruticosis*
Nettle	*Urtica diocia*
Cocksfoot	*Dactylis glomerata*
Broad-leaved dock	*Rumex obtusifolius*
Rosebay willowherb	*Chamerion angustifolium*
Common comfrey	*Symphytum officinale*
Butterfly bush	*Buddleja davidii*
Fuchsia	*Fuchsia magellanica*
Japanese knotweed	*Fallopia japonica*
Himalayan balsam	*Impatiens glandulifera*

Photograph 2: Typical stand of Tall ruderal along the greenway

Dense, continuous scrub

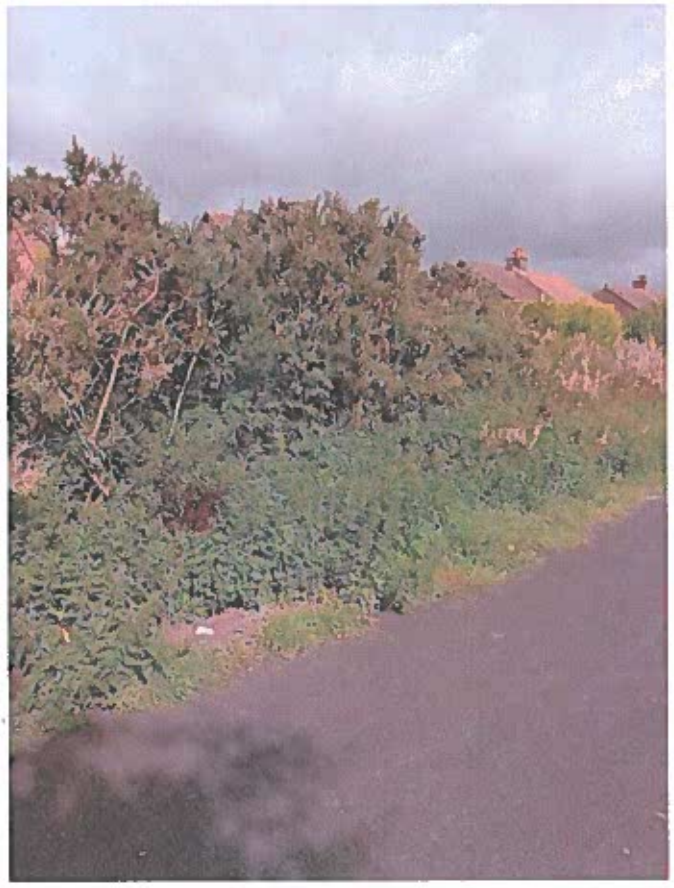
3.2.9 Scrub is seral or climax vegetation dominated by locally native shrubs, usually less than 5m tall, occasionally with a few scattered trees. Along the greenway, this habitat is common and frequently grades into areas of tall ruderal, grassland verge or woodland along the boundary. It is dominated by bramble, gorse and broom. The species associated with the scrub are listed in Table 4.

Table 4: Species list for scrub

Common name	Scientific name
Gorse	*Ulex europaeus*
Broom	*Cytisus scoparius*
Bramble	*Rubus fruticosus*
Nettle	*Urtica diocia*
Dog rose	*Rosa canina*
Butterfly bush	*Buddleja davidii*
Common comfrey	*Symphytum officinale*
Willow spp.	*Salix spp.*
Elder	*Sambucus nigra*
Cotoneaster	*Cotoneaster spp.*
Snowberry	*Symphoricarpos albus*

Scattered scrub

3.2.10 This habitat is found throughout the length of the greenway and is generally composed of stands of gorse, broom or bramble. The species associated with it are similar to dense, continuous scrub as listed in Table 4. Photograph 3 below shows typical areas of scrub found along the greenway.



Photograph 3: (Gorse) Scrub habitat found throughout the length of the greenway

Continuous bracken

3.2.11 There are sections of the greenway where bracken is the dominant species on the slopes, it frequently grades into scrub.

Semi-improved neutral grassland/poor semi-improved grassland

3.2.12 The grass verges of the greenway tend to fall within these categories of grassland and common along the length of the greenway. The species composition is variable and tends to grade into scrub, tall ruderal or woodland on the slopes. The species found within these habitats are listed in Table 5 below.

Table 5: grassland species

Common name	Scientific name
Herb robert	*Geranium robertianum*
Coltsfoot	*Tussilago farfara*
Spear thistle	*Cirsium vulgare*
Nettle	*Urtica diocia*
Vetch spp.	*Vicia spp.*
Greater plantain	*Plantago major*

Common name	Scientific name
Smooth hawksbeard	*Crepis capillaris*
Creeping buttercup	*Ranunculus repens*
Common ragwort	*Senecio jacobaea*
Purple loosestrife	*Lythrum salicaria*
Hogweed	*Heracleum sphondylium*
Common chickweed	*Stelleria media*
Green alkanet	*Pentaglottis sempervirens*
Ox-eye daisy	*Leucanthemum vulgare*
Redshank	*Persicaria maculosa*
Cocksfoot	*Dactylis glomerata*
Hedge mustard	*Sisymbrium officinale*
Red clover	*Trifolium pratense*
Ribwort plantain	*Plantago lanceolata*
Broad-leaved dock	*Rumex obtusifolius*
Germander speedwell	*Veronica chamaedrys*
Groundsel	*Senecio vulgaris*
Common fumitory	*Fumaria officinalis*
Common comfrey	*Symphytum officinale*
Red bartsia	*Odontites vernus*
Common fleabane	*Pulicaria dysenterica*
Knapweed	*Centaurea nigra*
Meadowsweet	*Filipendula ulmaria*
Yarrow	*Achillea millefolium*
Meadow vetchling	*Lathyrus pratensis*
Bittersweet	*Solanum dulcamara*
Common poppy	*Papaver rhoeas*
Teasel	*Dipsacus fullonum*
Dandelion	*Taraxacum officinale*
Pignut	*Conopodium majus*
White clover	*Trifolium repens*
Shaggy inkcap	*Coprinus comatus*

Photograph 4: Typical vegetation along the greenway verges

Arable

3.2.13 This habitat is found between Dundonald and Comber, on agricultural land adjacent to the greenway. On the day of survey, the arable fields had been harvested/cut and it was not possible to determine what crops were planted.

Target Notes

3.2.14 Target notes are given in Table 6 below and should be read in conjunction with the phase 1 habitat maps (**Figures 10a - 10g**).

Table 6 Target Notes

Target note number	Description
TN1	Stand of Japanese knotweed *Fallopia japonica*.
TN2	Stand of Japanese knotweed *Fallopia japonica*.
TN3	Row of planted trees in amenity grassland, includes beech *Fagus sylvatica* and pedunculate oak *Quercus robur*
TN4	Stand of planted trees, some of which showing signs of fire damage. Species include Norway maple *Acer platanoides*, beech, holly *Ilex aquifolium*, cherry laurel *Prunus laurocerasus*, and dog rose *Rosa canina*.
TN5	Row of hawthorn *Crataegus monogyna*.

Target note number	Description
TN6	Planted Scot's pine *Pinus sylvestris*
TN7	Stand of Himalayan balsam extending to bridge at North Road
TN8	Open slope dominated by bracken *Pteridium aquilinum*
TN9	Grey squirrel *Sciurus carolinensis* noted along greenway
TN10	Where woodland thins along the slope, it grades into continuous scrub with bramble *Rubus fruticosis*, bracken and butterfly-bush *Buddleja davidii*
TN11	Dense stand of cherry laurel around bridge at Sandown Road. Some shaggy inkcaps *Coprinus comatus* in verge
TN12	Small stand of Japanese knotweed
TN13	Scrub dominated by broom *Cytisus scoparius* ssp *scoparius* and bramble, with rosebay willowherb *Chamerion angustifolium*, nettle *Urtica diocia*, red clover *Trifolium pratense* and vetch *Vicia* spp.
TN14	Slope has occasional planted Leyland cypress *Cupressus leylandii* and a stand of bamboo *Bambusa* spp.
TN15	Recently cleared area with new hardstanding and electrical cabinets.
TN16	Patch of tall ruderal with hedge bindweed *Calystegia sepium*, spear thistle *Cirsium vulgare*, bramble, nettle, redshank *Persicaria maculosa*, cocksfoot, broad-leaved dock *Rumex obtusifolius* and groundsel *Senecio vulgaris*.
TN17	On day of survey patch of bare ground from path widening works and slope regrading.
TN18	Patchy woodland interspersed with patches of scrub and tall ruderal.
TN19	Stand of tall ruderal adjacent to fencing at rear of houses.
TN20	Area of scrub.
TN21	Row of Leyland cypress along rear of houses.
TN22	Stands of Himalayan balsam *Impatiens glandulifera*, along stream
TN23	Area of tall ruderal interspersed with scrub (broom and gorse)
TN24	Small patch of wildflowers of ox-eye daisy *Leucanthemum vulgare* and poppy *Papaver rhoeas*
TN25	Area of amenity shrub planting on slope alongside path.
TN26	Damp hollow alongside path with waterlogged conditions, stands of bulrush *Typha latifolia* present.
TN27	New roundabout and roads for Millmount development. Roundabout has amenity planting around it, includes *Hebe* spp. and miniature roses.
TN28	Patchwork of tall ruderal and scrub with trees along the boundary. Tree species include hawthorn, ash *Fraxinus excelsior*, elder *Sambucus nigra* and sycamore *Acer pseudoplatanus*
TN29	Area of improved grassland with scrub patches

Target note number	Description
TN30	Treeline between edge of greenway and playing fields, mostly elder and hawthorn
TN31	Playing fields
TN32	Ditch between the edge of the greenway and boundary of the playing fields. Stands of Himalayan balsam and horsetail *Equisetum arvense*
TN33	Stream in this section has been modified and banks straightened with large boulders placed along the banks. There are stands of Himalayan balsam and some pendulous sedge *Carex pendula*. Water level on the day of the survey was quite low, but flow was moderate. There is some otter potential especially in winter when flows are greater.
TN34	Area managed for biodiversity by Lisburn and Castlereagh City Council, as wildflower meadow. On day of survey grass was being cut and the two ponds in the field were dry.
TN35	Path around the lake and a dog exercise area in the field. Area of tall ruderal between the path and greenway.
TN36	Small stream, banks are steep and densely vegetated with scrub and ruderal. Areas of Himalayan balsam along stream banks.
TN37	Greenway verge changes from grassland and scrub with tree lined boundary. Areas of non-continuous scrub and areas of rosebay willowherb.
TN38	Badger tunnel/potential sett entrance running under the path, with an entrance hole on either side of the path. Badger hair noted on boundary fence. Will require further badger survey and potential disturbance licence if this section of Greenway is to be widened.
TN39	Grass verge grades into areas of scrub, bracken, ruderal with a treeline along the boundary.
TN40	Stands of Himalayan balsam along the verge and slopes on both sides of the greenway.
TN41	Small area of scrub grading into tall ruderal.
TN42	Grass verge grades into treeline along the boundary.
TN43	Grass verge grades into scrub.
TN44	Area of broad-leaved woodland at base of slope, likely plantation woodland.

3.2.15

3.3. Protected and Notable Species

Badger

3.3.1 A report published (by RPS) in 2013 shows extensive records of badger activity in the Millmount area; including six used setts; these however were located outside the extent of the greenway scheme (ref 3.2).

3.3.2 No badger activity was observed within the areas of the greenway that had been upgraded at the time of the survey.

3.3.3 One sett was identified adjacent to the greenway and one tunnel was identified under the greenway itself (**Figure 10e & 10f**).

Otter

3.3.4 A report published (by RPS) in 2013 shows records of otter activity in the Millmount area, at the Elner river including one possible holt location (ref 3.1).

3.3.5 No signs for otter such as footprints or evidence of holts were observed within the scheme extent during the survey.

Non-native invasive species

3.3.6 The non-native invasive plant species Japanese knotweed and Himalayan balsam were both recorded along the greenway. Both species exhibit rapid spread and outcompete native species. With respect to Japanese knotweed, the plant also can cause damage to infrastructure by growing through hard surfaces.

3.3.7 Himalayan balsam can outcompete native species and during winter, the plants die back completely leaving banks exposed and vulnerable to erosion. These species were recorded along the banks of the Elner River as well as a large stand around the overbridge at North Road.

3.3.8 These were mapped in advance of construction works and biosecurity have been implemented by the Contractor to ensure these are not spread as a consequence of the construction works.

Field Survey Sightings

3.3.9 The woodland, scrub and grassland along the verges of the greenway provides suitable nesting habitat for a range of common urban and farmland bird species. Although the survey was undertaken in September, when nesting is typically finished and bird activity is reduced, the following were observed on the day of the phase 1 survey:

- wren *Troglodytes*
- blackbird *Turdus merula*
- robin *Erithacus rubecula.*
- Long-eared owl (recorded in Dundonald area during bat surveys)

3.3.10 The dense, unmanaged vegetation provides habitat for a range of invertebrates with speckled wood *Pararge aegeria* and small white *Pieris rapae* butterflies a common site on the days of the survey between Dundonald and Comber.

3.3.11 A grey squirrel *Sciurus carolinensis* was observed crossing the path near Sandown Road. Badger *Meles meles* activity was recorded between Billy Neil playing fields and Comber, with a badger tunnel located under the path.

4. The Proposed Scheme

4.1. Design

4.1.1 The greenway path is to be widened to a total width of 4m throughout its entirety. This will be achieved through site clearance on the existing greenway verges and resurfacing of the path. The following cross sections demonstrate the options being applied to the widening to achieve 4m.

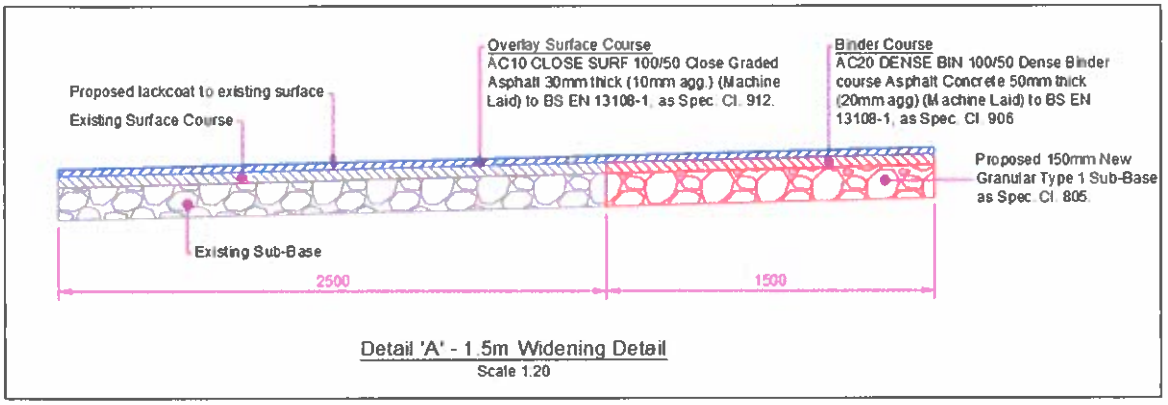
4.1.2 There are three proposed construction details for the widening of the Comber Greenway path and these vary depending on the available land space and constraints along the route.

4.1.3 Detail A –Proposes to widen the existing path by 1.5m wide full depth construction when the existing path is 2.5 metres wide.

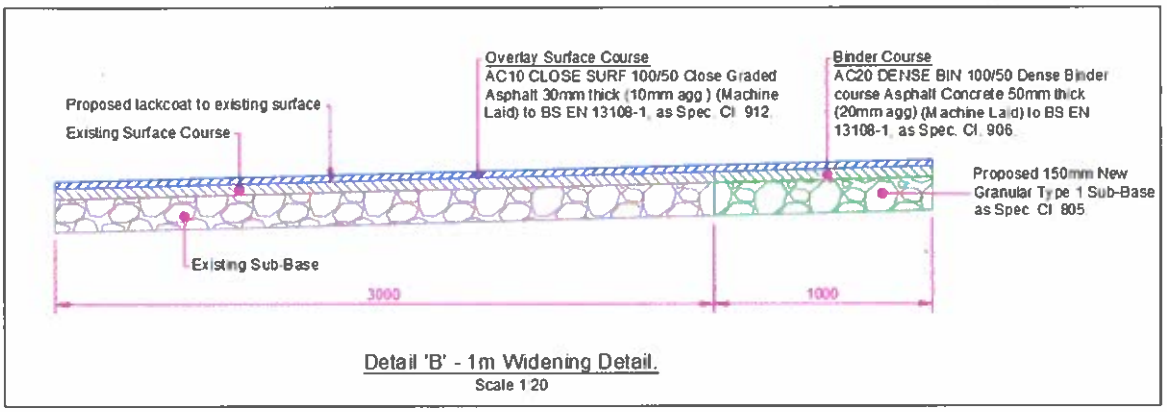
4.1.4 Detail B- Proposes to widen the existing path by 1.0m wide full depth construction when the existing path is 3.0 metres wide.

4.1.5 Detail C- Proposes to widen the existing path by 0.5m wide full depth construction on both sides of the path when the existing path is 3.0 metres wide.

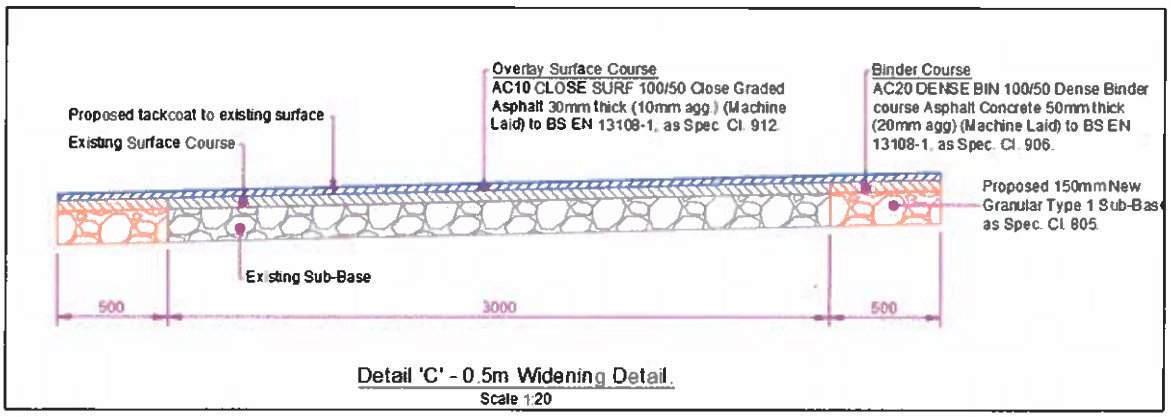
4.1.6 Overall the path was finished by overlaying the existing full path width with a 30mm thick asphalt surfacing to provide a complete finish to the footpath construction. This is also meant that no construction joints were visible to the surface.



Detail 'A' - 1.5m Widening Detail
Scale 1:20



Detail 'B' - 1m Widening Detail.
Scale 1:20



4.2. Construction Methodology

4.2.1 The greenway path is to be widened to a total width of 4m throughout its entirety. This will be achieved through site clearance on the verges and resurfacing of the path.

4.2.2 The lands adjacent to the path are to be cleared and excavated appropriately to enable the works.

4.2.3 Ducting is to be laid along the extent of the greenway within the verges.

4.2.4 The widened section of footpath will consist of:

- 150mm depth sub-base fill (type 1 unbound mixture).
- 50-60mm depth dense binder course asphalt concrete (100/150) will be laid over the sub-base.
- 30mm depth surface of close graded macadam (100/150) is to be laid over the base.

4.3. Design Mitigation

4.3.1 The following standard measures have been applied to the contract:

4.3.2 Standard Pollution Prevention Guidelines (NetRegs) and NIEA standing advice will be adhered to throughout works in order to protect the water environment and sensitive ecological receptors.

4.3.3 Measures will be put in place where possible to retain the seed bed topsoil from the excavated areas and re-locate to disturbed areas along the greenway in order to allow regeneration of habitats and off-set any potential adverse impacts from removal of vegetation.

4.3.4 Pre-construction checks for nesting birds will be carried out and clearance works will be completed outside of the nesting season where possible, to ensure no nests are disturbed by works.

4.3.5 All works restricted to daylight hours in order to remove disturbance to birds/bats/badgers from artificial lighting during construction.

4.3.6 Contractor to survey, map and put in place Invasive Species risk assessment and biosecurity measures.

5. Ecological Impact Assessment

5.1. Ecological Receptors and Evaluation

5.1.1 As the scope of the physical works is confined to the vegetation along the verges of the greenway, and within the boundary of DfI land, it is considered that there will be no effect on any of the European designated sites identified in section 4.1. Athough the Elner River provides a hydrological connection to Strangford Lough, there are no works proposed on any structure over this watercourse and with the use of best practice measures by the contractor to avoid pollution of the watercourse, it is assessed that there will be no impact on the lough.

5.1.2 There are no effect pathways that are likely to result in adverse impacts to Belfast Lough SPA/Ramsar, Craigantlet Woods ASSI, Stormont SLNCI, Moyard SLNCI or Ballyrainey SLNCI, therefore these are also scoped out of further assessment.

5.1.3 Based on the field surveys and desk top study, the following are considered to be the ecological receptors for the purposes of this scheme. Justification is provided as to whether they have potential to be affected and whether they are scoped in or out of this assessment.

Table 7: Ecological Receptors

Ecological receptor	Evaluation	Description	Likely to be affected
Dundonald Old Railway Line SLNCI	Local	Species rich wasteland with scattered willow and scrub and marshy grassland	Yes- habitat directly affected.
Campbell College and Ormiston SLNCI	Local	Mature grounds	No- located approximately 600m north of the greenway.
Broad-leaved plantation woodland	Local	Broad-leaved woodland is a priority habitat and the woodland along the greenway provides a corridor for species movement	Yes- habitat directly affected.
Tall ruderal	Local	Species which inhabit previously disturbed land.	Yes- habitat directly affected.
Scrub	Local	Locally native scrub.	Yes- habitat directly affected.
Semi-improved grassland	Local	Grass verges consisting of a mixture of species.	Yes- habitat directly affected.
Badger	National	NI protected species under the Wildlife Order.	Yes- badger activity was recorded within the footprint of the scheme.
Bats	National	NI protected species and European Protected Species. Habitats important for bats on local scale	Yes-species directly affected; bat activity recorded within the footprint of the scheme.
Non-native invasive species	Local	Species of concern for biodiversity.	Yes- Japanese knotweed and Himalayan Balsam were recorded within the scheme footprint.
breeding birds	National	Potential for NI priority species to be present during breeding season.	Yes- disturbance may affect nesting birds in adjacent woodlands, loss of nesting habitat along verges.

Ecological receptor	Evaluation	Description	Likely to be affected
Bracken	Local	Common fern which dies in winter.	Yes- habitat directly affected.
Arable	Local	Agricultural lands adjacent to the greenway of unknown crop.	No- lands are adjacent to the greenway in some areas however the scheme will not encroach on these lands.
Amenity grassland	Local	Playing fields	No- lands are adjacent to the greenway in some areas however the scheme will not encroach on these lands.
Improved grassland	Local	Dominated by perennial rye.	No- lands are beyond the greenway boundary.
Local watercourses	Local	Shallow, narrow streams/small rivers.	Yes- works in close proximity to watercourses.

5.2. Potential Impacts and Significance of Effect

Temporary effects will arise from site access and the use of a construction corridor along the greenway, permanent effects will arise from the increased land-take. As the construction access is linearly along the existing path using existing access points the effects will be limited to the extent of the widening only.

Dundonald Old Railway Line SLNCI

Construction Effects

5.2.1 The path in this location, alongside Moatview residential development through to Old Dundonald Road, is already of a high standard. It is anticipated that the widening here will primarily affect gassed verge and ruderal edging with negligible impact on the scrub and woodland present.

5.2.2 The increased land-take as a result of the path widening will a permanent effect resulting in reduction in overall area of primarily grassland verge of limited ecological value; as the increase in land-take is relatively small scale, it is not considered as having a significant effect on the value of the SLNCI.

Operational effects

5.2.3 The operational phase is likely to be similar to existing conditions, with possible increased activity from walkers and cyclists. These however will be confined to the path; therefore, the effect is considered not significant.

Habitats

Broad-leaved plantation woodland

Construction effects

5.2.4 There is potential for the construction works to cause direct disturbance to the woodland areas located along the greenway; this includes:

- Damage of roots during excavations
- Damage to branches/boughs overhanging works area from construction plant.
- Removal of trees

5.2.5 It is recommended that nearby trees are protected during the works in accordance with the guidelines in *BS 5837:2012 Trees in relation to design, demolition and construction. Recommendations.*

5.2.6 It is not envisaged that trees will need to be removed to enable the works and considering the extent of the along the Greenway, overall the effect on the woodland is considered to be negligible / not significant.

Operational effects

5.2.7 The operational phase is unlikely to have any direct effects on the woodland however there may be increased disturbance to species which the habitat supports. Given the existing level of use of the greenway, any additional disturbance is not expected to be significant.

Tall ruderal

Construction effects

5.2.8 The construction works will cause direct damage to or loss of the tall ruderal as it is found along the extent of the path which is to be widened.

5.2.9 Site clearance will remove the tall ruderal directly adjacent to the current path. This is considered not significant as the habitat is of limited intrinsic nature conservation value, ruderals are a pioneer species which colonise disturbed lands and the species will re-colonise disturbed areas along the path once the construction works are complete.

5.2.10 Where feasible, topsoil should be stripped carefully to maintain the seed-bed and stored for the duration of works (where possible); this should then be spread over the disturbed areas along the greenway to allow re-generation of the habitat.

Operational effects

5.2.11 There will be no significant effect on the tall ruderal once operational.

Scrub

Construction effects

5.2.12 Effects will be as for Tall Ruderal, scrub will recolonise disturbed areas.

Operation effects

5.2.13 Effects will be as for Tall Ruderal.

Semi-improved grassland

Construction effects

5.2.14 Small areas of semi-improved grassland are likely to be disturbed during construction works.

5.2.15 Where feasible, topsoil should be stripped carefully to maintain the seed-bed and stored for the duration of works; this should then be spread over the disturbed areas along the greenway to allow re-generation of the habitat.

5.2.16 The areas of effected grassland along the greenway verge are semi-improved, however classed as poor, consisting of common species. The loss of habitat due to increased land-take is considered not significant due to the small scale and the limited nature conservation value.

Operational Effects

5.2.17 The increased land-take is likely to cause permanent loss of areas of this habitat along the greenway. However the loss is not expected to be significant.

Non-native invasive species

Construction effects

5.2.18 The construction works have the potential to cause disturbance to the invasive species which are present from construction machinery and vehicles; this presents issues as Japanese knotweed and Himalayan balsam spread easily.

5.2.19 The Contractor is required have in Invasive Species risk assessment and implement biosecurity measures. To date it has been possible to avoid, through design alterations, all stands of Japanese Knotweed. Appropriate management of invasive species in line with best practice (including bio-security measures) will ensure there is no spread of the species. The effects are therefore considered not significant.

Operational effects

5.2.20 The operational phase will have no significant effect on invasive species.

Bracken

Construction effects

5.2.21 There is potential for the construction works to cause direct loss of or disturbance to this habitat during site clearance and works along the verges of the current greenway. However the extent of the widening likely to affect areas of bracken will be small and the effect of site clearance is not considered significant.

5.2.22 The loss of this habitat will be insignificant. The species is likely to re-colonise the area once works are complete as it is a pioneer species.

Operational effects

5.2.23 There will be no significant effect on the bracken from operation. Areas lost will regenerate post completion.

Local watercourses

Construction effects

5.2.24 There are no works proposed to any structure currently bridging the Elner River. No new structures over the river are proposed. However a section of the greenway runs adjacent to the river Elner; there is potential for the construction works to cause polluting discharges to the watercourse through the storage of oil/fuels/machinery/spoil etc. and from earthworks (excavation). The Contactor will be required to have cognisance of the need to protect water quality, implement appropriate pollution prevention measures and ensure that the construction works do not result in surface run-off during construction which could pollute / cause sedimentation of the river. If necessary, during construction, silt fencing may be applied along this section of the Greenway during the construction phase.

5.2.25 During operation there will be no change in the current situation.

Birds

Construction effects

5.2.26 The construction works have the potential to adversely affect bird species in the following ways:

- Loss of habitat which supports the features during clearance/construction works.
- Disturbance of nesting/roosting birds due to noise/light of works which results in adverse effects on their breeding pattern.

5.2.27 The loss of habitat along the verges to enable the greenway works is not considered to significantly affect the amount of habitat available for nesting, as most of the widening will result in loss of grassland.

5.2.28 Pre-construction site checks will ensure there are no nesting birds in the works area and clearance works will be completed outside of the nesting season where possible.

5.2.29 Works are also restricted to day-time hours to prevent disturbance from artificial lighting at night; there will be no significant effects on birds from disturbance.

Operational effects

5.2.30 The operation of the improved greenway is likely to have increased activity from walkers and cyclists as well as from potential lighting throughout. However considering the current level of activity along the greenway, it is assessed that there will be no significant effect on local bird populations.

Badger

Construction effects

5.2.31 Badger activity has been recorded in the Millmount area and along the greenway between Millmount and Comber. Should the section of Greenway from Millmount to Comber come forward for widening a detailed badger survey will be required in order to inform a potential licence application to close sett or setts present in the Greenway embankment. This survey will require access onto private lands beyond the Greenway boundary to confirm badger territory and identify main sett / alternative setts available.

5.2.32 The construction works have the potential to cause disturbance to badger setts and tunnels during site clearance, earth works, storage of spoil and tracking of machinery (which may collapse setts and tunnels).

5.2.33 Effects are considered potentially significant; Mitigation measures, including wildlife licencing (which is required to disturb any active badger sett) will be explored to ensure any works which may affect badger activity (setts and tunnels) will not have significant effects.

Operational effects

5.2.34 Operational activity is likely to be similar to present; increased lighting along the greenway has the potential to cause disturbance to badgers which are largely nocturnal.

5.2.35 Badgers present in the area appear to be habituated to the existing disturbance (anthropogenic and lighting) and so it is unlikely that operational activity will have significant effect on the badger population or their current range.

Otter

5.2.36 No otter field signs were recorded during the survey; however they are noted as present on the Elner River. There will be no direct effect on the river or riverside habitat and the construction works will be undertaken during daylight working hours only. Construction effects are negligible / not significant.

5.2.37 Operationally ti is anticipated there will be no change and no effect on the Elner river; and lighting applied will have to consider bats and as such light spill will be minimised.

Bats

Construction effects

5.2.38 With reference to the Bat Survey Report at Part 1; it is not anticipated that there will be any direct effect, as a result of construction site clearance, on bat roosts or potential bat roosts nor any effect on foraging or commuting as all works will be undertaken during daylight hours.

Operational effects

5.2.39 Operationally, as the wooded corridor that is the Greenway will be completely retained resulting in no loss of foraging or effect on commuting, the only potential effect relates to lighting. The Bat Survey Report is clear – the only acceptable lighting is low level, bat friendly lighting. With this in place the effects to the bat population are not considered to be significant.

6. Summary and Conclusions

6.1.1 Baseline conditions along the Comber greenway were identified through a combination of desk top study and field surveys. Several ecological receptors were identified that could potentially be affected by the widening project, these are:

- Dundonald Old Railway Line SLNCI
- broad-leaved plantation woodland
- tall ruderal
- scrub
- bracken
- semi-improved grassland
- local watercourses
- birds
- badger
- bats

6.1.2 Impacts on these receptors from construction include: changes in water quality from sedimentation and pollution; spread of invasive species; disturbance from general construction noise; loss of habitat from site clearance. A significant wildlife corridor has been and will be maintained for the entirety of the works. Measures, as proposed within this report will be implemented to ensure there are no significant, residual or long term effects on these receptors. Overall potential effects are considered to be not significant.

7. References

1.1 DEPARTMENT OF THE ENVIRONMENT (2015). *Valuing Nature. A Biodiversity Strategy for Northern Ireland to 2020.*

1.2 BRITISH STANDARDS INSTITUTION (2013). *Biodiversity – Code of practice for planning and development.*

1.3 NORTHERN IRELAND ENVIRONMENT AGENCY. Standing Advice available to view at http://www.planningni.gov.uk/index/advice/northern_ireland_environment_agency_guidance/standing_advice.htm

1.4 Belfast City Council (2012). *Local Biodiversity Action Plan for Belfast-.*

1.5 Down District Council (2012). *Local Biodiversity Action Plan Down District.*

2.1 NORTHERN IRELAND ENVIRONMENT AGENCY (NIEA). Protected Areas Interactive Map. Available to view at: https://www.daera-ni.gov.uk/services/natural-environment-map-viewer

2.2 Belfast City Council http://www.belfastcity.gov.uk/

2.3 Ards and North Down Borough Council https://www.ardsandnorthdown.gov.uk/

2.4 CHARTERED INSTITUTE OF ECOLOGY AND ENVIRONMENTAL MANAGEMENT (2016). *Guidelines for Ecological Impact Assessment in the UK and Ireland. Terrestrial, Freshwater and Coastal.*

3.1 RPS Group, 2013. Millmount Village Access Road *Otter Survey Report.*

3.2 RPS Group, 2013. Millmount Village Access Road *Badger Survey Report.*