

An Investigation into Bridge Usage by Bats within the Sullane & Laney River Catchments, Co. Cork

Report prepared

by

Mark Masterson, Daniel Buckley, Mary O'Brien and Conor Kelleher

of the

Cork County Bat Group

for

The Heritage Council

&

National Parks and Wildlife Service

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ABSTRACT

- In 2007, *Cork County Bat Group* undertook a survey of bridges for bat usage within the Rivers Sullane and Laney catchments. The project was funded by the *Heritage Council* and the *National Parks and Wildlife Service*. 23 participants volunteered over 500 hours to the project.
- The Sullane and Laney Rivers are tributaries of the River Lee and are located in north western Cork, in the South of Ireland. A total of 113 bridges lie within the two catchments; 77 in the Sullane catchment and 34 in the Laney catchment. A summary of all bridges surveyed is presented in Appendix A.
- The survey methodology followed that of Billington and Norman (1997). Bridges were graded as follows: Grade 0 = no potential (no suitable crevices); Grade 1 = crevices present may be of use to bats; Grade 2 = crevices ideal for bats but no evidence of usage; Grade 3 = evidence of bats (e.g. bat present, droppings).
- The survey was conducted in a number of phases. Preliminary Survey - April; First Survey - May to early July – (breeding season); Second Survey - September – (transitional season); Third Survey - November – (hibernation season).
- Field training was provided to all new volunteers and survey teams were established and provided with a survey pack. Each bridge was surveyed systematically with the aid of a high-powered, narrow beamed torch to inspect crevices, holes, cracks and joints beneath arches, within culverts and within the external features of the structure. When required, an endoscope was also used. A data-recording sheet was completed for each bridge surveyed.
- 71 (63%) of the 113 bridges inspected within the two catchments were classified as being Grade 0, i.e. of not bat roost potential. A total of 12 (11%) of these bridges were classified as Grade 3, i.e. bats or evidence of bat usage were present.
- If Grade 0 bridges are not included and if only bridges with suitable crevices or evidence of bat usage are considered, it becomes evident that a high proportion of bridges are used by bats. A total of 42 bridges are thus considered and, of these bridges, 12 (29%) are Grade 3. This indicates that bats use almost one third of bridges with bat roost potential.
- Overall, there was visual confirmation of two bat species; Natterer's and Daubenton's, and droppings of pipistrelle bats were also identified. Natterer's bat was identified in four bridges and Daubenton's bat was identified at three. Pipistrelle droppings were identified at one bridge. Unidentified bats were noted in four other bridges.
- Evidence of other animals (mammals, birds and some invertebrates) present was recorded at each location. These included otter, mink, brown rat, fox, sika deer, dipper, kingfisher, honey bee, wasp and herald moth.
- Overall, it is concluded that when suitable crevices are available, bats will use bridges and that efforts should be made to retain crevices or to enhance the suitability of bridges for bats during maintenance works. Appendix B contains a list of bridges which show bat roost potential.

1.0 INTRODUCTION

1.1 Project aims

The aim of the project was for the *Cork County Bat Group* (CCBG), with the help of volunteers, to survey all the bridges within the River Sullane / River Laney catchments for bat usage.

The objectives of the survey were to:

- identify new bat roosts,
- establish the importance of bridges as bat roosts and to compare the resultant data to that of other bridge surveys in Ireland,
- establish which bridges were being used or had potential to be used by bats and to provide this information to *Cork County Council* to ensure bats are considered and safeguarded during any future bridge maintenance works,
- raise awareness of the importance of bridges to bats and
- increase the abilities within CCBG through providing training in bat survey techniques for new and existing members.

1.2 Cork County Bat Group

Cork County Bat Group is a voluntary organisation whose primary aim is the conservation of bats in the Cork region through education, public events, roost surveys and research. Further information on the activities of CCBG and contact details are given in Appendix C .

1.2.1 Value of Voluntary Participation

CCBG believes that funding provided by the *Heritage Council* and the NPWS for this project represents a value for money approach to bat survey work. In total, twenty three volunteers contributed over 500 hours undertaking fieldwork with additional voluntary time being spent on project co-ordination, volunteer recruitment, training and report writing.

1.3 Bats and bridges

The following is a brief summary of bats and bridges. Further information on bats in general is available in books listed in the reference section of the report. A good summary of bats and bridges is provided in Shiel (1999).

To date, ten bat species have been recorded in Ireland and all but Brandt's bat *Myotis brandtii* have been recorded in Co. Cork. All Irish bats are microbats and feed exclusively on invertebrates. The largest, Leisler's bat *Nyctalus leisleri* weighs up to 20 grams and the smallest, the soprano pipistrelle *Pipistrellus pygmaeus* weighs only 4 to 7 grams.

Generally, mating occurs in the autumn but fertilization does not occur until the spring. As mammals they give birth to live young. Females form nursery colonies during the summer in which they give birth to and care for a single pup.. The disturbance or destruction of such a roost can, therefore, have a serious impact on the local bat population.

Bats are known to roost in houses, farm buildings, caves and trees as well as bridges. While breeding colonies are more stable, other, transitory roosts may be used by bats as day roosts or between feeding and commuting activity at night.

The Daubenton's bat's *Myotis daubentonii* feeding strategy is closely allied with water as it skims over the surface of rivers and lakes, trawling insects from the surface. The soprano pipistrelle is also strongly associated with wetland habitats as it finds ample quantities of midges, its staple diet, in such areas..

Traditionally, bats roosted in natural structures such as old trees and caves but, through loss of suitable natural sites and adaptation, bats now frequently make use of man-made structures (Altringham 2003) which include bridges especially old masonry bridges over freshwater that often develop cracks and crevices which provide ideal roosting sites. These secluded locations provide safety from predation and the water flowing beneath maintains both temperature and humidity. Modern span bridges are not as suitable for roosts as they lack such features.

Masonry bridges (Plate 1) were designed for the horse and cart. Unfortunately, the increase in vehicular traffic has undermined many structures and, as a consequence, there is a need to strengthen these bridges. The conventional method is to 'pressure grout' the bridge by means of injection spraying of concrete which can entomb any animals within.

Irish bat species that have been observed using bridges as roosts include Daubenton's, brown long-eared *Plecotus auritus* (Plate 3), Natterer's *M. nattereri*, whiskered *M. mystacinus* and common *Pipistrellus*

pipistrellus and soprano pipistrelle (Shiel, 1999).



Plate 1: Bridge 111, Ballymakeera Bridge on the River Sullane

1.4 Previous bridge surveys for bat usage

A number of studies into bat usage of bridges have been conducted in the UK and Ireland in recent years. Billington and Norman (1997) undertook a systematic study of bridges in Cumbria, UK and established that 12.5% of bridges were in use as bat roosts and a further 41% had bat roost potential. This study team established a methodology for grading bridges which is used in the present study. A study of bridges in Cos. Leitrim and Sligo (Shiel, 1999) which also followed the Billington and Norman (1997) protocols, found that 37.9% of structures had bats present. A more recent study by Keeley (2007), in Cos. Laois and Offaly, found that 15% of bridges surveyed had evidence of bat usage.

The only other published survey of bridge usage by bats in the Cork region was by Smiddy (1991) of bridges in Cork and Waterford in which bats were identified roosting in 14% bridges examined and a further 11% had evidence of bat usage.

2.0 SURVEY LOCATION AND METHODS

2.1 Survey area

The Rivers Sullane and Laney are both within the Lee River Catchment (Figure 1).

The Sullane River rises in the Derrynasaggart Mountains at an altitude of 280m, approximately 23km west of the town of Macroom, Co. Cork. The main channel is approximately 29.2km long and the catchment is approximately 21.7km². The river flows in a west-east direction before entering the River Lee 2km east of Macroom. The Laney River rises in the Boggeragh Mountains at an altitude of 490m, approximately 17km north of Macroom. The main channel is 19.75km long and the catchment is approximately 10km². The Laney enters the Sullane River at Macroom. The upland stretches of both catchments mainly consist of commercial forestry plantations and agricultural heath and bog used primarily for sheep grazing. The lower sections of the rivers flow through improved agricultural grasslands with associated hedgerows and tree line boundaries. There are small areas of broadleaf woodland along both rivers.

A total of 113 bridges lie within the two river catchments; 77 in that of the Sullane and 34 in that of the Laney. A summary of all bridges surveyed is presented in Appendix A.

2.2 Methodology

The survey methodology followed that of Billington and Norman (1997). This allowed for consistency of sampling and comparison between studies.

2.2.1 Bridge Grading

Billington and Norman (1997) established a grading system of bridges;

- 0 = no potential (no suitable crevices)
- 1 = crevices present may be of use to bats
- 2 = crevices ideal for bats but no evidence of usage
- 3 = evidence of bats (e.g. bat present, droppings etc.)

Evidence of bat presence was considered to be droppings, staining, claw marks, bat fly pupae presence, bats visible and bats audible. Any droppings encountered were collected for future identification. Bats can also leave stains on stone through oily secretions from glands. Bat parasites such as the biting fly *Nycteribia kolenatii*, most often associated with Daubenton's bat, leave the host to reproduce and their

pupae can be observed fastened to stones near the bat roosting area. These remain even when the bats have vacated the site.

2.2.2 *Surveys*

The survey was conducted in a number of phases. A preliminary survey of all bridges was conducted and this was followed by three separate surveys of all bridges that were deemed to have bat roosting potential:

- Preliminary Survey - April
- First Survey - May to early July – breeding season
- Second Survey - September – transitional season
- Third Survey - November – hibernation season

Preliminary Survey

A desk study identified all bridges on the Sullane and Laney river catchments using Ordnance Survey Discovery Series mapping. A team of CCBG volunteers then visited each bridge to establish a preliminary grade for the bridge, mark the GPS location, photograph the structure and make notes on bridge location for follow-up by other volunteers. All modern concrete bridges were given a grade of 0 and were not visited during subsequent surveys. All recorded data were entered onto an Excel spreadsheet and a GSI system generated map of all bridges. Bridges were numbered sequentially. These are presented in Figure 2.

Subsequent Surveys

Bridge surveys were conducted as outlined in section 2.2.3 below. During the first survey, the grading of each bridge visited was further evaluated and, if deemed appropriate; the bridge was regraded as 0 and not returned to in subsequent surveys.

2.2.3 *Bridge Inspection*

Each bridge was inspected systematically. A high-powered, narrow beamed torch was used to inspect crevices, holes, cracks and joints beneath arches, within culverts and within the external features of the structure. When required, an endoscope was also used. An endoscope is a fibre optic device with a 1m long cable which allows for inspection of deep and narrow spaces which are not otherwise accessible. Where a bat was known to be in a structure but identification was not possible by the above means, a survey at dusk was undertaken using heterodyne bat detectors (Batbox Duet and Batbox III) to identify the animal as it left the bridge.

For Health and Safety reasons, all surveys were conducted by two volunteers. One volunteer remained on the bank while the other inspected the bridge. Chest waders and life jackets were worn at all times. Refer to the Safety Statement in Appendix D issued with all survey packs.

2.2.4 Information recorded

A data recording sheet was completed for each bridge surveyed, a copy of which is presented in Appendix E. Data recorded included information on the bridge width, height and length; surrounding habitats; evidence of bats and of other animals. All data were collected by the Project Coordinator and inputted onto an Excel spreadsheet.



Plate 2: Volunteers inspecting bridge arch during training session

2.2.5 Training

A key aim of the survey was to encourage the participation of volunteers, therefore, prior to undertaking the study, a public meeting was organised, in April 2007, during which a presentation on the survey aims, requirements, needs and methodology was given and this was followed-up with a field training session that outlined the survey protocols and bat evidence to record *in situ* to volunteers (Plate 2).

Survey teams were established and each team was provided with a survey pack. The survey pack included a map with bridge locations, list of bridges with GPS position, field survey sheet, an explanatory

diagram of bridge architecture with labelled features for reference – reproduced in Appendix F, safety statement and field identification guides to bats and mammal tracks.

2.2.6 *Co-ordination of surveys*

It was the role of the Project Coordinator to manage the surveying of the bridges. Emails were issued to volunteers during each survey period. Available volunteers were issued with a list of up to 10 bridges to survey. When complete, the volunteers returned their forms and the Coordinator updated the spreadsheet with collected data.



Plate 3: Brown long-eared bat using a crevice in a masonry bridge as a roost

3.0 RESULTS

A total of 113 bridges were identified in the two river catchments which were accessible for this study. A number of large bridges in Macroom were not inspected because of the danger due to river depth. The Sullane River catchment is by far the larger of the two with 79 bridges with the Laney River catchment having 34. A list of all bridges with potential for or having bat roosts, along with supporting information, including grid reference, is presented in Appendix B at the end of this report.

3.1 Bridge grading

A summary of the number of bridges by grade in each catchment is presented in Table 1 below.

Grade 0

71 (63%) of the bridges in the two catchments were classified as being Grade 0, i.e. not having bat roost potential. Of all the bridges identified in the Sullane River catchment, 55 (70%) were awarded a Grade 0. In the Laney River catchment only 16 or 47% of the bridges were classified as Grade 0. These bridges were either masonry bridges which had been grouted; were modern concrete bridges with no crevices or their water crossing was too small and low and likely to flood entirely to have bat roosting potential.

Grade 1

14 (12%) of the bridges in the two catchments were classified as being Grade 1, i.e. crevices present may be of use to bats. Eight (10%) of the bridges in the Sullane River catchment were awarded a Grade 1 and six (18%) of the bridges in the Laney River catchment were classified as Grade 1.

Grade 2

16 (14%) of the bridges in the two catchments were classified as being Grade 2 i.e. crevices ideal for bats but with no evidence of usage. In the Sullane River catchment 10 (13%) of the bridges were Grade 2 and in the Laney River catchment 6 (18%) of the bridges were Grade 2.

Grade 3

Overall, a total of 12 (11%) bridges were classified as Grade 3, meaning that bats were present or there was evidence of bat usage. In the Sullane River catchment, 6 (8%) bridges were Grade 3 and in the Laney River catchment 6 (18%) bridges were also classified as being Grade 3.

Table 1: Number of bridges by Grade in each catchment

Catchment	Grade 0		Grade 1		Grade 2		Grade 3		Total No. Bridges
	Num	%	Num	%	Num	%	Num	%	
Sullane	55	70	8	10	10	13	6	8	79
Laney	16	47	6	18	6	18	6	18	34
Total	71	63	14	12	16	14	12	11	113



Plate 4: Natterer's bat – a Red Data Book species encountered during the survey

Usage in Bat Roost Potential Bridges

If Grade 0 bridges are not included and if only bridges with suitable crevices or evidence of bat usage are considered, it becomes evident that a high proportion of bridges are used by bats. Table 2 below presents a breakdown of the number of bridges in each grade. A total of 42 bridges are considered; 24 on the Sullane River and 18 on the Laney. Of these bridges, 12 (29%) are Grade 3 with 6 (25%) on the Sullane and 6 (33%) on the Laney. This indicates that bats use approximately one third of bridges with bat roost potential.

Table 2: Bat usage in bat roost potential bridges excluding Grade 0 bridges.

Catchment	Grade 1		Grade 2		Grade 3		Total
	<i>Num</i>	%	<i>Num</i>	%	<i>Num</i>	%	
Sullane	8	33	10	42	6	25	24
Laney	6	33	6	33	6	33	18
Total	14	33	16	38	12	29	42

3.2 Bridges containing bats or evidence of bat usage

A summary of the bridges with bats or evidence of bat usage is provided in Table 3 below.

Survey 1

Survey 1 was undertaken between the 13th May and 20th July 2007. A total of 50 bridges were visited by 15 volunteers. During this phase, a number of bridges were downgraded from Grade 1 to Grade 0.

Four bridges had evidence of bat usage; Bridge 102 was occupied by a single roosting Daubenton's bat (Plate 5), Bridge 084 had bat droppings present and Bridges 93 & 107 showed evidence of bat staining. All of these bridges are in the Laney River catchment.



Plate 5: Daubenton's bat – the most common species found during the survey

Survey 2

Survey 2 was undertaken between the 9th and 23rd September 2007 during which a total of 44 bridges were visited by five volunteers.

Seven bridges were identified as being in use by bats. On the Sullane River, Bridge 006 had a single Daubenton's bat present and Bridge 75 had a single Natterer's bat. Bridge 010 contained Natterer's bat droppings. Within the Laney River catchment, at Bridge 111, a single Daubenton's bat was identified and droppings were encountered at Bridges 084, 093 & 095.

Survey 3

Survey 3 was undertaken between the 3rd and 25th November 2007. A total of 10 volunteers participated in this phase.

A total of 6 Grade 3 roosts were identified. In the Sullane River catchment, four bridges, 006, 024, 027 & 037 held unidentified bat species. In the Laney River catchment, Natterer's bats were identified in Bridges 084 & 102.

Table 3: Bridges with bats or evidence of bat usage

Bridge Number	Survey 1	Survey 2	Survey 3
<i>Sullane Catchment</i>			
006		Daubenton's bat (1)	Unidentified species (1)
010		Natterer's bat droppings	
024			Unidentified species (1)
027			Unidentified species (1)
037			Unidentified species (1)
075		Natterer's bat (1)	
<i>Laney Catchment</i>			
084	Natterer's bat droppings	Pipistrelle & Natterer's bat droppings	Natterer's bat (1)
093	Staining	Droppings and staining	
095		Unidentified droppings	
102	Daubenton's bat (1)		Natterer's bat (1)
107	Staining		
111		Daubenton's bat (1)	
Number of bridges with bat usage	4	7	6

The number of individual bats present is given in brackets

Overall there was visual confirmation of two bat species, Natterer's and Daubenton's and droppings of pipistrelle bats were also identified. Natterer's were identified in four bridges and Daubenton's were identified at three bridges. Pipistrelle droppings were identified at one bridge.

3.3 Evidence of other wildlife activity

The opportunity was taken to include observations of other animal activity at each site. This entailed searching the river banks upstream and downstream of the bridge. Wildlife, other than bats, identified as using bridge sites included otter *Lutra lutra*, mink *Mustela vison*, brown rat *Rattus norvegicus*, fox *Vulpes vulpes*, sika deer *Cervus nippon*, dipper *Cinclus cinclus hibernicus* and kingfisher *Alcedo atthis* and over-wintering honey bees *Apis mellifera*, common wasps *Vespula vulgaris* and herald moths *Scoliopteryx libatrix*. A summary of the findings is presented in Table 4 below.

Table 4: Other wildlife noted during surveys

Bridge No.	Species encountered
001	Kingfisher x 2, dipper nest
002	Dipper
004	Otter spraint
006	Dipper nest, otter tracks, rat track
008	Sika deer tracks
009	Dipper nest
27A	Otter spraint
031	Mink scats, mouse droppings, otter spraint
037	Bees
039	Bees
048	Mink tracks
049	Otter tracks, winter herald moths
067	Otter spraint
075	Otter spraint
078	Dipper/blackbird nest, otter tracks
079	Mink tracks and scat, otter spraint, otter tracks
080	Dipper/blackbird nest
081	Otter spraint, bees/wasps in crevices
084	Otter
085	Otter spraint
086	Fox scat
093	Otter spraint, bees,
094	Otter spraint, bees
095	Mink track
097	Otter feeding remains
098	Otter spraint/ mink tracks
100	Mink scat
104	Otter spraint
106	Bees
109	Brown rat tracks, dipper nest
111	Dipper, kingfisher, bees/wasps in crevices

4.0 FINDINGS AND CONCLUSIONS

- A total of 113 bridges were surveyed by 23 volunteers of the Cork County Bat Group on up to three occasions between May and November 2007.
- Bridges were graded according to their suitability to provide roosts for bats. 0 = no potential (no suitable crevices), 1 = crevices present may be of use to bats, 2 = crevices ideal for bats but no evidence of usage, 3 = evidence of bats (e.g. bat present, droppings etc.).
- A summary of the findings is presented in Table 5 below:

Table 5: Summary of bridge survey findings

	Sullane River	Laney River	Overall
Number of bridges surveyed	79	34	113
Grade 0	55	161	71
Grade 1	8	6	14
Grade 2	10	6	16
Grade 3	6	6	12
Number of individual bats recorded	6	4	10
Natterer's bat	1	2	3
Daubenton's bat	1	2	3
Pipistrelle		Droppings only	
Unidentified bat	4		4

- 63% of bridges were Grade 0 or unsuitable for bats and only an average of 11% had evidence of bat usage. However, if only bridges which provide suitable bat roost crevices is considered, 29% of potentially suitable bridges had evidence of bat usage.
- Overall there was visual confirmation of two bat species; Natterer's and Daubenton's and droppings of pipistrelle bats were identified at one site.
- Other bat species that have been identified in structures in previous studies of Irish bridges, i.e. brown long-eared, whiskered and pipistrelle were not identified during this project.
- Lack of maternity sites discovered during this survey may be due to the upland nature of these two catchments with 89% of bridges being located above 100 metres and 58% above 150m. It is known that Daubenton's bats are sexually segregated, with males occupying sub-optimal habitat (uplands) and females occupying optimal habitat (lowlands) (Encarnacao *et al.* 2005). However, many lowland bridges in the study site are heavily used by traffic and were grouted or of unsuitable design.
- This *Heritage Council*/NPWS funded project was successful in identifying a number of new bat roosts, confirming the importance of bridges to bats and also increasing membership and capabilities of the *Cork County Bat Group*.
- It is concluded that, while a high percentage (63%) of bridges in the Sullane and Laney river catchments do not provide suitable crevices for bats to utilise, when bridges do offer suitable resting spaces they are used in high numbers (29%).

5.0 RECOMMENDATIONS

5.1 Legal status and conservation issues

All Irish bat species are protected under the Wildlife Act (1976) and Wildlife Amendment Act (2000). Also, the EC Directive on The Conservation of Natural habitats and of Wild Fauna and Flora (Habitats Directive 1992), seeks to protect rare species, including bats, and their habitats and requires that appropriate monitoring of populations be undertaken. Across Europe, they are further protected under the Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention 1982), which, in relation to bats, exists to conserve all species and their habitats. The Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention 1979, enacted 1983) was instigated to protect migrant species across all European boundaries. The Irish government has ratified both these conventions.

All bats are listed in Annex IV of the Habitats Directive and the lesser horseshoe bat is further listed under Annex II. Therefore,

- County Council Engineers and Fisheries Board personnel should be informed of the importance of bridges for bats and to consider them in planning and maintenance works or in new bridge design. A summary table of all bridges with bat roost potential or bats present is presented in Appendix B and will be forwarded to the relevant authorities to consider during future bridge maintenance activity.
- Prior to repair work on bridges, a bat survey should be conducted by a bat specialist. Best practice in maintenance of bridges for bats should be adhered to as outlined in Shiel's 1999 report (www.heritagecouncil.ie/publications/bats/index.html).
- As a high percentage of bridges are used by bats when suitable crevices are available, it is recommended that, when bridges are being renovated or new bridges built, known roosts should be retained and/or artificial roost units should be incorporated into the structure.
- All bat roost data shall be forwarded to *Bat Conservation Ireland* for inclusion in their database.
- Information on the presence of otter and mink shall be forwarded to the NPWS and information on kingfisher and dipper shall be forwarded to *BirdWatch Ireland*.
- *Cork County Bat Group* shall systematically survey the remaining bridges in the Lee Valley catchment over the coming years.

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Figures

Figure 1: River Lee Catchment

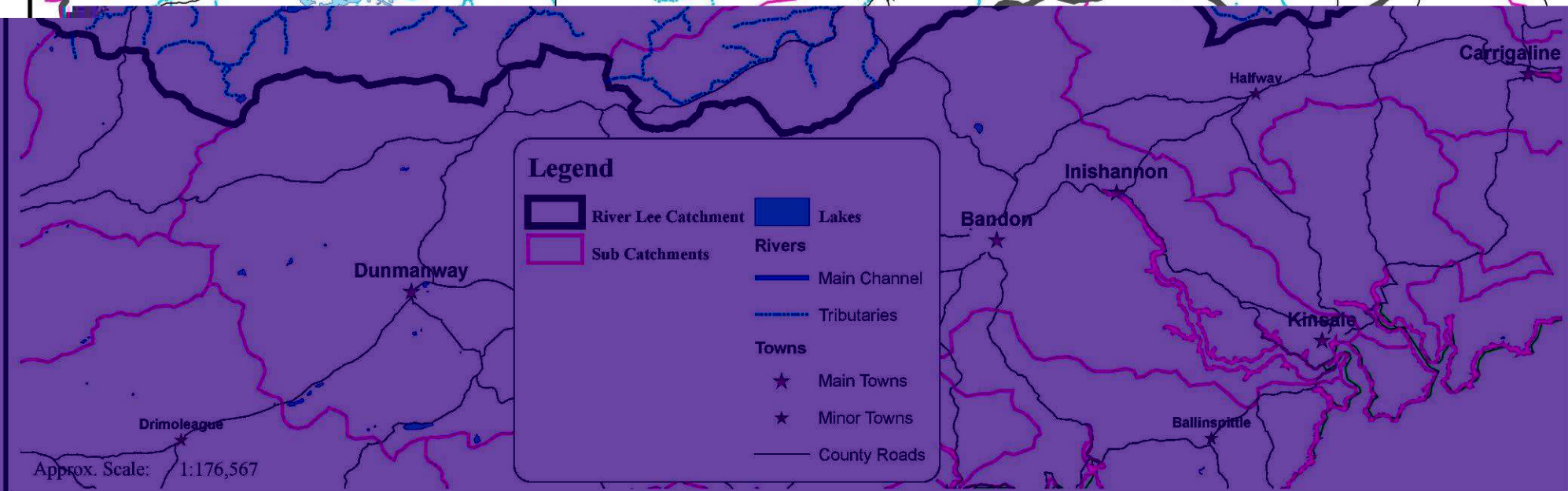
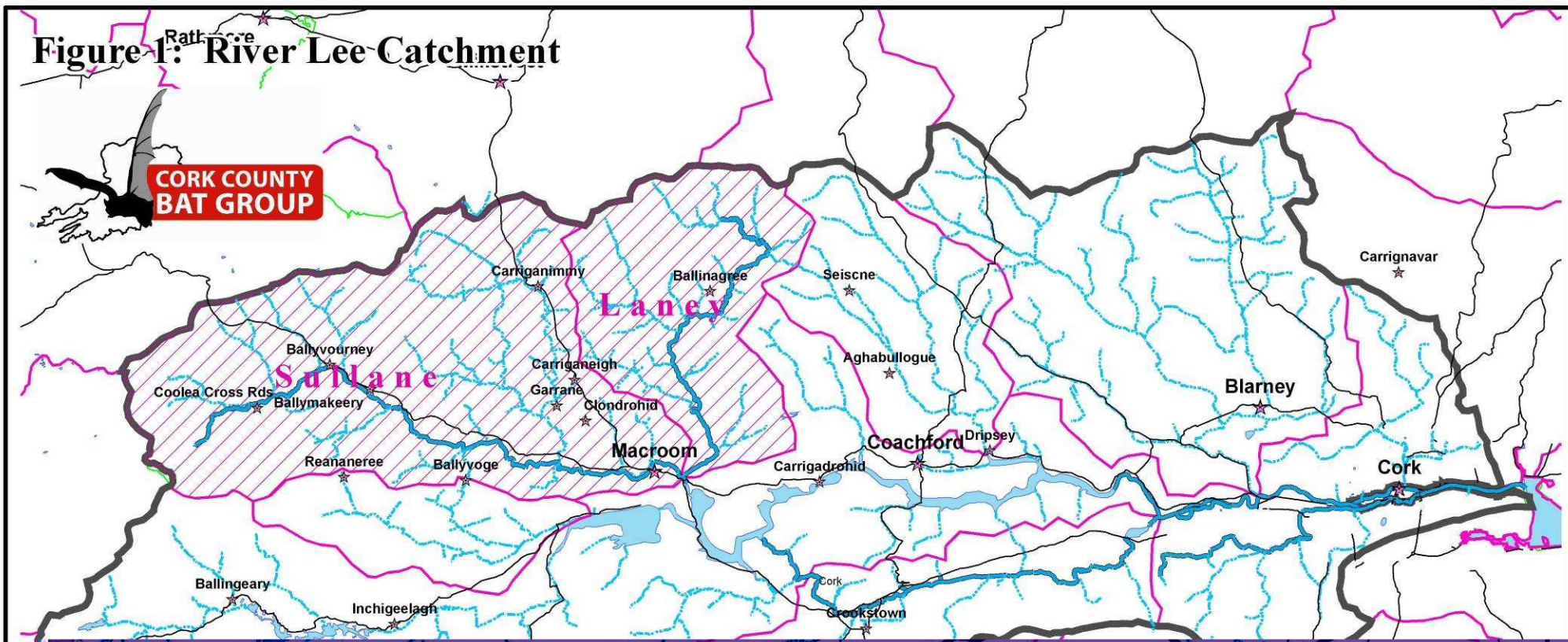
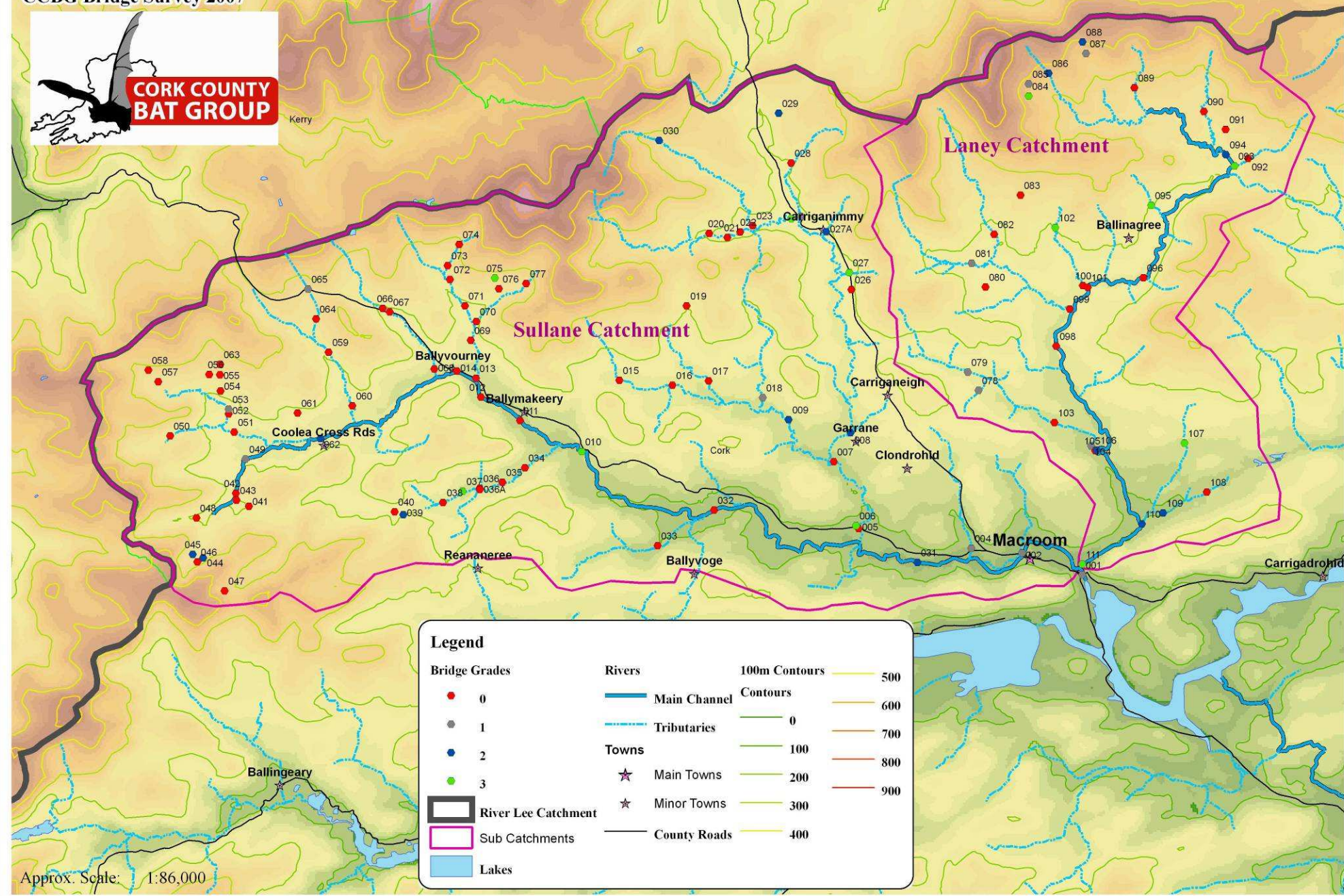


Figure 2: Rivers Sullane & Laney Catchments with Bridge Grading

CCBG Bridge Survey 2007



Appendices

Appendix A: CCBG Bridge Survey 2007 - List of all road bridges on the Sullane and Laney rivers

Bridge code number	Grade	Bridge name	River	Catchment	Altitude	Road number	Description	6 figure grid reference
001	1	New Bridge	Sullane	Sullane	70	R618	Large 5 arch masonry bridge constructed of sandstone	W353 725
002	1		Sullane	Sullane	90	N22	Large 10 arch masonry bridge constructed of sandstone	W337 730
003	0		Sullane	Sullane	80		Modern steel footbridge	W322 728
004	1		Tributary of Sullane	Sullane	80		Small single arch masonry bridge, low, constructed of stone	W325 731
005	0		Foherish	Sullane	80	N22	Medium 5 arch concrete bridge	W296 736
006	3	Carrigaphouca Bridge	Foherish	Sullane	80		Medium 8 arch masonry bridge, 5 dry arches	W296 737
007	0		Foherish	Sullane	100		small single arch concrete bridge	W290 753
008	2	Gurranenagappul Bridge	Foherish	Sullane	100		Large 3 arch masonry bridge	W294 760
009	2	Bealahacreagh Bridge	Finnow	Sullane	100		Medium 6 arch masonry bridge	W279 763
010	3	Pollnabro Bridge	Sullane	Sullane	100		Medium single arch concrete bridge	W227 755
011	0	Ballymakeera Bridge	Sullane	Sullane	100		medium 4 arch masonry bridge	W211 763
012	0		Sullane	Sullane	100		Medium 7 arch masonry bridge	W201 769
013	0	Bohill Bridge	Bohill	Sullane	140	N22	Medium 3 arch masonry bridge	W200 774
014	0		Sullane	Sullane	140		large 3 arch masonry bridge	W195 775
015	0	Ullanes Bridge	Dangansallagh	Sullane	150		Small single arch concrete bridge	W236 773

Appendix A: CCBG Bridge Survey 2007 - List of all road bridges on the Sullane and Laney rivers

Bridge code number	Grade	Bridge name	River	Catchment	Altitude	Road number	Description	6 figure grid reference
016	0	Ardeen Bridge	Finnow	Sullane	150		Small 2 arch concrete bridge	W250 772
017	0		Tributary of the Finnow	Sullane	150		Small single arch concrete bridge	W259 773
018	1	Kilgobnait Bridge	Tributary of the Finnow	Sullane	150		Medium single arch masonry bridge	W272 769
019	0		Tributary of the Finnow	Sullane	210		Small single arch concrete bridge	W253 792
020	0	Curraleigh bridge	Foherish	Sullane	190		Small single arch concrete bridge	W259 810
021	0		Foherish	Sullane	190		Small single arch concrete bridge	W263 809
022	0		Tributary of the Foherish	Sullane	190		Small single arch concrete bridge	W267 810
023	0	Garrane Bridge	Garrane	Sullane	190		Small 2 arch concrete bridge	W270 812
024	3	Foherish Bridge	Foherish	Sullane	190		Medium 3 arch masonry bridge	W280 814
025	1	Keel Bridge	Keel	Sullane	180	R582	Large single arch masonry bridge	W282 814
026	0		Tributary of the Foherish	Sullane	180	R582	Small stone two tunnel bridge	W295 796
027	3		Tributary of the Foherish	Sullane	180	R582	Small 1 arch masonry bridge	W294 800
027A	2	Carriganima Bridge	Tributary of the Foherish	Sullane	170	R582	Small single arch masonry bridge	W288 811
028	0		Tributary of Keel	Sullane	180		Single arch concrete bridge with stone supporting wall	W279 828
029	2		Tributary of the Keel	Sullane	190		Small 2 tunnel stone bridge	W276 840

Appendix A: CCBG Bridge Survey 2007 - List of all road bridges on the Sullane and Laney rivers

Bridge code number	Grade	Bridge name	River	Catchment	Altitude	Road number	Description	6 figure grid reference
030	2	Garrane Bridge	Garrane	Sullane	200		Medium single arch masonry bridge	W246 833
031	2	Linamilla Bridge	Sullane	Sullane	270		Large single arch masonry bridge	W311 727
032	0	Sullane Bridge	Sullane	Sullane	80		Medium 3 arch concrete bridge with stone columns	W260 741
033	0	Candroma Bridge	Sullane Beg	Sullane	90		Small single arch concrete bridge	W246 732
034	0		Douglas	Sullane	90		Small 2 arch concrete bridge	W212 751
035	0		Douglas	Sullane	130		Small single arch concrete bridge	W207 748
036	0	Gortnamill Bridge	Douglas	Sullane	130		Small 6 tunnelstone bridge	W201 746
036A	0		Douglas	Sullane	130		Small 4 tunnel stone bridge	W201 746
037	3	Rath East Bridge	Douglas	Sullane	150		Medium single arch masonry bridge with concrete extension	W197 745
038	0		Tributary of Douglas	Sullane	130		Small 2 arch concrete bridge with stone wall	W192 742
039	2		Douglas	Sullane	130		Medium single arch masonry bridge	W182 739
040	0		Tributary of the Douglas	Sullane	150		Small single arch concrete bridge	W180 740
041	0		Tributary of the Sullane	Sullane	130		Small single arch concrete bridge	W143 741
042	0		Tributary of the Sullane	Sullane	130		Medium single arch masonry bridge	W140 745
043	0		Tributary of the Sullane	Sullane	180		Medium single arch concrete bridge	W140 743

Appendix A: CCBG Bridge Survey 2007 - List of all road bridges on the Sullane and Laney rivers

Bridge code number	Grade	Bridge name	River	Catchment	Altitude	Road number	Description	6 figure grid reference
044	2		Tributary of the Sullane	Sullane	190		Small single arch masonry bridge, low, constructed of stone	W132 729
045	2		Tributary of the Sullane	Sullane	190		Small single arch masonry bridge, low, constructed of stone	W129 729
046	0		Tributary of the Sullane	Sullane	190		Small 2 tunneled stone bridge	W130 728
047	0		Tributary of the Sullane	Sullane	230		Small single arch masonry bridge with new brick wall	W137 720
048	0		Tributary of the Sullane	Sullane	250		Small single arch concrete bridge	W130 739
049	1	Mahoney's Bridge	Tributary of the Sullane	Sullane	270		Medium 2 arch masonry bridge with 5 culverts	W142 753
050	0		Bardinch	Sullane	330		Small single arch concrete bridge	W123 759
051	0	Bardinch Bridge	Bardinch	Sullane	190		Small 2 arch concrete bridge	W139 760
052	0		Inchamore Stream	Sullane	160		Small single arch concrete bridge	W138 765
053	1		Inchamore Stream	Sullane	220		Small single tunnel stone bridge	W138 766
054	0		Inchamore Stream	Sullane	190		Small single arch concrete bridge	W136 770
055	0		Inchamore Stream	Sullane	190		Small single arch masonry bridge	W136 775
056	0		Tributary of Inchamore Stream	Sullane	190		Small 2 arch masonry bridge	W133 775
057	0		Tributary of Inchamore Stream	Sullane	250		Small single arch concrete bridge	W120 773

Appendix A: CCBG Bridge Survey 2007 - List of all road bridges on the Sullane and Laney rivers

Bridge code number	Grade	Bridge name	River	Catchment	Altitude	Road number	Description	6 figure grid reference
058	0		Tributary of Inchamore Stream	Sullane	280		Small single arch concrete bridge	W118 776
059	0		Aughboy	Sullane	200		Medium 2 arch concrete bridge	W163 780
060	0		Aughboy	Sullane	150		Small single arch concrete bridge	W169 767
061	0		Tributary of the Sullane	Sullane	180		Small single arch concrete bridge	W155 765
062	2	Mileeny Bridge	Sullane	Sullane	140		Large 2 arch masonry bridge	W161 759
063	0		Tributary of Inchamore Stream	Sullane	270		Small single arch concrete bridge	W136 777
064	0		Aughboy	Sullane	230		Small single span concrete bridge	W160 789
065	1	Commeen Bridge	Tributary of Aughboy	Sullane	250		Large single arch masonry bridge	W158 796
066	0		Tributary of Aughboy	Sullane	190		Small single arch concrete bridge	W177 791
067	0	Colthurst Bridge	Tributary of Aughboy	Sullane	190		Large single arch masonry bridge	W178 790
068	0		Tributary of the Sullane	Sullane	140		Medium single arch masonry bridge	W190 776
069	0	Cappagh Bridge	Bohill	Sullane	170		Small single arch concrete bridge	W199 783
070	0		Tributary of the Bohill	Sullane	170		Small 2 arch concrete bridge	W200 788
071	0		Bohill	Sullane	180		Medium single arch concrete bridge	W197 792

Appendix A: CCBG Bridge Survey 2007 - List of all road bridges on the Sullane and Laney rivers

Bridge code number	Grade	Bridge name	River	Catchment	Altitude	Road number	Description	6 figure grid reference
072	0		Bohill	Sullane	210		Small single arch concrete bridge	W194 798
073	0		Bohill	Sullane	220		Small 2 arch concrete bridge	W193 802
074	0		Bohill	Sullane	280		Small single arch concrete bridge	W196 807
075	3		Tributary of the Bohill	Sullane	280		Small single arch masonry bridge	W205 799
076	0		Tributary of the Bohill	Sullane	230		Small single arch concrete bridge	W206 796
077	0		Tributary of the Bohill	Sullane	250		Small single arch concrete bridge	W213 797
078	1		Tributary of the Laney	Laney	160		Small 4 tunnel stone bridge	W327 771
079	1		Tributary of the Laney	Laney	150		Medium 6 arch masonry bridge	W324 775
080	0		Tributary of the Laney	Laney	190		Small 1 tunnel stone bridge	W328 797
081	1	Maunflugh Bridge	Awboy	Laney	190		Medium single arch masonry bridge	W325 803
082	0	Maulnahorn Bridge	Awboy	Laney	190		Medium single arch concrete bridge	W330 810
083	0		Awboy	Laney	240		Small single arch masonry bridge	W337 820
084	3		Tributary of the Laney	Laney	360		Small single tunnel stone bridge	W339 845
085	1		Tributary of the Laney	Laney	360		Small single tunnel stone bridge	W339 848
086	2		Tributary of the Laney	Laney	360		Large single arch masonry bridge	W344 850

Appendix A: CCBG Bridge Survey 2007 - List of all road bridges on the Sullane and Laney rivers

Bridge code number	Grade	Bridge name	River	Catchment	Altitude	Road number	Description	6 figure grid reference
087	1		Tributary of the Laney	Laney	350		Small 2 tunnel stone bridge	W354 855
088	2		Tributary of the Laney	Laney	400		Small single tunnel stone bridge	W353 858
089	0		Cuppoge Stream	Laney	270		Small single arch concrete bridge	W366 847
090	0	Aghalode Bridge	Aghalode	Laney	240		Medium single arch concrete bridge	W383 841
091	0		Tributary of the Laney	Laney	230		Small single arch concrete bridge	W389 836
092	0		Tributary of the Laney	Laney	210		Small single arch concrete bridge	W394 778
093	3		Tributary of the Laney	Laney	210		Medium single arch concrete bridge	W391 827
094	2	Carrigagulla Bridge	Laney	Laney	210		Medium 2 arch masonry bridge	W389 830
095	3		Tributary of the Laney	Laney	200		Small single arch masonry bridge	W370 817
096	0		Laney	Laney	150		Small single arch concrete bridge	W368 799
097	0		Tributary of the Laney	Laney	200		Small concrete bridge with 3 pipes	W365 778
098	0	Clonavrick Bridge	Laney	Laney	140		Medium 3 arch masonry bridge	W346 782
099	0	Awboy Bridge	Awboy	Laney	150		Medium 3 arch masonry bridge	W349 791
100	0	Copaleen-bawn Bridge	Awboy	Laney	150		Medium single arch masonry bridge	W353 797
101	0	Knocknagappul Bridge	Laney	Laney	140		Large 3 arch masonry bridge	W359 797

Appendix A: CCBG Bridge Survey 2007 - List of all road bridges on the Sullane and Laney rivers

Bridge code number	Grade	Bridge name	River	Catchment	Altitude	Road number	Description	6 figure grid reference
102	3	Horsemount Bridge	Glashreagh	Laney	190		Small single arch masonry bridge	W346 812
103	0		Tributary of the Laney	Laney	130		Small single arch masonry bridge	W346 763
104	1		Tributary of the Laney	Laney	110		Medium 2 arch masonry bridge	W355 757
105	0		Tributary of the Laney	Laney	100		Small 2 arch concrete bridge	W356 755
106	2	Morris's Bridge	Laney	Laney	100		Large 4 arch masonry bridge	W356 756
107	3		Clashavoon stream	Laney	130		Small single arch masonry bridge	W378 757
108	0		Tributary of the Laney	Laney	120		Small concrete bridge with 2 pipes	W384 745
109	2		Tributary of the Laney	Laney	100		Small single arch masonry bridge	W373 740
110	2		Tributary of the Laney	Laney	100		Small single arch concrete bridge with stone wall	W368 737
111	3	Laney Bridge	Laney	Laney	70		Large 4 arch masonry bridge	W353 727

Legend

Grade 0 = no potential (no suitable crevices);
 Grade 1 = crevices present may be of use to bats;
 Grade 2 = crevices ideal for bats but no evidence of usage;
 Grade 3 = evidence of bats (e.g. bat present, droppings).

APPENDIX B: Bridges offering bat roost potential which should be maintained for bats

Bridge code number	Grade	Bridge name (where present)	River	Catchment	Altitude	Road number	Description	GPS coordinates	6 figure grid reference
001	1	New Bridge	Sullane	Sullane	70	R618	Large 5 arch masonry bridge constructed of sandstone	W35307 72478	W353 725
002	1		Sullane	Sullane	90	N22	Large 10 arch masonry bridge constructed of sandstone	W33795 73024	W337 730
004	1		Tributary of Sullane	Sullane	80		Small single arch masonry bridge, low, constructed of stone	W32519 73142	W325 731
006	3	Carrigaphouca Bridge	Foherish	Sullane	80		Medium 8 arch masonry bridge, 5 dry arches	W29623 73708	W296 737
008	2	Gurranenagappul Bridge	Foherish	Sullane	100		Large 3 arch masonry bridge	W29487 76045	W294 760
009	2	Bealahacreagh Bridge	Finnow	Sullane	100		Medium 6 arch masonry bridge	W27929 76372	W279 763
010	3	Pollnabro Bridge	Sullane	Sullane	100		Medium single arch concrete bridge	W22727 75575	W227 755
018	1	Kilgobnait Bridge	Tributary of the Finn timer	Sullane	150		Medium single arch masonry bridge	W27277 76931	W272 769
024	3	Foherish Bridge	Foherish	Sullane	190		Medium 3 arch masonry bridge	W27999 81426	W280 814
025	1	Keel Bridge	Keel	Sullane	180	R582	Large single arch masonry bridge	W28231 81484	W282 814
027	3		Tributary of the Foherish	Sullane	180	R582	Small 1 arch masonry bridge	W29454 80071	W294 800
027A	2	Carriganima Bridge	Tributary of the Foherish	Sullane	170	R582	Small single arch masonry bridge	W28873 81101	W288 811

Rivers Sullane and Laney Bridge Survey 2007

029	2		Tributary of the Keel	Sullane	190		Small 2 tunnel stone bridge	W27675 84079	W276 840
030	2	Garrane Bridge	Garrane	Sullane	200		Medium single arch masonry bridge	W24674 83394	W246 833
031	2	Linamilla Bridge	Sullane	Sullane	270		Large single arch masonry bridge	W31167 72788	W311 727
037	3	Rath East Bridge	Douglas	Sullane	150		Medium single arch masonry bridge with concrete extension	W19738 74578	W197 745
039	2		Douglas	Sullane	130		Medium single arch masonry bridge	W18240 73988	W182 739
044	2		Tributary of the Sullane	Sullane	190		Small single arch masonry bridge, low, constructed of stone	W13214 72900	W132 729
045	2		Tributary of the Sullane	Sullane	190		Small single arch masonry bridge, low, constructed of stone	W12948 72989	W129 729
049	1	Mahoney's Bridge	Tributary of the Sullane	Sullane	270		Medium 2 arch masonry bridge with 5 culverts	W14277 75388	W142 753
053	1		Inchamore Stream	Sullane	220		Small single tunnel stone bridge	W13855 76634	W138 766
062	2	Mileeny Bridge	Sullane	Sullane	140		Large 2 arch masonry bridge	W16159 75903	W161 759
065	1	Commeen Bridge	Tributary of Aughboy	Sullane	250		Large single arch masonry bridge	W15845 79660	W158 796
075	3		Tributary of the Bohill	Sullane	280		Small single arch masonry bridge	W20542 79932	W205 799
078	1		Tributary of the Laney	Laney	160		Small 4 tunnel stone bridge	W32702 77108	W327 771
079	1		Tributary of the Laney	Laney	150		Medium 6 arch masonry bridge	W32430 77566	W324 775
081	1	Maunflugh Bridge	Awboy	Laney	190		Medium single arch masonry bridge	W32530 80309	W325 803

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084	3		Tributary of the Laney	Laney	360		Small single tunnel stone bridge	W33958 84511	W339 845
085	1		Tributary of the Laney	Laney	360		Small single tunnel stone bridge	W33964 84812	W339 848
086	2		Tributary of the Laney	Laney	360		Large single arch masonry bridge	W34465 85084	W344 850
087	1		Tributary of the Laney	Laney	350		Small 2 tunnel stone bridge	W35405 85575	W354 855
088	2		Tributary of the Laney	Laney	400		Small single tunnel stone bridge	W35317 85872	W353 858
093	3		Tributary of the Laney	Laney	210		Medium single arch concrete bridge	W39141 82755	W391 827
094	2	Carrigagulla Bridge	Laney	Laney	210		Medium 2 arch masonry bridge	W38922 83039	W389 830
095	3		Tributary of the Laney	Laney	200		Small single arch masonry bridge	W37044 81764	W370 817
102	3	Horsemount Bridge	Glashreagh	Laney	190		Small single arch masonry bridge	W34629 81202	W346 812
104	1		Tributary of the Laney	Laney	110		Medium 2 arch masonry bridge	W35532 75714	W355 757
106	2	Morris's Bridge	Laney	Laney	100		Large 4 arch masonry bridge	W35676 75611	W356 756
107	3		Clashavoon stream	Laney	130		Small single arch masonry bridge	W37881 75787	W378 757
109	2		Tributary of the Laney	Laney	100		Small single arch masonry bridge	W37343 74033	W373 740
110	2		Tributary of the Laney	Laney	100		Small single arch concrete bridge with stone wall	W36807 73754	W368 737
111	3	Laney Bridge	Laney	Laney	70		Large 4 arch masonry bridge	W35308 72742	W353 727

Key

Grade 1 & 2: Bat roost potential

Grade 3: Bats present

APPENDIX C: Cork County Bat Group Information

Cork County Bat Group is a voluntary organisation that has been involved in a number of bat related projects in the County in recent years. Some of its activities include:

Bat box projects:

- The group installed and maintains and monitors bat boxes in Currabinny woods, Carrigaline, Ballincollig Town Park and The Lough, Cork City.
- It also maintains and monitors bat boxes in Glengarriff Woods, Glengarriff.

Public talks/walks are held throughout the county and regularly in Cork City during:

- Biodiversity Week, Heritage Week and the Lifelong Learning Festival

Bat rescue, First Aid and rehabilitation

Bat handling licence training

Responding to roost owner enquiries

Promoting bat conservation through public education and awareness

Partaking in national and local bat surveys

Contact details

To report bat roosts or injured/grounded bats, please contact:

Cork County Bat Group,
Spring Lane,
Carrigagulla,
Ballinagree,
Macroon,
Co. Cork.

021-7339247 or 087-2980297

For general enquiries, please email: info@corkcountybatgroup.ie

Web site: www.corkcountybatgroup.ie

APPENDIX D: Bridge Survey Safety Statement

SAFETY STATEMENT

Name: **CORK COUNTY BAT GROUP**

Address: **“Northants”**

Spring Lane

Carrigagulla

Ballinagree

Co. Cork

This Safety Statement is Cork County Bat Group’s programme in writing to manage health and safety. It is aimed at protecting members of Cork County Bat Group and Voluntary Workers from accidents and ill-health while carrying out survey or educational work. We will update it and review at least once a year.

Emergency Contacts

Fire/Gardaí/Ambulance: 999

Co-Ordinator: **Daniel Buckley** 086 3691982

Co-Ordinator: **Ger Stanton** 087 9043723

Hospitals:

Cork (CUH) 021 4546400

Macroom 026 41002

Action	Named Hazard and Risk of Injury	Precautions to avoid injury
CorkCountyBat Group Bridge Survey	Trip or fall on uneven ground: High risk	<ul style="list-style-type: none">Identify potential hazards in daytime and avoid during nightNo distracting work should be carried out while walking, and good illumination should be carried at night for use when walking on uneven ground and/or in unknown areas.

		<ul style="list-style-type: none"> • Use headtorch and pocket notepad to keep hands free • Check mobile phone coverage during daylight hours
	Personal attack: Low risk	<ul style="list-style-type: none"> • Working alone should be avoided and no work should be undertaken where there is any significant risk, such as sites with a reputation for incidents, (e.g. where there may be a risk of personal assault). • Be aware of the location of the nearest house or phone so that help can be called if required. Carry a mobile phone. This should be tested at the start of the visit and during daylight visit to detect reception blind spots.
	Tetanus and leptospirosis: Low risk	<ul style="list-style-type: none"> • Clean any cuts etc immediately with clean water and cover adequately. • Anti-tetanus treatments should be up to date (these normally last ten years). • Avoid contact with water, particularly if contaminated with rats/cattle urine. Wash hands thoroughly and always before eating. If flu-like symptoms develop, inform doctor of possible exposure to Weils disease.
	Lymes disease: Low risk	<ul style="list-style-type: none"> • When working in grassland areas where deer are present, wear long trousers and long socks. Check exposed skin for ticks. If a tick is found and flu-like symptoms develop – inform doctor
	Risk of drowning: Medium risk	<ul style="list-style-type: none"> • Non-swimmers should be accompanied when walking by water • Always wear life jacket when surveying in water beneath bridge • Do not cross rivers unless by bridge • Avoid work when risk of flooding/flash flooding and be aware of tides • Do not enter water at levels above the knee • Do not enter water with strong currents • Keep at safe distance from bank/cliff/water edge
	Inclement weather: Medium risk	<ul style="list-style-type: none"> • Check weather forecast beforehand. • Ensure that waterproof and/or warm clothing is carried; hazards can increase significantly in heavy rain, strong winds and thunderstorms, especially at night. • Avoid/terminate all outdoor activity in inclement weather.
	Road Safety: High risk	<ul style="list-style-type: none"> • Always park car in a manner, so that it does not cause obstruction to other road users. • Always wear high visibility jackets
	Bulls: Medium risk	<ul style="list-style-type: none"> • Do not enter any fields where a bull is

		present.
	Getting lost: High risk	<ul style="list-style-type: none"> • Use map and compass and drive route in daylight in advance • Mobile phone available for use in emergency
Bat roost survey	Tetanus and leptospirosis: Medium risk	<ul style="list-style-type: none"> • Clean any cuts etc immediately with clean water and cover adequately. • Anti-tetanus treatments should be up to date (these normally last ten years). • Avoid contact with water, particularly if contaminated with rats/cattle urine. Wash hands thoroughly and always before eating. If flu-like symptoms develop, inform doctor of possible exposure to Weils disease.
	Fall from ladder: High risk	<ul style="list-style-type: none"> • Always use ladder stabilisers and ensure ladder is carefully propped against wall. Where present ask additional person to hold ladder. Never take unnecessary risks when climbing. Keep both hands free at all times. • Use hard hat and safety gloves
Bat handling	Bites: Medium risk	<ul style="list-style-type: none"> • Ensure any persons handling bats have undergone suitable training and licensing and always use gloves when handling bats. • Clean any cuts etc immediately with clean water and cover adequately.
	Tetanus: Medium risk	<ul style="list-style-type: none"> • Ensure any persons handling bats have undergone suitable training and licensing and always use gloves when handling bats. • Clean any cuts etc immediately with clean water and cover adequately. • Anti-tetanus treatments should be up to date (these normally last ten years).
	EBLV (Rabies): Low risk	<ul style="list-style-type: none"> • Ensure any persons handling bats have undergone suitable training and licensing and always use gloves when handling bats. • Ensure any bat workers handling bats have up-to-date rabies vaccinations and yearly Titre level tests.

I the undersigned have read the above document and agree to abide by it.

Signed: _____ **Date:** _____

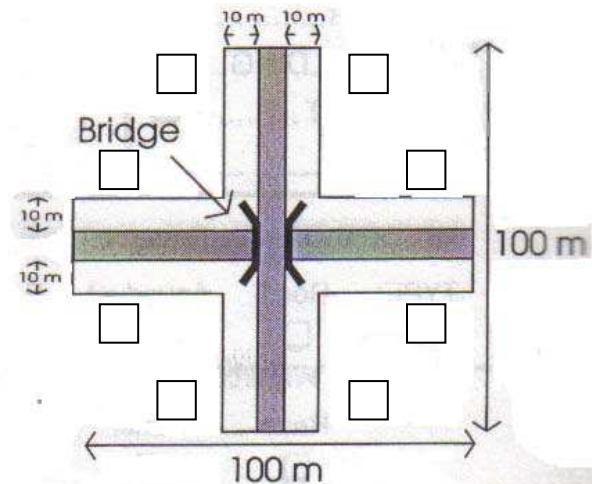
APPENDIX E: Survey Recording Sheet

BRIDGE SURVEY FORM						
Surveyors:				Mileage	Date	
Driver:						
BRIDGE DETAILS						
Bridge Code Number						
Construction Materials						
Please tick	Concrete	Sandstone	Limestone	Wood	Steel	
Span						
Abutments						
Construction Design						
Please tick	Arch	Cast	Beam	Slab	Tunnel	Pipe
Height of Arch (Metres)						
Road Width (Metres)						
Width of River (Metres)						
BAT DETAILS						
Species (please circle)						
Common pipistrelle	Soprano pipistrelle	Nathusius' pipistrelle	Leisler's bat	Daubenton's bat		
Natterer's bat	Whiskered bat	Brandt's Bat	Brown long eared bat	Lesser horseshoe bat		
Location (see bridge diagram)						
Evidence (please circle)	Droppings	Staining	Visual	Aural(sounds)	Detector	
Number of individuals						
Diagram (please show location of bats and compass direction)						

HABITAT DETAILS

Please insert habitat code in squares choosing the most dominant habitat along 50m each side of both the road and the river.

Please indicate North on the diagram.



Record the habitat along both linear features. Indicate North on the diagram and label each linear feature as watercourse, road, diused railway, etc.

(Billington and Norman 1997)

Habitat

A Broadleaf woodland
B Conifer woodland
C Mixed woodland
D Scrub / Young forestry
E Tree line / Hedgerow
F Semi-natural grassland
G Wet grassland
H Improved grassland
I Marsh
J Bog

K Montane heath
L Arable land
M Exposed rock

Other wildlife

Species

Evidence

APPENDIX F: Bridge features terminology (From Billington and Norman 1997)

