Appendix G

Environmental Reports

N2 Monaghan Town to Emyvale, County Monaghan Proposed Pavement and Minor Improvement Scheme

Corracrin to Emyvale

Contents:

N2 Monaghan to Emyvale Phase 2, 3 and 4

Ecology Report

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FAO: Oliver Mulligan, Monaghan County Council

By: Billy Flynn, Flynn, Furney Environmental Consultants

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1. Introduction

1.1 Project Background

The following report details the findings of surveys carried out by Flynn, Furney Environmental Consultants on behalf of Monaghan County Council along the route of the proposed N2 Monaghan to Emyvale realignment. These works will include widening of the existing road, involving some additional landtake and the crossing of a number of small watercourses. Surveys were carried out in April 2011 in order to describe baseline ecological conditions within the lands made available for this project and in surrounding areas. The report also advises on predicted impacts and mitigation measures. The objectives of these surveys are given below.

1.2 Objectives of Survey

The objectives of the survey may be described as follows:

- To identify and describe type, location and extent of habitats
- To provide details of species found in these habitats
- To describe potential impacts upon these habitats and species by the proposed project
- To provide detailed mitigation measures
- To provide appropriate mapping and photographic records of findings

1.3 Outline Description of Site under Survey

The study site is located in north Co. Monaghan, north of Monaghan town. It extends from the townland of Coolkill some 3km north of Monaghan town to the village of Emyvale. The route is shown in the drawings in Appendix A. The vast majority of the landuse in the area is grazing and the adjoining lands are predominantly improved agricultural grassland. The topography of the site is typical of a drumlin landscape. An important feature of the area under survey is the frequency of well-maintained hedgerow boundaries. The vast majority of the field boundaries surveyed were hawthorn-dominated hedgerows which have been subject to management in recent years. As such, the majority of hedgerows were of the type described by Foulkes (2011) as the most commonly occurring in Monaghan. Ash was the most common tree appearing in hedgerows and in treelines as well as single trees. Beech trees in treelines were also found to be common, particularly at the existing N2 roadside. Woodland is rare within the study area. Some small conifer plantations are found as well as a wooded garden. There is a single area of wet woodland at the southernmost point of the route, close to Griggy Lough. A small area of wet grassland is also found here.

1.4 Outline Description of Proposed Works

The proposed N2 Monaghan to Emyvale Road Improvement scheme proposes to improve the existing N2 Dublin – Derry National Primary Road by widening the road cross-section, easing bends and undertaking localised minor realignments of the existing road in 4 phases. Phase 1 of the N2 Monaghan to Emyvale Road Improvement Works is currently under construction. The proposed road cross section will include an 8m road width, 2 no. 3m wide verges and associated embankments for cut and fill. Sight visibility splays will also have to be kept clear of obstructions at junctions and accesses. The current work surveys the lands made available (LMA) for Phase 2, 3 and 4 of the proposed N2 Monaghan to Emyvale Road Improvements works.

Phase 2 and 4 are contiguous sections of road, which together comprise a length of approximately 5.3km extending from the townland of Coolkill to the townland of Gortmoney at the settlement of Corracrin. Phase 3 extends from Gortmoney in the settlement of Corracrin to the village of Emyvale. The survey area extends from National Grid Co-Ordinate 267773,336475 to 267695, 343790. The overall length under survey is approximately 7.35km.

1.5 Methodologies

Surveys were carried out between 6 and 25 April 2011. Habitats were identified, mapped and classified and dominant plant species noted in accordance with the guidelines given by the JNCC (2007) and the Heritage Counci (2010). Habitats were classified as per Fossitt (2000). Assessment of ecological impact followed the National Roads Authority (NRA, 2004) and the Institute of Ecology and Environmental Management (IEEM, 2006). The present survey was carried out in conjunction with surveys for terrestrial mammals, bats, birds and freshwater habitats. These are reported on separately in reports that accompany this present work. Consultation was carried out with the National Parks and Wildlife Service, Inland Fisheries Ireland and the local authority. A number of databases were consulted. These included the NPWS (www.npws.ie/en/protectedsites/) and given the proximity to the border with Northern Ireland, the GIS of the Northern Ireland Environment Agency (NIEA) was also used (http://maps.ehsni.gov.uk/NIEAProtectedAreas/).

A number of other databases were used such as the National Biological Data Centre (e.g. for Irish National Crayfish Database), the Red Data manual (2009), the Draft Local Area Biodiversity Plan (2008-13) for Co. Monaghan and the Monaghan Wetland Survey (2007).

2. Results

2.1 Area under Survey

The area under survey is shown graphically in the drawings in Appendix A (Drawing No. N2-1-001). The survey area included any lands or watercourses or other bodies within 150m of the proposed alignment. However, this was widened (up to 500m) in some areas (e.g.) in order to follow watercourses or mammal paths. All field boundaries such as hedgerows, treelines and ditches within 150m were surveyed. Additional survey effort was given to habitats within the landtake of the proposed scheme. These are described in Section 3.1 and shown graphically in Appendix A.

2.2 Designated Sites

There are no sites designated for conservation purposes within the landtake of the proposed scheme. There are 6 no. designated sites within 5km of the scheme. The nearest of these is Emy Lough, a mesotrophic lake- which is also designated as a Wildfowl Sanctuary- located 1.15km northwest of the most northerly extent of works. These sites are listed below:

Table 1. Sites Designated for Conservation within 5km of Scheme

Site	Site Code	Status
Emy Lough	000558	pNHA*
Glaslough Lake	000559	pNHA
Monmurry Grassland	000562	pNHA
Drumreaske Lough	001602	pNHA
Wright's Wood	001612	pNHA
Mullaghmore Lake (S)	001785	pNHA

*proposed Natural Heritage Area

There are an additional five designated sites in the Republic that are within 10km of the proposed scheme. All of these are pNHAs with the exception of Slieve Beagh which a Special Protection Area for birds (hen harrier). The pNHAs are the Ulster Canal (at Aghalisk), Killyhoman Marsh, Corcreeghy Lake and Woodland and Rosefield lake and Woodland.

A further five sites in Northern Ireland are within 10km of the proposed scheme. These are all Areas of Special Scientific Interest (ASSIs) with the exception of another SPA in the Slieve Beagh area across the border. The ASSIs are: Tullybrick Lough, Kiltubbrid Loughs, Lough Na Blaney Bane and Caledon and Tynan. None of the designated sites in either jurisdiction are directly connected to the watercourses or other habitats of the scheme.

2.3 Rare, Threatened and Protected Species

There are no records of any rare, threatened or protected species within the landtake of the proposed route. Correspondence from Inland Fisheries Ireland (IFI) confirmed that the white-clawed crayfish, a species listed in Annex II of the 'Habitats' Directive (1997) is found in the catchments of the rivers Blackwater and Mountain Water. This was a target species of the freshwater survey. However, few streams with suitable habitat conditions were found. Similarly, conditions were seen to be largely unsuitable for lamprey and salmonid species. Although there are no records for these species in this area, the above catchments could well contain brook lamprey. All four of the bat species recorded during surveys are protected under Irish and EU legislation. The kingfisher is a species listed under Annex I of the EU 'Birds' Directive (1979). The species is 'amber listed' as a bird of medium conservation concern by Lynas et. (2007) and was a target species for the bird and freshwater surveys carried out. No evidence of kingfisher nesting or other activity was found during this survey.

2.4 Areas of Ecological Constraint

Areas which were noted as containing more valuable habitat or particular species were recorded for the purposes of these works as *Areas of Ecological Constraint* (AECs). That is, works in these areas should be subject to particular requirements in order to minimise impact on habitat and species here and particular mitigation measures will be recommended. There are 5 no. of these areas and these are shown on the accompanying drawings as AEC with a guide number. The AECs are listed in the table below.

Table 2. Areas of Ecological Constraint

Number	Location	Outline Description
AEC 1	Phase 2: Chainage 1+400	Wet grassland and scrub
AEC 2	Phase 2: Chainage 3+000	Scrub and mature trees with rookery
AEC 3	Phase 4: Chainage 3+050-3+330	Mature trees with rookery
AEC 4	Phase 4: Chainage 5+800	Watercourse crossing at Gortmoney. Possible lamprey habitat
AEC 5		Watercourse crossing at Hoof Bridge. Possible crayfish habitat and riparian vegetation.

The areas of ecological constraint are detailed in Section 3.2 (below).

2.5 Freshwater Habitats

The proposed route will cross 7 no. watercourses and within close proximity (<100m) of one lake. There are a number of other lakes within c.1km of the route These are detailed in an accompanying report.

2.6 Birds

A dedicated bird survey was carried out as part of the survey work contributing to an accompanying report. 31 no. species of birds were recorded. The majority of these would be part of the typical suite of birds expected from hedgerow and agricultural grassland habitat. By far the majority of the birds recorded were of least conservation concern, being 'green-listed' species (Lynas et al., 2007). 6 'amber list' and a single 'red-list' species were recorded.

2.7 Bats

Four bat species were recorded during the survey work. These were common pipistrelle, soprano pipistrelle, Leisler's bat and Natterer's bats. All of these are listed as being of 'Favourble Status' in the Republic of Ireland. Trees with substantial growth of ivy are found within the landtake of the proposed route. These may be used by several bat species as occasional roosts. Mature trees with holes and crevices may be used as roosting sites all year-round. Some large mature trees are found within the route (e.g. at Enagh and Legacurry). Some foraging area may be lost to bats as part of the works. There are also numerous private dwellings outside the landtake which may offer roost habitat.

2.8 Terrestrial Mammals

A total of 6 no. mammal species were recorded as being active within the area under study. All of these are listed as being of 'least concern' in the Red Data manual for mammals. Of these, only two are subject to wildlife legislation. These being the badger and the Irish hare. The proposed route will not impact upon any badger setts or indeed have any significant impacts upon badger populations within the study area. The route will not have any significant impact upon the habitat or populations of the Irish hare. Other mammal species not encountered are likely to occur within the study.

2.9 Soils

There is a possibility of impact upon soils within and outside the landtake as a result of contamination during works. This may be caused by spillage or leakage of fuels, lubricants or other liquids during the construction phase. Contamination may also arise from concrete or other materials.

Impacted soils may themselves cause pollution if giving rise to elevated suspended solids concentrations to watercourses adjacent to route. This may impact negatively upon species such as white-clawed crayfish and fish species.

3. Discussion

3.1 Habitat Areas to be Impacted upon by Scheme

The following section details the habitat areas likely to be directly impacted upon by the proposed works. Refer to accompanying drawings.

a) Phase 2 - 4

Chainage 1+400 - 2+400

The alignment will cross Stream 1 (the Tirnaneil River). This will result in loss of some riparian habitat.

The alignment will result in the loss of a small area of wet grassland. Some semi-mature alders may also be lost. A small area of blackthorn and hawthorn scrub may also be lost. This is AEC1, see Section 3.2 (below). A wet ditch here will also be affected.

Stream 2 will be crossed by the alignment twice within this section, resulting in the loss of some riparian habitat.

An area of agricultural grassland (marked as 'Area A') will be lost.

2 no. good quality hedgerows of hawthorn and blackthorn (cut low) will be lost.

3 no. mature beech trees have been recently cut down in this section.

A double treeline of semi-mature lime trees (on an avenue) will be lost. A more mature ash tree with ivy will be retained.

Chainage 2+400 - 3+400

A very small area of mixed woodland including elder, cherry laurel, Lawson's cypress, ash and a single semi-mature beech will be partially affected.

4 no. mature beech are to be lost on the west side of the existing N2.
A low-cut hedgerow and treeline are to be lost on this side also.

An area of scrub with some mature trees and a rookery will be affected by the works. This is AEC2, see Section 3.2 (below).

A number of mature beech trees in two treelines containing rookeries will be affected by works. This is AEC3, see Section 3.2 (below).

Chainage 3+400 - 4+400

A length of low-cut (<1m) hawthorn and blackthorn hedgerow will be lost. A short treeline/hedgerow of semi-mature ash and hawthorn/blackthorn will be lost.

Stream 3 will be crossed here resulting in the loss of some riparian habitat.

Stream 4 will be culverted or realigned for some distance. Some riparian habitat will be lost.

Some mature conifer trees will be lost from a small plantation.

Well-maintained hawthorn-dominated hedgerow as well as some semi-mature sycamore trees will be lost from the west side of the existing alignment.

Chainage 4+400 - 5+400

A diverse mature mixed hedgerow at the front of a garden on the east of the existing N2 may be affected by works. This includes hawthorn, field maple and several non-native species. This continues along Stream 4.

A small area of scrub may be affected on this side of the alignment.

A mature ash tree with ivy will be lost here.

A willow treeline will be partially affected by works.

A small area of hawthorn and blackthorn hedgerow with semi-mature willow which is developing into scrub will be lost.

Some of a small conifer plantation with young horse chestnut will be lost.

Chainage 5+400 - 5+850

6 no. mature beech trees with ivy are to be lost (east side)

A mature Spanish chestnut tree is to be lost (west side)

Stream 6 is crossed which result in the loss of some bankside trees and riparian habitat. This is AEC 4. Refer to Section 3.2 below.

b) Phase 3

Chainage 0+000 - 1+000

A very small conifer plantation will be affected by works, trees lost may also include some young ash and beech.

An ash beech treeline may be lost on the west side of the alignment.

A number of ornamental or garden trees on the western side of the N2 may be lost at Anketell Grove. These include birch, semi-mature horse chestnut, poplar, sycamore and conifers.

6 no. ash trees on the east of alignment and 3 no. beech trees on the west of alignment are to be lost

A dwelling on the east of alignment is to be demolshed. This is of no potential as bat habitat.

At the front of a garden on the west of alignment a mixture of trees including horse chestnut, cherry and beech will be partially affected by the development.

A spaced treeline of ash, cherry, beech, sycamore over a tightly-cut hawthorn hedgerow will be lost.

3 no. semi-mature ash trees with ivy will be lost. A further mature ash with ivy may be retained.

A mature, though damaged cherry tree on the west of alignment may be retained.

Mature treeline over a low hawthorn hedgerow and earth bank, including beech, ash and sycamore will be lost.

Chainage 1+000 - 2+400 (end of works)

4 no. mature beech of potential bat habitat and containing a rookery will be lost.

Stream 7 will be crossed. Some riparian habitat including bankside trees will be lost. This is AEC 5 - refer to Section 3.2 (below).

A small area of scrub with rowan on the east of alignment will be lost.

A small area of scrub with some gorse and bracken on the west of alignment will be lost. There is a mixed treeline of semi-mature trees here of birch, willow and ash. There is a wet ditch here (non-flowing), which contains some reedmace.

A ruined cottage and waste ground on the east of alignment will be lost. This structure is not of value as bat habitat.

A mixed treeline of semi-mature trees (mostly ash) is to be lost. Another semi-mature treeline of ash, birch, sycamore and elder over a hawthorn and blackthorn hedgerow on the east of alignment is likely to be lost.

A mature hawthorn hedgerow (cut to 1.5m in height) is to be lost from the west of alignment .

A mature ash tree with ivy is likely to be lost from this side. This is potential bat habitat.

Some ornamental (street) trees may be lost on the west of alignment on the approach to Emyvale village.

3.2 Ecological Interests and Impacts

Five areas which are to be impacted upon by the proposed works have been described as Areas of Ecological Constraint. These are described below.

Table 3. Description of AECs

AEC 1 This is a small area of wet grassland with a wet ditch. There is marsh marigold, meadow-sweet, meadow buttercup, bugle and some angelica. There is also a row of semi-mature alders. Some scrub is developing to the north of this. Wet grassland is a rare habitat in this area. Some of this will be lost. There is some wet woodland to the east of this but will not be affected by works	
AEC 2 This is a small mixed plantation of pine, larch and ash. Below this, some scrub is developing which is mostly comprised of blackthorn. An adjacent hedgerow is of good diversity, having dog-rose, beech, ash, blackthorn and hawthorn. There is also a rookery in this plantation.	
AEC 3 This is a double treeline of mature beech which are some of the oldest trees within the landtake for the route. There are two rookeries within this. These treelines are listed as containing trees of special amenity value in Appendix 3 of the Co. Monaghan Development Plan (2007-2013). Mature trees with potential bat habitat to be lost are to be felled and left for 24 hours to minimise potential impact on bat species.	

AEC 4 This is the crossing of Stream 6. Some riparian habitat and bankside trees will be affected by works in this area. This stream may be of salmonid potential and may therefore represent habitat for brook lamprey.	
AEC 5 This is the crossing of Stream 7. Some riparian habitat and bankside trees, including mature alder will be affected by works in this area. This stream has potential as white-clawed crayfish habitat.	

The route crosses 7 watercourses in total. Potential impacts upon these have been described in the accompanying report: *N2 Monaghan to Emyvale Phase 2, 3 and4: Freshwater Ecology and Bird Surveys*.

3.3 Impact Assessments

Impact assessment used for these surveys followed that of the National Roads Authority (2009) and the IEEM (2006). These provide guidance on assessing impact significance upon aspects of sites proposed for works. Assessment of ecological value of sites is given below:

Table 4. Assessment of Ecological Valuation Summary

Site Rating	Valuation
A	International Importance
B	National Importance
C	County Importance
D	Local Importance (Higher value)
E	Local Importance (Lower value)

The site evaluation scheme of these guidelines would categorise the AECs and the other freshwater sites crossed by the scheme as Rating D: *Locally Important-Higher Value.* Qualifying criteria for this categorisation are given in the table below:

Table 5. *Qualifying criteria for sites of Local Importance (Higher value)*

Locally important populations of priority species or habitats or natural heritage features identified in the Local BAP, if this has been prepared;
Resident or regularly occurring populations (assessed to be important at the Local level)12 of the following:

- *Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive*
- *Species of animal and plants listed in Annex II and/or IV of the Habitats Directive; Species protected under the Wildlife Acts; and/or Species listed on the relevant Red Data list.*

Sites containing semi-natural habitat types with high biodiversity in a local context and a high degree of naturalness, or populations of species that are uncommon in the locality;
Sites or features containing common or lower value habitats, including naturalised species that are nevertheless essential in maintaining links and ecological corridors between features of higher ecological value.

(After NRA, 2009)

While sites of higher ecological value such as the River Blackwater and Emy Lough may be described as Rating B: *Nationally Important,* these sites are not directly connected to any of the freshwater sites crossed or affected by the proposed works. Conversely, the remaining areas to be impacted upon by the scheme may be categorised as *Rating E: Local Importance - Lower Value*.

Assessment of significance and duration of impact for these areas was derived from the NRA (2009). Criteria for assessment of used (EPA 2002), the following terms are defined when quantifying duration:

- Temporary: up to 1 year
- Short-term: from 1-7 years
- Medium-term: 7-15 years
- Long-term: 15-60 years
- Permanent: over 60 years

Assessment of likelihood of impact followed IEEM (2006) guidelines. Which assesses likelihood as follows:

- Almost Certain: probability estimated at greater than 95%
- Probable / Likely: probability estimated between 50% and 95%
- Unlikely: probability estimated between 5% and 50%
- Extremely Unlikely: probability estimated at less than 5%

Assessment of significance and duration of impacts on any D Rated sites are given in the table below.

Table 6. Assessment of Impacts

Site	Rating	Likelihood of Impact	Significance of Impact	Duration of Impact
AEC 1	D	Almost certain	Minor	Short-term
AEC 2	D	Almost certain	Moderate	Long-term
AEC 3	D	Almost certain	Moderate	Long-term
AEC 4	D	Almost certain	Minor	Short-term
AEC 5	D	Almost certain	Minor	Short-term
Tirnaneil River	D	Almost certain	Minor	Temporary
Griggy Lough	D	Unlikely	Minor	Temporary

Specific measures to mitigate against the significance of these impacts are given in the following section (4.2 - 4.3). Mitigation measures outside these areas are given in sections 4.3 -4.7.

4. Mitigation Measures

4.1 Rare, Threatened and Protected Species

No rare or threatened species of plant or mammal were found during surveys. All bird species recorded are subject to legislation. Mitigation measures for bird species are given in Section 4.4, for bat species in 4.5 and for protected mammal species in 4.6 (below)

4.2 Areas of Ecological Constraint

Mitigation measures specific to the areas of ecological constraint are given below.

Table 7. Mitigation measures for AECs

AEC No.	Conservation Interest	Mitigation Measures
1	Wet grassland and scrub	1. Clearance area to be minimised 2. No works to take place in adjacent woodland 3. Soil to be salvaged for reinstatement 4. Clearance to take place outside of bird nesting season
2	Mature trees and scrub and rookery	1. Tree-felling to take place outside of bird nesting season 2. Clearance of scrub to be minimised 3. Native species to be used for reinstatement
3	Mature treelines and rookeries	1. Tree-felling to take place outside of bird nesting season 2. Number of trees to be felled to be minimised 3. Specific surveys for roots of mature trees to be carried out before works to minimise residual impact on trees to be retained 4. Native species to be used for reinstatement of trees
4	Stream: riparian habitat and salmonid potential	1. Site to be surveyed for lamprey prior to works 2. Clearance area to be minimised
5	Stream: riparian habitat and potential crayfish habitat	1. Site to be surveyed for white-clawed crayfish prior to works 2. Number of riparian trees felled to be minimised

4.3 Freshwater Habitats

Detailed mitigation measures for freshwater habitats are given in an accompanying report. These are summarised below.

- Works must follow best practice guidelines by the National Roads Authority (2006) for national road schemes crossing watercourses should be followed. These give specific directions with regard to works and design. In particular, culvert design specifications should be followed.

- The guidelines by the Eastern Regional Fisheries Board (2005) should also be used for planning of works and culvert and fish passage design.

- Consultation with Inland Fisheries Ireland (IFI) should be held on the design of any watercourse crossings.

- Culvert planning and design must be agreed with IFI prior to site works.

- Natural materials should be used in reinstatement of stream sections.

- An environmental operating plan should be drawn up for the site in accordance with guidelines given by the NRA (2009).

- Good site practice methodologies should be essential when working in proximity to watercourses. The guidelines given by CIRIA (Murnane et al., 2006) should be followed.

- A water quality monitoring programme should be set up prior to commencement of works.

- Surveys for protected species must be undertaken at Streams 6 and 7 as described above.

4.4 Birds

Detailed mitigation measures for bird habitats are given in an accompanying report. These are summarised below.

- Tree-felling and scrub clearance works should take place outside of the bird nesting season. Any works taking place within this should be appropriately supervised.

- Tree-felling and clearance should be minimised in extent and selective pruning / cutting carried out in preference to clearance.

- Machinery noise is to be limited.

- Native species are to be used for habitat reinstatement and landscape planting

4.5 Bats

Detailed mitigation measures for bats are given in an accompanying report. These are summarised below.

- The removal of trees, hedgerows, and treelines is to be limited where possible. The delineation of a buffer zone in areas of woody vegetation should be carried out.

- Where treelines or hedgerows must be removed, plants should be salvaged where possible for use in landscape planting. Any mature trees should be removed between September and November.

- Large mature trees showing potential for bat habitat should be removed under specialist supervision. These should be felled as per expert advice.

- Buildings identified as being of potential bat habitat should be protected during works.

- All works activity, including lighting systems should take account of bat activity.

- Compensatory bat habitat may be provided by means of bat boxes or tubes.

- Monitoring of the construction phase to ensure the success of these mitigation measures is recommended.

4.6 Terrestrial Mammals

Detailed mitigation measures for terrestrial mammals are given in an accompanying report. These are summarised below.

- The landtake of the scheme, in particular in areas of scrub or hedgerow, is to be limited.
- Alignment fencing is to be placed between the new alignment and any watercourses in order to allow access to these.
- Habitat reinstatement and landscape planting should use native species and be used to direct mammals toward culverts.

4.7 Soils

The potential impacts upon soils arising from construction of the proposed route may be mitigated against in a number of ways. The instigation of good site management and works practices will ensure that most of these are carried out on a routine basis. The implementation of an environmental operating plan will also assist in protecting soils. Specific recommendations to protect soils are given below:

- No works are to be carried out during times of heavy rainfall or flooding or at any other time when the stability or integrity of soil may be threatened.
- A buffer zone is to be maintained between stockpiled materials and any watercourses.
- Bunds are to be used to protect watercourses from sedimentation and possible ingress of solids
- Designated areas for concrete mixing, pouring and refuelling are to be maintained. These are to be positioned so that no extensive areas of ground or any watercourses may be impacted upon during works.
- Extent of works is to be limited within areas where soils are vulnerable such as wetland, wet grassland or on watercourse banks.

4.8 Other Mitigation Measures

Specific mitigation measures recommended for areas outside the AECs and watercourses are as follows (refer to drawings in Appendix A):

a) Phase 2 - 4

Chainage 1+400 - 2+400

Tree and other riparian habitat clearance at Stream 1 (the Tirnaneil River) is to be limited. Vegetation is to be replaced with native species.

Vegetation on the realigned Stream 2 is to be replaced with native species.

A mature ash tree with ivy at end of section will be retained.

Chainage 2+400 - 3+400

Mature trees with ivy to be lost are to be felled and left for 24 hours to minimise potential harm to bat species.

Trees at church to be retained where possible.

Hedgerows to be replaced with native species (hawthorn and blackthorn).

Chainage 3+400 - 4+400

Hedgerows and treelines are to be replaced with native species (hawthorn and blackthorn).

Riparian habitat at Streams 3 and 4 is to be retained where possible.

Number of mature conifer trees lost from plantation is to be minimised.

Chainage 4+400 - 5+400

Mature hedgerow loss is to be minimised

Number of trees to be lost from willow treeline is to be minimised.

Chainage 5+400 - 5+850

Hedgerows and treelines are to be replaced with native species (hawthorn and blackthorn).

b) Phase 3

Chainage 0+000 - 1+000

Trees at Anketell Grove are to be retained where possible. Care should be taken to avoid damage to roots of trees retained.

Mature trees with ivy to be lost are to be felled and left for 24 hours to minimise potential harm to bat species.

A mature cherry tree on the west of alignment should be retained if possible.

Hedgerows and treelines are to be replaced with native species such as ash, hawthorn and blackthorn.

Chainage 1+000 - 2+400 (end of works)

Mature trees with ivy to be lost are to be felled and left for 24 hours to minimise potential harm to bat species.

Area of scrub to be cleared is to be minimised.

Hedgerows and treelines are to be replaced with native species such as ash, hawthorn and blackthorn.

Ornamental trees are to be retained where possible

5. Conclusion and Recommendations

The main conclusions of this report may be summarised as follows:

- No designated areas for conservation lie within or will be affected by the proposed route.

- Areas to be affected by the route have been assessed as being of *Local Importance*. Of these, 5 no. areas as well as 5 no. watercourses were assessed as being of *Local Importance: higher value* (Rating D). The remaining habitats to be affected by the route may be described as being *Local Importance: lower level* (Rating E).

- No rare, threatened or protected plant or terrestrial mammal species will be significantly impacted upon by the proposed works.

- *Minor negative* impacts of permanent duration to bird populations arising from loss of habitat (mature trees and hedgerow) is predicted.

- *Moderate negative* impacts on commuting bats is predicted arising from loss of habitat such as treelines and hedgerows and feeding areas. However, these may be reduced to minor negative if remaining linear features are reconnected within the landscape.

- *Minor negative* impacts to freshwater habitats of temporary duration arising from habitat loss is predicted.

The main recommendations of this report may be summarised as follows:

- Loss of habitat, particularly riparian and mature woody vegetation is to be minimised. Habitat is to be replaced 'like-for-like' and soil salvage is to be incorporated into compensation habitat where possible.

- Impacts on bird population may be mitigated by correct timing of works, supervision of clearance in sensitive areas and replacement of lost habitat with native species.

- Impacts on bat populations may be mitigated by correct timing of works, limiting clearance areas, compensatory and replacement habitat provision, observance of good practice in any lighting schemes and during works.

- Pre-construction surveys as described above

- Consultation with relevant bodies, in particular Inland Fisheries Ireland and the National Parks and Wildlife Service, should be held prior to works.

- Best practice works operations and good site practice adhering to recognised standards are to be carried out in agreement with relevant personnel.

6. References

Aulio-Wann & Associates (2007) *Local Biodiversity Action Plan for County Monaghan (Final Draft).* Report for Monaghan County Council

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National Parks and Wildlife Service www.npws.ie/en/protectedsites/
Northern Ireland Environment Agency (NIEA) http://maps.ehsni.gov.uk/NIEAProtectedAreas/

Appendix A: Ecology Drawings

Ecology Drawing Nos. N2-1-01
N2-1-02
N2-1-03
N2-1-04

Phase 2

Phase 4

Flynn , Furney.
environmental consultants

Client:

Monaghan County Council

Monaghan County Council
Comhairle Contae Mhuineacháin

General Notes / Legend

BC1	Arable Crops
FL4	Mesotrophic Lakes
FL5	Eutrophic Lakes
FW1	Eroding/Upland Rivers
FW2	Depositing/Lowland Rivers
GA1	Grassland
GS4	Wet Grassland
WD1	Mixed Broadleaved Woodland
WD4	Conifer Plantation
WL1	Hedgerows
WL2	Treelines
WN6	Wet Woodland
WS1	Scrub
AEC	Area of Ecologlcal Constraint
	50m Offset

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Project Name and Address
N2 Realignment
Phase 2, 4 & 3
Ecology Drawings

Ecology

Drawing No.	N2–1–01	
1	First Issue	29.4.11
No.	Revision/Issue	Date

Project	N2	Sheet Set
Date	29.04.2011	01/02
Approx Scale	1: 4000 in A1	

Drawing - A

Drawing - B

Drawing - C

Drawing - D

Flynn , Furney.
environmental consultants

Client:

Monaghan County Council
Comhairle Contae Mhuineacháin

General Notes / Legend

BC1	Arable Crops
FL4	Mesotrophic Lakes
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WN6	Wet Woodland
WS1	Scrub
AEC	Area of Ecological Constraint
	50m Offset

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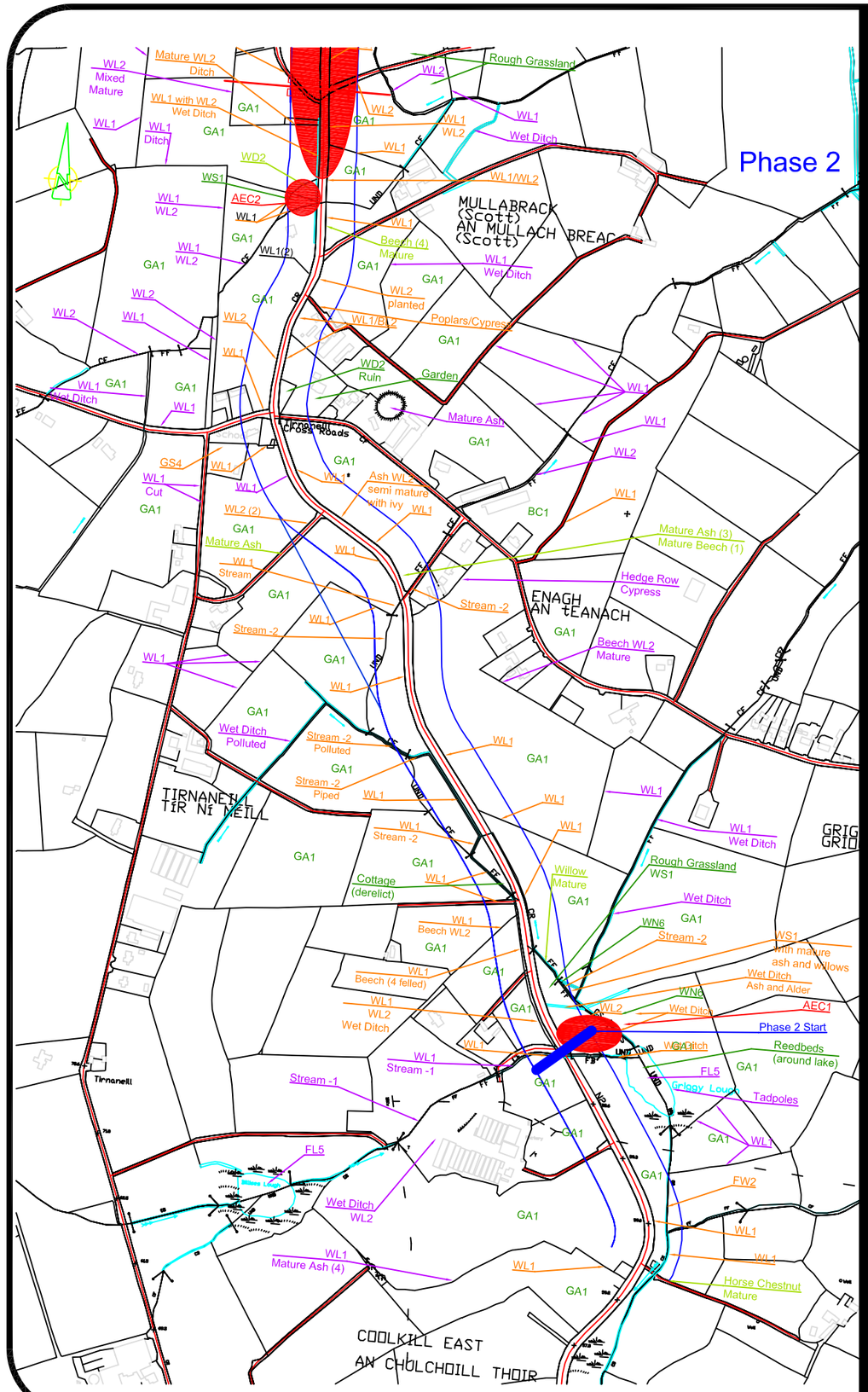
Project Name and Address
N2 Realignment
Phase 2, 4 and 3
ECOLOGY DRAWINGS

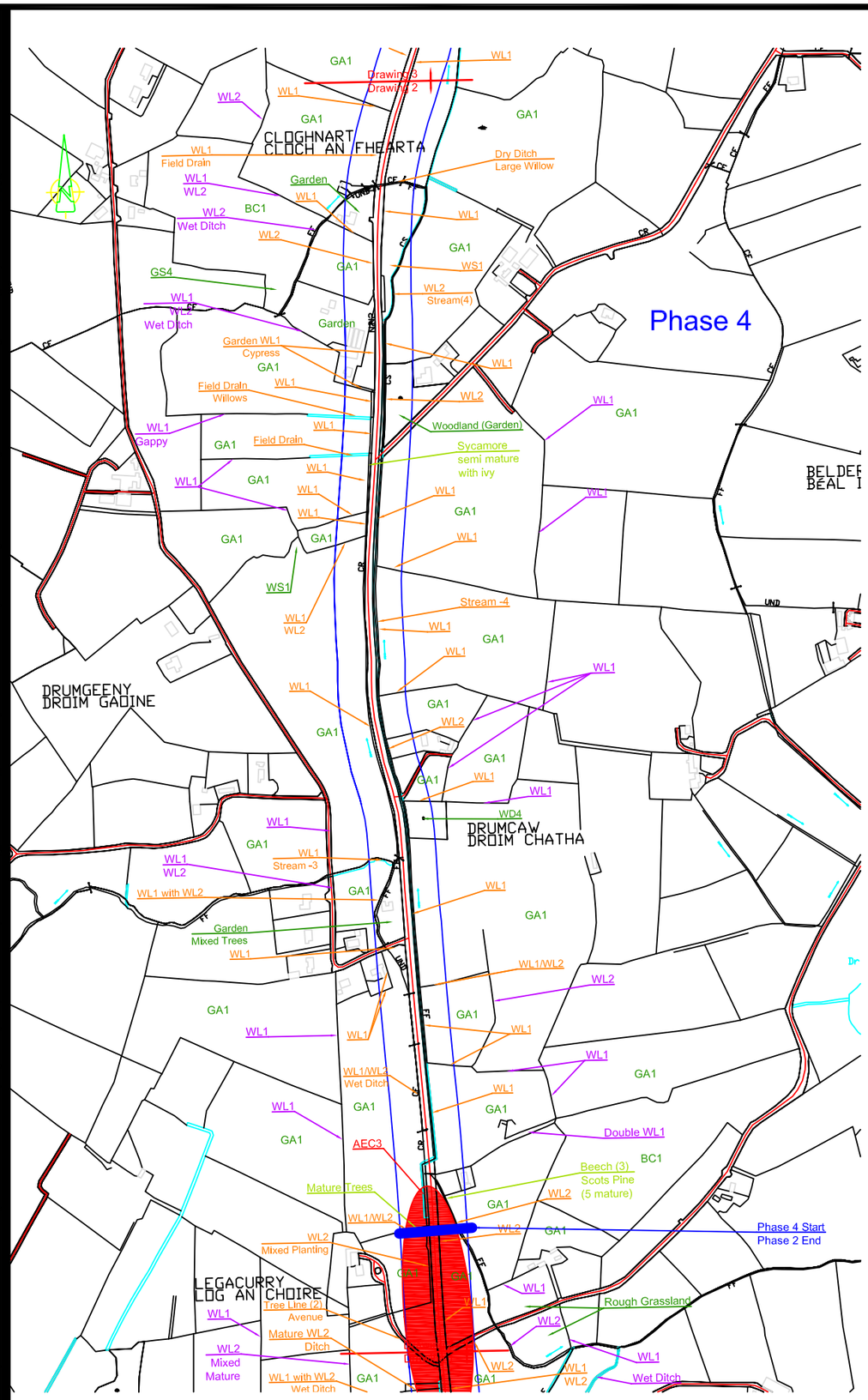
ECOLOGY

Drawing No.	N2–1–02	
2	Rev A	29.4.11
No.	Revision/Issue	Date

Project	N2	Sheet Set
Date	29.04.2011	02/02
Approx Scale	1:4000 in A1	



Drawing - A



Drawing - B

Flynn , Furney.
environmental consultants

Client:

Monaghan County Council
Monaghan County Council
Comhairle Contae Mhuineacháin

General Notes / Legend

BC1	Arable Crops
FL4	Mesotrophic Lakes
FL5	Eutrophic Lakes
FW1	Eroding/Upland Rivers
FW2	Depositing/Lowland Rivers
GA1	Grassland
GS4	Wet Grassland
WD1	Mixed Broadleaved Woodland
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WL1	Hedgerows
WL2	Treelines
WN6	Wet Woodland
WS1	Scrub
AEC	Area of Ecological Constraint
	50m Offset

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Project Name and Address
N2 Realignment
Phase 2,4 and 3
Ecology Drawings

Ecology

Drawing No.	N2–1–03	
1	First Issue	29.4.11
No.	Revision/Issue	Date

Project	Sheet Set
N2	03/04
Date 29.04.2011	
Approx Scale 1:4000 in A1	

Drawing - C

Drawing - D

CREEVELEA
AN CHRAOBH LIATH

CARRIGANS
NA CARRAIGINI

GORTMONEY
GORT MUINE

DERRYHALLAGH
DOIRE SHALACH

KNOCKRONAGHAN
CNOC CHRUITHNEACHAIN

CORRACRIN
CORR AN CHRAINN

LISBOY
AN LIOS BUÍ

SCARNAGEERAGH or EMYVALE
Scairbh na gCaorach

CORNACREEVE
Corr/ na Creoibhe

DERRYGASS
Doire Gas

TULLY
AN TULLAIG

Phase 3

Phase 3 Start
Phase 4 End

Flynn , Furney.
environmental consultants

Client:

Monaghan County Council
Comhairle Contae Mhuineacháin

General Notes / Legend

BC1	Arable Crops
FL4	Mesotrophic Lakes
FL5	Eutrophic Lakes
FW1	Eroding/Upland Rivers
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WL2	Treelines
WN6	Wet Woodland
WS1	Scrub
AEC	Area of Ecological Constraint
	50m Offset

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Project Name and Address
N2 Realignment
Phase 2, 4 and 3
Ecology Drawings

Ecology

Drawing No.	N2–1–04	
1	First Issue	29.4.11
No.	Revision/Issue	Date

Project	Sheet Set
N2	04/04
Date 29.04.2011	
Approx Scale 1:4000 in A1	

Appendix B: Species Names

1. Plant Species

Name	Common Name
Acer pseudoplatanus	Sycamore
Aesculus hippocastanum	Horse chestnut
Alnus glutinosa	Alder
Angelica sylvestris	Angelica
Betula pendula	Silver birch
Caltha palustris	Marsh marigold
Castanea sativa	Spanish Chestnut
Chamaecyparis lawsoniana	Lawson's cypress
Chrysosplenium oppositifolium	Opposite-leaved golden saxifrage
Corylus avellana	Hazel
Crataegus monogyna	Hawthorn
Fagus sylvatica	Beech
Filipendula ulmaria	Meadowsweet
Fraxinus excelsior	Ash
Hedera helix	Ivy
Ilex aquifolium	Holly
Ligustrum vulgare	Privet
Populus tremula	Aspen
Prunus sp.	Cherry
Prunus spinosa	Blackthorn
Ranunculus acris	Meadow buttercup
Ribes sanguineum	Flowering currant
Rosa canina	Dog rose
Rubus fructicosus	Bramble
Salix spp.	Willow
Sambuccus nigra	Elder
Sorbus aucuparia	Rowan
Sorbus aucuparia	Rowan
Symphoricarpos alba	Snowberry
Taraxacum sp	Dandelion
Tilia sp.	Lime
Urtica dioica	Nettle

2. Avifauna

Scientific name	Common name
Alcedo athis	Kingfisher
Corvus frugilegus	Rook
Vanellus vanellus	Lapwing (green plover)

3. Mammal Species

Scientific name	Common name
Lutra lutra	Otter
Meles meles	Badger
Lepus timidus hibernicus	Irish hare

4. Other Species

Scientific name	Common name
Austropotamobius pallipes	White-clawed crayfish
Lampetra fluviatilis	River lamprey
Lampetra planeri	Brook lamprey
Limnephilidae	A caddis fly family
Petromyzon marinus	Sea lamprey
Rana temporaria	Common frog

N2 Monaghan to Emyvale Phase 2, 3 and 4

Freshwater Ecology and Bird Surveys

Date: 22 April 2011

FAO: Oliver Mulligan, Monaghan County Council

By: Billy Flynn, Flynn, Furney Environmental Consultants

Table of Contents

1. Introduction

1.1 Background

The following report details the findings of surveys carried out by Flynn, Furney Environmental Consultants on behalf of Monaghan County Council along the route of the proposed N2 Monaghan to Emyvale realignment. These works will include widening of the existing road, involving some additional landtake and the crossing of a number of small watercourses. Surveys were carried out in April 2011 in order to describe freshwater and bird habitat areas and advise on appropriate mitigation measures. The objectives of these surveys are given below.

1.2 Objectives of Survey

The objectives of the survey may be described as follows:

- To identify the presence or absence of key species such as eels, lamprey and kingfisher
- To identify and record important habitat types such as freshwater or nesting habitats
- To describe potential impacts upon these species by the proposed project
- To provide detailed mitigation measures
- To provide appropriate mapping and photographic records of findings

1.3 Outline Description of Site under Survey

The study site is located in north Co. Monaghan, north of Monaghan town. It extends from the townland of Coolkill some 3km north of Monaghan town to the village of Emyvale. The route is shown in the drawings in Appendix A. The vast majority of the landuse in the area is grazing and the adjoining lands are predominantly improved agricultural grassland. The topography of the site is typical of a drumlin landscape. An important feature of the area under survey is the frequency of well-maintained hedgerow boundaries. The vast majority of the field boundaries surveyed were hawthorn-dominated hedgerows which have been subject to management in recent years. As such, the majority of hedgerows were of the type described by Foulkes (2011) as the most commonly occurring in Monaghan. Ash was the most common tree appearing in hedgerows and in treelines as well as single trees. Beech trees in treelines were also found to be common particularly at the existing N2 roadside. Woodland is rare within the study area. Some small conifer plantations are found as well as a wooded garden. There is a single area of wet woodland at the southernmost point of the route, close to Griggy Lough.

The proposed route crosses 7 no. small watercourses. Although the route is within the catchments of the Monaghan Blackwater and The Mountain Water

Rivers, the route does not cross any major tributaries of these rivers. A single river is crossed by the route. This is the Tirnaneil River the upper stretch of which runs between Bellises Lough and Griggy Lough and is crossed by the existing N2. The lower section of this river flows in a southerly direction from Griggy Lough to the Blackwater. The river is crossed twice by the proposed alignment. The two river crossings are the subject of a previous report (on Phase I of this project) by Atkins (2010).

1.4 Outline Description of Proposed Works

The proposed N2 Monaghan to Emyvale Road Improvement scheme proposes to improve the existing N2 Dublin – Derry National Primary Road by widening the road cross-section, easing bends and undertaking localised minor realignments of the existing road in 4 phases. Phase 1 of the N2 Monaghan to Emyvale Road Improvement Works is currently under construction. The proposed road cross section will include an 8m road width, 2 no. 3m wide verges and associated embankments for cut and fill. Sight visibility splays will also have to be kept clear of obstructions at junctions and accesses. The current work surveys the lands made available (LMA) for Phase 2, 3 and 4 of the proposed N2 Monaghan to Emyvale Road Improvements works.

Phase 2 and 4 are contiguous sections of road, which together comprise a length of approximately 5.3km extending from the townland of Coolkill to the townland of Gortmoney at the settlement of Corracrin. Phase 3 extends from Gortmoney in the settlement of Corracrin to the village of Emyvale. The survey area extends from National Grid Co-Ordinate 267773,336475 to 267695, 343790. The overall length under survey is approximately 7.35km.

1.5 Methodologies

A desktop survey of mapping, aerial photography and species records was initially carried out. Databases held by the National Parks and Wildlife Service (NPWS) and The National Biodiversity Data Centre (NBDC) were consulted. Correspondence with Inland Fisheries Ireland and NPWS was also utilised. Surveys of watercourses followed guidelines given by the Environment Agency (2003). Habitats were identified, mapped and classified and dominant plant species noted in accordance with the guidelines given by the JNCC (2007) and The Heritage Council (2010). Habitats were classified as per Fossitt (2000). Assessment of ecological impact followed guidelines by IEEM (2006) and NRA (2006). Survey for protected species also followed guidelines given in NRA (2010).

2. Results

2.1 Freshwater Survey

All watercourses crossed by the proposed route were surveyed between 6th and 18th April 2011. In addition to this, any watercourses within 250m of the route were also surveyed for target species such as lamprey, white-clawed crayfish, kingfisher and otter. This was extended to 0.5km on some watercourses (e.g. the Mountain Water River) where deemed appropriate.

A previous study (Atkins, 2010) carried out detailed assessment of the Tirnaneil River, the majority of the length of which falls within Phase I of the project. However, as Phase II commences at the crossing of a portion of this river (between Bellises Lough and Griggy Lough), an assessment was carried out on this portion by the present authors. This river is described in this present work as Stream 1. The watercourses surveyed are shown graphically in the drawings in Appendix A and are described in the following section.

None of the sites surveyed fall under any conservation designation. There are no Natural Heritage Areas or Special Areas of Conservation within the proposed route. None of the watercourses surveyed have any direct connectivity with any designated sites. Details of designated sites close to the proposed route are given in an accompanying report.

2.1.1 Description of Sites

Stream 1 (Tirnaneil River - upper stretch).

This watercourse (FW2) drains Belisses Lough (circa 0.7km west of alignment) and flows in a north-easterly direction into Griggy Lough which is less than 0.1km east of the alignment. This stream was u-shaped within the section under survey. Flow was slow to moderate. The stream passes through improved agricultural grassland but also adjoins a mixed use agricultural and horticultural facility which includes mushroom farming. The stream is piped underground for a section downstream of this farm and passes through piped culverts under the existing N2. The stream then passes through a small area of grassland and waste ground before discharging into Griggy Lough, a small eutrophic lake. There is evidence of organic pollution within the stream. Some algal mats are seen in some slow-flowing areas to the west of the existing N2. Some filamentous algae was seen on the base of the stream immediately downstream of the culvert. Some foam was also seen. There were no instream macrophytes. The substrate was uniformly silt. There are 6 no. alders on the banks of the stream downstream of the N2. Upstream of this the channel is overhung with hawthorn, ash and sycamore. No macroinvertebrates were seen on the substratum. Water crickets were seen in some of the slower areas.

This section of the river is of no fisheries value at present given its apparently polluted condition. There is little or no potential for eels to utilise this channel. The stream has been modified for much of the stretch under survey resulting in straightened areas and poor bank vegetation. There is also evidence that a vehicle has tracked across this stream in recent months.

The River Habitat Survey (RHS) data for this stretch is given below.

Watercourse	**Phase**	**Description**
Tirnaneil River (Stream 1)	2	Morphology Channel Structure: U-shaped Banktop Height: 4m Bankfull Height: 3m Average Depth: 20cm Average Width: 1.5-1.8m Modifications: Straightening, bank clearance, pollution.
Habitat	Instream	Substrate: almost uniformly silt, some stones and concrete downstream of culvert . Macrophytes: None. Some algal mats and threads noted.
	Bank	Vegetation type: simple. Grasses dominant. Land use: Agricultural grassland, mushroom farming, unused ground.
Photographs		
		

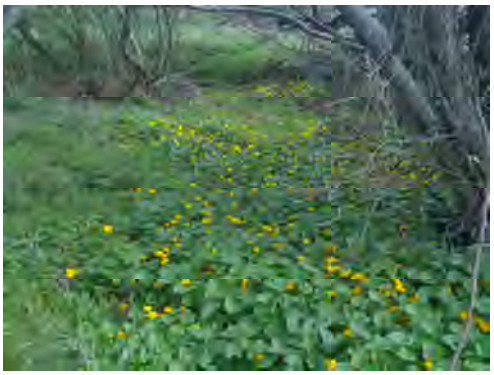
Stream 2 (unnamed stream)

This stream arises in the townland of Tirnaneil circa 0.25km west of the existing N2. The stream flows in a roughly southerly direction through agricultural lands before running alongside the existing N2 under which it is piped. The stream then passes between further agricultural grassland and some scrub before draining to Griggy Lough. Flow was noted as being slight in the upper stretches to none closer to Griggy Lough. The stream is joined by a number of drainage ditches. Although no flow was noted in these at time of survey, and some were completely dry, flow may well exist in higher rainfall conditions. There is evidence of some organic pollution in the upper section of this stream. This appears to be entering the stream from a drainage ditch which enters the river from the south in Tirnaneil. The stream is partially overhung with hawthorn and blackthorn hedgerow and semi-mature ash for much of the section to the west of the alignment although some field boundaries are without substantial vegetation here. Alongside the road, the vegetation over the stream is tightly cut hawthorn-dominated hedgerow. On the lower sections of the stream are more mature trees including ash and willow and these are found on both sides of the stream closer to Griggy Lough. The shallow depth of this stream and lack of flow conditions would indicate poor fishery potential though it may offer some cyprinid habitat. The stream is of no value for lamprey or salmonid species. No crayfish were found.

The River Habitat Survey (RHS) data for this stream are given below.

Watercourse	Phase	Description
Stream 2	2	Morphology Channel Structure: U-shaped Banktop Height: 1m Bankfull Height: 1m Average Depth: 20cm Average Width: 0.8m Modifications: straightened on last roadworks
Habitat	Instream	Substrate: Mostly silt with some cobble Macrophytes: None Fishery value: Limited
	Bank	Vegetation Type: Complex in areas with mature trees. Small area of scrub Landuse: Mostly agricultural grassland, roadside.

Photographs



Stream 3 (unnamed watercourse)

This is a very small watercourse which originates to the west of Drumcaw. The stream flows east toward the N2 under which it is diverted and then joins Stream 4. It is presumed that in higher rainfall conditions part of the flow from this stream would be diverted before the road crossing and flow in a northerly direction parallel to the existing N2. There was some standing water in this channel at time of survey but no flow was noted.

The substrate is a mixture of silt, cobbles and some gravels. Much of the stream is overhung with tightly cut hedgerow. There are some more mature trees at the upper section (west). However, most of the channel is very shaded and the vegetation on banks is limited. The small size and low flow levels of the stream would make this watercourse unlikely to be of suitable habitat for any fish species. There is a limited variety of substrate in this stream and few macroinvertebrates were seen. These were limited to freshwater shrimp (*Gammarus*) and cased caddis larvae of the family Glossosomatidae. RHS data for this stream are given below:

Watercourse	**Phase**	**Description**
Stream 3	2 - 4	Morphology Channel Structure: U-shaped Banktop Height: up to 1.2m Bankfull Height: 1m Average Depth: 10cm Average Width: 80cm Modifications: straightened at last roadworks
Habitat	Instream	Substrate: silt, cobble, gravel Macrophytes: none Fishery value: limited - none
	Bank	Vegetation Type: predominantly simple Landuse: agricultural grassland, road
Photographs		
		

Stream 4 (Unnamed Stream)

This stream originates as a field drain at Legacurry and flows in a northerly direction. The stream flows along the eastern side of the existing N2 for over 1km, diverts away from the road at a garden at Cloghnart before once more flowing parallel to the N2 for several hundred metres. It diverges away from the road again at Corracrin where it joins Stream 6 (see below). The stream is overhung with roadside hedgerow for most of its length. The stream is lost from sight in some areas as it is completely overgrown with gorse, blackthorn, ash and honeysuckle. The poor light conditions lead to very poor macrophyte habitat. The stream has been partially canalised approaching its junction with Stream 6 (see below). The stream is fast-flowing for most of its length. Average depths were very shallow (all <10cm). Macroinvertebrate fauna was limited to *Gammarus duebeni* and Glossosotomid caddises which were highly abundant. This stream offers suitable habitat for species such as stickleback, which were noted, but not for salmonid species. RHS data for this stream are given below:

Watercourse	**Phase**	**Description**
Stream 4	2-4	Morphology Channel Structure: U-shaped Banktop Height: up to 1.5m Bankfull Height: Less than 1m Average Depth: 5-8cm Average Width: c. 0.9-1m Modifications: straightening, canalisation
Habitat	Instream	Substrate: Varied: silt-cobbles Macrophytes: None Fishery value: Limited
	Bank	Vegetation Type: dominated by hedgerow vegetation Landuse: agricultural grassland, road
Photographs		
		

Stream 5 (Unnamed stream, tributary of Stream 4)

This watercourse arises in agricultural land in the townland of Knockronaghan to the west of the existing N2. The stream then flows in a rough easterly direction where it runs parallel to the N2 before crossing under the road via a double-piped culvert. The stream is lined with semi-mature willow to the west of the N2 but for most of its length there is little or no substantial vegetation with the exception of the roadside hedgerow. No fish were recorded in this stream although it would offer suitable habitat for species such as stickleback. The existing culvert may offer a barrier to upstream migration for several species. Flow was noted to be slow in several areas. This allowed pond-skaters and water-crickets to be found in some areas where the depth was up to 0.3m. *Gammarus duebeni* were occasionally seen. No salmonid habitat exists in this watercourse.

RHS data for this stream are given below:

Watercourse	**Phase**	**Description**
Stream 5	4	Morphology Channel Structure: U-shaped Banktop Height: up to 2m Bankfull Height: c. 1m Average Depth: 20cm Average Width: 1m Modifications: straightening, culverting
Habitat	Instream	Substrate: silt with some cobbles Macrophytes: None Fishery value: Limited
	Bank	Vegetation Type: mixed- semi-mature trees and hedgerow, grasses Landuse: agricultural grassland, road
Photographs		
		

Stream 6 (Unnamed stream)

This is a small but fast-flowing stream which arises south of the townland of Creevelea to the west of the existing N2. The stream flows in an easterly direction crosses beneath the N2 under a bridge where shortly after it is joined by Stream 4. It then continues to flow in an easterly direction being crossed by and then running roughly parallel to a local road. The stream has been canalised for a short section where a mill was located. The larger woody vegetation has been cleared from the stream in the field immediately to the east of the N2. The remaining vegetation includes cow parsley, grasses, nettle, meadowsweet and a small amount of bramble. There is a low concrete weir on this stretch. At the crossing under the N2 there is another weir. Above this, young alder and holly have been cut to around 1.2m in height. The maximum width of the channel is around 2m. with an average depth of 20cm. The substrate is mostly silt and there is much debris from tree-cutting. Macroinvertebrates seen were whirligig beetles and water crickets on the surface, a single leech, caddises of the Glossosotomidae family and many tubificid worms. Upstream of the crossing under the N2, flow is slower and there is more siltation visible. Larger caddises of the family Limnephilidae were seen here. The stream here is overhung by semi-mature to mature alders, some of these are in poor condition. The bankside vegetation here is relatively simple, dominated by grasses with some cow parsley and cuckoo flower. The banks are low (<0.5m) on average but stream depth is more uniform and deeper. There are no riffle areas. The stream may well support cyprinid species but none were seen. The stream offers little potential for lamprey or salmonids. RHS data for this stream are given below:

Watercourse	**Phase**	**Description**
Stream 6	4	Morphology Channel Structure: U-shaped Banktop Height: 2m Bankfull Height: 2m Average Depth: 20cm Average Width: 1.8m Modifications: straightening, canalisation, vegetation removal, weirs, mill wheels
Habitat	Instream	Substrate: mostly silt Macrophytes: none Fishery value: limited but has salmonid potential
	Bank	Vegetation Type: Complex (but most woody plants cut) Landuse: Agricultural grassland, road, woodland

(Stream 6 continued)

Photographs	
	

Stream 7 (Unnamed stream)

This is one of the more substantial streams crossed by the route. This stream arises from a stream draining Grove Lough at Cornacreve to the west of the route which joins another watercourse c. 200m west of the N2. This passes under the alignment at Hoof Bridge in Phase 3 of the scheme. The stream then flows in a south-easterly direction to drain into Tully Lough circa 200m west of the N2 at Tully. The stream is overhung with mature trees for much of its length. To the east of the route (leading to Tully L.) there is a double treeline of young alder. On the other side of the alignment there is a mixture of young alder and ash though only on the southern side of the stream. Bank vegetation is complex (more than 10 no. species) including lesser celandine, arum, grasses, docks, dandelion, opposite-leaved golden saxifrage and ivy at ground level. There is bramble, honeysuckle young hawthorn and ivy in the understorey. A substantial number of macroinvertebrates were noted, including cased caddis (Limnephilidae and many Glossosotomidae) and *G. duebeni.* However, no mayfly or stonefly larvae were found. It is unlikely that this stream offers any potential for salmonid or lamprey habitat. This watercourse was seen to have a mixed substrate from some limited silt areas to a predominance of cobbles. Most of the area under survey was riffle. This stream would be suitable habitat for white-clawed crayfish. However, despite intensive survey of this stream, none were found.
RHS data for this stream are given below:

Watercourse	**Phase**	**Description**
Stream		Morphology Channel Structure: U-shaped Banktop Height: 2m Bankfull Height: c. 1m Average Depth: 15cm Average Width: 1.7m Modifications: Culvert (under N2)

(RHS Data: Stream 7 continued)

Habitat	Instream	Substrate: predominantly cobble Macrophytes: none Fishery value: cyprinid, crayfish potential
	Bank	Vegetation Type: complex Landuse: agricultural grassland, road
Photographs		
		

2.1.2 Rare, Threatened or Protected Species

a. Lamprey: There are three species of lamprey known to occur in Ireland. These are Sea Lamprey, River Lamprey and Brook Lamprey. All three species appear on Annex II of the EU 'Habitats' Directive (1997). It is likely that river and brook lamprey occur within the River Blackwater and Mountain Water catchments (Igoe et al., 2004) although there are no specific records for these (Kurz & Costelloe, 1999). No suitable habitat for Lamprey species was found during the survey. Of the watercourses crossed by the route, Stream 6 appears to offer the most potential habitat for brook lamprey.

b. Kingfisher: The kingfisher is a species listed under Annex I of the EU 'Birds' Directive (1979). The species is 'amber listed' as a bird of medium conservation concern by Lynas et. (2007). No evidence of kingfisher nesting or other activity was found during this survey. Kingfishers have been seen on the Mountain Water River and at Stream 7(Pers. Comm[1]) and are likely to be common within the Blackwater catchment.

c. Crayfish: The white-clawed crayfish is a protected species which is listed in Annexes II and V of the 'Habitats' Directive. This species is known to occur in this area (Demers et al., 2005; NBDC) and was recorded in a previous study for this project (Atkins, 2010). Correspondence with IFI confirmed that this species exists in the area under study. The Monaghan County Council Biodiversity Plan (2007) describes this species as 'fairly widespread'. Although suitable habitat for crayfish exists in some of the watercourses crossed by the route, none were found during this survey. The watercourses most likely to offer suitable habitat are Streams 1 (Tirnaneil River) and 7. However, water quality was seen to be very poor in the Tirnaneil River and would therefore make this unsuitable crayfish habitat. Water quality is higher (estimated Q2-Q3) in Stream 7 and would make this more suitable habitat. Tully Lough would also offer suitable habitat.

d. Common Frog: This species is protected under the Wildlife Acts (1976 and 2000) as is its breeding places. Tadpoles of the common frog were found in only 1 no. location within 150m of the route. This was at Griggy Lough. The species is known to be widespread in Monaghan (Barron, 2006).

e. Salmonid (fish) species: No suitable salmonid habitat was found to be within the area under survey.

f. Coarse fish species: Stickleback was the only fish species recorded during the survey. However, good stocks of several species are known from several lakes within the catchment.

[1] Pers Comm: Landowner to fieldworker, 8 April 2011- The reported record from Stream 7 was from "some years ago".

2.2 Bird Survey

All birds seen or heard during the course of the survey were recorded. Birds were recorded within and over the study site. Birds outside the site that could be recognised by sight or song / call were also recorded. Specific bird nesting habitats were recorded where possible. In addition to this, bird-song counts were carried out shortly after dawn on 18 April to listen for species which may not have been heard during survey hours. Approximately 30 minute counts were held in each of the project phases areas at Tirnaneil, Drumcaw and Tully. Bird habitat such as rookeries and scrub were recorded and are shown in the drawings in Appendix A.

2.2.1 Species Recorded

Scientific name	Common name	Resident/ Visitor	BOCCI Status*
Acrocephalus schoenobaenus	Sedge warbler	V	G
Anas crecca	Teal	V	A
Anas platyrhynchos	Mallard	R	G
Apus apus	Swift	V	A
Buteo buteo	Common buzzard	R	G
Carduelis carduelis	Goldfinch	V	G
Columba palumbus	Wood pigeon	R	G
Corvus corax	Raven	R	G
Corvus corvus	Grey crow	R	G
Corvus frugilegus	Rook	R	G
Corvus monedula	Jackdaw	R	G
Erithacus rubecula	Robin	R	G
Fringilla coelebs	Chaffinch	R	G
Gallinago gallinago	Snipe	R	A
Gallinula chloropus	Moorhen	R	G
Hirundo rustica	Barn swallow	V	A
Motacilla cinerea	Grey wagtail	R	G
Parus ater hibernicus	Coal tit	R	G
Parus caeruleus	Blue tit	R	G
Parus major	Great tit	R	G
Passer montanus	Tree sparrow	R	A
Phasianus colchicus	Pheasant	R	G
Pica pica	Magpie	R	G
Pyrhulla pyrhulla	Bullfinch	R	G
Sturnus vulgaris	Starling	R	A
Sylvia atricapilla	Black-cap	V	G
Troglodytes troglodytes	Wren	R	G
Turdus merula	Blackbird	R	G
Turdus philomelus	Song thrush	R	G
Vanellus vanellus	Lapwing (green plover)	R	R

* Status as per Lynas et al. (2007). i.e. as being 'Red (R), Amber (A) or Green (G)' of respectively high, medium or low conservation concern.

Of the 31 no. species recorded, 25 are resident and 6 are summer visitors.

2.2.2 Rare, Threatened or Protected Species

Of the 31 no. species recorded, 6 no. are on the 'Amber' list of birds of conservation concern in Ireland (Lynas et al., 2007). These are: teal, swift, starling, barn swallow, tree sparrow and snipe. A single species - lapwing- is on the 'Red' list and the remainder are on the 'Green' list. No other endangered species were recorded. No kingfisher were recorded during survey.

3. Discussion

3.1 Evaluation of Sites and Impacts upon Freshwater Habitats

The impacts which may be expected from the proposed works are described below. These possible impacts have been assessed under the National Roads Authority guidelines (NRA, 2006). These provides guidance on assessing impact significance upon aspects of sites proposed for works. The site evaluation scheme of these guidelines would categorise the majority of the freshwater sites as Rating D: *Local Importance: higher value*[2]. While sites of higher ecological value such as the River Blackwater and Emy Lough may be described as Rating B: *Nationally Important,* these sites are not directly connected to any of the freshwater sites crossed or affected by the proposed works. Conversely, some of the sites crossed would have poorer freshwater status than described in the qualifying criteria for site importance (see footnote). However, to adopt a precautionary approach, all of the freshwater sites crossed may be given the Rating of D. The rating of these and other sites is given below:

Site	Habitat Type	Rating
Belisses Lough	Eutrophic Lake	D: Local Importance: higher value
Stream 1 (Tirnaneil River - upper stretch).	River	D: Local Importance: higher value
Griggy Lough	Eutrophic Lake	D: Local Importance: higher value
Streams 2-7	Streams	D: Local Importance: higher value
Tully Lough	Mesotrophic Lake	D: Local Importance: higher value
Emy Lough	Mesotrophic Lake	B: National Importance
Mountain Water River	River	C: County Importance

The significance of impacts upon a D category aquatic site are classified as follows:

Scale/Duration	Temporary	Short-term	Medium-term	Long-term
Extensive	Minor	Minor	Moderate	Moderate
Localised	Not significant	Minor	Minor	Minor

(After NRA, 2006)

[2] Category D sites are: containing semi-natural habitat types with high biodiversity in a local context and a high degree of naturalness, or populations of species that are uncommon in the locality; or Sites or features containing common or lower value habitats, including naturalised species that are nevertheless essential in maintaining links and ecological corridors between features of higher ecological value (NRA, 2009).

In line with the EPA Guidelines (EPA 2002), the following terms are defined when quantifying duration:

- Temporary: up to 1 year
- Short-term: from 1-7 years
- Medium-term: 7-15 years
- Long-term: 15-60 years
- Permanent: over 60 years

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

Likelihood of impact is defined in accordance Likelihood of impact is defined in accordance with IEEM's *Guidelines for Ecological Impact Assessment* (2006):

- Almost Certain: probability estimated at greater than 95%
- Probable / Likely: probability estimated between 50% and 95%
- Unlikely: probability estimated between 5% and 50%
- Extremely Unlikely: probability estimated at less than 5%

3.2 Freshwater Habitats to be Impacted upon by Scheme

It is proposed that the re-alignment of the N2 will cross 7 no. watercourses and will also require the re-alignment of a number of these. In addition to this, the route passes in close proximity (<100m) to a lake (Griggy Lough) and within 200m of 2 no. other lakes: Bellises Lough, Tully Lough. Only one lake within 5km of the route is under designation. This is Emy Lough, a proposed Natural Heritage Area and statutory Wildfowl Sanctuary.

The following details watercourses and other freshwater habitats which may be impacted upon by the scheme and details possible impact of works.

Site	Rating	Likelihood of Impact	Significance of Impact
Belisses Lough	C	Extremely Unlikely	Not significant
Stream 1 (Tirnaneil River - upper stretch).	*D*	Almost certain	Minor
Griggy Lough	C	Unlikely	Minor
Streams 2-7	*D*	Almost certain	Minor
Tully Lough	C	Unlikely	Minor
Emy Lough	B	Extremely Unlikely	Not significant
Mountain Water River	C	Extremely Unlikely	Not significant

The above table concludes that there will almost certainly be impacts of minor significance on Streams 1 - 7. Impacts of minor significance upon Griggy and Tully Lough are rated as unlikely. These impacts are discussed in Section 3.3 (below). No impacts of any significance are predicted for the remaining sites.

3.3 Possible Impacts upon Freshwater Habitats

The most significant impacts upon the freshwater sites may be listed as follows:

- Watercourse bank-side vegetation and habitat loss and disturbance during works
- Loss of riparian habitat during channel realignment
- Direct impact upon protected freshwater species such as lamprey and white-clawed crayfish during stream realignment
- Loss of breeding habitat of the common frog
- Indirect impacts to the above species from siltation or other pollution (e.g. fuel, hydraulic fluids, lubricants or concrete) which may occur during culvert construction or channel realignment.

All of the above may be described as minor significance of temporary duration.

Residual impacts from loss of bankside and riparian habitat may be expected. These may be described as of minor significance of short-term duration.

The above impacts may be mitigated by the measures described in Section 4.1 (below)

3.4 Evaluation of Impacts on Bird Species and Habitats

The main impact to birds from the proposed works will be loss of habitat. The majority of this habitat is hedgerow and mature trees. A much less significant amount of grassland will be lost during works. A number of rookeries will be lost or otherwise impacted upon during works (See Appendix A). There will also be impact upon bird species from disturbance during construction, including noise and vibration. Some residual impacts may be expected from loss of habitat. These possible impacts have been assessed under the National Roads Authority guidelines (NRA, 2006). These provides guidance on assessing impact significance upon aspects of sites proposed for works. Guidelines by IEEM (2006) on assessing likelihood of impacts were also used.

The direct loss of habitat by the project, in particular hedgerows, mature trees, treelines and some small plantation areas is predicted to be a minor negative of permanent duration.

Disturbance to bird species from noise and vibration during construction has been assessed as being minor negative of temporary duration.

Residual impacts from loss of habitat such as riparian zones or scrub are predicted as being minor negative of long-term duration.

Measures to mitigate against these impacts are described in the following section.

4. Mitigation Measures

4.1 Freshwater Habitats

Best practice guidelines by the National Roads Authority (2006) for national road schemes crossing watercourses should be followed. These give specific directions with regard to works and design. In particular, culvert design specifications should be followed.

The guidelines by the Eastern Regional Fisheries Board (2005) should also be used for planning of works and culvert and fish passage design.

Consultation with Inland Fisheries Ireland (IFI) should be held on the design of any watercourse crossings. IFI have already expressed preference for the use of clear-span bridges over culverts. If culverts are to be used, the design for these must be carried out in consultation with IFI on a case-by-case basis.

IFI have also expressed their preference for the realignment of any extensive lengths of river or watercourse channel over culverting. The new channels should display hydraulic and morphological characteristic fulfilling the requirements of fisheries habitats. Bed and bank works should be executed in natural materials.

IFI have also stated that:

- Instream works in any salmonid catchments should take place between May and September.
- In the event of any waters containing lamprey, NPWS must be contacted.
- No instream works shall be carried out without written approval of IFI
- There must be no discharge of suspended solids or any other deleterious material to watercourses
- Fish passage conditions must be maintained at all times.

The design, material use, timing and sequence of channel closures and realignments / culverting must be agreed in advance with IFI.

At all times, area of works at water crossings or on banksides is to be limited.

Initial works crossing watercourses should be supervised by an approved ecologist when setting out the site.

It is recommended that a survey for white-clawed crayfish be carried out at Stream 7 prior to the commencement of works.

It is recommended that stream 6 is surveyed for brook lamprey prior to the commencement of works.

It is recommended that any slow-moving or still-water areas are surveyed for spawn or tadpoles of the common frog if works coincide with the breeding season of this species. If found, these must be moved under licence by qualified personnel. Pools may be created within the lands made available to compensate for any loss of breeding habitat.

Residual impacts arising from the loss of riparian or bankside vegetation may be mitigated against by the replacement of native vegetation and the use of native species in landscape measures. It is recommended that an ecologist is consulted in the drawing up of a landscape plan for this project.

It is recommended that physiochemical water quality sampling takes place prior to the commencement of works to establish baseline conditions. Field monitoring should take place during construction.

It is highly recommended that an environmental operating plan be drawn up for the site in accordance with guidelines given by the NRA (2009). This plan should be drawn up using guidelines given by CIRIA (Murnane et al., 2006) in order to minimise pollution risks from site.

Specific mitigation measures for watercourse protection during site works have been detailed in a report issued by Atkins (2010 - Appendix C). These should be implemented during works on this present project.

4.2 Bird Species

The following mitigation measures are recommended to minimise impacts upon bird populations.

- Works involving the removal of any woody vegetation or site clearance shall take place outside the bird nesting season (May-August inclusive).
- Any tree-felling or scrub-clearance carried out within the nesting season should be supervised by an ecologist. Known nesting sites such as rookeries should not be impacted upon during this time.
- Clearance works shall be strictly limited. Sites should be clearly marked out prior to clearance. Scrub and riparian areas should be protected from clearance where possible.
- Selective cutting and pruning should be used in preference to clearance if possible. This is particularly important for riparian trees.
- Machinery noise should be limited close to any of the lakes.

5. Conclusion and Recommendations

The main conclusions of the surveys may be summarised as follows:

- The proposed realignment of the N2 will cross a total of 7 no. watercourses. None of these watercourses were found to be of salmonid standard.
- None of the watercourses crossed are under any statutory designation. The nearest designated site is Emy Lough pNHA which is 1.15km north of the most northerly part of the route.
- The route passes within 250m of three lakes. None of these lakes are under any designation. The route crosses three watercourses which discharge into these lakes as well as one tributary of the Mountain Water River, a known trout river.
- Although freshwater crayfish are known in this catchment and in that of the Blackwater, none were found during this survey. No suitable habitat for lamprey was found.
- Two suspected incidences of pollution were noted. Both of these were of agricultural origin.
- 31 bird species were recorded during fieldwork. The majority of these are typical birds of farmland, hedgerow and woodland. Some birds of wetland were found.
- The majority of birds recorded are of low conservation concern although a single 'red-listed' species (Lapwing) was recorded.
- Several rookeries were recorded within the lands made available for this project

The main recommendations arising from these surveys may be summarised as follows:

- Best practice guidelines for works crossing watercourses by the National Roads Authority and the Eastern Regional Fisheries Board should be followed for planning and design of works at all watercourse crossings and realignments.
- Guidelines by CIRIA (UK) should be used for the maintenance of best practice on site and for protection of watercourses during works.

- Realignment of watercourses is to be preferred over culverts
- Works are to be carried out in consultation with Inland Fisheries Ireland with particular regard to structure design and instream works.
- Works within 'closed' seasons for watercourses are to be avoided where possible.
- Streams 6 and 7 are to be surveyed for brook lamprey and crayfish respectively before construction works.
- Trees, hedgerows and other woody vegetation should not be cleared during the bird nesting season.
- Clearance is to be strictly limited and damage to any areas of scrub is to be avoided where possible. Pruning and cutting should be used in preference to site clearance.

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Appendix A: Freshwater and Bird Survey Drawings

Freshwater/Bird Drawing Nos.	N2-3-01
	N2-3-02
	N2-3-03
	N2-3-04

Phase 2

Phase 4

Drawing - A

Drawing - B

Flynn, Furney.

Client:

Monaghan County Council
Comhairle Contae Mhuineach in

General Notes / Legend

50m Offset

Landtake

Flynn Furney
Environmental
Consultants Ltd
www.flynnfurney.com

Project Name and Address

N2 Realignment
Phase 2,4 and 3
Ecology Drawings

Avian

Drawing No.	N2–3–01	
2	Rev A	29.4.11
No.	Revision/Issue	Date

Project	Sheet Set
N2	01/04
Date: 29.04.2011	
Approx Scale: 1:4000 in A1	

Drawing - C

Drawing - D

Phase 3

Phase 3

CARRIGANS
NA CARRAIGINI

CREEVELEA
AN CHRAOBH LIATH

DERRYHALLAGH
DOIRE SHALACH

GORTMONEY
GORT MUINE

KNOCKRONAGHAN
CNOC CHRUITHNEACHAIN

CORRACRIN
CORR AN CHRAINN

LISBOY
AN LIOS BUÍ

SCARNAGEERAGH or EMYVALE
Scairbh na gCaorach

EMYVALE

DERRYGASS
Doire Gas

CORNACREEVE
Corr na Creaibhe
LTRC: Scairbh na gCaorach]

TULLY
AN TULLAIG

Grove Lough

Tully Lough

Hoof Bridge

Grave Yard

Anketell Grove

Stone

Church

Ravens

Kingfisher
(reports)

Rookery

Moorhens

Phase 3 Start
Phase 4 End

Drawing 4
Drawing 3

Drawing 5
Drawing 2

ch 1000
ch 900
ch 800
ch 700
ch 600
ch 500
ch 400
ch 300
ch 200
ch 100
ch 5500
ch 5700
ch 5600
ch 5500
ch 5400
ch 5300
ch 5200
ch 5100
ch 5000
ch 2600
ch 2500
ch 2400
ch 2300
ch 2200
ch 2100
ch 2000
ch 1900
ch 1800
ch 1700
ch 1600
ch 1500
ch 1400
ch 1300
ch 1200
ch 1100
ch 1000

Flynn , Furney.

Client:

Monaghan County Council
Comhairle Contae Mhuineach in

General Notes / Legend

50m Offset

Landtake

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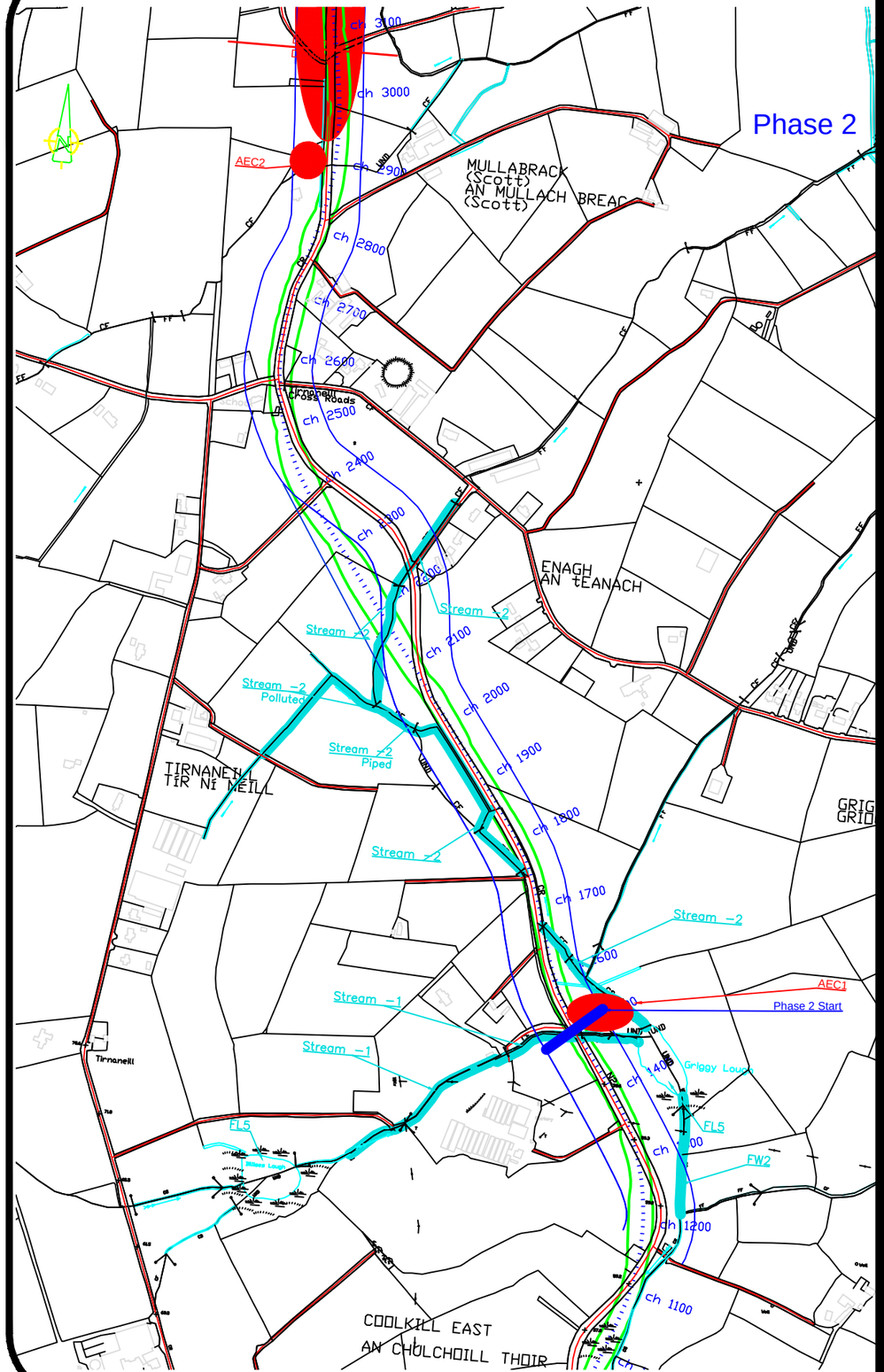
Project Name and Address

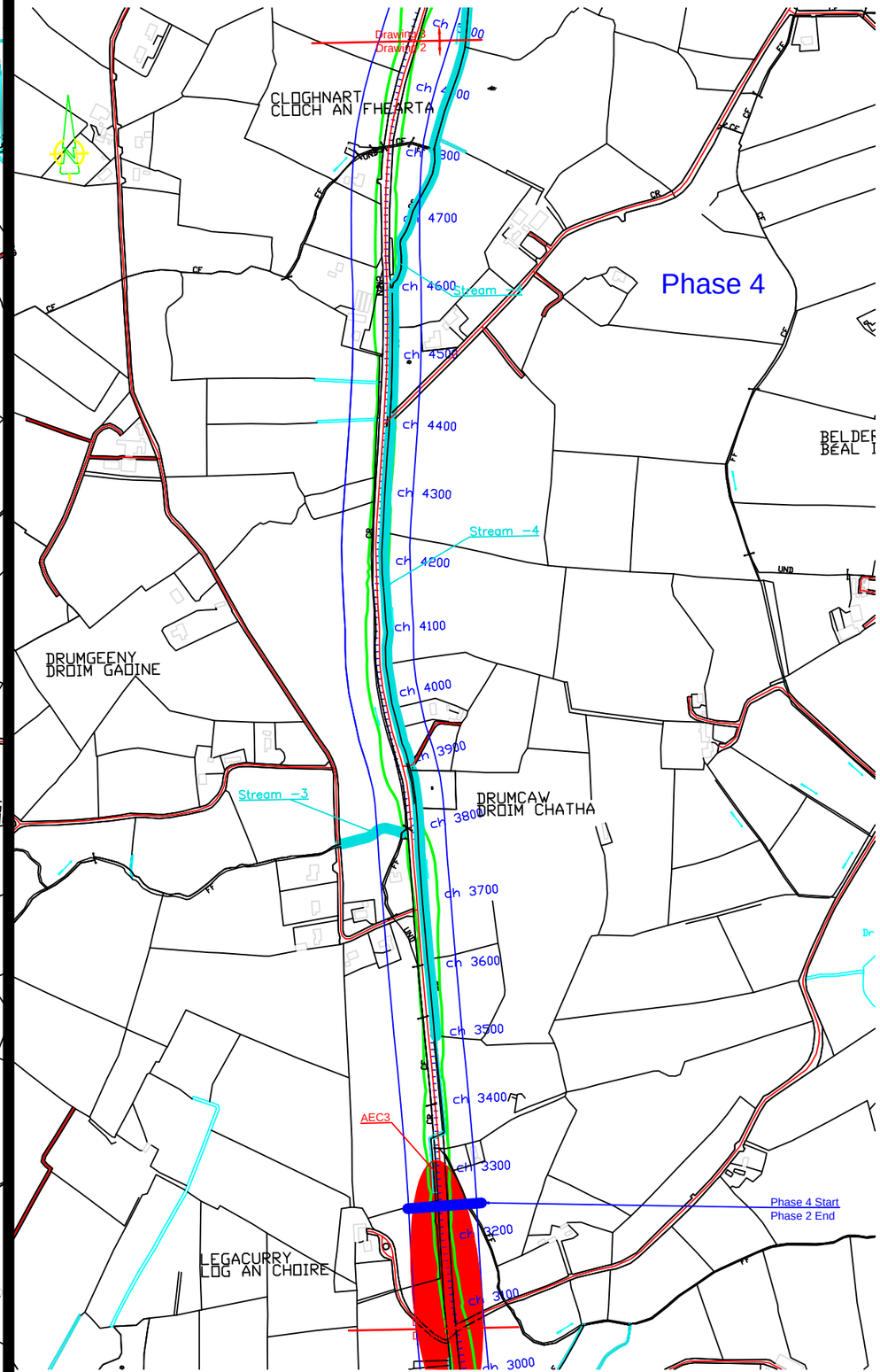
N2 Realignment
Phase 2,4 and 3
Ecology Drawings

Avian

Drawing No.	N2–3–02	
2	Rev A	29.4.11
No.	Revision/Issue	Date

Project	Sheet Set
N2	02/04
Date 29.04.2011	
Approx Scale 1:4000 in A1	





Flynn, Furney.

Client:

Monaghan County Council

Monaghan County Council
Comhairle Contae Mhuineach in

General Notes / Legend

FL4	Mesotrophic Lakes
FL5	Eutrophic Lakes
FW1	Eroding/Upland Rivers
FW2	Depositing/Lowland Rivers
AEC	Area of Ecological Constraint

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Project Name and Address
N2 Realignment
Phase 2,4 and 3
Ecology Drawings

Freshwater

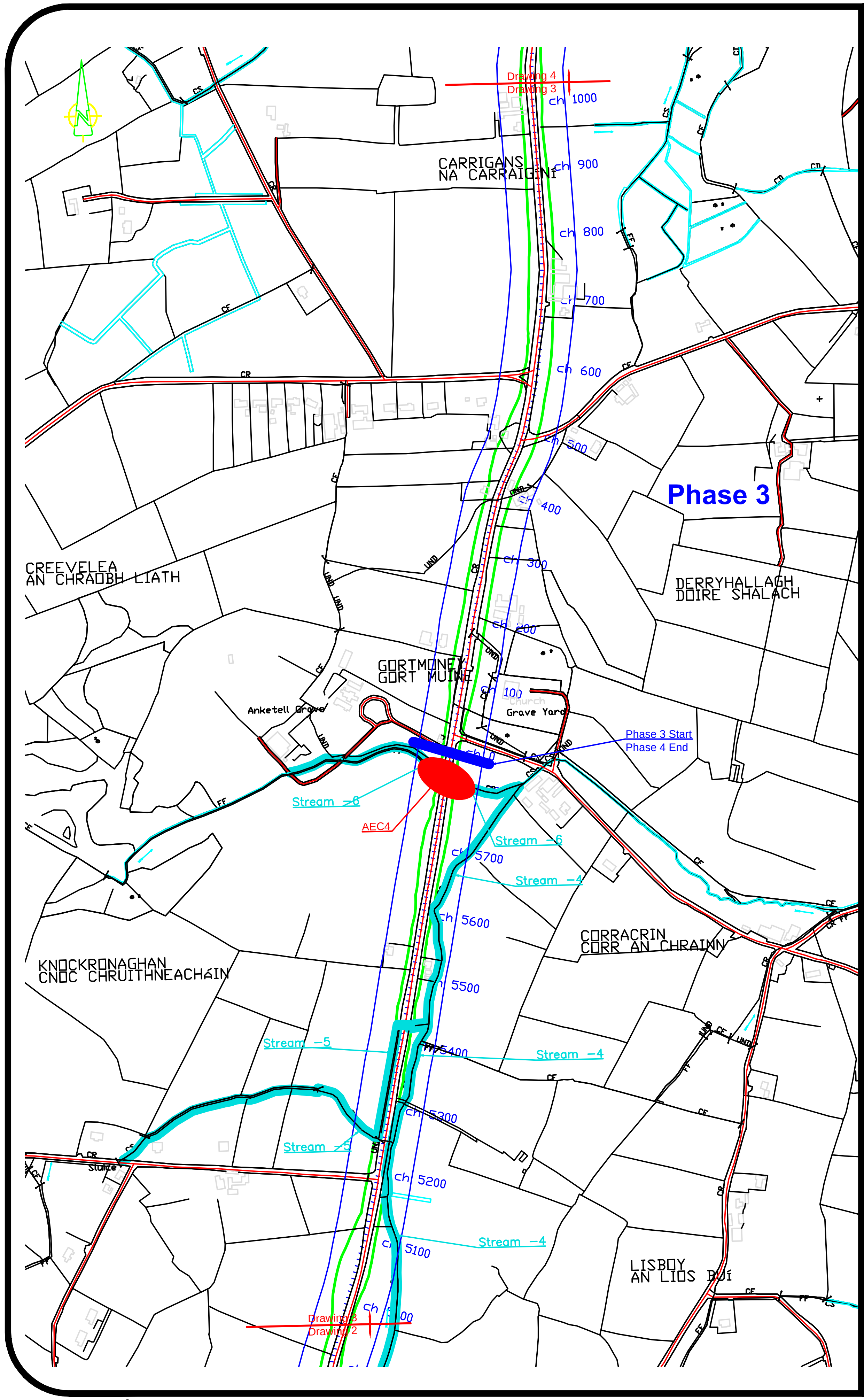
Drawing No. N2–3–03

No.	Revision/Issue	Date
2	Rev A	29.4.11

Project	Sheet Set
N2	03/04
Date: 29.04.2011	
Approx Scale: 1:4000 in A1	

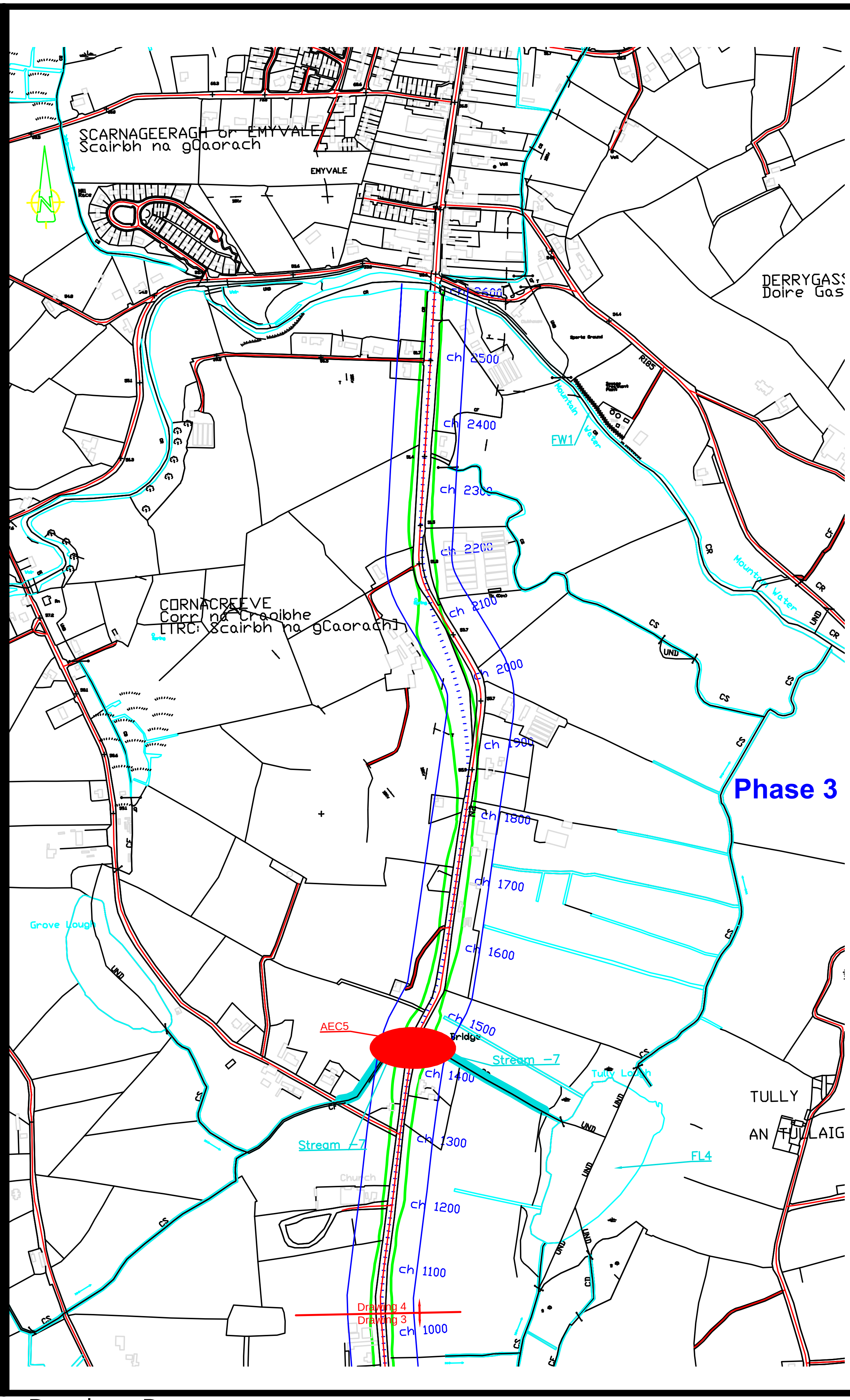
Drawing - A

Drawing - B



Drawing 4
Drawing 3
ch 1000
CARRIGANS
NA CARRAIGÍNÍ
ch 900
ch 800
ch 700
ch 600
ch 500
ch 400
Phase 3
ch 300
ch 200
ch 100
CREEVELEA
AN CHRAOBH LIATH
DERRYHALLAGH
DOIRE SHALACH
GORTMONEY
GORT MUINE
Anketell Grove
Grave Yard
Phase 3 Start
Phase 4 End
Stream -6
AEC4
Stream -6
ch 5700
Stream -4
ch 5600
CORRACRIN
CORR AN CHRAINN
KNOCKRONAGHAN
CNOC CHRUITHNEACHÁIN
ch 5500
Stream -5
ch 5400
Stream -4
ch 5300
Stream -5
ch 5200
ch 5100
Stream -4
LISBOY
AN LIOS BUÍ
Drawing 3
Drawing 2

Drawing - C



SCARNAGEERAGH or EMYVALE
Scairbh na gCaorach
EMYVALE
DERRYGASS
Doire Gas
ch 2600
ch 2500
ch 2400
FW1
ch 2300
ch 2200
CORNACREEVE
Corr na Craoibhe
[TRC: Scairbh na gCaorach]
ch 2100
ch 2000
ch 1900
Phase 3
ch 1800
ch 1700
Grove Lough
ch 1600
AEC5
ch 1500
Bridge
Stream -7
ch 1400
TULLY
AN TULLAIGH
Stream -7
ch 1300
FL4
ch 1200
ch 1100
Drawing 4
Drawing 3
ch 1000

Drawing - D

Flynn, Furney.

Client:

Monaghan County Council
Comhairle Contae Mhuineach in

General Notes / Legend

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Project Name and Address

N2 Realignment
Phase 2,4 and 3
Ecology Drawings

Freshwater

Drawing No. N2-3-04

No.	Revision/Issue	Date
2	Rev A	29.4.11

Project: N2
Sheet Set: 04/04
Date: 29.04.2011
Approx Scale: 1:4000 in A1

Appendix B: Species Names

1. Plant Species

Name	Common Name
Acer pseudoplatanus	Sycamore
Acer pseudoplatanus	Sycamore
Alnus glutinosa	Alder
Arum maculatum	Arum
Cardamine pratensis	Cuckoo flower
Chrysosplenium oppositifolium	Opposite-leaved golden saxifrage
Corylus avellana	Hazel
Crataegus monogyna	Hawthorn
Fagus sylvatica	Beech
Filipendula ulmaria	Meadowsweet
Fraxinus excelsior	Ash
Hedera helix	Ivy
Hedera helix	Ivy
Heracleum sphondylium	Hogweed
Ilex aquifolium	Holly
Ligustrum vulgare	Privet
Prunus spinosa	Blackthorn
Ranunculus ficaria	Lesser celandine
Rosa canina	Dog rose
Rubus fructicosus	Bramble
Salix spp.	Willow
Sambuccus nigra	Elder
Sorbus aucuparia	Rowan
Taraxacum sp	Dandelion
Urtica dioica	Nettle

2. Avifauna

Scientific name	Common name
Acrocephalus schoenobaenus	Sedge warbler
Alcedo athis	Kingfisher
Anas crecca	Teal
Anas platyrhynchos	Mallard
Apus apus	Swift
Buteo buteo	Common buzzard
Carduelis carduelis	Goldfinch
Columba palumbus	Wood pigeon
Corvus corax	Raven
Corvus corvus	Grey crow

Corvus frugilegus	Rook
Corvus monedula	Jackdaw
Erithacus rubecula	Robin
Fringilla coelebs	Chaffinch
Gallinago gallinago	Snipe
Gallinula chloropus	Moorhen
Hirundo rustica	Barn swallow
Motacilla cinerea	Grey wagtail
Parus ater hibernicus	Coal tit
Parus caeruleus	Blue tit
Parus major	Great tit
Passer montanus	Tree sparrow
Phasianus colchicus	Pheasant
Pica pica	Magpie
Pyrhulla pyrhulla	Bullfinch
Sturnus vulgaris	Starling
Sylvia atricapilla	Black-cap
Troglodytes troglodytes	Wren
Turdus merula	Blackbird
Turdus philomelus	Song thrush
Vanellus vanellus	Lapwing (green plover)

3. Mammal Species

Scientific name	Common name
Lutra lutra	Otter

4. Other Species

Scientific name	Common name
Anguilla anguilla	Eel
Austropotamobius pallipes	White-clawed crayfish
Chironomidae	A family of midges
Gammarus duebeni	A freshwater shrimp
Gasterosteus aculeatus	Three-spined stickleback
Gerridae	A pond-skater family
Glossosomatidae	A caddis fly family
Lampetra fluviatilis	River lamprey
Lampetra planeri	Brook lamprey
Limnephilidae	A caddis fly family
Petromyzon marinus	Sea lamprey
Rana temporaria	Common frog
Veliidae	A water cricket family

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environmental consultants

N2 Monaghan to Emyvale Phase 2, 3 and 4

Terrestrial Mammal Report

Date: 23 April 2011

FAO: Oliver Mulligan, Monaghan County Council

By: Billy Flynn, Flynn, Furney Environmental Consultants

Table of Contents

1. Introduction

1.1 Background

The following report details the findings of surveys carried out by Flynn, Furney Environmental Consultants on behalf of Monaghan County Council along the route of the proposed N2 Monaghan to Emyvale realignment. These works will include widening of the existing road, involving some additional landtake and the crossing of a number of small watercourses. Surveys were carried out in April 2011 in order to describe terrestrial mammal habitat and activity within the lands made available for this project and in surrounding areas. The report also advises on mitigation measures. The objectives of these surveys are given below.

1.2 Objectives of Survey

The objectives of the survey may be described as follows:

- To identify the presence or absence of terrestrial mammal species
- To identify and record signs of mammal activity or refuges
- To describe potential impacts upon these species by the proposed project
- To provide detailed mitigation measures
- To provide appropriate mapping and photographic records of findings

1.3 Outline Description of Site under Survey

The study site is located in north Co. Monaghan, north of Monaghan town. It extends from the townland of Coolkill some 3km north of Monaghan town to the village of Emyvale. The route is shown in the drawings in Appendix A. The vast majority of the landuse in the area is grazing and the adjoining lands are predominantly improved agricultural grassland. The topography of the site is typical of a drumlin landscape. An important feature of the area under survey is the frequency of well-maintained hedgerow boundaries. The vast majority of the field boundaries surveyed were hawthorn-dominated hedgerows which have been subject to management in recent years. As such, the majority of hedgerows were of the type described by Foulkes (2011) as the most commonly occurring in Monaghan. Ash was the most common tree appearing in hedgerows and in treelines as well as single trees. Beech trees in treelines were also found to be common particularly at the existing N2 roadside. Woodland is rare within the study area. Some small conifer plantations are found as well as a wooded garden. There is a single area of wet woodland at the southernmost point of the route, close to Griggy Lough.

1.4 Outline Description of Proposed Works

The proposed N2 Monaghan to Emyvale Road Improvement scheme proposes to improve the existing N2 Dublin – Derry National Primary Road by widening the road cross-section, easing bends and undertaking localised minor realignments of the existing road in 4 phases. Phase 1 of the N2 Monaghan to Emyvale Road Improvement Works is currently under construction. The proposed road cross section will include an 8m road width, 2 no. 3m wide verges and associated embankments for cut and fill. Sight visibility splays will also have to be kept clear of obstructions at junctions and accesses. The current work surveys the lands made available (LMA) for Phase 2, 3 and 4 of the proposed N2 Monaghan to Emyvale Road Improvements works.

Phase 2 and 4 are contiguous sections of road, which together comprise a length of approximately 5.3km extending from the townland of Coolkill to the townland of Gortmoney at the settlement of Corracrin. Phase 3 extends from Gortmoney in the settlement of Corracrin to the village of Emyvale. The survey area extends from National Grid Co-Ordinate 267773,336475 to 267695, 343790. The overall length under survey is approximately 7.35km.

1.5 Methodologies

A desktop survey of mapping, aerial photography and species records was initially carried out. Correspondence with the Conservation Ranger of the National Parks and Wildlife Service was also undertaken. Landowners, when met, were also asked of known sightings of protected mammal species.

The mammal survey involved direct observation (during daylight hours) of signs of mammal activity which included prints, tracks, hairs, droppings, odour, digging and evidence of feeding. Refuges such as badger (*Meles meles*) setts were also observed and recorded. Where encountered, evidence of mammal activity such as well-used paths, tracks and latrines etc was recorded and these are also shown in the drawings in Appendix A.

Guidelines by the NRA (2005a [for badgers] and 2006 [for otters]) were employed for this survey. Establishment of significance of impact was carried out following the guidelines given by the IEEM (2006). The entire proposed route of the N2 was walked, the survey area extending up to 250m from the proposed alignment. Particular attention was paid to field boundaries, scrub and woodland.

2. Results

2.1 Desktop Survey

There are records of many mammal species in north Co. Monaghan (e.g. Hayden and Harrington, 2000). These include stoat, otter, badger, sika, red and fallow deer, hedgehog, fox, rabbit and Irish hare. A previous study of Phase I of this present project by Keely (2010) recorded evidence of otters along tributaries of the Monaghan Blackwater as well as evidence of fox, rabbit, hedgehog, brown rat, wood mouse.

Correspondence with National Parks and Wildlife Service staff confirmed that pine marten are now established in Co. Monaghan. Red squirrel have been seen in Glaslough (author record) in recent years. The Conservation Ranger confirmed that there are no deer known within the study area.

2.2 Mammal Survey

Mammal surveys took place between the 6 and 8 April 2011. Conditions for survey were optimal. Survey results are shown graphically in the drawings in Appendix A.

a) Badger

A single badger sett was found during survey. This was in Phase 3 of the scheme at approximate chainage 1+000 a little over 100m west of the alignment. This is a single-entrance outlier and has been disused for some time. It is unlikely that this has been in use in the last year. No setts were found within the lands made available for the scheme. Badger tracks were found in 5 no. locations. Two latrines were found. It is estimated that the 250m survey corridor encountered 4 no. badger territories. A landowner (Pers comm.[1]) reported that badgers in this area had been snared and removed as part of the government's bovine Tuberculosis eradication attempts and populations had never recovered.

Fig 1. Badger sett at Carrigans

[1] Pers. comm. Landowner to fieldworker 6 April 2011. Believed to be an accurate report as the landowner is a veterinary surgeon who worked on this project.

b) Irish Hare

A single sighting of an Irish hare was made. This was in Phase 2 of the scheme at approximate chainage 4+500, around 40m west of the alignment.

c) Fox

Fox tracks and runs were found throughout the area under survey.

d) Rabbit

Rabbit warrens and burrows were found in large numbers throughout the survey site.

Fig 2. One of many rabbit warrens seen

e) Squirrels

Although some suitable habitat exists for both species of squirrel within 250m of the proposed route, no sightings of any squirrels were made nor evidence of any activity found.

f) Pine marten

This is a mammal whose range has been extending throughout the island of Ireland. However, no sightings of this species or any signs of activity were made.

g) Otter

No signs of otter activity were recorded. There is little suitable otter habitat found within the survey area. The exception to this is the Mountain Water River. No otter signs were found along a 1km stretch of this river centred on the village of Emyvale.

h) Other Mammal Species

Deer: No signs of deer activity were recorded during survey. The Conservation Ranger and any landowners encountered confirmed that no deer are known in this area.

Mink: While suitable habitat for this species exists in several areas within the survey area, no signs of this species' activity were found. Mink were reported by a landowner (Pers comm.[2]) to be present in the vicinity of Stream 6 at Gortmoney. Should mink occur in the area, no mitigation measures would be recommended for this species as it is a non-native invasive species.

Brown Rat and Wood Mouse: Tracks of these species were found throughout the survey area in which they would be common.

Stoat, Hedgehog and Pygmy Shrew: No findings of these species were made. However, it is extremely likely that they would occur within the area under survey.

Roadkill: No roadkilled mammals were encountered during intensive survey of the existing N2 and its proposed realignment route.

All of the mammals found during this survey are listed as being of 'Least Concern' on the Red Data list for Irish Mammals (Marnell et al., 2009) in both national and European contexts.

Fig 3. Badger prints to west of route

[2]

3. Discussion

3.1 Mammal Habitats to be Impacted upon by Scheme

a) Badger

No badger setts will be impacted upon by this scheme. It is not thought that any badger territory is divided by the existing N2, nor will the proposed works divide any territorial area. No indications that badgers cross the existing N2 were found. Extremely few signs of badger activity were found, given the suitability of the area for badgers. The recent licensed removal of badgers from the area is believed to be in part responsible for this. No significant impacts are expected on this species.

b) Irish Hare

The proposed works will involve some loss of habitat for this species. However, it is not thought that this would have any perceptible impact upon hares in this area.

c) Stoat and Hedgehog

The proposed works will involve some loss of habitat for these species. The significance of these impacts is thought to be moderate negative of short-term duration.

d) Brown Rat and Wood Mouse

The proposed works will involve some loss of habitat for these species. Given the high populations of these species no impact of any perceptible significance is predicted.

Fig 4. Mature treelines such as this in Phase 4 of the scheme offer habitat to several mammal species

4. Mitigation Measures

4.1 Terrestrial Mammals

a) Badgers

No impacts are predicted upon this species given the survey findings. However, adopting a precautionary approach is recommended, given that the populations of this mammal may recover in time. No badger-proof fencing is recommended on the realignment. The post and rail fencing with mesh that is proposed for this route would prove a deterrent for mammals crossing this route. However, no paths or tracks found indicate any established mammal routes across the proposed route. Mesh may be attached to any farmer's access gates to be installed along the new fenceline. Concrete sills would ensure that these gates were mammal-proof. No underpasses are recommended.

b) Irish Hare

Strictly limiting the land-take of the scheme will mitigate against the impact of habitat loss on this species.

c) Stoat, Hedgehog, Brown Rat and Wood Mouse

Strictly limiting the land-take of the scheme will mitigate against the impact of habitat loss on these species. Clearance of any scrub areas should be avoided where possible. Mature hedgerows should be left as intact as possible in all works areas.

d) General Mitigation Measures

Alignment fencing should be placed between the proposed road and existing or realigned watercourses. Fencing should go over culverts, allowing mammal access through the culverts. Fencing should be tied in to structures such as culverts and bridges. Planting should use native shrub and tree species. These may be used to guide species toward culverts.

Fig 5. Mammal run used by badgers in Phase 4

5. Conclusion and Recommendations

The main conclusions of this report may be summarised as follows:

- Evidence of activity of 6 no. mammals was found. These being: badger, Irish hare, rabbit, fox, brown rat and wood mouse.

- Though no signs were found, it is likely that several other mammal species occur within the survey area. These being: stoat and hedgehog. Mink may also occur but this is a non-native invasive species.

- No badger setts or otter holts will be impacted upon by the proposed scheme. A single badger sett was found but this was disused and over 100m from the lands made available.

- No badger territory will be impacted upon by the proposed scheme. Unusually low badger population densities are thought to be a result of intensive (licensed) badger snaring and culling in recent years.

- No evidence of deer or pine marten were found in the area under survey.

The main recommendations may be summarised as follows:

- While no mammal -proof fencing is recommended. Post and rail fencing with standard mesh should be placed between the alignment and watercourses and allow mammal access to culverts. Farmers' gates may be made mammal-proof.

- Limiting the amount of habitat such as hedgerow, tree, scrub and woodland will serve to mitigate against the impact of this scheme on protected species such as stoat and hedgehog.

- The replacement of hedgerow and mature woody vegetation with native species of shrub and tree will mitigate against loss of habitat. This planting may also be used to direct mammals toward culverts.

6. References

Hayden, T. & Harrington, R. (2000). Exploring *Irish mammals*. Dúchas. Town House Dublin.

Marnell, F., Kingston, N. & Looney, D. (2009) Ireland Red List No. 3: Terrestrial Mammals, National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin, Ireland.

National Roads Authority (2005a). Guidelines for the treatment of badgers prior to the construction of national roads schemes. NRA, Dublin.

National Roads Authority (2006a) *Guidelines for the Treatment of Otters prior to the Construction of National Roads*. National Roads Authority, Dublin.

Appendix A: Mammal Survey Drawings

Mammal Survey	N2-2-01
Drawing Nos.	N2-2-02

Phase 2

Phase 4

Drawing - A

Drawing - B

Flynn, Furney.
environmental consultants

Client:

Monaghan County Council

Monaghan County Council
Comhairle Contae Mhuineach in

General Notes / Legend

- Badger Path
- Badger Print
- Badger Sett
- L Badger Latrine
- 50m Offset
- Landtake

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Project Name and Address

N2 Realignment
Phase 2,4 and 3
Ecology Drawings

Mammal

Drawing No.	N2–2–01	
2	Rev A	29.4.11
No.	Revision/Issue	Date

Project	Sheet Set
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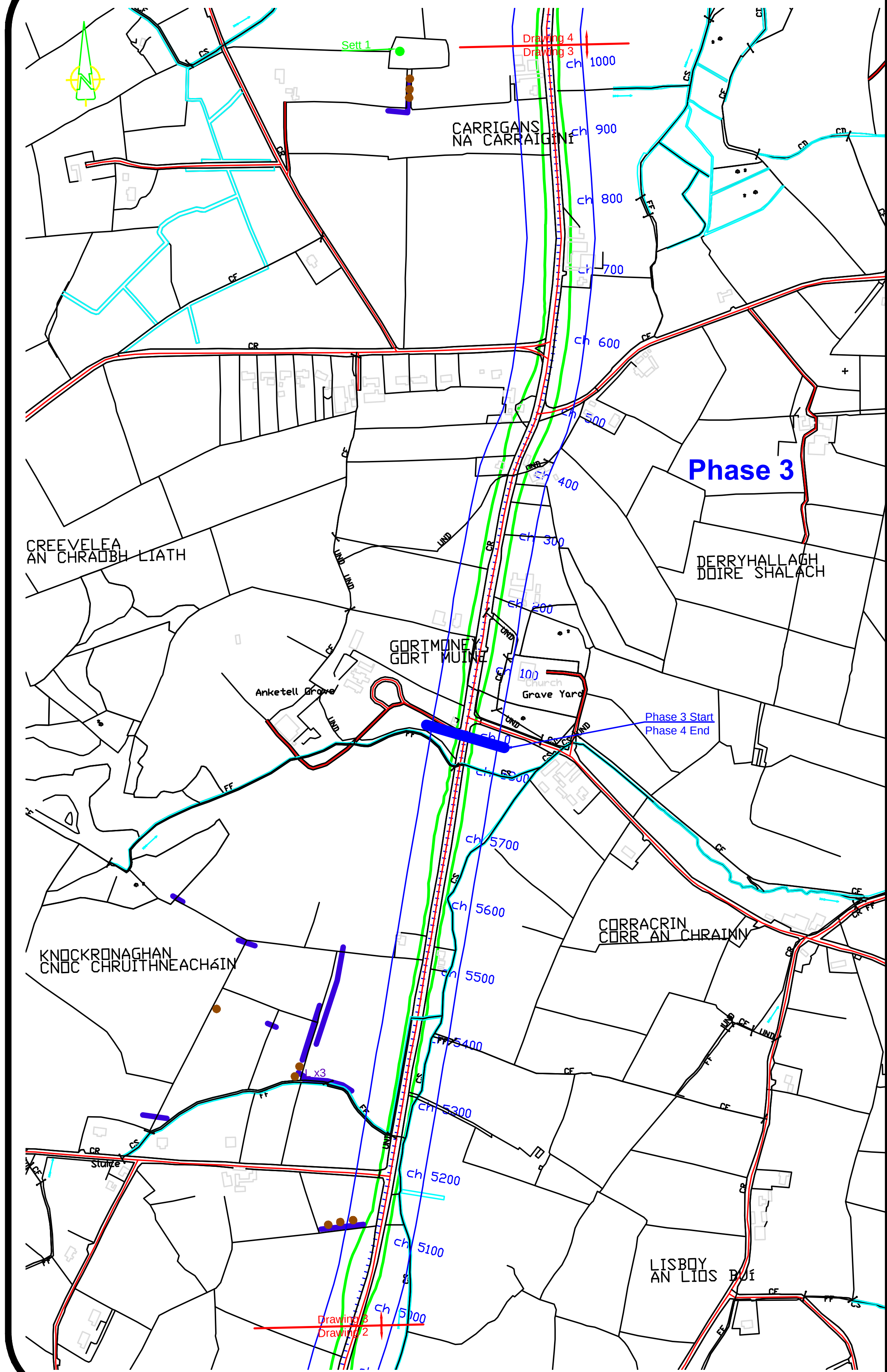
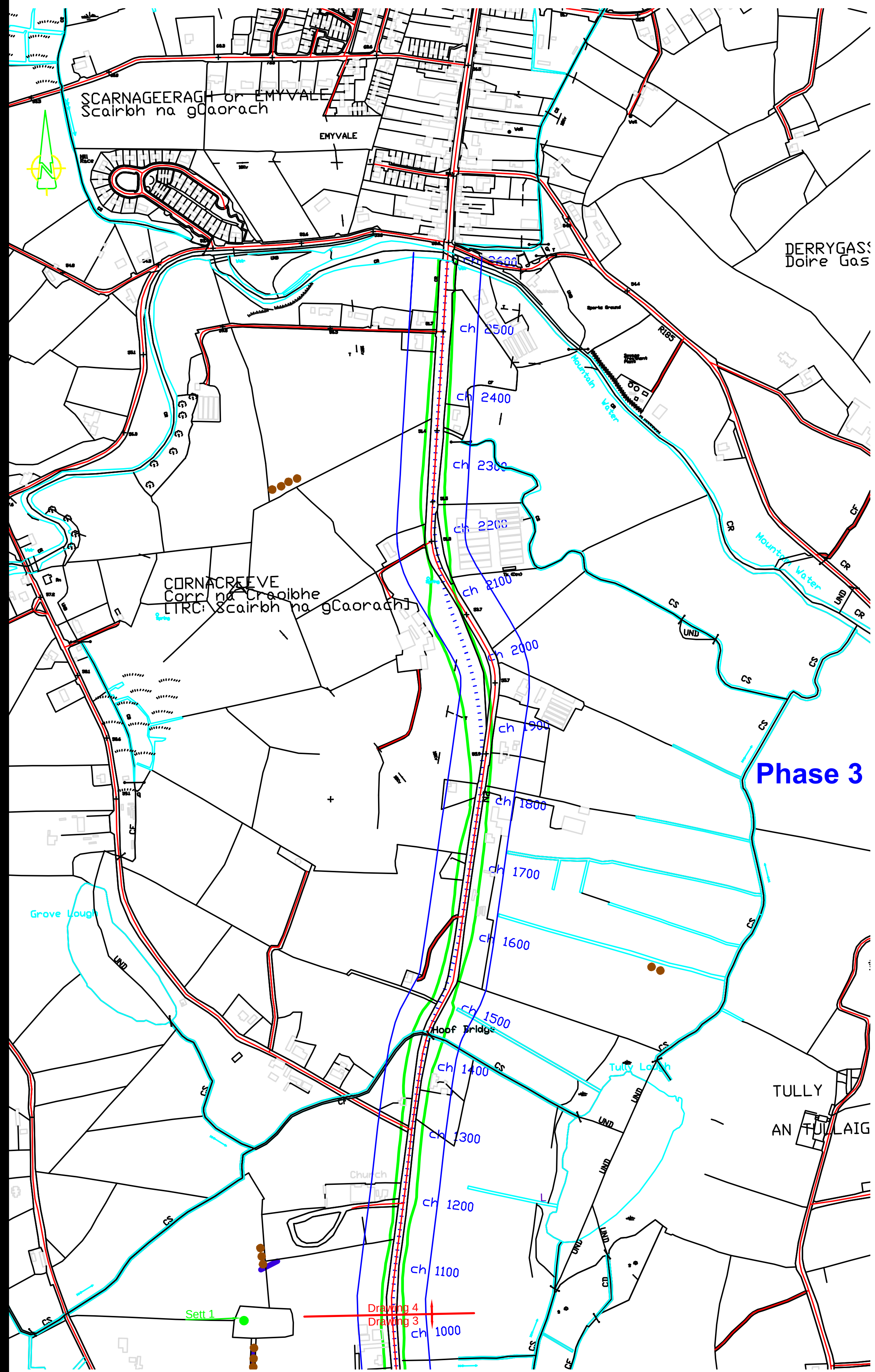
Date 29.04.2011	
Approx Scale 1:4000 in A1	



Drawing - C



Drawing - D

Client:

Monaghan County Council
Comhairle Contae Mhuineach in

General Notes / Legend

- Badger Path
- Badger Print
- Badger Sett
- Badger Latrine
- 50m Offset
- Landtake

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Project Name and Address

N2 Realignment Phase 2,4 and 3 Ecology Drawings

Mammal

Drawing No.	N2-2-02	
2	Rev A	29.4.11
No.	Revision/Issue	Date

Project	Sheet Set
N2	02/02
Date 29.04.2011	
Approx Scale 1:4000 in A1	

Phase 2

Phase 4

Drawing - A

Drawing - B

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Monaghan County Council
Comhairle Contae Mhuineach in

General Notes / Legend

- Badger Path
- Badger Print
- Badger Sett
- L Badger Latrine
- 50m Offset
- Landtake

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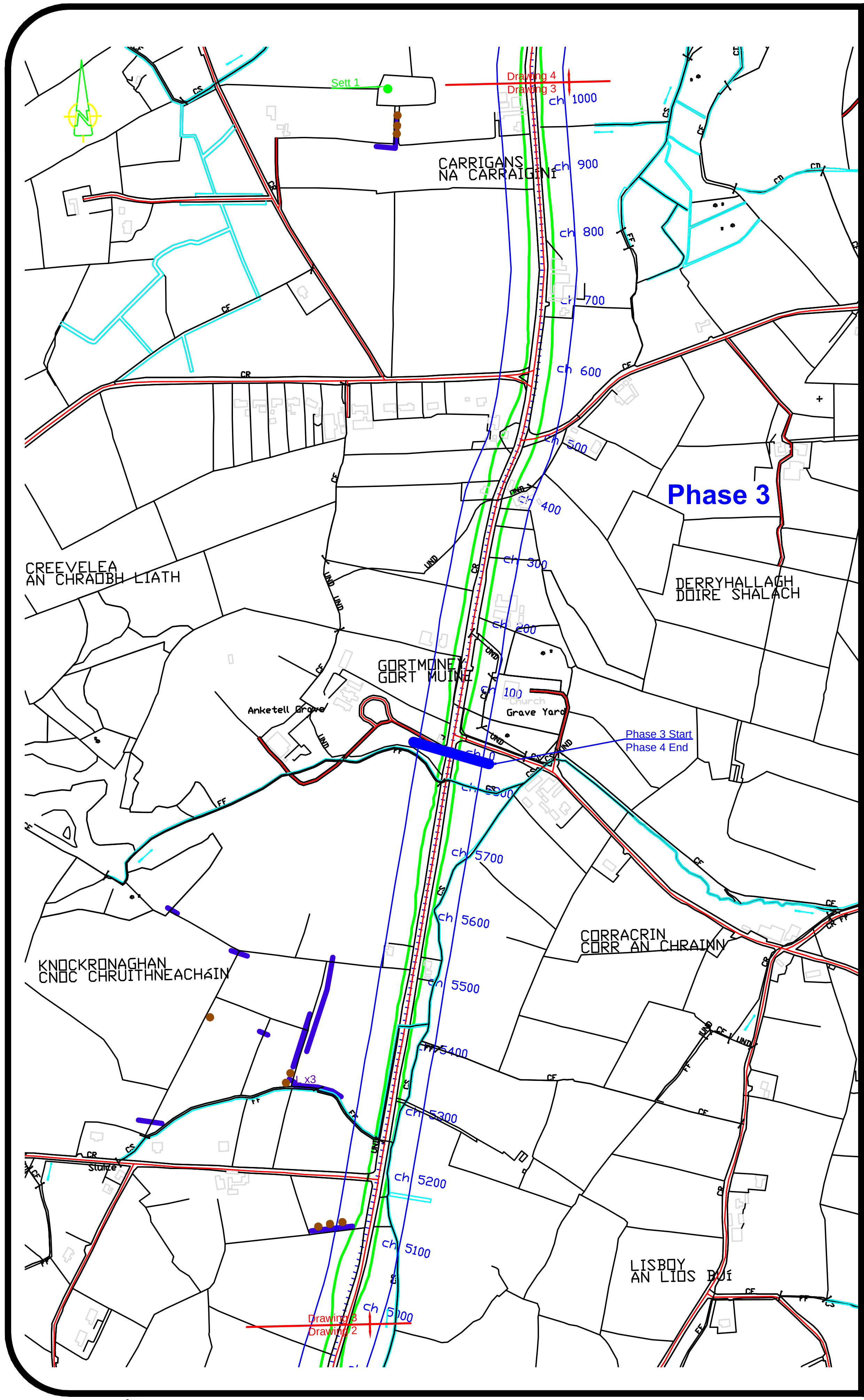
Project Name and Address

N2 Realignment
Phase 2,4 and 3
Ecology Drawings

Mammal

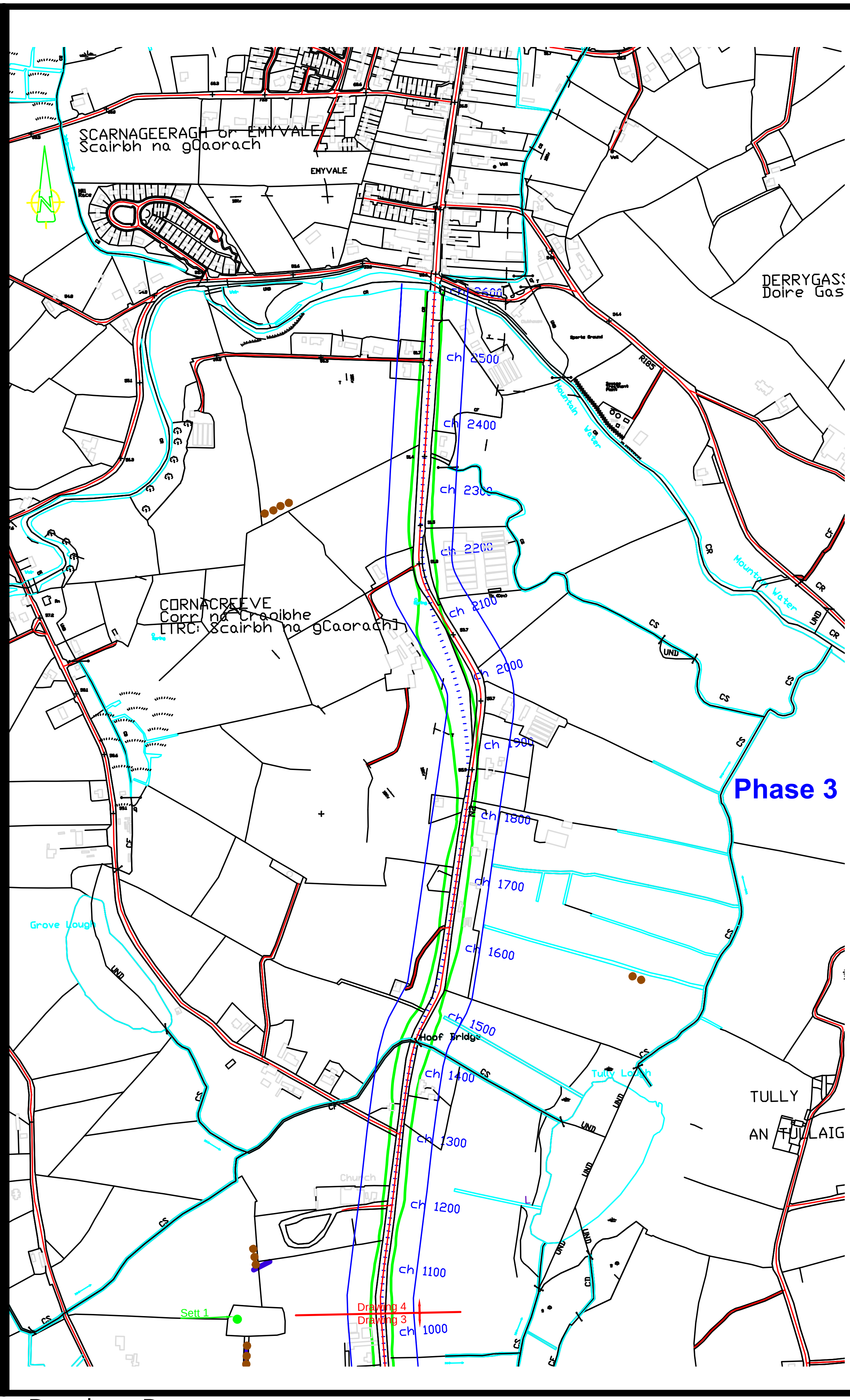
Drawing No.	N2–2–01	
2	Rev A	29.4.11
No.	Revision/Issue	Date

Project	Sheet Set
N2	01/02
Date 29.04.2011	
Approx Scale 1:4000 in A1	



Sett 1
Drawing 4
Drawing 3
ch 1000
CARRIGANS
NA CARRAIGÍNÍ
ch 900
ch 800
ch 700
ch 600
ch 500
ch 400
ch 300
ch 200
ch 100
Phase 3
CREEVELEA
AN CHRAOBH LIATH
DERRYHALLAGH
DOIRE SHALACH
GORTMONEY
GORT MUINE
Anketell Grove
Grave Yard
Phase 3 Start
Phase 4 End
ch 5700
ch 5600
ch 5500
ch 5400
ch 5300
ch 5200
ch 5100
ch 5000
CORRACRIN
CORR AN CHRAINN
KNOCKRONAGHAN
CNOC CHRUITHNEACHÁIN
x3
Stile
LISBOY
AN LIOS BUÍ
Drawing 3
Drawing 2

Drawing - C



SCARNAGEERAGH or EMYVALE
Scairbh na gCaorach
EMYVALE
DERRYGASS
Doire Gas
ch 2600
ch 2500
ch 2400
ch 2300
ch 2200
ch 2100
ch 2000
ch 1900
ch 1800
ch 1700
ch 1600
ch 1500
ch 1400
ch 1300
ch 1200
ch 1100
ch 1000
CORNACREEVE
Corr na Craoibhe
[TRC: Scairbh na gCaorach]
Mountain Water
Phase 3
Grove Lough
Hoof Bridge
Tully Lough
TULLY
AN TULAIGH
Church
Sett 1
Drawing 4
Drawing 3

Drawing - D

Flynn, Furney.

Client:

Monaghan County Council

Monaghan County Council
Comhairle Contae Mhuineach in

General Notes / Legend

- Badger Path
- Badger Print
- Badger Sett
- Badger Latrine
- 50m Offset
- Landtake

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Project Name and Address

N2 Realignment
Phase 2,4 and 3
Ecology Drawings

Mammal

Drawing No. N2-2-02

No.	Revision/Issue	Date
2	Rev A	29.4.11

Project: N2

Sheet Set: 02/02

Date: 29.04.2011

Approx Scale: 1:4000 in A1

Appendix B: Mammal Species Names

Name	Common Name
Apodemus sylvaticus	Wood mouse
Cervus elaphus	Red deer
Cervus nippon	Sika deer
Dama dama	Fallow deer
Erinaceous europaeus	Hedgehog
Lepus timidus hibernicus	Irish hare
Lutra lutra	Otter
Martes martes	Pine marten
Meles meles	Badger
Mustela erminea hibernica	Stoat
Mustela vison	Mink
Oryctolagus cuniculus	Rabbit
Rattus norvegicus	Brown rat
Sciurus vulgaris	Red squirrel
Sorex minutus	Pygmy shrew
Vulpes vulpes	Fox

BAT ECO SERVICES

Bat Survey

N2 Monaghan to Emyvale

Road Improvements

Dr Tina Aughney

2011

Report prepared for:

Monaghan County Council,
County Offices,
The Glen, Monaghan.

Contracted by: Flynn, Furney Environmental Cons.

ULEX HOUSE, DRUMHEEL, LISDUFF, VIRGINIA, COUNTY CAVAN
+353 86 4049468 info@batecoservices.com www.batecoservices.com

SUMMARY

Name:	N2 Monaghan to Emyvale Road Improvements.
Description:	Phases 2-4 road improvements involving realignment and widening of current road scheme, approximately 7km in length.
Grid reference:	Various gird references listed in report.
Bat species present:	Soprano pipistrelle, common pipistrelle, Leisler's bat and Natterer's bat.
Roost location:	Potential Bat Roosts (PBRs) in selected trees and roosts located off-line.
Bat access:	Not applicable
Proposed works:	Removal of tree lines, potential removal of a cottage and old church ruins and removal of hedgerows to facilitate road widening.
Impact on bats:	Minor impacts on bats.
Bat survey by:	Dr Tina Aughney
Survey Dates:	23rd, 24th and 25th April 2011

TABLE OF CONTENTS

1. Introduction

N2 Monaghan to Emyvale Road Improvement Scheme is comprised of approximately 7km of road divided into 3 phases and located in the 10km squares of H6030 and H6040. A bat survey was commissioned to provide advice with regard to bat usage in vicinity of the proposed road scheme. This bat survey was undertaken on 23rd, 24th and 25th April 2011 and this report details the results of this survey and describes the bat fauna occurring in the area of the proposed road scheme.

Such surveying was completed due to the fact that bats are protected species under the Wildlife Act (1976) and Wildlife [Amendment] Act (2000). 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. 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. All bat species are protected under Annex IV of the EU Habitats Directive, while the lesser horseshoe bat is listed under Annex II. Member states are required to designate Special Areas of Conservation for all species listed under Annex II in order to protect them.

The general format of this report is in accordance with guidelines recommended by the EPA (2002) *Guidelines on the Information to be contained in Environmental Impact Statements*. Recommendations and evaluation techniques utilised are in general accordance with *Guidelines for Baseline Ecological Assessment* (Institute of Environmental Assessment, UK, 1995), *Wildlife Impact: the treatment of nature conservation in environmental assessment* (RSPB, 1995) and *Guidelines for ecological evaluation and impact assessment* (Regini, M. 2000) and NRA Guidelines.

1.1 Site description

The proposed road scheme is located north of Monaghan Town along the existing N2 heading north to the town of Emyvale. Potential Bat Sites were identified by Flynn, Furney Environmental Consultant ecologists and submitted to Dr Tina Aughney for surveying (See Table 1). During daytime inspection of proposed road route on 23rd and 24th April 2011, additional sites were identified by Dr Aughney as important bat sites (See Table 2).

Table 1: Potential Bats Sites identified by Flynn, Furney Environmental Consultants

Grid Reference	Site No.	Description
H67646 37318	Site 1	Old cottage in ruins, west of route
H67332 37835	Site 2	4 mature ash trees with ivy
H67236 38001	Site 3	Ruined church, east of route
H67274 38457	Site 4	Mature beech trees, east & west of route
H67403 40990	Site 5	Mature sycamore trees, east of route
H67582 42210	Site 6	Mature trees beside road and along stream
H67666 43341	Site 7	Mature ash tree

Table 2: Additional Potential Bats Sites identified

Grid Reference	Site No.	Description
H67332 37835	Site 2a	3 ash trees with heavy ivy growth, east of route
H67211 40062	Site 4a	Mature ash tree with heavy ivy growth, east of route
H67589 42086	Site 5a	2 mature trees with heavy ivy growth, west of route

1.2 Bat survey

This report presents the results of a site visit by Dr Tina Aughney on 23rd, 24th and 25th April 2011 during which the on-site buildings was inspected, Potential Bat Roosts (PBRs) in trees were inspected and identified and night-time bat detector surveys were undertaken in selected areas along the routes.

2. Survey Methodology

Survey of bat fauna was carried out by means of a thorough search of buildings on-site. Presence of bats is indicated principally by their signs, such as staining, lack of spider webs, feeding signs or droppings - though direct observations are also occasionally made. The nature and type of habitats present are also indicative of the species likely to be present.

This bat survey consists of the following elements:

- assessment of habitat survey maps to determine suitable foraging, roosting and commuting areas for bats
- collation of known bat records from the Bat Conservation Ireland database
- bat surveys to determine bat species roosting, commuting and foraging in vicinity of the proposed road route

The bat survey was carried on 23rd, 24th and 25th April 2011. Weather conditions on each of the survey dates were good with light winds and warm temperatures at the beginning of the evening while turning cooler by morning (See Table 3 for details).

Table 3: Bat Survey locations and weather conditions

Date	Location	Survey	Weather
23.4.2011	Cottage	Dusk Detector Survey	14.5 °C, clear sky, calm, dry
23rd to 24th	Cottage	Anabat SD1 Detector	14.5 – 10.7 °C, clear sky, dry, calm
23rd to 24th	Church Ruins	Anabat SD1 Detector	14.5 – 10.7 °C, clear sky, dry, calm
24.4.2011	Site 1 & Church Ruins	Dawn Survey	10.7 °C, clear sky, calm, dry
24.4.2011	Site 4	Dusk Survey	12.8 °C. overcast, breezy, dry
24th to 25th	Site 5	Anabat SD1 Detector	12.8 – 9.8 °C, cloudy, breezy, dry
25.4.2011	Site 6	Dawn Survey	9.8°C, clear sky, breezy, dry

A Passive Monitoring System of bat detection was employed for this survey scheme (i.e. a bat detector is left in the field, there is no observer present and bats which pass near enough to the monitoring unit are recorded and their calls are stored for later analysis). The bat detector is effectively used as a bat activity data logger. This results in a far greater sampling effort over a shorter period of time. Bat detectors are employed as the ultrasonic calls produced by bats cannot be heard by human hearing.

Bat surveying was completed using the Frequency Division AnaBat Detector System (AnaBat SD1 Flash Card Bat Detector). Frequency Division is a technique used to convert the inaudible bat echolocation calls to audible sounds. The AnaBat unit also uses Zero-Crossing Analysis (ZCA) to make the real-time recorded calls visible for display purposes. It is these sonograms (2-d sound pictures) that are digitally stored on the CF card and downloaded for analysis. Each time a bat is detected, an individual time-stamped (date and time to the second) file is recorded.

Two units were employed for each survey date (23^{rd}-24^{th} & 24^{th}-25^{th}). A unit was erected on a tripod (2m high) and located at specific grid reference points. One unit failed to record during survey session on 24^{th}-25^{th} survey night. Therefore, three locations were recorded successfully over the survey period (see Figures 4.1 and 4.2).

Bats are identified by their ultrasonic calls. This detector system record bat ultrasonic calls on a continuous basis and stores the information onto an internal CF card. Each detector was set to record from 20:00 hrs to 06:00 hrs during each survey date. Data was then downloaded and analyised using Analook (sound software for the AnaBat system). Each time-stamped AnaBat file was analyised and the species of bat recorded was noted as a bat pass. Some files may have recorded more than one species. In this instance, a bat pass is noted for each species (e.g. two species identified in a time-stamped file which corresponded to one soprano pipistrelle bat pass and one common pipistrelle bat pass). However, in the light of two individuals of the same species being recorded in the same time-stamped file, only one bat pass was noted for this time-stamped file. Table 4.1 lists the grid reference sites surveyed using the passive monitoring system.

To support the Passive Monitoring Programme, dusk and dawn surveying was also completed on each survey date (See Table 3 for details) using a bat Pettersson 240x Time Expansion Detector and Heterodyne Bat Detector. Dusk surveys were completed during the hours of 8.30 p.m. to 11.30 p.m. while Dawn surveys were undertaken from 4.30 a.m. to 6.00 a.m.

2.1 Survey Constraints

This survey was undertaken outside the preferred summer months of May to mid-September. However, the temperatures recorded during this survey were appropriate for a summer bat survey. Therefore, while there were some survey constraints, the survey results are considered by the author to be sufficient to make an assessment of bat activity along the proposed route and to provide appropriate mitigation measures.

3. Bat Assessment

The bat ecology impact assessment was completed using data collated from a number of bat surveys (Passive Monitoring System and Dusk and Dawn bat surveys) and a database search of the Bat Conservation Ireland database.

3.1 Bat Survey Results

Bat activity was recorded during this bat survey. The passive monitoring system using AnaBat units recorded the following species: soprano pipistrelle, common pipistrelle, *Pipistrellus* species and Leisler's bat,. The dusk and dawn surveys recorded one additional species: Natterer's bats (see Figures 1 – 4). To interpret results, it is important to note that sunset was approximately 20:00 hrs while sunrise was approximately 05:00 hrs. Therefore, bat activity at the beginning and end of the survey period is likely to be commuting bats exiting/returning to roosting sites while bat activity in between these periods are likely to be foraging bats.

Over the two nights of passive monitoring survey, 3 grid reference locations were monitored (using AnaBat Frequency Division Detectors). In relation to data collection at each of the AnaBat sites, bat activity was recorded at all AnaBat stations and ranged from 15 bat passes at Site 1 (cottage) surveyed on the 23.4.2011 to 298 bats passes at Site 3 (church ruins) surveyed on 23.4.2011 (See Figure 1). A total of 333 bat passes were recorded: common pipistrelle: 169 (51%) bat passes; soprano pipistrelle: 159 bat passes (48%); and Leisler's bat: 5 bat passes (1%). The common pipistrelle was the most recorded bat species.

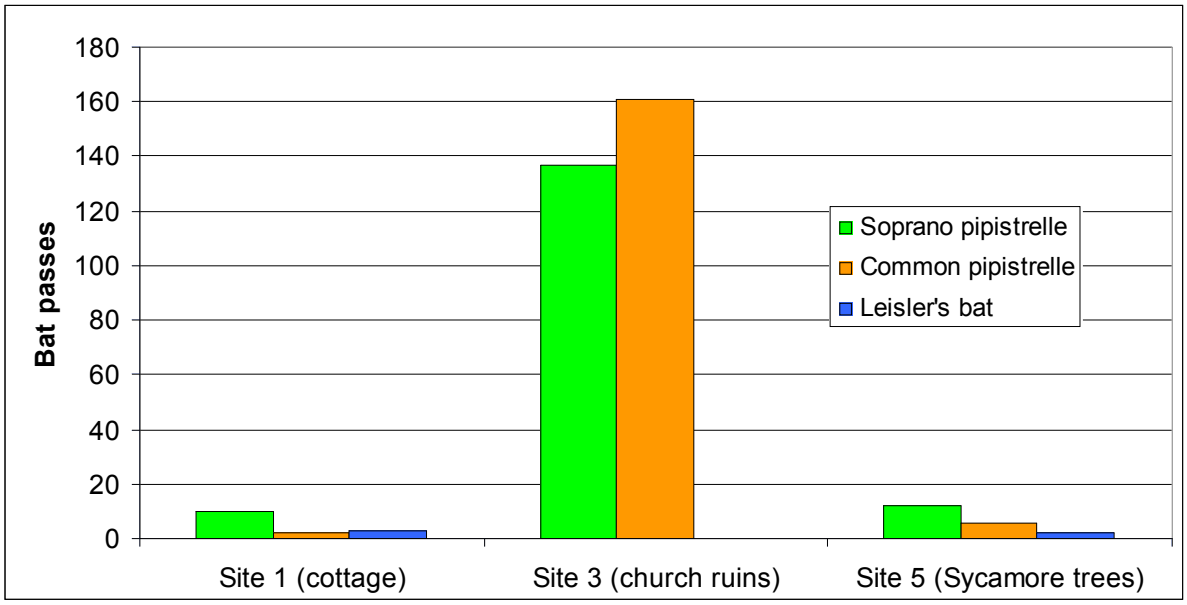

Figure 1: Summary of results of passive monitoring system using AnaBat SDI Flash Card detectors (Each colour corresponds to a bat species).

Sonogram analysis for the passive monitoring system yielded the highest amount of results due to the greater survey effort using this system. The results are presented for each grid reference location with a series of summary graphs to further illustrate the results. Each graph is discussed but without visual observations, these are extrapolated opinions referring to likely behaviour for each species in relation to commuting, foraging and roosting bats.

On 23.4.2011 passive monitoring was completed at two sites (Site 1: cottage & Site 3: church ruins). An AnaBat detector was located at each of these sites. Site 1 (cottage) is located at the southern end of the road scheme and is a single storey unoccupied cottage with slate roof located in a green field surrounded by low hedgerows and improved agricultural grassland fields. There is a high connectivity of hedgerows adjacent to this site. Bat activity recorded at this site was the lowest number of bat passes compared to all other stations. The results indicated that the three species of bat recorded commute at dusk through this survey site. Dusk surveys also supports this and recorded the same three species commuting along hedgerows from a south to north direction along the hedgerow and ditch west of the cottage.

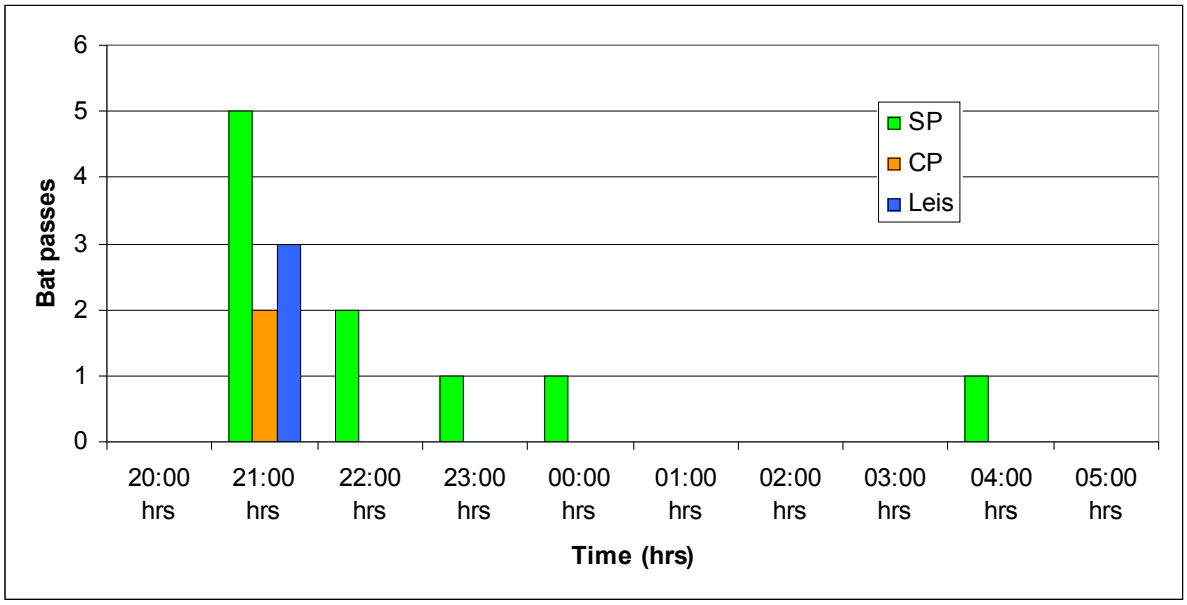

Figure 2: Bat activity recorded on 23.4.2011 (AnaBat SD1 Flash Card Detector) at Site 1 (cottage). SP: soprano pipistrelle; CP: common pipistrelle; Leis: Leisler's bat

Site 3 (church ruins) is located further north of the road scheme to the east of the existing N2. This stone ruin is surrounded by trees and scrub. There is no roof and but walls contain numerous crevices suitable for roosting bats. The site is located adjacent to a number of buildings (occupied houses and farm buildings) and is surrounded by agricultural land and connecting hedgerows and treelines. Bat activity recorded at this site was the highest number of bat passes compared to all other stations. The results indicated that the three species of bat foraged around this survey site. Dawn surveys also support this and recorded the same three species commuting away from the site along hedgerows east of the church ruins towards roosts located off-line. The high number of bat passes were principally due to a small number of individual bats foraging around the trees and scrub throughout the night.

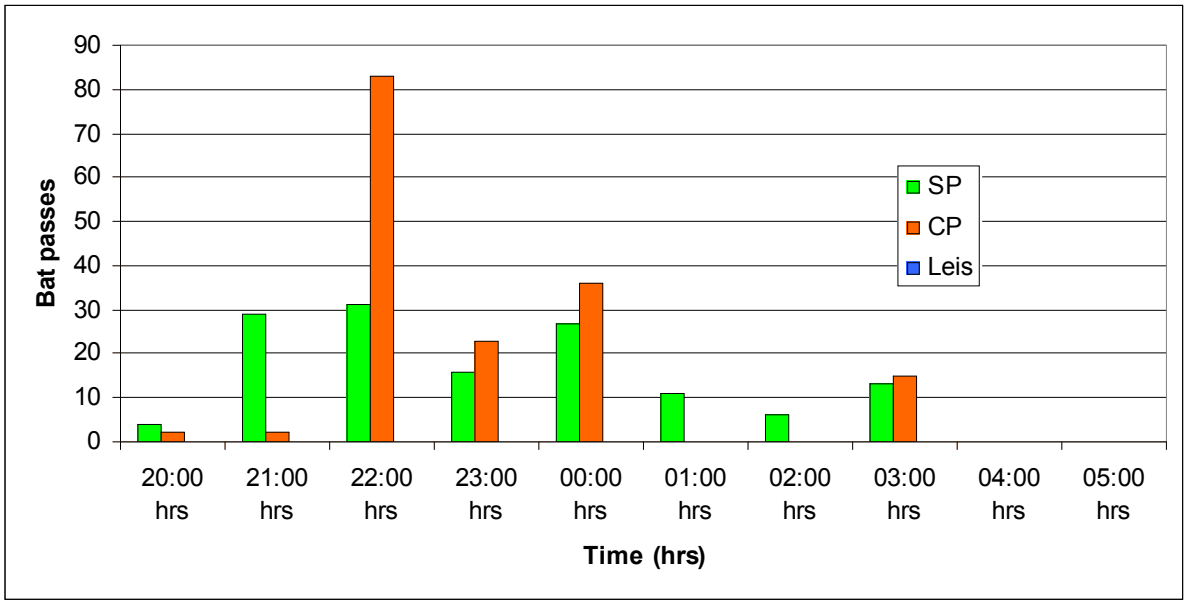

Figure 3: Bat activity recorded on 23.4.2011 (AnaBat SD1 Flash Card Detector) at Site 3 (church ruins). SP: soprano pipistrelle; CP: common pipistrelle; Leis: Leisler's bat

Site 5 (sycamore trees) is located further north of the road scheme and to the east of the existing N2. This site consisted of mature trees adjacent to a house, stream and south of a conifer plantation. The site is surrounded by agricultural land and connecting hedgerows and treelines. The results indicated that the three species of bat foraged around this survey site.

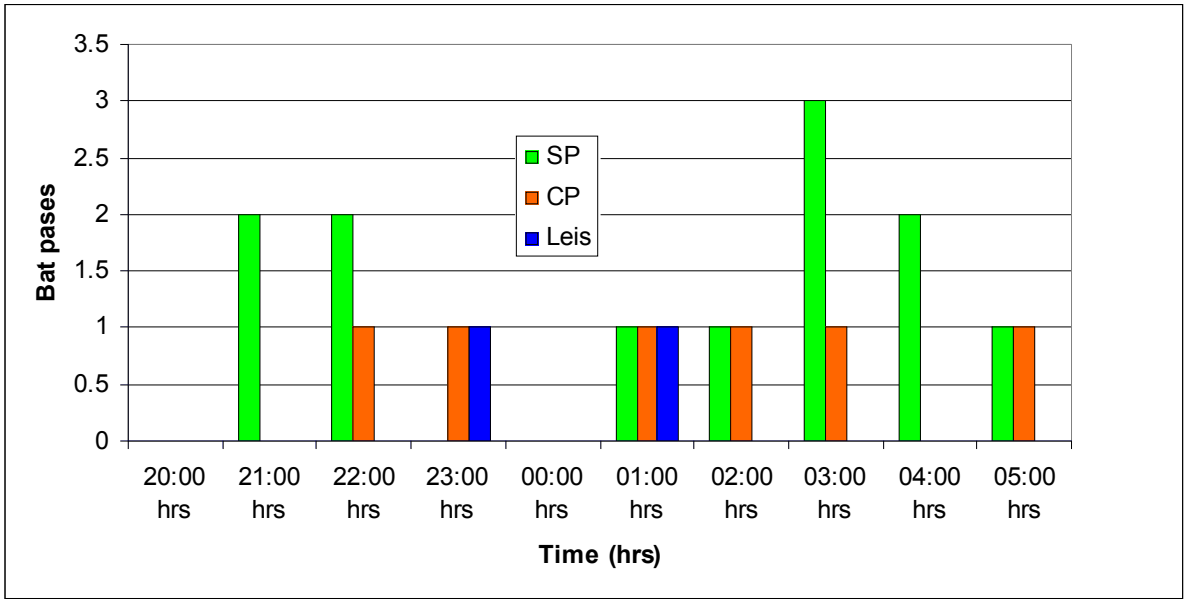

Figure 4: Bat activity recorded on 24.4.2011 (AnaBat SD1 Flash Card Detector) at Site 5 (sycamore trees). SP: soprano pipistrelle; CP: common pipistrelle; Leis: Leisler's bat

3.2 Dusk and Dawn Surveys

Dusk and dawn surveys were completed. A Dusk Survey completed at Site 1 (cottage) on the 23.4.2011 recorded no bats emerging from the building. Bats recorded in vicinity of the buildings (soprano pipistrelle, common pipistrelle and Leisler's bats) were all commuting past the cottage.

A Dawn Survey completed on 24.4.2011 at Site 2 (mature ash trees with ivy) and Site 3 (church ruins) recorded soprano pipistrelles and common pipistrelles commuting along tree lines and hedgerows away from the church ruins. Roosting sites for these individual bats are likely to be located in buildings further east of the current N2 road.

A Dusk Survey was completed at Site 4 (mature beech trees) on 24.4.2011. Bat activity was high in this area with two crossing points identified for commuting bats. A large occupied house is located adjacent to this site west of the current N2 route while the road junction with a sign post for Drumcaw L5260 is located to the east of the N2. Bats commuted across the N2 at this junction using mature tree canopies on either side of the road as a hop-over. Soprano pipistrelles (11 individuals) and Natterer's bats (2 individuals), likely to be roosting from the building to the west of the route, travelled across the N2 at this point from west to east and continued to commute down the Drumcaw road. Common pipistrelles (three individuals) travelled in the opposite direction, coming from roosts located on the Drumcaw road and commuted across the N2 from an east to west direction but using the same hop-over point. A second hop-over point was located approximately 200m further north of the N2 where soprano pipistrelles (4 individuals) travelled from a west to east direction along a treeline towards the N2. Leisler's bats (3 individuals) commuted from and east to west direction across the N2 but due to its high flying, this species was not reliant on hop-overs to safely commute across the N2.

A Dawn Survey was completed on 25.4.2011 at Site 6 (mature trees) and this site is located south of Emyvale. This survey was completed by walking the 2km stretch of roadway at dawn. Only soprano pipistrelles (2 individuals) and Leisler's bats (1 individual) was detected commuting. This may have been due to the cooler temperatures recorded at dawn reducing insect activity and therefore bat activity.

3.3 Potential Bat Roosts (PBRs)

The importance of trees to bats varies with species, season and foraging behaviour. For Leisler's bats, trees are essential for both summer and winter roosts while Daubenton's and Natterer's bats utilise trees more often during the summer months. Other species such as

brown long-eared bats and pipistrelle bats avail of trees in the winter months. In general, individual males throughout the season use tree roosts, more often, while females will use trees for temporary night roosts or night perches for consuming prey. Hollow trees are widely used by bats for both summer and winter roosts (weather dependent) and bats will roost in 'sound' trees in crevices, holes and under split bark. Bats rest, give birth, raise young and hibernate in tree holes, crevices and beneath loose bark. Species of trees utilised by bats include oak, ash, beech and Scots pine. Trees, especially native ones also play host to numerous insect species which are prey items for bat species. Trees also provide shelter for swarming insects which bats will avail of. In addition, trees are important commuting routes for bats. A gap in a hedge/treeline of greater than 10m may force some species of bats to seek an alternative commuting route.

There are a large number of trees deemed as potential bats roosts along the proposed route (44 trees identified). The majority of these trees have value as potential bat roosts due to the heavy ivy growth present on the trees. These locations are as follows:

Table 4: Potential Bat Roosts in trees located along the N2 Monaghan to Emyvale

Grid Reference	Site No.	Description
H67332 37835	Site 2	Ash trees with ivy, east of route: x4
H67332 37835	Site 2a	Ash trees with heavy ivy growth, east of route: x3
H67236 38001	Site 3	Mature trees, church ruins: x2
H67274 38457	Site 4	Mature beech trees, east and west of route: x18
H67211 40062	Site 4a	Ash tree with heavy ivy growth, east of route: x1
H67403 40990	Site 5	Mature sycamore trees, east of route: x4
H67589 42086	Site 5a	Mature trees with heavy ivy growth, west of route: x2
H67582 42210	Site 6	Mature trees beside road: x9
H67666 43341	Site 7	Mature ash tree, west of route: x1

3.4 Bat Conservation Ireland Database Records

A database search was completed for the 10km radius search of the grid reference H6739. Within this radius, details with regards to seven roosts (soprano pipistrelle, common pipistrelle, Pipistrelle species, Leisler's bat, bat, brown long-eared bat and whiskered bat), four transects (One from the All Ireland Car Monitoring Scheme: H40 30km square: soprano pipistrelle, common pipistrelle, Leisler's bats, *Myotis* spp., Nathusius' pipistrelle and

Pipistrellus spp.; two transects from the All Ireland Daubenton's Bat Waterway Survey: Monaghan Town (H6800034700) & New Mills Bridge (H7189838769): Daubenton's bat, Leisler's bat, Pipistrelle species and soprano pipistrelle) and seven Ad Hoc bat detector records (soprano pipistrelle, common pipistrelle, *Pipistrellus* species, Leisler's bat and Daubenton's bat) are on the database (search completed on 26.4.2011).

4. Potential Impacts of proposed works on Bat Fauna

The principal concerns related to bats in view of road schemes are:

- Habitat fragmentation thereby reducing commuting routes in the landscape
- Loss of roosts through the removal of trees along the road routes
- Loss of foraging habitats

Therefore, for this assessment, this report will draw on guidelines already available in Europe and will use the following documents:

- *A conservation plan for Irish vesper bats, Irish Wildlife Manual No. 20 National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin, Ireland.*
- *Bat Mitigation Guidelines for Ireland. Irish Wildlife Manuals, No. 25. National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin, Ireland.*
- *National Biodiversity Plan. Department of Arts, Heritage, Gealtacht and the Islands.*
- *The status of EU protected habitats and species in Ireland: Conservation status in Ireland of habitats and species listed in the European Council Directive on the Conservation of Habitats, Flora and Fauna 92/43/EEC. National Parks and Wildlife Service, Department of Environment, Heritage and Local Government.*

4.1 Ecological Assessment

The following bat species have been recorded during this bat survey: common pipistrelle, soprano pipistrelle, Leisler's bat and Natterer's bats.

In summary, the proposed development will need to consider the following:

a. Bats and their bat roosts are protected by Irish (Wildlife Act 1976 and 2000 Amendment) which make it an offence to wilfully interfere with or destroy the breeding or resting place of these species. All species of bats are listed in

Schedule 5 of the 1976 Act and therefore are subject to the provisions of Section 23.

b. The EU Habitats Regulations Directive 1992 seeks to protect rare and vulnerable species, including all species of bats. All ten species of bat are protected with the lesser horseshoe bat listed as an Annex II species while all other bats (commonly known as vesper bats) are listed as Annex IV species.

c. Local Planning Authorities are required to give consideration to nature conservation interests under the guidance of the SEA Directive 2001/42/EC. This directive states that the protected status afforded to bats means that planning authorities must consider their presence in order to reduce the impact of developments through mitigation measures.

d. The National Biodiversity Plan confers general responsibilities on all participants in the development process to take into account of protected species. "*The overall objective is to secure the conservation, and where possible the enhancement, and sustainable use of biological diversity in Ireland and contribute to conservation and sustainable use of biodiversity globally".*

NPWS Conservation Status Assessment report for each of the species recorded is presented in a summary below the species list:

Natterer's bat *Myotis nattereri* (Species Code 1322)

Leisler's bat *Nyctalus leisleri* (Species Code 1331)

Common pipistrelle *Pipistrellus pipistrellus* (Species Code 1309)

Soprano pipistrelle *Pipistrellus pygmaeus* (Species Code 5009)

All Irish bat species are given a Favourable Status in Republic of Ireland. The principal pressures on Irish bat species are as follows:

- urbanized areas (e.g. light pollution)
- bridge/viaduct repairs
- pesticides usage
- removal of hedges, scrub, forestry
- water pollution
- other pollution and human impacts (e.g. renovation of dwellings with roosts)

- infillings of ditches, dykes, ponds, pools and marshes
- management of aquatic and bank vegetation for drainage purposes
- abandonment of pastoral systems
- spieleology and vandalism
- communication routes: roads
- forestry management

For this ecological assessment, the habitats adjacent to the proposed road route may be considered in terms of extent, diversity, naturalness, rarity, fragility, typicality, recorded history, position, potential value and intrinsic appeal (Regini, 2000). The potential of these habitats for bat fauna is considered in this framework also.

i Bats may use trees with heavy ivy growth as occasional roosts, many of which are located within the survey area.

ii Bats may use mature trees with tree holes etc., as roosting sites all year around. Large mature trees are located adjacent to the N2 at Site 2 and Site 4.

iii Extensive foraging and commuting areas are available to bats within the survey area.

iv An extensive array of buildings are located adjacent to the survey area, some of which were recorded as likely bat roosts during this bat survey.

1 *Improved agricultural grasslands and wet grasslands*.

Provides forage for common bat species especially soprano and common pipistrelle and Leisler's bat. However, their ecological value is increased within this survey area due to the high degree of connectivity as a result of hedgerows, mixed woodland and treelines. Medium ecological value.

2 *hedgerow and treeline boundaries*.

Present throughout the survey site. Such provide wildlife corridors and foraging areas for many bat species. Bat roosts may be present in mature trees or larger ivy-covered trees. However, these linear habitats are essential for commuting bats. High ecological value.

3 *mixed woodland*.

The survey area includes a section of mixed woodland at Site 4 and a small immature area of trees further north along the N2. This habitat type provides foraging area for an array of bat species but its value is increased due to the high degree of connectivity as a result of hedgerows and treelines. May be considered as of High ecological value for bats.

4 *conifer plantations*.

There is one section of conifer plantations within the survey area (north of Site 5) adjacent to mixed woodland and are considered important for bats, as commuting areas to foraging habitats such as mixed woodland. May be considered as of Medium ecological value for bats.

5 *rivers and streams*.

A small number of streams cross the N2. These links habitats (grasslands, treelines, hedgerows, scrub and woodland) in the area and creates an area of Medium ecological value for roosting, commuting and foraging bats.

4.2 Predicted Impacts

All bat species recorded during this bat survey are Annex IV species under the EU Habitats Directive and all have a Favourable Status in Ireland.

Due to the fact that bats disperse widely into the landscape, road schemes have the potential to impact on bats. Habitats such as treelines, hedgerows, woodland removed to make way for both the main route and link roads impacts on bats. But this impact increases when commuting routes are severed especially in relation to slow flying bat species (Natterer's bats).

Bat fauna within the survey area will be affected by both the construction phase and operational phase of the road scheme. Mitigation measures, as below, are recommended to ameliorate the potential impacts of the proposed road scheme on bat populations.

Principal impacts of road scheme, in general, on bat fauna may be summarised as follows:

1 Loss of treelines, hedgerows or other linear features as a result of construction will impact on commuting bats. This is considered as a Moderate Negative impact and maybe reduced to Minor Negative if remaining linear features are reconnected within the landscape.

2 Loss or fragmentation of foraging habitats may diminish the available insect prey species and reduce feeding area for bats in some locations. This is considered as a Moderate Negative impact and maybe reduced to Minor Negative if replanting along the road route with similar native tree and shrub species is undertaken.

3 Potential loss of church ruins may reduce roosting sites for individual bats. This is considered a Minor Negative impact and may be reduced if this building is not removed as a result of the road improvements.

4.3 Mitigation Measures

Mitigation is best achieved through avoidance. It is proposed that the following measures be put in place to avoid or lessen the degree of impacts.

Mitigation by avoidance

1. Aim to limit removal of trees, hedgerows and treelines along proposed route. Where possible, young trees and shrubs should be salvaged from existing hedgerows and treelines marked for removal. Such specimens should be replanted as part of landscaping plan.
2. Treelines, hedgerows or other linear habitats should remain in-situ and remain protected from the construction of link roads.
3. Habitats identified as important foraging areas for bats should be protected from damage.
4. Access routes should maintain a buffer zone in order to protect woodland, hedgerow and treelines.
5. Avoid damage to the church ruins and surrounding trees.

Mitigation by Reduction

1 Removal of linear habitats

a) Removal of treeline/hedgerow/woodland should be minimised to the minimum area required to construct the road route.

2 Re-routing of linear habitats

Any treelines/hedgerows or woodland margin habitats outside the landtake of the scheme should be fenced off to a distance equal to the outer canopy. This is to ensure that root damage is not caused to trees which are to be retained.

3 Mature trees

a) Trees which are to be removed will be felled during the autumn months of September, October or November (felling during the spring or autumn months avoids the periods when the bats are most active).

b) Any trees showing crevices, hollows etc., should be removed while a bat specialist is present to deal with any bats found. Such animals should be retained in a box until dusk and released on-site. A bat expert will survey all trees due for removal prior to construction works commencing.

c) Large mature trees will be felled carefully, essentially by gradual dismantling by tree surgeons, under supervision of a bat specialist.

d) Care will be taken when removing branches as removal of loads may cause cracks or crevices to close, crushing any animals within. These cracks should be wedged open prior to load removal. The dead branches should be lowered to the ground using ropes to avoid impacts which may injure or kill bats within.

e) Any ivy covered trees which require felling will be left to lie for 24 hours after cutting to allow any bats beneath the cover to escape. This measure applies to the majority of trees identified on-site.

4 Protection of church ruins

While no bats were recorded roosting in the church ruins during this survey does not mean that bats would not avail of suitable crevices within the structure. Natterer's bats, in particular, will roost in such buildings. If the proposed route involves the destruction of this building, a full survey of crevices with the use of an endoscope and torch light is required prior to works. Works should be undertaken in the autumn months of September, October and November or the spring month of March.

5 Protection of habitats

Any semi natural habitats adjacent to proposed route, link roads and access routes should be fenced off to prevent unnecessary damage or degradation. Working areas should be clearly defined prior to the commencement of construction or fenced to ensure they are kept to a minimum.

6 Maintain roosts : no disturbance to roosts

Buildings located close to the route should be protected from disturbance during construction works.

7 Limit work spaces and lighting during construction

a) Open areas required to facilitate road works along the route should be limited to areas where tree felling and hedgerow removal is not required. Lighting of such work spaces can also disrupt traditional foraging grounds for bats and therefore should be limited and should not occur during foraging period (30 minutes prior to sunset to 30 minutes after sunrise).

b) Works at night time should be avoided in areas where foraging bats are concentrated.

c) All other areas should be screened to prevent lighting spilling out onto adjacent habitats and lighting used should be directional onto works.

8 Culverts or tunnels

a) Any proposed culverts or tunnels over streams or existing roads can be used by commuting bats if 2m x 2m in relation to culverts over streams. To facilitate bat usage of such routes, continuous treeline/hedgerow would be required to direct bats towards such structures.

9 Bat boxes and bat tubes

A bat box scheme should be included in the area to offset the potential loss of roosts due to tree removal. It is recommended that a minimum of 12 bat boxes (Schwegler' woodcrete preferably) would suffice. These bat boxes/tubes should be located in trees or poles outside

the landtake of the scheme but as close as possible to the sites of the vegetation which has been lost. The site details are as follows:

i. Site 2 (mature trees east of the N2)

ii. Site 4 (mature trees west of the N2)

iii. Site 5 (mature trees east of the N2)

Details of sourcing these boxes and erection can be supplied. 'Schwegler' woodcrete bat boxes are recommended but other designs are available – timber, concrete and concrete/sawdust). Consult the following publication: *Bat Boxes: A guide to the history, function, construction and use in the conservation of bats by R. E. Stebbings and S. T. Walsh (The Bat Conservation Trust, 1991).* Brown long-eared bats, Leisler's bats, common pipistrelles and soprano pipistrelle bats will frequently use bat boxes both as temporary and maternity roosts. Special hibernation bat boxes are also available. Suppliers of artificial bat roost units:

i) Schwegler Bat Boxes, Jacobi, Jayne & Co: www.jacobijayne.com

ii) Alana Ecology: www.alanaecology.com

The main function of bat boxes is to provide alternative safe roosting sites for groups of bats where natural sites become unavailable. The internal diameter of a bat box is required to be sufficient to allow bats to cluster together in numbers to retain body heat. It is important to understand the life cycle of bats and their tendency to use an array of roosting sites through the year. In summary, bats require different roost conditions for hibernation, during the sensitive time of rearing their young (maternity roost), night roosts for resting stops during night feeding and satellite roosts in between the main hibernation and maternity season. Roosting conditions also vary with each species. In general, hibernation boxes require greater insulation (wall thickness of 100mm timber) to provide a constant temperature for bats throughout the winter to prevent bats from freezing. All other boxes, typically called summer boxes, are designed to provide secure and dry sheltered conditions. These boxes have relatively thin walls (about 20-30mm timber) and are used by bats outside the hibernation period. These requirements mean that any Bat Box Schemes should provide suitable bat boxes to cover the general requirements of different bat species all year around.

'Woodcrete' boxes are made of a mixture of concrete, sawdust and clay moulded into to shape. They have the advantage of allowing natural respiration, stable temperature and durability. 'Woodcrete' boxes last, on average, for 25 years.

To ensure that bats use the bat boxes, it is very important to site them carefully. Some general points to follow include:

1. Straight limb trees (or telegraph pole) with no crowding branches or other obstructions for at least 3 metres above and below position of bat box.
2. Diameter of tree should be wide and strong enough to hold the required number of boxes.
3. Locate bat boxes in areas where bats are known to forage or adjacent to suitable foraging areas. Locations should be sheltered from prevailing winds.
4. Bat boxes should be erected at a height of 3-5 metres to reduce the potential of vandalism and predation of resident bats.
5. It is recommended to erect a number of bat boxes on one tree at an array of aspects. South facing boxes will receive the warmth of the sun, which is necessary for maternity colonies. In large bat box scheme it is generally recommended to have three bat boxes arranged at the same height facing North, South-East and South-West. This ensues a range of temperatures are available all day. If the South facing boxes become too warm, bats can safely remove to the cooler North facing box.

Acceptance of boxes by bats is less predictable than those for birds. Therefore, it is essential to monitor their use over a period of time. Those boxes that remain unused within two years of date of erection should be re-located. Bat boxes should also be checked in wintertime for general wear and tear and to remove droppings from the previous summer use.

NB: Bats use boxes intermittently and the chance of finding a bat in a box at the time of inspection is considered to be 1 in 10.

Bat boxes should be inspected, by bat licence holder, at least once within 12 months of erection at appropriate season in order to monitor bat use and the species using boxes. Any bats found should be counted and identified to species level.

Safety is also essential during erection and monitoring of bat boxes. Use of hard hats, a strong aluminium ladder with safety strap for trees, and use of gloves (if handling bats) are recommended. Only a licensed person (NPWS Licence) can handle bats.

Monitoring: construction and operation phase

The mitigation measures should be monitored by wildlife experts at intervals during the initial years of operation of the development to ensure successful implementation. Good practice also requires that impacts on adjoining areas are also monitored.

1 Mitigation measures for bats will be monitored for the first 3 years after implantation of the scheme and additional measures taken as required to ensure that the location of wind turbines are not impacting on bats.

2 These monitoring measures may require additional works or supplementary mitigation, which should be included within the overall budget of the proposed road scheme.

3. A monitoring programme should be formulated and agreed upon prior to construction of the road route.

Residual impact of the proposal

The overall impacts of the proposed road scheme on the bat fauna in the area, without mitigation measures adopted, may be considered as Minor to Moderate Negative.

Loss of hedgerows, treelines, wet grassland and woodland habitats will be expected to have some negative impacts due to loss of foraging areas and commuting routes and may add to local species isolation through further fragmentation of habitats. Some potential bat roosts in trees will be lost to development. If all 'best practice' mitigation measures are undertaken, impacts on bat fauna utilising watercourse habitats may be considered as minor. Impacts – Minor Negative.

Given best practice design and operation of the proposed development, with recommendations included within this report incorporated, and with accompanying mitigation and remedial measures included, the Residual impact of the development may be considered as of minor impact in terms of impacts on bats. Impacts expected - Minor Negative.

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Appendices

Bat ecology – general

The bat is the only mammal that is capable of true flight. There are over 1,100 species worldwide, representing almost a quarter of all mammal species. There are 47 species in Europe - in Ireland, ten species of bat are currently known to exist, which are classified into two families, the Rhinolophidae (Horseshoe bats) and the Vespertilionidae (Common bats).

Prey

All the European bat species feed exclusively on insects. A Pipistrelle, weighing only 4 to 8 grammes, will eat up to 3000 insects every night, ensuring a build up of fat in the bat's body to allow it to survive the winter deep in hibernation.

Breeding and longevity

Irish bats can produce one young per year but, more usually, only one young is born every two years (Boyd & Stebbings, 1989). This slow rate of reproduction inhibits repopulation in areas of rapid decline. Although bats have been known to live for twenty or more years, this is rare as most die in their first and the average lifespan, in the wild, is four years.

Threats

All bat species are in decline as they face many threats to their highly developed and specialised lifestyles. Many bats succumb to poisons used as woodworm treatments within their roosting sites (Racey & Swift, 1986). Agricultural intensification, with the loss of hedgerows, treelines, woodlands and species-rich grasslands have impacted bat species also. Habitual roosting or hibernation sites in caves, mines, trees and disused buildings are also often lost to development. Summer roosts are prone to disturbance from vandals. Agricultural pesticides accumulate in their prey, reaching lethal doses (Jefferies, 1972). Chemical treatments in cattle production sterilise dung thus ensuring that no insects can breed within it to be fed upon by bats. Likewise, river pollution, from agricultural runoff, reduces the abundance of aquatic insects. Road building, with the resultant loss of foraging and roosting sites is a significant cause in the reduction of bat populations across Europe.

Extinction

As recently as 1992, the greater mouse-eared bat *Myotis myotis* became the first mammal to become extinct in Britain since the wolf in the 18th century.

Description of bat species known or expected on site

Common pipistrelle *Pipistrellus pipistrellus*

This species was only recently separated from its sibling, the soprano or brown pipistrelle *P. pygmaeus*, which is detailed below (Barratt *et al*, 1997). The common pipistrelle's echolocation calls peak at 45 kHz. The species forages along linear landscape features such as hedgerows and treelines as well as within woodland.

Soprano pipistrelle *Pipistrellus pygmaeus*

The soprano pipistrelle's echolocation calls peak at 55 kHz, which distinguishes it readily from the common pipistrelle on detector. The pipistrelles are the smallest and most often seen of our bats, flying at head height and taking small prey such as midges and small moths. Summer roost sites are usually in buildings but tree holes and heavy ivy are also used. Roost numbers can exceed 1,500 animals in mid-summer.

Leisler's bat *Nyctalus leisleri*

This species is Ireland's largest bat, with a wingspan of up to 320mm; it is also the third most common bat, preferring to roost in buildings, although it is sometimes found in trees and bat boxes. It is the earliest bat to emerge in the evening, flying fast and high with occasional steep dives to ground level, feeding on moths, caddis-flies and beetles. The echolocation calls are sometimes audible to the human ear being around 15 kHz at their lowest. The audible chatter from their roost on hot summer days is sometimes an aid to location. This species is uncommon in Europe and as Ireland holds the largest national population the species is considered as Near Threatened here.

Natterer's bat *Myotis nattereri*

This species has a slow to medium flight, usually over trees but sometimes over water. They follow hedges and treelines to their feeding sites, consuming flies, moths and caddis-flies. Natterer's bats are frequently recorded in hibernation sites in winter but there are few records of summer roosts. Those that are known are usually in old stone buildings but they have been found in trees and bat boxes.The status of the Natterer's bat has not been determined but it is classed as *Threatened* and is listed in the *Irish Red Data Book* (Whilde, A., 1993).

List of Irish bat species and adjudged status on site

Bats		Status on site
Chiroptera[1]		
Common Pipistrelle[2]	*Pipistrellus pipistrellus*	Present
Soprano Pipistrelle	*Pipistrellus pygmaeus*	Present
Nathusius' Pipistrelle	*Pipistrellus nathusii*	Absent
Brown Long-eared	*Plecotus auritus*	Absent
Leisler's	*Nyctalus leisleri*	Present
Lesser Horseshoe	*Rhinolophus hipposideros*	Absent
Whiskered	*Myotis mystacinus*	Absent
Natterer's	*Myotis nattereri*	Present
Daubenton's	*Myotis daubentonii*	Absent
Brandt's	*Myotis brandtii*	Absent

[1] Bat distribution records from O'Sullivan (1994) and Richardson (2000).

[2] Two common species of pipistrelle bat are present in Ireland, recent taxonomic revision. The species are identified by the frequency they use for echolocation (46Hz [Common] and 55Hz [Soprano]), and both occur in similar habitats. Roosts occur in buildings and trees.

Photographic Evidence

Plate 1: Cottage (Site 1) located along the N2 existing road (west of route).

Plate 2: Site 2, mature trees with heavy ivy growth (east of route)

Plate 3: Church Ruins surrounded by trees and shrubs (Site 3) (east of route).

Plate 4: Site 4, mature trees east and west of N2 existing road

Plate 5: Site 5, sycamore trees (east of existing N2 road route).

Plate 6: Site 6, mature trees (east and west of existing N2 road route).

Plate 7: Site 7, ash tree with heavy ivy growth. Plate 9: Site 4a, ash tree with ivy8

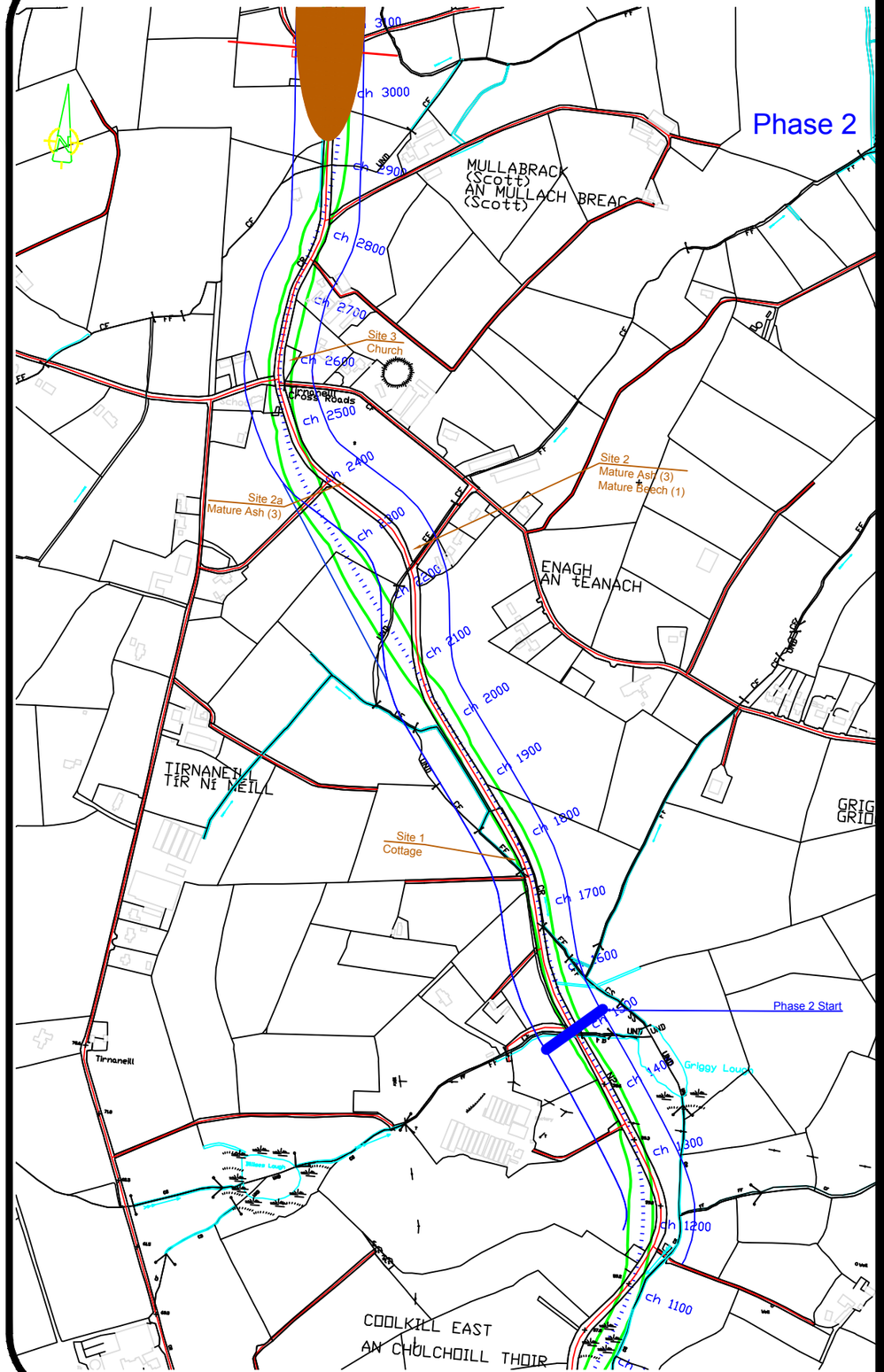
Plate 9: Site 2a, three ash trees with heavy ivy growth, east of road route.

Plate 10: AnaBat SDI Bat Detector on tripod.

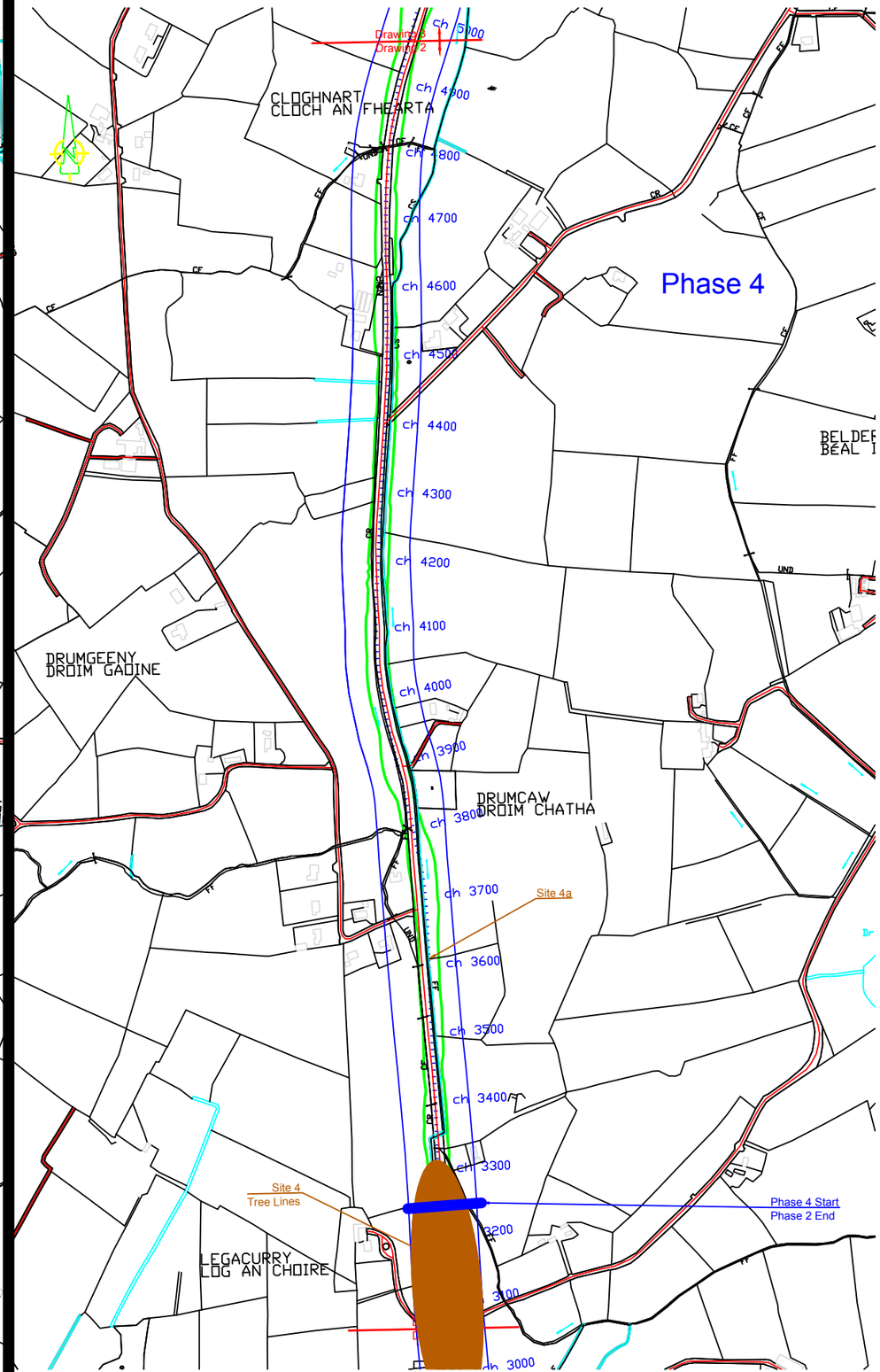
Appendix A: Bat Survey Drawings

Bat Survey Drawing Nos. N2-4-01

N2-4-02



Drawing - A



Drawing - B

Flynn, Furney.
environmental consultants

Client:

Monaghan County Council
Comhairle Contae Mhuineacháin

General Notes / Legend

- 50m Offset
- Landtake
- Site — Bat Sites

Flynn Furney Environmental Consultants Ltd
www.flynnfurney.com

Project Name and Address

N2 Realignment
Phase 2,4 and 3
Ecology Drawings

Bat

Drawing No.	N2–4–01	
1	First Issue	29.4.11
No.	Revision/Issue	Date

Project	Sheet Set
N2	01/02
Date 29.04.2011	
Approx Scale 1:4000 in A1	

Drawing - C

Drawing - D

Flynn , Furney.

Client:

Monaghan County Council

Monaghan County Council

General Notes / Legend

50m Offset

Landtake

Site Bat Sites

Flynn Furney Environmental Consultants Ltd

www.flynnfurney.com

Project Name and Address

N2 Realignment
Phase 2,4 and 3
Ecology Drawings

Bat

Drawing No. N2-4-02

No.	Revision/Issue	Date
1	First Issue	28.4.11

Project: N2

Date: 28.04.2011

Sheet Size: 1:4000 in A1

Sheet No: 02/02