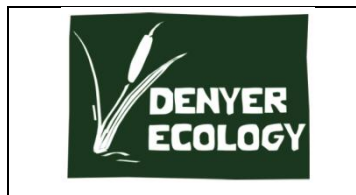


N4 Collooney to Castlebaldwin, Proposed Road Development

APPENDIX NO. 12.8

DEDICATED SPRING SURVEY

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**N4 COLLOONEY TO CASTLEBALDWIN
SPRING SURVEY**

December 2012

**Report produced by Denyer Ecology for:
Sligo County Council**

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N4 Collooney to Castlebaldwin spring survey

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1 INTRODUCTION

1.1 Background

Sligo County Council commissioned Denyer Ecology to undertake a bryophyte survey and evaluation of two alkaline fen/ spring sites. These sites are adjacent to current N4 but also within 250 m of the proposed N4 Collooney to Castlebaldwin N4 re-alignment.

1.2 Aims

The aims of the survey and evaluation were to:

- Undertake a bryological survey of the springs and fen vegetation in the local vicinity of the springs. This included microscopic examination of bryophyte and charophyte samples where required.
- Assess whether the springs correspond to the priority Annex I habitat 'Petrifying springs with tufa formation'
- Evaluation of the ecological importance (i.e. local/ county/ national/ international importance) as per standard NRA guidelines: Guidelines for assessment of Ecological Impacts of National Road Schemes (NRA, 2009).

1.3 Sites

Two sites were visited during the survey:

- 1) Lackagh Fen
- 2) Ardloy and Aghalenane Loughs

Both sites are located to the south-west of the N4 between Collooney to Castlebaldwin.

2 METHODOLOGY

2.1 Bryophyte and flora survey

At each site, the areas where potential petrifying springs had been recorded were visited and the bryophytes and charophytes (stoneworts) recorded. In addition, example areas of alkaline fen, transition mire and bog habitats were walked briefly to confirm the habitat type and bryophyte community. Due to the time of year it was not possible to make lists of vascular plants at the sites, but this was not the primary focus of the survey. All habitat types were identified and classified using *A Guide to Habitats in Ireland* (Fossitt, 2000). The habitat name is underlined in the text. Where necessary, samples of bryophytes and charophytes were taken and species identification confirmed microscopically. Species that indicate calcareous (basic) water or substrates are referred to as 'callicoles' and these are marked with an asterisk in the species lists.

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2.2 Plant species nomenclature

Plant nomenclature follows that of the *New Flora of the British Isles* 3rd Edition (Stace, 2010), bryophyte nomenclature follows the *Checklist of British and Irish bryophytes* (BBS, 2009).

2.3 Ecological Evaluation criteria

The ecological importance of flora and fauna was assessed using the criteria listed in the Guidelines for Assessment of Ecological Impacts of National Roads Schemes (NRA, 2009). They form a standardised method for assessing ecological importance in Ireland.

Ecological evaluation:

- International ecological importance
- National ecological importance
- County ecological importance
- Local (higher value) ecological importance
- Local (lower value) ecological importance

3 RESULTS AND DISCUSSION

3.1 Lackagh Fen

Lackagh fen is located in a small valley and with the N4 located to the east, wet grassland and improved agricultural grassland to the west and minor roads to the north and south. The site is an area of bog that has been cutover in the past. The site is influenced by calcareous groundwater and less calcareous surface water. As the peat is at different levels across the site, this leads to a mosaic of alkaline fen, poor fen and bog.

3.1.1 'Raised bog' vegetation

Areas of higher peat are slightly drier and are more acid than the surrounding vegetation. These areas have some affinity with raised bog or poor fen and support the bryophytes:

Aulacomnium palustre

Hylocomium splendens

Rhytidiadelphus squarrosus

Scleropodium purum

Although the raised areas are slightly acidic, Sphagnum species were not recorded and species indicative of more basic conditions such as *Dicranum bonjeanii* and *Rhytidiadelphus triquetrus* are

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present occasionally. This suggests some influence from calcareous ground water in these areas. This habitat is not characteristic of any Annex I habitats.

3.1.2 *Alkaline fen*

In areas where the peat has been cut to a lower level, the water level was at or above the surface at the time of survey. These areas have affinity to alkaline fen, grading to wet grassland, marsh and tall-herb swamp in areas with more surface water influence. The alkaline fen may have some input of neutral to mildly basic over much of the area, as not all of the vegetation was not indicative of highly calcareous conditions. Species recorded:

Bryophytes

*Bryum pseudotriquetrum**

Calliergonella cuspidata

*Campylium stellatum**

Marchantia polymorpha subspecies *polymorpha*

Brachythecium rivulare

Leptodictyum riparium

Philonotis fontana

Charophytes

Chara virgata

Climacium dendroides was frequent throughout and this species often indicates fluctuating water levels.

This vegetation has affinity with the **Annex I habitat: Alkaline Fen [7230]**. There is a high litter cover in some areas due to a lack of grazing and much of the vegetation is in unfavourable condition.

3.1.3 *Calcareous springs*

There are several wetter areas within the site that support a more calcareous vegetation community. Area 1 is located on the southern boundary of the site, adjacent to the willow scrub and is within an area of alkaline fen/ swamp. Area 2 is the main spring area, located to the north-east and was the original target of the survey. Area 3 is a newly discovered spring area, to the north-east of Area 2. Areas 2 and 3 are located in the main area of alkaline fen. The approximate locations of these areas are shown in Figure 3.1 below.

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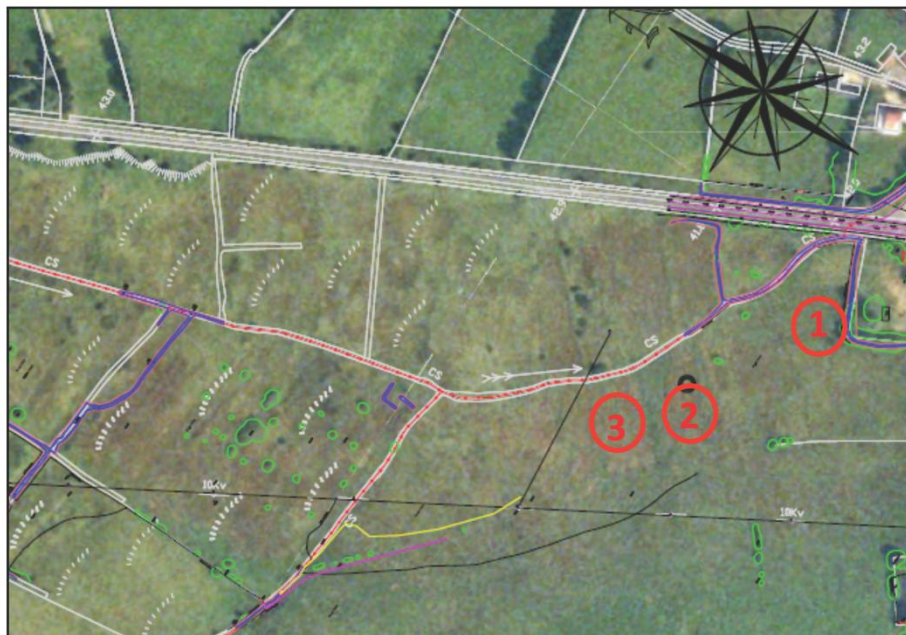


Figure 3.1: Approximate locations of calcareous springs at Lackagh Fen (areas labelled by red numbers)

These areas are much wetter than the surrounding vegetation and the surface is quaking. Tufa formation is present in these areas, either as small amounts on the base of bryophytes (Areas 1 and 2) or, as a thick crust below the water and vegetation surface (Area 2). These areas support bryophytes and charophytes indicative of highly calcareous conditions:

Bryophytes

- Aneura pinguis**
- Bryum pseudotriquetrum**
- Calliergonella cuspidata*
- Calliergon giganteum**
- Campyliadelphus elodes**
- Campylium protensum**
- Campylium stellatum**
- Cratoneuron filicinum**
- Philonotis fontana*
- Rhizomnium pseudopunctatum**

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Charophytes*Chara virgata**Chara vulgaris**

A Bladderwort species *Utricularia australis*/*U. Vulgaris* was frequent in the central spring area. This was not possible to identify to species level as flowers were not present but both of these two species are relatively uncommon in Ireland.

The three spring areas appear to be influenced by calcareous groundwater. The areas of tufa formation and calcareous bryophyte communities are localised, suggesting that these are calcareous spring locations. At the edges of these areas there is a greater influence of surface water and the vegetation grades to the less calcareous alkaline fen.

The calcareous springs are considered to be examples of the **Annex I priority habitat: Petrifying springs with tufa formation (*Cratoneurion*) [7220]**. The typical tufa forming bryophytes: *Palustriella commutata*, *P. falcata* (previously known as *Cratoneuron commutatum* and *C. commutatum* var. *falcatum*) and *Eucladium verticillatum* were not recorded. However, *Cratoneuron filicinum* is abundant with a range of other calcicole bryophytes and stoneworts and tufa deposits in Area 2 are very thick. The springs are therefore considered to be examples of **Petrifying springs with tufa formation** but not 'best/ good examples' which would rank as being of international ecological importance (NRA, 2009).

3.1.4 Rare bryophyte species

Rhizomnium pseudopunctatum and *Campyliadelphus elodes* are both listed as 'Near Threatened' in the Irish bryophyte Red Data Book (Lockhart et al., 2012). These were recorded in a number of locations within and adjacent to the spring sites.

3.1.5 Ecological evaluation

Lackagh Fen supports the Annex I habitats **Alkaline Fen** and the Annex I priority habitat **Petrifying springs with tufa formation** in a mosaic with other wetland habitats. It also supports two Red Data Book bryophyte species. It is therefore considered to be of National Ecological Importance.

3.1.6 Threats

The wetland habitats at this site are sensitive to changes in water levels, management such as grazing, damage by machinery or heavy trampling and changes to water quality. Water quality changes can arise from nutrient inputs from adjacent land or road run-off. In addition, input of surface water that is of lower alkalinity than the groundwater that currently supplies the calcareous

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wetland habitats, could negatively impact the alkaline fen and calcareous spring vegetation. Without management such as grazing, the quality of the Annex I habitats, particularly the alkaline fen is likely to deteriorate.

3.2 Ardloy and Aghalenane Loughs

Ardloy and Aghalenane Loughs comprise a moderate size lough (Aghalenane Lough) and two smaller loughs to the south-east (including Ardloy Lough). These are connected by a watercourse. The loughs are surrounded by reed and tall sedge swamp and alkaline fen. Surrounding the lough system is an area of wetland vegetation with alkaline fen, transition mire, scrub and other wetland habitats. The wetland habitats vary according to water levels, calcareous groundwater influence, management (such as grazing) and nutrient inputs from surrounding vegetation.

The key fen habitats are described below and shown on Figure 3.2.



Figure 3.2: Key fen habitats at Aghalenane Lough (1 = transition mire; 2 = alkaline fen; 3 = cf *Molinia* meadow)

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3.2.1 Transition mire

There is an area of transition mire located to the west of Aghalenane Lough (labelled 1 on Figure 3.2). This has a quaking surface and high water table. Some areas are highly calcareous and have species typical of alkaline fen such as:

Bryophytes

*Aneura pinguis**
*Bryum pseudotriquetrum**
Calliergonella cuspidata
*Calliergon giganteum**
*Campylium stellatum**
*Cratoneuron filicinum**
*Ctenidium molluscum**
*Dicranum bonjeanii**
*Fissidens adianthoides**
*Rhizomnium pseudopunctatum**
*Scorpidium cossonii**

Charophytes

*Chara vulgaris**

However, as is typical of transition mire, the localised areas of calcareous fen grade into less calcareous vegetation with the additional wetland species:

Bryophytes

Aulacomnium palustre
Climacium dendroides
Hylocomium splendens
Philonotis fontana
Pohlia melanadon
Rhytidiadelphus squarrosus
Scleropodium purum
Sphagnum contortum

Sphagnum contortum is a relatively uncommon *Sphagnum* species which is indicative of transition mire. This species is frequent to locally abundant throughout the transition mire area. The

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vegetation is generally species-rich and the high water table is preventing much scrub encroachment and litter accumulation.

The transition mire vegetation is considered to be a good example of the **Annex I habitat: Transition mires and quaking bogs [7140]**.

3.2.2 *Alkaline fen and calcareous springs*

To the south of Aghalenane Lough the vegetation is dominated by sedges and bryophytes and is an example of alkaline Fen (labelled 2 on Figure 3.2). The water table is high here and the bryophyte layer dominated by species that are tolerant of being periodically submerged such as *Calliergon giganteum*, *Bryum pseudotriquetrum* and *Cratoneuron filicinum*. Tufa deposits are present occasionally on the bases of bryophytes, but do not form extensive deposits. Additional bryophytes, generally at low frequency, include:

*Aneura pinguis**
Brachythecium rivulare
Calliergonella cuspidata
*Campylium stellatum**
*Ctenidium molluscum**
*Fissidens adianthoides**
*Rhizomnium pseudopunctatum**

The presence of tufa deposits in localised areas shows an input of calcareous groundwater. These areas are considered to be examples of the **Annex I priority habitat: Petrifying springs with tufa formation (Cratoneurion) [7220]**. As for Lackagh Fen, the typical tufa forming bryophytes: *Palustriella commutata*, *P. falcata* and *Eucladium verticillatum* were not recorded. *Cratoneuron filicinum* is frequent, but the overall diversity of calcicole bryophytes is low, calcicole stoneworts not recorded and tufa deposits sparse. This is likely to be due to surface water inputs and dilution of calcareous groundwater. In addition there are localised algae patches within the alkaline fen, suggesting nutrient inputs from adjacent fields. The tufa areas/ springs within the alkaline fen are therefore considered to be examples of **Petrifying springs with tufa formation** but not 'best/ good examples' which would rank as being of international ecological importance (NRA, 2009). The alkaline fen is considered to be an example of the **Annex I habitat: Alkaline Fen [7230]**.

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3.2.3 Molinia meadow

To the east of the alkaline fen, the peat is slightly higher which may be due to past peat cutting history (labelled 3 on Figure 3.2). This area is dominated by the grass *Molinia caerulea*. Calcicole bryophytes are still occasionally present in this area, but at a much lower frequency. At this time of year it is not possible to fully assess the vascular plant flora. However, a number of vascular plants indicative of the **Annex I habitat: *Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (*Molinia caerulea*) [6410]** were recorded:

Vascular plants*Angelica sylvestris**Carex flacca**Carex panicea**Cirsium palustre**Filipendula ulmaria**Juncus acutiflorus**Molinia caerulea**Potentilla erecta**Senecio aquaticus**Succisa pratensis**Trifolium pratense***Bryophytes***Calliergonella cuspidata*

The full list of potential positive and high quality indicator species is given in O'Neill et al., (2010). Additional species may be present within the vegetation, but not visible due to the time of year of the survey. No high quality indicator species were recorded (O'Neill et al., 2010). Species diversity is relatively low, litter cover high and forb cover varying across the site and therefore it may not be a good example of this habitat type.

3.2.4 Rare bryophyte species

Rhizomnium pseudopunctatum is listed as 'Near Threatened' in the Irish bryophyte Red Data Book (Lockhart et al., 2012). This was recorded from the transition mire and alkaline fen areas. In addition, the transition mire is considered to be suitable habitat for the Annex II species *Hamatocaulis vernicosus* (Near Threatened in the Irish bryophyte Red Data Book). This bryophyte was not recorded during the present survey but the transition mire was only surveyed briefly as it

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was not the main focus of the bryophyte survey. The presence of *Hamatocaulis vernicosus* therefore cannot be ruled out.

3.2.5 Ecological evaluation

Ardloy and Aghalenane Loughs support the Annex I habitats **Alkaline Fen; Transition mire and quaking bogs** and the Annex I priority habitat **Petrifying springs with tufa formation**. In addition, there is vegetation with affinity to the Annex I habitat ***Molinia* meadows on calcareous, peaty or clayey-silt-laden soils**. The transition mire and alkaline fen areas also support a Red Data Book bryophyte species. The **Petrifying springs with tufa formation** at this site are not extensive or good examples. However, the presence of a number of good condition Annex I habitats, mosaic of wetland habitats (including loughs) and Red Data Book bryophyte is of high value and the site is considered to be of National Ecological Importance.

3.2.6 Threats

The wetland habitats at this site are sensitive to changes in water levels, management such as grazing, damage by machinery or heavy trampling and changes to water quality. Water quality changes can arise from nutrient inputs from adjacent land and input of surface water of lower alkalinity than the groundwater that supplies the calcareous wetland habitats.

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