

Botanical Survey Report

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RECEIVED. 03-77 12023

May 2023

DOCUMENT CONTROL SHEET

	DOCUMENT CONTROL SHEET
Client	Marina Quarter Limited.
Project Title	Proposed Development at Cornamaddy, Athlone, Co. Westmeath
Document Title	Botanical Survey Report

Revision	Status	Author(s)	Reviewed	Approved	Issue Date
00	Draft for internal review	YM Ecologist	ROH Project Ecologist	-	
01	Draft for Client Review	YM Ecologist	ROH Project Ecologist	BL Principal Ecologist	10/05/2023
02	Final	YM Ecologist	ROH Project Ecologist	BL Principal Ecologist	10/05/2023



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1 INTRODUCTION



This report contains the results of a botanical survey of the dry meadow grassland (GS2) and dry calcareous and neutral grassland (GS1) habitats at a Site in Cornamaddy, Athlone, Co. Westmeath on the 26th of April 2023. The purpose of the survey was to update the previous botanic survey and assessment of grassland habitate as potentially qualifying Annex I habitats.

This report is submitted to address a Further Information Request from Westmeath County Council for Planning Application Reference 22577. The issue raised by the third-party observations relate to a lack of clarity with regards to the assessment of the area, the esker on Site, which was classed as dry calcareous and neutral grassland (GS1) habitat in the Biodiversity Chapter of the Environmental Impact Assessment Report (EIAR) accompanying this application under separate cover (Enviroguide, 2022).

1.1 Quality Assurance and Competence

Enviroguide Consulting is a wholly Irish Owned multi-disciplinary consultancy specialising in the areas of the Environment, Waste Management and Planning. All Enviroguide consultants carry scientific or engineering qualifications and have a wealth of experience working within the Environmental Consultancy sectors, having undergone extensive training, and continued professional development.

Enviroguide Consulting as a company remains fully briefed in European and Irish environmental policy and legislation. Enviroguide staff members are highly qualified in their field. Professional memberships include the Chartered Institution of Wastes Management (CIWM), the Irish Environmental Law Association and Chartered Institute of Ecology and Environmental Management (CIEEM).

All surveying and reporting have been carried out by qualified and experienced ecologists and environmental consultants. ROH and YM, Ecologists with Enviroguide, undertook the rare flora surveys and desktop research for this report.

ROH has a B.Sc. in Environmental Science (Hons) from the National University of Ireland, Galway and a M.Sc. (Hons) in Ecological Assessment, from University College Cork, and a wealth of experience in desktop research, literature scoping-review, and report writing, as well as practical field experience (Habitat surveys, Invasive species surveys, Wintering bird surveys, large mammals etc.). ROH has extensive experience in compiling Biodiversity Chapters of EIARs, Ecological Impact Assessments (EcIAs), Appropriate Assessment (AA) screening and Natura Impact Statement (NIS) reports, and in the overall assessment of potential impacts to ecological receptors from a range of developments.

YM has a B.Sc. in Botany from Tokyo University of Agriculture and a M.Sc. in Botany from Hokkaido University, and has experience in desktop research, reporting and GIS works, as well as practical field experience including flora surveys, rare and protected plant species surveys, phytosociological vegetation surveys, habitat mappings and invasive species surveys. YM has prepared several AA screening reports. YM is also



a Qualifying member of the Chartered Institute of Ecology and Environmental Management (CIEEM).

1.2 Site Location

The land subject to this planning application is located at Cornamaddy, Athlone, Co. Westmeath, approximately 2km to the northeast of Athlone Town Centre. The Site is generally bound to the west by greenfield lands and Cornamagh Cemetery, to the north by greenfield lands, to the south by greenfield lands and the Ballymahon Road and to the southeast by the existing Drumaconn housing estate.





FIGURE 1. SITE LOCATION



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2 LEGISLATIVE AND POLICY CONTEXT

2.1 **Rare / Protected Species Legislation**

2.1.1 Wildlife Act 1976 and amendments

PECEINED. 03/77 The Wildlife Act 1976 was enacted to provide protection to birds, animals, and plants in Ireland and to control activities which may have an adverse impact on the conservation of wildlife. The act also provides a mechanism to give statutory protection to Natural Heritage Areas (NHAs).

The current list of plant species protected by Section 21 of the Wildlife Act, 1976 (and amendments) is set out in the Flora (Protection) Order, 2022 (S.I. No. 356/2015). The Flora (Protection) Order affords protection to several species of plant in Ireland. This Act makes it illegal to cut, uproot or damage the listed species in any way, or to offer them for sale. This prohibition extends to the taking or sale of seed. In addition, it is illegal to alter, damage or interfere in any way with their habitats. This protection applies wherever the plants are found and is not confined to sites designated for nature conservation.

2.1.2 EC (Birds and Natural Habitats) Regulations 2011

The EU Directive on the Conservation of Natural Habitats and of Wild Fauna and Flora (Habitats Directive 1992) provides protection to particular species and habitats throughout Europe. The Habitats Directive has been transposed into Irish law through the EC (Birds and Natural Habitats) Regulations 2011.

Annex IV of the EU Habitats Directive provides protection to a number of listed species, wherever they occur. Under Regulation 23 of the Habitats Directive, any person who, in regard to the listed species, "Deliberately captures or kills any specimen of these species in the wild, deliberately disturbs these species particularly during the period of breeding, rearing, hibernation and migration, deliberately takes or destroys eggs from the wild or damages or destroys a breeding site or resting place of such an animal shall be guilty of an offence."

2.1.3 EU Habitats Directive

The Habitats Directive aims to protect some 220 habitats and approximately 1000 species throughout Europe. The habitats and species are listed in the Directives annexes, where Annex I covers habitats and Annex II, IV and V cover species. There are 59 Annex I habitats in Ireland and 33 Annex IV species which require strict protection wherever they occur. The Directive requires the designation of Special Areas of Conservation (SACs) for areas of habitat deemed to be of European interest. The SACs together with the Special Protection Areas (SPAs) from the Birds Directive form a network of protected sites called Natura 2000.

The Annex I grassland habitat which this report is primarily focused on is semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) [6210]; important orchid sites [*6210]. The orchid-rich variant of [*6210] is accorded



priority status. The following description is adapted from the National Conservation Status Assessments of the National Parks and Wildlife Service (NPW\$) (2013).

Within Ireland the Annex I habitat [6210/*6210] comprises species-rich plant communities found on shallow, well-drained calcareous substrates. It is considered a priority habitat only if it is an important orchid site. The Annex I habitat includes a mixture of grasses and herbs, with calcicole species typically frequent. It usually occurs on obvious geological features such as eskers, outcropping limestone rock and in association with limestone pavement. The Burren and Aran Islands and Dartry Mountains are particularly important areas within Ireland for this Annex I habitat.

2.2 Invasive Species Legislation

Certain plant species and their hybrids are listed as Invasive Alien Plant Species in Part 1 of the Third Schedule of the *European Communities (Birds and Natural Habitats) Regulations* 2011 (SI 477 of 2011, as amended). In addition, soils and other material containing such invasive plant material, are classified in Part 3 of the Third Schedule as vector materials and are subject to the same strict legal controls.

Failure to comply with the legal requirements set down in this legislation can result in either civil or criminal prosecution, or both, with very severe penalties accruing. Convicted parties under the Act can be fined up to €500,000.00, jailed for up to 3 years, or both.

Extracts from the relevant sections of the regulations are reproduced below.

"49(2) Save in accordance with a licence granted [by the Department of Arts, Heritage and the Gaeltacht], any person who plants, disperses, allows or causes to disperse, spreads or otherwise causes to grow in anyplace [a restricted non-native plant], shall be guilty of an offence.

49(3) ... it shall be a defence to a charge of committing an offence under paragraph (1) or (2) to prove that the accused took all reasonable steps and exercised all due diligence to avoid committing the offence.

50(1) Save in accordance with a licence, a person shall be guilty of an offence if he or she [...] offers or exposes for sale, transportation, distribution, introduction, or release—

(a) an animal or plant listed in Part 1 or Part 2 of the Third Schedule,

(b) anything from which an animal or plant referred to in subparagraph (a) can be reproduced or propagated, or

(c) a vector material listed in the Third Schedule, in any place in the State specified in the third column of the Third Schedule in relation to such an animal, plant or vector material."



3 METHODOLOGY

3.1 Desk Study



Prior to the survey, a desktop study, was carried out to collate and review available information, datasets and documentation sources relevant for the completion of the botanical survey in April 2023.

The dry calcareous and neutral grassland (GS1) habitat at the Site of the Proposed Development was assessed for it's potential to correspond with the Annex I habitat semi-natural dry grasslands and scrubland facies: on calcareous substrates (*Festuco-Brometalia*) [6210], (please note that this includes the priority feature "*important orchid rich sites*"). This assessment applied the updated methodology as per Martin et al., (2018) (Table 1 and Table 2).

TABLE 1. ASSESSMENT CIRITERIA OF THE ANNEX I HABITAT SEMI-NATURAL DRY GRASSLANDS AND SCRUBLAND FACIES: ON CALCAREOUS SUBSTRATES [6210]); IMPORTANT ORCHID SITES (*6210) ACCORDING IN MARTIN ET AL. (2018).

Criteria	Scale of assessment
Vegetation Composition	
Number of high-quality species (Table 2) present ≥ 2	Plot + 20 m buffer surrounding
	the area
Total number of positive indicator species (Table 2)	Plot + 20 m buffer surrounding
present ≥ 7	the area
Vegetation structure	
% forb cover	Plot
% graminoid cover	Plot
Record % cover of litter (Pass ≤ 25%)	Plot
Record Y or N, for if the proportion of the sward between	Plot
5-40 cm tall is ≥ 30%	
Physical structure	
Record the % cover of bare soil (Pass \leq 10%)	Plot
Record Y or N, for if the area of the habitat showing signs	Local vicinity
of serious grazing or disturbance is < 20 m ²	
Pressures	
Cover of bare soil ≤5%	Plot
Area of the habitat showing signs of serious grazing or	Plot
disturbance <20m2	
Negative species	
Record the % collective cover of scrub, bracken and	Plot
heath (woody species) (Pass ≤ 5%)	
Record the % collective cover of the negative indicator	Plot
species (Table 2) (Pass ≤ 20%)	

TABLE 2. POSITIVE INDICATOR SPECIES FOR SEMI-NATURAL DRY GRASSLANDS & SCRUB FACIES ON CALCAREOUS SUBSTRATES [6210]; IMPORTANT ORCHID SITES (*6210) ACCORDING IN MARTIN ET AL. (2018).

High Quality Positive Indicator Species	Positive Indicator Species
Antennaria dioica	Arabis hirsuta
Anthyllis vulneraria	Brachypodium pinnatum



High Quality Positive Indicator Species	Positive Indicator Species		
Asperula cynanchica	Bromopsis erecta		
Blackstonia perfoliata	Carex flacca		
Briza media	Ctenidium molluscum		
Campanula rotundifolia	Daucus carota		
Carex caryophyllea Galium verum			
Carlina vulgaris	Helictotrichon pubescens		
Centaurea scabiosa	Homalothecium lutescens		
Filipendula vulgaris	Leontodon hispidus / L. saxatilis (record		
	both but count as one in assessment)		
Gentiana verna	Lotus corniculatus		
Gentianella amarella/campestris	Origanum vulgare		
Geranium sanguineum Pilosella officinarum			
Knautia arvensis Ranunculus bulbosus			
Koeleria macrantha Sesleria caerulea			
Linum catharticum	Thymus polytrichus		
Primula veris	Trisetum flavescens		
Sanguisorba minor			
Orchid species			
Negative indicators species listed in Martin	n et al., (2018): Arrhenatherum elatius,		
Cirsium arvense, Cirsium vulgare, Dactylis glo	omerata, Lolium perenne, Rumex crispus,		
Rumex obtusifolius, Senecio jacobaea, Trifoli	um repens, Urtica dioica		

During the national Grassland Monitoring Survey (GMS) of Annex I grasslands between 2015 and 2017 (Martin et al., 2018), a review was carried out of the methodology used during the baseline Irish Semi-natural Grasslands Survey (ISGS) of O'Neill et al., (2013). Following this review, amendments to the survey and assessment methodology for Annex I grasslands were made and reported in Martin et al., (2018).

The main differences in the methodology for assessment of lowland hay meadows from that of O'Neill et al. (2013) are, that where the assessment is failing with regard to 1-2 positive indicator species, the following modifications to the methodology can be applied:

- An assessment relevé (also referred to as a monitoring stop) can pass the assessment if a high-quality positive indicator species is recorded within 20m of the monitoring plot;
- In the case of assessment relevés where only one positive indicator is missing to pass the assessment, the relevé can pass the assessment if an additional positive indicator species was recorded within 20m of the plot;
- A marginal failure (35-39%) in % forb:graminoid ratio is allowed to pass on expert judgement; and
- If positive indicator species are failing, consider recording presence/absence of additional positive indicator species.

The desktop study for the Proposed Development Site relied on the following:

• Information on the previous survey for the habitat and flora for the Site,

referred to in the Biodiversity Chapter of the EIAR (Enviroguide 2022) and the AA screening and NIS (Enviroguide 2023) accompanying this application;

- Satellite imagery and mapping obtained from various sources and dates including Google, Digital Globe, Bing and Ordnance Survey Ireland; and
- Information on the extent, nature, and location of the Proposed Development, provided by the applicant and their design team.

A comprehensive list of all the specific documents and information sources consulted in the completion of this report is provided in Section 8 - References.

3.2 Field Survey

A botanical walkover survey for the habitat assessment of the Site was conducted by Enviroguide Project Ecologists YM and ROH on the 26th of April 2023. The survey had regard to the Heritage Council guidance (Smith *et al.* 2011).

The focus of the survey was the area of dry calcareous and neutral grassland (GS1) habitat as per the Biodiversity Chapter of the EIAR accompanying the planning application under a separate cover (Enviroguide 2022) (Figure 2). It is noted that the esker area at the Site is not zoned for development and construction activity is not proposed on the esker.





FIGURE 2 HABITAT MAP OF THE SITE (ENVIROGUIDE 2022)

3.2.1 Relevé Survey Methodology

To assess floristic composition of the dry calcareous and neutral grassland (GS1) habitat at the Site, relevés were collected, setting a sample plot in each topographical area, namely: a slope $(30^\circ - 45^\circ)$ of the esker, a ridge $(0^\circ - 5^\circ)$ of the esker and a fee of slope $(0^\circ - 10^\circ)$ of the esker.

In summary, the survey methodology was as follows.

- Set a 2 * 2 m² plot with scales;
- Record all vascular species within a quadrat, layering into height strata, i.e., herb layer and shrub layer in this survey;
- Record the dominance of each species, basically following the Braun-Blanquet cover-abundance scale (Table 3).

Rating symbol	Description	Percentage
5	Any number, with cover more than 3/4 of the reference area	>75%
4	Any number, with 1/2 - 3/4 cover	50-75%
3	Any number, with 1/4 - 1/2 cover	25-50%
2	Any number, with 1/20 – ¼ cover	5-25%
1	Numerous, but less than 1/20 cover, or scattered, with cover up to 1/20	5%
+	Few, with small cover	-
r	Solitary, with small cover	-

TABLE 3. BRAUN-BLANQUET COVER-ABUNDANCE SCALE (MUELLER-DOMBOIS 1974).

3.3 Limitations

The botanical survey of the dry calcareous and neutral grasslands at the Site was undertaken in late April, as per the Heritage Council best practice guidance for carrying out habitat surveys (April-September) (Smith *et al.* 20011). However, it should be noted that seasons for a number of Positive/Negative Indicator Species shown in Table 2 are after May and some species within the relevés were recorded in the form of rosettes. The findings of this report are seasonally constrained, however this is not considered a limitation as the survey was undertaken within the parameters of the best practice guidelines.

4 RESULT

In total, nine relevés were collected at the Site for each habitat, namely: five relevés on slopes of the esker (three relevés on the NE slope and two relevés on the SW slope), two relevés on the ridge of the esker, two relevés on the toe of slope of the esker (Figure 3 and Table 4). A full list of flora identified within the relevés at the Site is provided in Appendix I.









TABLE 4. VEGETATION PHYSIOGNOMY OF SAMPLE PLOTS.





4.1 Positive Indicator

The positive indicator species recorded within the nine relevés surveyed (Q1 - Q9) are presented in Table 5 below and Figure 4. A total of eight positive indictors species for Annex I semi-natural dry grasslands & scrub facies on calcareous substrates [6210] were recorded, including three high quality indicator species recorded across the nine relevés and 20 m surrounding area of each plot. Overall, the north-east slope of the esker contained the highest number of positive indicator species.



TABLE 5. POSITIVE INDICATOR SPECIES RECORDED IN EACH PLOT/QUADRAT AND 20M SURROUDING AREA.

Species	Toe of slope		NE Slope			SW Slope		Ridge	
	Q1	Q2	Q3	Q4	Q9	Q7	Q8	Q 5	Q6
High Quality (HQ) Positive Species	or						.0	2-7_	
Blackstonia perfoliata			\checkmark	\checkmark	\checkmark				120
Carex caryophyllea			\checkmark	~					4
Linum catharticum	\checkmark		\checkmark						
Primula veris	\checkmark		\checkmark	\checkmark		\checkmark			
Orchidaceae sp. *					~	~	~		
Positive Indicator Species									
Carex flacca	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark		\checkmark	\checkmark
Lotus corniculatus	\checkmark		\checkmark	\checkmark	\checkmark			\checkmark	
Pilosella officinarum			\checkmark	\checkmark	\checkmark			\checkmark	
Total Positive Indicator Species	4	1	7	6	5	3	1	3	1
Total HQ Indicator Species	2	0	4	3	2	2	1	0	0

* Dactylorhiza fuchsii or Orchis mascula







FIGURE 4. POSITIVE INDICATOR SPECIES RECORDED IN EACH PLOT AND 20M SURROUDING AREA .

4.2 Negative Indicator and Other Pressure

Negative indicator species recorded within the nine relevés are presented in Table 6. A total of four negative indictors species for Annex I semi-natural dry grasslands & scrub facies on calcareous substrates [6210] were recorded across the nine relevés and 20 m buffer zones surrounding each plot. Overall, the ridge and toe of slope of the esker contained a higher number of negative indicator species.

In addition, one stand of cotoneaster (*Cotoneaster* sp.) was recorded within the sample plot Q3 (Figure 5 and Table 6). Although cotoneaster is not listed in the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations 2011, as amended, the threat of this species to Annex I habitats was reported as below (Murphy and Fernandez 2009).

"Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (important orchid sites) (6210/6211)

The overall conservation status was considered to be Unfavourable for habitat 6210/6210 at all Survey Units containing the Annex I habitat except for Gortlecka (Table 21). Four Survey Units were given an Unfavourable Bad assessment. A high Forbs ratio requirement was identified as the main reason for an overall negative assessment for the habitat structure and functions. Quarrying and invasive species (Cotoneaster microphyllus) were also threatening this Annex I habitat in Gortnandarragh (Lough Corrib). Gortlecka was the only Survey Unit that passed the conservation status assessment."

Additional pressures such as a trampled track around the esker and some dumping due to antisocial behaviour on the slope of the esker were identified. The encroachment of shrubs and saplings including grey willow (*Salix cinerea s.lat.*), gorse (*Ulex europaeus*), blackberry (*Rubus fruticosus agg.*) and Sycamore (*Acer pseudoplatanus*).

TABLE 6. NEGATIVE INDICATOR SPECIES RECORDED IN EACH PLOT AND 20M SURROUDING AREA.

Species	Toe of slope		NE Slope			SW Slope		Ridge	
Species	Q1	Q2	Q3	Q4	Q9	Q7	Q8	Q5	Q6
Negative Indicator Species									
Cirsium vulgare	\checkmark	\checkmark		\checkmark					



Species	Toe of slope			NE Slop	е	SW	Slope	Ridge		
Species	Q1	Q2	Q3	Q4	Q9	Q7 ⁽	ÇQ8	Q5	Q6	
Dactylis glomerata	\checkmark						SUL,	\checkmark	\checkmark	
(Senecio sp.) *							\sim). ·		
Trifolium repens	\checkmark						\checkmark	C. C.		
Urtica dioica									€0√	
Total Negative Indicator Species	3	1	0	1	0	0	2	3	22	

* Senecio jacobaea is a negative indicator species



FIGURE 5. NEGATIVE INDICATOR SPECIES AND OTHER PRESSURE RECORDED IN EACH PLOT AND 20M SURROUDING AREA.



5 ASSESSMENT

The Annex I semi-natural dry grasslands and scrubland facies of calcareous substrates (*Festuco-Brometalia*) (*important orchid sites) [6210] assessment applied the modified methodology in Martin et al. (2018) for four relevés (Q1, Q3, Q5 and Q7) and the result are presented in Table 7. The aforementioned relevés were chosen as sample plots as they have the highest number of positive indicator species for each topographical feature.

The Annex I grassland assessment of the calcareous grassland establishing on the esker concludes that there is no relevé corresponding to the Annex I grassland Seminatural dry grasslands and scrubland facies on calcareous substrates [6210] based on the modified methodology used in the latest Annex I grassland monitoring assessments (Martin et al., 2018).

Among relevés used for the assessment, Q3 and Q7, which correspond to the calcareous grassland establishing on the slope of the esker, have the highest number of features required to pass the criteria. However, respectively, both Q3 and Q7 have failed to pass all criteria due to;

- Q3 failed to pass the following: 'Record the % cover of bare soil (Pass ≤ 10%)' and 'Forb component of forb:graminoid ratio 40-90%'. and a lack of positive indicator.
- Q7 failed to pass the 'Total number of positive indicator and HQ species \geq 7'.

In addition, it is noted that the area of calcareous grasslands on the slope of the esker recorded in this assessment was very small (0.4m² approx.) which is just equal to the minimum mappable habitat area **and well below that of the minimum area for a grassland to be considered as a primary area of Annex I habitat** which is 1ha (O'Neill et al., 2013).

It is also notable that, due to a lack of management, the esker and surrounding areas are currently transitioning to scrub and dry meadows and grassy verges habitat due to high proportion of willow species and gorse encroachment. A high proportion of tall grass species were also recorded, e.g., cock's-foot (*Dactylis glomerata*) and meadow foxtail (*Alopecurus pratensis*), from the boundary and the ridge of the esker. In the absence of management (i.e., mowing, scrub clearance), this grassland will eventually be lost to scrub encroachment.

 TABLE 7. ASSESSMENT OF A CALCAREOUS GRASSLAND IN THE SITE FOR CORRESPONDENCE WITH THE ANNEX I

 HABITAT SEMI-NATURAL DRY GRASSLANDS AND SCRUBLAND FACIES ON CALCAREOUS SUBSTRATES [6210]

 ACCORDING TO CRITERIA IN MARTIN ET AL. (2018). NOTE: GREEN FILLED CELL STANDS FOR 'PASS' THE CRITERIA.

	NE slope of	SW slope	Toe of	Ridge of
Criteria	the esker	of the	slope of the	the esker
	(Q3)	esker (Q7)	esker(Q1)	(Q5)
Vegetation Composition				
Number of high-quality species present ≥ 2	4	2	2	-



Total number of positive indicator and HQ species ≥ 7(Within plot + 20 m buffer surrounding the area)	7	3	4 ***	3	
Positive indicator species with relevé	3	1	2	33777	
Other positive indicator species within 20m of relevé	-	-	-	-	<u>کی</u>
Alternative positive indicators within plot	-	-	-	-	
Cover of negative indicator species: individually ≤10%	-	-	10%	≥5%	
Percentage collective cover of negative indicator species ≤20%	-	-	15%	≥5%	
Vegetation structure					
Forb component of forb :graminoid ratio 40-90% *	25.5%	43.5%	61.5%	23.9%	
Litter cover ≤25%	1%	10%	10%	5%	
Proportion of the sward between 10-50cm tall ≥50%	98%	80%	50%	45%	
Physical structure					
Record the % cover of bare soil (Pass ≤ 10%)	20%	2%	5%	5%	
Record Y or N, for if the area of the habitat showing signs of serious grazing or disturbance is < 20 m2	Y	Y	Y	Y	
Negative species					
Record the % collective cover of scrub, bracken and heath (woody species) (Pass ≤ 5%)	2%	1%	5%	50% (Grey willow)	
Record the % collective cover of the negative indicator species (Pass ≤ 20%)	0%	0%	10%	2%	

* Forb:graminoid ratio: Ratio of % forb cover to %graminoid (grass / sedge / rush) cover, expressed as [%forb/(%forb+%graminoid)]x100;

6 CONCLUSION

It is concluded that the dry calcareous and neutral grassland (GS1) habitat at the Site does not correspond to the Annex I grassland habitat semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*) (*important orchid sites) [6210].

Although the relevés recorded predominantly in the north-eastern and south-western slopes of the esker, passed several of the criteria of the aforementioned Annex I habitat, none of the relevés were found to meet the condition of the minimum area for a grassland to be considered as a primary area of Annex I grassland (1 ha) (O'Neill et al., 2013).

<u>Therefore, dry calcareous and neutral grassland (GS1) habitat at the Site does</u> <u>not correspond to Annex I grassland.</u>

In addition, the esker assessed in this report is threatened by scrub encroachment from the ridge and the north-eastern toe of slope and in the absence of management will naturally transition to scrub habitat within a number of years.

It is noted that the relevé predominantly in the north-eastern slope on the esker supported adequate positive indicator species. The north-eastern slope of the esker is therefore evaluated as of **high local conservation value**, at the Site scale only.



7 RECOMMENDATION

The dry calcareous and neutral grassland habitat at the Site does not currently correspond to an Annex I habitat. The botanical survey of the esker at the Site concluded that although small areas of the esker contained positive indicator species, the esker did not pass the criteria required to correspond to an Annex I habitat [6210].

There is an opportunity to create and maintain a species rich grassland habitat within the landscape plan and to create a functional buffer zone between the grassland habitat and the Proposed Development. To maintain a species-rich grassland, several factors need to be considered, including maintenance practices and conservation strategies.

7.1 Construction Phase

Based on the conclusion of this survey, the management measures for the calcareous grasslands during the construction phase are recommended as below:

- Temporary fencing or signs will be erected around the walkover area (Figure 3) as exclusion zones under the instruction of an Ecological Clerk of Works (ECoW) to prevent disturbing the esker;
- If any vehicles need to access the esker area, the track will be limited to a single track using the existing trampled path, keeping at a sufficient distance from the esker to prevent disturbance;
- No pesticide/ herbicide sprays or fertilisers will be used in the immediate vicinity of the esker;
- No deposition of spoil during Site works will occur on the esker; and
- All construction works will follow best-practice mitigation measures for invasive species management.

7.2 Post-construction

A long-term monitoring programme will be implemented at the Site to track species diversity, population trends and ecosystem health. The Site will be monitored by a suitably qualified ecologist/botanist post construction annually for 5 years. The details of this monitoring programme will be agreed with the Local Authority.

7.3 Maintenance Practices

The following measures will improve the quality and composition of the dry calcareous and neutral grassland habitat at the Site:

 A mowing regime is recommended for the grassland species conservation. The method here is to determine an appropriate mowing regime to promote plant diversity and prevent dominance of fast-growing species. Efforts to conserve an esker habitat include the exclusion of human activity as much as possible from the habitat and the identification of any degraded areas that might require the reintroduction of native species. Scrub encroachment on the esker will also be monitored.

- Control of non-native species cotoneaster through manual removal. Sycamore has been identified in the treeline habitats at the Site however as sycamore is a functional replacement for Ash (*Fraxinus excelsior*) due to ash dieback, its removal is not recommended.
- A buffer zone of wildlife corridor will be created around the esker to protect it from encroachment. This includes the creation of a scrub corridor between the development and the esker to created continuity with existing hedgerows.



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APPENDIX I – SURVEY DATA

A list of species recorded within each of the relevés collected at the Site is shown in Table 8. TABLE 8. SPECIES DATA FROM THE RELEVÉ IN THE SITE.

Species	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	09	5_
Acer pseudoplatanus			r	+					+	2
Achillea millefolium			+	1	1		1	1		
Alopecurus pratensis						5	1			
Anthoxanthum odoratum	+			+	2		1	2	1	
Bellis perennis				+	+					
Betula sp	r		r		r					
Blackstonia perfoliata			+	+					1	
Carex carvophyllea				+						
Carex flacca	1	1	2	1	1		+		+	
Centaurea nigra			_	2			2	2	1	
Cerastium fontanum	+									
Chamerion angustifolium				+						
Cirsium vulgare	+	+		r						
Cotoneaster sp.			r							
Crataegus monogyna			+	+			+			
Crepis vesicaria								r		
Dactylis glomerata	2				1	1		2		
Orchidaceae (Dactylorhiza fuchsii or Orchis mascula)							+	+	+	
Equisetum arvense	1									
Festuca rubra	+		2	1	3		3		4	
Hedera helix			+		+					
Heracleum sphondylium				+		+	+			
Hypericum sp.				r						
Juncus inflexus	1	4								
Linum catharticum	+		+							
Lotus corniculatus	+		1	1					1	
Luzula campestris				+	1		+	1	+	
Pilosella officinarum			+	+					2	
Plantago lanceolata	1	1	+	+	+		1	1	1	
Potentilla anserina	+									
Potentilla sterilis				+	+					
Primula veris				+			+			
Prunella vulgaris			+	+						
Ranunculus acris	+					+	+	+		
Ranunculus repens				+		1				
Rosa canina							+			
Rubus fruticosus agg.				+	+					
Rumex acetosa						+				
Salix cinerea s.lat.	1	+	1		3		+			



Species	Q1	Q2	Q3	Q4	Q5	QA	Q7	Q8	Q9	1
Scrophularia nodosa	+					'<	Ĉ.			1
Senecio sp.					+		s'	+		1
Sorbus aucuparia			r							1
Taraxacum officinalis agg.	1	1	+	1	1	+	2	iC	2	1
Trifolium pratense		+					+	+	47	Ł
Trifolium repens	1				+			1	4	$\frac{1}{2}$
Urtica dioica					+	2				50
Veronica chamaedrys		+			+	+	+	+		1
Vicia sp.		+								l









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