61253

Environmental Impact Assessment Report

Cummeenabuddoge Wind Farm

Technical Appendix 8-1: Terrestrial Ecology

Cummeennabuddoge Wind (DAC)

September 2024

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1 Introduction

1.1 Terms of Reference

A range of terrestrial ecological surveys were undertaken by Malachy Walsh & Partners (MWP) Ireland in 2020-21 at the Proposed Development Site known as the Cummeenabuddoge Wind Farm. Surveys included were as follows:

- Habitats – classified using Fossitt (2000);
- Kerry slug (*Geomalacus maculosus*) surveys, as per Kearney, J. (2010) *Kerry slug (Geomalacus maculosus Allman 1843) recorded at Lettercraffroe, Co. Galway*. Irish Naturalists' Journal 31: 68-69.
- Scoping for Habitat Condition Assessment for Marsh Fritillary (*Euphydryas aurinia*);
- Targeted mammal surveys as per guidance outlined in Chanin (2003) with reference to Bang et al. (2006), NRA (2009), and Muir et al. (2013);
- Amphibians and reptile checks (whilst undertaking other surveys); and
- Invasive Plant and Animal Species checks (whilst undertaking other surveys).

The Proposed Development Site is centred on Irish Transverse Mercator (ITM) coordinate system (W 19846 83148) and occupies an area of approximately 986ha, (shown bounded by the red line on Figure 1-1a).

1.2 Brief Project Description

The Proposed Development lies within commercial forestry, located on land at Clydaghroe and Cummeenabuddoge, Clonkeen, almost entirely within County Kerry, although a proportion of the grid connection cabling and works along the turbine delivery route is proposed within County Cork. The settlements of Millstreet and Ballyvourney are approximately 11km to the northwest and 6km to the south of the Proposed Development respectively.

1.3 Objectives

The principal objectives of this report are:

- To describe the methodology and report on the results of terrestrial ecological surveys; and
- To describe the baseline non-avian ecological status of the proposed working areas, including an appropriate buffer.

2 Methodology

MWP Ireland undertook surveys between July-September 2021 using a team of ten ecologists, working in pairs. MWP have a large in-house ecology team with expertise in habitat, bird, bat, terrestrial mammals, and specialist freshwater ecology and have been operating in Ireland for over 50 years.

2.1 Desk Study

A search for sites designated for nature conservation and protected species records data was undertaken. The former was for sites designated for habitats and non-avian species within 10km of the Site. The latter for records from the National Biodiversity Data Centre (NBDC) for the 10km grid squares which cover the Site W18 and W28. Records for Invasive Alien Species (IAS) were also collected for these grid squares. Whilst the 10km grid square is considered suitable, as it includes Important Ecological Features (IEFs) which may be present, the large size may provide records which are not relevant to the Site. The records should therefore be used as a guide as to what may be present and inform the ground-truthing provided by the surveys.

A 10km study area was used to allow for species which use watercourses that have a hydrological connection to the Site.

2.2 Field Surveys

The study area was the Proposed Development Site Boundary focusing on appropriate habitats for different receptors, such as for otters on watercourses, Kerry slug in plantation etc.

2.2.1 Habitats

The habitat surveying consisted of ecologists walking through habitats within the site boundary to classify the habitats following 'A Guide to Habitats in Ireland' (Fossitt, 2000)

During the surveys, surveyors carried out searches of the species listed below and for the habitat features likely to support protected species including:

- The plant species listed in Annex II of the EU Habitats Directive.
- Flora Protection Order species.
- Flora species listed in The Irish Red Data Book (Wyse Jackson et al., 2016).

On completion of field surveys habitat boundaries and associated attribute data were mapped using desk-based GIS software, namely ArcMap (10.6) which was also used to calculate habitat areas and lengths. Habitat boundaries and associated attribute data were also mapped using ArcMap (10.6).

Evidence of any invasive species was noted during the habitat survey.

2.2.2 Kerry Slug

Kerry slug surveys within the Site were carried out in August – September 2021 by MWP in support of the preparation of the EIAR for the proposed wind farm development. These surveys consisted of live refuge trapping and hand searching for Kerry slug under licence. Five traps were set out at eight different locations where stone outcropping

occurred within the Site. Hand searching was carried out in tandem with the metric outcrop trapping.

2.2.3 Marsh Fritillary

The presence / absence of the marsh fritillary butterfly food plant, devil's-bit scabious *Succisa pratensis*, was noted during the habitat survey of the Proposed Development site. A Habitat Condition Assessment for marsh fritillary butterfly was then carried out of areas where the food plant is present following criteria from Biodiversity Ireland[1] as shown in Annex 2. This method characterises suitable habitats for marsh fritillary as those that:

- Have three or more devil's-bit scabious plants per square metre, across more than twenty percent of the habitat area.
- Have a varying vegetation height.
- Are grazed to maintain the structure in the sward.

2.3 Mammals

Desk studies and in-house experience of the Site and its wider area informed the scope of the mammal surveys. These data were compiled, before carrying out of the ecological surveys described in this report, to inform the design of surveys and to ensure that all surveyors were cognisant of the potential presence of these species at, and in the area around the Site.

Mammal surveys included checking for evidence of activity such as prints, droppings, burrow-holes, dens and food caches, activity trails, disturbed vegetation, and direct visual observations in suitable breeding and foraging habitats. Surveys for protected mammals followed guidance outlined in Chanin (2003) with reference to Bang et al. (2006), NRA (2009), and Muir et al. (2013).

Evidence of any invasive species was noted during the Mammal survey.

2.4 Amphibians and Reptiles

Amphibians or reptiles encountered during other surveys were recorded.

[1] https://www.biodiversityireland.ie/wordpress/wp-content/uploads/Marsh-Fritillary-Habitat-Condition-Form.pdf

3 Baseline

3.1 Desk Study

3.1.1 Sites of Nature Conservation Interest

Sites designated for habitats and non-avian species within 10km of the Proposed Development are shown in Table 1. A 10km study area was used to allow for species which use watercourses that have a hydrological connection to the Site.

For designated sites relating to ornithology see EIA Chapter 10: Ornithology. Six designated sites are present all of which are Special Areas of Conservation. The closest *is the Killarney National Park, Macgillycuddy's Reeks and Caragh River Catchment SAC* which intersects the site on the northern boundary. The *Mullaghanish Bog SAC* is approximately 75m from the southern boundary.

Table 1: Statutory designated sites for non-avian interests within 10km of the Proposed Development Site

Site Name	Site Designation	Distance from the Proposed Development
Mullaghanish Bog SAC*	Blanket Bogs	75m from Southern Boundary
St. Gobnet's Wood SAC*	Old Oak Woodlands	4km South
Killarney National Park, Macgillycuddy's Reeks and Caragh River Catchment SAC*	Oligotrophic Waters containing very few minerals Oligotrophic to Mesotrophic Standing Waters Floating River Vegetation Wet Heath Dry Heath Alpine and Subalpine Heaths Juniper Scrub Calaminarian Grassland Molinia Meadows Blanket Bogs (Active)* Rhynchosporion Vegetation Old Oak Woodlands Alluvial Forests* Yew Woodlands* Kerry Slug (*Geomalacus maculosus*) Freshwater Pearl Mussel (*Margaritifera margaritifera*) Marsh Fritillary (*Euphydryas aurinia*) Sea Lamprey (*Petromyzon marinus*) Brook Lamprey (*Lampetra planeri*) River Lamprey (*Lampetra fluviatilis*) Twaite Shad (*Alosa fallax*) Atlantic Salmon (*Salmo salar*) Lesser Horseshoe Bat (*Rhinolophus hipposideros*) Otter (*Lutra lutra*) Killarney Fern (*Trichomanes speciosum*)	Adjacent Northern Boundary

	Slender Naiad (*Najas flexilis*)	
Blackwater River (Cork/Waterford) SAC*	Estuaries Tidal Mudflats and Sandflats Perennial Vegetation of Stony Banks Salicornia Mud Atlantic Salt Meadows Mediterranean Salt Meadows Floating River Vegetation Old Oak Woodlands Alluvial Forests* Freshwater Pearl Mussel (*Margaritifera margaritifera*) White-clawed Crayfish (*Austropotamobius pallipes*) Sea Lamprey (*Petromyzon marinus*) Brook Lamprey (*Lampetra planeri*) River Lamprey (*Lampetra fluviatilis*) Twaite Shad (*Alosa fallax*) Atlantic Salmon (*Salmo salar*) Otter (*Lutra lutra*) Killarney Fern (*Trichomanes speciosum*)	6km NE

Prohus Wood Proposed Natural Heritage Area is located 9.6km southeast of Proposed Development. This site is a very young wood derived from widespread clearance about forty years ago (1986). The site has not developed much habitat diversity but is developing quite naturally. This site is not considered further in Chapter 8. Ecology given its distance from the Proposed Development.

3.1.2 NBDC records

Protected species and IAS records from 10km grid squares (W18; W28), which cover the Site are shown in Tables 2– 5.

Table 2: Protected species for which records are retained at NBDC for 10km grid W18

Species name	Date of last record	Title of dataset	Designation
Common Frog (*Rana temporaria*)	08/03/2020	Amphibians and reptiles of Ireland	EU Habitats Directive >> Annex V Wildlife Acts
Clubmoss (*Huperzia selago*)	20/11/2016	Vascular plants: Online Atlas of Vascular Plants 2012 Onwards	EU Habitats Directive >> Annex V Wildlife Acts
Kerry Slug (*Geomalacus maculosus*)	03/09/2016	General Biodiversity Records from Ireland EU Habitats Directive	>> Annex II >>Annex IV Wildlife Acts
Badger (*Meles meles*)	26/12/2018	Mammals of Ireland 2016-2025	Wildlife Acts
Hedgehog (*Erinaceus*	20/06/2007	Roadkill Survey	Wildlife Acts

europaeus)			
Otter (*Lutra lutra*)	09/04/2017	Mammals of Ireland 2016-2025	EU Habitats Directive >> Annex II >> Annex IV Wildlife Acts
Pine Marten (*Martes martes*)	16/06/2016	Mammals of Ireland 2016-2025	EU Habitats Directive || >> Annex V Wildlife Acts
Red Deer (*Cervus elaphus*)	31/12/2008	Deer of Ireland Database	Wildlife Acts
Red Squirrel (*Sciurus vulgaris*)	31/12/2012	Irish Squirrel Survey 2012	Wildlife Acts

Table 3: Protected species for which records are retained at NBDC for 10km grid W28

Species name	Date of last record	Title of dataset	Designation
Common Frog (*Rana temporaria*)	20/07/2020	Amphibians and reptiles of Ireland	EU Habitats Directive >> Annex V Wildlife Acts
Clubmoss (*Huperzia selago*)	25/03/2018	Vascular plants: Online Atlas of Vascular Plants 2012 Onwards	EU Habitats Directive >> Annex V
Badger (*Meles meles*)	31/12/2013	Mammals of Ireland 2016-2025	Wildlife Acts
Hedgehog (*Erinaceus europaeus*)	25/05/2020	Road Kill Survey	Wildlife Acts
Otter (*Lutra lutra*)	09/05/2017	Mammals of Ireland 2016-2025	EU Habitats Directive >> Annex II || >> Annex IV Wildlife Acts
Red Deer (*Cervus elaphus*)	31/12/2008	Deer of Ireland Database	Wildlife Acts
Sika Deer (*Cervus nippon*)	31/12/2008	Mammals of Ireland 2016-2025	Wildlife Acts

Table 4: IAS for which records are retained at NBDC for 10km grid W18

Species name	Date of last record	Title of dataset
Japanese Knotweed (*Fallopia japonica*)	13/06/2007	River Biologists' Database (EPA)
Sycamore (*Acer pseudoplatanus*)	04/06/2018	Vascular plants: Online Atlas of Vascular Plants 2012 Onwards
American Mink (*Mustela vison*)	03/09/2010	Atlas of Mammals in Ireland 2010-2015

Bank Vole (*Myodes glareolus*)	03/07/2015	Atlas of Mammals in Ireland 2010-2015
Sika Deer (*Cervus nippon*)	31/12/2018	Mammals of Ireland 2016-2025

Table 5: IAS for which records are retained at NBDC for 10km grid W8

Species name	Date of last record	Title of dataset
Cherry laurel (*Prunus laurocerasus*)	03/09/2016	Vascular plants: Online Atlas of Vascular Plants 2012 Onwards
Japanese Knotweed (*Fallopia japonica*)	15/07/2009	River Biologists' Database (EPA)
Rhododendron (*Rhododendron ponticum*)	03/09/2016	Vascular plants: Online Atlas of Vascular Plants 2012 Onwards
Sycamore (*Acer pseudoplatanus*)	03/09/2016	Vascular plants: Online Atlas of Vascular Plants 2012 Onwards
American Mink (*Mustela vison*)	09/05/2017	Mammals of Ireland 2016-2025
Bank Vole (*Myodes glareolus*)	31/12/1992	Atlas of Mammals in Ireland 2010-2015
Rabbit (*Oryctolagus cuniculus*)	13/01/2007	Hare Survey of Ireland 2006 & 2007
Sika Deer (*Cervus nippon*)	31/12/2018	Mammals of Ireland 2016-2025

3.2 Field Surveys

3.2.1 Habitats

The Fossitt (2000) habitats encountered are listed below and in further detail in Table 6.

- FL Lakes;
- FW1 Eroding/upland rivers;
- GS4 Wet grassland;
- HH3 Wet heath;
- PB4 Cutover bog;
- WS1 Scrub;
- WD4 Conifer plantation;
- HH3/GS4 Wet heath/Wet grassland; and
- HH3/GS3/GS4 Wet heath/Dry-humid acid grassland/Wet grassland.

Table 6: Habitats recorded within the Site as per Fossitt (2000)

Level 1[2]	Level 2[3]	Level 3[4]	Location/distribution
B Cultivated and built land	BL Built land	BL3 Buildings and artificial surfaces	An extensive network of forest roads extends through the Site.
E Exposed rock and other disturbed ground	ED Disturbed ground	ED2 Spoil and bare ground	An area that is being actively quarried for road building material is located within the Site. Some sections of forest tracks within clear-fell areas also fit within this category.
F Freshwater	FL Lakes and Ponds		Lough Carrignamork and Lough Gall are situated on the southern boundary of the Site.
	FW Watercourses	FW1 Eroding/upland rivers	Approximately 6 first-order tributary streams of the Clydagh River rise within the Site and flow northwards from the Site to the river. Another tributary of the Clydagh that rises within the Site drains south/southwest to it and passes close to the southwestern access point to the Site from the N22.National Primary Road.
		FW4 Drainage ditches	All of the forest tracks have drainage ditches as do some sections of the conifer blocks. It was not possible to determine the extent of the latter.
G Grassland & Marsh	GS Semi-natural grassland	GS4 Wet grassland	Two small areas of this habitat type were recorded at bankside locations abutting the Clydagh River.
H Heath and Dense Bracken	HH Heath	HH3 Wet heath	This is the dominant upland habitat within and adjacent to the Site in areas not occupied by conifer blocks and, in all likelihood, was the indigenous habitat predating the initial expansion of commercial conifer forestry into the Boggeragh uplands. Small remnant areas are also distributed through the conifer blocks. However, these are small and isolated. It is likely that their continued existence has

[2] Level 1: Broad habitat groups.

[3] Level 2: Habitat subgroups

[4] Level 3: Habitats

Level 1[2]	Level 2[3]	Level 3[4]	Location/distribution
			less to do with an inherent or intrinsic resilience than it has with failures in the planting regime.
	HD Dense Bracken	HD1 Dense Bracken	While not a dominant element in the mix several large stands were recorded along forest tracks.
P Peatlands	PB Bogs	PB4 Cutover bog	Present to the north of Lough Carrignamork and Lough Gall, the area of this habitat which bears the signature of peat removal also extends to the southwest of Lough Carrignamork where the peat has been removed completely leaving the glacial till exposed. This 'strip mining' of what may have been quite shallow peat can also be seen on the southern slopes of Caherbarnagh and at other locations in the Clydagh Valley.
W Woodland and scrub	WD Highly modified/ non-native woodland	WD4 Conifer plantation	The dominant component consisting of a mix of age profiles from recently planted to mature post-thicket phase.
	WS Scrub/ transitional woodland	WS1 Scrub	Isolated stands of willow scrub are distributed throughout the Site. This distribution is often, but not exclusively, associated with the streams that intersect the Site.
Grassland Marsh/Heath and Dense Bracken mosaic habitat		HH3/GS4 Wet heath/Wet grassland	Present as linear corridors along streams. The ongoing presence of these is likely to be due to grazing by sika deer.
		HH3/GS3/GS4 Wet heath/Dry-humid acid grassland/Wet grassland	Present as linear corridors along streams. The ongoing presence of these is likely to be due to grazing by sika deer.

3.2.2 Species Recorded

The species encountered, or those for which evidence was recorded, are described below. No potentially suitable habitat for marsh fritillary was recorded by surveyors during the habitat surveys and therefore no habitat condition assessments were undertaken.

3.3 Kerry Slug.

Eight transects with five traps in each - all located in conifer woodland – were deployed on 10/08. On 17/08, slugs were recorded at six of the eight transects. By 24/08, specimens had been recorded at all eight. In addition, the species was recorded, in plain sight, on numerous occasions, on a firebreak in an area of clear-fell, on the route to a bat detector located near turbine 6. Specimens were recorded in this area on each subsequent bat survey visit and during any other survey work that incorporated that area of clear-fell, and one specimen was recorded in the vicinity of turbine 8 (Figure 8.5).

A summary table itemising the records, dates, and coordinates is included in Annex 1.

3.4 Hedgehog

Hedgehog scat was recorded at one streamside location.

3.5 Common Frog

Common frog was encountered on several occasions.

Table 7: Species recorded within the Site with current conservation status

Species	Evidence Collated from Desk Study and Site Surveys	Conservation Status – Trend[5]	Red List[6] Status
Kerry slug	Recorded at the Site	Favourable – Improving	Least Concern
Hedgehog	Scat from this species recorded during surveys	Not listed in annexes	Least Concern
Common frog	Ubiquitous species recorded at Site during surveys Habitats available at Site are suitable.	Favourable – stable.	Least Concern

3.6 Invasive Plant and Animal Species

- Cherry laurel (*Prunus laurocerasus*) was recorded at one location adjacent to the access point to the Proposed Development Site.

[5] As per NPWS (2019) for species listed in the annexes to the Habitats Directive.

[6] Red Lists are documents which list the threatened species within a geographical area. Species are assessed against standard criteria and assigned a threat status.

- Himalayan knotweed (*Persicaria wallichii*) was recorded at a location in proximity to turbine 2 (Figure 8.3).
- Rhododendron (*Rhododendron ponticum*) was recorded at several locations on the access track from the southwest. All but one of them were individual saplings.

Pairs of Sika deer (*Cervus nippon*), usually hinds with juveniles, were recorded at several locations and on several occasions during the habitat, bat, and Kerry slug survey visits. All were encountered while crossing forest tracks between sections of closed-canopy conifer. Tracks were recorded along the stream-side forest clearing on the route turbine 12 and on the muddy ground in the area around turbine 15.

4 Conclusion

In terms of the habitat mix, the Site is typical of all equivalent upland conifer plantations, in that it is utterly, and irreversibly, modified from a natural state by the planting and harvesting cycles of intensive management of commercial forestry. Homogenised by the single crop with the only remnants of the indigenous habitats being those remaining areas where topography or streams prevented planting or where the soil was too shallow to support the conifer crop and where, as a result, a slight degree of biodiversity remains.

However, the presence of Kerry slug, and, based on current survey data, its apparent distribution throughout the Site may supplant or modify the value of the habitats due to the rarity of, and protection afforded to, the species.

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Annexes

Annex 1: Records of Kerry slug observations

	Caption	Date	Time	Grid (W)	Eastings	Northings	Lat	Long	X(ITM)	Y(ITM)	X(UTM)	Y(UTM)
	KS	1/6	11:44	20483 83086	120483	083086	51.994451	-9.1585279	520440	583124	489115	5760432
	KS	1/6	11:46	20490 83097	120490	083097	51.99455	-9.15842	520447	583135	489123	5760443
	KS	1/6	11:53	20665 83148	120665	083148	51.99504	-9.15589	520622	583186	489296	5760498
	13 KS	1/6	11:15	20652 83101	120652	083101	51.994611	-9.1560709	520609	583139	489284	5760450
	KS >=1	1/6		20514 83087	120514	083087	51.994471	--9.1580681	520472	583126	489147	5760435
	KS >=1	12/7		20477 83080	120477	083080	51.994403	-9.15860521	520435	583119	489110	5760427
	KS >=1	12/7		20585 83217	120585	083217	51.9956497	-9.15706463	520543	583256	489216	5760566
	KS >=1	12/7		20584 83216	120584	083216	51.9956406	-9.15707896	520542	583255	489215	5760564
	KS >=1	12/7		20575 83214	120575	083214	51.9956213	-9.15720952	520533	583253	489206	5760562
	KS >=1	12/7		20574 83214	120574	083214	51.9956212	-9.15722408	520532	583253	489205	5760562
	KS >=1	12/7	After[1] 12:00	20566 83216	120566	083216	51.9956380	-9.15734102	520524	583255	489197	5760564
	KS >=1	12/7		20565 83213	120565	083213	51.9956109	-9.15735488	520523	583252	489196	5760561
	KS >=1	12/7		20565 83213	120565	083213	51.9956109	-9.15735488	520524	583252	489196	5760561
	KS >=1	12/7		20552 83203	120552	083203	51.9955192	-9.15754183	520510	583242	489183	5760551
	KS >=1	12/7		20553 83204	120553	083204	51.9955283	-9.1575275	520511	583243	489184	5760552
	KS >=1	12/7		20552 83204	120552	083204	51.9955282	-9.15754206	520510	583243	489183	5760552
	KS >=1	12/7		20540 83202	120540	083202	51.9955085	-9.15771631	520498	583241	489171	5760550
	3 KS	10/8	11:06	20664 83105	120664	083105	51.994647	-9.1558930	520621	583143	489296	5760454
	5 KS	10/8	11:12	20688 83116	120688	083116	51.994751	-9.1555519	520645	583154	489320	5760465
	2 KS	1/9	14:36	20680 83111	120680	083111	51.994707	-9.1556706	520637	583149	489311	5760460
	1KS	1/9	14:36	20680 83107	120680	083107	51.994672	-9.155661	520637	583145	489312	5760457
	1KS	1/9	14:36	20628 83108	120628	083108	51.994675	-9.156425	520585	583146	489260	5760457
	1KS	1/9	14:38	20678 83084	120678	083084	51.994467	-9.155683	520635	583122	489310	5760434
	1KS	1/9	14:39	20673 83117	120673	083117	51.994758	-9.155767	520630	583155	489305	5760466
	1KS	1/9	14:52	20626 83097	120626	083097	51.994571	-9.1564465	520583	583135	489258	5760445
	3 KS	17/8	10:32	20604 83219	120604	083219	51.995670	-9.1567934	520561	583257	489235	5760568
	1KS	17/8	10:43	20588 83218	120588	083218	51.995656	-9.1570236	520545	583256	489219	5760566
	1 KS	13/9	15:43	20592 83100	120592	083100	51.994596	-9.1569346	520550	583138	489225	5760448
	1 KS	13/9	15:47	20634 83090	120634	083090	51.994508	-9.1563338	520591	583128	489266	5760438
	1 KS	13/9	15:50	20637 83094	120637	083094	51.994548	-9.1562860	520594	583132	489269	5760443
	1 KS	13/9	15:52	20656 83101	120656	083101	51.994610	-9.1560034	520614	583139	489288	5760450
	1 KS	13/9	15:55	20674 83105	120674	083105	51.994654	-9.1557553	520631	583143	489306	5760455

	1 KS	13/9	15:59	20690 83111	120690	083111	51.994713	-9.1555209	520647	583150	489322	5760461
	2 KS	13/9	15:10	20548 83210	120548	083210	51.995577	-9.1576070	520505	583248	489179	5760558
	2 KS	13/9	15:03	20564 83204	120564	083204	51.995525	-9.1573745	520521	583242	489195	5760552
	1KS	17/8	10:43	20588 83218	120588	083218	51.995656	-9.1570236	520545	583256	489219	5760566
	3 KS	17/8	10:32	20604 83219	120604	083219	51.995670	-9.1567934	520561	583257	489235	5760568
	1KS[2]	13/9	11:05	20384 84004	120384	084004	52.002686	-9.1601828	520341	584042	489004	5761349

[1] A total of 38 specimens recorded

Annex 2: Marsh Fritillary habitat condition assessment methodology[8]

Habitat condition monitoring for the Marsh Fritillary involves fixed point habitat recording on a structured walk across a site, from which an assessment can be made. A separate survey and assessment should be completed for each sub-site.

METHOD

- Establish a W shape (zigzag) route that will cross thoroughly and evenly the whole site/sub-site.
- Decide stopping distances along this route where recordings of habitat condition will be made e.g. every 10 or 20 paces. Aim to have at least 20 stopping points for a small site (<1 ha) more than 40 stopping points for a medium-sized site (1-5 ha) and more than 50 stopping points for a large site (>5 ha).
- Follow your route and at each stopping point measure (in cm) the vegetation height at the point you stop (measure to the top of the leaves i.e. ignore the flowers of grasses and plants). Then, using an imaginary box with sides of 1 m in front of you, record the presence of Devil's-bit Scabious in one of these abundance categories (A = 1-2 plants, B = 3-9 plants, C = 10+ plants, D = No plants). Using the same area, record (mark with an 'X') the presence or absence of these three habitat attributes: structured vegetation, low (<25 cm tall) invading scrub with a cover of >10% and stock grazing signs (e.g. tracks, poach marks, dung).
- At the end of the assessment, then provide an estimate the cover (%) of tall (>0.5 m) scrub for the whole site/sub-site.

MARSH FRITILLARY HABITAT CONDITION SURVEY FORM

SITE NAME		SUB-SITE	
OS GRID REF		RECORDER(S)	
SURVEY DATE		TALL SCRUB COVER (%)	
MANAGEMENT OBSERVATIONS (e.g. enclosed, recently grazed or cut, peat cutting, burning, etc.)			
ASPECT AND SLOPE DESCRIPTION The main aspect and a brief description of whether the site has suitable habitat			

[8] As per https://www.biodiversityireland.ie/wordpress/wp-content/uploads/Marsh-Fritillary-Habitat-Condition-Form.pdf

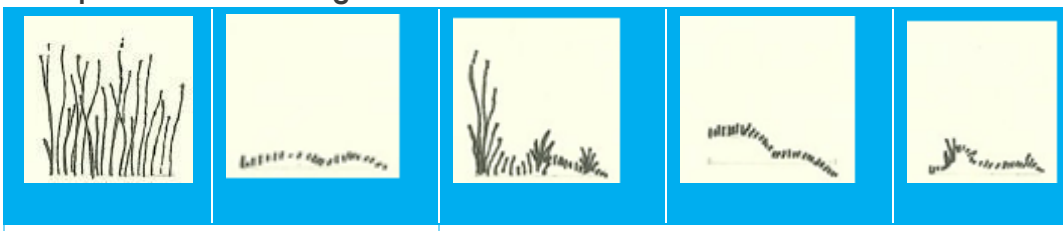
SITE NAME		SUB-SITE	
covering a variety of aspects (including variation at a micro scale such as banks)			
EXPOSURE (e.g. high exposure sites would be open coastal sites)			

STRUCTURED WALK RECORDS

Key for recording attributes:

1. Vegetation Height:	A = <12 cm	B = 12-25 cm	C = 25-50 cm	D = >50 cm
2. Devil's bit scabious:	A = 1-2 plants/m2	B = 3-9 plants/m2	C = 10+ plants/m2	D = None
3. Structured vegetation:	Mark with an 'X' if there is presence of any steps in vegetation or ground that provide localised protection from elements at ground level. See figure below for guidance.			
4. Low invading scrub:	Tick if low invading scrub (e.g. birch, gorse, bog myrtle) <25 cm tall and >10% cover present. The word 'invading' is important here. Do not include scrub that is an integral part of the habitat (e.g. Juniper in Juniper heath systems).			
5. Evidence of stock grazing:	Tick if localised evidence present (e.g. poaching, dung, etc.)			

Example of Structured Vegetation:



No	Yes Varied vegetation height, bank or slope change, small tussocks or poaching etc.

Stop Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1. Vegetation Height																				
2. Devil's-bit Scabious abundance																				
Mark with an 'X' if attributes below are present at each stop																				
3. Structured																				

Stop Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
vegetation																				
4. Low invading scrub																				
5. Evidence of stock grazing																				

Stop Number	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
1. Vegetation Height																				
2. Devil's-bit Scabious abundance																				
Mark with an 'X' if attributes below are present at each stop																				
3. Structured vegetation																				
4. Low invading scrub																				
5. Evidence of stock grazing																				

Stop Number	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
1. Vegetation Height																				
2. Devil's-bit Scabious abundance																				
Mark with an 'X' if attributes below are present at each stop																				
3. Structured vegetation																				
4. Low invading scrub																				
5. Evidence of stock grazing																				

DATA ANALYSIS (Optional)

At the end of the field survey, calculate the following for each area sampled:

MEAN VEG. HEIGHT (cm)		% FREQUENCY OF CATEGORY B/C SCABIOUS IN <12 cm SWARDS	
% FREQUENCY OF SCABIOUS		% FREQUENCY OF CATEGORY B/C SCABIOUS IN >25 cm SWARDS	
% FREQUENCY OF SCABIOUS CATEGORY A		% FREQUENCY OF SRUCTURED VEGETATION	
% FREQUENCY OF SCABIOUS CATEGORY B		% FREQUENCY OF LOW INVADING SCRUB	
% FREQUENCY OF SCABIOUS CATEGORY C		% FREQUENCY OF STOCK GRAZING SIGNS	
% FREQUENCY OF 12-25 cm SWARDS		TALL (>0.5 m) SCRUB COVER (%)	
% FREQUENCY OF CATEGORY B/C SCABIOUS IN 12-25 cm SWARDS			

HABITAT CONDITION ASSESSMENT

Assess the condition to one of the following categories:

Good Condition Habitat (**GC**): >20% freq. of Scabious of category B/C abundance growing in 12-25 cm tall swards and <10% cover of tall scrub (>0.5 m tall)

Suitable (Under-grazed) Habitat (**SU**): >20% freq. of Scabious of category B/C abundance growing in >25 cm tall swards and <20% freq. of Scabious of category B/C abundance growing in 12-25 cm tall swards

Suitable (Over-grazed) Habitat (**SO**): >20% freq. of Scabious of category B/C abundance growing in <12cm tall swards and <20% freq. of Scabious of category B/C abundance growing in 12-25 cm tall swards

Unsuitable habitat (**US**): <5% freq. of Scabious of category B/C abundance growing in >25 cm tall swards.

MANAGEMENT ALERTS

Undergrazing indicators	Overgrazing indicators
>10% cover of tall scrub (>0.5 m tall)	<25% frequency of structured vegetation
>75% frequency of structured vegetation	>80% frequency of evidence of stock grazing
>10% frequency of low invading scrub with >10% cover	Mean vegetation height <12 cm
<20% frequency of evidence of stock grazing	
Mean vegetation height >25cm	

5.1 SUMMARY DATA ANALYSIS

CONDITION CATEGORY		NOTES
MANAGEMENT ISSUES		