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RESULTS OF A SURVEY TO MONITOR THE EU ANNEX I HABITAT CALAMINARIAN GRASSLAND, 2018
APPENDICES

Rory L. Hodd and Nick G. Hodgetts

An Roinn Cultúir, Oidhreachta agus Gaeltachta
Department of Culture, Heritage and the Gaeltacht

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Coastal heath, Howth Head, Co. Dublin, Maurice Eakin; **Red Squirrel** *Sciurus vulgaris*, Eddie Dunne, NPWS Image Library; **Marsh Fritillary** *Euphydryas aurinia*, Brian Nelson; **Puffin** *Fratercula arctica*, Mike Brown, NPWS Image Library; **Long Range and Upper Lake**, Killarney National Park, NPWS Image Library; **Limestone pavement**, Bricklieve Mountains, Co. Sligo, Andy Bleasdale; **Meadow Saffron** *Colchicum autumnale*, Lorcan Scott; **Barn Owl** *Tyto alba*, Mike Brown, NPWS Image Library; **A deep water fly trap anemone** *Phelliactis* sp., Yvonne Leahy; **Violet Crystalwort** *Riccia huebeneriana*, Robert Thompson

Main photograph:

Calaminarian grassland habitat beside Muckross Lake, Killarney National Park, Co. Kerry, Rory L. Hodd

Results of a survey to monitor the EU Annex I habitat Calaminarian grassland, 2018 APPENDICES

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Appendix I Site reports

This section contains individual site reports for the 29 sites surveyed, as listed in Table 1 of the main report. Each site report includes photographs and maps. The differences in the reported areas (ha) of Calaminarian grassland (6130) between the 2008 and 2018 surveys are largely owing to the different methods used, notably the use of GIS mapping in 2018 (see Sections 3.2 and 2.4 of the main report). Area figures from 2008 are included for information purposes only. Genuine, significant changes in area are highlighted. These were derived from evidence observed on site and comparison with the 2008 site descriptions and photographs.

Site 02 Ballycorus

Site Name	**OS Discovery map**	**Grid ref**	**County**
Ballycorus	50	O22562088	Dublin

Recorder	**Date**	**Conservation value**
Rory Hodd	15/02/2018	High

Metallophyte species present 2008

Cephaloziella massalongi, Ditrichum plumbicola

Metallophyte species confirmed 2018

Ditrichum plumbicola

2018 site area (ha)	**2018 area 6130 (ha)**	**2008 area 6130 (ha)**	**Area change**
0.17	0.11	0.12	Minor decrease

Site description/changes since 2008

This site, which was part of a lead mine between 1807 and 1919, consists of a small area of spoil on a north-facing slope, partially shaded by a line of mature *Pinus sylvestris* to the west and north, downslope of a prominent chimney. There is no spoil apparent in the vicinity of the chimney. The spoil is mostly bare and open, with scattered patches of grassy vegetation and small areas of gorse scrub. There is a small gully in the centre of the spoil area, with scattered rock outcrops. Few changes to the site are apparent since the 2008 survey, although the amount of alga present may have increased since then, and the amount of bare, loose spoil.

Description of Calaminarian grassland habitat

Calaminarian grassland occurs intermittently throughout, interspersed with loose bare spoil, and is dominated in most parts by *Solenostoma gracillimum*, with *Polytrichum piliferum, Diplophyllum albicans* and *Ceratodon pururеus* also prominent in places. Vascular plants are mostly absent, except for occasional scattered *Agrostis capillaris*. Metallophyte bryophyte interest is concentrated at the base of the slope, partially shaded by *Pinus sylvestris*, where *Ditrichum plumbicola* and possible *Cephaloziella massalongi* (specimen could not be confirmed) occur in small quantity. These species were not found further up the slope, where David Holyoak recorded them in 2008, most of that habitat being either loose and unstable, or a species-poor mat dominated by *S. gracillimum*.

Impact code (2013)	**Description**	**Location**	**Influence (+, -, 0)**	**Intensity (H,M,L)**	**% habitat affected**
G01.02	walking, horseriding and non-motorised vehicles	Inside	-	M	25
G01.03.02	off-road motorized driving	Inside	-	H	15
K01.01	erosion	Inside	-	M	100
K02.02	accumulation of organic material	Inside	-	M	20

Impact code (2018)	**Description**	**Location**	**Influence (+, -, 0)**	**Intensity (H,M,L)**	**% habitat affected**
F07	sports, tourism and leisure activities	Inside	-	M	25
L01	abiotic natural processes	Inside	-	M	100
L03	accumulation of organic material	Outside	-	M	20

Notes on management/impacting activities

Trees to the west shade parts of the site, including where rare species grow, and has resulted in the deposition of much needle litter and the growth of algal gunk in bryophyte niches, which is impacting the health of *D. plumbicola*. There is an unofficial walking path through the site, and evidence of pony trekking and riding of scrambler bikes at the top and on west side of site. A couple of small excavations of the spoil have taken place, possibly for research purposes, but is not impacting Calaminarian grassland habitat. Burning of gorse scrub has also taken place, but also has no impact on Calaminarian grassland.

Conservation measures needed

Removal of the adjacent pine trees may be beneficial to the Calaminarian grassland habitat, as the litter and favourable conditions for the growth of algae is damaging to the habitat. Scrambler bikes and pony trekking, although only impacting a small proportion of the habitat, should be prevented from entering the site, and walkers should be contained to one path, rather than the numerous paths currently running across the spoil.

Conservation measure code	Description
CF03	Reduce impact of outdoor sports, leisure and recreational activities
CL01	Management of habitats (others than agriculture and forest) to slow, stop or reverse natural processes

Condition of Calaminarian grassland	%	Area (ha)
In good condition	30	0.03
In not-good condition	70	0.08
Condition not known	0	0

Parameter	Criterion	Result		Assessment
Area	Annual change in area	Minor decrease		Favourable
Structure and functions	No. of criteria passed	2		Unfavourable-inadequate
	No. indicator spp.	3	Pass	
	Scrub encroachment	1%	Pass	
	Negative human impact	45%	Fail	
Future prospects				Unfavourable-inadequate
Overall Assessment				Unfavourable-inadequate

Overall assessment

The area of Calaminarian grassland habitat at this site has possibly decreased in extent since the previous survey, and deterioration in quality is apparent, possibly due to the deposition of needle litter and growth of algae resulting from shading by pine trees, or from Nitrogen deposition. Pressure from human activity is also still in effect since the previous survey. Therefore, the condition of Calaminarian grassland habitat at this site should be considered as Unfavourable-inadequate, and conservation measures are required to improve and maintain the quality of the Calaminarian grassland habitat present. The site is of moderate-high conservation importance, due to the presence of *Ditrichum plumbicola* and *Cephaloziella massalongi*, albeit in small quantity.

Habitats present on mine spoil resource	%
Calaminarian grassland	61
ED2 Bare spoil	15
GS3 Dry-humid acid grassland	20
ER1 Exposed siliceous rock	3
WS1 Scrub	1

Indicator metallophyte species present
Cephaloziella cf. *massalongi*
Ditrichum plumbicola
Solenostoma gracillimum

Other species present on mine spoil resource
Agrostis capillaris
Ceratodon purpureus
Cladonia sp.
Digitalis purpurea
Diplophyllum albicans
Galium saxtile
Hypnum jutlandicum
Kindbergia praelonga
Pinus sylvestris (seedling)
Pogonatum aloides
Polytrichum piliferum
Pseudoscleropodium purum
Rhytidiadelphus squarrosus
Sedum anglicum
Ulex europaeus

Metallophyte species	Grid ref	Extent	Notes
Ditrichum plumbicola	O2252720905	1x1cm	Small alga-covered patch on top of stone at base of spoil area, partially shaded by trees, with much litter present
Cephaloziella cf. *massalongi*	O2252820903	50x10cm	Covering small grass-topped soil bank in partial shade of trees

Photographs:

Figure 2 Overview of Ballycorus lead mine, with Calaminarian grassland scattered through most of the spoil area.

Figure 3 Ballycorus lead mine, with evidence of damage by scrambler bikes in the foreground. The red arrow indicates the approximate location of populations of *Ditrichum plumbicola* and *Cephaloziella* cf. *massalongi*.

Figure 4 View of Calaminarian grassland habitat at Ballycorus, with scattered *Agrostis capillaris* and bryophyte mats.

Figure 5 Calaminarian grassland habitat covered with fallen needles from adjacent stand of *Pinus sylvestris*.

Figure 6 Patch of *Ditrichum plumbicola,* swamped by algal mats.

Figure 7 Mat of possible *Cephaloziella massalongi* at the lower end of the site.

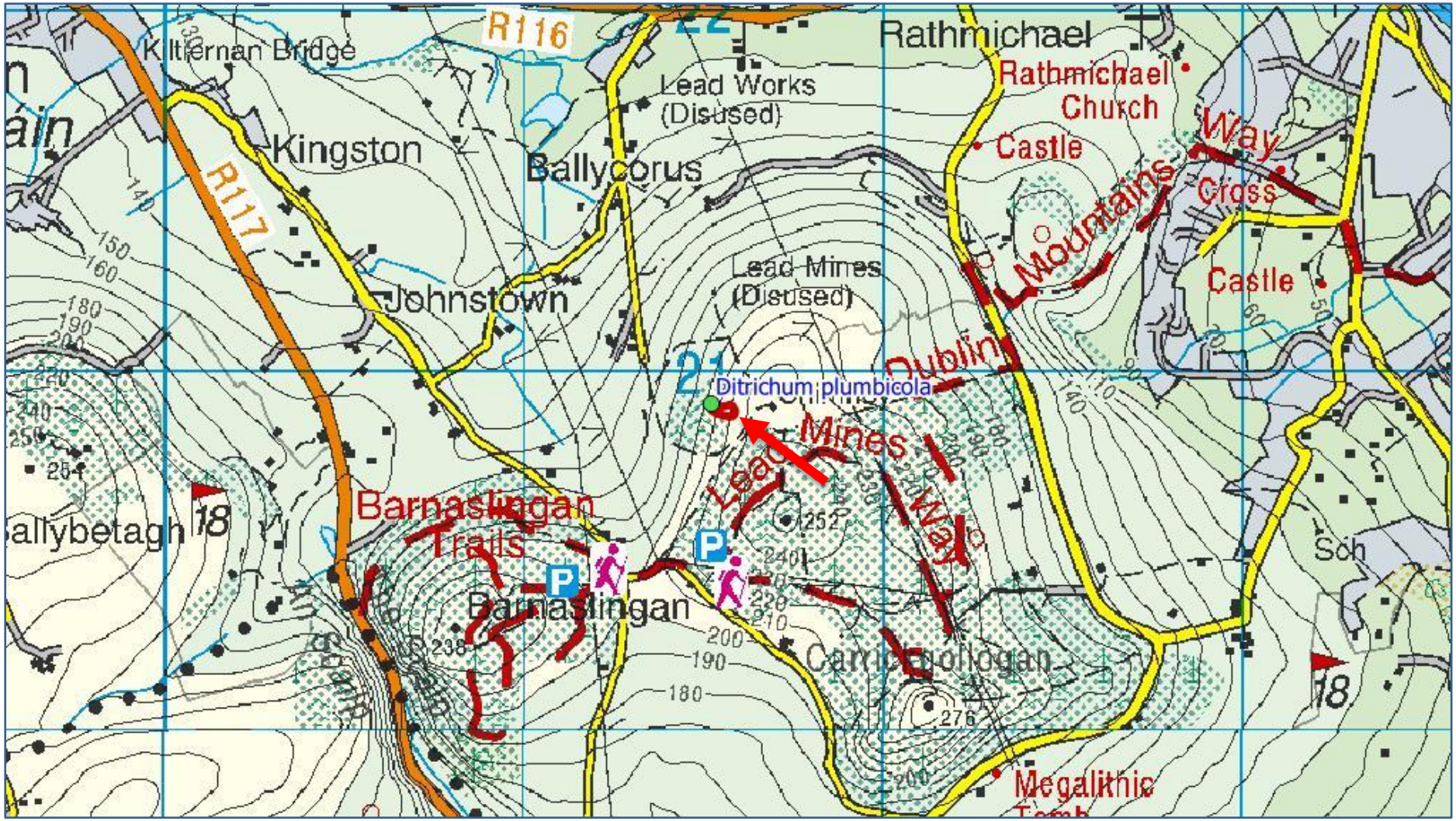

Figure 8 Ordnance Survey Discovery Series map, showing the location of the lead spoil (red outline) and rare species (green dot) at Ballycorus. (Scale is 1:15,000). Ordnance Survey Ireland Licence No EN 0059216 © Ordnance Survey Ireland / Government of Ireland.

Figure 9 Ordnance Survey 2005 aerial imagery, showing the lead-spoil area (red outline) and rare species (green dot) at Ballycorus. (Scale is 1:3,000). Ordnance Survey Ireland Licence No EN 0059216 © Ordnance Survey Ireland / Government of Ireland.

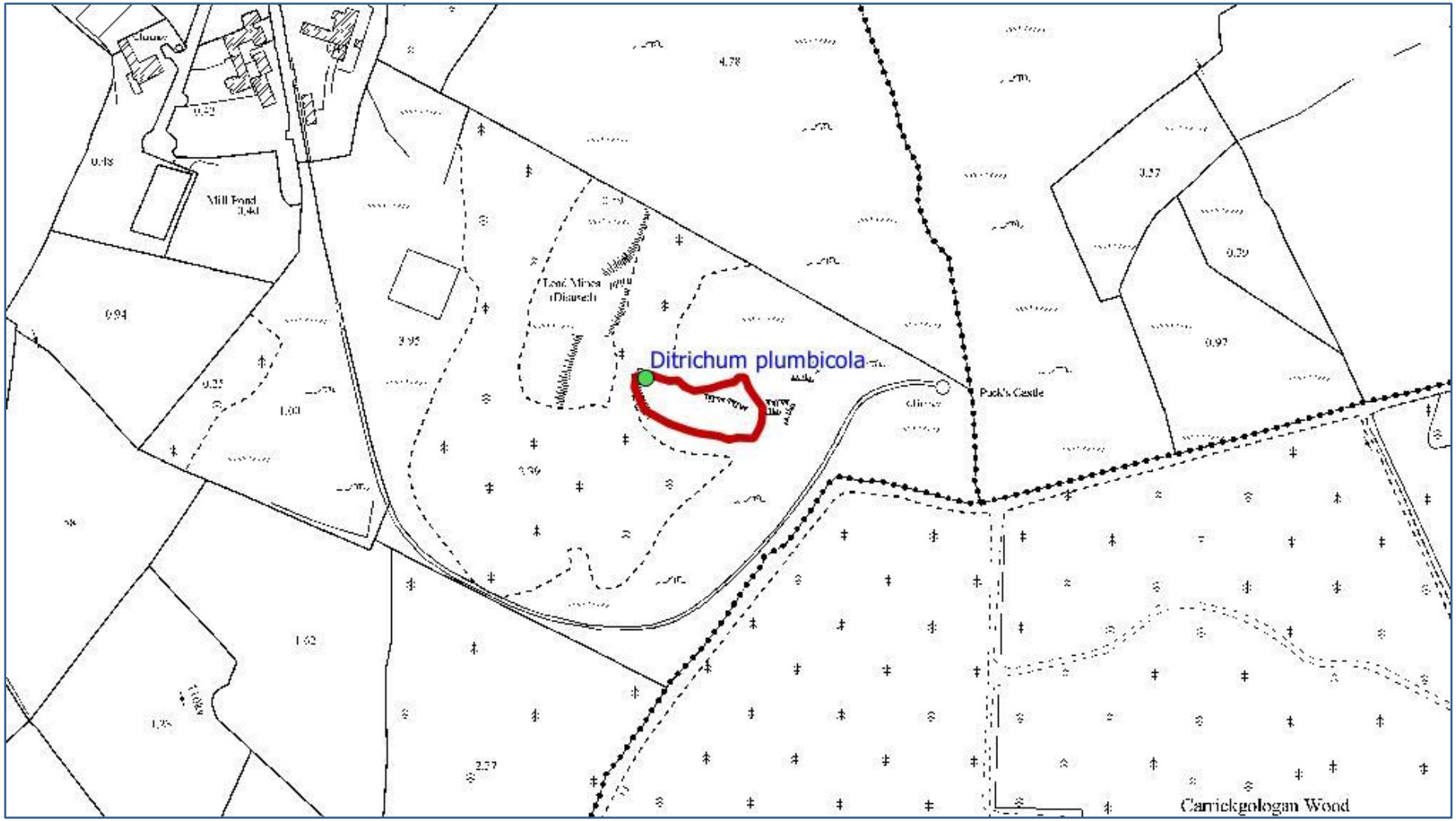

Figure 10 Ordnance Survey 1:5000 series map, showing the lead spoil area (red outline) and rare species (green dot) at Ballycorus. (Scale is 1:3,000). Ordnance Survey Ireland Licence No EN 0059216 © Ordnance Survey Ireland / Government of Ireland

Site 04 Nr. Connary Hall

Site Name	**OS Discovery map**	**Grid ref**	**County**
Nr. Connary Hall	62	T211838	Wicklow

Recorder	**Date**	**Conservation value**
Rory Hodd	27/07/2018	Low-moderate

Metallophyte species present 2008
None

Metallophyte species confirmed 2018
None

2018 site area (ha)	**2018 area 6130 (ha)**	**2008 area 6130 (ha)**	**Area change**
3.1	0.61	2.2	No change apparent

Site description/changes since 2008
This is an undulating area of spoil located on a ridge top and consists of open spoil interspersed with heath and grassland, as well as some encroaching patches of scrub. There are two fenced areas of spoil, bisected by a track. This fence had been recently repaired, so it was not possible to access most of the site to either side of the track. The vegetation of this site was surveyed recently (Callaghan 2017) as part of on-going work by the Department of Communications, Climate Action and Environment for the rehabilitation of the Avoca Mines area. Indications from that survey suggest that there has been little change in Calaminarian grassland since the 2008 survey. It is worth noting that Callaghan (2017) mapped and estimated a far greater extent of Calaminarian grassland (3.16 ha) at this site than the current survey (0.61 ha), including areas of *Calluna vulgaris* that were considered Dry heath vegetation in the current survey, but also illustrating the variablility in profossional interpretation of what constitutes this habitat type.

Description of Calaminarian grassland habitat
Scattered open patches of Calaminarian grassland vegetation occur amongst heath vegetation at the site. This vegetation is species poor and is dominated by the facultative metallophyte liverwort *Gymnocolea inflata*.

Impact code (2013)	**Description**	**Location**	**Influence (+, -, 0)**	**Intensity (H,M,L)**	**% habitat affected**
K02.01	succession	Inside	-	L	100

Impact code (2018)	**Description**	**Location**	**Influence (+, -, 0)**	**Intensity (H,M,L)**	**% habitat affected**
L02	natural succession	Inside	-	L	100

Notes on management/impacting activities
There are few impacts acting on this site, as it is mostly fenced from disturbance. There are sheds in which dogs are kept in the north-western corner of the spoil area, but this is having no impact on the Calaminarian grassland habitat. Scrub and heath are slowly encroaching onto the areas of Calaminarian grassland as toxicity decreases.

Conservation measures needed
Control of scrub could be undertaken to keep areas of Calaminarian grassland clear.

Conservation measure code	Description
CL01	Management of habitats (others than agriculture and forest) to slow, stop or reverse natural processes

Condition of Calaminarian grassland	%	Area (ha)
In good condition	100	0.61
In not-good condition	0	0
Condition not known	0	0

Parameter	Criterion	Result		Assessment
Area	Annual change in area	No decrease		Favourable
Structure and functions	No. of criteria passed	2		Favourable
	No. indicator spp.	2	Pass	
	Scrub encroachment	5%	Pass	
	Negative human impact	0%	Pass	
Future prospects				Favourable
Overall Assessment				Favourable

Overall assessment
The site is generally in good overall condition, with no specific threats noticed, bar natural succession. The Calaminarian grassland vegetation that could be examined was generally species-poor and not forming extensive patches, so this site is of low-moderate conservation value.

Habitats present on mine spoil resource	%
Calaminarian grassland	20
ED2 Bare spoil	25
ER3 Siliceous loose rock	5
GS3 Dry-humid acid grassland	10
HH1 Dry heath	35
WS1 Scrub	5

Indicator metallophyte species present
Bryum cf. *pallescens*
Gymnocolea inflata

Other species present on mine spoil resource
Achillea millefolium
Agrostis capillaris
Anthoxanthum odoratum
Betula pubescens
Calluna vulgaris
Campylopus flexuosus
Campylopus introflexus
Cirsium vulgare
Cotoneaster sp.
Cytisus scoparius
Erica cinerea
Hedera hibernica

Hypnum jutlandicum
Linum catharticum
Picea sitchensis
Pilosella offcinarum
Pinus sylvestris
Rubus fruticosus
Senecio jacobea
Taxus baccata
Tsuga heterophylla
Ulex europaeus
Vaccinium myrtillus

Photographs

Figure 11 Northern area of spoil near Connary Hall, as viewed through fence, where there are scattered patches of Calaminarian grassland.

Figure 12 Southern area of spoil near Connary Hall, with scattered Calaminarian grassland, viewed through fence.

Figure 13 Species-poor Calaminarian grassland alongside fence, interspersed with heath and grassland near Connary Hall.

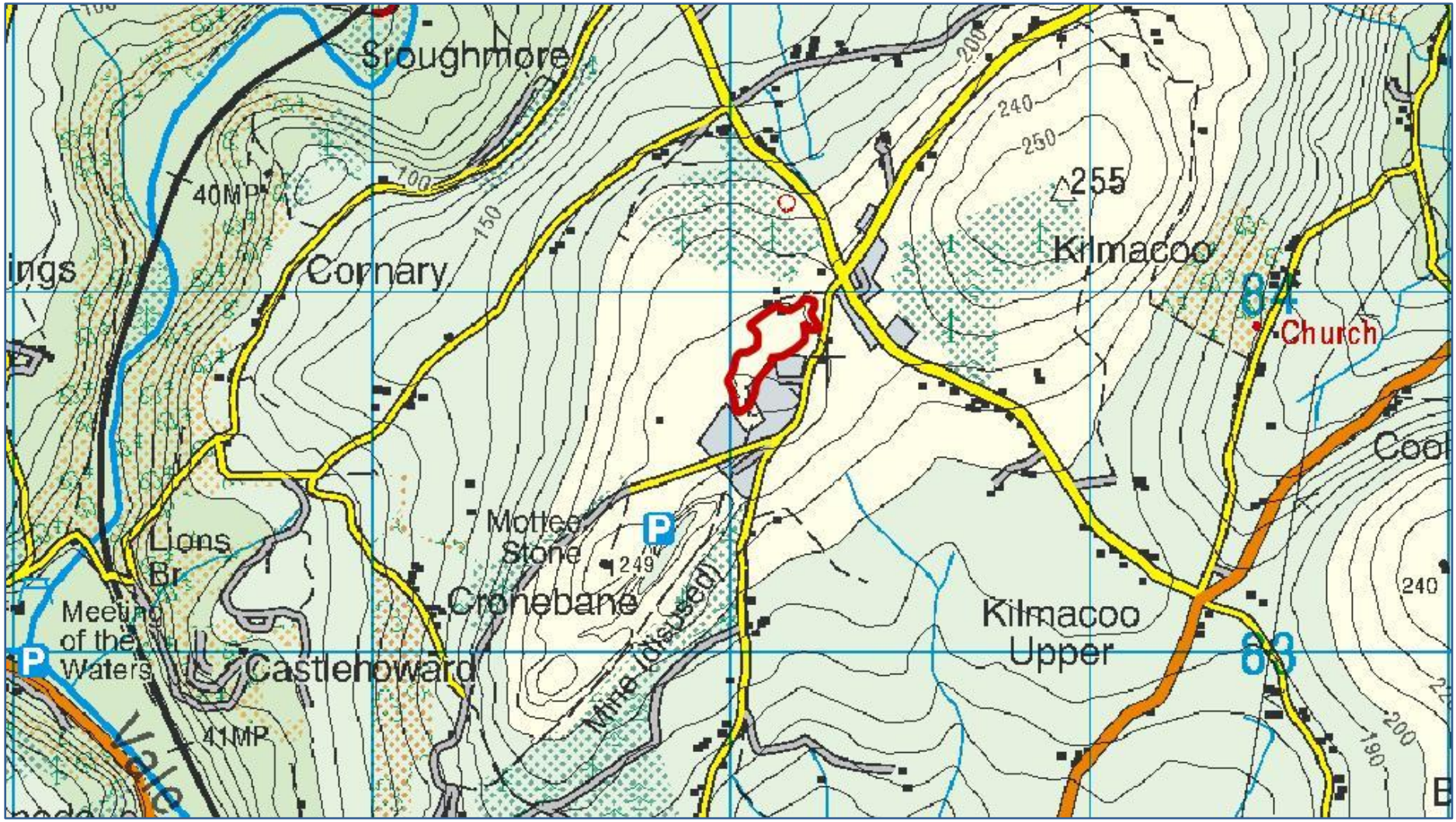

Figure 14 Ordnance Survey Discovery Series map, showing the location of the mine spoil area (red outline) near Connary Hall. (Scale is 1:15,000). Ordnance Survey Ireland Licence No EN 0059216 © Ordnance Survey Ireland / Government of Ireland.

Figure 15 Ordnance Survey 2005 aerial imagery, showing the spoil area (red outline) near Connary Hall. (Scale is 1:5,000). Ordnance Survey Ireland Licence No EN 0059216 © Ordnance Survey Ireland / Government of Ireland.

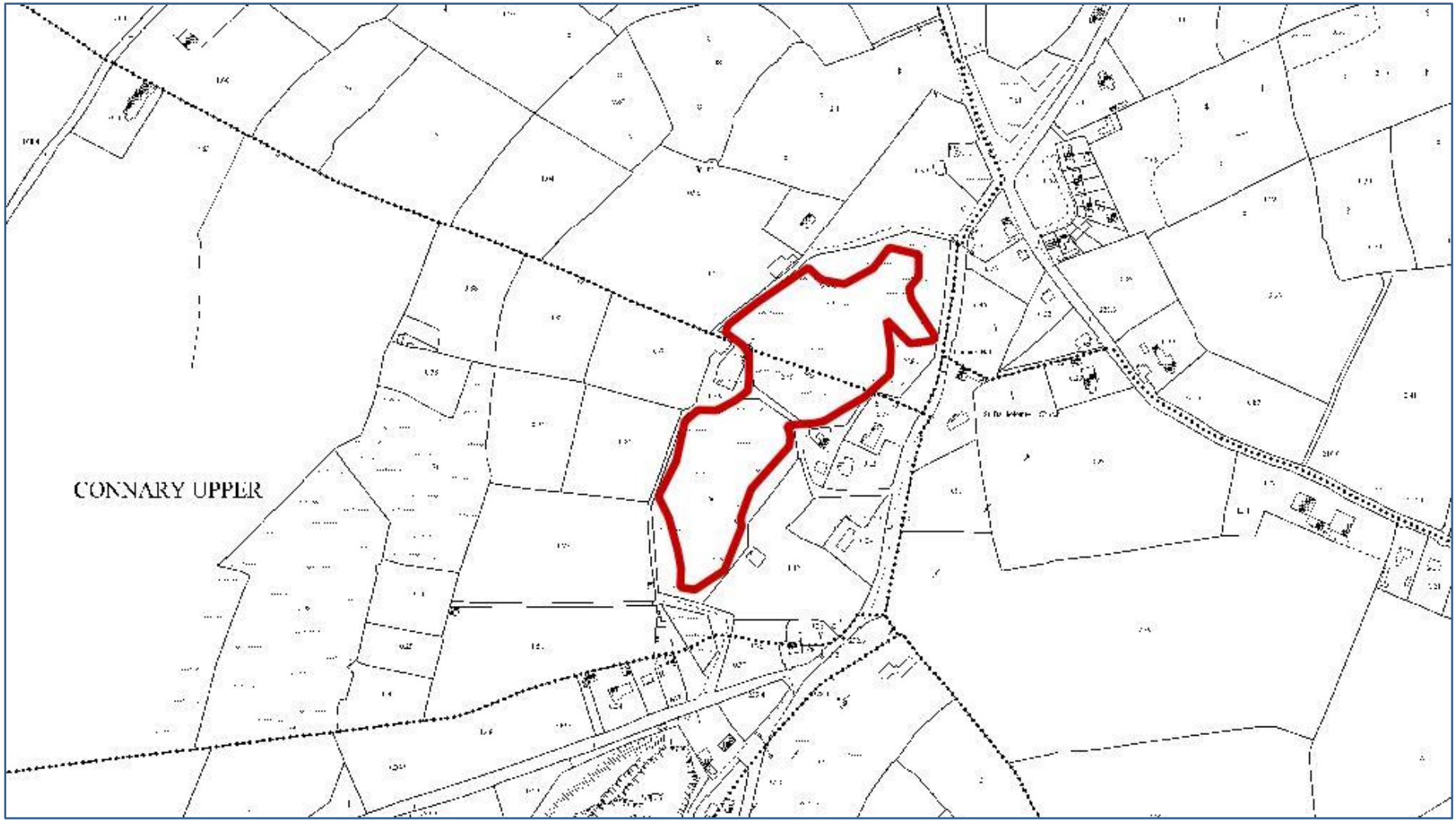

Figure 16 Ordnance Survey 1:5000 series map, showing the lead spoil area (red outline) near Connary Hall. (Scale is 1:5,000). Ordnance Survey Ireland Licence No EN 0059216 © Ordnance Survey Ireland / Government of Ireland.

Site 05 Glendasan

Site Name	OS Discovery map	Grid ref	County
Glendasan	56	T098981	Wicklow

Recorder	Date	Conservation value
Rory Hodd	22/02/2018	High

Metallophyte species present 2008

Cephaloziella massalongi, Cephaloziella nicholsonii, Ditrichum plumbicola

Metallophyte species confirmed 2018

Cephaloziella nicholsonii

2018 site area (ha)	2018 area 6130 (ha)	2008 area 6130 (ha)	Area change
2.3	1.27	3.6	No change

Site description/changes since 2008

This is an extensive site on a hillside sloping down to a river, within the Wicklow Mountains National Park, and was the location of the large Hero lead Mine. There is a large central area consisting primarily of open spoil, with the ruins of a number of buildings, walls and buddles present. There is an open shaft in the upper part of the site, from which tiers of spoil spread downslope. To the east and west of this central area, the spoil is interspersed with rocky heath and grassland. This site does not seem to have changed since 2008. This is one of the most important sites for Calaminarian grassland in Ireland and has the most well-developed example of Calaminarian grassland habitat on lead mine spoil.

Description of Calaminarian grassland habitat

Calaminarian grassland is widespread and well-developed at this site, and generally occurs throughout the areas of bare spoil, the open central area of the site consisting mostly of this habitat. There are scattered patches of Calaminarian grassland amongst the heathy vegetation to the east and west of the central area. The Calaminarian grassland habitat present is variable, with strong bryophyte mats present, frequent species including *Cephaloziella* spp., *Solenostoma gracillimum, Weissia controversa, Ceratodon purpureus* and *Dicranella varia*. In addition to *Cephaloziella stellulifera*, *C. nicholsonii* was found in a number of places, on retaining walls of buddles. *Ditrichum plumbicola* was not refound, despite a careful search, but the habitat still looks suitable for it.

Impact code (2013)	Description	Location	Influence (+, -, 0)	Intensity (H,M,L)	% habitat affected
A04.02.05	non-intensive mixed animal grazing	Inside	0	L	10
G05.01	trampling	Inside	-	H	15
K01.01	erosion	Inside	-	M	10

Impact code (2018)	Description	Location	Influence (+, -, 0)	Intensity (H,M,L)	% habitat affected
A10	extensive grazing	Inside	0	L	10
F07	sports, tourism and leisure activities	Inside	-	H	15
L01	abiotic natural processes	Inside	-	M	10

Notes on management/impacting activities

The primary impact on this site is trampling by visitors, as there is a carpark adjacent to the site, and an

interpretive sign. There is also a walking path, St. Kevin's Way, running through the site. The whole site is accessible and is a popular destination for visitors, but trampling is confined mainly to the lower parts, close to the interpretive sign and parking area, and around the ruined buildings in the middle of the site, but there are paths throughout the site. Droppings of sheep and deer were seen in parts of the site, but no grazing animals were seen. Grazing intensity is moderately low here.

Conservation measures needed

Any development of the site to make it more accessible to visitors, such as installing more interpretive material or constructing formal paths would negatively impact the Calaminarian grassland habitat. However, if visitors were encouraged to stick to designated paths, the impact would be concentrated and the impact would be lessened over most of the site.

Conservation measure code	Description
CF03	Reduce impact of outdoor sports, leisure and recreational activities

Calaminarian grassland Condition	%	Area (ha)
In good condition	90	1.14
In not-good condition	10	0.13
Condition not known	0	0

Parameter	Criterion	Result		Assessment
Area	Annual change in area	No annual decrease		Favourable
Structure and functions	No. of criteria passed	3		Favourable
	No. indicator spp.	7	Pass	
	Scrub encroachment	0%	Pass	
	Negative human impact	15%	Pass	
Future prospects				Favourable
Overall Assessment				Favourable

Overall assessment

This site is of very high conservation value, and is one of the two most important Calaminarian grassland sites in Ireland, with a relatively large area of the habitat and well-developed vegetation with a number of rare species present in good quantity (although only two patches of *Cephaloziella nicholsonii* could be confirmed. The area, structure and functions and future prospects are all favourable, although trampling by visitors to the mine ruins is of some concern and if this were to increase in extent, the assessment may not remain favourable in the future.

Habitats present on mine spoil resource	%
Calaminarian grassland	55
BL1 Stone walls	1
ED2 Bare spoil	4.5
ER1 Exposed siliceous rock	1.5
ER3 Siliceous loose rock	11.5
FW1 Stream	0.5
GS3 Dry-humid acid grassland	3
HH1 Dry heath	22.5
HH3 Wet heath	0.5

Indicator metallophyte species present
Cephaloziella cf. *massalongi*
Cephaloziella nicholsonii
Bryum cf. *pallescens*
Cephaloziella stellulifera
Gymnocolea inflata
Solenostoma gracillimum
Weissia controversa var. *densifolia*

Other species present on mine spoil resource
Calluna vulgaris
Agrostis capillaris
Asplenium adiantum-nigrum
Asplenium trichomanes
Campylopus atrovirens
Campylopus introflexus
Cephalozia bicuspidata
Cerastium fontanum
Ceratodon purpureus
Cladonia sp.
Dicranella varia
Diplophyllum albicans
Dryopteris sp.
Encalypta streptocarpa
Erica cinerea
Erica tetralix
Eriphorum angustifolium
Huperzia selago
Hylocomium splendens
Juncus articulatus
Molinia caerulea
Peltigera sp.
Picea sitchensis (seedling)
Pogonatum aloides
Pohlia nutans
Polygala serpyllifolia
Polytrichum piliferum
Racomitrium lanuginosum
Rhytidiadelphus squarrosus
Rumex acetosa
Sagina procumbens
Taraxacum officinalis
Ulex europaeus
Ulex gallii
Weissia controversa var. *controversa*

Metallophyte species	Grid ref	Extent	Notes
Cephaloziella nicholsonii	T0988998109	1x1m	Scattered patches amongst rocks on slope.
Cephaloziella nicholsonii	T0988198129	3x1m	Scattered patches across open slope below wall.

Photographs:

Figure 17 Overview of Hero Mine in Glendasan, with extensive Calaminarian grassland present across the open spoil area. Foxrock Mine and Vale of Glendasan are visible in the background.

Figure 18 View of Hero Mine, Glendasan looking upslope, the retaining walls visible support numerous patches of *Cephaloziella* spp.

Figure 19 Calaminarian grassland at Glendasan, consisting of scattered *Agrostis capillaris* and bryophyte mats dominated by *Cephaloziella* spp., interspersed with bare spoil.

Figure 20 Calaminarian grassland habitat amongst boulders at Glendasan, with *Cephaloziella* spp. frequent.

Figure 21 Retaining wall of buddle amongst which patches of *Cephaloziella* cf. *nicholsonii* grow.

Figure 22 Cushion of *Cephaloziella* cf. *nicholsonii* on retaining wall.

Figure 23 Calaminarian grassland habitat at Glendasan, showing damage due to trampling by visitors.

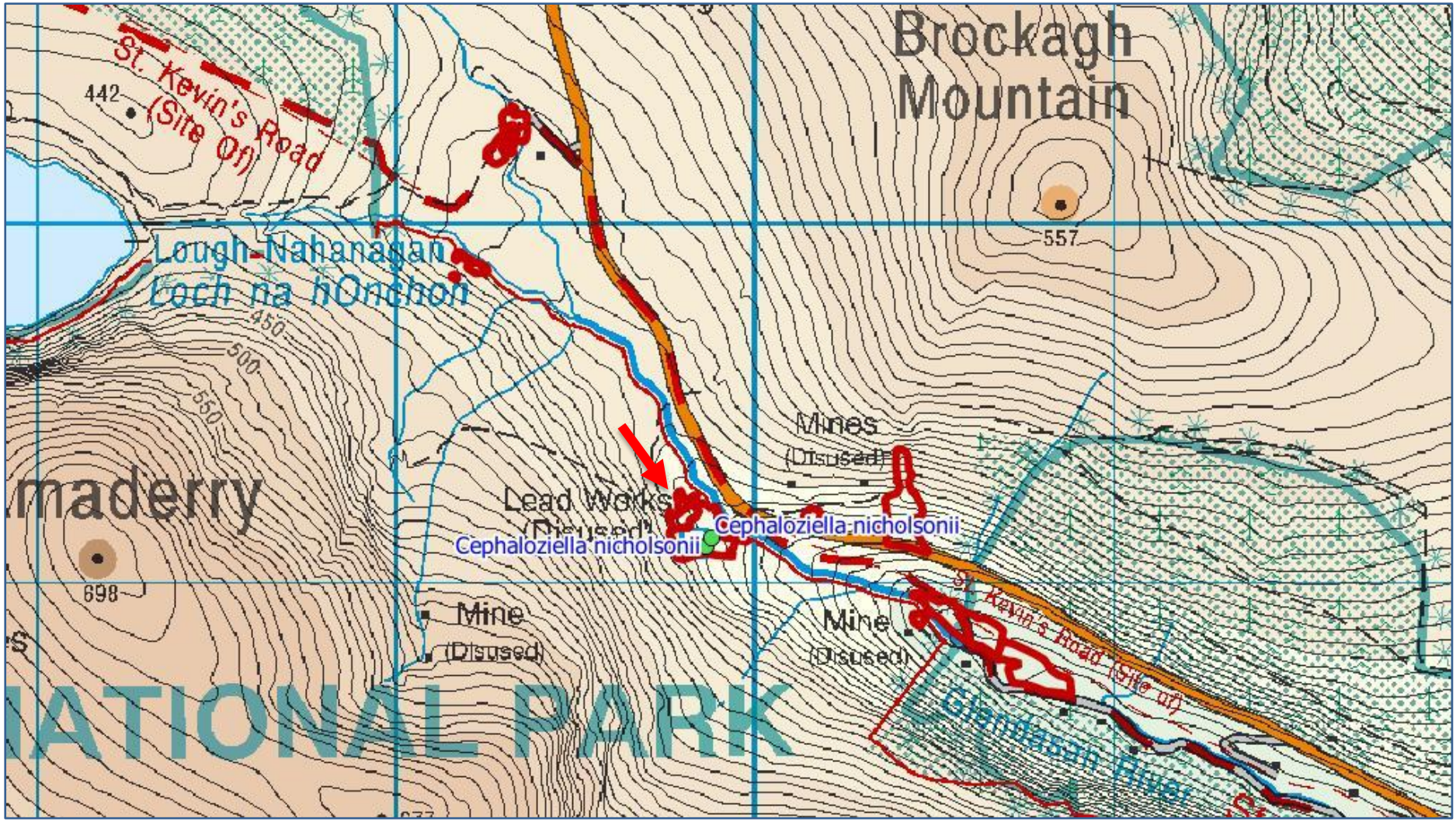

Figure 24 Ordnance Survey Discovery Series map, showing the location of the mine spoil surveyed (red outline) and rare species (green dots) in the Glendasan Valley, Hero Mine is indicated by red arrow. (Scale is 1:15,000). Ordnance Survey Ireland Licence No EN 0059216 © Ordnance Survey Ireland / Government of Ireland.

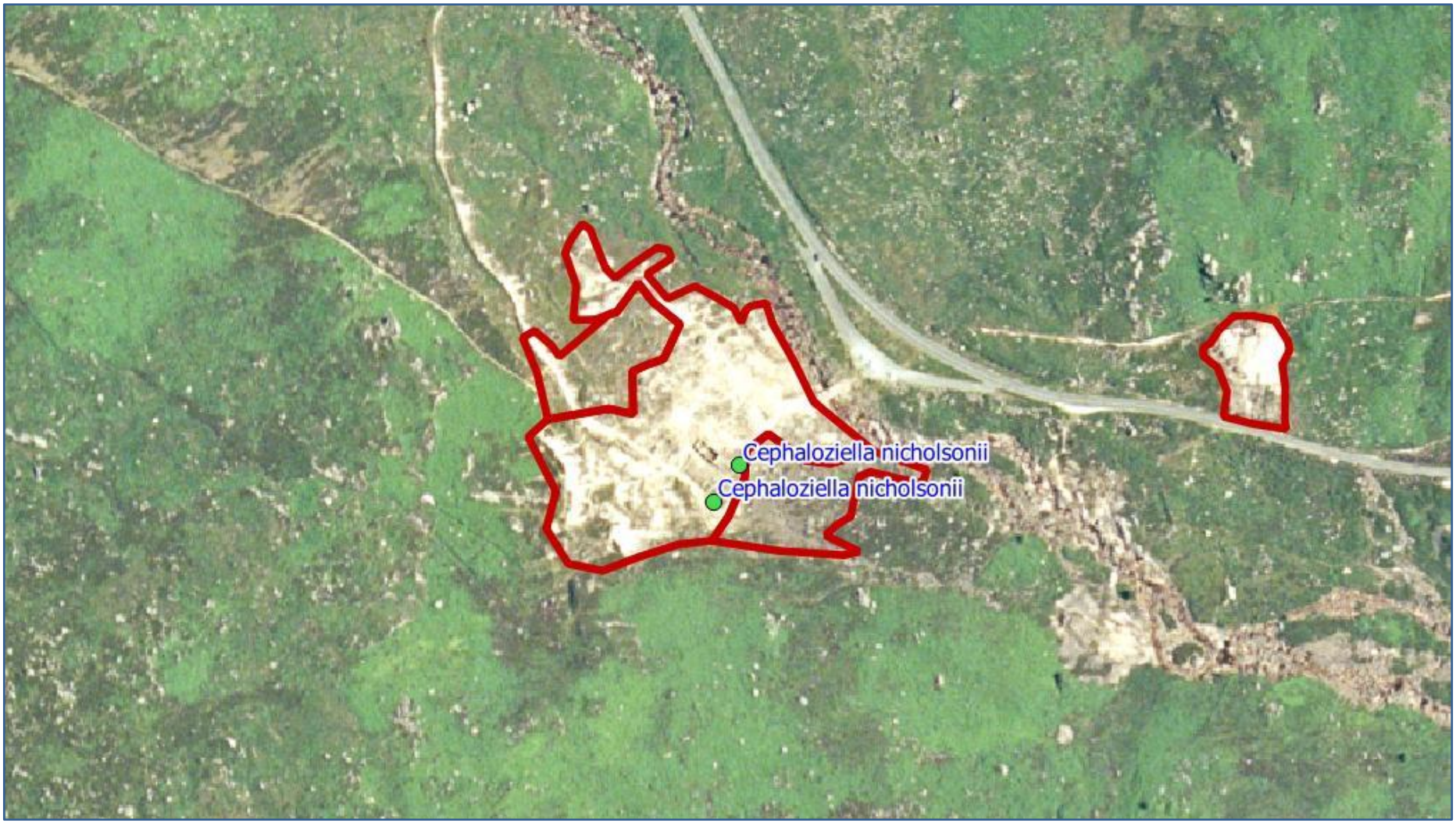

Figure 25 Ordnance Survey 2005 aerial imagery, showing the mine spoil area (red outline) and rare species (green dots) at Glendasan. The right-hand polygon is part of Foxrock Mine. (Scale is 1:3,000). Ordnance Survey Ireland Licence No EN 0059216 © Ordnance Survey Ireland / Government of Ireland.

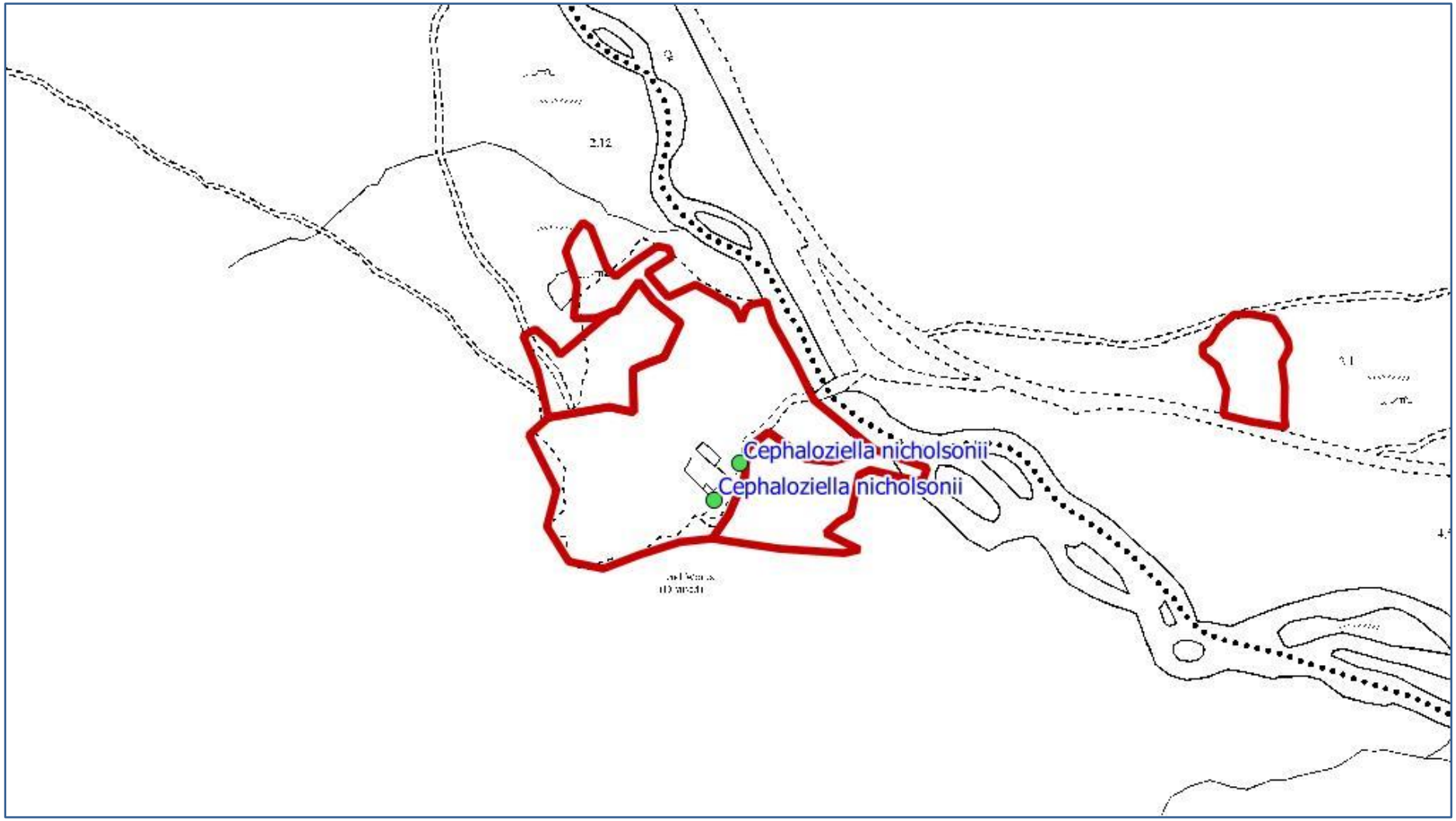

Figure 26 Ordnance Survey 1:5000 series map, showing the mine spoil area (red outline) and rare species (green dots) at Glendasan. The right-hand polygon is part of Foxrock Mine. (Scale is 1:3,000). Ordnance Survey Ireland Licence No EN 0059216 © Ordnance Survey Ireland / Government of Ireland.

Site 06 Foxrock Mine

Site Name	**OS Discovery map**	**Grid ref**	**County**
Foxrock Mine	56	T104982	Wicklow
Recorder	**Date**	**Conservation value**	
Rory Hodd	13/03/2018	Moderate	
Metallophyte species present 2008 None			
Metallophyte species confirmed 2018 None			
2018 site area (ha)	**2018 area 6130 (ha)**	**2008 area 6130 (ha)**	**Area change**
2	0.27	0.6	No change

Site description/changes since 2008

This site consists of two areas of mostly loose spoil on a steep slope on the side of the Glendasan valley. The westernmost of these areas is relatively small, with a large flush, dominated by *Bryum pseudotriquetrum* and *Philonotis fontana* at the top, leading onto open, loose spoil. The eastern spoil area spreads down a large area of hillside, from a now-collapsed adit to close to the edge of the road below. This spoil is generally loose and unstable, with two flat terraces with ruined buildings and an adit. Patches of dry heath and grassland are also developing on the spoil. This site does not seem to have changed since 2008.

Description of Calaminarian grassland habitat

Calaminarian grassland is patchy in both spoil areas, as most of the spoil is too steep and unstable to support vegetation. In flat and stable areas, there is well-developed Calaminarian grassland, and *Dicranella varia* is the most frequent species, with some patches of *Weissia controversa* var. *controversa* present in places. A small patch of *Cephaloziella stellulifera* grows sparingly on the western area of spoil.

Impact code (2013)	Description	Location	Influence (+, -, 0)	Intensity (H,M,L)	% habitat affected
A04.02.05	non-intensive mixed animal grazing	Inside	0	M	30
K01.01	erosion	Inside	-	H	50

Impact code (2018)	Description	Location	Influence (+, -, 0)	Intensity (H,M,L)	% habitat affected
A10	extensive grazing	Inside	0	M	30
L01	abiotic natural processes	Inside	-	H	50

Notes on management/impacting activities

Few impacting activities are apparent, with some sheep grazing taking place. Natural erosion is the most apparent impact on this site, due to the steepness of the slope on which it occurs.

Conservation measures needed

Ensure that the widening or repairs to the adjacent road do not impact the Calaminarian grassland vegetation. If the spoil were stabilised, more Calaminarian grassland would be likely to develop.

Conservation measure code	Description
CL01	Management of habitats (others than agriculture and forest) to slow, stop or reverse natural processes

Condition of Calaminarian grassland	%	Area (ha)
In good condition	100	0.27
In not-good condition	0	0
Condition not known	0	0

Parameter	Criterion	Result		Assessment
Area	Annual change in area	No decrease		Favourable
Structure and functions	No. of criteria passed	3		Favourable
	No. indicator spp.	3	Pass	
	Scrub encroachment	0%	Pass	
	Negative human impact	0%	Pass	
Future prospects				Favourable
Overall Assessment				Favourable

Overall assessment
This site is generally in favourable condition, although it is only of moderate conservation value, as the Calaminarian grassland is scattered in occurrence, is generally not species-rich and contains no rare species.

Habitats present on mine spoil resource	%
Calaminarian grassland	14
BL1 Stone walls	0.5
ED2 Bare spoil	53.5
ER3 Siliceous loose rock	15
FW1 Stream	0.5
GS3 Dry-humid acid grassland	1
HH1 Dry heath	9
HH3 Wet heath	3
PF2 Poor flush	3.5

Indicator metallophyte species present
Bryum cf. *pallescens*
Cephaloziella stellulifera
Solenostoma gracillimum

Other species present on mine spoil resource
Agrostis capillaris
Asplenium trichomanes
Bryum pseudotriquetrum
Calluna vulgaris
Campylopus atrovirens
Carex demissa
Carex nigra
Ceratodon purpureus
Cladonia subcervicornis

Dicranella varia
Diplophyllum albicans
Epilobium brunnescens
Erica tetralix
Festuca ovina
Huperzia selago
Hypnum jutlandicum
Juncus bulbosus
Juncus effusus
Juncus squarrosus
Molinia caerulea
Philonotis fontana
Pogonatum aloides
Polytrichum piliferum
Racomitrium lanuginosum
Sagina procumbens
Ulex gallii
Weissia controversa var. *controversa*

Photographs:

Figure 27 View from the base of the main spoil area at Foxrock Mine, consisting mainly of large loose spoil heaps and fans.

Figure 28 View down from the highest part of the main spoil area at Foxrock Mine, Vale of Glendasan is visible below.

Figure 29 Calaminarian grassland vegetation characterised by *Weissia controversa*, *Dicaranella varia* and *Agrostis capillaris* on a stabilised ridge of spoil at Foxrock Mine.

Figure 30 The smaller, eastern area of spoil at Foxrock Mine, with part of an extensive flush over spoil visible to right.

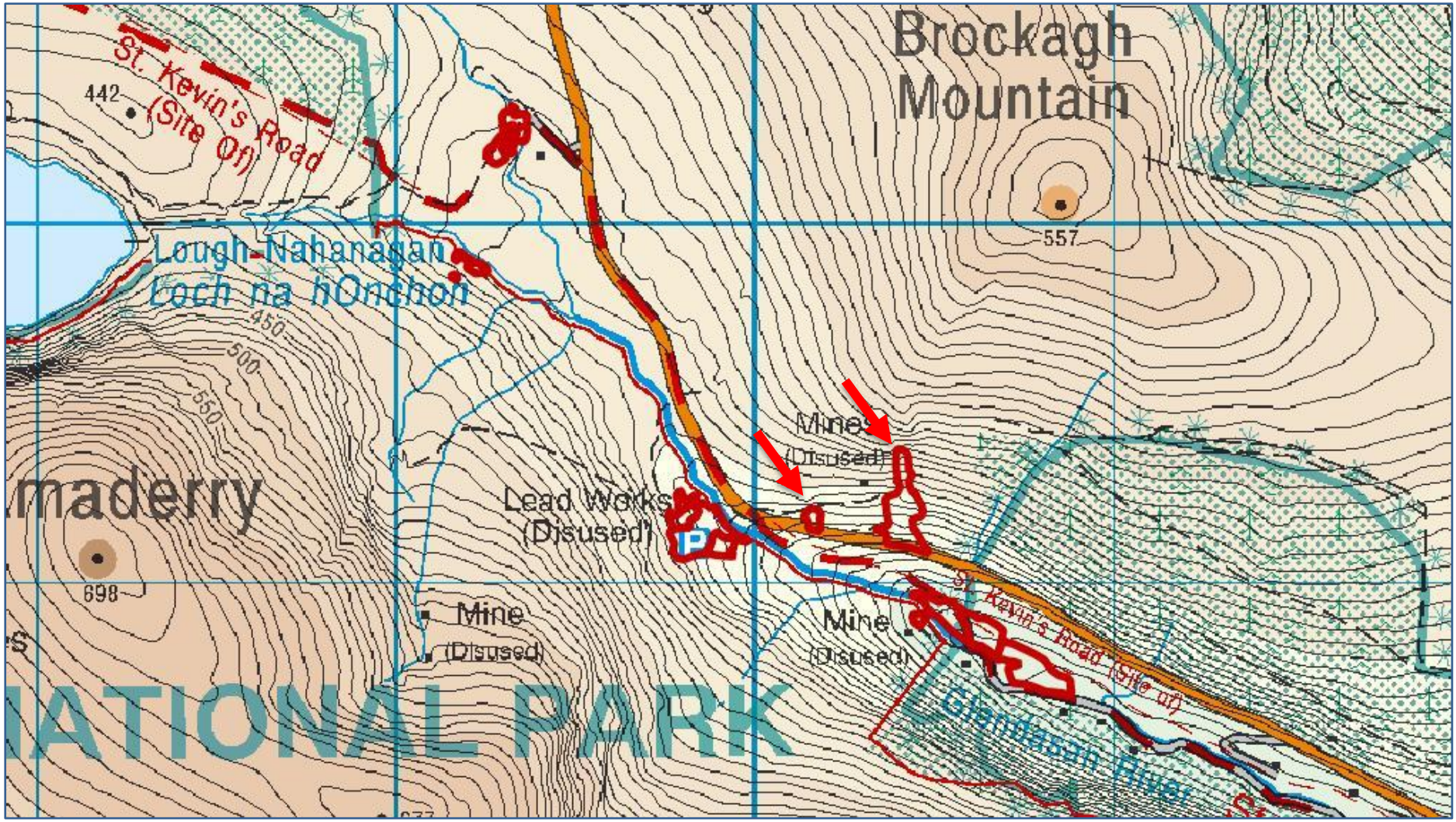

Figure 31 Ordnance Survey Discovery Series map, showing the location of the mine spoil surveyed (red outline) in the Glendasan Valley, the two areas of spoil at Foxrock mine are indicated by red arrows. (Scale is 1:15,000). Ordnance Survey Ireland Licence No EN 0059216 © Ordnance Survey Ireland / Government of Ireland.

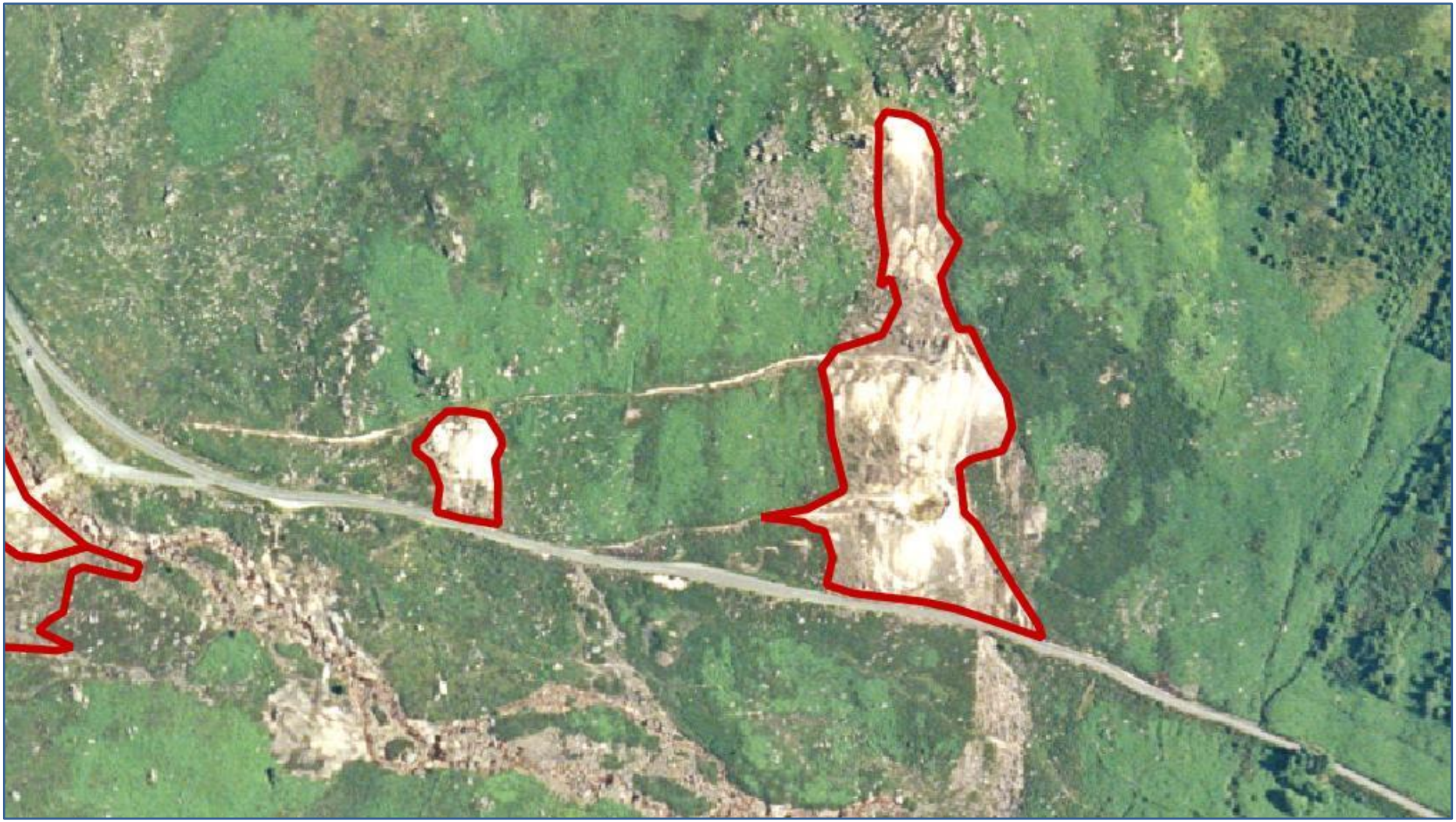

Figure 32 Ordnance Survey 2005 aerial imagery, showing the mine spoil area (red outline) at Foxrock Mine. The polygons on the left-hand edge are part of Hero Mine. (Scale is 1:3,000). Ordnance Survey Ireland Licence No EN 0059216 © Ordnance Survey Ireland / Government of Ireland.

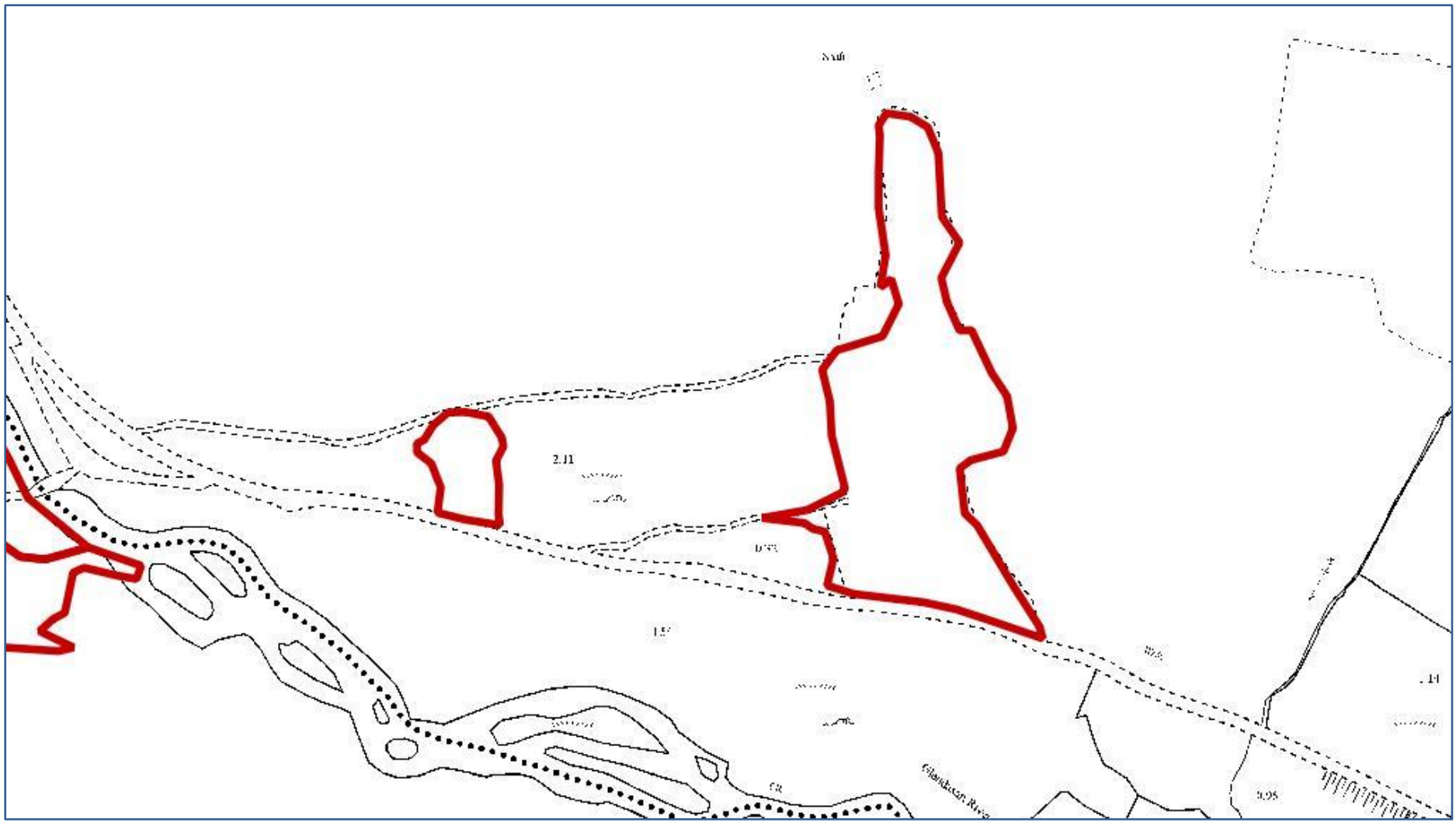

Figure 33 Ordnance Survey 1:5000 series map, showing the mine spoil area (red outline) at Foxrock Mine. The polygons on the left-hand edge are part of Hero Mine. (Scale is 1:3,000). Ordnance Survey Ireland Licence No EN 0059216 © Ordnance Survey Ireland / Government of Ireland.

Site 07 Ballymurtagh

Site Name	**OS Discovery map**	**Grid ref**	**County**
Ballymurtagh	62	T192815	Wicklow
Recorder	**Date**	**Conservation value**	
Rory Hodd	27/07/2018	Low	
Metallophyte species present 2008 None			
Metallophyte species confirmed 2018 None			

2018 site area (ha)	**2018 area 6130 (ha)**	**2008 area 6130 (ha)**	**Area change**
4.3	0.004	0.11	Decrease likely

Site description/changes since 2008

This site consists of a large area of spoil covering a broad hilltop, adjacent to a reclaimed landfill, that would have previously been spoil. The spoil is mostly open and loose, with no vegetation present, with patches of heath, scrub and mixed woodland in parts. Extensive quarrying of the spoil has taken place in some places, causing much instability of the spoil surface.

Description of Calaminarian grassland habitat

There is very little Calaminarian grassland present, being limited to small patches amongst open *Calluna vulgaris*, in the upper part of the site. The patches are species poor and are dominated by *Gymnocolea inflata*.

Impact code (2013)	Description	Location	Influence (+, -, 0)	Intensity (H,M,L)	% habitat affected
C01.01	sand and gravel extraction	Inside	-	H	10
K02.01	succession	Inside	-	L	100

Impact code (2018)	Description	Location	Influence (+, -, 0)	Intensity (H,M,L)	% habitat affected
C01	extraction of minerals	Inside	-	H	10
L02	natural succession	Inside	-	L	100

Notes on management/impacting activities

There are signs of encroachment of heath vegetation and trees in the upper part of the site, where the Calaminarian grassland habitat is located. Excavation of spoil and capping of open shafts may have led to the loss of some Calaminarian grassland patches.

Conservation measures needed

Clearance of heath and trees may assist the survival of Calaminarian grassland at this site.

Conservation measure code	Description
CL01	Management of habitats (others than agriculture and forest) to slow, stop or reverse natural processes

Condition of Calaminarian grassland	%	Area (ha)
In good condition	100	0.004
In not-good condition	0	0
Condition not known	0	0

Parameter	Criterion	Result		Assessment
Area	Annual change in area	Decrease likely		Unfavourable-inadequate
Structure and functions	No. of criteria passed	3		Favourable
	No. indicator spp.	1	Pass	
	Scrub encroachment	0%	Pass	
	Negative human impact	10%	Pass	
Future prospects				Unfavourable-inadequate
Overall Assessment				Unfavourable-inadequate

Overall assessment
This site is in poor condition and is therefore assessed as Unfavourable-inadequate, with very little Calaminarian grassland habitat left, with a continuing decrease likely. The very limited extent and species-poor nature of the Calaminarian grassland present means that this site is of low conservation value.

Habitats present on mine spoil resource	%
Calaminarian grassland	0.1
ED2 Bare spoil	74.9
ED3 Recolonising bare ground	1
HH1 Dry heath	10
HH3 Wet heath	1
WD2 Mixed woodland	3
WS1 Scrub	10

Indicator metallophyte species present
Gymnocolea inflata

Other species present on mine spoil resource
Agrostis capillaris
Betula pubescens
Calluna vulgaris
Campylopus atrovirens
Cirsium palustre
Cirsium vulgare
Dicranella heteromalla
Digitalis purpurea
Diplophyllum albicans
Erica cinerea
Hypnum jutlandicum
Peltigera sp.
Picea sitchensis

Pinus sylvestris
Polytrichastrum formosum
Polytrichum piliferum
Pteridium aquilinum
Senecio jacobea
Teucrium scorodonia
Tsuga heterophylla
Ulex europaeus

Photographs:

Figure 34 Overview of Ballymurtagh mine, which is dominated by loose spoil.

Figure 35 View of ridge-top at Ballymurtagh, scrappy, species-poor patches of Calaminarian grassland occur in the area indicated by red arrow.

Figure 36 Area of spoil that may have previously supported Calaminarian grassland, but has now been dug over.

Figure 37 Small patches of Calaminarian grassland amongst open heath vegetation, with regeneration of conifers and other trees evident.

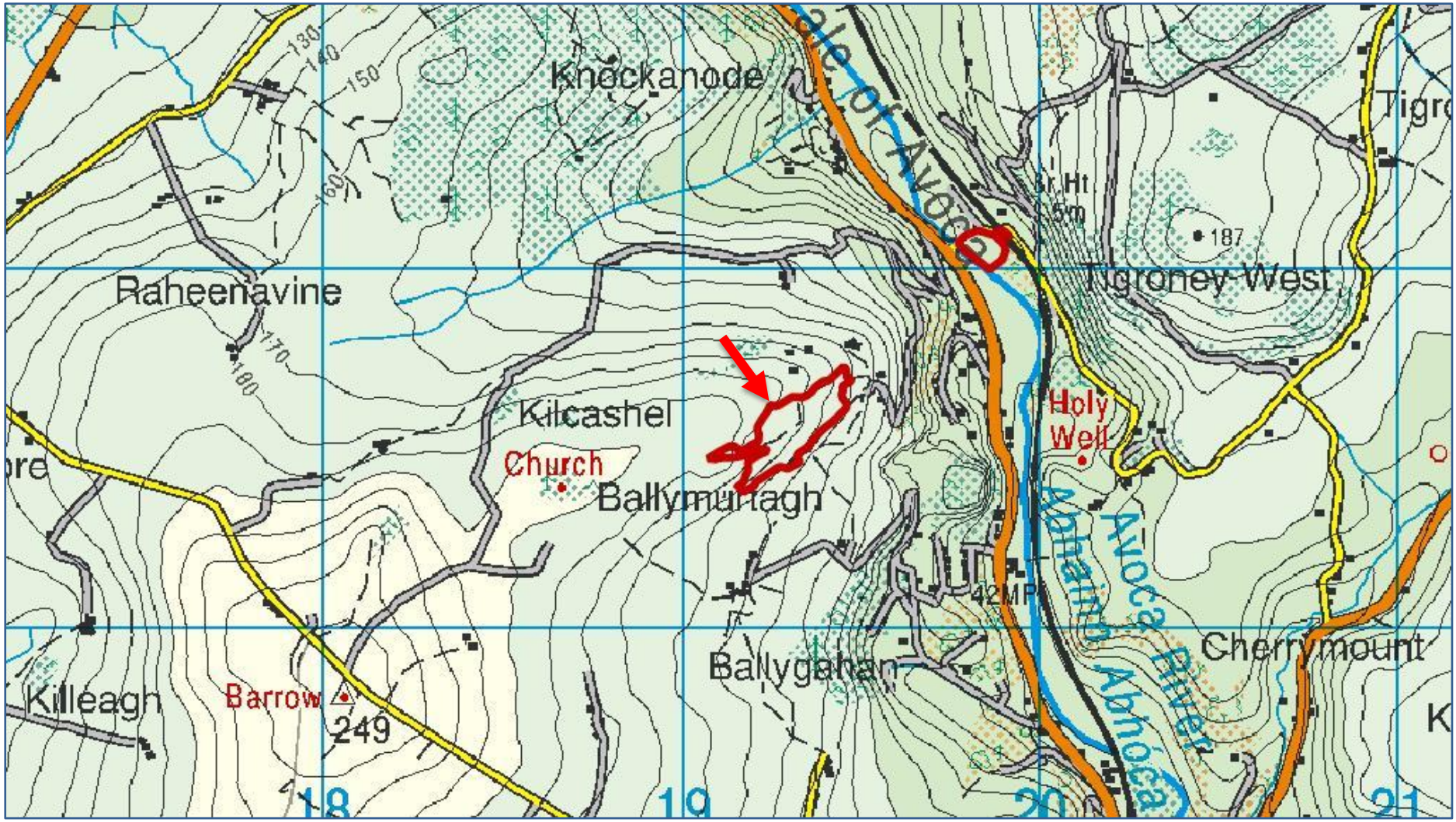

Figure 38 Ordnance Survey Discovery Series map, showing the location of mine spoil (red outline) around the Avoca Valley, the area of spoil at Ballymurtagh is indicated by red arrow. (Scale is 1:15,000). Ordnance Survey Ireland Licence No EN 0059216 © Ordnance Survey Ireland / Government of Ireland.

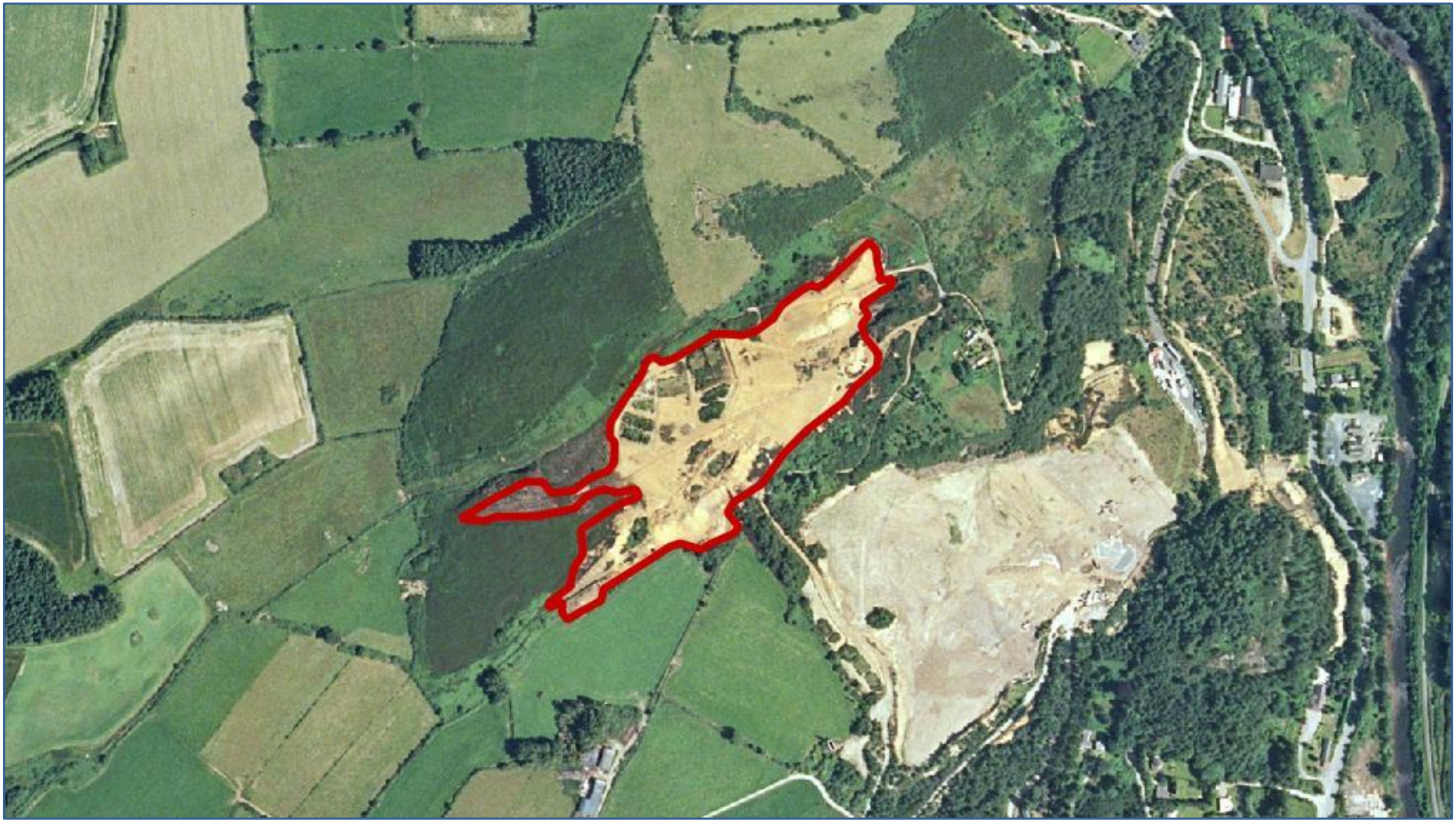

Figure 39 Ordnance Survey 2005 aerial imagery, showing the mine spoil area (red outline) at Ballymurtagh. The large open area to the southeast has since been reclaimed as landfill. (Scale is 1:5,000). Ordnance Survey Ireland Licence No EN 0059216 © Ordnance Survey Ireland / Government of Ireland.

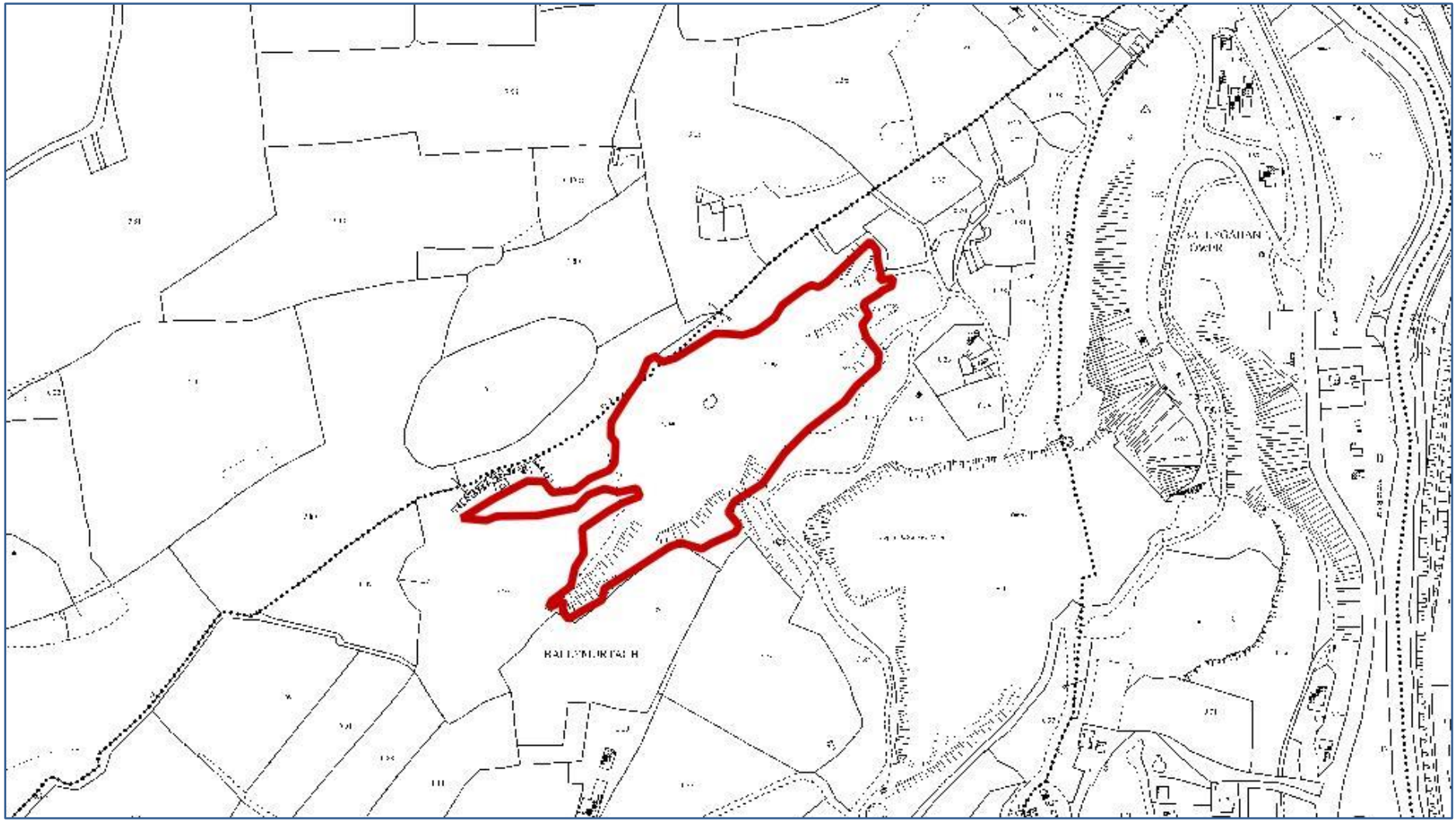

Figure 40 Ordnance Survey 1:5000 series map, showing the mine spoil area (red outline) at Ballymurtagh. (Scale is 1:5,000). Ordnance Survey Ireland Licence No EN 0059216 © Ordnance Survey Ireland / Government of Ireland.

Site 08 Tigroney West

Site Name	**OS Discovery map**	**Grid ref**	**County**
Tigroney West	62	T199822	Wicklow
Recorder	**Date**	**Conservation value**	
Rory Hodd	27/07/2018	Low	
Metallophyte species present 2008 *Cephaloziella nicholsonii*			
Metallophyte species confirmed 2018 None			
2018 site area (ha)	**2018 area 6130 (ha)**	**2008 area 6130 (ha)**	**Area change**
0.9	0.003	0.03	Minor decrease likely

Site description/changes since 2008
This site formerly consisted of a sloping area of spoil and a flat area of spoil beside the Avoca River, separated by a road and railway line. The spoil mostly been reclaimed and the majority of spoil has been covered with soil on which an open grassland community is forming. The spoil slope above the road and railway has now been completely covered, so has been excluded from the site area. The area between the railway and the Avoca River has also been extensively reclaimed, but some small areas of spoil are still exposed, the most metalliferous of which are alongside the railway and river bank.

Description of Calaminarian grassland habitat
Calaminarian grassland is very limited in extent, with the main area occurring in a strip along the river bank, where Cu is leaching out of the soil. This vegetation is dominated by a dense carpet of *Solenostoma gracillimum*. *Cephaloziella nicholsonii* was not refound, but the time of year when the survey was carried out was suboptimal for finding rare metallophyte bryophytes. *Cephaloziella nicholsonii* was seen at this locality by Callaghan (2017).

Impact code (2013)	Description	Location	Influence (+, -, 0)	Intensity (H,M,L)	% habitat affected
K01.01	erosion	Inside	-	M	100

Impact code (2018)	Description	Location	Influence (+, -, 0)	Intensity (H,M,L)	% habitat affected
L01	abiotic natural processes	Inside	-	M	100

Notes on management/impacting activities
Most of this site has been reclaimed and the spoil has been covered, limiting the area available for the occurrence of Calaminarian grassland.

Conservation measures needed
None

Condition of Calaminarian grassland	%	Area (ha)
In good condition	100	0.003
In not-good condition	0	0
Condition not known	0	0

Parameter	Criterion	Result		Assessment
Area	Annual change in area	Minor decrease		Favourable
Structure and functions	No. of criteria passed	3		Favourable
	No. indicator spp.	2	Pass	
	Scrub encroachment	0%	Pass	
	Negative human impact	0%	Pass	
Future prospects				Unfavourable-inadequate
Overall Assessment				Unfavourable-inadequate

Overall assessment

This site is assessed as Unfavourable-inadequate, as it has mostly been reclaimed, and the remaining Calaminarian grassland is not likely to persist in the long-term. The Calaminarian grassland that is left is of limited extent and is species poor, so the conservation value of this site is low, but the presence of *Cephaloziella nicholsonii* makes it worthy of conservation.

Habitats present on mine spoil resource	%
Calaminarian grassland	0.3
ED2 Bare spoil	1
ED3 Recolonising bare ground	48.7
GS3 Dry-humid acid grassland	5
WD2 Mixed woodland	30
WS1 Scrub	15

Indicator metallophyte species present
Scapania compacta
Solenostoma gracillimum

Other species present on mine spoil resource
Agrostis capillaris
Betula pubescens
Bryum sp.
Calluna vulgaris
Ditrichum heteromallum
Marsupella emarginata
Mnium hornum
Racomitrium aciculare

Photographs:

Figure 41 Large sloping area at Tigroney West, formerly covered by bare spoil, but now reclaimed and revegetated.

Figure 42 Bare spoil remaining between minor road and the railway, with small patches of Calaminarian grassland vegetation present.

Figure 43 Shady bank alongside the Avoca River at Tigroney West, where a narrow band of Calaminarian grassland vegetation occurs above the river.

Figure 44 Narrow band of Calaminarian grassland along the Avoca River, dominated by dense mats of *Solenostoma gracillimum*.

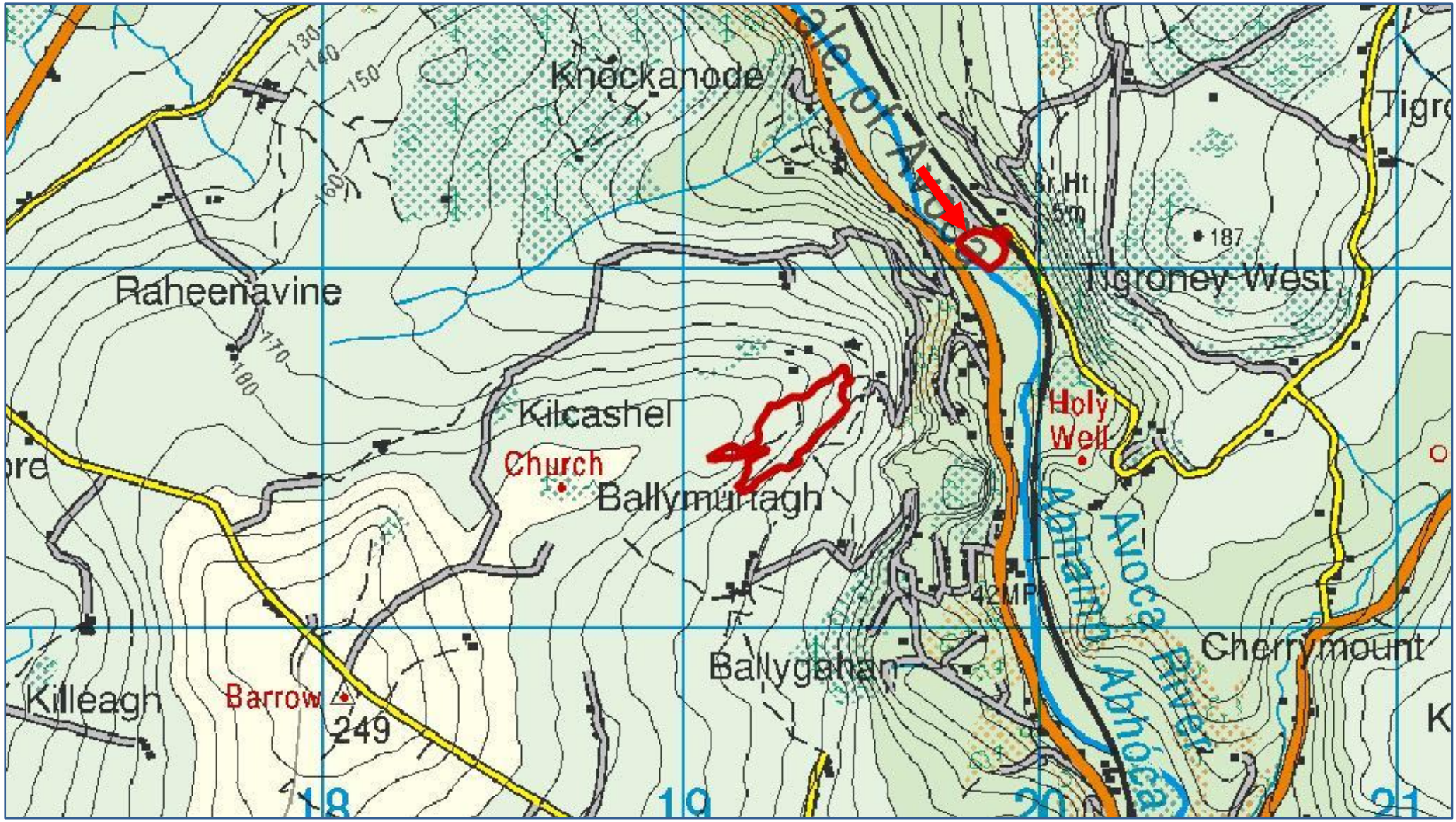

Figure 45 Ordnance Survey Discovery Series map, showing the location of mine spoil (red outline) around the Avoca Valley, the area of spoil at Tigroney West is indicated by red arrow. (Scale is 1:15,000). Ordnance Survey Ireland Licence No EN 0059216 © Ordnance Survey Ireland / Government of Ireland.

Figure 46 Ordnance Survey 2005 aerial imagery, showing the mine spoil area (red outline) at Tigroney West. The large open area of spoil to the northeast has since been reclaimed. (Scale is 1:3,000). Ordnance Survey Ireland Licence No EN 0059216 © Ordnance Survey Ireland / Government of Ireland.

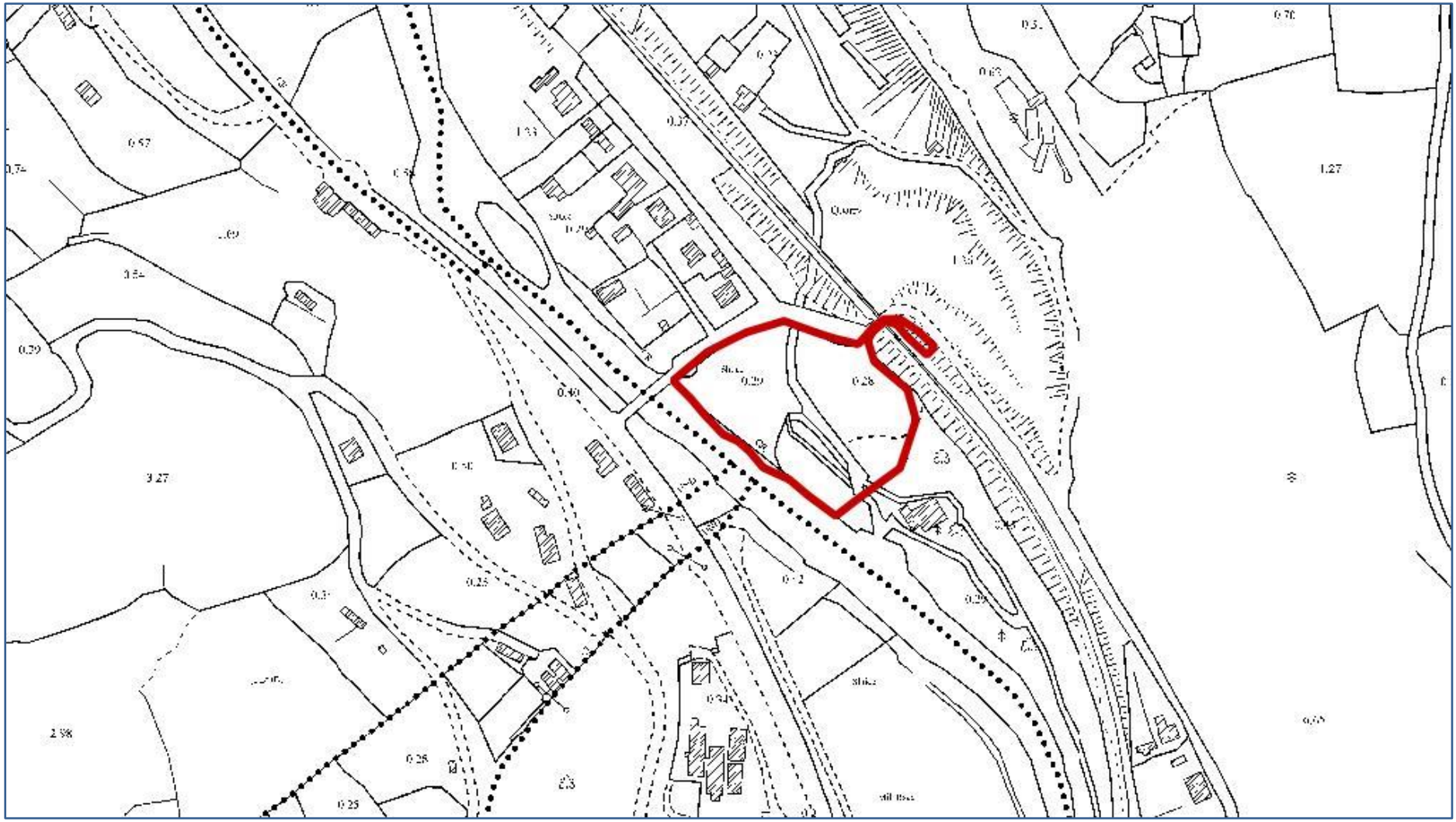

Figure 47 Ordnance Survey 1:5000 series map, showing the mine spoil area (red outline) at Tigroney West. (Scale is 1:3,000). Ordnance Survey Ireland Licence No EN 0059216 © Ordnance Survey Ireland / Government of Ireland.

Site 09 Ballinafunshoge

Site Name	**OS Discovery map**	**Grid ref**	**County**
Ballinafunshoge	56	T082925	Wicklow
Recorder	**Date**	**Conservation value**	
Rory Hodd	12/03/2018	Low	
Metallophyte species present 2008 None			
Metallophyte species confirmed 2018 None			
2018 site area (ha)	**2018 area 6130 (ha)**	**2008 area 6130 (ha)**	**Area change**
1.9	0.13	0.1	No change

Site description/changes since 2008
This site consists of a broad flat area of bare spoil beside the Avonbeg River, and a fan of coarse spoil spreading downslope through forested slopes from a shaft above the road. The lower area is predominantly open spoil, with small patches of scrub and grassland in places. The upper area has no apparent toxicity remaining and is slowly being colonised by heath and trees. This site does not show many signs of change from 2008.

Description of Calaminarian grassland habitat
The Calimanarian grassland at this site is restricted to the flat, lower area, with few signs of heavy metal toxicity in the upper spoil on the slope. Calaminarian grassland is patchy across the flat area, being most well developed on banks close to the road and along the edge of small ditches. There is sparse cover of *Agrostis capillaris* across many areas, with *Dicranella varia* being the most prominent bryophyte. *Solenostoma gracillimum* forms dense stands along ditch edges, while there are strong patches of *Cephaloziella stellulifera* in places.

Impact code (2013)	Description	Location	Influence (+, -, 0)	Intensity (H,M,L)	% habitat affected
C01.01	sand and gravel extraction	Inside	-	M	10
G01.03.02	off-road motorized driving	Inside	-	H	40
K02.01	succession	Inside	-	L	10

Impact code (2018)	Description	Location	Influence (+, -, 0)	Intensity (H,M,L)	% habitat affected
C01	extraction of minerals	Inside	-	M	10
F07	sports, tourism and leisure activities	Inside	-	H	40
L02	natural succession	Inside	-	L	10

Notes on management/impacting activities
The area in which Calaminarian grassland occurs is heavily disturbed by off-road vehicles, with tracks, often deeply rutted, throughout. There is also evidence of the excavation and removal of spoil in parts. Some succession of gorse scrub is evident, with young plants beginning to spread and grow in parts of the site and a handful of seedlings of non-native conifers are becoming established on the spoil. Dumping is likely to be an issue at some point, as the best examples of Calaminarian grassland are adjacent to the road, where dumping is likely to occur.

Conservation measures needed
Vehicle access to this site, for both the purpose of spoil extraction and off-road recreation, should be blocked to allow Calaminarian grassland to develop more widely and to allow damaged stands to recover. Scrub encroachment should be managed, and encroaching seedlings of non-native conifers should be removed.

Conservation measure code	Description
CC01	Adapt/manage extraction of non-energy resources
CF03	Reduce impact of outdoor sports, leisure and recreational activities
CL01	Management of habitats (others than agriculture and forest) to slow, stop or reverse natural processes

Condition of Calaminarian grassland	%	Area (ha)
In good condition	40	0.05
In not-good condition	60	0.08
Condition not known	0	0

Parameter	Criterion	Result		Assessment
Area	Annual change in area	No decrease		Favourable
Structure and functions	No. of criteria passed	2		Unfavourable-inadequate
	No. indicator spp.	2	Pass	
	Scrub encroachment	10%	Pass	
	Negative human impact	50%	Fail	
Future prospects				Unfavourable-inadequate
Overall Assessment				Unfavourable-inadequate

Overall assessment
The status of this site is assessed as unfavourable-inadequate, due to the presence of extensive impacts from off-road vehicles. Although the area has not decreased, the quality of the Calaminarian grassland vegetation is undoubtedly impacted negatively. It is likely that no improvement in condition will be possible until this pressure is removed.

Habitats present on mine spoil resource	%
Calaminarian grassland	6.5
ED2 Bare spoil	70
ER3 Siliceous loose rock	2
FW1 Stream	1
GS3 Dry-humid acid grassland	0.5
HH1 Dry heath	14
WD5 Scattered trees	1.5
WS1 Scrub	4.5

Indicator metallophyte species present
Cephaloziella stellulifera
Solenostoma gracillimum

Other species present on mine spoil resource
Agrostis capillaris
Asplenium trichomanes
Barbula convoluta
Calliergonella cuspidata
Calluna vulgaris
Cephalozia bicuspidata
Cerastium fontanum
Ceratodon purpureus
Cladonia spp.
Cytisus scoparius
Dicranella varia
Didymodon fallax
Diplophyllum albicans
Festuca ovina
Galium saxatile
Holcus lanatus
Huperzia selago
Hypnum jutlandicum
Ilex aquifolium
Jasione montana
Juncus acutiflorus
Juncus effusus
Kindbergia praelonga
Koeleria macrantha
Molinia caerulea
Picea sitchensis (seedling)
Pilosella officinarum
Pinus sylvestris (seedling)
Pogonatum aloides
Polytrichum piliferum
Rhytidiadelphus squarrosus
Rumex acetosa
Sagina procumbens
Trifolium repens
Ulex europaeus

Photographs:

Figure 48 Overview of Ballinafunshoge from top of spoil fan to south. All Calaminarian grassland vegetation is located on the flat area on the valley floor.

Figure 49 Flat area of spoil at Ballinafunshoge, with Calaminarian grassland present in scattered patches.

Figure 50 Calaminarian grassland on small spoil heaps near road, with strong patches of *Cephaloziella stellulifera* present.

Figure 51 Tyre tracks and hollows caused by extensive off-road driving on the spoil area.

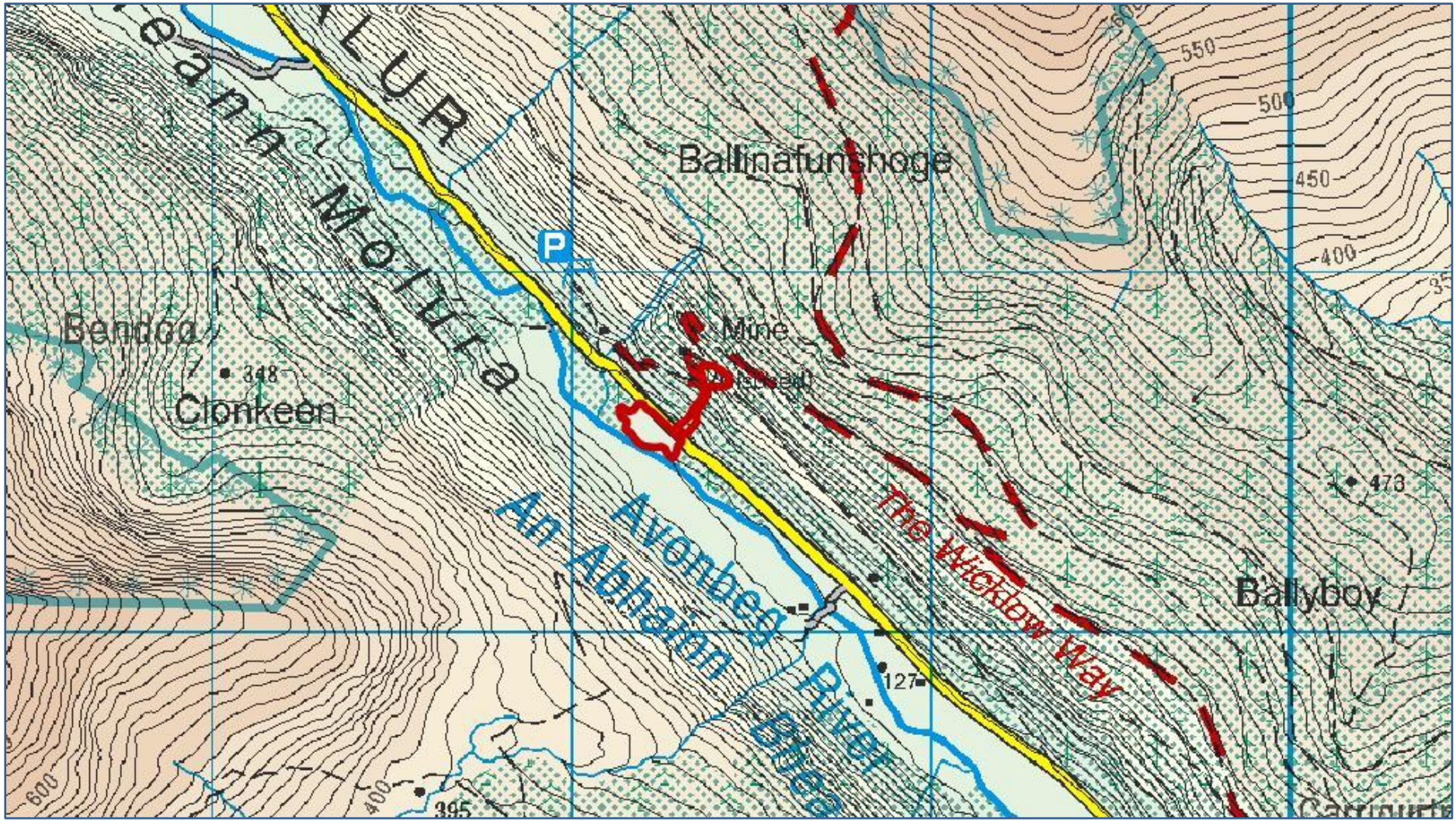

Figure 52 Ordnance Survey Discovery Series map, showing the location of mine spoil (red outline) at Ballinafunshoge (Scale is 1:15,000). Ordnance Survey Ireland Licence No EN 0059216 © Ordnance Survey Ireland / Government of Ireland.

Figure 53 Ordnance Survey 2005 aerial imagery, showing the mine spoil area (red outline) Ballinafunshoge. (Scale is 1:3,000). Ordnance Survey Ireland Licence No EN 0059216 © Ordnance Survey Ireland / Government of Ireland.

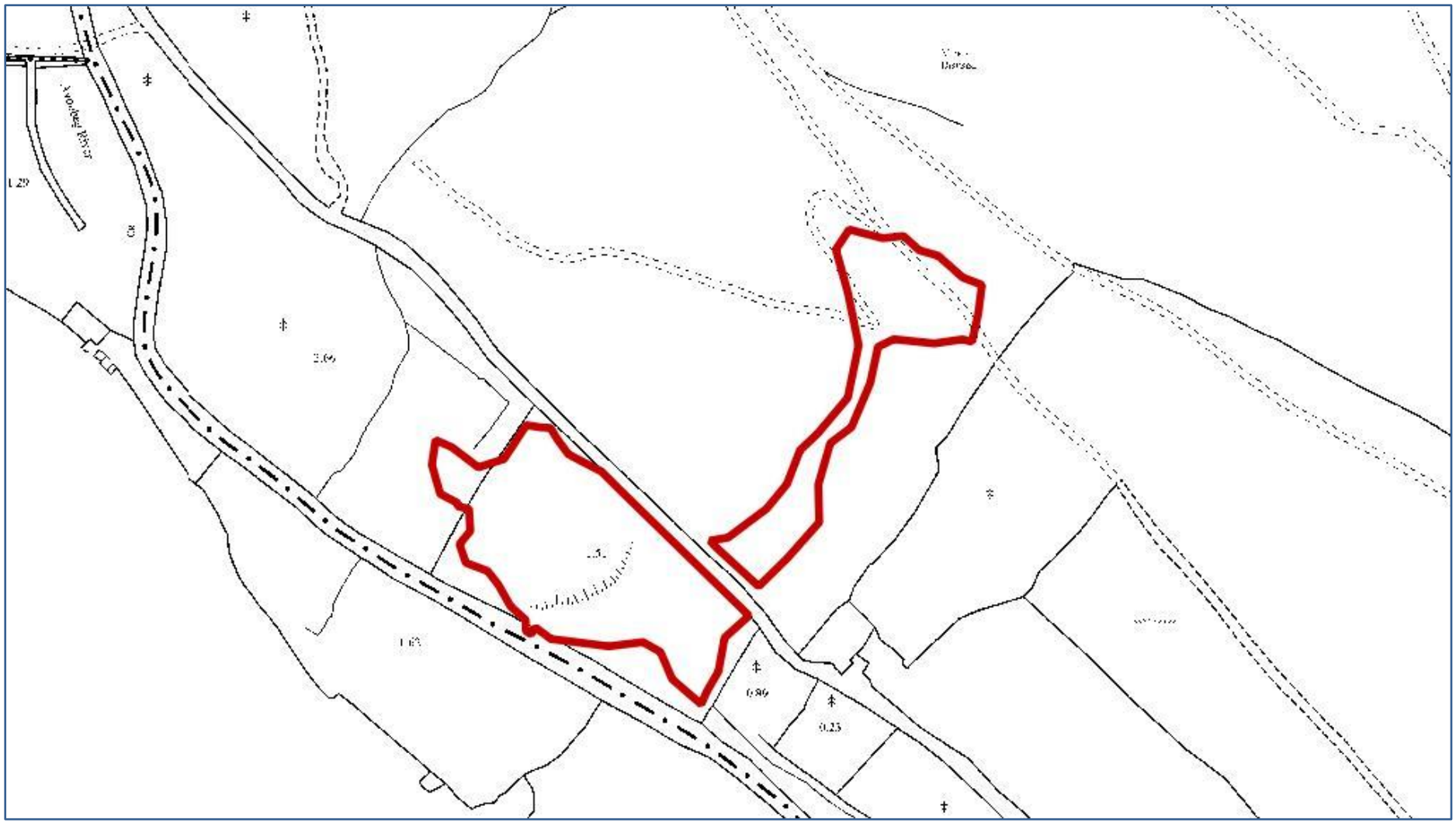

Figure 54 Ordnance Survey 1:5000 series map, showing the mine spoil area (red outline) at Ballinafunshoge. (Scale is 1:3,000). Ordnance Survey Ireland Licence No EN 0059216 © Ordnance Survey Ireland / Government of Ireland.

Site 10 Vale of Glendasan

Site Name	**OS Discovery map**	**Grid ref**	**County**
Vale of Glendasan	56	T108977	Wicklow
Recorder	**Date**	**Conservation value**	
Rory Hodd	13/03/2018	Low	
Metallophyte species present 2008 None			
Metallophyte species confirmed 2018 None			
2018 site area (ha)	**2018 area 6130 (ha)**	**2008 area 6130 (ha)**	**Area change**
3.1	0.5	0.97	No change

Site description/changes since 2008

This is an extensive area of bare spoil, consisting of two piled areas of spoil at base of slope and a large open area of alluvial spoil alongside the river on the valley floor. In the middle part of the site, the spoil has been colonised by grassland, and only small bare patches of spoil remain. The lower area, consisting of alluvial spoil, is mostly unvegetated due to constant disturbance by flooding. This site is apparently unchanged since 2008.

Description of Calaminarian grassland habitat

The Calaminarian grassland vegetation present is patchy and generally species poor. In the upper part of the site, above the river, there are mixed bryophyte mats, with *Dicranella varia, Weissia controversa* var. *controversa* and *Bryum* cf. *pallenscens* prominent. The Calaminarian grassland on the alluvial spoil is very species poor, mostly consisting of monospecific stands of *Agrostis capillaris*.

Impact code (2013)	Description	Location	Influence (+, -, 0)	Intensity (H,M,L)	% habitat affected
A04.02.05	non-intensive mixed animal grazing	Inside	0	L	60
K01.01	erosion	Inside	-	M	80
K02.01	succession	Inside	-	M	10

Impact code (2018)	Description	Location	Influence (+, -, 0)	Intensity (H,M,L)	% habitat affected
A10	extensive grazing	Inside	0	L	10
L01	abiotic natural processes	Inside	-	M	80
L02	natural succession	Inside	-	M	10

Notes on management/impacting activities

The adjacent river is the main force acting on this site, with constant erosion and deposition taking place, meaning that most of the spoil is bare. A large herd of goats was present on the site when visited, and deer would also graze here, but are having little impact on the Calaminarian grassland vegetation. Some encroachment of gorse scrub and grassland is evident, but this is only taking place slowly.

Conservation measures needed
Clearance of gorse scrub may be necessary in the future, if it desired to retain this species-poor example of Calaminarian grassland vegetation.

Conservation measure code	Description
CL01	Management of habitats (others than agriculture and forest) to slow, stop or reverse natural processes

Condition of Calaminarian grassland	%	Area (ha)
In good condition	100	0.5
In not-good condition	0	0
Condition not known	0	0

Parameter	Criterion	Result		Assessment
Area	Annual change in area	No annual decrease		Favourable
Structure and functions	No. of criteria passed	3		Favourable
	No. indicator spp.	1	Pass	
	Scrub encroachment	10%	Pass	
	Negative human impact	0%	Pass	
Future prospects				Favourable
Overall Assessment				Favourable

Overall assessment
Although this site is assessed as in favourable condition, with few major threats or pressures, most of the Calaminarian grassland present is extremely species-poor, and is a low priority for enactment of specific conservation efforts.

Habitats present on mine spoil resource	%
Calaminarian grassland	16.5
BL3 Buildings and artificial surfaces	6.5
ED2 Bare spoil	45
ER3 Siliceous loose rock	9
FW1 Upland river	1
GS3 Dry-humid acid grassland	16
HD1 Bracken	2
WS1 Scrub	4

Indicator metallophyte species present
Bryum cf. *pallescens*

Other species present on mine spoil resource
Agrostis capillaris
Asplenium trichomanes
Bryum pseudotriquetrum
Calluna vulgaris
Campylopus atrovirens
Campylopus introflexus
Cardamine sp.
Carex demissa

Cerastium fontanum
Ceratodon purpureus
Cladonia sp.
Dicranella varia
Erica tetralix
Eriophorum angustifolium
Festuca ovina
Huperzia selago
Hylocomium splendens
Hypnum jutlandicum
Juncus acutiflorus
Kindbergia praelonga
Molinia caerulea
Peltigera sp.
Philonotis fontana
Pleurozium schreberi
Pogonatum aloides
Pohlia nutans
Polytrichum formosum
Polytrichum piliferum
Pteridium aquilinum
Racomitrium elongatum
Racomitrium lanuginosum
Rhytidiadelphus squarrosus
Sagina procumbens
Ulex europaeus
Ulex gallii
Weissia controversa var. *controversa*

Photographs:

Figure 55 Overview of the Vale of Glendasan, as seen from the top of the site.

Figure 56 Relatively stable spoil on the northern side of the Vale of Glendasan, with scattered patches of Calaminarian grassland.

Figure 57 Mostly bare and mobile alluvial spoil close to the river in the base of the Vale of Glendasan.

Figure 58 Species-poor Calaminarian grassland vegetation, consisting mainly of a monospecific sward of *Agrostis capillaris* on alluvial spoil alongside the river.

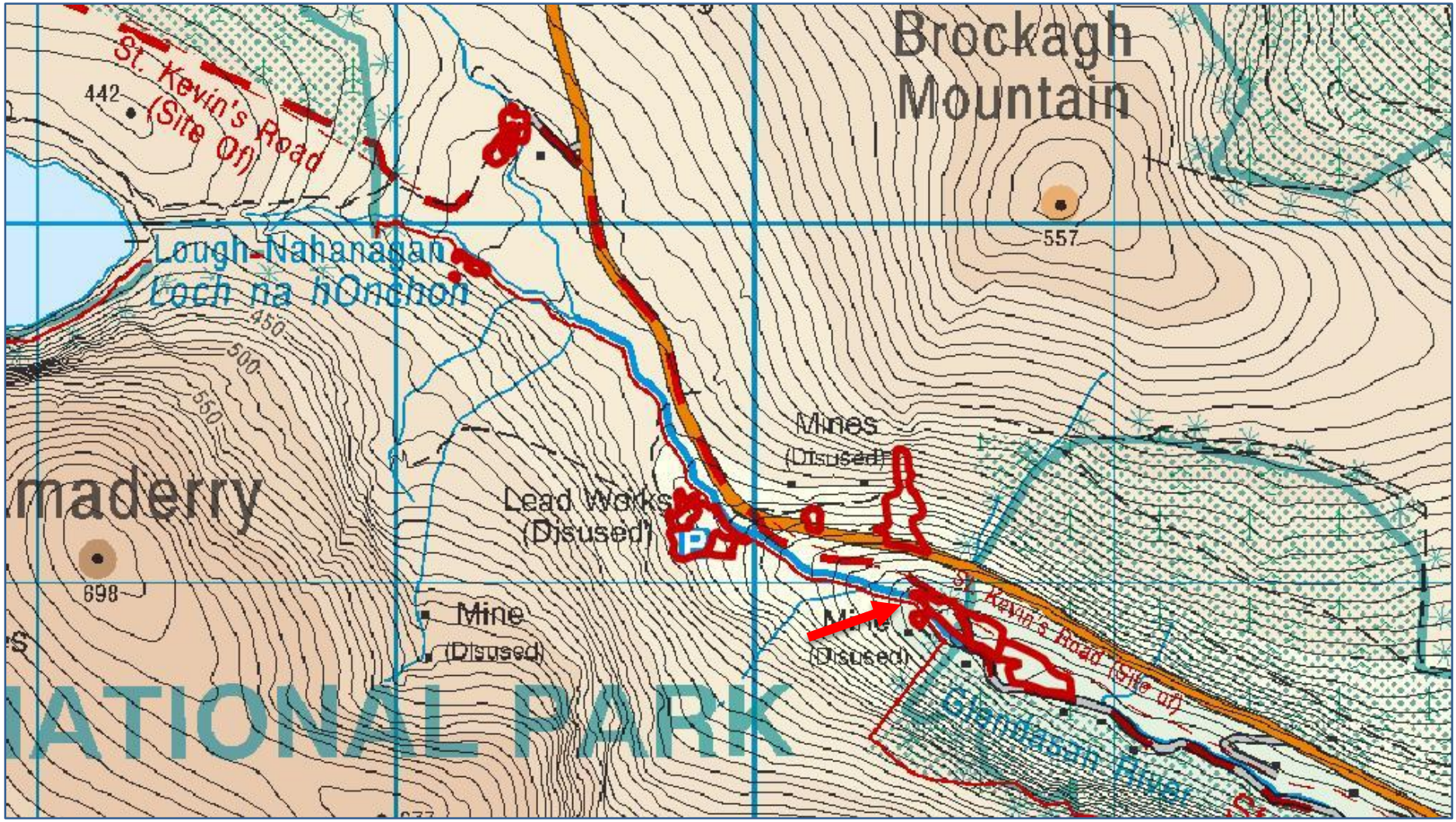

Figure 59 Ordnance Survey Discovery Series map, showing the location of the mine spoil surveyed (red outline) in the Glendasan Valley, the area of spoil in the Vale of Glendasan is indicated by red arrow. (Scale is 1:15,000). Ordnance Survey Ireland Licence No EN 0059216 © Ordnance Survey Ireland / Government of Ireland.

Figure 60 Ordnance Survey 2005 aerial imagery, showing the mine spoil area (red outline) in the Vale of Glendasan. (Scale is 1:3,000). Ordnance Survey Ireland Licence No EN 0059216 © Ordnance Survey Ireland / Government of Ireland.

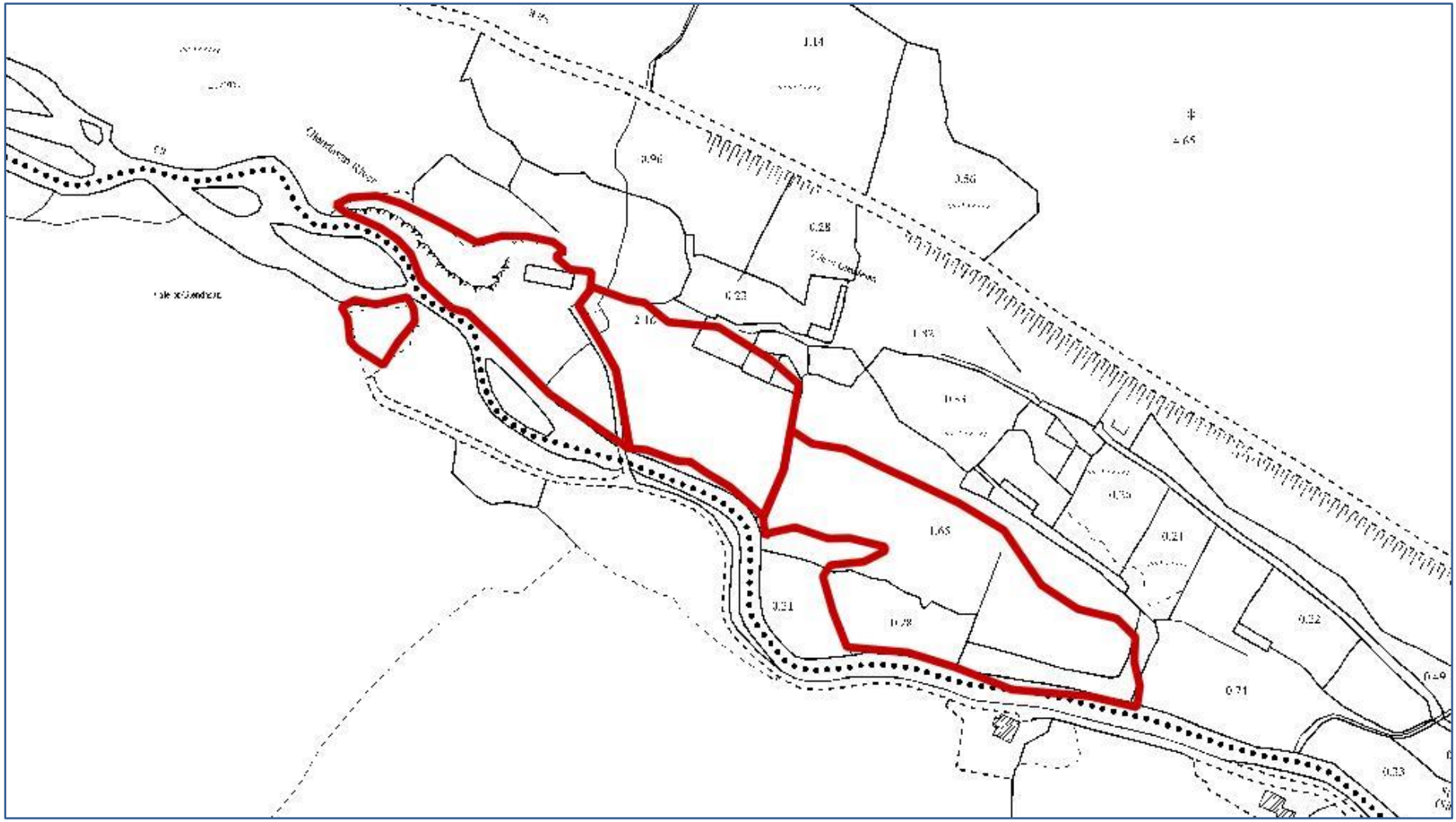

Figure 61 Ordnance Survey 1:5000 series map, showing the mine spoil area (red outline) in the Vale of Glendasan. (Scale is 1:3,000). Ordnance Survey Ireland Licence No EN 0059216 © Ordnance Survey Ireland / Government of Ireland.

Site 11 Brockagh

Site Name	**OS Discovery map**	**Grid ref**	**County**
Brockagh	56	T093992	Wicklow
Recorder	**Date**	**Conservation value**	
Rory Hodd	16/02/2016	Moderate	
Metallophyte species present 2008			
None			
Metallophyte species confirmed 2018			
None			
2018 site area (ha)	**2018 area 6130 (ha)**	**2008 area 6130 (ha)**	**Area change**
0.8	0.11	0.2	No change

Site description/changes since 2008
This is a flat area of spoil nestled in the curve of a river, with spoil interspersed with much heath and grassland. In places, there are wet, flushed areas and small ponds. A track runs through the centre of the site and there is a heavily poached area alongside the track in which a ring feeder has been placed. A small area of open ground across the small river, included within the site in the previous survey, was excluded from the area, as no evidence of heavy metal influence was found, and it is likely to have been resurfaced with gravel for use as a parking area. The main change apparent in the site is the major increase in grazing levels and trampling by sheep, due to the presence of a feeding station within the site.

Description of Calaminarian grassland habitat
Calimanarian grassland is interspersed in patches through the heath and grassland vegetation, rarely forming extensive areas. The most widespread species on this ground is *Weissia controversa*, with *W. controversa* var. *densifolia* forming pure stands in damp hollows. *Gymnocolea inflata* and *Solenostoma gracillimum* are prominent in places, with small amounts of *Cephaloziella stellulifera* present.

Impact code (2013)	Description	Location	Influence (+, -, 0)	Intensity (H,M,L)	% habitat affected
A04.02.05	non-intensive mixed animal grazing	Inside	-	H	80
G01.02	walking, horseriding and non-motorised vehicles	Inside	0	L	10
G01.03.02	off-road motorized driving	Inside	-	M	15
K01.01	erosion	Inside	-	M	10

Impact code (2018)	Description	Location	Influence (+, -, 0)	Intensity (H,M,L)	% habitat affected
A10	extensive grazing	Inside	-	H	80
F07	sports, tourism and leisure activities	Inside	-	M	20
L01	abiotic natural processes	Inside	-	M	10

Notes on management/impacting activities
The quality of this site has been seriously degraded by the presence of a ring feeder within the site. This has resulted in heavy poaching, deposition of dung leading to eutrophication and churning of the

ground by tractor wheels, as well as intensification of grazing in the vicinity. The result of this is that there is no Calaminarian grassland present close to the ring feeder and there is increased pressure on the rest of the habitat present in the vicinity.

Conservation measures needed
The ring feeder should be removed from this site and sheep should also be excluded and discouraged from using the area around the Calaminarian grassland habitat until the condition of the habitat has been restored to its previous quality.

Conservation measure code	Description
CA05	Adapt mowing, grazing and other equivalent agricultural activities

Condition of Calaminarian grassland	%	Area (ha)
In good condition	20	0.02
In not-good condition	80	0.09
Condition not known	0	0

Parameter	Criterion	Result		Assessment
Area	Annual change in area	No decrease		Favourable
Structure and functions	No. of criteria passed	2		Unfavourable-inadequate
	No. indicator spp.	5	Pass	
	Scrub encroachment	0%	Pass	
	Negative human impact	80%	Fail	
Future prospects				Unfavourable-bad
Overall Assessment				Unfavourable-bad

Overall assessment
This site is considered to be in Unfavourable-bad condition, as feeding of livestock within the area of Calaminarian grassland is having a major negative impact on the quality of the habitat, and will continue to impact the habitat until action is taken to remove this pressure. The vegetation present is of moderate conservation value, with a number of infrequent species present, so it would be worthwhile to attempt to improve the condition of this site.

Habitats present on mine spoil resource	%
Calaminarian grassland	14
ED2 Bare spoil	10
ER3 Siliceous loose rock	5
FL8 Ponds	0.5
FW1 Upland river	0.5
GS3 Dry-humid acid grassland	20
HH1 Dry heath	50

Indicator metallophyte species present
Bryum cf. *pallescens*
Cephaloziella stellulifera
Gymnocolea inflata
Solenostoma gracillimum
Weissia controversa var. *densifolia*

Other species present on mine spoil resource
Agrostis capillaris
Bryum pallens
Calluna vulgaris
Campylopus introflexus
Campylopus pyriformis
Ceratodon purpureus
Cladonia spp.
Dicranum scoparium
Diplophyllum albicans
Hylocomium splendens
Hypnum jutlandicum
Peltigera sp.
Philonotis fontana
Pleurozium schreberi
Pogonatum aloides
Pohlia nutans
Polytrichum piliferum
Racomitrium lanuginosum
Rhytidiadelphus squarrosus
Weissia controversa var. *controversa*

Photographs:

Figure 62 View across the mine site at Brockagh, with areas of spoil interspersed with dry heath and acid grassland.

Figure 63 Calaminarian grassland vegetation, dominated by *Weissia controversa* var. *controversa*, with patches of *Cephaloziella stellulifera*.

Figure 64 *Weissia controversa* var. *densiflora* forming dense mats in a damp hollow at Brockagh.

Figure 65 Extensive poaching and other impacts caused by the presence of a ringfeeder on Calaminarian grassland habitat at Brockagh.

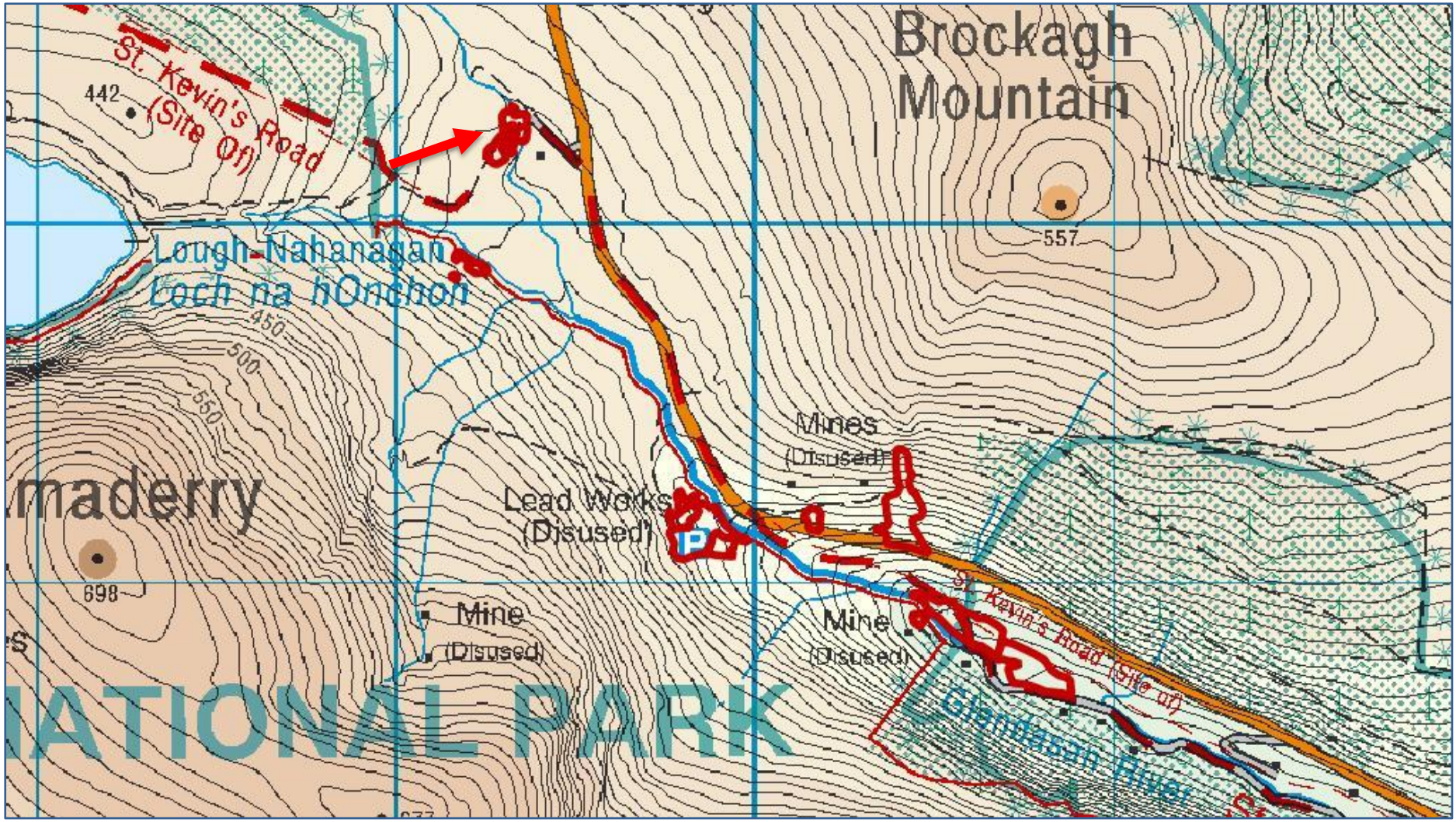

Figure 66 Ordnance Survey Discovery Series map, showing the location of the mine spoil surveyed (red outline) in the Glendasan Valley, the area of spoil at Brockagh is indicated by red arrow. (Scale is 1:15,000). Ordnance Survey Ireland Licence No EN 0059216 © Ordnance Survey Ireland / Government of Ireland.

Figure 67 Ordnance Survey 2005 aerial imagery, showing the mine spoil area (red outline) at Brockagh. (Scale is 1:3,000). Ordnance Survey Ireland Licence No EN 0059216 © Ordnance Survey Ireland / Government of Ireland.

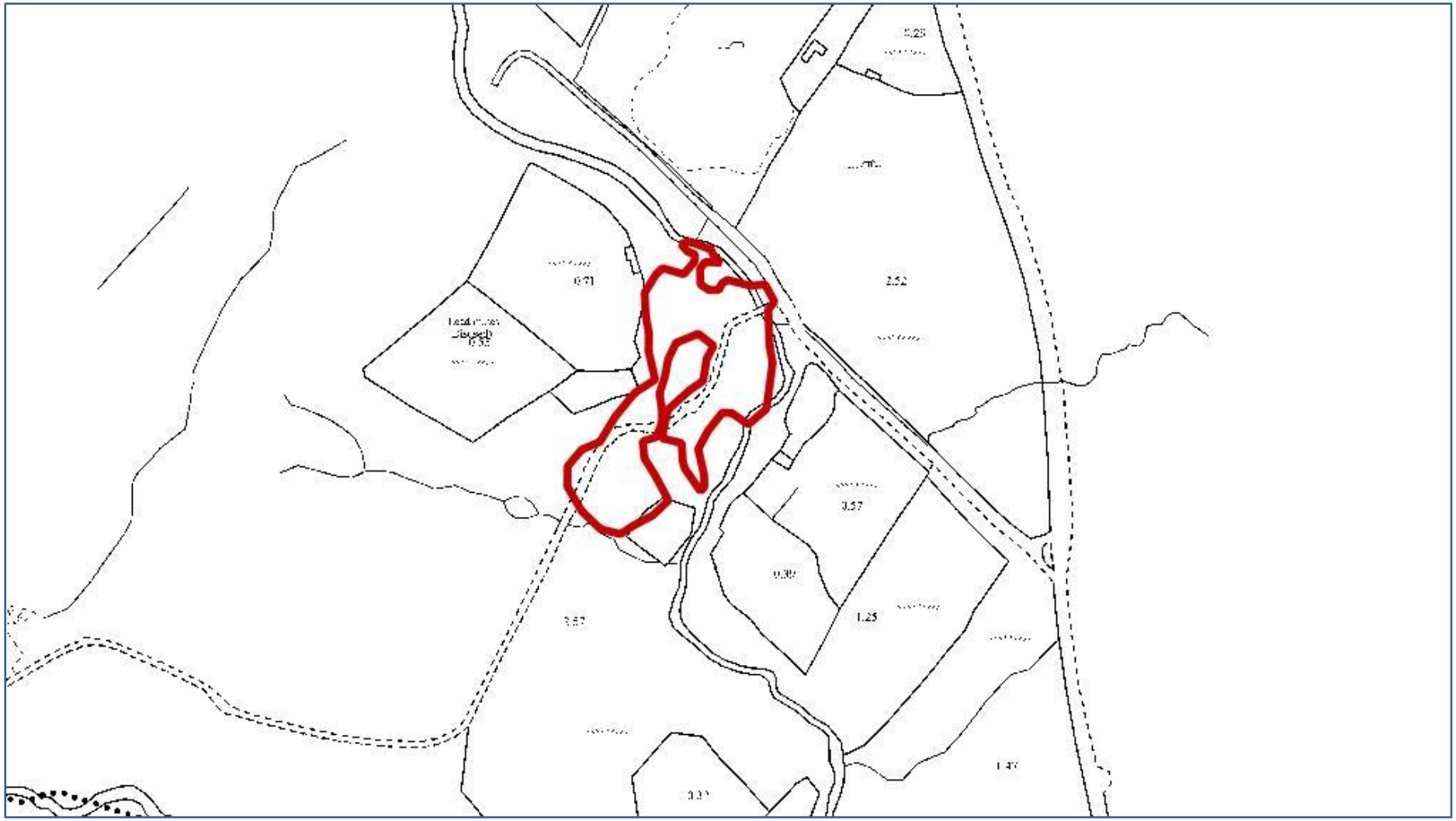

Figure 68 Ordnance Survey 1:5000 series map, showing the mine spoil area (red outline) at Brockagh. (Scale is 1:3,000). Ordnance Survey Ireland Licence No EN 0059216 © Ordnance Survey Ireland / Government of Ireland.

Site 12 East of Lough Nahanagan

Site Name	**OS Discovery map**	**Grid ref**	**County**
E. of L. Nahanagan	56	T09219888	Wicklow
Recorder	**Date**	**Conservation value**	
Rory Hodd	15/02/2016	Low	
Metallophyte species present 2008 None			
Metallophyte species confirmed 2018 None			
2018 site area (ha)	**2018 area 6130 (ha)**	**2008 area 6130 (ha)**	**Area change**
0.2	0.03	0.1	No change

Site description/changes since 2008
This site consists of a long ridge of spoil at the base of a slope, surrounded by gorse scrub and heath, and a small patch of spoil just above this on the hillside. There is a small ruin on the ridge of spoil, and a flooded adit at the base of the slope. The eastern end of the spoil ridge is mostly open and has steep, loose unvegetated sides. The western end of the ridge is more densely vegetated, consisting of heath interspersed with small patches of spoil. No changes are apparent since 2008.

Description of Calaminarian grassland habitat
Much of the open spoil at the eastern end of the ridge is unsuitable for the formation of Calaminarian grassland vegetation, as it is unstable and in constant motion. Calaminarian grassland has formed around the base of this ridge and in stable hollows on top of the ridge. Elsewhere, there are scattered patches of Calaminarian grassland wherever there is open spoil. The Calaminarian grassland vegetation is species-poor, with no rare metallophyte species present. *Weissia controversa* var. *controversa* is generally the dominant species, with other bryophytes scattered and inconsistent in occurrence. *Agrostis capillaris* is prominent in some areas of Calaminarian grassland.

Impact code (2013)	Description	Location	Influence (+, -, 0)	Intensity (H,M,L)	% habitat affected
A04.02.05	non-intensive mixed animal grazing	Inside	0	M	100
K01.01	erosion	Inside	-	M	70

Impact code (2018)	Description	Location	Influence (+, -, 0)	Intensity (H,M,L)	% habitat affected
A10	extensive grazing	Inside	0	M	100
L01	abiotic natural processes	Inside	-	M	70

Notes on management/impacting activities
Few impacts are apparent to this site; deer and sheep shelter in this area and there are signs of paths and dung, but no impact on Calaminarian grassland vegetation apparent.

Conservation measures needed
None

Condition of Calaminarian grassland	%	Area (ha)
In good condition	100	0.03
In not-good condition	0	0
Condition not known	0	0

Parameter	Criterion	Result		Assessment
Area	annual change in area	no decrease		Favourable
Structure and functions	No. of criteria passed	3		Favourable
	No. indicator spp.	2	Pass	
	Scrub encroachment	0%	Pass	
	Negative human impact	0%	Pass	
Future prospects				Favourable
Overall Assessment				Favourable

Overall assessment
This site is in favourable condition, as there are no detrimental impacts on it, and no change in area is likely to have happened. However, the extent of Calaminarian grassland is small and it is relatively species-poor, so is of low conservation value.

Habitats present on mine spoil resource	%
Calaminarian grassland	17
ED2 Bare spoil	59
GS3 Dry-humid acid grassland	4
HH1 Dry heath	20

Indicator metallophyte species present
Bryum cf. *pallescens*
Solenostoma gracillimum

Other species present on mine spoil resource
Agrostis capillaris
Bryum pallens
Calluna vulgaris
Campylopus introflexus
Cephalozia bicuspidata
Cerastium fontanum
Ceratodon purpureus
Cirsium palustre
Cladonia sp.
Diplophyllum albicans
Erica cinerea
Huperzia selago
Hylocomium splendens
Hypnum jutlandicum
Hypocaeris radicata
Lophozia bicrenata
Moninia caerulea
Nardus stricta

Pleurozium screberi
Polygala sepyllifolia
Polytrichum formosum
Polytrichum piliferum
Potentilla erecta
Racomitrium ericoides
Racomitrium lanuginosum
Rumex acetosa
Scapania gracilis
Scapania umbrosa
Ulex europaeus
Weissia controversa var. *controversa*

Photographs:

Figure 69 Overview of the ridge of spoil east of Lough Nahanagan, from small outlying area of spoil on slope above.

Figure 70 Spoil ridge east of Lough Nahanagan, with Calaminarian grassland vegetation, consisting of *Agrostis capillaris* and scattered mosses, on stabilised areas of spoil.

Figure 71 Band of Calaminarian grassland around the base of spoil ridge, dominated by *Weissia controversa* var. *controversa.*

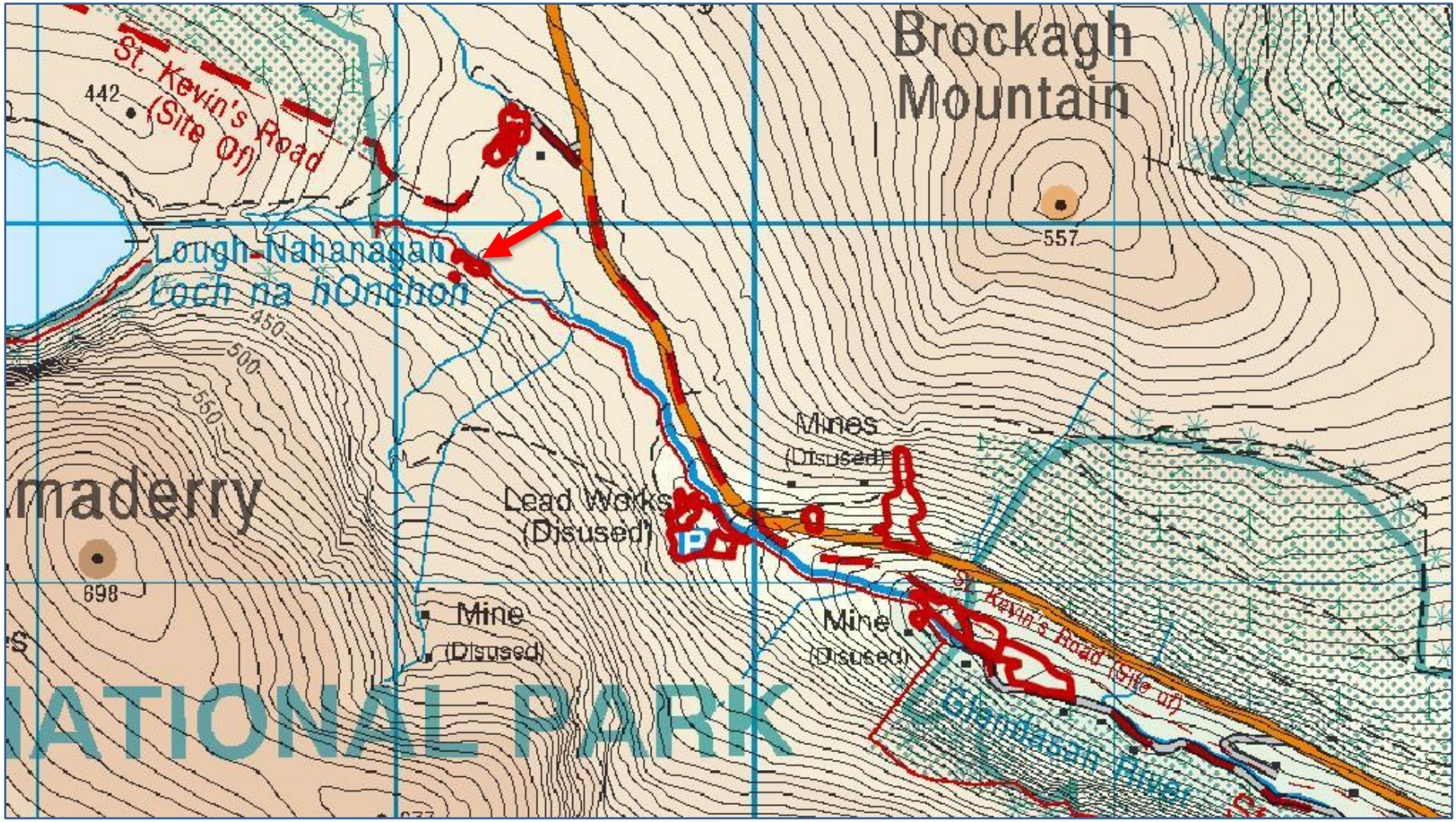

Figure 72 Ordnance Survey Discovery Series map, showing the location of the mine spoil surveyed (red outline) in the Glendasan Valley, the area of spoil East of Lough Nahanagan is indicated by red arrow. (Scale is 1:15,000). Ordnance Survey Ireland Licence No EN 0059216 © Ordnance Survey Ireland / Government of Ireland.

Figure 73 Ordnance Survey 2005 aerial imagery, showing the mine spoil area (red outline) East of Lough Nahanagan. (Scale is 1:3,000). Ordnance Survey Ireland Licence No EN 0059216 © Ordnance Survey Ireland / Government of Ireland.

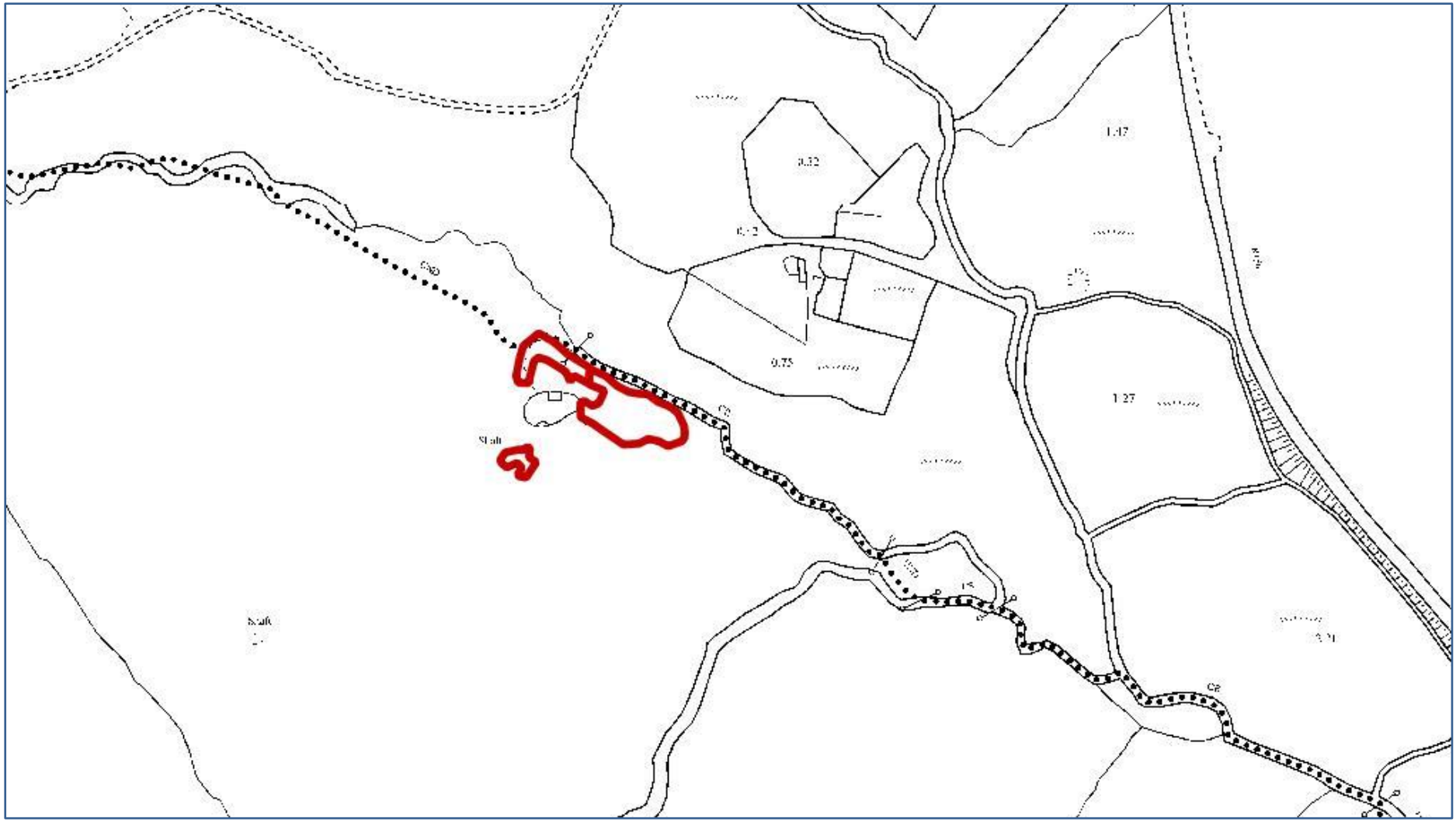

Figure 74 Ordnance Survey 1:5000 series map, showing the mine spoil area (red outline) East of Lough Nahanagan. (Scale is 1:3,000). Ordnance Survey Ireland Licence No EN 0059216 © Ordnance Survey Ireland / Government of Ireland.

Site 13 Bunmahon

Site Name	**OS Discovery map**	**Grid ref**	**County**
Bunmahon	82	X444986	Waterford
Recorder	**Date**	**Conservation value**	
Nick Hodgetts	14/02/2018	High	
Metallophyte species present 2008 *Cephaloziella massalongi, Pohlia andalusica*			
Metallophyte species confirmed 2018 *Cephaloziella massalongi, Pohlia andalusica*			
2018 site area (ha)	**2018 area 6130 (ha)**	**2008 area 6130 (ha)**	**Area change**
0.31	0.06	0.02	Minor decrease

Site description/changes since 2008

The vegetation on the clifftop is composed of a mosaic of a thick grass sward, maritime heath and small patches of Calaminarian grassland. Steep to vertical vegetation on the cliff face is composed of maritime vascular plants with patches of colonist vegetation on recently eroded areas. The hollows with *C. massalongi* are still present and in good condition. There has been little obvious change since 2008, but some areas have become overrun by thick grasses and have collapsed into a gully because of erosion. There are many fences on the site, presumably erected since 2008, cordoning off mineshafts and other unsafe areas, so that not all areas are accessible.

Description of Calaminarian grassland habitat

Calaminarian grassland occurs in patches in the clifftop grassland, each patch surrounded by coarse thick grassland or heath vegetation. *Cephaloziella* spp. are abundant, but all the material examined on the clifftop was either *C. stellulifera* or *C. divaricata* (or unidentifiable to species), with no *C. massalongi* seen. Small stands of *Pohlia andalusica*, each just a few cm across, occur in one of these patches. Common associates include *Armeria maritima, Ceratodon purpureus, Diplophyllum albicans, Solenostoma gracillimum* and *Scapania compacta*. Many areas were colonised with algae, encrusting the bryophytes. *C. massalongi* was seen only in the small hollowed out 'caves' in the cliff face, where it was locally abundant, but this can scarcely be termed Calaminarian grassland. A mossy bank low down on the sea cliff (X44359861) supported *Cephaloziella* sp. (probably *C. divaricata*), *Tortella flavovirens* and *Trichostomum brachydontium*. There has probably been a slight decrease in area because of the encroachment of coarse vegetation.

Impact code (2013)	Description	Location	Influence (+, -, 0)	Intensity (H,M,L)	% habitat affected
A04.03	lack of grazing	Inside	-	H	70
E03.01	disposal of household waste	Inside	-	L	2
G01.02	walking, horseriding and non-motorised vehicles	Inside	-	L	50
H04	air pollution	Outside	-	M	60
K01.01	erosion	Inside	-	M	100
K02.01	succession	Inside	-	H	50

Impact code (2018)	Description	Location	Influence (+, -, 0)	Intensity (H,M,L)	% habitat affected
A06	abandonment of grassland management	Inside	-	H	70
F07	sports, tourism and leisure activities	Inside	-	L	50
F09	deposition of waste	Inside	-	L	2
J03	air pollution	Outside	-	M	60
L01	abiotic natural processes	Inside	-	M	100
L02	natural succession	Inside	-	H	50

Notes on management/impacting activities
The main management issue is the lack of grazing resulting in the spread of coarse grassland. Erosion of the cliffs is also an issue, and will eventually affect the whole site. Leisure use is a minor pressure, its main manifestation being small tracks and dog excrement on the clifftop, which could affect small areas of Calaminarian grassland. Tipping is also a minor threat. Mechanical vegetation clearance might be quite dangerous on the unstable clifftop.

Conservation measures needed
Scraping the thick grass and some topsoil away would probably be beneficial. Introduction of sheep grazing may be an option, but the sward is so thick that it may have to be approached mechanically first.

Conservation measure code	Description
CA04	Reinstate appropriate agricultural practices to address abandonment, including mowing, grazing or equivalent measures
CL01	Management of habitats (others than agriculture and forest) to slow, stop or reverse natural processes

Condition of Calaminarian grassland	%	Area (ha)
In good condition	67	0.04
In not-good condition	33	0.02
Condition not known	0	0

Parameter	Criterion	Result		Assessment
Area	annual change in area	Minor decrease		Favourable
Structure and functions	No. of criteria passed	2		Unfavourable-inadequate
	No. indicator spp.	5	Pass	
	Scrub encroachment	0%	Pass	
	Negative human impact	33%	Fail	
Future prospects				Unfavourable-inadequate
Overall Assessment				Unfavourable-inadequate

Overall assessment
This site is still in reasonable condition, with both of the key metallophyte bryophytes still present, but it is deteriorating because of coarse vegetation taking over. It is probably also getting smaller as the cliff erodes, while the landward side of the site remains the same. Some remedial management to expose

more Calaminarian grassland (or potential Calaminarian grassland) is desirable. The stands of *C. massalongi* in the hollows on the vertical cliff face below appear to be secure and in good condition at present.

Habitats present on mine spoil resource	**%**
Calaminarian grassland	20
CS1 Rocky sea cliffs	10
ED2 Spoil and bare ground	5
GS3 Dry-humid acid grassland	50
HH1 Dry siliceous heath	15

Indicator metallophyte species present
Cephaloziella massalongi
Pohlia andalusica
Cephaloziella stellulifera
Scapania compacta
Solenostoma gracillimum

Other species present on mine spoil resource
Agrostis sp.
Armeria maritima
Bellis perennis
Cephaloziella divaricata
Ceratodon purpureus
Didymodon sp.
Diplophyllum albicans
Festuca rubra
Hypochaeris radicata
Plantago coronopus
Pohlia annotina
Pohlia nutans
Sedum anglicum
Silene uniflora
Tortella flavovirens
Trichostomum brachydontium
Ulex europaeus
Weissia sp.

Metallophyte species	**Grid ref**	**Extent**	**Notes**
Cephaloziella massalongi	X4436798595	2x2m	Abundant, covering back of 'cave'. Adit in cliff above beach
Cephaloziella massalongi	X4436398607	2x2m	Locally abundant in small 'cave' in cliff
Pohlia andalusica	X4441398620	10x10cm	Several small stands in close proximity. More or less David Holyoak's Q28

Photographs:

Figure 75 General view of spoil area at Bunmahon, with gorse and coarse grass encroaching on Calaminarian grassland.

Figure 76 Calaminarian grassland at Bunmahon, with *Cephaloziella stellulifera* prominent.

Figure 77 Cave in cliff at Bunmahon, in which *Cephaloziella massalongi* grows.

Figure 78 Coarse grassland colonising on clifftop at Bunmahon.

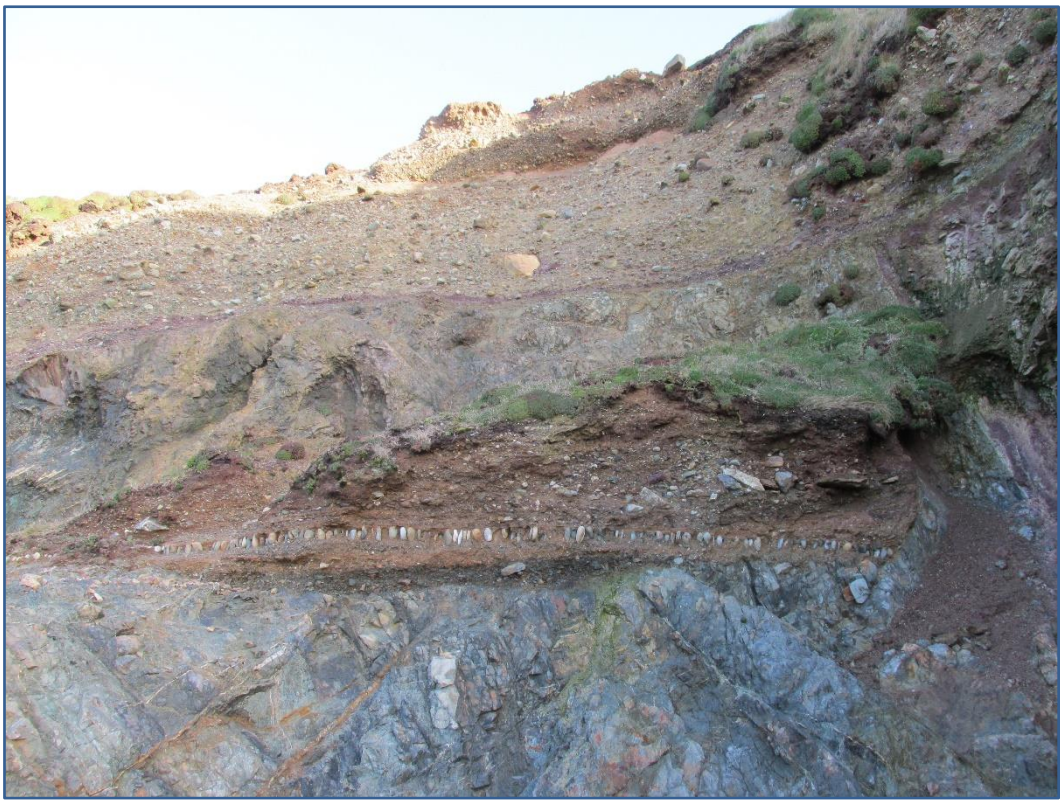

Figure 79 Eroding cliff, close to location of *Cephaloziella massalongi*.

Figure 80 Patch of *Pohlia andalusica* in Calaminarian grassland on cliff top at Bunmahon.

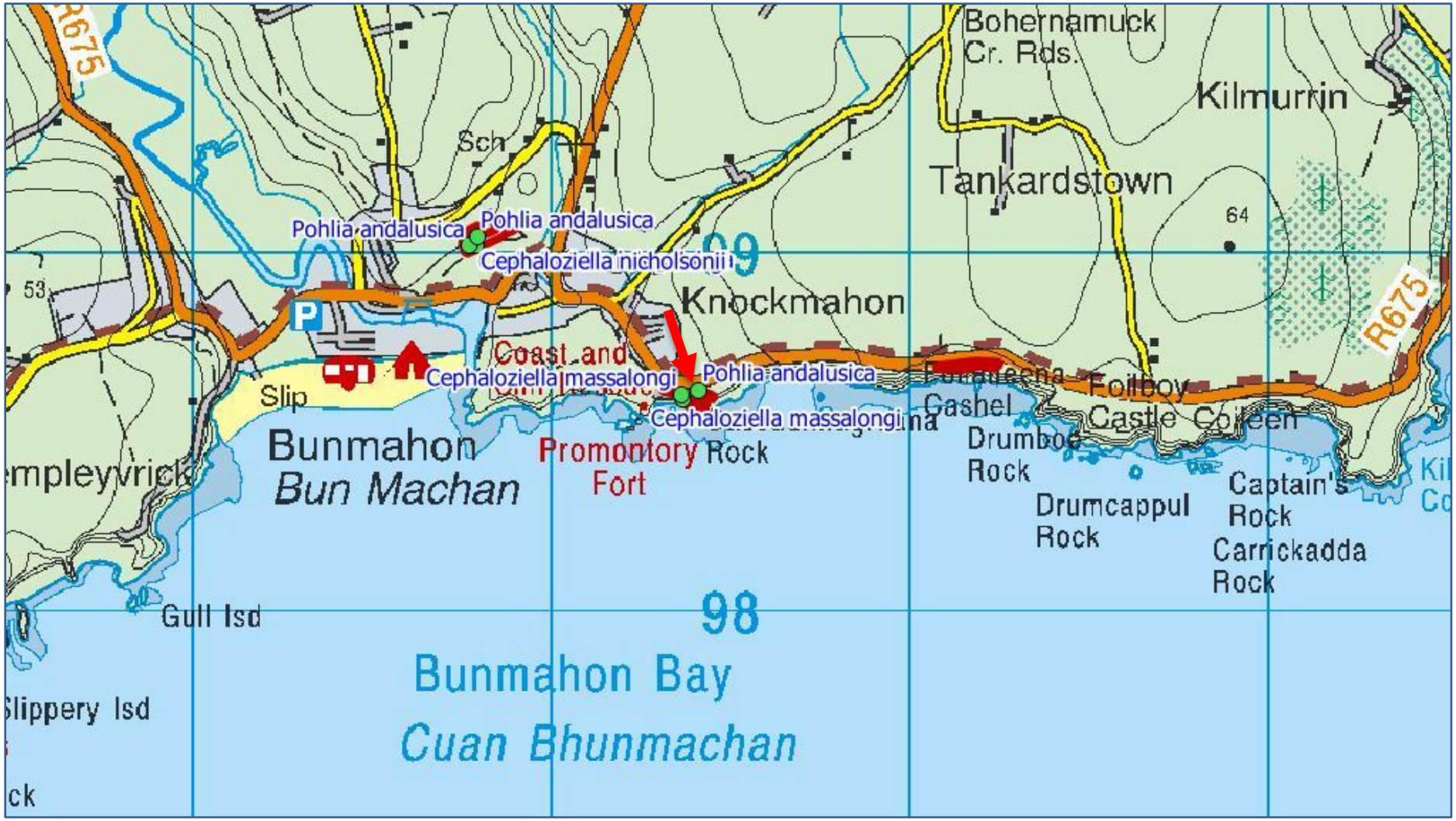

Figure 81 Ordnance Survey Discovery Series map, showing the location of the mine spoil (red outline) and rare species (green dots) along the Copper Coast, Bunmahon mine is indicated by red arrow. (Scale is 1:15,000). Ordnance Survey Ireland Licence No EN 0059216 © Ordnance Survey Ireland / Government of Ireland.

Figure 82 Ordnance Survey 2005 aerial imagery, showing the mine spoil area (red outline) and rare species (green dots) at Bunmahon. (Scale is 1:3,000). Ordnance Survey Ireland Licence No EN 0059216 © Ordnance Survey Ireland / Government of Ireland.

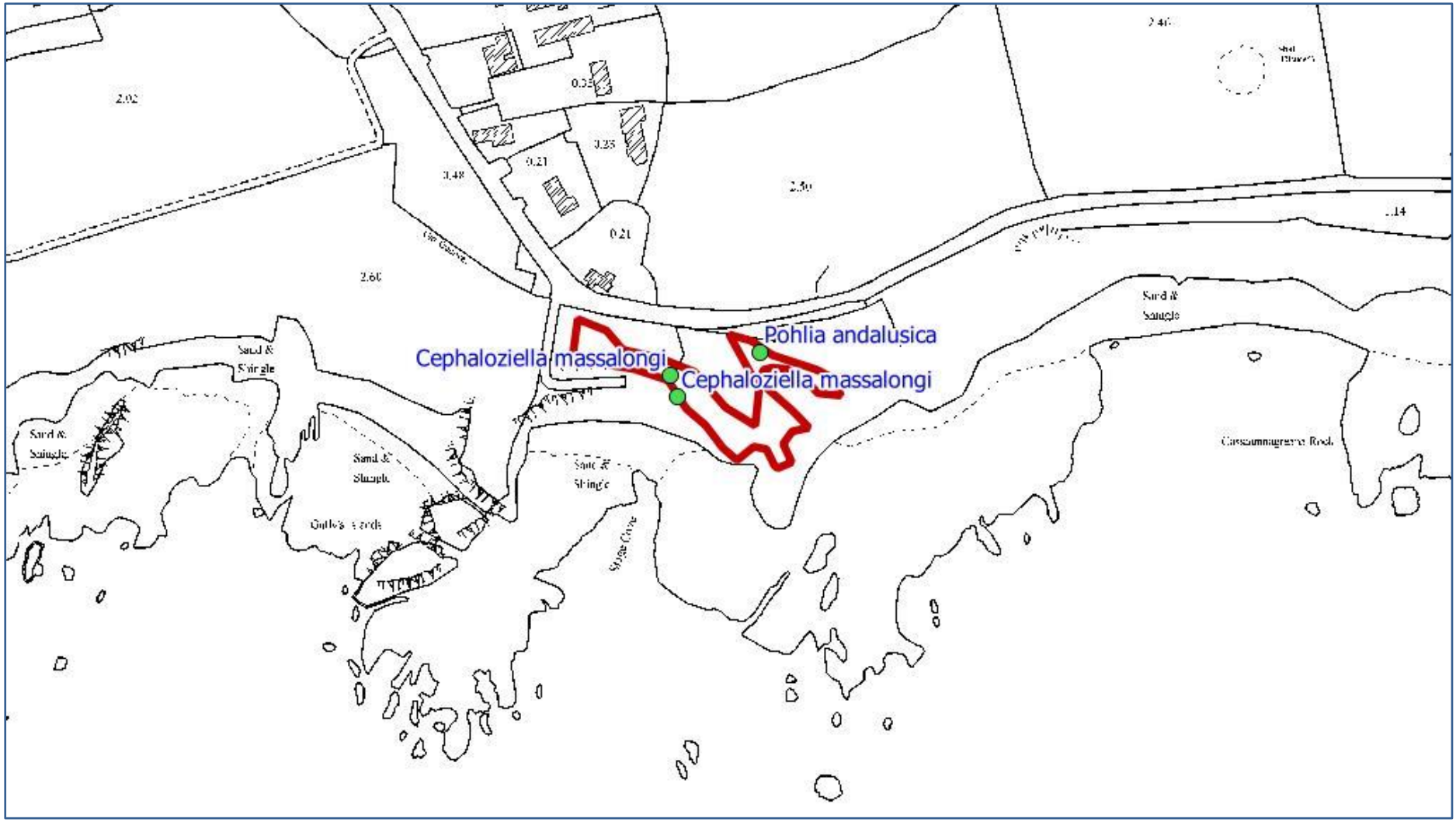

Figure 83 Ordnance Survey 1:5000 series map, showing the mine spoil area (red outline) and rare species (green dots) at Bunmahon. (Scale is 1:3,000). Ordnance Survey Ireland Licence No EN 0059216 © Ordnance Survey Ireland / Government of Ireland.

Site 14 Tankardstown

Site Name	**OS Discovery map**	**Grid ref**	**County**
Tankardstown	82	X451986	Waterford
Recorder	**Date**	**Conservation value**	
Nick Hodgetts	14/02/2018	Low	
Metallophyte species present 2008 None			
Metallophyte species confirmed 2018 None			

2018 site area (ha)	**2018 area 6130 (ha)**	**2008 area 6130 (ha)**	**Area change**
0.32	0.006	0.006	Major decrease

Site description/changes since 2008

This is an old copper mine. The main mine buildings, on the landward side of the road, have been restored and this land contains no Calaminarian grassland. Tiny fragments exist on the seaward side of the road. However, the thick grass (*Festuca*) has continued to advance and now forms a thick blanket over most of the clifftop, leaving only a few very small patches of Calaminarian grassland plus fragments of ruderal vegetation. The area estimate of Calaminarian grassland above is probably generous.

Description of Calaminarian grassland habitat

There is one small surviving patch at the location of David Holyoak's quadrat Q32, plus a few more patches at the cliff edge, although most of these may be better regarded as ruderal vegetation rather than true Calaminarian grassland. *Cephaloziella stellulifera* is present in small quantity (at X4511898683), and *C. divaricata* is probably also present (but not fertile), with heath vegetation including *Erica tetralix* and *Frullania tamarisci*. In the long term, natural erosion of the cliff will further diminish the resource.

Impact code (2013)	**Description**	**Location**	**Influence (+, -, 0)**	**Intensity (H,M,L)**	**% habitat affected**
A04.03	lack of grazing	Inside	-	H	100
K01.01	erosion	Inside	-	M	100
K02.01	succession	Inside	-	H	75

Impact code (2018)	**Description**	**Location**	**Influence (+, -, 0)**	**Intensity (H,M,L)**	**% habitat affected**
A06	abandonment of grassland management	Inside	-	H	100
L01	abiotic natural processes	Inside	-	M	100
L02	natural succession	Inside	-	H	75

Notes on management/impacting activities

At present, management of the site on the seaward side of the road is minimal or non-existent. The absence of any grazing has resulted in a build-up of a thick layer of grass over most of the area. Any conservation action to address the problem of the thick grass sward would have to be done very carefully on this exposed and unstable clifftop.

Conservation measures needed
Scraping the thick grass and some topsoil away would probably be beneficial. Introduction of sheep grazing may be an option, but the sward is so thick that it may have to be approached mechanically first.

Conservation measure code	Description
CA04	Reinstate appropriate agricultural practices to address abandonment, including mowing, grazing or equivalent measures
CL01	Management of habitats (others than agriculture and forest) to slow, stop or reverse natural processes

Condition of Calaminarian grassland	%	Area (ha)
In good condition	30	0.002
In not-good condition	70	0.004
Condition not known	0	0

Parameter	Criterion	Result		Assessment
Area	annual change in area	Major decrease		Unfavourable-bad
Structure and functions	No. of criteria passed	2		Unfavourable-inadequate
	No. indicator spp.	1	Pass	
	Scrub encroachment	0%	Pass	
	Negative human impact	66%	Fail	
Future prospects				Unfavourable-bad
Overall Assessment				Unfavourable-bad

Overall assessment
C. stellulifera is still present in small quantity in a very small patch of Calaminarian grassland, but the site is likely to lose all its Calaminarian grassland within a few more years without remedial action.

Habitats present on ine spoil resource	%
Calaminarian grassland	2
ED2 Spoil and bare ground	3
GS3 Dry-humid acid grassland	80
HH1 Dry siliceous heath	15

Indicator metallophyte species present
Cephaloziella stellulifera

Other species present on mine spoil resource
Agrostis sp.
Armeria maritima
Barbula unguiculata
Bellis perennis
Campylopus sp.
Cephaloziella sp. (probably *C. divaricata*)
Ceratodon purpureus
Cladonia rangiformis
Cladonia spp.
Cladonia portentosa

Erica tetralix
Festuca rubra
Frullania tamarisci
Hypnum jutlandicum
Hypnum cupressiforme var. *lacunosum*
Hypochaeris radicata
Silene uniflora
Thymus polytrichus
Trichostomum brachydontium

Photographs:

Figure 84 General view of spoil area at Tankardtown, with small areas of Calaminarian grassland amongst encroaching coarse grass.

Figure 85 Calaminarian grassland at Tankardstown, with *Cephaloziella stellulifera* present.

Figure 86 Close-up of Calaminarian grassland, with *Cephaloziella stellulifera* dominant.

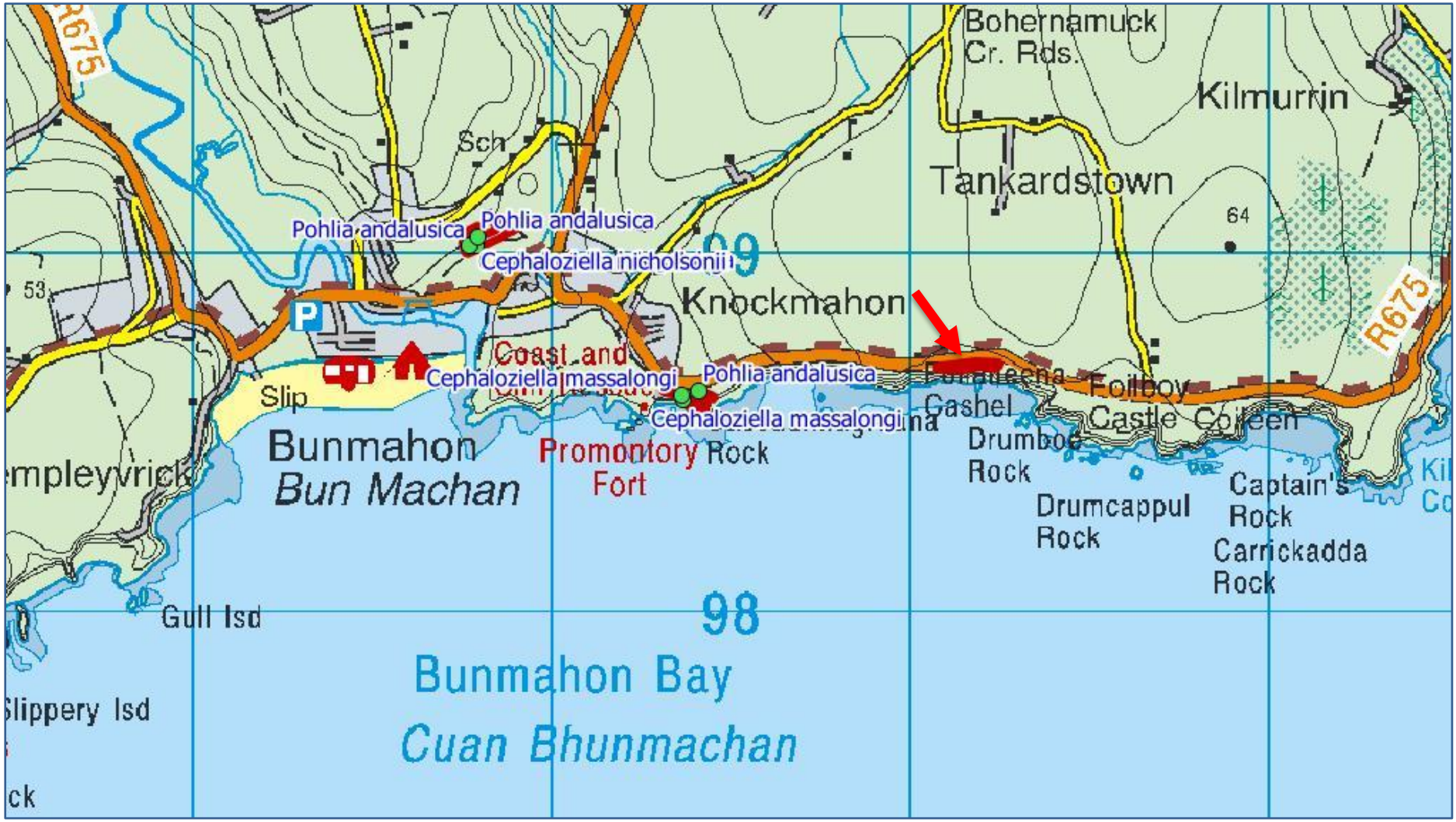

Figure 87 Ordnance Survey Discovery Series map, showing the location of the mine spoil (red outline) and rare species (green dots) along the Copper Coast, Tankardstown mine is indicated by red arrow. (Scale is 1:15,000). Ordnance Survey Ireland Licence No EN 0059216 © Ordnance Survey Ireland / Government of Ireland.

Figure 88 Ordnance Survey 2005 aerial imagery, showing the mine spoil area (red outline) at Tankardstown. (Scale is 1:3,000). Ordnance Survey Ireland Licence No EN 0059216 © Ordnance Survey Ireland / Government of Ireland.

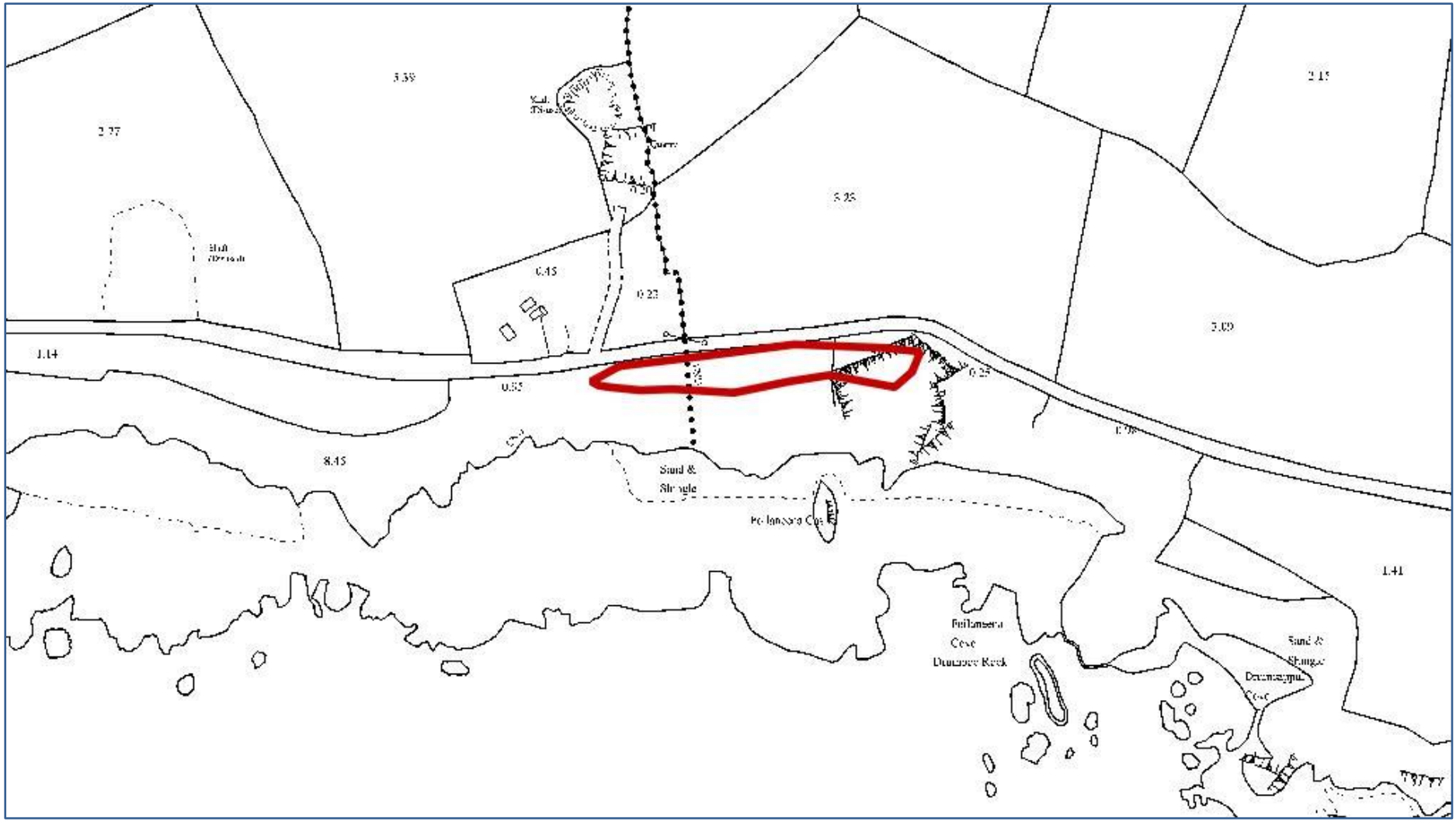

Figure 89 Ordnance Survey 1:5000 series map, showing the mine spoil area (red outline) at Tankardstown. (Scale is 1:3,000). Ordnance Survey Ireland Licence No EN 0059216 © Ordnance Survey Ireland / Government of Ireland.

Site 15 Knockmahon Village

Site Name	**OS Discovery map**	**Grid ref**	**County**
Knockmahon Village	82	X438990	Waterford
Recorder	**Date**	**Conservation value**	
Nick Hodgetts	15/02/2018	High	
Metallophyte species present 2008 *Cephaloziella integerrima, Cephaloziella nicholsonii, Pohlia andalusica*			
Metallophyte species confirmed 2018 *Cephaloziella integerrima, Cephaloziella massalongi, Cephaloziella nicholsonii, Pohlia andalusica*			
2018 site area (ha)	**2018 area 6130 (ha)**	**2008 area 6130 (ha)**	**Area change**
0.62	0.28	0.28	Decrease

Site description/changes since 2008

This site, an area of copper mine spoil, still exists, but gorse has continued to encroach, and there is more eutrophication percolating through the site from uphill where there are a number of residential properties. The eutrophication is particularly evident in the central drainage channel running through the site, but it is also spreading out onto wet flat surfaces, leading to a widespread algal film. Hummocks, raised up from eutrophicated ground, are in better condition. There is some evidence of cattle disturbance, in spite of several ineffective and slack electric fences.

Description of Calaminarian grassland habitat

Calaminarian grassland is still supported on this site, but it has deteriorated; some has been taken over by gorse, and a film of algae covers much of the site. The original locations for *Cephaloziella nicholsonii*, at the side of the central channel, are now heavily eutrophicated and no longer suitable. *Cephaloziella integerrima, C. nicholsonii* and *Pohlia andalusica* were all refound, and in addition *C. massalongi* was found, in a mixed stand with *C. divaricata*. Both *C. integerrima* and *C. nicholsonii* were in very small amounts. *P. andalusica* was seen in two places, being very locally frequent at one of them.

Impact code (2013)	Description	Location	Influence (+, -, 0)	Intensity (H,M,L)	% habitat affected
A04.03	lack of grazing	Inside	-	H	100
E03.01	disposal of household waste	Inside	-	M	10
H01.04	pollution to surface waters via urban run-off	Outside	-	H	60
K02.01	succession	Inside	-	H	15

Impact code (2018)	Description	Location	Influence (+, -, 0)	Intensity (H,M,L)	% habitat affected
A06	abandonment of grassland management	Inside	-	H	100
F09	deposition of waste	Inside	-	M	10
F11	pollution to surface or ground water due to urban run-offs	Outside	-	H	60
L02	natural succession	Inside	-	H	15

Notes on management/impacting activities

Rabbits are present on site, possibly ameliorating the effects of abandonment. Cattle also come onto the site occasionally, over some ineffective electric fencing. There are some relatively new houses above the site (presumably the source of the eutrophicated water), and a bungalow being restored next to the site; any further building/residential activity is likely to increase the pressure on this site. There is a very nice 'Copper Coast' geological display by the road nearby; it would be good to do something similarly constructive for the metallophyte plants.

Conservation measures needed

The most pressing needs are to restrict the encroachment of gorse and to address the pollution from eutrophicated water coming down from uphill. This water not only affects the central channel, but spreads over the whole site, except on hummocks, leading to an increase in coarse vascular plant vegetation and, perhaps even more damagingly, to a virtually ubiquitous film of algae. Dumping also needs to be discouraged. It is recommended that, rather the site being left as a local eyesore, it is carefully developed as a point of botanical interest for visitors, in a similar fashion to the way in which the geology has been highlighted in the nearby 'geology trail'.

Conservation measure code	Description
CA04	Reinstate appropriate agricultural practices to address abandonment, including mowing, grazing or equivalent measures
CF04	Reduce/eliminate point pollution to surface or ground waters from residential areas and activities
CL01	Management of habitats (others than agriculture and forest) to slow, stop or reverse natural processes

Condition of Calaminarian grassland	%	Area (ha)
In good condition	50	0.14
In not-good condition	50	0.14
Condition not known	0	0

Parameter	Criterion	Result		Assessment
Area	annual change in area	decrease		Unfavourable-inadequate
Structure and functions	No. of criteria passed	2		Unfavourable-inadequate
	No. indicator spp.	7	Pass	
	Scrub encroachment	15%	Pass	
	Negative human impact	50%	Fail	
Future prospects				Unfavourable-inadequate
Overall Assessment				Unfavourable-inadequate

Overall assessment

This is still an important site, with four metallophyte species (but in very small quantities) and relatively extensive Calaminarian grassland, but it is deteriorating rapidly owing to eutrophication/pollution and the spread of gorse and other coarse vascular vegetation. Good stands of Calaminarian grassland persist on hummocks, but much of the flat or lower ground is now covered with a layer of algae that is ousting the bryophytes. The overall assessment must therefore be Unfavourable-inadequate.

Habitats present on mine spoil resource	%
Calaminarian grassland	45
ED2 Spoil and bare ground	20
FW4 Drainage ditches	2
GS3 Dry-humid acid grassland	5
GS4 Wet grassland	5
WS1 Scrub	23

Indicator metallophyte species present
Cephaloziella integerrima
Cephaloziella massalongi
Cephaloziella nicholsonii
Pohlia andalusica
Bryum cf. *pallescens*
Cephaloziella stellulifera
Solenostoma gracillimum

Other species present on mine spoil resource
Agrostis sp.
Anomobryum julaceum
Armeria maritima
Bryum dichotomum
Calliergonella cuspidata
Carex sp.
Cephaloziella divaricata
Ceratodon purpureus
Cratoneuron filicinum
Dichodontium pellucidum
Dicranella varia
Didymodon insulanus
Didymodon tophaceus
Hypochaeris radicata
Jungermannia atrovirens
Nardia scalaris
Plantago maritima
Pohlia annotina
Rhytidiadelphus squarrosus
Rubus fruticosus agg.
Silene uniflora
Trifolium repens
Ulex europaeus

Metallophyte species	Grid ref	Extent	Notes
Cephaloziella integerrima	X4378999028	Unknown	Difficult to estimate extent, but scattered fragments over a few m²
Cephaloziella massalongi	X4378499024	Unknown	Difficult to estimate extent, as intimately mixed with *C. divaricata*
Cephaloziella nicholsonii	X4379399024	1x1cm	Tiny fragments among other bryophytes and algae
Pohlia andalusica	X4377399026	5x5cm	Just surviving here with *Bryum dichotomum*, under a film of algae
Pohlia andalusica	X4379599047	30x20cm	David Holyoak's Q33; discontinuous patches

Photographs:

Figure 90 General view of spoil area at Knockmahon Village, with relatively extensive open areas of spoil.

Figure 91 Calaminarian grassland vegetation at Knockmahon Village.

Figure 92 Gorse scrub closing in on Calaminarian grassland at Knockmahon Village.

Figure 93 Eutrophied ditch running through site and impacting quality of Calaminarian grassland vegetation.

Figure 94 Strong patch of *Pohlia andalusica* in Calaminarian grassland at Knockmahon Village.

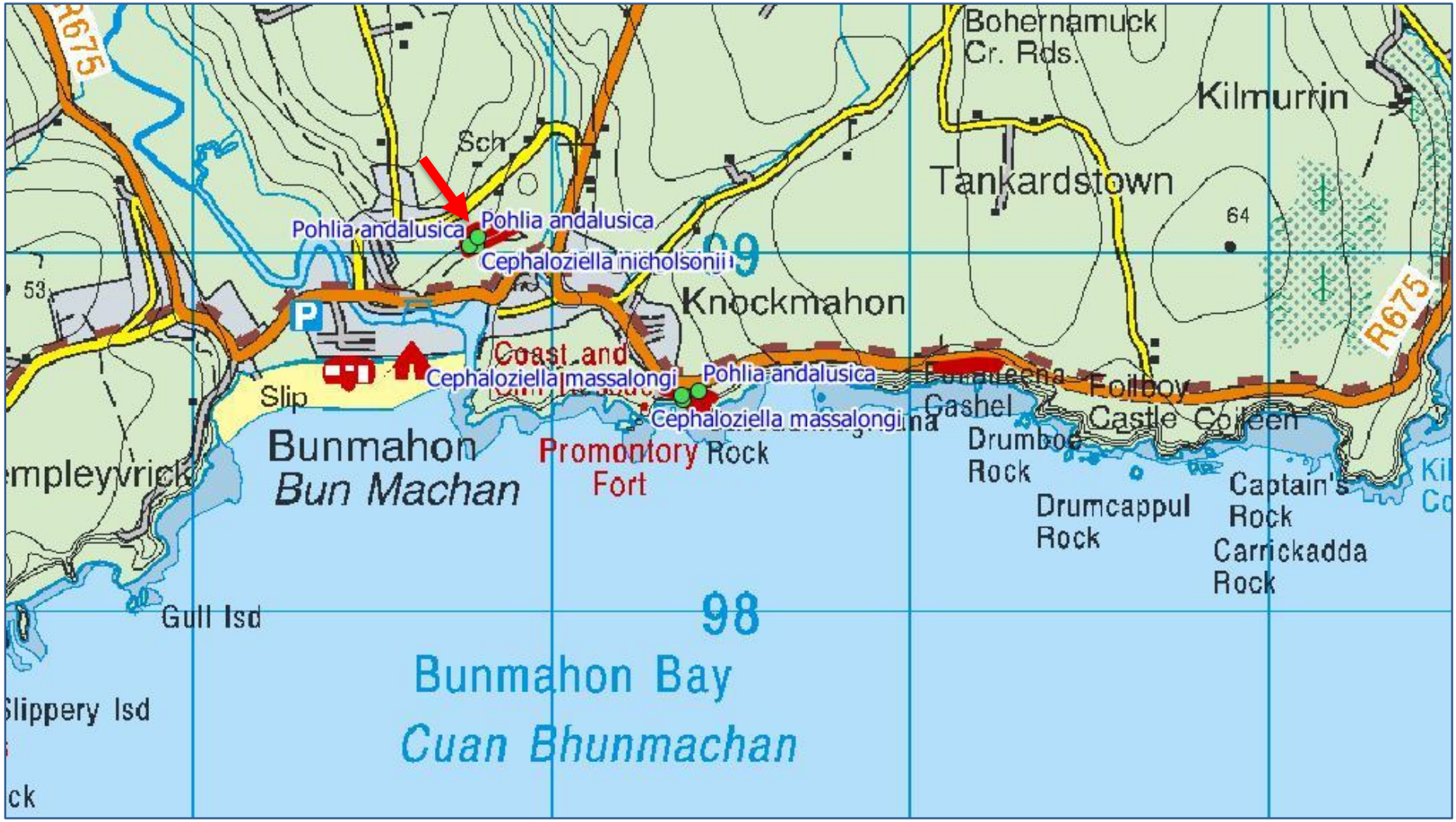

Figure 95 Ordnance Survey Discovery Series map, showing the location of the mine spoil (red outline) and rare species (green dots) along the Copper Coast, Knockmahon Village is indicated by red arrow. (Scale is 1:15,000). Ordnance Survey Ireland Licence No EN 0059216 © Ordnance Survey Ireland / Government of Ireland.

Figure 96 Ordnance Survey 2005 aerial imagery, showing the mine spoil area (red outline) and rare species (green dots) at Knockmahon Village. (Scale is 1:3,000). Ordnance Survey Ireland Licence No EN 0059216 © Ordnance Survey Ireland / Government of Ireland.

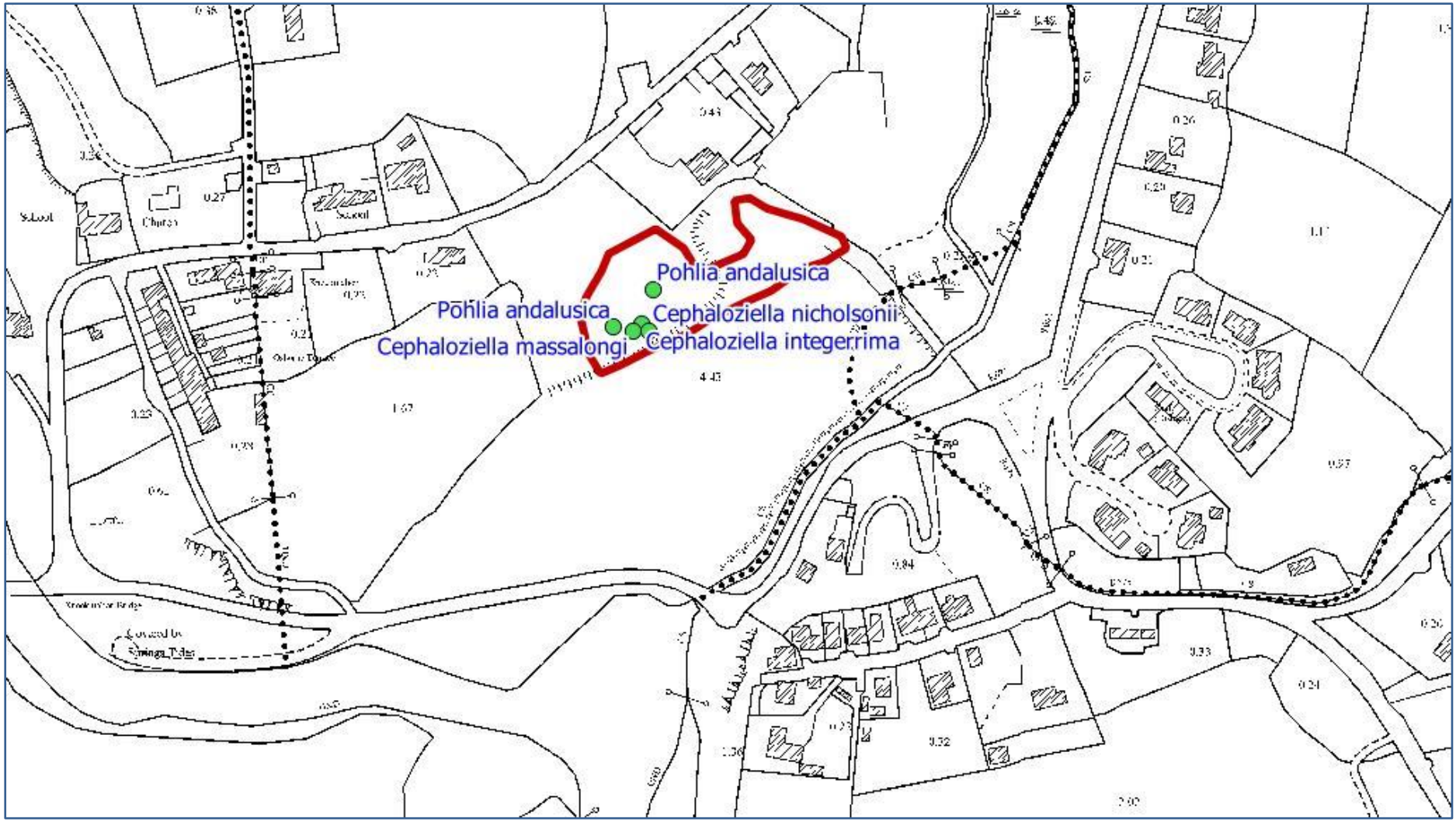

Figure 97 Ordnance Survey 1:5000 series map, showing the mine spoil area (red outline) and rare species (green dots) at Knockmahon Village. (Scale is 1:3,000). Ordnance Survey Ireland Licence No EN 0059216 © Ordnance Survey Ireland / Government of Ireland.

Site 18 Muckross Lake

Site Name	**OS Discovery map**	**Grid ref**	**County**
Muckross Lake	78	V94878594	Kerry
Recorder	**Date**	**Conservation value**	
Rory Hodd	07/03/2018	Moderate	
Metallophyte species present 2008 *Cephaloziella massalongi*			
Metallophyte species confirmed 2018 None			
2018 site area (ha)	**2018 area 6130 (ha)**	**2008 area 6130 (ha)**	**Area change**
0.04	0.027	0.16	Moderate decrease likely

Site description/changes since 2008

This site consists of a small area of open spoil at the top of low cliff by the edge of Muckross Lake, with two old shafts and other excavations at the back of spoil area, surrounded by mature woodland. The western end of the spoil area is mostly covered by gorse scrub and a few young trees, with patches of open spoil in between. There are very small areas of spoil, with tiny areas of Calaminarian grassland, around another shaft to the east of this area, but it was not included within the site, as it does not cover a significant area. An increase in scrub cover on the mine spoil has possibly occurred since the 2008 report.

Description of Calaminarian grassland habitat

There is Calaminarian grassland vegetation throughout the open spoil area, in good condition, with abundant, often fertile, mats of *Cephaloziella stellulifera* and frequent plants of *Silene uniflora*. Some areas of spoil are covered by *Cladonia ciliata.* There are extensive healthy mats that were identified previously as *Cephaloziella massalongi* covering the shaded north-facing rock exposures of the old shafts, but fertile material collected from here in 2018 was identified as *C. stellulifera*.

Impact code (2013)	Description	Location	Influence (+, -, 0)	Intensity (H,M,L)	% habitat affected
E03.01	disposal of household waste	Inside	-	M	5
G01.02	walking, horseriding and non-motorised vehicles	Inside	0	L	30
K01.01	erosion	Inside	-	M	20
K02.01	succession	Inside	-	H	20

Impact code (2018)	Description	Location	Influence (+, -, 0)	Intensity (H,M,L)	% habitat affected
F07	sports, tourism and leisure activities	Inside	0	L	30
F09	deposition of waste	Inside	-	M	5
L01	abiotic natural processes	Inside	-	M	20
L02	natural succession	Inside	-	H	20

Notes on management/impacting activities
The main threat to the Calaminarian grassland vegetation at this site is encroachment of gorse scrub, which is closing in at the western end of the site, while the rest of the site is still mostly open. Erosion of spoil at the cliff top is ongoing, but does not seem to be impacting the overall quality of the Calaminarian grassland habitat. Dumping of bits of metal has occurred in one of the shafts. There is a small path running down from the nearby track, but the impact is minor.

Conservation measures needed
The scrub which is encroaching on to the spoil should be cleared, which would not be a difficult task considering the small size of the site. However, it is important not to clear any of the surrounding woodland, as it is providing important shade for mats of *Cephaloziella*. Rubbish should be removed from the shaft.

Conservation measure code	Description
CL01	Management of habitats (others than agriculture and forest) to slow, stop or reverse natural processes

Condition of Calaminarian grassland	%	Area (ha)
In good condition	80	0.022
In not-good condition	20	0.005
Condition not known	0	0

Parameter	Criterion	Result		Assessment
Area	Annual change in area	Moderate decrease		Unfavourable-inadequate
Structure and functions	No. of criteria passed	2		Unfavourable-inadequate
	No. indicator spp.	2	Pass	
	Scrub encroachment	20%	Fail	
	Negative human impact	5%	Pass	
Future prospects				Unfavourable-inadequate
Overall Assessment				Unfavourable-inadequate

Overall assessment
The status of this site is assessed as Unfavourable-inadequate, due to encroachment of gorse scrub. This encroachment is likely to continue, although the barest area of the spoil is unlikely to be lost in the near future. If measures were put in place to control the scrub, the status of the site would become favourable. This site is of moderate conservation importance, as it possibly contains a population of *Cephaloziella massalongi* and well-developed Calaminarian grassland vegetation, albeit over a small area and relatively species-poor.

Habitats present on mine spoil resource	%
Calaminarian grassland	62
ED2 Bare Spoil	5
ER2 Exposed calcareous rock	3
ER4 Calcareous loose rock	10
WS1 Scrub	20

Indicator metallophyte species present
Cephaloziella stellulifera
Silene uniflora

Other species present on mine spoil resource
Agrostis capillaris
Betula pubescens
Bryum capillare
Campyliadelphus chrysophyllus
Cladonia ciliata
Dicranella varia
Festuca rubra
Funaria hygrometrica
Gymnostomum aeruginosum
Hedera hibernica
Pinus sylvestris (seedling)
Pteridium aquilinum
Rosa spinosissima
Rubia peregrina
Rubus fruticosus
Rumex acetosa
Succissa pratensis
Taxus baccata
Teucrium scorodonia
Ulex europaeus
Weissia controversa var. *controversa*

Photographs:

Figure 98 Calaminarian grassland by the shore of Muckross Lake, with *Silene uniflora, Cephaloziella stellulifera* and *Agrostis capillaris*.

Figure 99 Dense mats of *Cephaloziella* on the shady bank of an old shaft, material from which was identified as *Cephaloziella stellulifera*. Material from this location was previously identified as *C. massalongi.*

Figure 100 Scrub and young trees encroaching onto Calaminarian grassland beside Muckross Lake.

Figure 101 Old bits of metal dumped into mine shaft at Muckross.

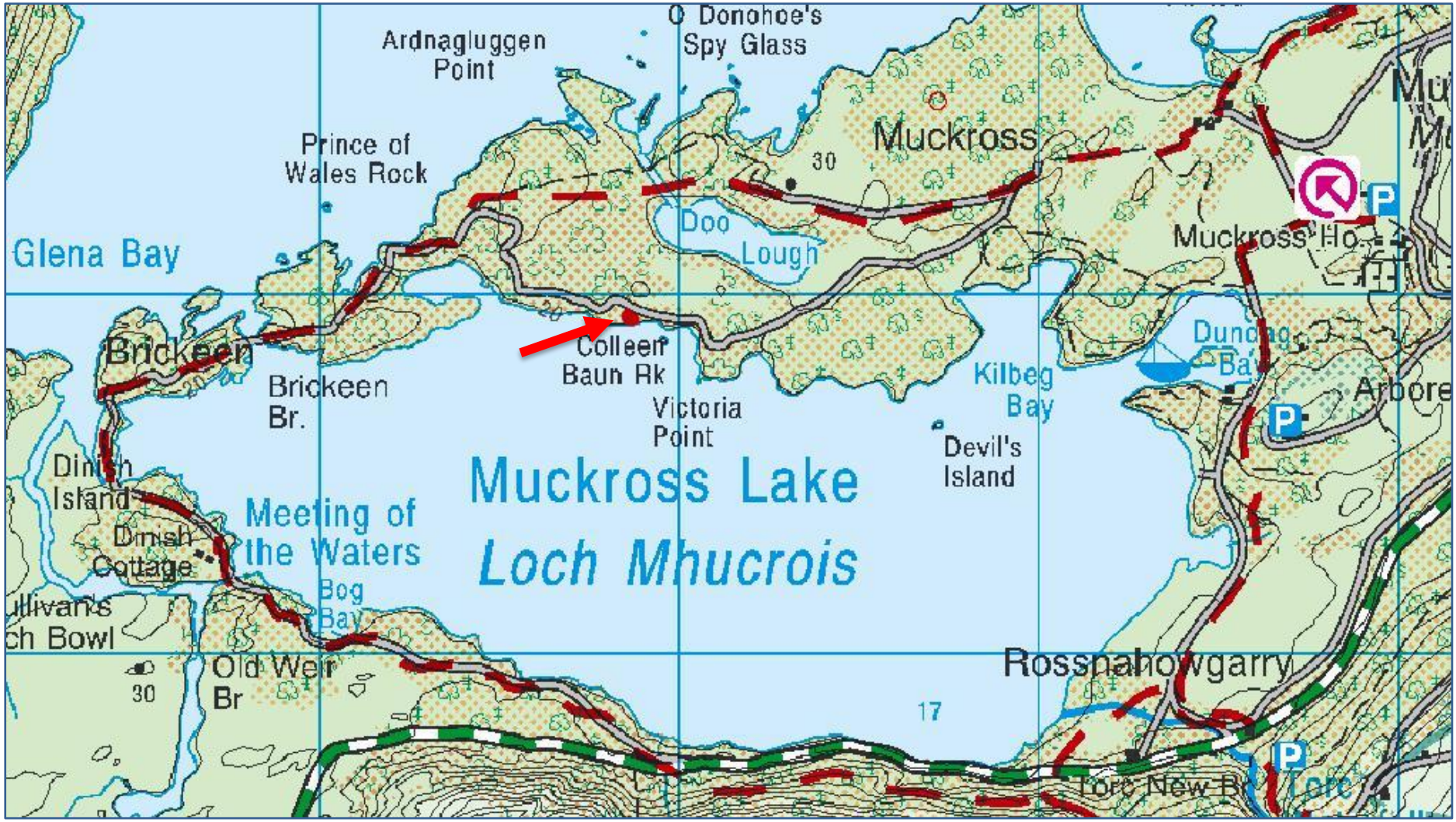

Figure 102 Ordnance Survey Discovery Series map, showing the location of the mine spoil area (red outline) beside Muckross Lake. (Scale is 1:15,000). Ordnance Survey Ireland Licence No EN 0059216 © Ordnance Survey Ireland / Government of Ireland.

Figure 103 Ordnance Survey 2005 aerial imagery, showing the lead spoil area (red outline) beside Muckross Lake. (Scale is 1:3,000). Ordnance Survey Ireland Licence No EN 0059216 © Ordnance Survey Ireland / Government of Ireland.

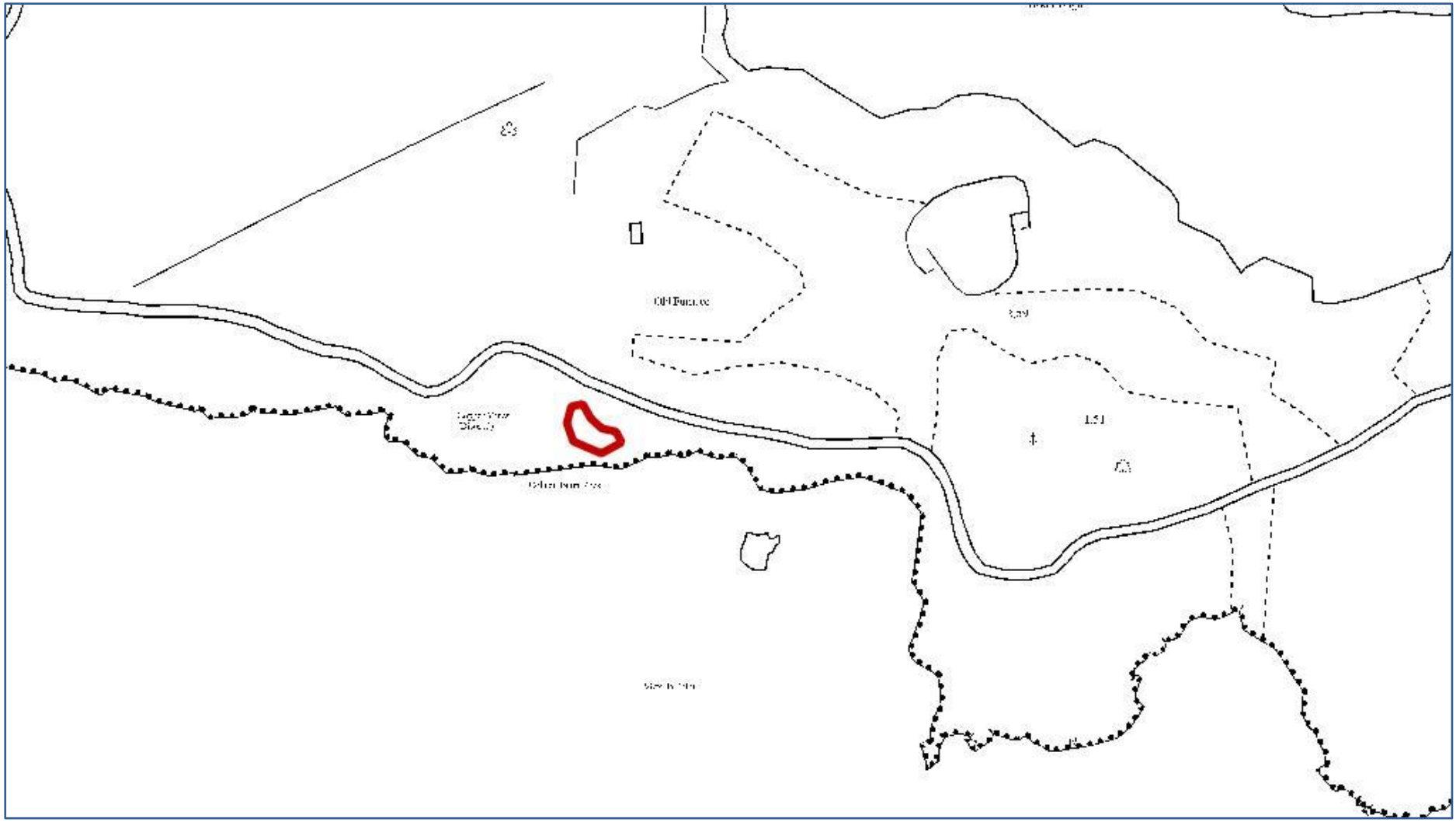

Figure 104 Ordnance Survey 1:5000 series map, showing the lead spoil area (red outline) beside Muckross Lake. (Scale is 1:3,000). Ordnance Survey Ireland Licence No EN 0059216 © Ordnance Survey Ireland / Government of Ireland.

Site 19 Ross Island

Site Name	**OS Discovery map**	**Grid ref**	**County**
Ross Island	78	V94588806	Kerry
Recorder	**Date**	**Conservation value**	
Rory Hodd	07/03/2018	High	
Metallophyte species present 2008 *Cephaloziella massalongi*			
Metallophyte species confirmed 2018 *Cephaloziella massalongi*			
2018 site area (ha)	**2018 area 6130 (ha)**	**2008 area 6130 (ha)**	**Area change**
0.14	0.055	0.15	No change

Site description/changes since 2008

This is an old copper mine site, with a very long history, located on a wooded peninsula on the shores of Lough Leane. There are a number of deep water-filled excavations, most of which are now within woodland. Open spoil is patchy in this area and occurs mainly along the lakeshore and around the excavations, in two areas a couple of hundred metres apart. Both of these areas are partially shaded by trees. In many parts, the spoil does not show evidence of being highly metal-rich. The site seems to be mostly unchanged from the 2008 survey.

Description of Calaminarian grassland habitat

The Calaminarian grassland habitat in both areas is relatively species-poor, and is dominated by *Armeria maritima*, with *Silene uniflora* scattered through. Patches of *Weissia controversa* var. *densifolia* are scattered in places and there are strong patches of *Cephaloziella massalongi* on a shaded rocky bank at the back of the water-filled excavation known as 'The Blue Hole'.

Impact code (2013)	Description	Location	Influence (+, -, 0)	Intensity (H,M,L)	% habitat affected
G05.01	trampling	Inside	-	H	30
K01.01	erosion	Inside	-	M	30
K02.01	succession	Inside	-	M	70

Impact code (2018)	Description	Location	Influence (+, -, 0)	Intensity (H,M,L)	% habitat affected
F07	sports, tourism and leisure activities	Inside	-	H	30
L01	abiotic natural processes	Inside	-	M	30
L02	natural succession	Inside	-	M	70

Notes on management/impacting activities

A large portion of this site is shaded by mature trees, primarily *Pinus sylvestris*, with scrub also encroaching in places. There is evidence of the habitat eroding on the lakeshore, particularly in the area close to the Blue Hole. Trampling is also having an impact on the habitat, with a number of well-used paths running through the Calaminarian grassland vegetation. Despite these impacts, the habitat seems to be relatively stable, as all of these impacts have been present for a long period of time.

Conservation measures needed
Walkers should be excluded from more sensitive parts of the habitat, particularly along the lakeshore. Selective removal of trees, and some scrub, could be beneficial, but would need to be carried out with care, to avoid further disturbance of the habitat.

Conservation measure code	Description
CF03	Reduce impact of outdoor sports, leisure and recreational activities
CL01	Management of habitats (others than agriculture and forest) to slow, stop or reverse natural processes

Condition of Calaminarian grassland	%	Area (ha)
In good condition	30	0.017
In not-good condition	70	0.038
Condition not known	0	0

Parameter	Criterion	Result		Assessment
Area	Annual change in area	No annual decrease		Favourable
Structure and functions	No. of criteria passed	2		Unfavourable-inadequate
	No. indicator spp.	4	Pass	
	Scrub encroachment	2.5%	Pass	
	Negative human impact	30%	Fail	
Future prospects				Unfavourable-inadequate
Overall Assessment				Unfavourable-inadequate

Overall assessment
This site is assessed as Unfavourable-inadequate, due to the continuing trampling of the Calaminarian grassland habitat by walkers, and the continued shading of the site by trees, which is damaging the quality of the habitat at this site. The site is of moderate-high conservation importance, as it contains Calaminarian grassland vegetation of a type not found elsewhere, and has a strong population of *Cephaloziella massalongi*.

Habitats present on mine spoil resource	%
Calaminarian grassland	38
BL3 Artificial surfaces	2.5
ED2 Bare spoil	25
ER4 Calcareous loose rock	21
FL8 Ponds	0.5
WD2 Mixed woodland	10.5
WS1 Scrub	2.5

Indicator metallophyte species present
Cephaloziella massalongi
Armeria maritima
Silene uniflora
Weissia controversa var. *densifolia*

Other species present on mine spoil resource
Agrostis capillaris
Agrostis stolonifera
Alnus glutinosa
Amblystegium serpens
Betula pubescens
Bryum pallescens
Calliergonella cuspidate
Cladonia ciliata
Climacium dendroides
Cratoneuron filicinum
Dichodontium pellucidum
Dicranella varia
Festuca rubra
Hedera hibernica
Hygrohypnum luridum
Pinus sylvestris
Rhytidiadelphus squarrosus
Rosa sp.
Rubus fruticosus
Rumex acetosa
Schistidium crassipilum
Taxus baccata (seedling)
Ulex europaeus
Viola riviniana
Weissia controversa var. *controversa*

Metallophyte species	**Grid ref**	**Extent**	**Notes**
Cephaloziella massalongi	V9457888108	50x50cm	Scattered small patches in small cave beside Blue Hole.
Cephaloziella massalongi	V9457488107	2x2m	Scattered patches, up to 20x20cm in size, on limestone rockface at the back of the Blue Hole.
Cephaloziella massalongi	V9457988106	1x3m	Scattered patches, up to 10x10cm, on rockface behind Blue Hole.

Photographs:

Figure 105 Calaminarian grassland on the shore of Lough Leane at Ross Island, showing signs of erosion.

Figure 106 Calaminarian grassland vegetation by the shore of Lough Leane, dominated by *Armeria maritima* and shaded by trees of *Pinus sylvestris*.

Figure 107 The Blue Hole, which is fringed with Calaminarian grassland, and has large patches of *Cephaloziella massalongi* growing on rockfaces behind.

Figure 108 Calaminarian grassland habitat of *Cephaloziella massalongi* on seeping shaded rockfaces behind the Blue Hole.

Figure 109 Large patches of *Cephaloziella massalongi* on rockface behind the Blue Hole.

Figure 110 Eroded path running through *Armeria maritima*-dominated Calaminarian grassland habitat on Ross Island.

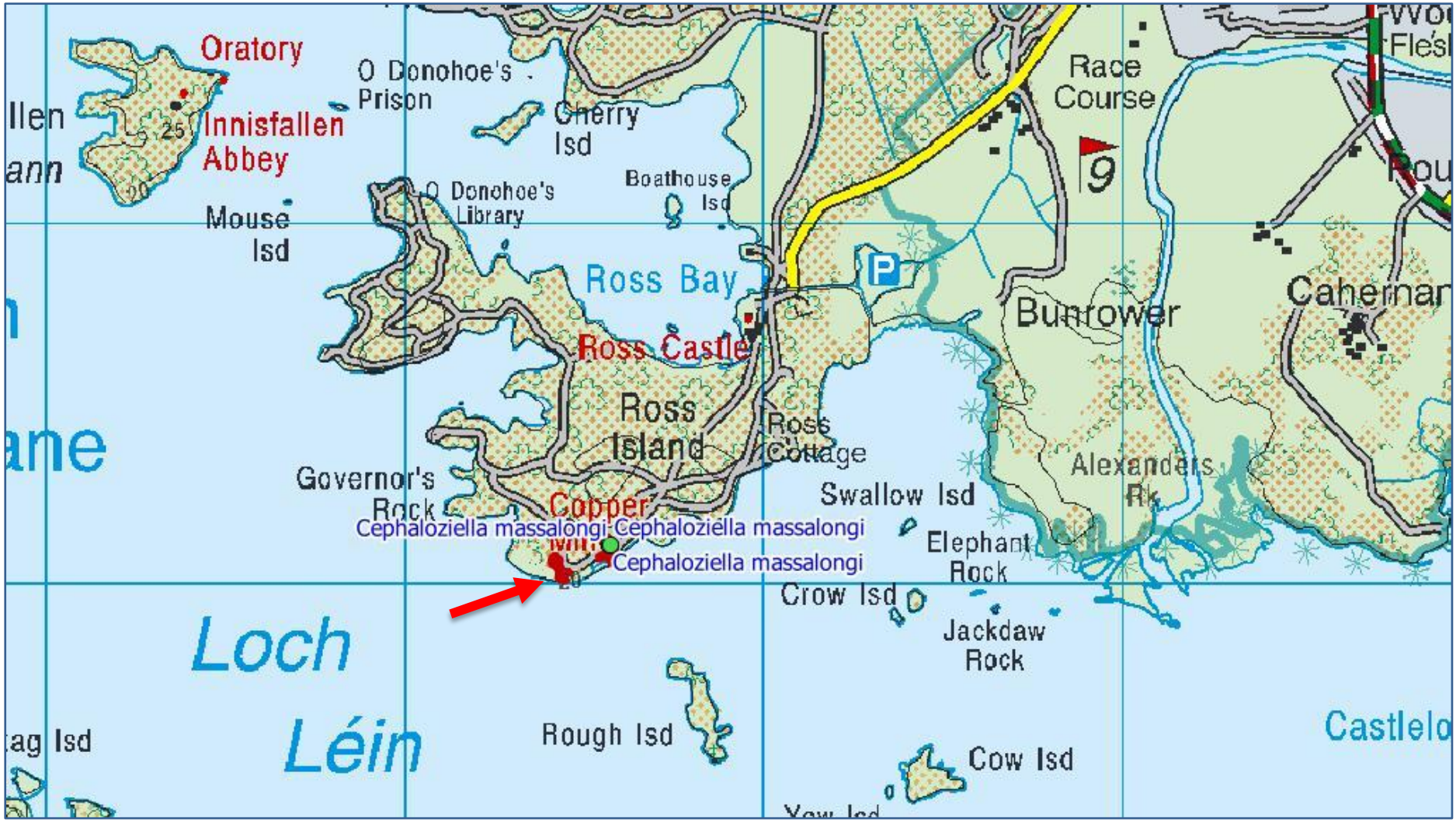

Figure 111 Ordnance Survey Discovery Series map, showing the location of the mine spoil area (red outline) and rare species (green dots) on Ross Island. (Scale is 1:15,000). Ordnance Survey Ireland Licence No EN 0059216 © Ordnance Survey Ireland / Government of Ireland.

Figure 112 Ordnance Survey 2005 aerial imagery, showing the spoil area (red outline) and rare species (green dots) on Ross Island. (Scale is 1:3,000). Ordnance Survey Ireland Licence No EN 0059216 © Ordnance Survey Ireland / Government of Ireland.

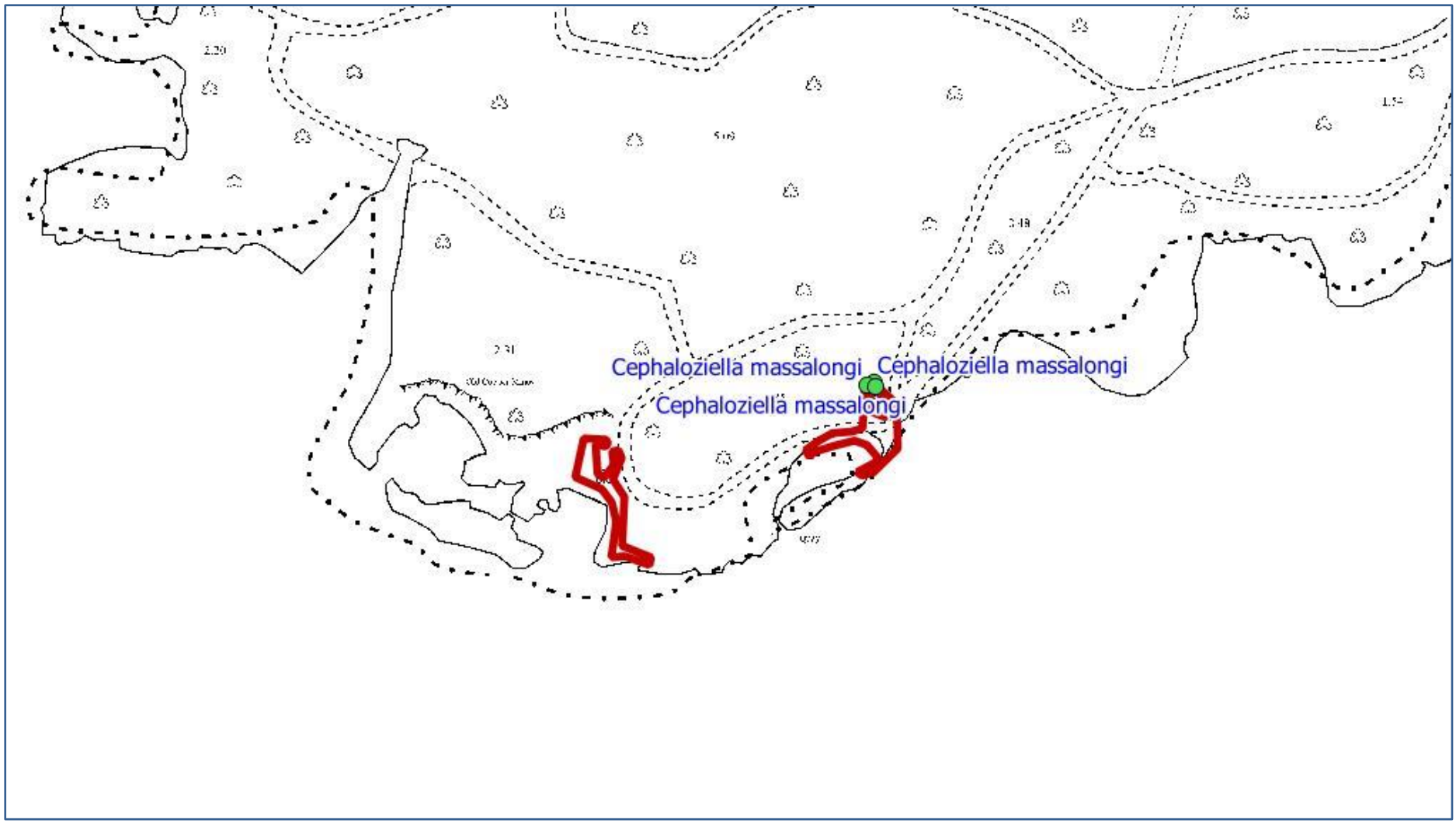

Figure 113 Ordnance Survey 1:5000 series map, showing the lead spoil area (red outline) and rare species (green dots) on Ross Island. (Scale is 1:3,000). Ordnance Survey Ireland Licence No EN 0059216 © Ordnance Survey Ireland / Government of Ireland

Site 20 Allihies (Mountain)

Site Name	OS Discovery map	Grid ref	County
Allihies (Mountain)	84	V590458	Cork
Recorder	**Date**	**Conservation value**	
Rory Hodd	02/04/2018	Very high	
Metallophyte species present 2008 *Cephaloziella integerrima, Cephaloziella massalongi, Cephaloziella nicholsonii, Ditrichum cornubicum, Ditrichum lineare, Pohlia andalusica, Scopelophila cataractae*			
Metallophyte species confirmed 2018 *Cephaloziella massalongi, Ditrichum cornubicum*			
2018 site area (ha)	**2018 area 6130 (ha)**	**2008 area 6130 (ha)**	**Area change**
4.9	1.3	3.1	No change

Site description/changes since 2008

This is a large and important site, with a long history, sprawling across a large area of rocky hillside above the village of Allihies. The site is bisected by a small road and contains numerous shafts and adits, as well as the imposing ruins of the Man Engine House. The area below the road has much humid open spoil, with an old quarried area in the lower part, alongside patches of heath and acid grassland. Above the road, the spoil is more scattered and interspersed with dry heath and exposed rock. It was not possible to access all parts of the site, as the open shafts are fenced off, but the habitat present could be observed through the fence. This site shows few changes from the previous survey.

Description of Calaminarian grassland habitat

Calaminarian grassland occurs throughout the spoil areas, and is varied and species-rich. Typically, it is dominated by *Cephaloziella* spp., which form extensive mats across the site. *Solenostoma gracillimum* also forms strong mats in parts, and a range of species is present within the Calaminarian grassland habitat. *Ditrichum cornubicum* was found to still be growing in small amount in the area where it was previously found by David Holyoak. A number of rare metallophyte species were not refound, but the presence of much surface water throughout the site meant that it was difficult to distinguish between species within the bryophyte mat, and locating suitable material for identification was almost impossible. Recent very cold weather is also likely to have made identification of species more difficult. These species were recorded by Des Callaghan across the site in 2013, and would almost certainly be relocated if a survey was carried out in more suitable conditions, and there is absolutely no reason to presume that these species have decreased in abundance.

Impact code (2013)	Description	Location	Influence (+, -, 0)	Intensity (H,M,L)	% habitat affected
A04.02.02	non-intensive sheep grazing	Inside	0	M	80
C01.01	sand and gravel extraction	Inside	-	H	5
E03.01	disposal of household waste	Inside	-	M	1
G01.02	walking, horseriding and non-motorised vehicles	Inside	0	M	30
G01.03.02	off-road motorized driving	Inside	-	M	5
K01.01	erosion	Inside	-	M	20

Impact code (2018)	Description	Location	Influence (+, -, 0)	Intensity (H,M,L)	% habitat affected
A10	extensive grazing	Inside	0	M	80
C01	extraction of minerals	Inside	-	H	5
F07	sports, tourism and leisure activities	Inside	0	M	30
F09	deposition of waste	Inside	-	M	1
L01	abiotic natural processes	Inside	-	M	20

Notes on management/impacting activities

This site is grazed throughout by sheep, but they are not currently significantly impacting the Calaminarian grassland vegetation. Dumping of rubble and digging has taken place on a small scale and old iron fencing has been dumped at the location of *D. cornubicum*. A number of walking paths occur through the site, and trampling is particularly apparent around the Man Engine House, but is not currently detrimental to the Calaminarian grassland habitat.

Conservation measures needed

The fencing dumped at the site of *Ditrichum cornubicum* should be removed and dumping of rubble and digging should be halted. The location of *D. cornubicum* should be monitored and scraping back of the surface to expose new metal-rich substrate should be considered, as there are currently few plants present.

Conservation measure code	Description
CH03	Reduce impact of other specific human actions
CL01	Management of habitats (others than agriculture and forest) to slow, stop or reverse natural processes

Condition of Calaminarian grassland	%	Area (ha)
In good condition	95	1.25
In not-good condition	5	0.06
Condition not known	0	0

Parameter	Criterion	Result		Assessment
Area	Annual change in area	No annual decrease		Favourable
Structure and functions	No. of criteria passed	3		Favourable
	No. indicator spp.	7	Pass	
	Scrub encroachment	0%	Pass	
	Negative human impact	10%	Pass	
Future prospects				Favourable
Overall Assessment				Favourable

Overall assessment

This site is assessed as in favourable condition, as there are no threats and pressures negatively impacting the Calaminarian grassland habitat on a large scale, and the local community are aware of the conservation importance of the site, so are likely to conserve the site in good condition in the future. This is the most important site for Calaminarian grassland in Ireland, as there is an extensive area of Calaminarian grassland present in good condition, with a number of rare metallophyte species, including *Ditrichum cornubicum* at one of three known sites worldwide.

Habitats present on mine spoil resource	%
Calaminarian grassland	27
BL1 Stone walls	0.5
BL3 Artificial surfaces	0.5
ED2 Bare spoil	5
ER1 Exposed siliceous rock	4.5
ER3 Siliceous loose rock	8.5
FW1 Stream	0.1
GS3 Dry-humid acid grassland	3
GS4 Wet grassland	0.3
HH1 Dry heath	50.6

Indicator metallophyte species present
Ditrichum cornumbicum
Cephaloziella massalongi
Cephaloziella stellulifera
Gymnocolea inflata
Scapania compacta
Solenostoma gracillimum
Weissia controversa var. *densifolia*

Other species present on mine spoil resource
Agrostis capillaris
Agrostis stolonifera
Anomobryum julaceum
Archidium alternifolium
Asplenium adiantum-nigrum
Asplenium trichomanes
Brachythecium rutabulum
Bryum bicolor
Bryum pseudotriquetrum
Calliergonella cuspidata
Calluna vulgaris
Campylopus introflexus
Cephloziella cf. *divaricata*
Cerastium fontanum
Ceratodon purpureum
Cladonia subcervicornis
Cratoneuron filicinum
Dichodontium pellucidum
Dicranella varia
Dicranum scoparium
Digitalis purpurea
Diplophyllum albicans
Epilobium brunnescens
Holcus lanatus
Hylocomium splendens
Hymenostylium recurvirostrum

Hypochaeris radicata
Jasione montana
Juncus acutiflorus
Juncus effusus
Poa annua
Pogonatum aloides
Pohlia annotina
Pohlia nutans
Pohlia wahlenbergii
Pseudoscleropdium purum
Racomitrium lanuginosum
Rhytidiadelphus loreus
Rhytidiadelphus squarrosus
Rumex acetosa
Sagina procumbens
Saxifraga spathularis
Trichostomum brachydontium
Ulex gallii
Urtica dioica
Veronica officinalis

Metallophyte species	Grid ref	Extent	Notes
Cephaloziella massalongi	V5912445770	2x2m	Scattered patches through crevices in retaining wall.
Ditrichum cornubicum	V5892045859	1x1cm	Very small patch on edge of track, consisting of ca. 20 tightly packed small shoots.

Photographs:

Figure 114 View of the lower area of Allihies, with much Calaminarian grassland present, and the Man Engine House visible in the background.

Figure 115 Well-developed Calamanarian grassland vegetation at Allihies, consisting primarily of indeterminate mats of *Cephaloziella* spp.

Figure 116 Mat of *Cephaloziella massalongi* in shady crevice of retaining wall below track.

Figure 117 Habitat of *Ditichum cornubicum*, location of patch found indicated by red arrow. Dumped iron fencing should be removed.

Figure 118 Track on which *Ditrichum cornubicum* grows, approximate location of small patch indicated by red arrow.

Figure 119 Close-up of small cushion of *Ditrichum cornumbicum* on gravelly track below the Man Engine House.

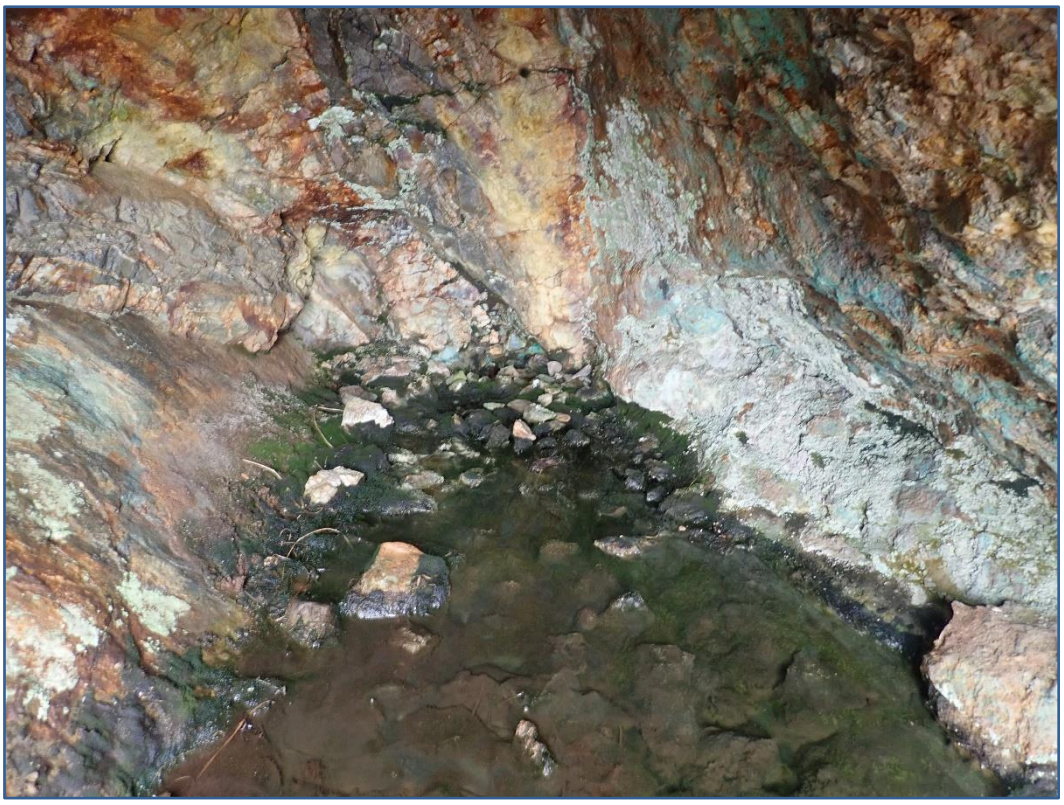

Figure 120 Dark adit below the Man Engine House, in which extensive mats of *Cephaloziella* sp. grow.

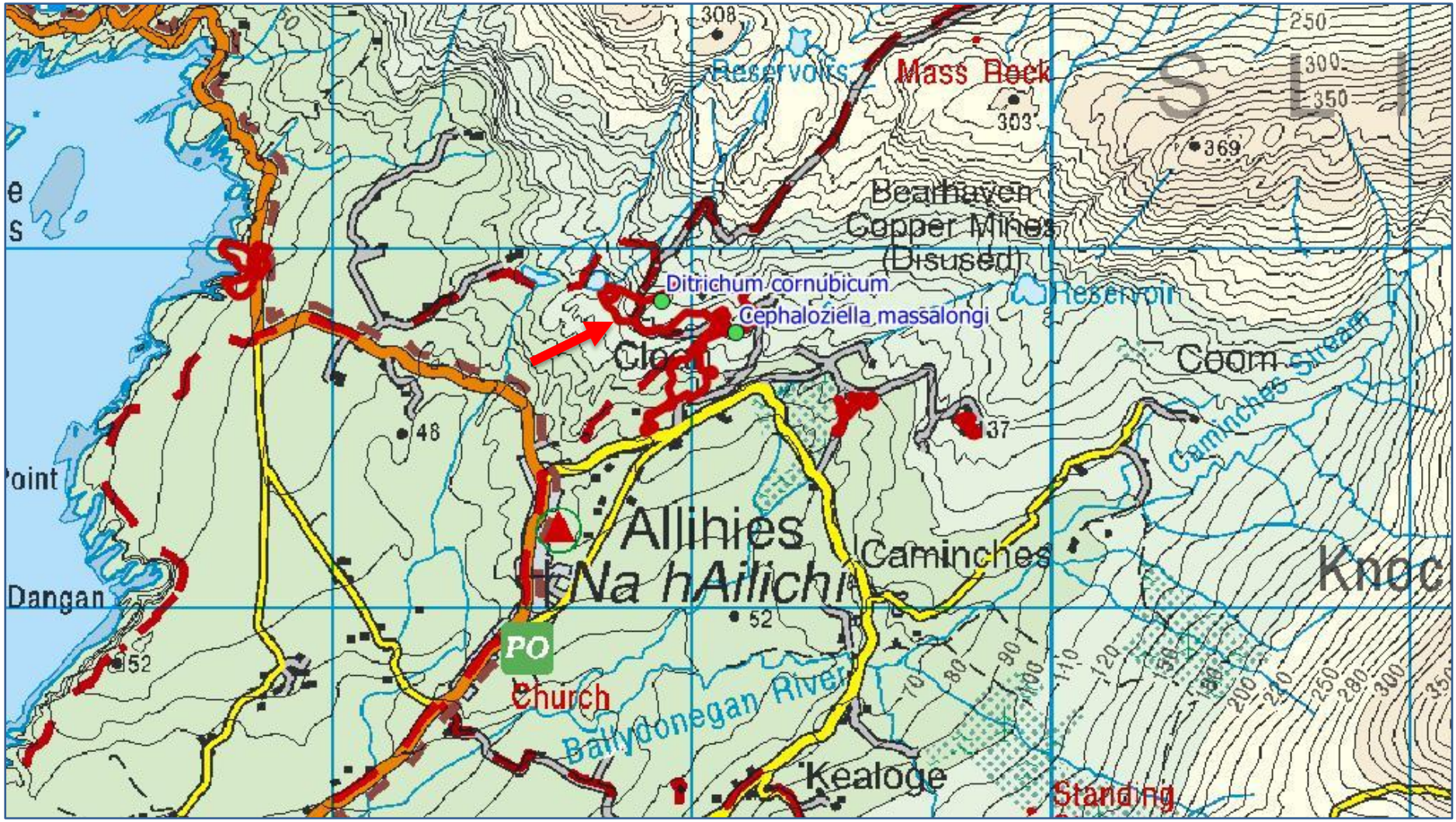

Figure 121 Ordnance Survey Discovery Series map, showing the location of the mine spoil (red outline) and rare species (green dots) around Allihies, Mountain Mine is indicated by red arrow. (Scale is 1:15,000). Ordnance Survey Ireland Licence No EN 0059216 © Ordnance Survey Ireland / Government of Ireland.

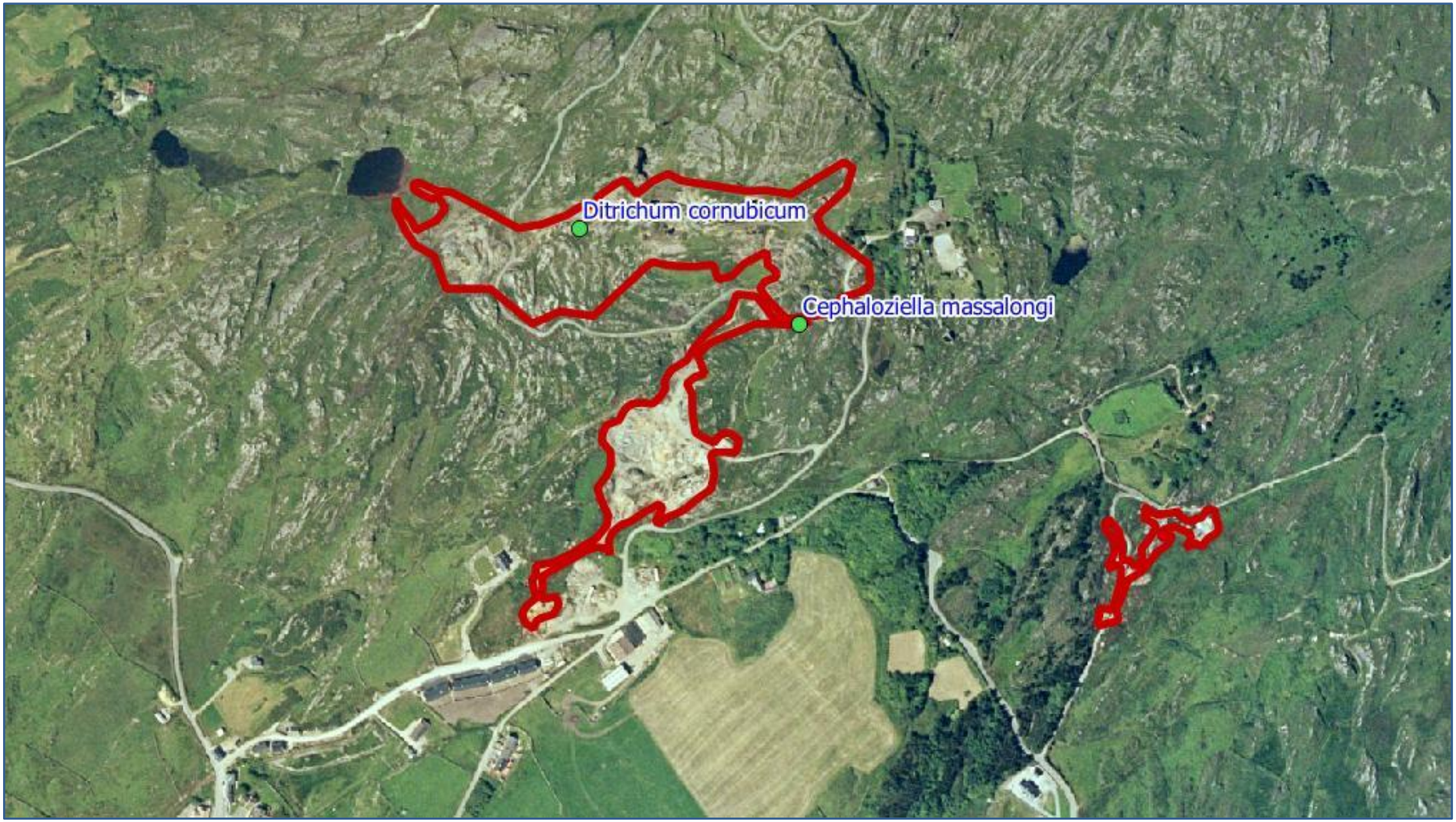

Figure 122 Ordnance Survey 2005 aerial imagery, showing the mine spoil area (red outline) and rare species (green dots) at Allihies. The right-hand polygon is spoil area North of Caminches. (Scale is 1:5,000). Ordnance Survey Ireland Licence No EN 0059216 © Ordnance Survey Ireland / Government of Ireland.

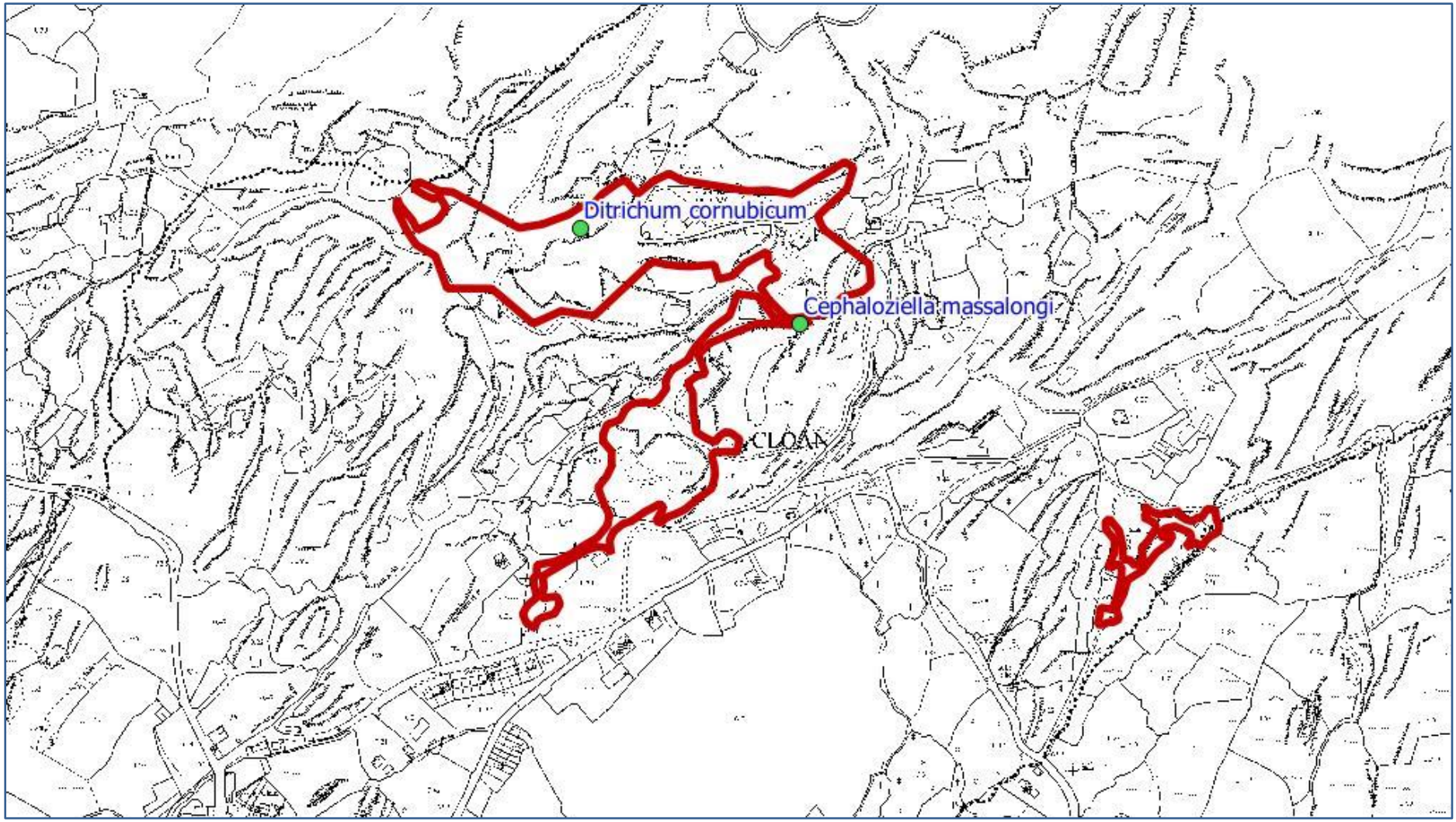

Figure 123 Ordnance Survey 1:5000 series map, showing the mine spoil area (red outline) and rare species (green dots) at Allihies. The right-hand polygon is spoil area North of Caminches. (Scale is 1:5,000). Ordnance Survey Ireland Licence No EN 0059216 © Ordnance Survey Ireland / Government of Ireland.

Site 21 North of Caminches

Site Name	**OS Discovery map**	**Grid ref**	**County**
N. of Caminches	84	V59464559	Cork
Recorder	**Date**	**Conservation value**	
Rory Hodd	31/03/2018	Low	
Metallophyte species present 2008 *Pohlia andalusica*			
Metallophyte species confirmed 2018 None			
2018 site area (ha)	**2018 area 6130 (ha)**	**2008 area 6130 (ha)**	**Area change**
0.26	0.026	0.01	No change

Site description/changes since 2008
This is a small and diffuse site, consisting of scattered patches of rocky spoil interspersed with heath and rocky outcrops, on a slope alongside a track. There are two fenced-off shafts at the edge of the spoil area. Few changes are apparent since 2008, although there is possibly more evidence of disturbance alongside the track at the edge of the spoil area.

Description of Calaminarian grassland habitat
The Calaminarian grassland here is species-poor and scattered, with most of the spoil consisting of larger rocky scree-like fragments that are unsuitable for the formation of Calaminarian grassland. *Cephaloziella stellulifera* forms extensive patches, with other bryophytes and *Agrostis capillaris* scattered throughout. *Pohlia andalusica* could not be confirmed from the location where it was previously recorded, scattered immature stems of *Pohlia* were present, but no bulbils were detected to aid determination of the species.

Impact code (2013)	Description	Location	Influence (+, -, 0)	Intensity (H,M,L)	% habitat affected
C01.01	sand and gravel extraction	Inside	-	M	3
E03.01	disposal of household waste	Outside	-	L	1
G01.03.02	off-road motorized driving	Inside	-	M	5

Impact code (2018)	Description	Location	Influence (+, -, 0)	Intensity (H,M,L)	% habitat affected
C01	extraction of minerals	Inside	-	M	3
F07	sports, tourism and leisure activities	Inside	-	M	5
F09	deposition of waste	Outside	-	L	1

Notes on management/impacting activities
A horse lorry has been dumped in a flat excavated area at the bottom of the site, but is not on Calaminarian grassland habitat, although runoff and debris from this may impact Calaminarian grassland over time. The Calaminarian grassland habitat is threatened by excavation and digging alongside the track, as well as churning up by tyres.

Conservation measures needed
The dumped horse lorry should be removed, and local landowner should be discouraged from driving and turning on, or excavating, the areas of Calaminarian grassland along the track edge.

Conservation measure code	Description
CH03	Reduce impact of other specific human actions

Condition of Calaminarian grassland	%	Area (ha)
In good condition	80	0.02
In not-good condition	20	0.006
Condition not known	0	0

Parameter	Criterion	Result		Assessment
Area	Annual change in area	No annual decrease		Favourable
Structure and functions	No. of criteria passed	3		Favourable
	No. indicator spp.	1	Pass	
	Scrub encroachment	0%	Pass	
	Negative human impact	5%	Pass	
Future prospects				Favourable
Overall Assessment				Favourable

Overall assessment
This site is assessed as favourable, as there are currently no significant major threats to its survival and its condition and area appear not to have changed significantly since 2008. However, due to its small size and marginal position, it is vulnerable to change and could be significantly damaged in a short period of time. However, as it is a small and relatively species-poor site, it is of lower conservation value and not a priority for extensive conservation measures.

Habitats present on mine spoil resource	%
Calaminarian grassland	10
ED1 Exposed gravel	10
ED2 Bare spoil	30
ER1 Exposed siliceous rock	20
ER3 Siliceous loose rock	15
HH1 Dry heath	15

Indicator metallophyte species present
Cephaloziella stellulifera

Other species present on mine spoil resource
Agrostis capillaris
Anomobryum julaceum
Asplenium adiantum-nigrum
Bryum pallens
Calluna vulgaris
Campylopus fragilis
Dichodontium pellucidum
Dicranella varia

Dicranum scoparium
Epilobium brunnescens
Funaria hygrometrica
Fuchsia magellanica
Pinus nigra (seedling)
Plantago lanceolate
Pohlia annotina
Pohlia nutans
Polygala serpyllifolia
Pseudocrossidium hornschuchianum
Racomitrium lanuginosum
Rhytidiadelphus squarrosus
Rumex acetosa
Senecio jacobaea
Trifolium repens
Ulex gallii
Urtica dioica

Photographs:

Figure 124 Overview of spoil area north of Caminches, with spoil mainly located along track and in small valley to the right.

Figure 125 Loose spoil north of Caminches, with Calaminarian grassland growing on some relatively stable areas.

Figure 126 Sparse Calaminarian grassland vegetation, characterised by the presence of *Cephaloziella stellulifera*.

Figure 127 Old horse lorry dumped adjacent to Calaminarian grassland habitat, with possible pollution occuring.

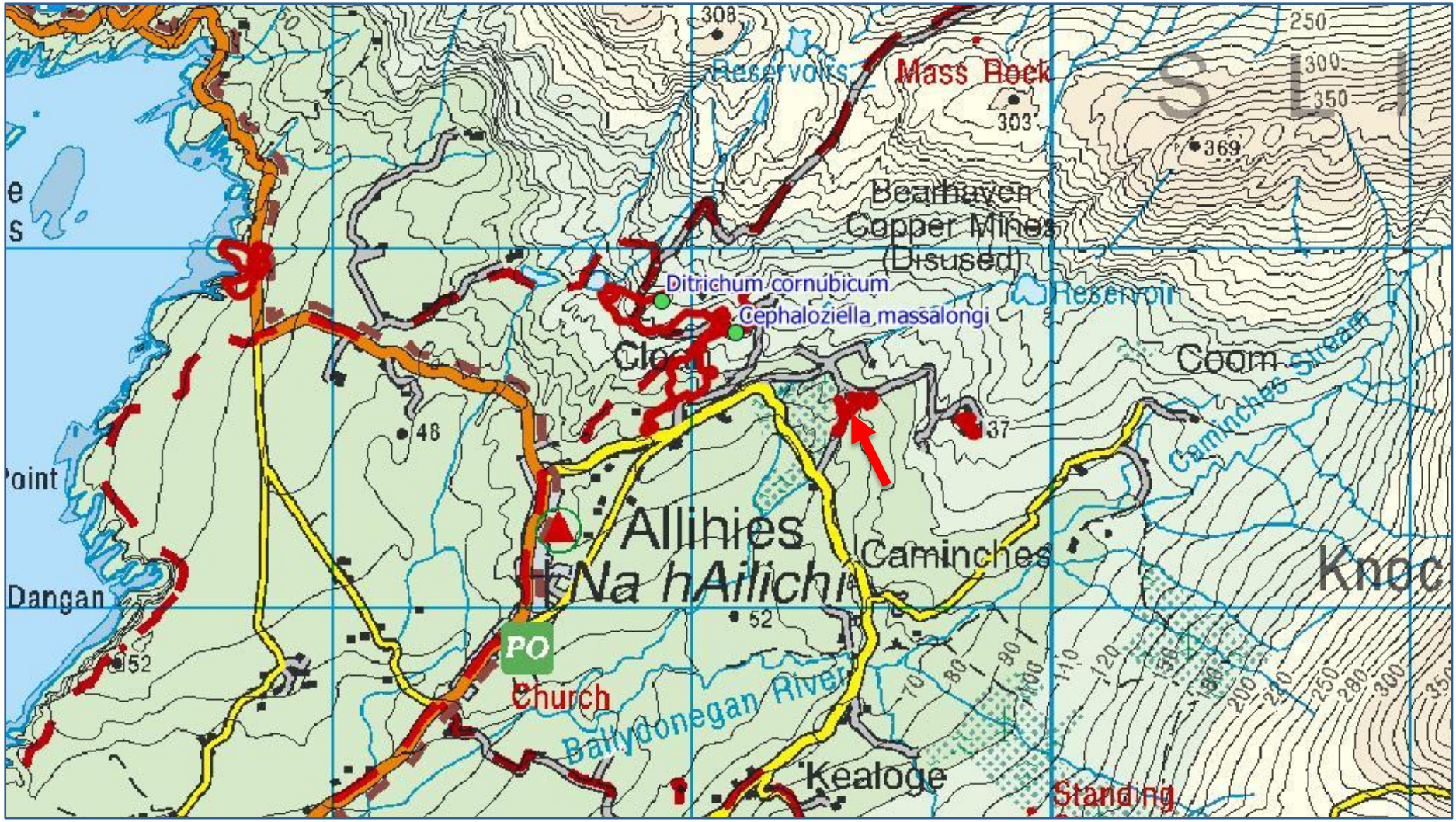

Figure 128 Ordnance Survey Discovery Series map, showing the location of the mine spoil (red outline) and rare species (green dots) around Allihies, site North of Caminches is indicated by red arrow. (Scale is 1:15,000). Ordnance Survey Ireland Licence No EN 0059216 © Ordnance Survey Ireland / Government of Ireland.

Figure 129 Ordnance Survey 2005 aerial imagery, showing the mine spoil area (red outline) North of Caminches. The right-hand polygon is spoil area Northeast of Caminches. (Scale is 1:3,000). Ordnance Survey Ireland Licence No EN 0059216 © Ordnance Survey Ireland / Government of Ireland.

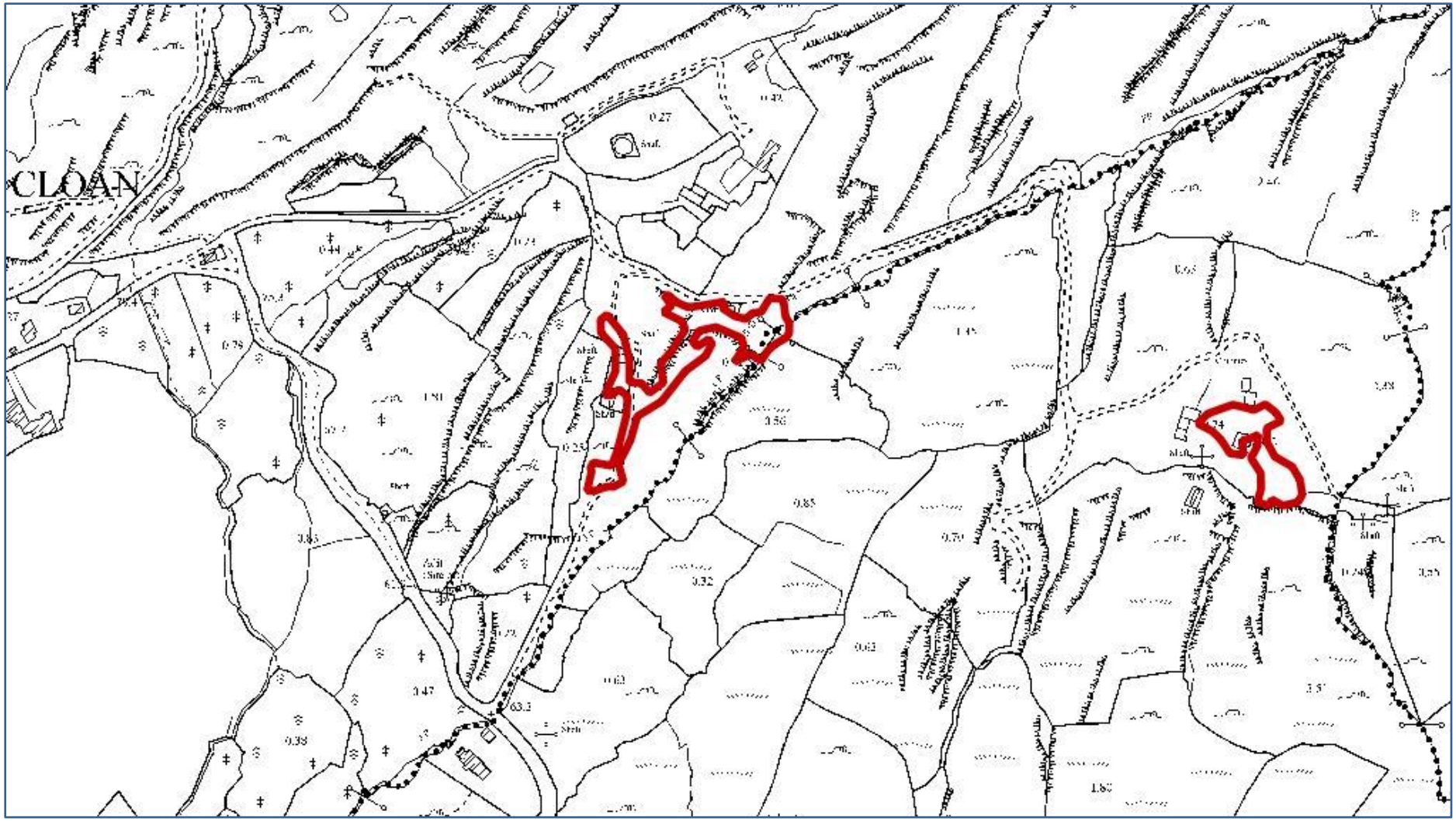

Figure 130 Ordnance Survey 1:5000 series map, showing the mine spoil area (red outline) North of Caminches. The right-hand polygon is spoil area Northeast of Caminches. (Scale is 1:3,000). Ordnance Survey Ireland Licence No EN 0059216 © Ordnance Survey Ireland / Government of Ireland.

Site 22 Northeast of Caminches

Site Name	**OS Discovery map**	**Grid ref**	**County**
NE. of Caminches	84	V59774551	Cork
Recorder	**Date**	**Conservation value**	
Rory Hodd	31/03/2018	Low	
Metallophyte species present 2008 None			
Metallophyte species confirmed 2018 None			
2018 site area (ha)	**2018 area 6130 (ha)**	**2008 area 6130 (ha)**	**Area change**
0.13	0.007	0.006	Moderate loss likely

Site description/changes since 2008
This is a small site, located on top of a ridge. It consists of the ruins of a prominent engine house, a deep, fenced-off shaft, and a relatively small area of spoil. The spoil occurs on the flat top of the ridge adjacent to the engine house and shaft and on the southern slope just below this. Since 2008, there is evidence of digging and extraction of spoil at two locations in the spoil.

Description of Calaminarian grassland habitat
Calaminarian grassland is scattered across the spoil area in small patches, where the spoil is more compacted and humid. *Anomobryum julaceum* and *Bryum* cf. *pallescens* are the most prominent species, with *Agrostis capillaris* and *Bryum dichotomum* frequent. There are scattered patches of *Cephaloziella stellulifera*.

Impact code (2013)	Description	Location	Influence (+, -, 0)	Intensity (H,M,L)	% habitat affected
A04.02.05	non-intensive mixed animal grazing	Inside	0	M	100
C01.01	sand and gravel extraction	Inside	-	H	50
G01.03.02	off-road motorized driving	Inside	-	M	5

Impact code (2018)	Description	Location	Influence (+, -, 0)	Intensity (H,M,L)	% habitat affected
A10	extensive grazing	Inside	0	M	100
C01	extraction of minerals	Inside	-	H	50
F07	sports, tourism and leisure activities	Inside	-	M	5

Notes on management/impacting activities
Parts of the spoil have been excavated, for unknown purposes, which may have led to the loss of some Calaminarian grassland vegetation. There are a number of vehicles dumped below the site, and it is possible that other vehicles will be dumped on the site in the future.

Conservation measures needed
Dumping and excavation of spoil should be prevented in future.

Conservation measure code	Description
CC01	Adapt/manage extraction of non-energy resources

Condition of Calaminarian grassland	%	Area (ha)
In good condition	50	0.0035
In not-good condition	50	0.0035
Condition not known	0	0

Parameter	Criterion	Result		Assessment
Area	Annual change in area	Moderate decrease		Unfavourable-inadequate
Structure and functions	No. of criteria passed	2		Unfavourable-inadequate
	No. indicator spp.	2	Pass	
	Scrub encroachment	0%	Pass	
	Negative human impact	50%	Fail	
Future prospects				Unfavourable-inadequate
Overall Assessment				Unfavourable-inadequate

Overall assessment
The status of this site considered to be Unfavourable-inadequate, as there is evidence of extensive removal of spoil from this site. It is not known whether Calaminarian grassland was present on the spoil which was removed, but it is likely that at least some Calaminarian grassland habitat has been lost. If the extraction was halted and the Calaminarian grassland vegetation allowed to re-establish, the condition of the site could be restored to favourable. This site is of low conservation importance, as the Calaminarian grassland habitat is species-poor and limited in extent.

Habitats present on mine spoil resource	%
Calaminarian grassland	5
ED2 Bare spoil	81.5
ER1 Exposed siliceous rock	0.5
ER3 Siliceous loose rock	5
GS3 Dry-humid acid grassland	5
HH1 Dry heath	3

Indicator metallophyte species present
Bryum cf. *pallescens*
Cephaloziella stellulifera

Other species present on mine spoil resource
Agrostis capillaris
Anomobryum julaceum
Asplenium adiantum-nigrum
Asplenium trichomanes
Bryum dichotomum
Calluna vulgaris
Campylopus subulatus
Carex viridula

Centaurea erythraea
Ceratodon purpureus
Cladonia sp.
Cladonia subcervicornis
Fossombronia sp.
Frullania tamarisci
Hypochaeris radicata
Juncus acutiflorus
Koeleria macrantha
Lotus corniculatus
Luzula multiflora
Plantago coronopus
Plantago lanceolate
Pohlia annotina
Pseudocrossidium hornschuchianum
Racomitrium lanuginosum
Rhytidiadelphus squarrosus
Rumex acetosa
Scapania irrigua
Sedum anglicum
Senecio jacobaea
Steroecaulon vesuvianum
Succisa pratensis
Trifolium repens
Ulex gallii
Umbilicus rupestris

Photographs:

Figure 131 Overview of mine north-east of Caminches, with a small area of spoil adjacent to a well-preserved engine house.

Figure 132 Loose spoil north-east of Caminches, supporting sparse patches of Calaminarian grassland vegetation.

Figure 133 Small area of damp Calaminarian grassland with mats of *Cephaloziella stellulifera*.

Figure 134 Area where spoil has been removed for unknown purposes, possibly leading to the loss of Calaminarian grassland.

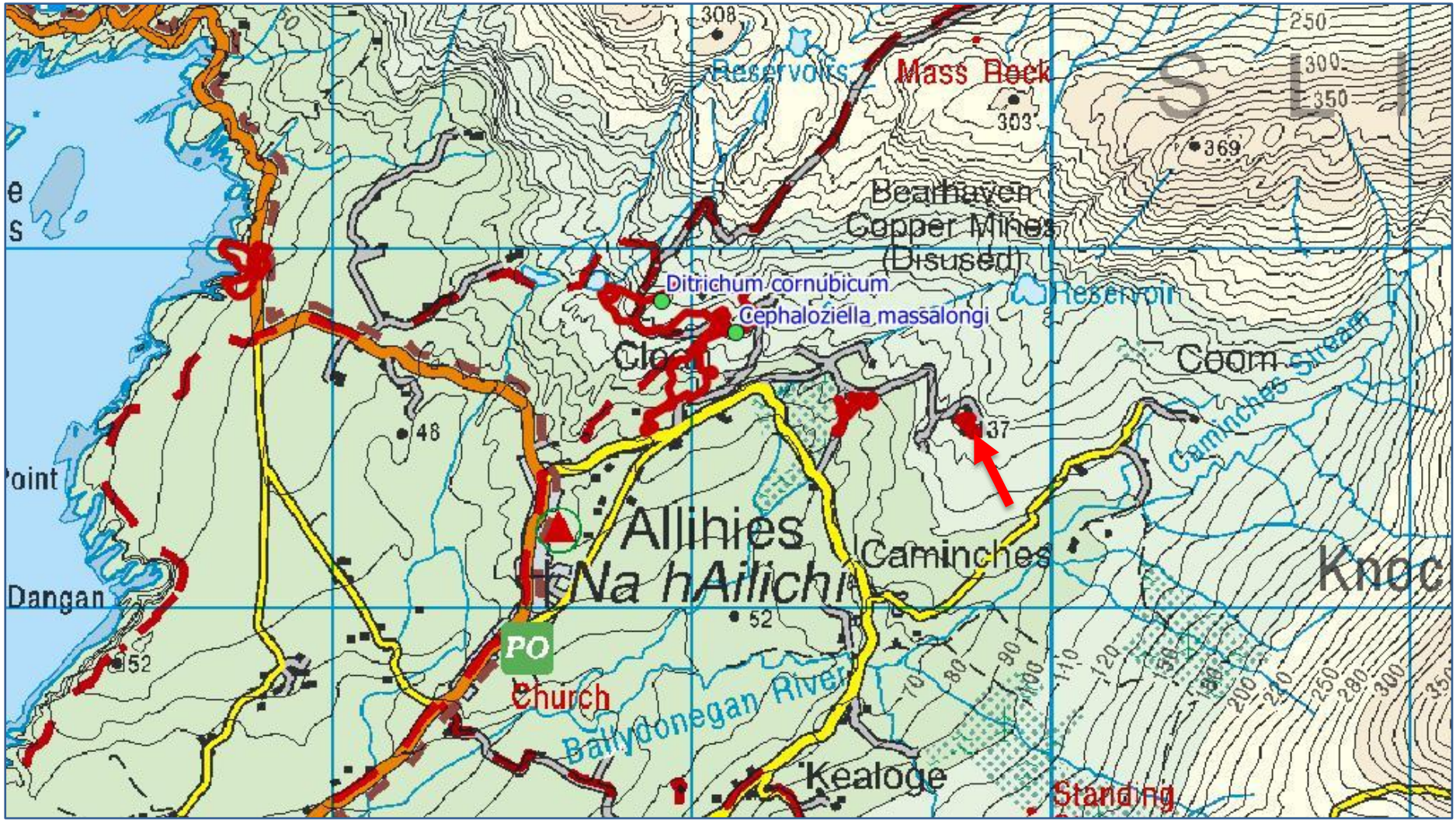

Figure 135 Ordnance Survey Discovery Series map, showing the location of the mine spoil (red outline) and rare species (green dots) around Allihies, site Northeast of Caminches is indicated by red arrow. (Scale is 1:15,000). Ordnance Survey Ireland Licence No EN 0059216 © Ordnance Survey Ireland / Government of Ireland.

Figure 136 Ordnance Survey 2005 aerial imagery, showing the mine spoil area (red outline) Northeast of Caminches. The left-hand polygon is spoil area North of Caminches. (Scale is 1:3,000). Ordnance Survey Ireland Licence No EN 0059216 © Ordnance Survey Ireland / Government of Ireland.

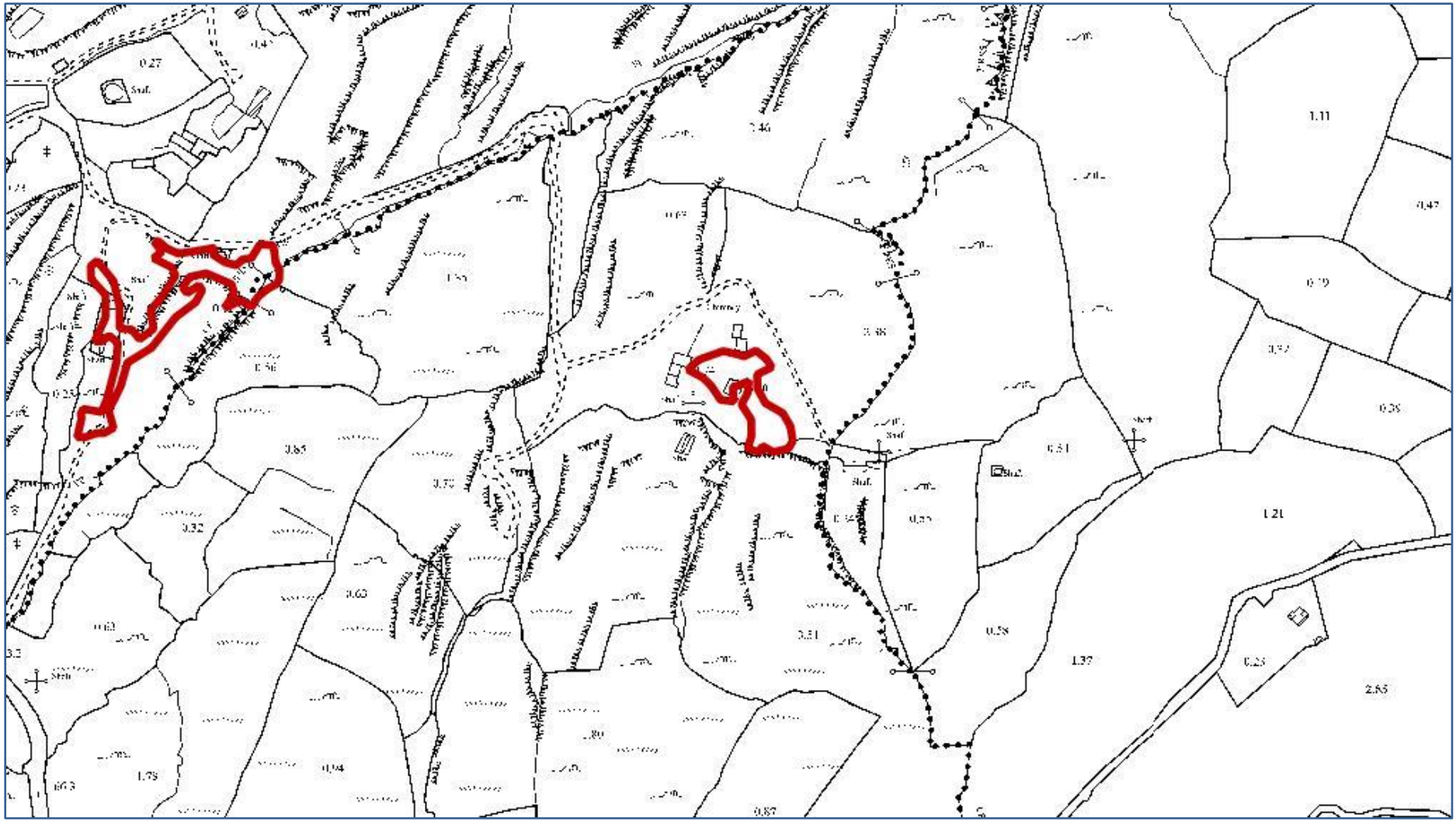

Figure 137 Ordnance Survey 1:5000 series map, showing the mine spoil area (red outline) Northeast of Caminches. The left-hand polygon is spoil area North of Caminches. (Scale is 1:3,000). Ordnance Survey Ireland Licence No EN 0059216 © Ordnance Survey Ireland / Government of Ireland.

Site 23 Dooneen

Site Name	**OS Discovery map**	**Grid ref**	**County**
Dooneen	84	V57754598	Cork
Recorder	**Date**	**Conservation value**	
Rory Hodd	31/03/2018	Moderate	
Metallophyte species present 2008 *Cephaloziella massalongi* (*Cephaloziella nicholsonii* also recorded here by D.A. Callaghan in 2013)			
Metallophyte species confirmed 2018 None			
2018 site area (ha)	**2018 area 6130 (ha)**	**2008 area 6130 (ha)**	**Area change**
0.88	0.22	0.34	No change

Site description/changes since 2008
This site is located on top of copper-stained cliffs above the sea, and is divided in two by a tarmac road. The landward side of the road is mostly grassland, with scattered open areas of spoil, old buildings and rubble and a deep shaft. There is also a shaft and some old walls on the seaward side of the road, but there is more open spoil, interspersed with dry coastal heath. Few changes are apparent since 2008, although trampling has possibly increased.

Description of Calaminarian grassland habitat
The Calaminarian grassland here is scattered and generally species-poor. *Cephaloziella stellulifera* is the most prominent species, forming strong mats, with patches of *Solenostoma gracillimum* in places, as well as much *Anomobryum julaceum*. *Armeria maritima* grows throughout the area of Calaminarian grassland. *Cephaloziella* cf. *massalongi* occurs at the southern end of the site, but its identity could not be confirmed.

Impact code (2013)	Description	Location	Influence (+, -, 0)	Intensity (H,M,L)	% habitat affected
A04.02.05	non-intensive mixed animal grazing	Inside	0	M	10
E03.01	disposal of household waste	Inside	-	H	5
G05.01	trampling	Inside	-	M	40
K01.01	erosion	Inside	-	H	5

Impact code (2018)	Description	Location	Influence (+, -, 0)	Intensity (H,M,L)	% habitat affected
A10	extensive grazing	Inside	0	M	10
F07	sports, tourism and leisure activities	Inside	-	M	40
F09	deposition of waste	Inside	-	H	5
L01	abiotic natural processes	Inside	-	H	5

Notes on management/impacting activities
The primary impact on this area of Calaminarian grassland is trampling, as there is a carpark, with an information board, located at the edge of the site, from where there is open access to the entire seaward area. This impact is likely to increase in intensity, as the layby is an official stop on the Wild Atlantic

Way, which has led to an increase in visitor numbers. Erosion of spoil is also occurring at a minor scale on the clifftop. A small amount of building waste has been dumped on top of spoil on the landward side of the road, and there are also signs of dumping in the open shafts.

Conservation measures needed
The Calaminarian grassland vegetation would benefit from the erection of a fence to exclude trampling by humans. The building rubble should be removed from the spoil inland of the road to allow the recolonization of Calaminarian grassland.

Conservation measure code	Description
CF03	Reduce impact of outdoor sports, leisure and recreational activities
CH03	Reduce impact of other specific human actions

Condition of Calaminarian grassland	%	Area (ha)
In good condition	55	0.12
In not-good condition	45	0.1
Condition not known	0	0

Parameter	Criterion	Result		Assessment
Area	Annual change in area	No decrease		Favourable
Structure and functions	No. of criteria passed	2		Unfavourable-inadequate
	No. indicator spp.	3	Pass	
	Scrub encroachment	0%	Pass	
	Negative human impact	45%	Fail	
Future prospects				Unfavourable-inadequate
Overall Assessment				Unfavourable-inadequate

Overall assessment
This site is assessed as unfavourable-inadequate, as trampling is currently a negative impact across much of the Calaminarian grassland on the seaward side of the site, and will likely only lead to further degradation of the habitat in the future. Although much of the Calaminarian grassland here is species-poor, this site is of moderate conservation value due to the presence of populations of *Cephaloziella massalongi* and *C. nicholsonii* (neither species confirmed during this survey).

Habitats present on mine spoil resource	%
Calaminarian grassland	25.7
BL3 Built land	0.3
ED2 Bare spoil	15
ER3 Siliceous loose rock	4.5
GA1 Agricultural grassland	2
GS3 Dry-humid acid grassland	23
HH1 Dry heath	27.5
PF2 Poor flush	1.5
WS1 Scrub	1

Indicator metallophyte species present
Cephaloziella stellulifera
Scapania compacta
Solenostoma gracillimum

Other species present on mine spoil resource
Agrostis stolonifera
Anomobryum julaceum
Anthyllis vulneraria
Armeria maritima
Bryum dichotomum
Calliergonella cuspidata
Calluna vulgaris
Campylopus introflexus
Cerastium fontanum
Ceratodon purpureus
Cladonia sp.
Crocosmia x crocosmiflora
Dicranum scoparium
Diplophyllum albicans
Empetrum nigrum
Erica cinerea
Festuca rubra
Ftullania tamarisci
Hebe sp.
Holcus lanatus
Hypnum jutlandicum
Hypocaeris radicata
Jasione montana
Mnium hornum
Plantago coronupus
Pseudoscleropodium purum
Rumex acetosa
Sagina procumbens
Schistidium maritimum
Sedum anglicum
Tortella flavovirens
Ulex gallii

Photographs:

Figure 138 Calaminarian grassland forming good patches amongst heath vegetation on the cliff top at Dooneen.

Figure 139 Damp Calaminarian grassland, at location where *Cephaloziella massalongi* was previously recorded.

Figure 140 Old shaft into which a variety of rubbish has been dumped.

Figure 141 Location where builder's rubble has been dumped onto Calaminarian grassland at Dooneen.

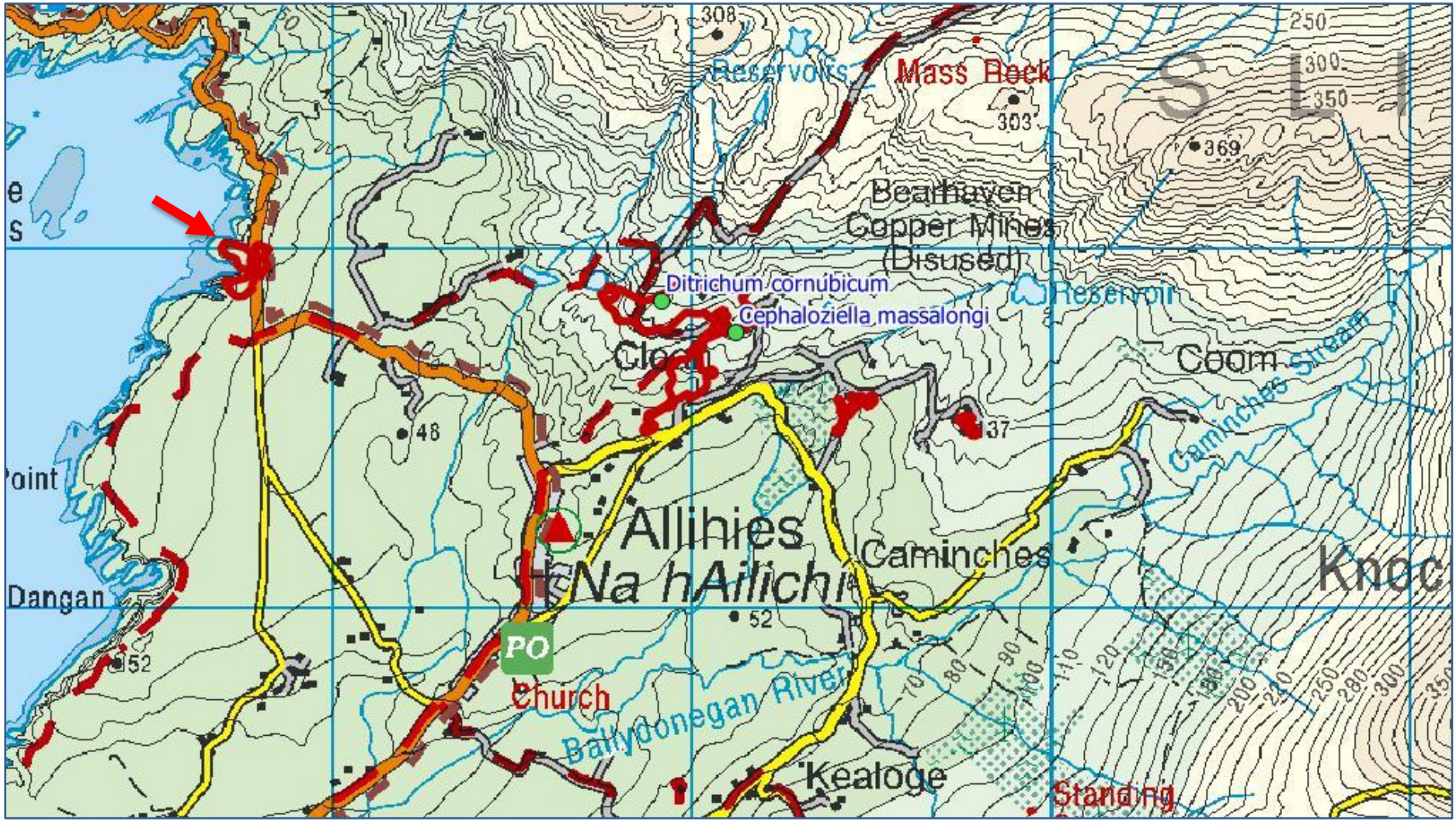

Figure 142 Ordnance Survey Discovery Series map, showing the location of the mine spoil (red outline) and rare species (green dots) around Allihies, Dooneen Mine is indicated by red arrow. (Scale is 1:15,000). Ordnance Survey Ireland Licence No EN 0059216 © Ordnance Survey Ireland / Government of Ireland.

Figure 143 Ordnance Survey 2005 aerial imagery, showing the mine spoil area (red outline) at Dooneen. (Scale is 1:3,000). Ordnance Survey Ireland Licence No EN 0059216 © Ordnance Survey Ireland / Government of Ireland.

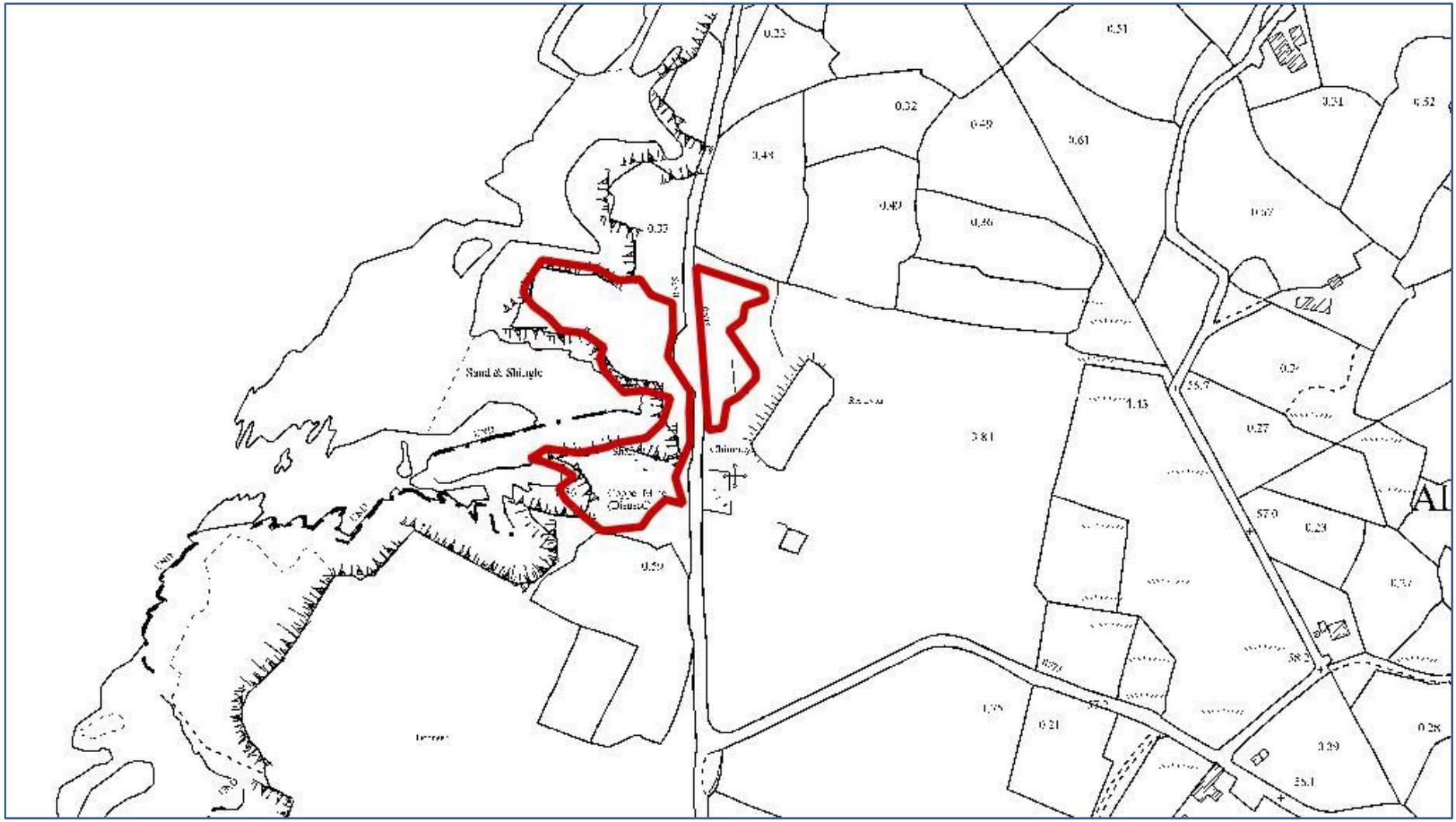

Figure 144 Ordnance Survey 1:5000 series map, showing the mine spoil area (red outline) at Dooneen. (Scale is 1:3,000). Ordnance Survey Ireland Licence No EN 0059216 © Ordnance Survey Ireland / Government of Ireland.

Site 24 Cappagh

Site Name	**OS Discovery map**	**Grid ref**	**County**
Cappagh	88	V99003245	Cork
Recorder	**Date**	**Conservation value**	
Rory Hodd	06/04/2018	Moderate-high	
Metallophyte species present 2008–2018 *Cephaloziella nicholsonii, Pohlia andalusica, Scopelophila cataractae*			
Metallophyte species confirmed 2018 *Cephaloziella massalongi, Pohlia andalusica*			
2018 site area (ha)	**2018 area 6130 (ha)**	**2008 area 6130 (ha)**	**Area change**
0.09	0.06	0.08	Minor decrease likely

Site description/changes since 2008

This is a diffuse site that was likely previously much more extensive, but is now broken up by quarried areas, houses, roads and areas of heath. There are three areas of open spoil. The lowest area is surrounded by gorse scrub and covers an area of ca. 5x10m. The other two areas of spoil are mainly surfacing tracks. The lower of these also has a bank of spoil below it, and spoil in a rocky area by the eastern end of the track. The uppermost area of spoil is only along the surface of a disused track. A deep, fenced off, shaft is located in the western part of the site, but there is no sign of metalliferous influence around it. No changes are apparent since the previous survey.

Description of Calaminarian grassland habitat

The Calaminarian grassland in the lower area forms a sparse cover, with scattered *Bryum* cf. *pallescens, Pohlia andaluscia, P. annotina, P. nutans* and *Agrostis capillaris*. A strong population of *Cephaloziella nicholsonii* or *massalongi* grows along a nearby wall, and possibly in abundance in an inaccessible shaft nearby, which could not be checked due to a large fence around the shaft. Material from this wall was identified by D.T. Holyoak as *C. nicholsonii* in 2008, but as *C. massalongi* by N.G. Hodgetts in 2018. It seems unlikely that both species are present here intermixed, and this highlights the taxonomic difficulties of these *Cephaloziella* species. *Pholia andalusica* was found to be abundant at multiple locations in the lower area of Calaminarian grassland and along the track in the middle of the site. The areas of Calaminarian grassland along the tracks have much *Cephaloziella stellulifera*, with carpets of *Dichodontium pellucidum* in places and some strong patches of *Scapania compacta*.

Impact code (2013)	Description	Location	Influence (+, -, 0)	Intensity (H,M,L)	% habitat affected
E03.01	disposal of household waste	Inside	-	M	10
G01.03.02	off-road motorized driving	Inside	0	L	25
K02.01	succession	Inside	-	H	15

Impact code (2018)	Description	Location	Influence (+, -, 0)	Intensity (H,M,L)	% habitat affected
F07	sports, tourism and leisure activities	Inside	0	L	25
F09	deposition of waste	Inside	-	M	10
L02	natural succession	Inside	-	H	15

Notes on management/impacting activities
This site is likely to have previously been more extensive, and Calaminarian grassland habitat is likely to have been lost due to development and quarrying. Due to the fragmentary nature and limited extent of the remaining Calaminarian grassland, it is highly vulnerable to the impacts of future developments. The areas of Calaminarian grassland on track surfaces would be lost if resurfacing were to take place. The lower area is vulnerable to encroachment by gorse scrub, although there are signs of clearance of gorse from here.

Conservation measures needed
Development on these areas, or resurfacing of the tracks should be prevented, and the spoil should be kept clear of gorse scrub to prevent encroachment.

Conservation measure code	Description
CL01	Management of habitats (others than agriculture and forest) to slow, stop or reverse natural processes

Condition of Calaminarian grassland	%	Area (ha)
In good condition	80	0.05
In not-good condition	20	0.01
Condition not known	0	0

Parameter	Criterion	Result		Assessment
Area	Annual change in area	Minor decrease		Favourable
Structure and functions	No. of criteria passed	3		Favourable
	No. indicator spp.	5	Pass	
	Scrub encroachment	15%	Pass	
	Negative human impact	10%	Pass	
Future prospects				Unfavourable-inadequate
Overall Assessment				Unfavourable-inadequate

Overall assessment
Although the area and structure and functions of Calaminarian grassland at this site are assessed as favourable, the future prospects are Unfavourable-inadequate, due to the very limited and fragmented nature of the Calaminarian grassland present, making it very vulnerable to impacts and changes which could lead to the eradication of this site overnight. The site is of moderate-high conservation importance, due to the presence of strong populations of *Cephaloziella nicholsonii* or *massialongi* and *Pohlia andalusica*.

Habitats present on mine spoil resource	%
Calaminarian grassland	72
ED2 Bare spoil	12.5
ER1 Exposed siliceous rock	3
GS3 Dry-humid acid grassland	3.5
HH3 Dry heath	9

Indicator metallophyte species present
Cephaloziella nicholsonii
Pohlia andalusica
Bryum cf. *pallescens*
Cephaloziella stellulifera
Scapania compacta

Other species present on mine spoil resource
Agrostis capillaris
Anomobryum julaceum
Asplenium adiantum-nigrum
Bryum capillare
Bryum dichotomum
Calluna vulgaris
Ceratodon purpureus
Cladonia sp.
Dichodontium pellucidum
Dicranum scoparium
Dicranella varia
Didymodon insulanus
Digitalis purpurea
Erica cinerea
Hedera hibernica
Hylocomium splendens
Hypnum resupinatum
Lophozia ventricosa
Poa annua
Pohlia annotina
Pohlia nutans
Polypodium interjectum
Rhytidiadelphus squarrosus
Rubus fruticosus
Rumex acetosa
Sedum anglicum
Ulex europaeus
Ulex gallii

Metallophyte species	Grid ref	Extent	Notes
Cephaloziella massalongi	V9893032370	4x1m	Large healthy patches growing along 4m length of wall, becoming overgrown on one side, and backing on to a yard containing heavy plant machinery on the other. Material from this location was identified as *C. nicholsonii* during the 2008 survey.
Pohlia andalusica	V9893132355	20x20cm	Small patches growing on edge of small open area of spoil, mixed with *P. nutans*.
Pohlia andalusica	V9902632456	20x10cm	Patches mixed with *Cephaloziella stellulifera* along surface of track.

Photographs:

Figure 144 Small lower area of Calaminarian grassland at Cappagh, consisting of small open patches amongst other vegetation.

Figure 145 Track surfaced with spoil, with Calaminarian grassland formed in the centre and in small patches to the side.

Figure 146 Track through heathland surfaced with spoil and supporting patches of Calaminarian grassland.

Figure 147 Stone wall supporting extensive patches of *Cephaloziella nicholsonii/massalongi*.

Figure 148 Habitat of *Pohlia andalusica,* in centre of spoil-surfaced track.

Figure 149 Strong population of *Pohlia andalusica* in spoil on track at Cappagh.

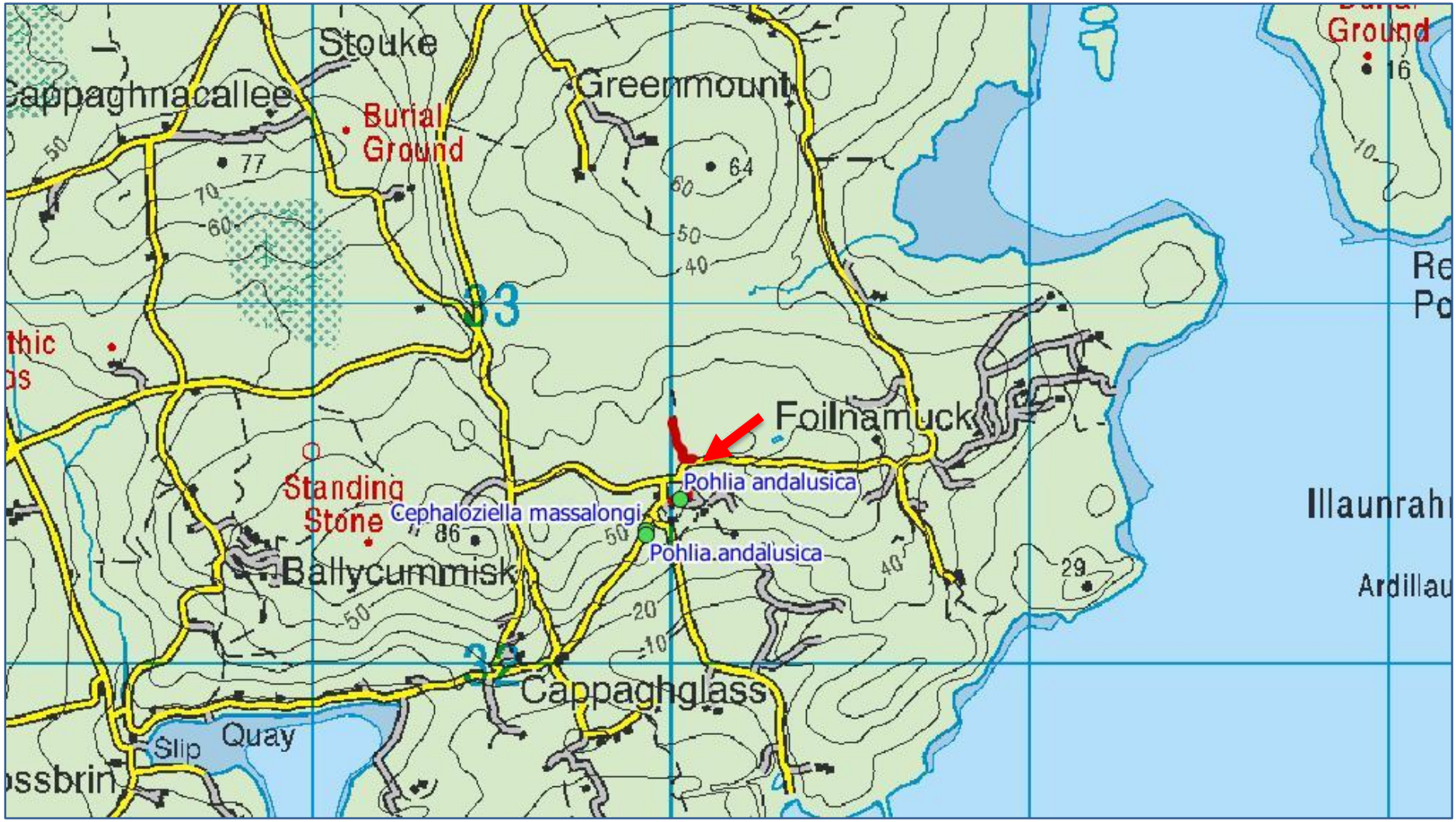

Figure 150 Ordnance Survey Discovery Series map, showing the location of the mine spoil (red outline) and rare species (green dots) at Cappaghglass. (Scale is 1:15,000). Ordnance Survey Ireland Licence No EN 0059216 © Ordnance Survey Ireland / Government of Ireland.

Figure 151 Ordnance Survey 2005 aerial imagery, showing the mine spoil area (red outline) and location of rare species (green dots) at Cappaghglass. (Scale is 1:3,000). Ordnance Survey Ireland Licence No EN 0059216 © Ordnance Survey Ireland / Government of Ireland.

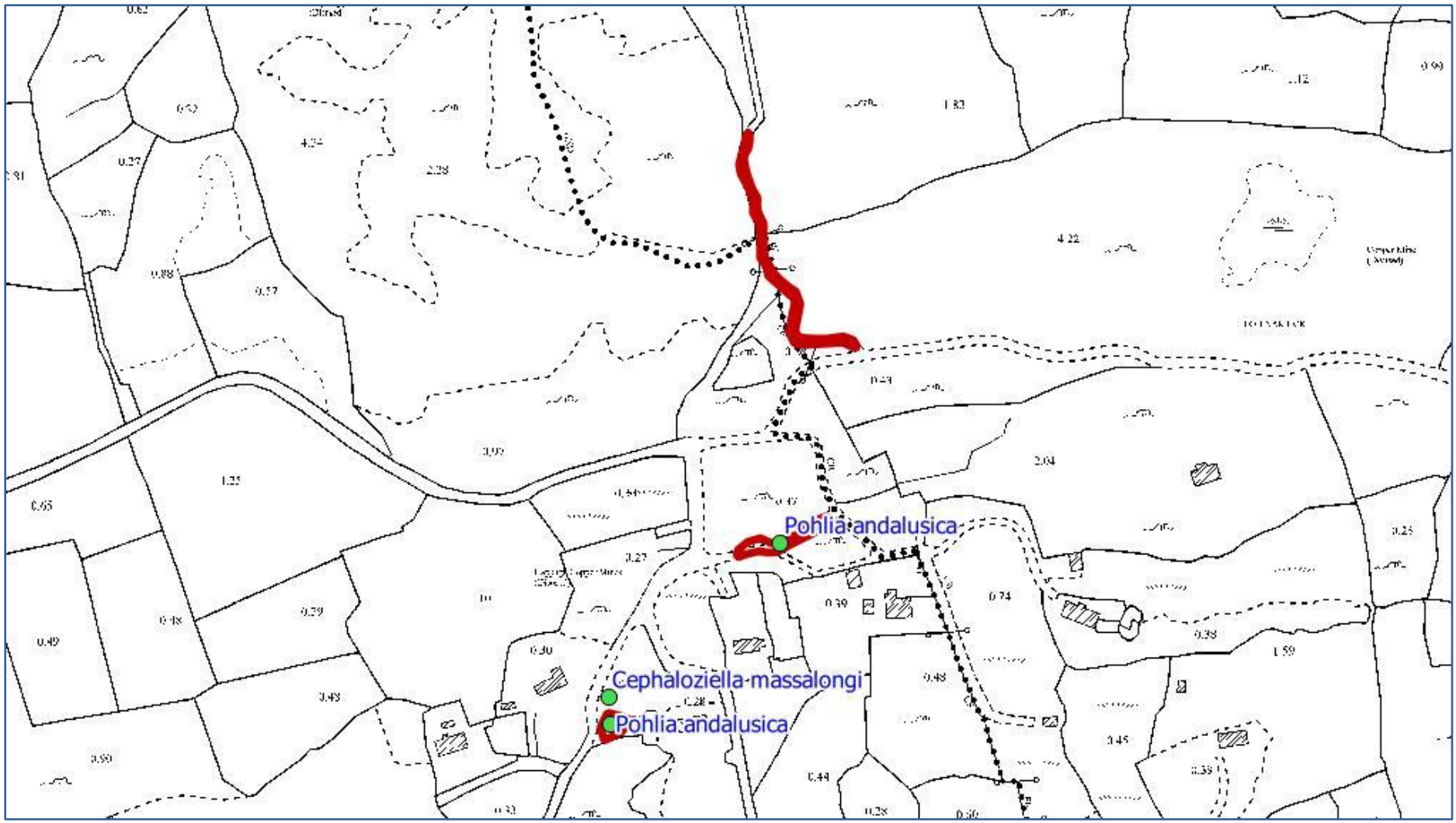

Figure 152 Ordnance Survey 1:5000 series map, showing the mine spoil area (red outline) and location of rare species (green dots) at Cappaghglass. (Scale is 1:3,000). Ordnance Survey Ireland Licence No EN 0059216 © Ordnance Survey Ireland / Government of Ireland.

Site 25 Brow Head

Site Name	**OS Discovery map**	**Grid ref**	**County**
Brow Head	88	V77112354	Cork
Recorder	**Date**	**Conservation value**	
Rory Hodd	07/04/2018	Low	
Metallophyte species present 2008			
None			
Metallophyte species confirmed 2018			
None			
2018 site area (ha)	**2018 area 6130 (ha)**	**2008 area 6130 (ha)**	**Area change**
0.2	0.007	0.07	Minor decrease

Site description/changes since 2008
The workings at this site are spread across the headland, most of which is covered by dry and wet heath vegetation. The main area of spoil is close to the cliff edge and is mostly dry and scree-like. The main mine buildings are set back from the cliff edge, and there is a small amount of open spoil in the yard of these buildings. There are small areas of open spoil around shafts scattered across the hillside, but they are not of sufficient area to be included within the site. No changes are apparent since the previous survey.

Description of Calaminarian grassland habitat
The largest area of spoil close to the cliff edge has little Calaminarian grassland vegetation, and is mainly loose, dry and rocky. Some Calaminarian grassland vegetation does occur around a dressing floor, with mats of *Scapania compacta*, in association with *Armeria maritima*, present. The small area of exposed spoil in the yard of the old buildings is covered by mats of *Cephaloziella stellulifera*, with some *Scapania compacta* present, alongside large cushions of *Ceratodon purpureus* and scattered *Agrostis capillaris.*

Impact code (2013)	Description	Location	Influence (+, -, 0)	Intensity (H,M,L)	% habitat affected
A04.02.05	non-intensive mixed animal grazing	Inside	0	L	100
K01.01	erosion	Inside	-	L	5
K02.01	succession	Inside	-	M	75

Impact code (2018)	Description	Location	Influence (+, -, 0)	Intensity (H,M,L)	% habitat affected
A10	extensive grazing	Inside	0	L	100
L01	abiotic natural processes	Inside	-	L	5
L02	natural succession	Inside	-	M	75

Notes on management/impacting activities
Few impacts are apparent; succession is slowly taking place, with Calaminarian grassland being replaced by acid grassland in the yard of the old buildings. Grazing by sheep and cattle occurs across the site, but is low in intensity. Close to the cliffs, the spoil is gradually eroding into the sea.

Conservation measures needed
As the area of Calaminarian grassland at this site is small, it is particularly vulnerable to impacts, but it does not warrant specific measures for conservation being put in place, except to prevent succession of the area of Calaminarian grassland in the yard of the old buildings.

Conservation measure code	Description
CL01	Management of habitats (others than agriculture and forest) to slow, stop or reverse natural processes

Condition of Calaminarian grassland	%	Area (ha)
In good condition	100	0.007
In not-good condition	0	0
Condition not known	0	0

Parameter	Criterion	Result		Assessment
Area	Annual change in area	Minor decrease		Favourable
Structure and functions	No. of criteria passed	3		Favourable
	No. indicator spp.	5	Pass	
	Scrub encroachment	0%	Pass	
	Negative human impact	0%	Pass	
Future prospects				Unfavourable-inadequate
Overall Assessment				Unfavourable-inadequate

Overall assessment
The area and structure and functions of this site are assessed as Favourable, but the small area and evidence of succession mean that the future prospects are Unfavourable-inadequate. This site is of low conservation importance due to the small area and species-poor nature of the Calaminarian grassland present.

Habitats present on mine spoil resource	%
Calaminarian grassland	3.5
BL1 Stone walls	0.5
ED2 Bare spoil	56.5
ER3 Exposed siliceous rock	3
GS3 Dry-humid acid grassland	12.5
HH1 Dry heath	24

Indicator metallophyte species present
Cephaloziella stellulifera
Scapania compacta
Bryum cf. *pallescens*
Gymnocolea inflata
Solenostoma gracillimum

Other species present on mine spoil resource
Armeria maritima
Festuca rubra
Ceratodon purpureus
Agrostis capillaris
Holcus lanatus
Cladonia sp.
Kindbergia praelonga
Rhytidiadelphus squarrosus
Rumex acetosa
Calluna vulgaris
Erica cinerea
Sedum anglicum
Campylopus introflexus
Cerastium fontanum

Photographs:

Figure 153 Small area of Calaminarian grassland, with *Cephaloziella stellulifera* prominent and becoming overgrown by grasses, in yard of old mine buildings.

Figure 154 Area of spoil on cliff top at Brow Head.

Figure 155 Damp Calaminarian grassland near cliff top at Brow Head, characterised by *Armeria maritima* and *Scapania compacta*.

Figure 156 Adit close to cliff top, with mat of *Cephaloziella* sp. on its walls.

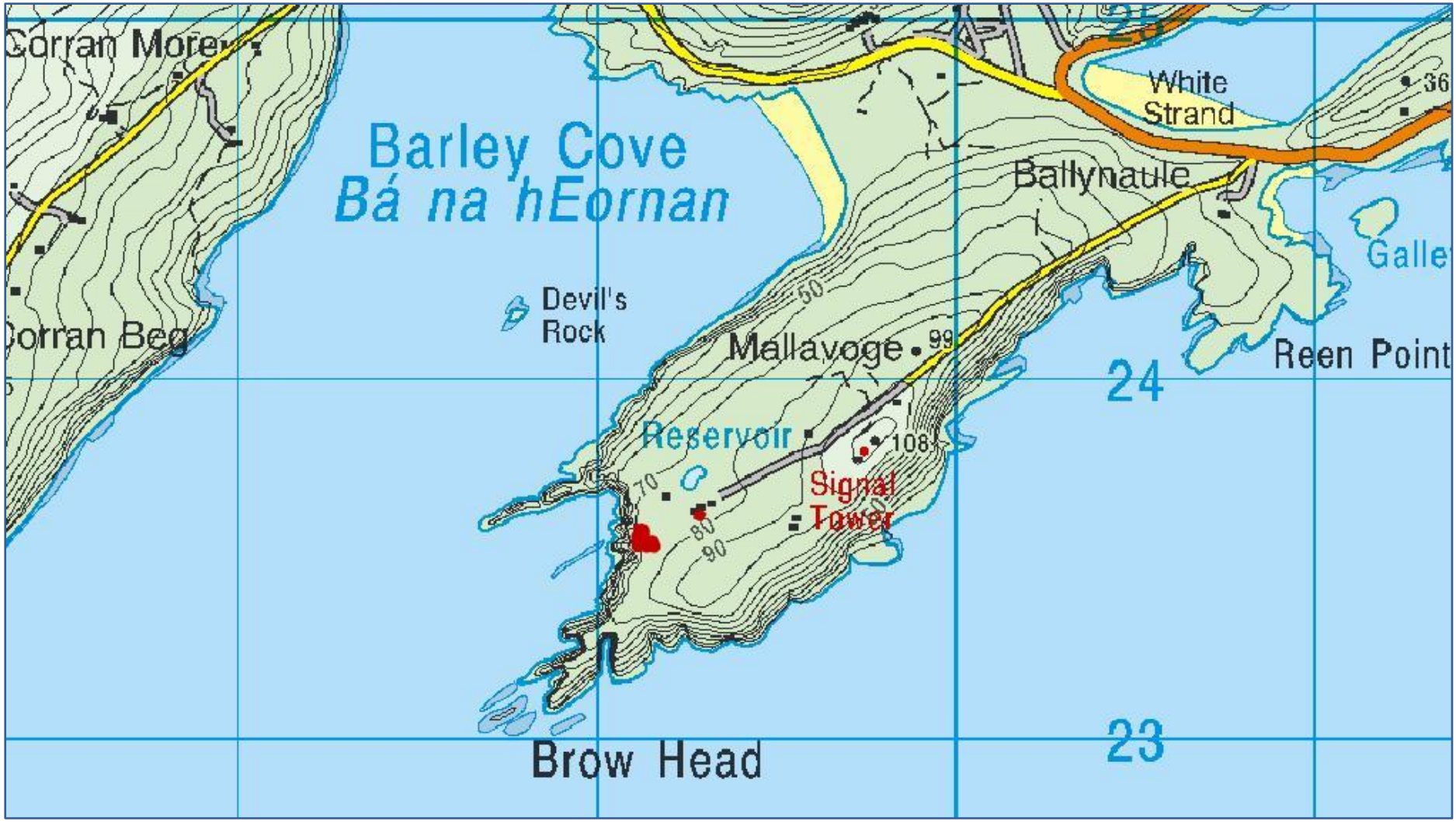

Figure 157 Ordnance Survey Discovery Series map, showing the location of the mine spoil (red outline) on Brow Head. (Scale is 1:15,000). Ordnance Survey Ireland Licence No EN 0059216 © Ordnance Survey Ireland / Government of Ireland.

Figure 158 Ordnance Survey 2005 aerial imagery, showing the mine spoil area (red outline) on Brow Head. (Scale is 1:3,000). Ordnance Survey Ireland Licence No EN 0059216 © Ordnance Survey Ireland / Government of Ireland.

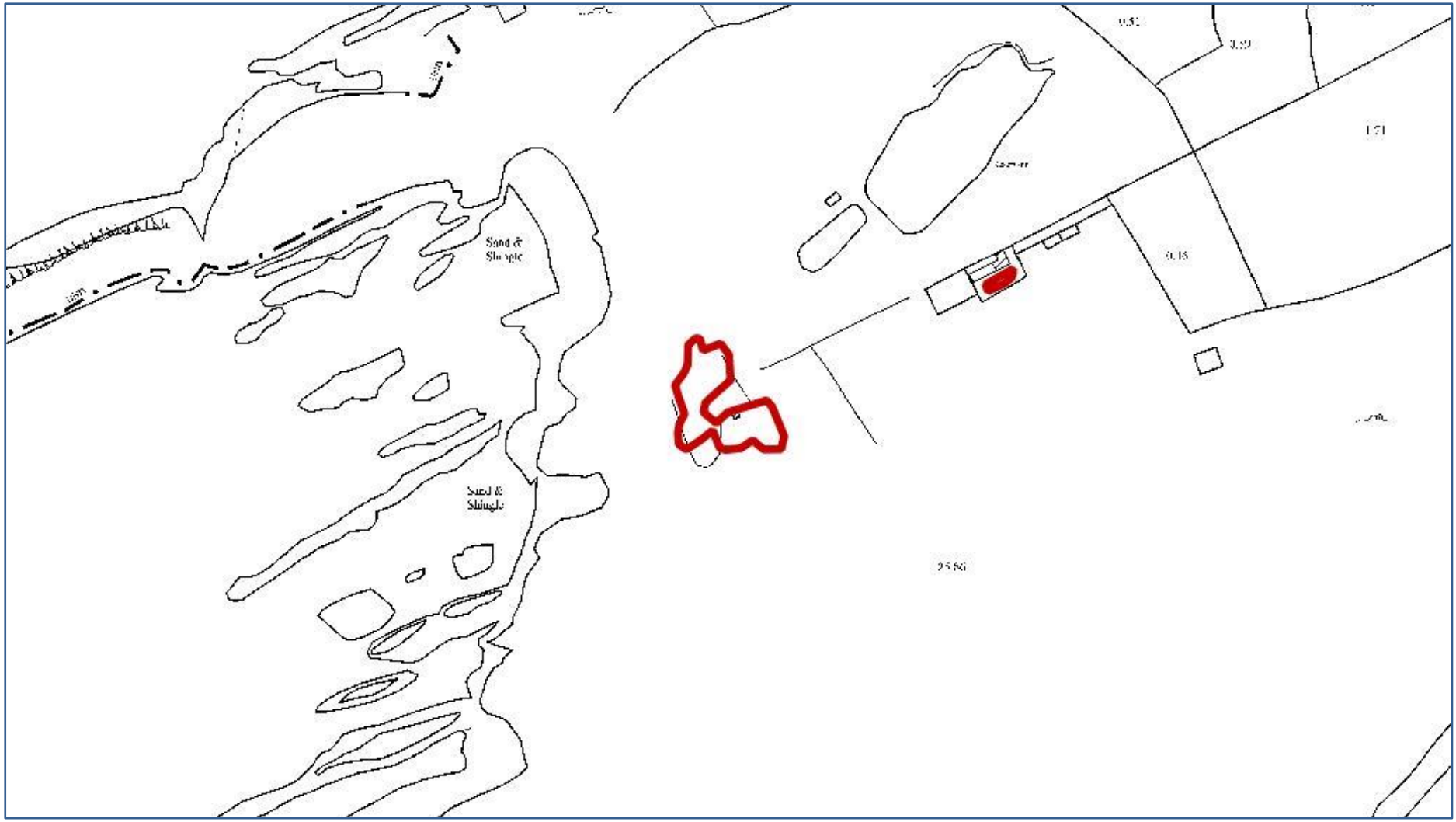

Figure 159 Ordnance Survey 1:5000 series map, showing the mine spoil area (red outline) on Brow Head. (Scale is 1:3,000). Ordnance Survey Ireland Licence No EN 0059216 © Ordnance Survey Ireland / Government of Ireland.

Site 26 Polleenateada

Site Name	OS Discovery map	Grid ref	County
Polleenateada	88	V78093069	Cork
Recorder	**Date**	**Conservation value**	
Rory Hodd	06/04/2018	Low	
Metallophyte species present 2008			
None			
Metallophyte species confirmed 2018			
None			
2018 site area (ha)	**2018 area 6130 (ha)**	**2008 area 6130 (ha)**	**Area change**
0.29	0.14	0.015	No change

Site description/changes since 2008
This site is located on an exposed clifftop and consists of a few ruined buildings, concrete-capped shafts and a small area of spoil, which stretches from close to the coast, along a track to a low quarried area, most of which has become flooded and has been succeeded by wetland vegetation. The spoil closest to the coast is on a steep slope and consists mainly of rock fragments, so does not support any vegetation, but the spoil in other areas is mostly stable and consolidated. Acid grassland is developing on the spoil in places, but not extensively. There is no evidence of change since 2008.

Description of Calaminarian grassland habitat
Calaminarian grassland occurs across most of the stable spoil, and is generally species poor, especially near the coast. *Armeria maritima* is the most frequent species, with strong patches of *Cephaloziella stellulifera* present in many places. *Scapania compacta* forms extensive stands away from the coastal area.

Impact code (2013)	Description	Location	Influence (+, -, 0)	Intensity (H,M,L)	% habitat affected
A04.02.02	non-intensive sheep grazing	Inside	0	M	100
G01.02	walking, horseriding and non-motorised vehicles	Inside	0	L	60
K01.01	erosion	Inside	-	L	30

Impact code (2018)	Description	Location	Influence (+, -, 0)	Intensity (H,M,L)	% habitat affected
A10	extensive grazing	Inside	0	M	100
F07	sports, tourism and leisure activities	Inside	0	L	60
L01	abiotic natural processes	Inside	-	L	30

Notes on management/impacting activities
Few pressing impacts are apparent, the land is grazed by sheep, and occasional walkers visit the area. The area of spoil closest to the sea is slowly eroding.

Conservation measures needed
No conservation measures are currently required.

Condition of Calaminarian grassland	%	Area (ha)
In good condition	100	0.14
In not-good condition	0	0
Condition not known	0	0

Parameter	Criterion	Result		Assessment
Area	Annual change in area	No decrease		Favourable
Structure and functions	No. of criteria passed	3		Favourable
	No. indicator spp.	3	Pass	
	Scrub encroachment	0%	Pass	
	Negative human impact	0%	Pass	
Future prospects				Favourable
Overall Assessment				Favourable

Overall assessment
This site can be considered to be in favourable condition, as there are no significant threats or pressures acting on the Calaminarian grassland habitat. It is considered as being of low conservation importance, due to the species-poor nature of the Calaminarian grassland present.

Habitats present on mine spoil resource	%
Calaminarian grassland	49
BL1 Stone walls	0.3
ED2 Bare spoil	30
ER1 Exposed siliceous rock	0.7
ER3 Siliceous loose rock	3
GS3 Dry-humid acid grassland	15
HH1 Dry heath	1
PF2 Poor flush	0.5
WS1 Scrub	0.5

Indicator metallophyte species present
Cephaloziella stellulifera
Scapania compacta
Solenostoma gracillimum

Other species present on mine spoil resource
Agrostis capillaris
Armeria maritima
Asplenium marinum
Brachythecium rutabulum
Bryum capillare
Bryum dichotomum
Bryum sauteri
Calluna vulgaris
Ceratodon purpureus
Cladonia sp.
Festuca rubra
Jasione montana

Kindbergia praelonga
Plantago coronopus
Poa annua
Pohlia annotina
Pohlia nutans
Prunella vulgaris
Rumex acetosa
Sagina procumbens
Saxifraga spathularis
Sedum anglicum
Silene uniflora
Taraxacum officinalis
Trichostomum brachydontium
Ulex europaeus
Ulex gallii
Viola riviniana

Photographs:

Figure 160 Overview of mine workings at Polleenateada, stretching inland from clifftop.

Figure 161 Calaminarian grassland vegetation close to clifftop, with cushions of *Armeria maritima* and mats of *Cephaloziella stellulifera*.

Figure 162 Loose bank of spoil inland of wet area, with some patches of Calaminarian grassland.

Figure 163 *Armeria maritima* and *Scapania compacta* in Calaminarian grassland at Polleenateada.

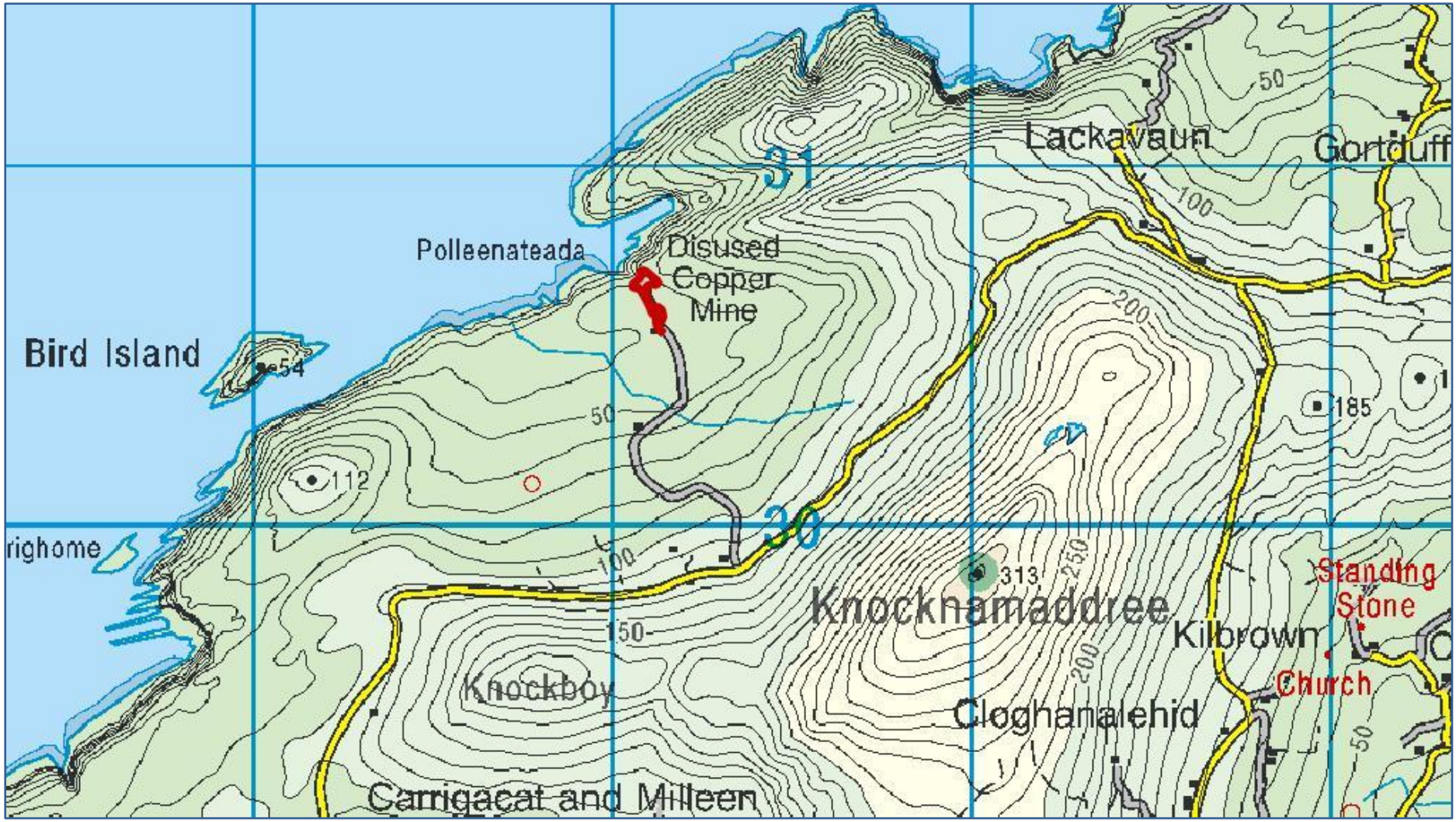

Figure 164 Ordnance Survey Discovery Series map, showing the location of the mine spoil (red outline) at Polleenateada. (Scale is 1:15,000). Ordnance Survey Ireland Licence No EN 0059216 © Ordnance Survey Ireland / Government of Ireland.

Figure 165 Ordnance Survey 2005 aerial imagery, showing the mine spoil area (red outline) at Polleenateada. (Scale is 1:3,000). Ordnance Survey Ireland Licence No EN 0059216 © Ordnance Survey Ireland / Government of Ireland.

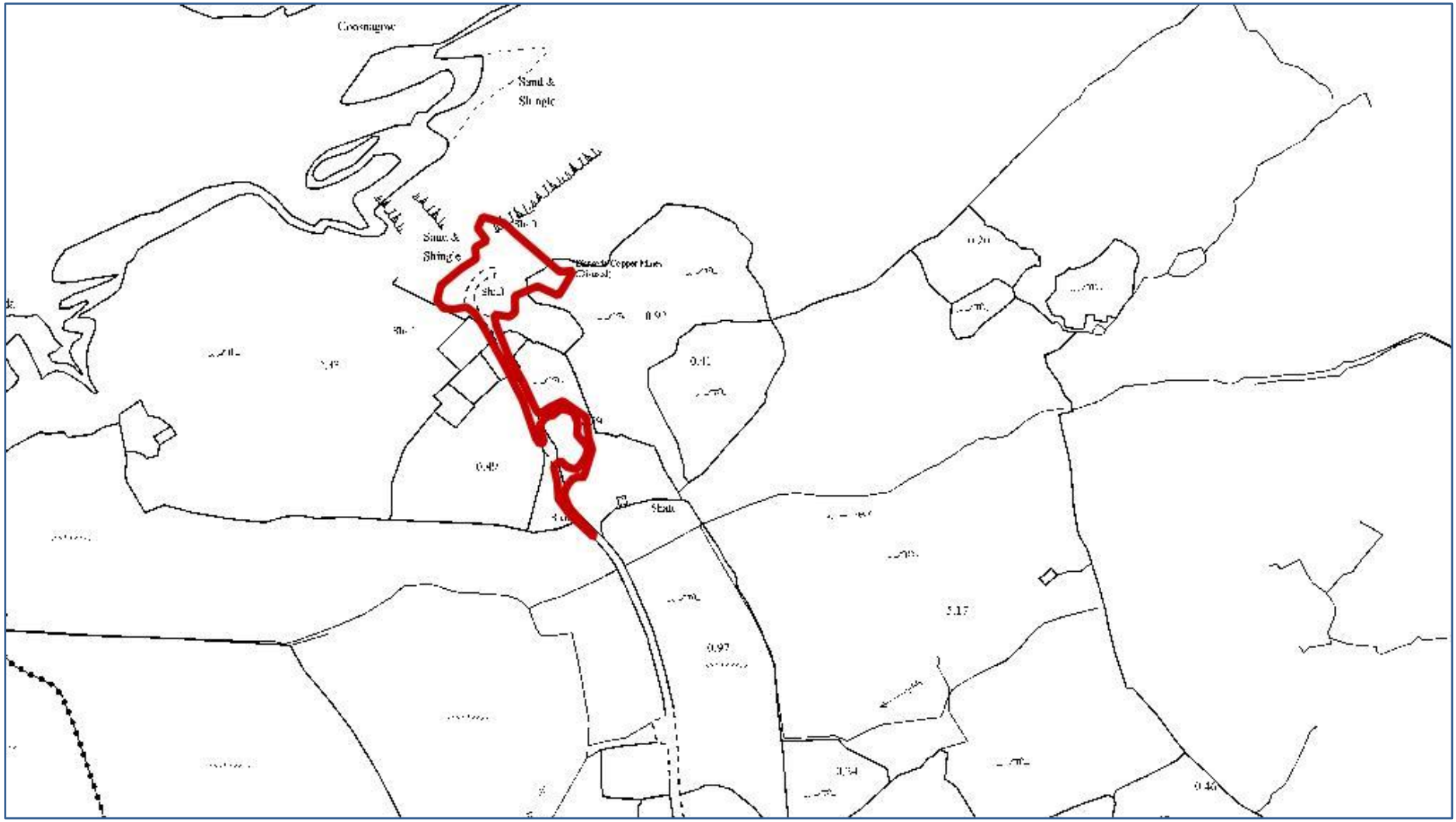

Figure 166 Ordnance Survey 1:5000 series map, showing the mine spoil area (red outline) at Polleenateada. (Scale is 1:3,000). Ordnance Survey Ireland Licence No EN 0059216 © Ordnance Survey Ireland / Government of Ireland.

Site 27 Lackamore

Site Name	OS Discovery map	Grid ref	County
Lackamore	59	R78846027	Tipperary
Recorder	**Date**	**Conservation value**	
Nick Hodgetts	16/02/2018	None	
Metallophyte species present 2008			
None			
Metallophyte species confirmed 2018			
None			

2018 site area (ha)	2018 area 6130 (ha)	2008 area 6130 (ha)	Area change
0	0	0.07	Complete loss

Site description/changes since 2008
This site no longer exists as a suitable habitat for metallophyte vegetation, and there is no Calaminarian grassland remaining. It now consists of 'improved' pasture, which is very wet, poached (possibly by horses) and very eutrophicated. One large heap of soil remains, but it consists of bare soil with ruderal vegetation colonising. A few very small patches of vegetation-poor ground remain, but these are eutrophicated and cannot be termed Calaminarian grassland. A local man approached about access said that the site had been cleared and converted to pasture less than 10 years ago.

Description of Calaminarian grassland habitat
None present. A few fragments of a *Cephaloziella* which might be *C. stellulifera* were collected from one of the small bare patches, but it was infertile and too small to identify with certainty.

Impact code (2013)	Description	Location	Influence (+, -, 0)	Intensity (H,M,L)	% habitat affected
A01	cultivation	Inside	-	H	100

Impact code (2018)	Description	Location	Influence (+, -, 0)	Intensity (H,M,L)	% habitat affected
A01	Conversion into agricultural land	Inside	-	H	100

Notes on management/impacting activities
The whole site has been converted to 'improved' pasture.

Conservation measures needed
None: the resource has now disappeared.

Condition of Calaminarian grassland	%	Area (ha)
In good condition	0	0
In not-good condition	0	0
Condition not known	0	0

Parameter	Criterion	Result		Assessment
Area	annual change in area	Complete loss		Unfavourable-bad
Structure and functions	No. of criteria passed	1		Unfavourable-inadequate
	No. indicator spp.	0	Fail	
	Scrub encroachment	0%	Pass	
	Negative human impact	100%	Fail	
Future prospects				Unfavourable-bad
Overall Assessment				Unfavourable-bad

Overall assessment
The whole site has been converted to 'improved' pasture. A few very small patches of vegetation-poor ground remain, and a fragment of *Cephaloziella* sp. was collected. There is no realistic prospect of Calaminarian grassland vegetation returning. *Blasia pusilla*, found on the soil heap, is a new county record. This site should not be monitored in future.

Habitats present on mine spoil resource	%
GA1 Improved agricultural grassland	90
ED3 Recolonising bare ground	10

Indicator metallophyte species present
None

Other species present on mine spoil resource
Blasia pusilla
Brachythecium rivulare
Brachythecium rutabulum
Bryum capillare
Bryum dichotomum
Calliergonella cuspidata
Cephaloziella sp.
Ceratodon purpureus
Dichodontium pellucidum
Dicranella varia
Hylocomium splendens
Kindbergia praelonga
Racomitrium lanuginosum
Rhytidiadelphus squarrosus
Rumex acetosella
Trifolium repens

Photographs:

Figure 167 General view over area at Lackamore that was previously open spoil.

Figure 168 Close-up of grassland at Lackamore in location where Calaminarian grassland previously occurred.

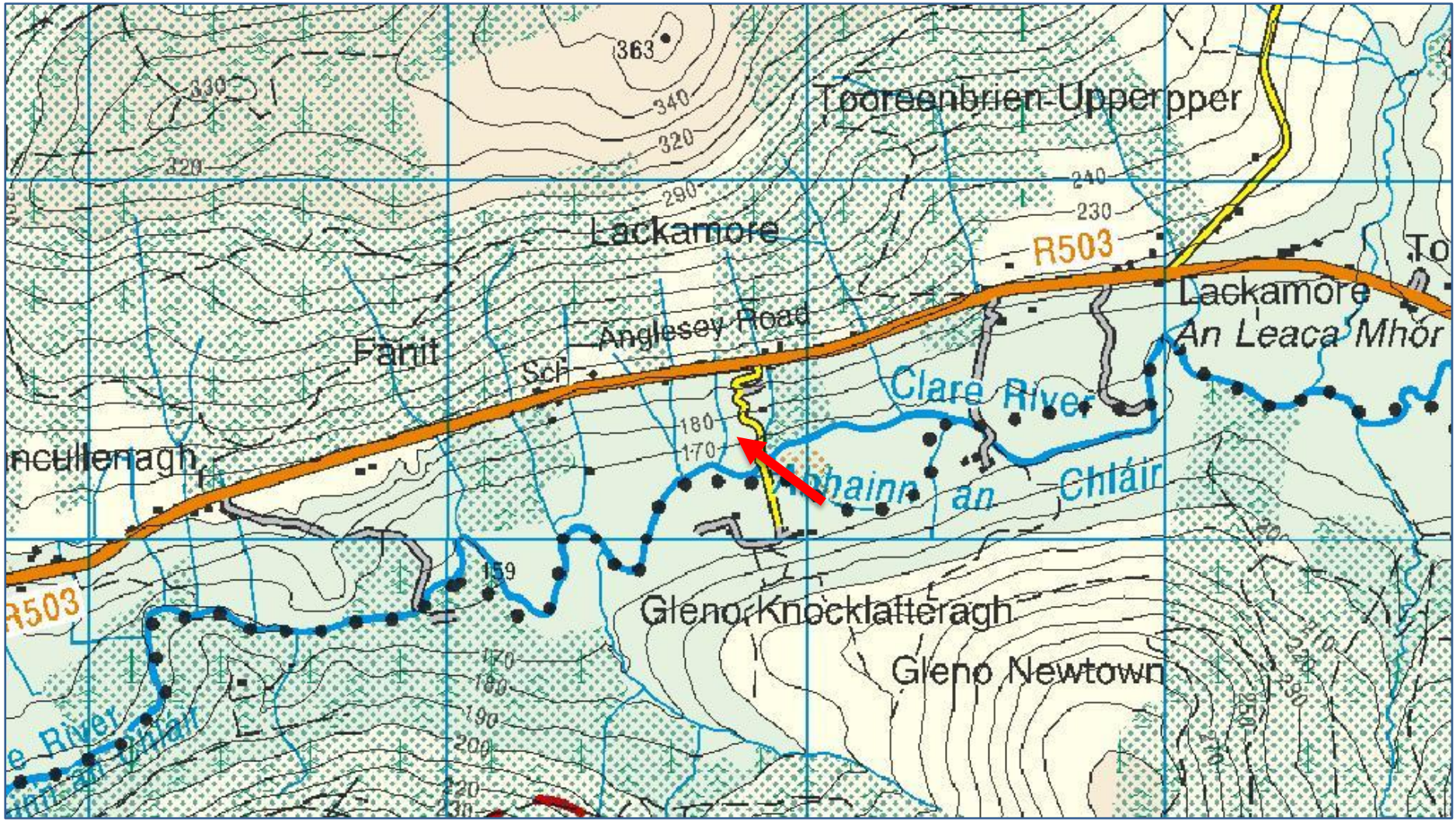

Figure 169 Ordnance Survey Discovery Series map, showing the former location of bare spoil at Lackamore. (Scale is 1:15,000). Ordnance Survey Ireland Licence No EN 0059216 © Ordnance Survey Ireland / Government of Ireland.

Site 28 Shallee

Site Name	**OS Discovery map**	**Grid ref**	**County**
Shallee	59	R806712	Tipperary
Recorder	**Date**	**Conservation value**	
Nick Hodgetts	17/02/2018, 19/02/2018	High	
Metallophyte species present 2008 *Cephaloziella nicholsonii, Ditrichum plumbicola*			
Metallophyte species confirmed 2018 *Cephaloziella nicholsonii*			

2018 site area (ha)	**2018 area 6130 (ha)**	**2008 area 6130 (ha)**	**Area change**
2.3	0.472	0.9	Significant decrease

Site description/changes since 2008

This is an extensive area of old lead mine workings. It is apparently similar to as it was in 2008 but the engine house is now restored, and gorse has generally advanced further into areas of Calaminarian grassland. A network of tall palisade fencing restricts access to some extent, but David Holyoak's Q65–68 were accessible behind a simple wooden fence, and the other localities for *Ditrichum plumbicola* were accessible (just) through a breach in the fence and after a battle with gorse. Almost the entire western end of the site north of the main track is used as a dump, with much rubbish burning also having taken place. Most areas behind fencing are now thickly colonised with gorse. There is an area of sandy grassland just north of the engine house, but it is occupied mainly by common large pleurocarpous mosses, and is not Calaminarian grassland.

Description of Calaminarian grassland habitat

There are many small stands of Calaminarian grassland scattered in the vicinity of David Holyoak's quadrats Q65–68, and south of the main track in the western part of the site, where *Ditrichum plumbicola* was recorded in the past. However, all are being encroached upon by gorse (Q68 has been completely overwhelmed). *Cephaloziella stellulifera* is locally abundant, as is *Weissia controversa* (incl. 'var. *densifolia*'). A very small scrap of *C. nicholsonii* was located in more or less the same place as in 2008, but *Ditrichum plumbicola* could not be refound anywhere, in spite of extensive survey in the vicinity of its known stands, and a return visit. Some stands (west part of site) have been overrun by gorse, brambles and heather. *Dicranella varia* is abundant, and very small *D. varia* often occupies niches where *D. plumbicola* might be found. A minute scrap of what could be *D. plumbicola* was collected, but it was so small and alga-encrusted that it was unidentifiable. There is a film of algae covering much of the surface, which is clearly detrimental to the bryophytes. The extensive dumping, burning and vandalism is also evident in stands of Calaminarian grassland, where there is often much rubbish, including broken bottles.

Impact code (2013)	**Description**	**Location**	**Influence (+, -, 0)**	**Intensity (H,M,L)**	**% habitat affected**
E03.01	disposal of household waste	Inside	-	H	70
G05.09	fencing	Outside	0	L	100
H04	air pollution	Outside	-	H	100
K02.01	succession	Inside	-	H	50

Impact code (2018)	Description	Location	Influence (+, -, 0)	Intensity (H,M,L)	% habitat affected
F09	deposition of waste	Inside	-	H	70
H06	restrictive access to site	Outside	0	L	100
J03	air pollution	Outside	-	H	100
L02	natural succession	Inside	-	H	50

Notes on management/impacting activities
Much of this site is fairly dangerous due to broken glass and industrial refuse.

Conservation measures needed
Control of the gorse must be a high priority, but it is much more difficult to know what to do about the layer of algae that is covering most of the Calaminarian grassland habitat and affecting the bryophytes, as its cause is possibly linked to the ever-increasing amount of nitrogen in the environment generally, owing to agricultural practices and vehicle emissions.

Conservation measure code	Description
CL01	Management of habitats (others than agriculture and forest) to slow, stop or reverse natural processes

Condition of Calaminarian grassland	%	Area (ha)
In good condition	10	0.047
In not-good condition	90	0.425
Condition not known	0	0

Parameter	Criterion	Result		Assessment
Area	annual change in area	decrease		Unfavourable-inadequate
Structure and functions	No. of criteria passed	1		Unfavourable-inadequate
	No. indicator spp.	5	Pass	
	Scrub encroachment	50%	Fail	
	Negative human impact	90%	Fail	
Future prospects				Unfavourable-bad
Overall Assessment				Unfavourable-bad

Overall assessment
This site is assessed as unfavourable because of the encroachment of gorse, the general deterioration owing to eutrophication/pollution, possibly from atmospheric nitrogen, and the fact that *Ditrichum plumbicola* could not be refound, and *Cephaloziella nicholsonii* was found only in very small quantity.

Habitats present on mine spoil resource	%
Calaminarian grassland	20
BL3 Buildings and artificial surfaces	1
ED2 Spoil and bare ground	37.5
HH1 Dry heath	1
HH3 Wet heath	0.5
WS1 Scrub	40

Indicator metallophyte species present
Cephaloziella nicholsonii
Bryum cf. *pallescens*
Cephaloziella stellulifera
Solenostoma gracillimum
Weissia controversa var. *densifolia*

Other species present on mine spoil resource
Agrostis capillaris
Aneura pinguis
Bryum dichotomum
Bryum pseudotriquetrum
Calluna vulgaris
Campylium stellatum
Cephalozia bicuspidata
Cephaloziella divaricata
Ceratodon purpureus
Cratoneuron filicinum
Dicranella varia
Didymodon sp.
Diplophyllum albicans
Hylocomium splendens
Hypnum jutlandicum
Molinia caerulea
Pogonatum aloides
Pohlia nutans
Pseudoscleropodium purum
Sagina procumbens
Solidago virgaurea
Ulex europaeus

Metallophyte species	**Grid ref**	**Extent**	**Notes**
Cephaloziella nicholsonii	R8064771285	1x1cm	Tiny fragment in algal film, with *C. stellulifera* and *Dicranella varia*

Photographs:

Figure 170 General view across spoil area at Shallee, interspersed with scrub, where patches of Calaminarian grassland occur.

Figure 171 Scattered patches of Calaminarian grassland at Shallee.

Figure 172 Calaminarian grassland habitat with sparse bryophyte cover and much impact from dumping.

Figure 173 Location where *Ditrichum plumbicola* was formerly found, now swamped by scrub and coarse vegetation.

Figure 174 Dense gorse scrub covering mine spoil habitat at Shallee.

Figure 175 Degraded area where burning and dumping has taken place on spoil.

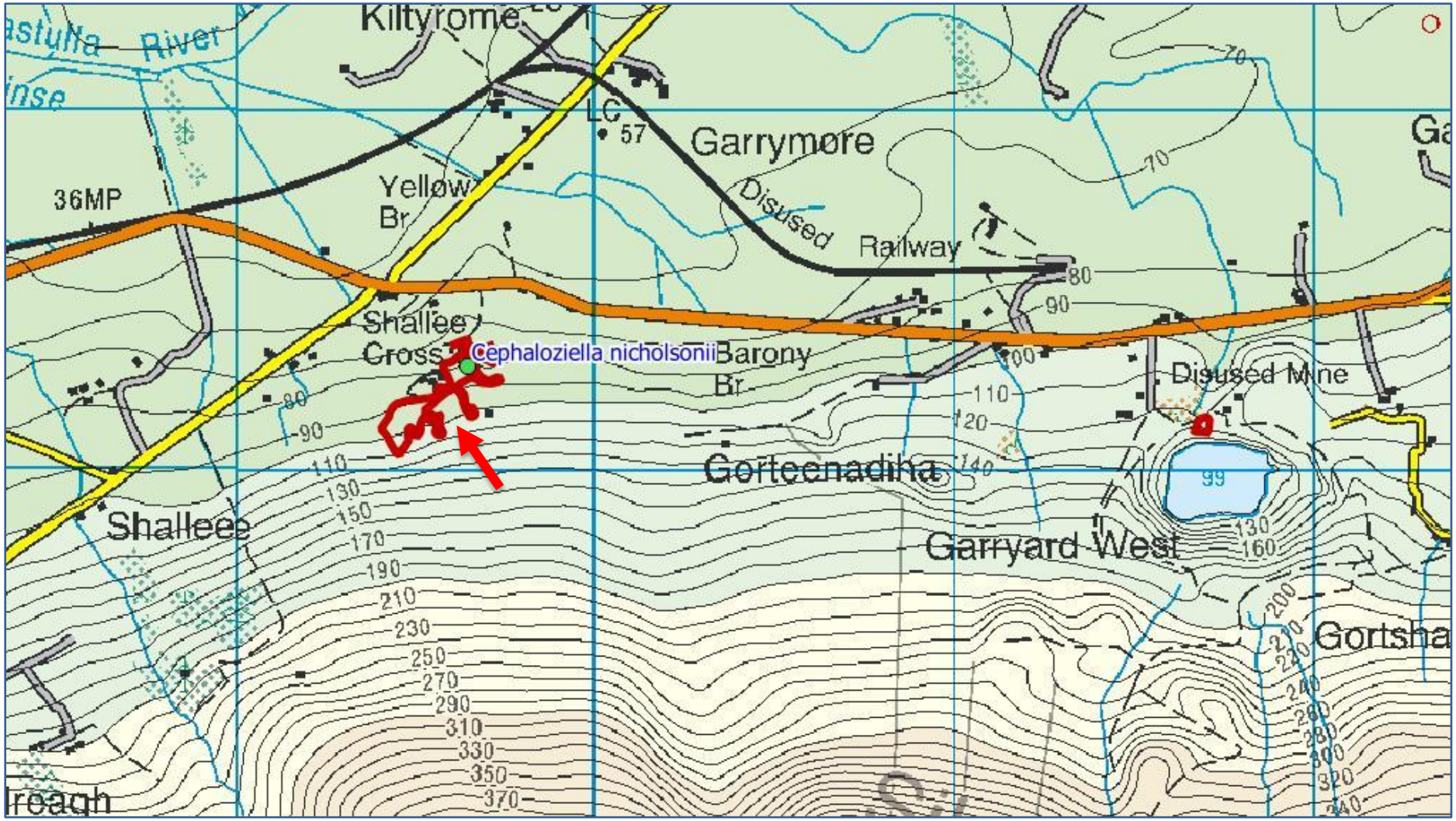

Figure 176 Ordnance Survey Discovery Series map, showing the location of the mine spoil (red outline) surveyed and rare species (green dot) in the Silvermines, the spoil area at Shallee is indicated by the red arrow. (Scale is 1:15,000). Ordnance Survey Ireland Licence No EN 0059216 © Ordnance Survey Ireland / Government of Ireland.

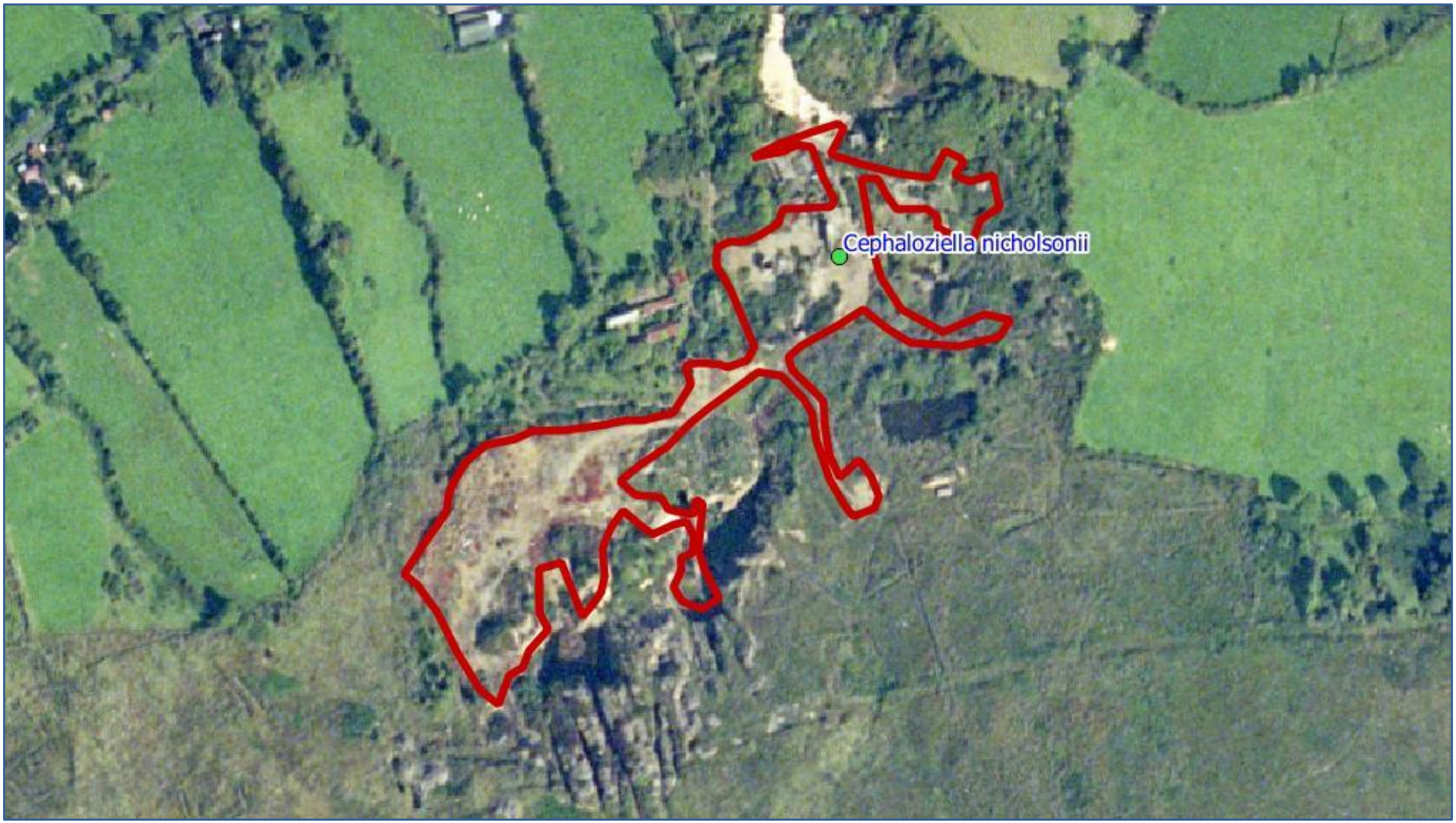

Figure 177 Ordnance Survey 2005 aerial imagery, showing the mine spoil area (red outline) and location of rare species (green dot) at Shallee. (Scale is 1:3,000). Ordnance Survey Ireland Licence No EN 0059216 © Ordnance Survey Ireland / Government of Ireland.

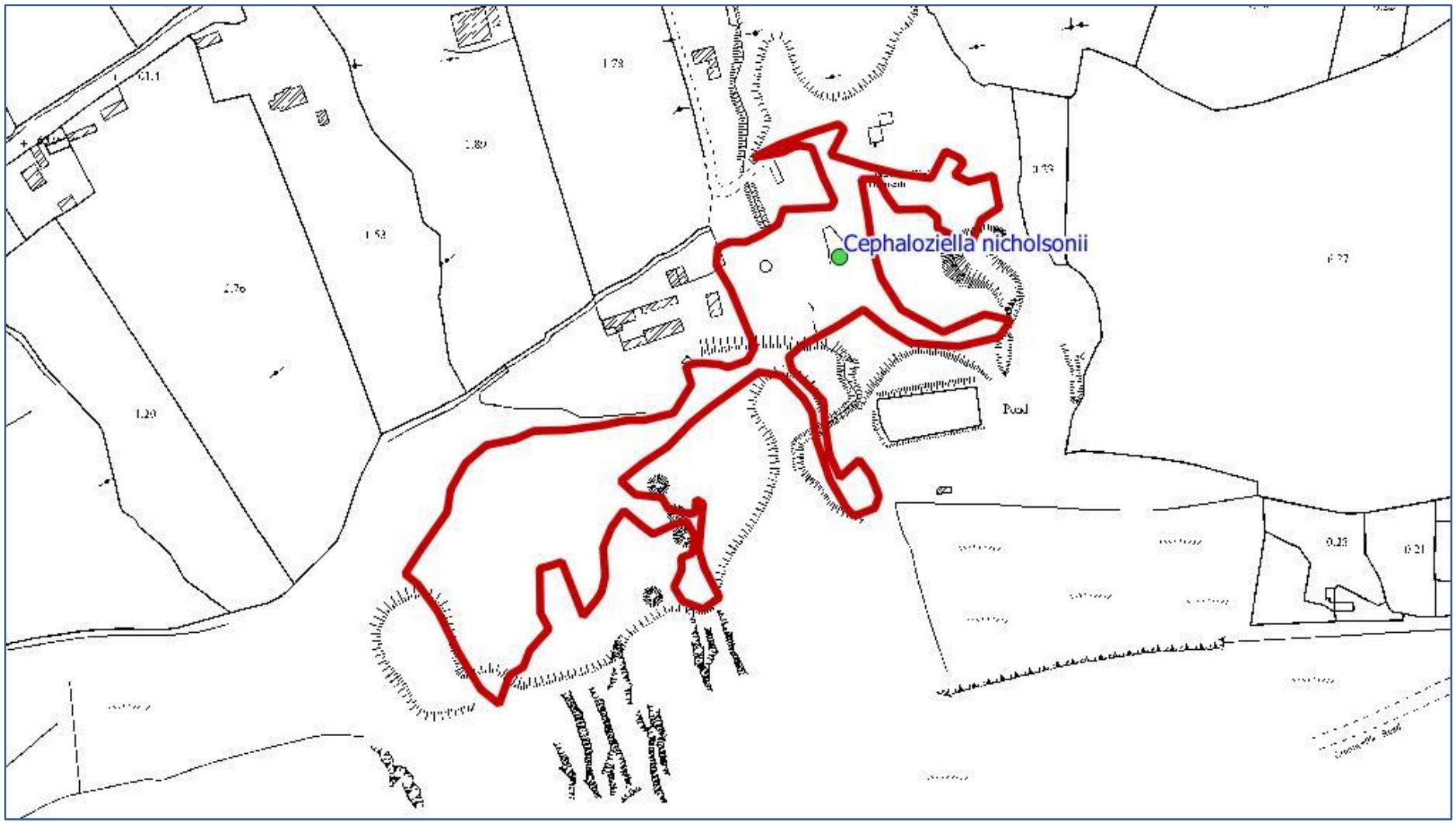

Figure 178 Ordnance Survey 1:5000 series map, showing the mine spoil area (red outline) and location of rare species (green dot) at Shallee. (Scale is 1:3,000). Ordnance Survey Ireland Licence No EN 0059216 © Ordnance Survey Ireland / Government of Ireland.

Site 29 Garryard West

Site Name	**OS Discovery map**	**Grid ref**	**County**
Garryard West	59	R826710	Tipperary
Recorder	**Date**	**Conservation value**	
Nick Hodgetts	16/02/2018	Low	
Metallophyte species present 2008			
None			
Metallophyte species confirmed 2018			
None			

2018 site area (ha)	**2018 area 6130 (ha)**	**2008 area 6130 (ha)**	**Area change**
0.13	0.04	0.19	Significant decrease

Site description/changes since 2008

This is a large area of quarry workings, mostly covered with old mine buildings, tarmac, bare ground with ruderal vegetation, heaps of spoil with common species, etc. In spite of security notices, a local woman approached about access said that the site was 'used by everybody'. There is now extensive palisade fencing in place, making much of this potentially dangerous site inaccessible. There is extensive growth of gorse and there are many instances of illegal dumping. A horse was grazing near one of the old mine buildings.

Description of Calaminarian grassland habitat

There is very little Calaminarian grassland, confined to a slipped slope above the lake. David Holyoak's Q69 was too dangerous and inaccessible to examine, now behind a tall palisade fence, on eroding ground in a gully going down to the lake. *Cephaloziella stellulifera* is probably still there, but the gully, like many other areas, is being progressively colonised by gorse.

Impact code (2013)	**Description**	**Location**	**Influence (+, -, 0)**	**Intensity (H,M,L)**	**% habitat affected**
G05.09	fencing	Outside	0	L	100
K01.01	erosion	Inside	0	H	60
K02.01	succession	Inside	-	H	40

Impact code (2018)	**Description**	**Location**	**Influence (+, -, 0)**	**Intensity (H,M,L)**	**% habitat affected**
H06	restrictive access to site	Outside	0	L	100
L01	abiotic natural processes	Inside	0	H	60
L02	natural succession	Inside	-	H	40

Notes on management/impacting activities

The main impact on the tiny fragment of Calaminarian grassland is the spread of gorse. The same local woman who was approached about access said that the site is earmarked for a 'big hydropower scheme', of which construction had begun when the site was passed in October 2018. What effect this will have on the small area of Calaminarian grassland is unknown.

Conservation measures needed
Management of the gorse is needed to keep the small area of Calaminarian grassland clear, if it is thought worthwhile.

Conservation measure code	Description
CL01	Management of habitats (others than agriculture and forest) to slow, stop or reverse natural processes

Condition of Calaminarian grassland	%	Area (ha)
In good condition	70	0.03
In not-good condition	30	0.01
Condition not known	0	0

Parameter	Criterion	Result		Assessment
Area	annual change in area	Significant decrease		Unfavourable-inadequate
Structure and functions	No. of criteria passed	1		Unfavourable-inadequate
	No. indicator spp.	3	Pass	
	Scrub encroachment	40%	Fail	
	Negative human impact	30%	Fail	
Future prospects				Unfavourable-bad
Overall Assessment				Unfavourable-bad

Overall assessment
This is not an important site for Calaminarian grassland. The very small area of Calaminarian grassland is under threat from gorse expansion and is considered in unfavourable condition.

Habitats present on mine spoil resource	%
Calaminarian grassland	30
ED2 Spoil and bare ground	30
WS1 Scrub	40

Indicator metallophyte species present
Bryum cf. *pallescens*
Gymnocolea inflata
Solenostoma gracillimum

Other species present on mine spoil resource
Agrostis capillaris
Aneura pinguis
Bryum dichotomum
Bryum pallens
Cephaloziella sp.
Dicranella varia
Didymodon tophaceus
Festuca rubra
Funaria hygrometrica
Jungermannia atrovirens
Ulex europaeus

Photographs:

Figure 179 Fenced off area of spoil at Garryard West, with sparse Calaminarian grassland present.

Figure 180 View of steep unstable area of spoil at Garryard West with Calaminarian grassland present.

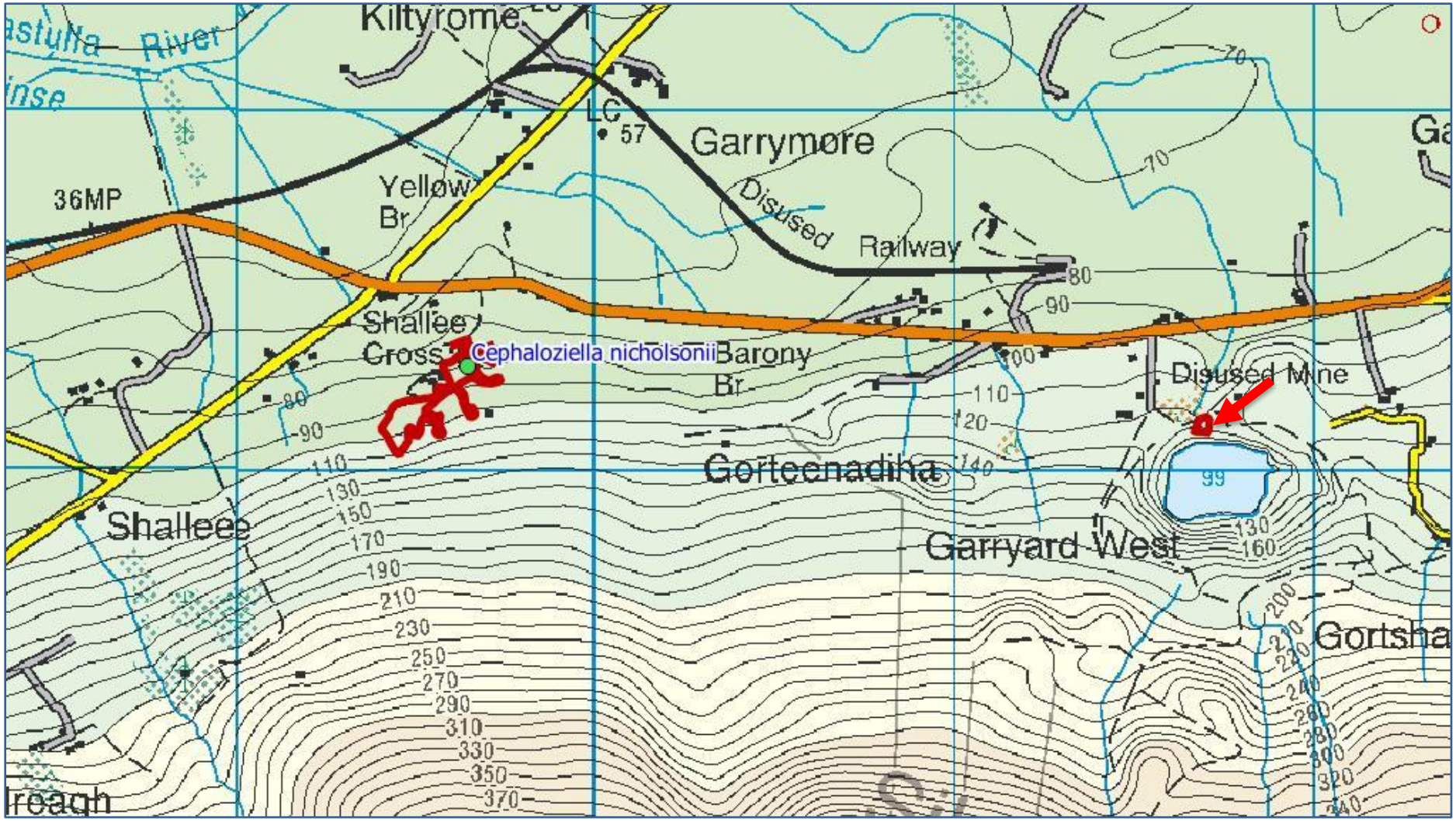

Figure 181 Ordnance Survey Discovery Series map, showing the location of the mine spoil (red outline) surveyed and rare species (green dot) in the Silvermines, the spoil area at Garryard West is indicated by the red arrow. (Scale is 1:15,000). Ordnance Survey Ireland Licence No EN 0059216 © Ordnance Survey Ireland / Government of Ireland.

Figure 182 Ordnance Survey 2005 aerial imagery, showing the mine spoil area (red outline) at Garryard West. (Scale is 1:3,000). Ordnance Survey Ireland Licence No EN 0059216 © Ordnance Survey Ireland / Government of Ireland.

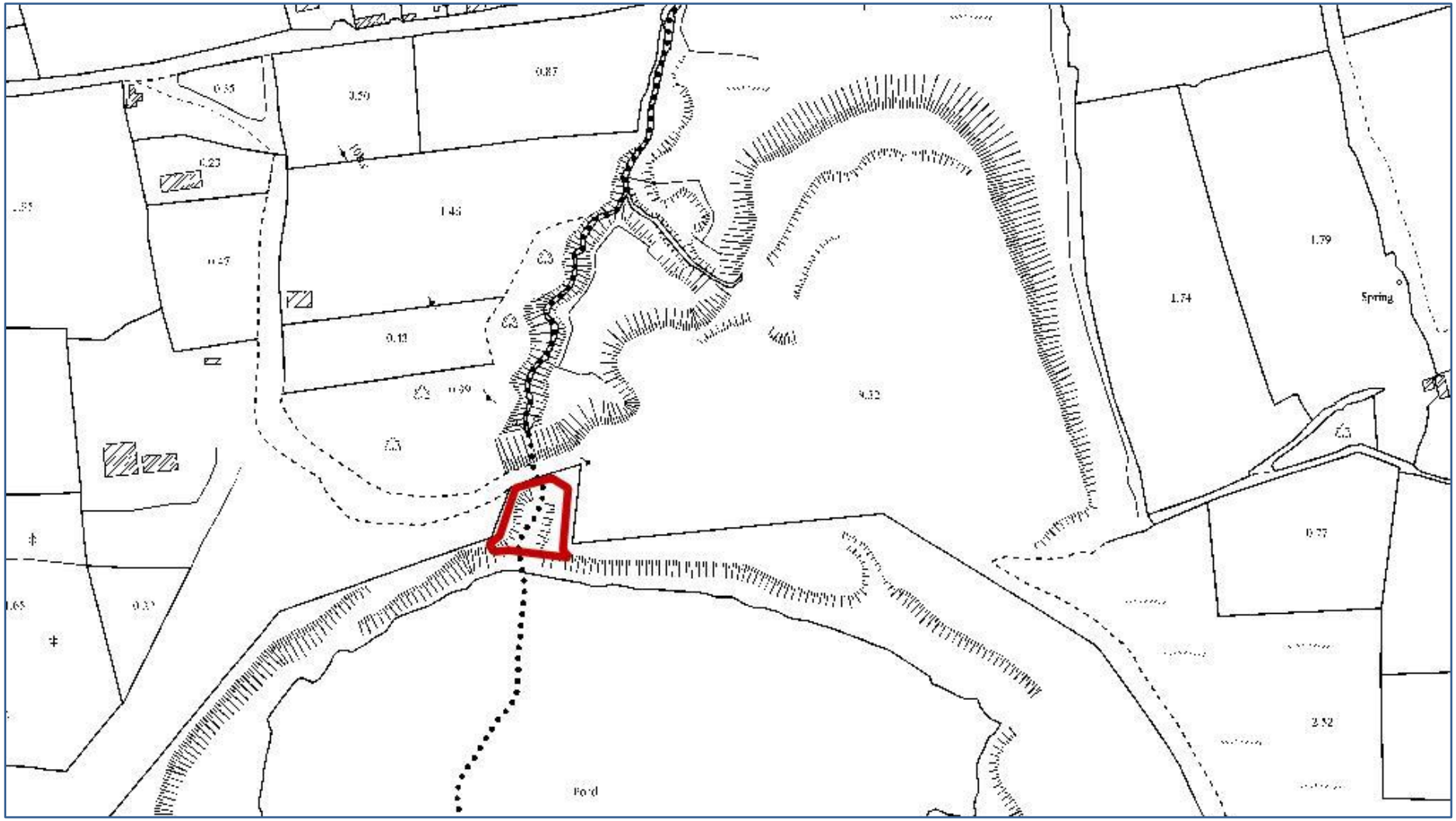

Figure 183 Ordnance Survey 1:5000 series map, showing the mine spoil area (red outline) at Garryard West. (Scale is 1:3,000). Ordnance Survey Ireland Licence No EN 0059216 © Ordnance Survey Ireland / Government of Ireland.

Site 30 Ballyhickey

Site Name	**OS Discovery map**	**Grid ref**	**County**
Ballyhickey	58	R41737687	Clare
Recorder	**Date**	**Conservation value**	
Nick Hodgetts	18/02/2018	Low	
Metallophyte species present 2008 None			
Metallophyte species confirmed 2018 None			

2018 site area (ha)	**2018 area 6130 (ha)**	**2008 area 6130 (ha)**	**Area change**
0.06	0.011	0.009	No change

Site description/changes since 2008
This is a small disused lead mine in wet cattle pasture. Only small remnants of the old mine site now exist. There has apparently been little change, but the edges of the pond (old quarry) are now fenced off and more vegetated with thick grass.

Description of Calaminarian grassland habitat
The small area of Calaminarian grassland at the old mine buildings appears to have changed very little, with much the same flora present. A previously surveyed area was inaccessible behind a fence, but from a distance looked unlikely to be interesting. As in 2008, no specialist metallophyte species were seen.

Impact code (2013)	**Description**	**Location**	**Influence (+, -, 0)**	**Intensity (H,M,L)**	**% habitat affected**
A04.01.01	Intensive cattle grazing	Inside	-	M	70
G01.03.02	off-road motorized driving	Inside	-	L	70
G05.09	fencing	Outside	-	M	30
H02.06	groundwater pollution due to agricultural activities	Outside	-	M	100

Impact code (2018)	**Description**	**Location**	**Influence (+, -, 0)**	**Intensity (H,M,L)**	**% habitat affected**
A09	Intensive grazing by livestock	Inside	-	M	70
A26	Agricultural activities generating diffuse pollution to surface or ground waters	Outside	-	M	100
A36	Other agricultural activities	Inside	-	L	70
H06	restrictive access to site	Outside	-	M	30

Notes on management/impacting activities
The surrounding pasture is wet and eutrophicated, cattle-poached and with abundant vehicle tracks. The nutrient enrichment presumably extends onto the fragments of Calaminarian grassland.

Conservation measures needed
No measures are recommended, as this site is not particularly interesting or important. If some remedial action were to be taken, it might include fencing the mine buildings to protect the Calaminarian grassland from cattle and vehicular damage, and perhaps scraping to expose more substrate to encourage more metallophytes. Some grazing within the fenced area by the water-filled quarry might be desirable to address the thick sward of grass.

Condition of Calaminarian grassland	%	Area (ha)
In good condition	0	0
In not-good condition	100	0.011
Condition not known	0	0

Parameter	Criterion	Result		Assessment
Area	annual change in area	No change		Favourable
Structure and functions	No. of criteria passed	1		Unfavourable-inadequate
	No. indicator spp.	0	Fail	
	Scrub encroachment	0%	Pass	
	Negative human impact	100%	Fail	
Future prospects				Unfavourable-bad
Overall Assessment				Unfavourable-bad

Overall assessment
Unfavourable. There are no specialist species, and the site is impacted by nutrient enrichment, cattle and vehicular damage.

Habitats present on mine spoil resource	%
Calaminarian grassland	20
ED2 Spoil and bare ground	15
GA1 Improved agricultural grassland	65

Indicator metallophyte species present
None

Other species present on mine spoil resource
Agrostis stolonifera
Bryum dichotomum
Bryum pseudotriquetrum
Dicranella varia
Festuca rubra
Rumex acetosella
Thymus polytrichus

Photographs:

Figure 184 General view of spoil area and mine building at Ballyhickey, showing impacts from agricultural activity.

Figure 185 Calaminarian grassland and old building at Ballyhickey.

Figure 186 Calaminarian grassland vegetation at Ballyhickey.

Figure 187 Coarse grassland alongside pond, covering what was formerly Calaminarian grassland.

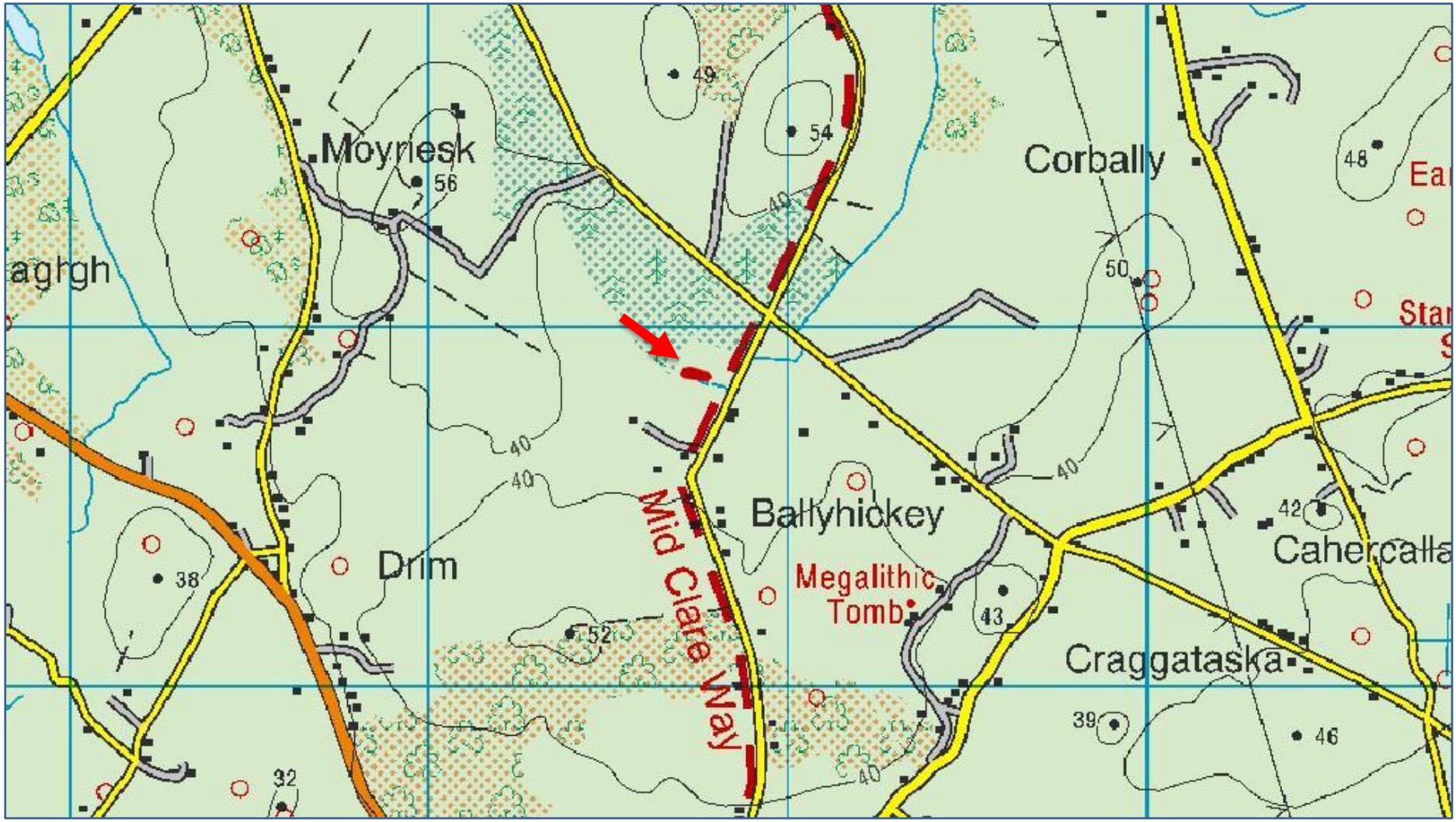

Figure 188 Ordnance Survey Discovery Series map, showing the location of the mine spoil (red outline) at Ballyhickey. (Scale is 1:15,000). Ordnance Survey Ireland Licence No EN 0059216 © Ordnance Survey Ireland / Government of Ireland.

Figure 189 Ordnance Survey 2005 aerial imagery, showing the mine spoil area (red outline) at Ballyhickey. (Scale is 1:3,000). Ordnance Survey Ireland Licence No EN 0059216 © Ordnance Survey Ireland / Government of Ireland.

Figure 190 Ordnance Survey 1:5000 series map, showing the mine spoil area (red outline) at Ballyhickey. (Scale is 1:3,000). Ordnance Survey Ireland Licence No EN 0059216 © Ordnance Survey Ireland / Government of Ireland.

Site 31 Sheshodonnell East

Site Name	**OS Discovery map**	**Grid ref**	**County**
Sheshodonnell East	51	R26869690	Clare
Recorder	**Date**	**Conservation value**	
Nick Hodgetts	18/02/2018	Moderate	
Metallophyte species present 2008 None			
Metallophyte species confirmed 2018 None			

2018 site area (ha)	**2018 area 6130 (ha)**	**2008 area 6130 (ha)**	**Area change**
0.03	0.009	0.014	No change

Site description/changes since 2008

This is a small old lead/zinc mine in a wide flat area of limestone pavement. There has not been much change, but it has become somewhat more vegetated, especially with *Minuartia verna*. Cattle are still an issue, with the wetter parts poached and somewhat eutrophicated with cattle dung. It is therefore probably gradually deteriorating.

Description of Calaminarian grassland habitat

The small areas of Calaminarian grassland on and around the old mine spoil support a limited metallophyte flora, together with a more conventional calcicole flora. *Minuartia verna* is unusually abundant, and *Cephaloziella stellulifera* is not uncommon, with *Bryum dichotomum, Ceratodon purpureus, Dicranella varia* and *Weissia controversa* (incl. 'var. *densifolia*'). Some of the wetter areas of Calaminarian grassland have become cattle-poached. David Holyoak's Q75 is now under a thick grassy sward. The overall extent of Calaminarian grassland has probably declined very slightly, but not significantly, so no change is recorded above.

Impact code (2013)	**Description**	**Location**	**Influence (+, -, 0)**	**Intensity (H,M,L)**	**% habitat affected**
A04.01.01	Intensive cattle grazing	Inside	-	M	80

Impact code (2018)	**Description**	**Location**	**Influence (+, -, 0)**	**Intensity (H,M,L)**	**% habitat affected**
A09	Intensive grazing by livestock	Inside	-	M	80

Notes on management/impacting activities

The impact of the cattle grazing is partly mechanical and partly from nutrient enrichment from their dung.

Conservation measures needed

Measures to reduce cattle grazing should be taken, but grazing should not be completely excluded, as that would risk the site being overrun with coarse vegetation.

Conservation measure code	**Description**
CA05	Adapt mowing, grazing and other equivalent agricultural activities

Condition of Calaminarian grassland	%	Area (ha)
In good condition	20	0.002
In not-good condition	80	0.007
Condition not known	0	0

Parameter	Criterion	Result		Assessment
Area	annual change in area	No decrease		Favourable
Structure and functions	No. of criteria passed	2		Unfavourable-inadequate
	No. indicator spp.	4	Pass	
	Scrub encroachment	0%	Pass	
	Negative human impact	80%	Fail	
Future prospects				Unfavourable-inadequate
Overall Assessment				Unfavourable-inadequate

Overall assessment
There has not been much change at this site, which has a very limited interest, but the effect of the cattle mean that overall it is assessed as unfavourable.

Habitats present on mine spoil resource	%
Calaminarian grassland	30
ED2 Spoil and bare ground	15
ER2 Exposed calcareous rock	30
GS1 Dry calcareous and neutral grassland	25

Indicator metallophyte species present
Bryum cf. *pallescens*
Cephaloziella stellulifera
Minuartia verna
Weissia controversa var. *densifolia*

Other species present on mine spoil resource
Bryum capillare
Bryum dichotomum
Cerastium fontanum
Dichodontium pellucidum
Dicranella varia
Festuca rubra
Hylocomium splendens
Plantago lanceolata
Rumex acetosa
Schistidium crassipilum
Succisa pratensis

Photographs:

Figure 191 View of spoil area at Sheshodonnell East, with scattered patches of Calaminarian grassland.

Figure 192 Calaminarian grassland at Sheshodonnell East, with *Minuartia verna* prominent alongside bryophytes.

Figure 193 Calaminarian grassland with *Minuartia verna*, showing signs of poaching by cattle.

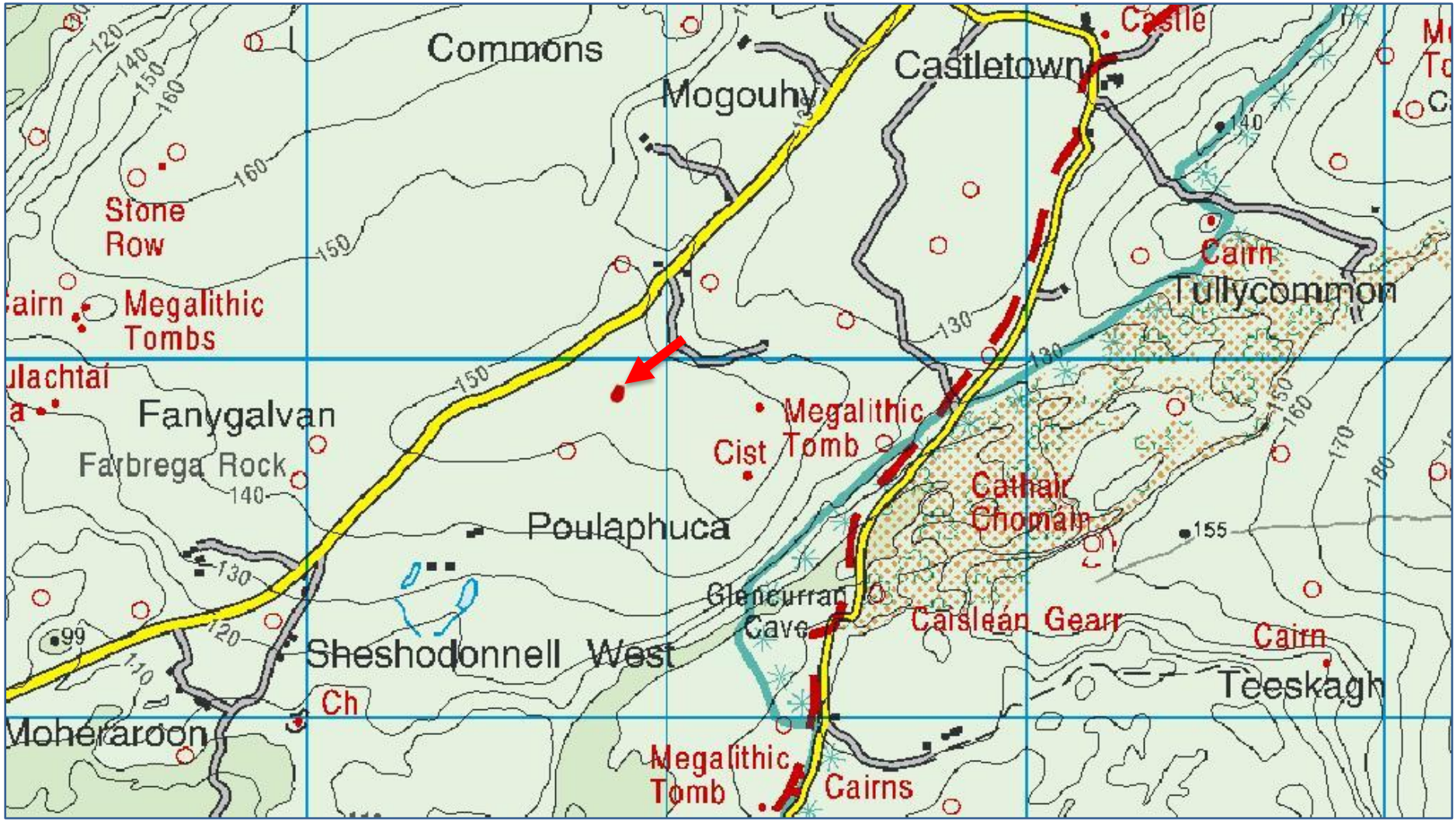

Figure 194 Ordnance Survey Discovery Series map, showing the location of the mine spoil (red outline) at Sheshodonnell East. (Scale is 1:15,000). Ordnance Survey Ireland Licence No EN 0059216 © Ordnance Survey Ireland / Government of Ireland.

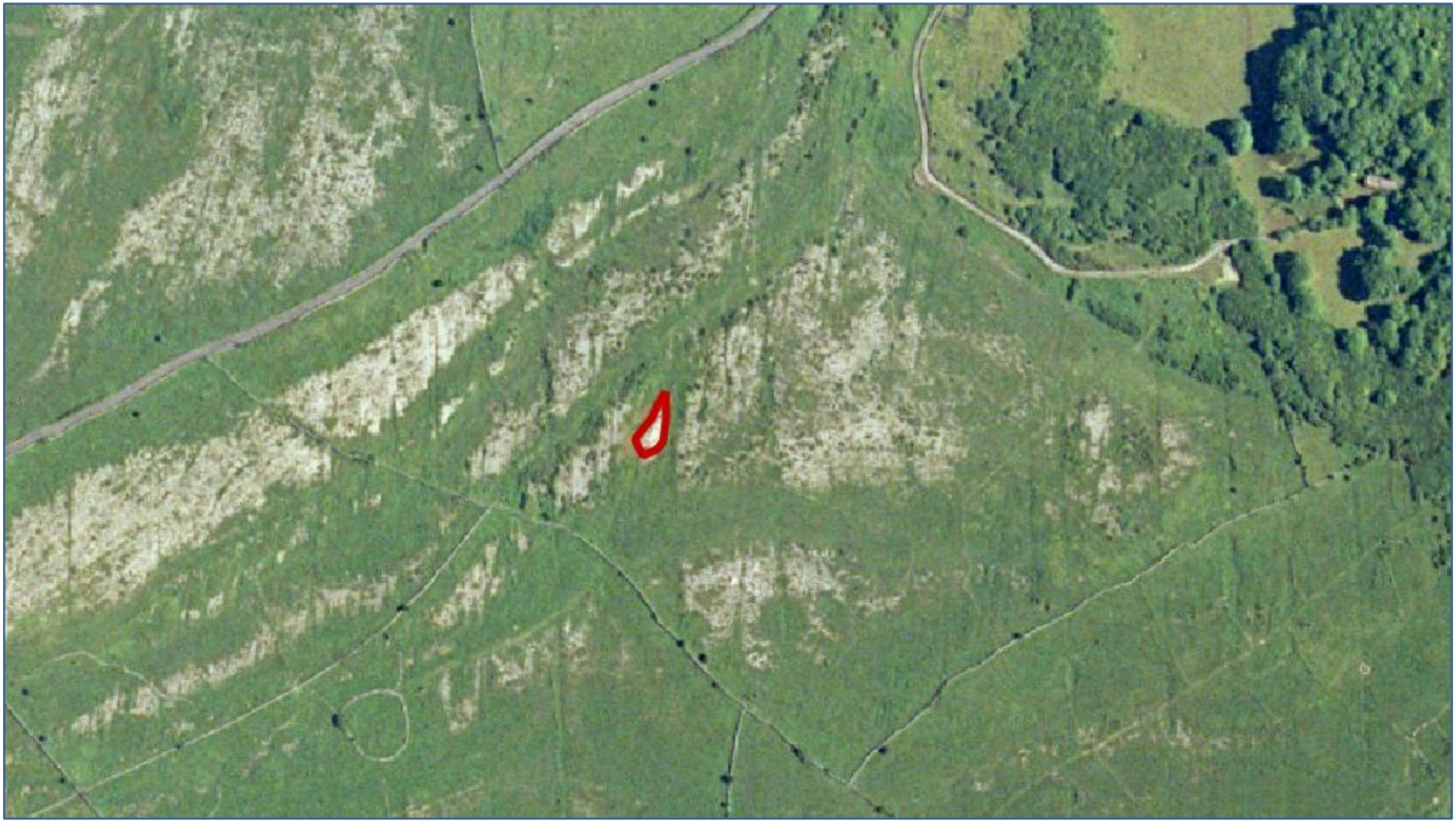

Figure 195 Ordnance Survey 2005 aerial imagery, showing the mine spoil area (red outline) at Sheshodonnell East. (Scale is 1:3,000). Ordnance Survey Ireland Licence No EN 0059216 © Ordnance Survey Ireland / Government of Ireland.

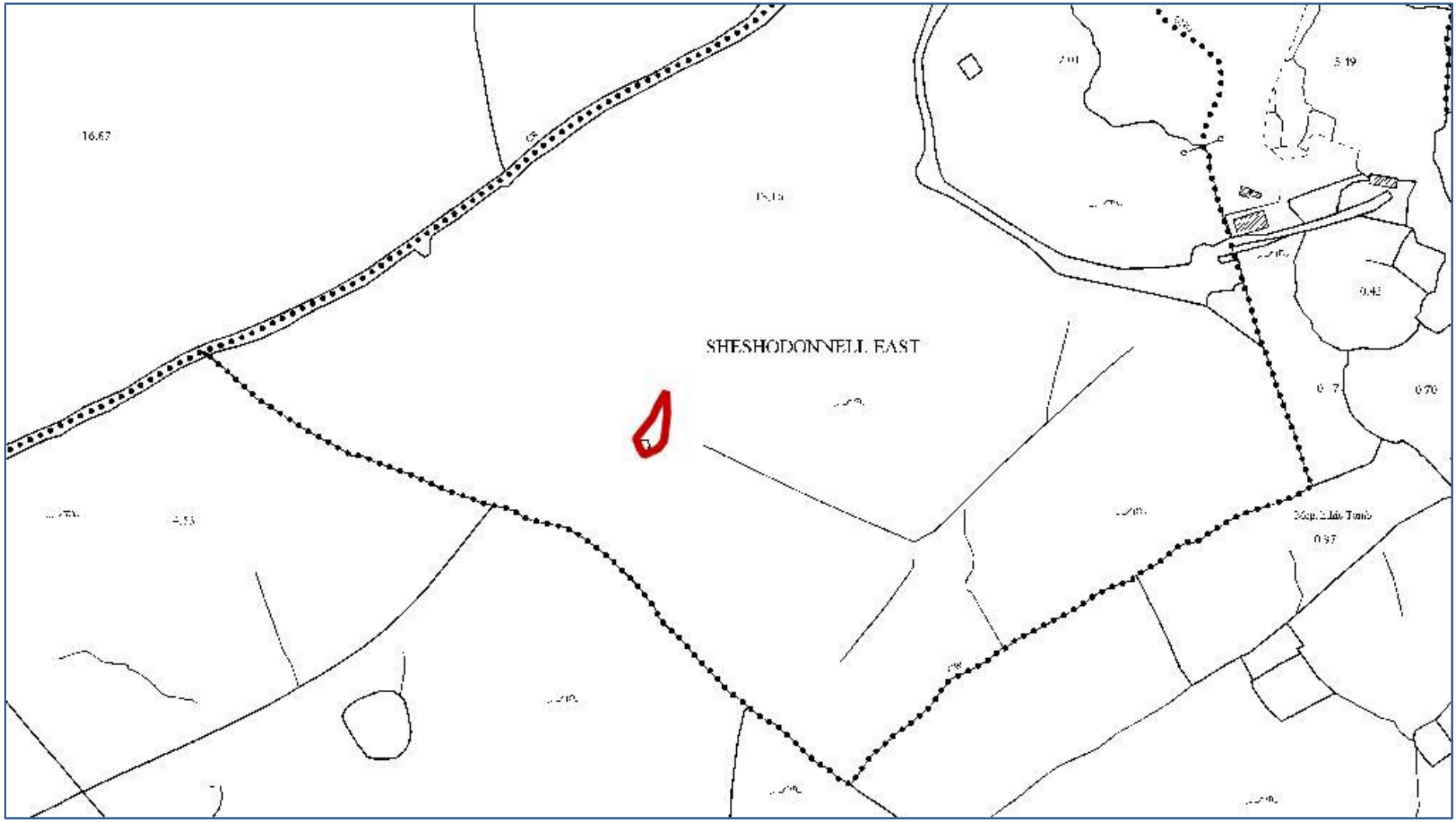

Figure 196 Ordnance Survey 1:5000 series map, showing the mine spoil area (red outline) at Sheshodonnell East. (Scale is 1:3,000). Ordnance Survey Ireland Licence No EN 0059216 © Ordnance Survey Ireland / Government of Ireland.

Site 34 Keeldrum

Site Name	**OS Discovery map**	**Grid ref**	**County**
Keeldrum	1	B90372624	Donegal
Recorder	**Date**	**Conservation value**	
Rory Hodd	16/03/2018	Low	
Metallophyte species present 2008 None			
Metallophyte species confirmed 2018 None			
2018 site area (ha)	**2018 area 6130 (ha)**	**2008 area 6130 (ha)**	**Area change**
0.14	0.013	0.0009	Increase

Site description/changes since 2008
This is a small site, consisting of small patches of open spoil close to an old building. There are other buildings nearby, but there is no spoil associated, and a larger area of former spoil, to the west, has been dug over and now contains no metallophyte interest. The small area of metalliferous spoil that is exposed shows signs of having been relatively recently exposed by scraping with a digger, and the area of spoil that was exposed in 2008 is now covered by acid grassland.

Description of Calaminarian grassland habitat
The Calaminarian grassland present is of extremely limited extent and is very species poor, having been recently created, and does not show signs of being highly contaminated by heavy metals. The sparse vegetation on this spoil consists of scattered grasses and *Bryum* cf. *pallescens*, which was not fertile, so the identity could not be confirmed. *Cephaloziella stellulifera* was found amongst relatively dense vegetation on two banks close to the ruin, in dense vegetation that shows no other metalliferous influence, but was previously likely to have been open spoil.

Impact code (2013)	Description	Location	Influence (+, -, 0)	Intensity (H,M,L)	% habitat affected
A04.02.02	non-intensive sheep grazing	Inside	0	M	100
C01.01	sand and gravel extraction	Inside	+	H	90
E03.01	disposal of household waste	Inside	-	M	10

Impact code (2018)	Description	Location	Influence (+, -, 0)	Intensity (H,M,L)	% habitat affected
A10	extensive grazing	Inside	0	M	100
C01	extraction of minerals	Inside	+	H	90
F09	deposition of waste	Inside	-	M	10

Notes on management/impacting activities
The Calaminarian grassland habitat at this site has only been kept open by the scraping away of vegetation by a digger, and is likely to revert to acid grassland again. Encroachment of scrub is also likely to occur in the long term. Dumping of building rubble has occurred on part of the newly exposed Calaminarian grassland area, but is limited in extent.

Conservation measures needed
The Calaminarian grassland at this site is likely to be lost in the short to medium term, unless it were to be kept open by periodic scraping by digger. However, the spoil does not appear to be strongly metalliferous, and will likely not support good stands of Calaminarian grassland.

Conservation measure code	Description
CL01	Management of habitats (others than agriculture and forest) to slow, stop or reverse natural processes

Condition of Calaminarian grassland	%	Area (ha)
In good condition	0	0
In not-good condition	100	0.013
Condition not known	0	0

Parameter	Criterion	Result		Assessment
Area	Annual change in area	Increase		Favourable
Structure and functions	No. of criteria passed	3		Favourable
	No. indicator spp.	2	Pass	
	Scrub encroachment	10%	Pass	
	Negative human impact	10%	Pass	
Future prospects				Unfavourable-bad
Overall Assessment				Unfavourable-bad

Overall assessment
Although the area and structure and functions are assessed as Favourable, this is misleading, as the area of Calaminarian grassland assessed is secondary in nature and unlikely to persist, while previous patches of Calaminarian grassland have been lost due to succession to grassland. Therefore, unless the spoil is artificially exposed and disturbed, Calaminarian grassland will not persist at this site in future, so future prospects are assessed as Unfavourable-bad. This site is of low conservation importance.

Habitats present on mine spoil resource	%
Calaminarian grassland	10
BL1 Stone walls	19
ED2 Bare spoil	11
GS3 Dry-humid acid grassland	48
WS1 Scrub	12

Indicator metallophyte species present
Bryum cf. *pallescens*
Cephaloziella stellulifera

Other species present on mine spoil resource
Agrostis capillaris
Breutelia crysochoma
Cardamine hirsuta
Cerastium fontanum
Cirsium vulgare
Ctenidium molluscum

Dicranella varia
Galium saxatile
Holcus lanatus
Hylocomium splendens
Hypnum lacunosum
Hypochaeris radicata
Juncus bulbosus
Juncus effusus
Luzula multiflora
Plantago lanceolata
Prunella vulgaris
Ranunculus repens
Rhytidiadelphus squarrosus
Rumex acetosa
Thuidium tamariscinum
Ulex europaeus
Veronica officinalis
Weissia controversa var. *controversa*

Photographs:

Figure 197 Area of spoil at Keeldrum Upper that has been scraped by a digger and is now forming a very depauperate form of Calaminarian grassland.

Figure 198 Depaurperate vegetation forming on scraped are of spoil, with grasses and potential *Bryum pallescens*.

Figure 199 Bank with extensive mats of *Cephaloziella stellulifera* amongst grassy vegetation.

Figure 200 Builder's rubble dumped on area of open spoil at Keeldrum.

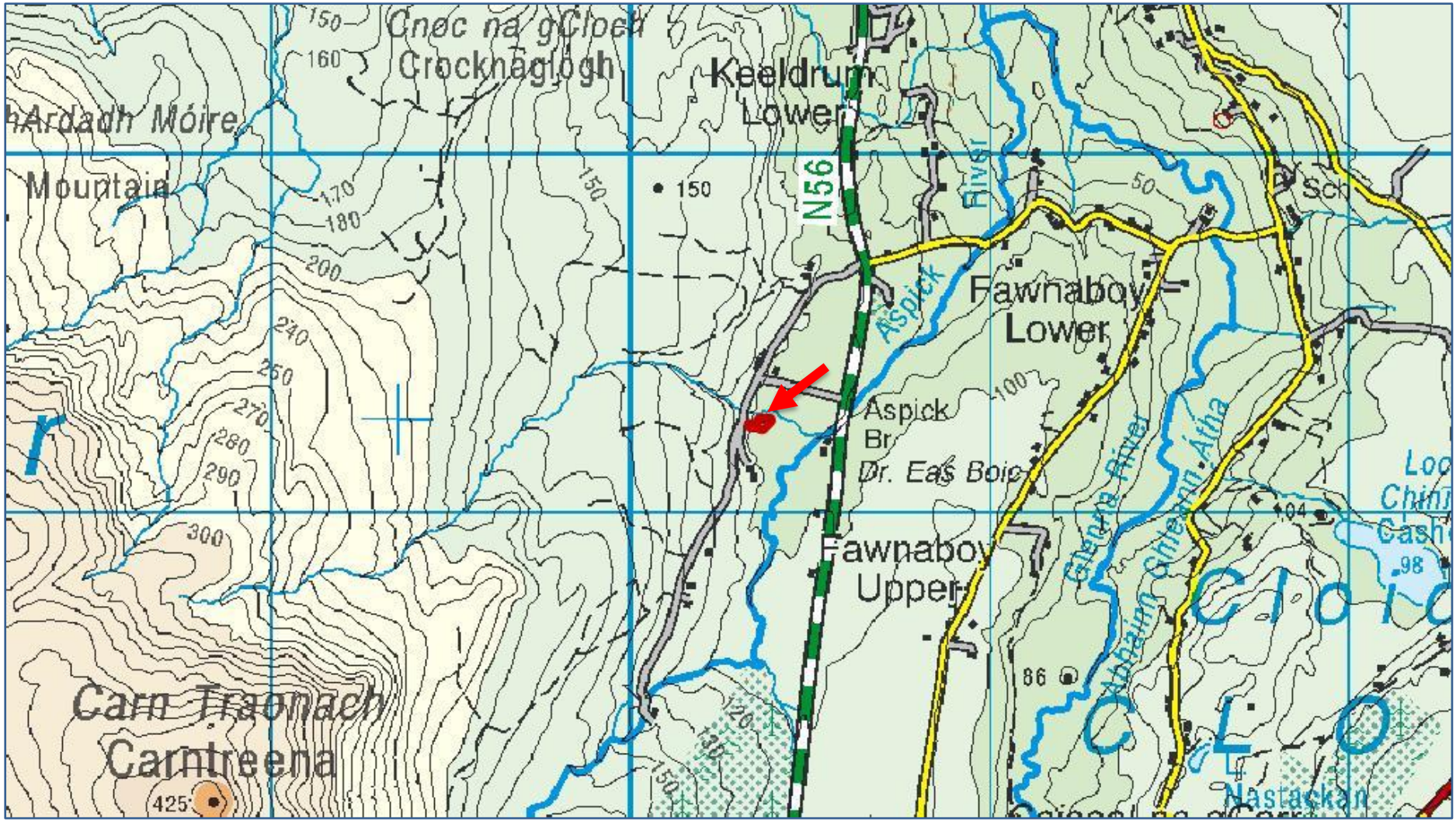

Figure 201 Ordnance Survey Discovery Series map, showing the location of the mine spoil (red outline) at Keeldrum. (Scale is 1:15,000). Ordnance Survey Ireland Licence No EN 0059216 © Ordnance Survey Ireland / Government of Ireland.

Figure 202 Ordnance Survey 2005 aerial imagery, showing the mine spoil area (red outline) at Keeldrum. (Scale is 1:3,000). Ordnance Survey Ireland Licence No EN 0059216 © Ordnance Survey Ireland / Government of Ireland.

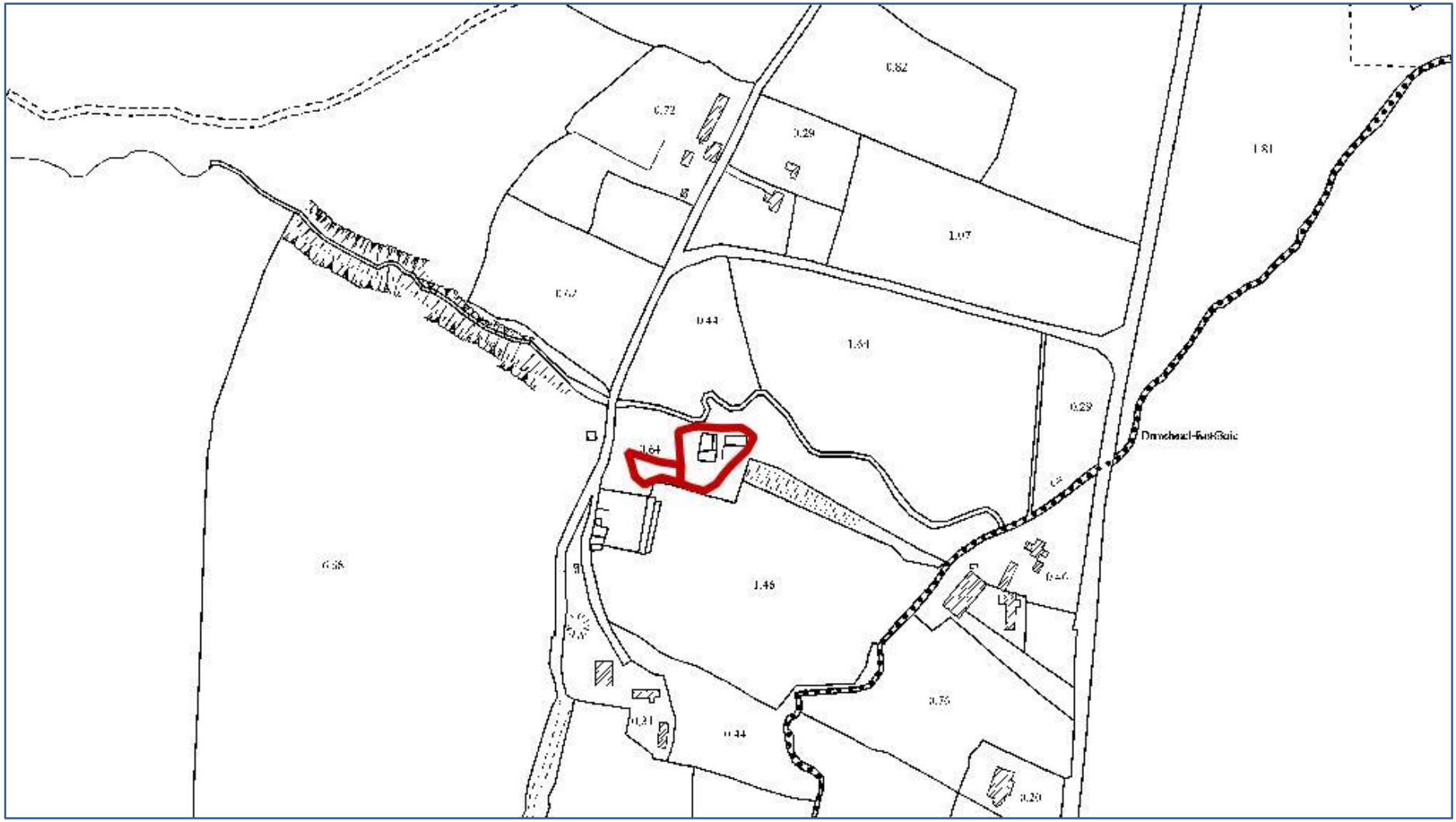

Figure 203 Ordnance Survey 1:5000 series map, showing the mine spoil area (red outline) at Keeldrum. (Scale is 1:3,000). Ordnance Survey Ireland Licence No EN 0059216 © Ordnance Survey Ireland / Government of Ireland.

Site 35 Caim Ballyhighland

Site Name	**OS Discovery map**	**Grid ref**	**County**
Caim Ballyhighland	68	S88544090	Wexford
Recorder	**Date**	**Conservation value**	
Nick Hodgetts	13/02/2018	High	
Metallophyte species present 2008 *Cephaloziella nicholsonii, Scopelophila cataractae*			
Metallophyte species confirmed 2018 *Cephaloziella nicholsonii, Scopelophila cataractae*			
2018 site area (ha)	**2018 area 6130 (ha)**	**2008 area 6130 (ha)**	**Area change**
0.7	0.35	0.16	No change

Site description/changes since 2008

This is an old copper mine with an area of bare spoil in the middle, surrounded by gorse, within which there are smaller areas of Calaminarian grassland, ruderal vegetation and planted conifers. A new fence has been erected enclosing much of the central bare spoil. Outwith the fence there is gorse encroachment and maturing conifers, often growing right up to the fence, although substantial patches of Calaminarian grassland remain; inside the fence, vehicle activity has ceased, there is some scrub encroachment and some erosion of the main heap, but it is mainly open. The area inside the fence was accessible only through a 'child-sized' hole that someone had cut in the wire. The two rare metallophytes are still present, *Scopelophila cataractae* in abundance, *Cephaloziella nicholsonii* in one substantial patch; *C. stellulifera* is still abundant in places.

Description of Calaminarian grassland habitat

Calaminarian grassland occurs in substantial stands within the new fence, and in smaller stands elsewhere, in patches among the gorse and other vegetation. *Scopelophila cataractae* is abundant in the central fenced area, often virtually to the exclusion of any other species, and occurs in smaller patches to the south of the fenced area. Calaminarian grassland outwith the fence often has abundant *Cephaloziella* spp., most of which seems to be *C. stellulifera*. There is one patch of *C. nicholsonii* to the south of the fenced area, where it grows with *C. stellulifera*. Other associates within patches of Calaminarian grassland include *Agrostis capillaris, Bryum* spp., *Ceratodon purpureus*, *Diplophyllum albicans, Funaria hygrometrica, Pohlia annotina, Sagina procumbens* and *Solenostoma gracillimum*. Near the old engine house, the Calaminarian grassland intergrades into more ruderal vegetation, and the northern 'arm' of the site becomes increasingly wet and eutrophicated at its north end, dominated by grasses, *Calliergonella cuspidata, Rhytidiadelphus squarrosus* and *Cirsium arvense*. The area of Calaminarian grassland on the west side of the site is no longer accessible due to the new fence and thick gorse, but from a distance it appears to be in reasonable condition (although being encroached upon by gorse), and there is no reason to suppose that *C. nicholsonii* has disappeared from this area. Quadrats Q81 and Q82 have been overgrown by gorse, but both *C. nicholsonii* and *S. cataractae* survive nearby. Any slight loss at the margins is probably compensated for by an increase in Calaminarian grassland at the expense of bare ground in the central fenced area.

Impact code (2013)	Description	Location	Influence (+, -, 0)	Intensity (H,M,L)	% habitat affected
E03.01	disposal of household waste	Inside	-	M	5
G05.09	Fencing	Inside	+	L	80
H01.03	point source pollution to surface water	Inside	-	M	5
K01.01	Erosion	Inside	0	L	5
K02.01	Succession	Inside	-	H	20

Impact code (2018)	Description	Location	Influence (+, -, 0)	Intensity (H,M,L)	% habitat affected
A25	Agricultural activities generating point source pollution to surface waters	Inside	-	M	5
F09	deposition of waste	Inside	-	M	5
H06	restrictive access to site	Inside	+	L	80
L01	abiotic natural processes	Inside	0	L	5
L02	natural succession	Inside	-	H	20

Notes on management/impacting activities

The erection of the fence has successfully excluded bikes and other machines, and at present the Calaminarian grassland here is in good condition. The spoil heap here is gradually eroding, but this merely provides a turnover of habitat for *S. cataractae*. Outwith the fence, gorse and other scrub will continue to spread unless checked. Scrub has also colonised within the fence on the NE side, mainly gorse and willow, and that too will presumably continue to spread. Illegal tipping and various discharges (e.g. from the animal pen) continue to affect the site outwith the fence. The surrounding conifers are maturing and therefore increasingly shading and dropping needles onto the edges of the site.

Conservation measures needed

Removal of the conifers and control of the scrub will be beneficial to the Calaminarian grassland habitat. Illegal tipping and bonfires need to be discouraged. Run-off from the animal pen area should be contained and limited. The new fence needs to be monitored and maintained.

Conservation measure code	Description
CA10	Reduce/eliminate point pollution to surface or ground waters from agricultural activities
CF04	Reduce/eliminate point pollution to surface or ground waters from industrial, commercial, residential and recreational areas and activities
CL01	Management of habitats (others than agriculture and forest) to slow, stop or reverse natural processes

Condition of Calaminarian grassland	%	Area (ha)
In good condition	30	0.11
In not-good condition	70	0.24
Condition not known	0	0

Parameter	Criterion	Result		Assessment
Area	annual change in area	no decrease		Favourable
Structure and functions	No. of criteria passed	3		Favourable
	No. indicator spp.	5	Pass	
	Scrub encroachment	15%	Pass	
	Negative human impact	10%	Pass	
Future prospects				Favourable
Overall Assessment				Favourable

Overall assessment

This site is still in a reasonably good condition, with both rare metallophyte species still present. *S. cataractae* is abundant, with at least tens of thousands of shoots. However, the site can be expected to deteriorate as time goes on in the absence of active management, owing mainly to scrub encroachment. The area within the new fence can be regarded as being in favourable condition, but outwith the fence the condition is unfavourable. However, the latter is by far the smallest part of the Calaminarian grassland element of the site, so overall the site condition is Favourable, with future prospects also Favourable, providing the conservation measures needed are addressed.

Habitats present on mine spoil resource	%
Calaminarian grassland	50
ED2 Spoil and bare ground	35
GS3 Dry-humid acid grassland	10
WS1 Scrub	5

Indicator metallophyte species present
Cephaloziella nicholsonii
Scopelophila cataractae
Bryum cf. *pallescens*
Cephaloziella stellulifera
Solenostoma gracillimum

Other species present on mine spoil resource
Agrostis capillaris
Brachythecium rutabulum
Bryum dichotomum
Calliergonella cuspidata
Ceratodon purpureus
Cirsium arvense
Cladonia portentosa
Dicranella varia
Diplophyllum albicans
Funaria hygrometrica
Galium saxatile
Juncus effusus
Pogonatum aloides
Pohlia annotina
Pohlia melanodon
Polytrichum piliferum
Rhytidiadelphus squarrosus
Sagina procumbens
Ulex europaeus

Metallophyte species	**Grid ref**	**Extent**	**Notes**
Cephaloziella nicholsonii	S8857840857	25x10cm	Wet ground on side of channel, close to encroaching gorse
Scopelophila cataractae	S8857640861	15x10cm	Wet ground on side of channel, close to encroaching gorse
Scopelophila cataractae	S8856240886	>5x3m	Abundant in and around 'cave' in spoil heap
Scopelophila cataractae	S8853040888	30x30cm	Open, wet, flat area; present in smaller stands in many places
Scopelophila cataractae	S8854340908	>10x3m	Abundant along *ca.* 10m length of steep side of spoil heap

Photographs:

Figure 204 View of spoil and Calaminarian grassland habitat at Caim Ballyhighland.

Figure 205 Area of Calaminarian grassland with *Cephaloziella stellulifera*.

Figure 206 Scarp of spoil along which abundant *Scopelophila cataractae* grows.

Figure 207 Cave in spoil around which much *Scopelophila cataractae* grows.

Figure 208 Dense patch of *Scopelophila cataractae* on vertical spoil face.

Figure 209 Green patch of *Cephaloziella nicholsonii* on low bank with *Scopelophila cataractae* and *Cephaloziella stellulifera.*

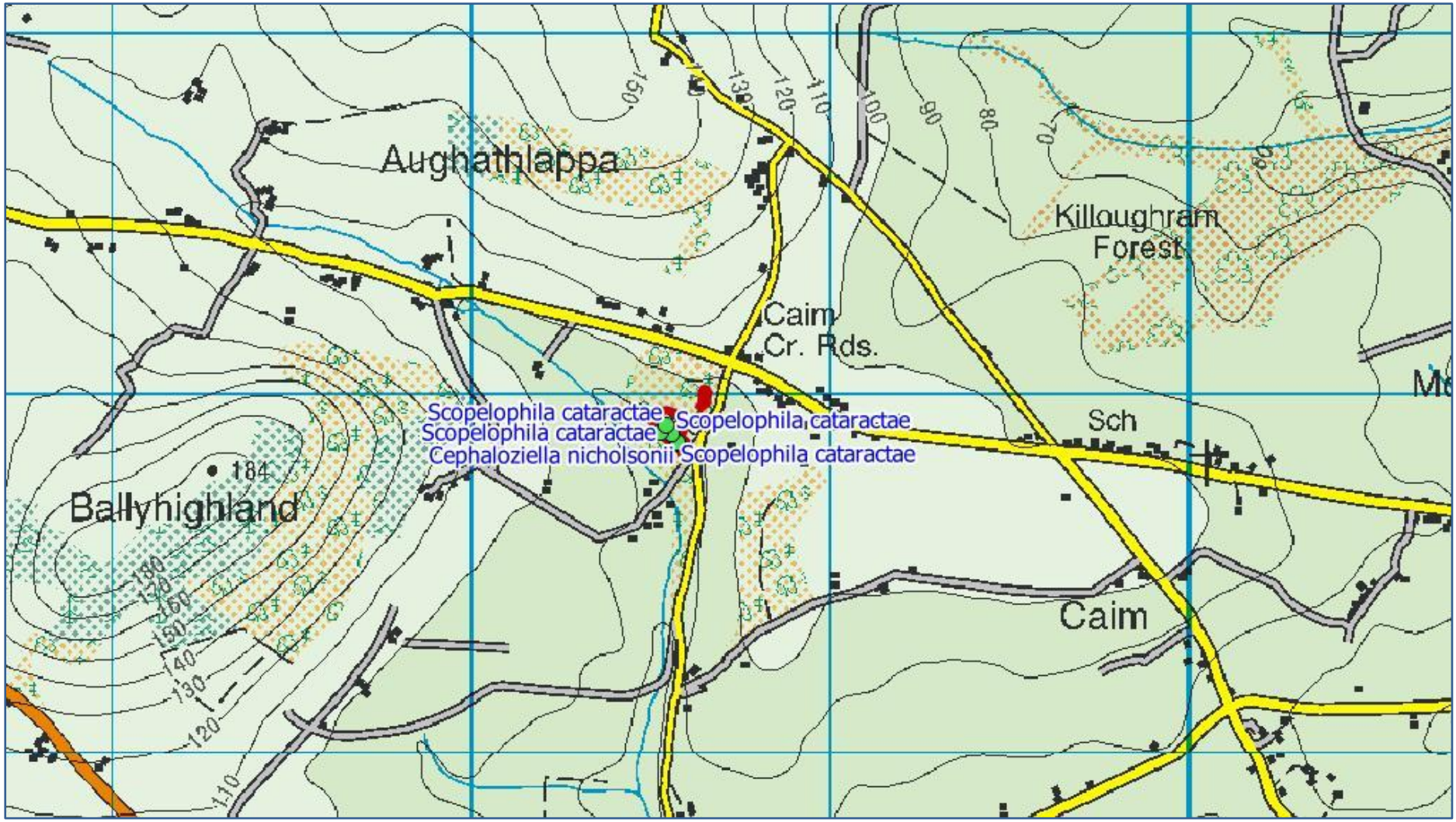

Figure 209 Ordnance Survey Discovery Series map, showing the location of the mine spoil (red outline) and rare species (green dots) at Caim Ballyhighland. (Scale is 1:15,000). Ordnance Survey Ireland Licence No EN 0059216 © Ordnance Survey Ireland / Government of Ireland.

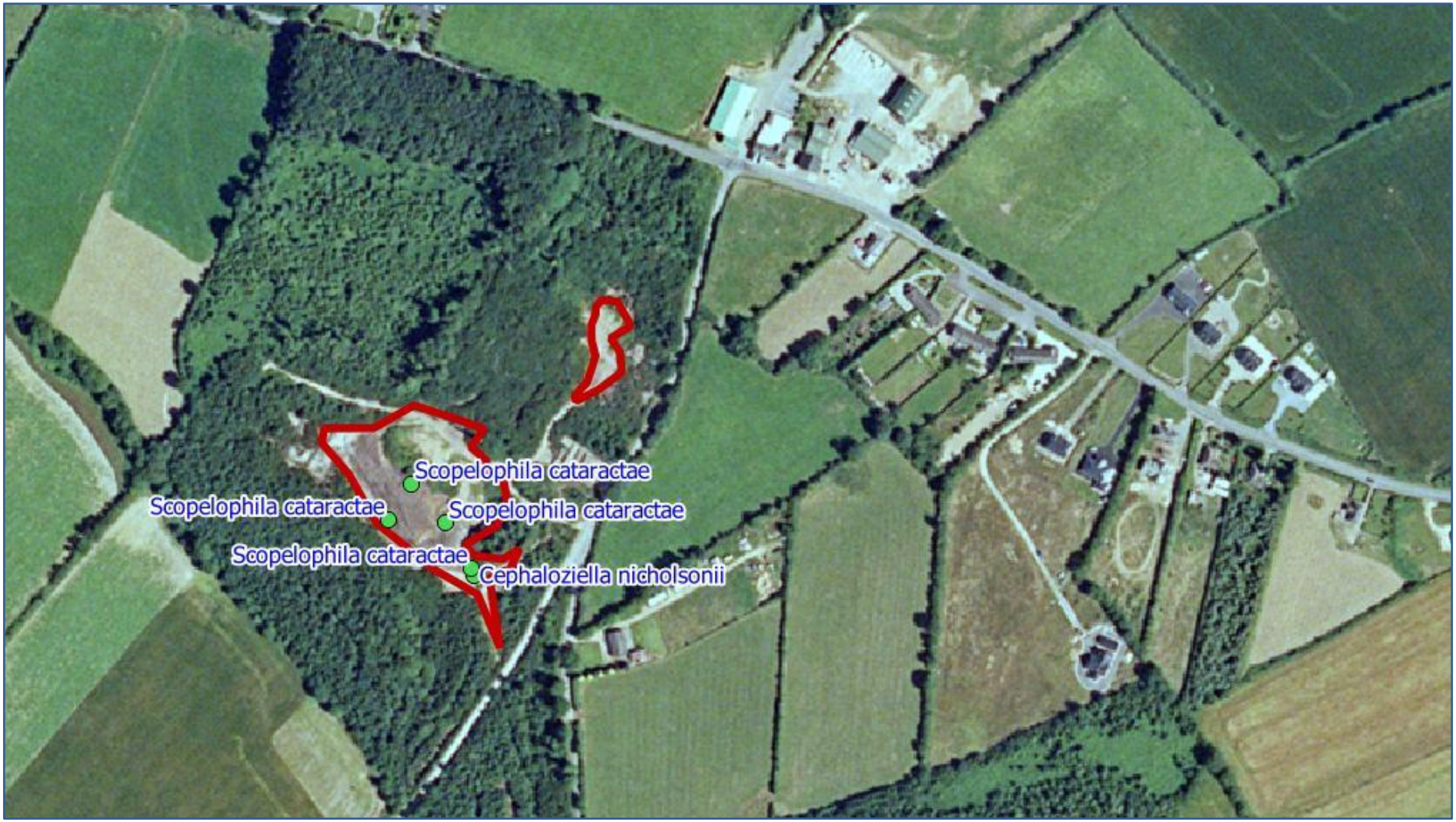

Figure 209 Ordnance Survey 2005 aerial imagery, showing the mine spoil area (red outline) and location of rare species (green dots) at Caim Ballyhighland. (Scale is 1:3,000). Ordnance Survey Ireland Licence No EN 0059216 © Ordnance Survey Ireland / Government of Ireland.

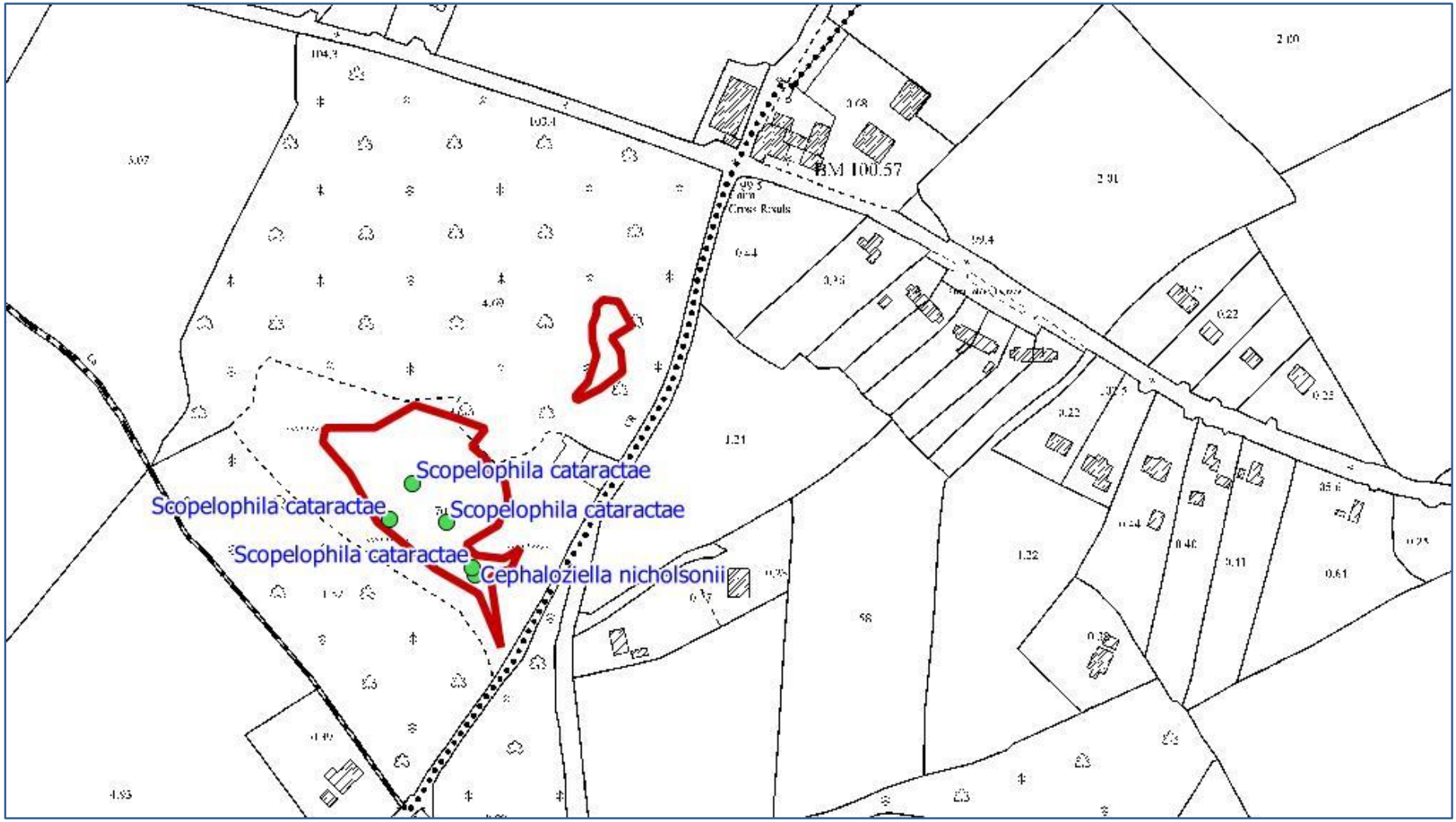

Figure 210 Ordnance Survey 1:5000 series map, showing the mine spoil area (red outline) and location of rare species (green dots) at Caim Ballyhighland. (Scale is 1:3,000). Ordnance Survey Ireland Licence No EN 0059216 © Ordnance Survey Ireland / Government of Ireland.