Penwith Moors Ecohydrological catchment land-cover survey

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Further information

This report can be downloaded from the Natural England Access to Evidence

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Contents

Introduction

Areas of semi-natural habitat ('rough ground') in West Penwith, Cornwall are being considered for inclusion in a Site of Special Scientific Interest (SSSI) under the Wildlife and Countryside Act 1981. Between 2012-2019 the areas currently under consideration were surveyed to establish a vegetation baseline for the proposed SSSI. These surveys can be accessed on Natural England's Access to Evidence catalogue. This was largely in the form of vegetation surveys using, National Vegetation Classification (NVC) methodology, of areas of semi-natural and natural vegetation. These surveys were undertaken by Cornwall Environmental Consultants Ltd (2012), Hewins Ecology (2013-2014) and Belinda Wheeler (2019), under contract to Natural England. The proposed SSSI consists of multiple units of fragmented 'rough ground' supporting lowland heathland, acid grassland, mires, bracken and scrub. Although there are many mires of varying size within the moors, Natural England has identified 11 being the largest and most intact as being the most significant. These mires form a key feature of the proposed SSSI.

The eleven mire catchments within Penwith Moors that this survey is focused on are:

1. Bodrifty
2. Bosiliack
3. Bostraze
4. Boswarva
5. Boswens
6. Bussow
7. Embla
8. Gear/Chykembro
9. Lanyon / Men-an-Tol
10. Tredinnick
11. Tregerest

The guidelines for the selection of biological SSSIs are published by the Joint Nature Conservancy Council JNCC. Wetlands (including valley mires) are influenced by the quantity and quality of the water they receive from their surrounding hydrological catchment. Part 1 of the guidelines emphasises the importance of site integrity,

stating that SSSI boundaries should be drawn to encompass not only the special features of the site but also any land necessary to ensure the sustainability of those features including supporting processes such as hydrology. Part 2 Chapter 7 (Fens) (1989) states that as a minimum the valley bottoms and all land up to the top of the steepest slopes within each catchment should be considered for inclusion within the SSSI boundary.

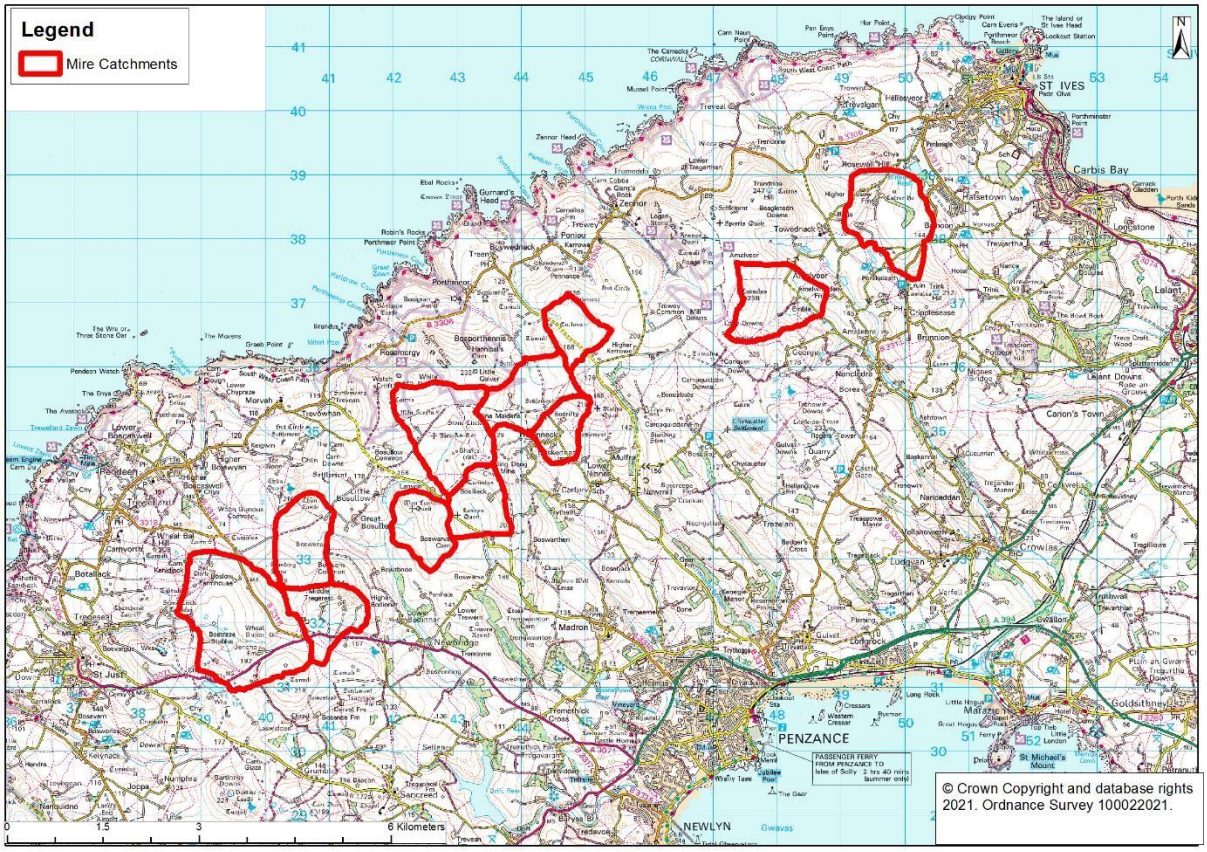

Figure 1: Map showing location of mire catchments within Penwith

In 2020, a desk based ecohydrological assessment of the 11 valley mires catchments was undertaken by Atkins to help inform the decisions around the identification of a SSSI boundary which would satisfy Chapter 7 of the SSSI selection guidelines. This assessment used topographical, hydrological and geological data to run a risk assessment model for each mire to determine the most important land within the catchment of the mires and the pressures upon them. The output of this exercise identified and mapped 5 'hydrological risk zones' around each of the mires. See *West Penwith Ecohydrological Investigation and Characterisation: Phase 3, 2020-21*. Of these 5 zones, the "steepest slope zone" equates to the top of the steepest slopes within each catchment referred to in Chapter 7 of the SSSI selection guidelines. The hydrological risk zones that were identified through the desk exercise were verified in the field by Atkins between 24th -28th May 2021.

Objectives

The objectives of the land-cover survey are to record the current (2021) land-cover in order to:

1. Help inform the land management-based risk assessment undertaken as part of the ecohydrological assessment by providing a field-verified and up-to-date record;
2. Help inform future management decisions and advice within each catchment;
3. To identify if there are any remaining parcels of land which support a habitat feature which might qualify *per se* under the SSSI selection guidelines;
4. demonstrate that all significant parts of the catchments not previously subject to vegetation survey (NVC) had been visited by Natural England staff.

A land cover survey was required to identify the main land cover of field parcels within the 11 identified valley mire catchments, that have not previously been surveyed.

Methodology

Significant parts of the catchments had already been subject to vegetation survey applying methodology of the NVC. Land-cover survey was carried out for the steepest slope zones in each catchment, thereby incorporating the hydrological zone which the SSSI selection guidelines identify as the minimum area to be included within the site boundary, which included significant areas of enclosed farmland or 'clean' land.

The catchments were surveyed by a 'walk-over' survey during which the land cover present in the fields was assigned to pre-defined categories by visual observation. Land-cover was mapped on a field-by-field and, where appropriate, within-field basis. Mapping of small in-field features such as small ponds and of field margins were not mapped as these fell out of the scope of the requirement of this survey. A land cover category was assigned to every enclosed field or other land parcel within the catchments. The land cover within each field was visually confirmed on the ground at 'close quarters', though it was not necessary to enter every field in order to achieve this, especially where good vantage points were present and the land cover could be easily distinguished. All parts of the catchments, however, were accessed. No land cover was recorded for areas of land that were not covered by the scope of the survey, such as roads, tracks, road verges and hedgerows. These areas are recorded in the results section as 'Miscellaneous' category. Similarly, areas already having been subject to NVC surveys (commissioned by Natural England in previous years) were not included in this land cover survey. Areas that have already been

NVC surveyed and already under consideration as SSSI are recorded in the results section as ‘Rough ground’.

Land cover was mapped to one of the following categories:

- Arable: cereals
- Arable: horticulture (vegetables, flower bulbs, etc.)
- Arable: any (bare ground, crop cannot be identified, etc.)
- Arable: short-term grass-ley
- Improved grassland
- Semi-improved grassland (species-poor)
- Amenity grassland
- Semi-natural habitats (specify using Phase 1 categories)
- Domestic dwelling / garden
- Farm buildings / yard / infrastructure (in use)
- Abandoned buildings
- Miscellaneous

Target notes were also made where appropriate to record additional details which may be pertinent to the objectives of the survey. These are geographically referenced and shown on each catchment map in this report.

Prior to the field work maps of each catchment were created at an appropriate scale (1:1250 – 1:2500) to clearly show field parcels and boundaries. These maps originated from Ordnance Survey (OS) MasterMap cartographic & topographic base maps. (Digital mapping data is provided by Ordnance Survey through Natural England under the Public Sector Mapping Agreement (PSMA)). Areas of land that had already been NVC surveyed were added to the maps to help surveyors identify areas that were to be surveyed. The maps were created digitally using ArcMap Geographical Information System (GIS) software and were made to be integrated with ArcGIS Online platform and the ESRI Collector app to allow data to be captured in the field on mobile devices. Paper maps were also created/used as a backup.

Once survey data had been collected it was downloaded to ArcGIS Online in shapefile (.SHP) format.

Field work

The survey in the field was undertaken by Alex Gilroy and Mark Beard (both Natural England; Devon, Cornwall & Isles of Scilly Area Team). They were accompanied for much of the survey by David Gasca-Tucker and Eleanore Miles of Atkins (contractor for the ecohydrological field assessment being undertaken simultaneously). The majority of the fieldwork was carried out between Mon 24th- Fri 28th May 2021. Due to time constraints during the survey week, some limited parts of Bostraze, Bussow and Tregerest catchments were not visited between 24th-28th May, and were completed on 9th June & 17th June 2021.

Every effort was made to access all parts of the farmed catchments and as a minimum each farm holding within the farmed catchments were visited with the owners'/managers' knowledge and/or consent. In the majority of cases the landowner or manager had given permission to enter land on a voluntary basis. In the small number of cases where this had been refused or where no response had been forthcoming, access was secured using Natural England's legal powers of entry under section 51 of the Wildlife and Countryside Act. Some survey work was carried out from adjacent public highways or other public rights of way, though in all cases with the landowners'/managers' knowledge.

Weather conditions throughout the survey were largely dry and mild with some occasional (heavy) prolonged rainfall encountered.

Results and Analysis by Catchment

Bodrifty Catchment

Total area of Steepest slope zone approximated to field boundaries: **69.16 ha**

Table 1: Summary of Land cover within Bodrifty steepest slope zone

Land Use	Area (ha)	Percentage (%)
Domestic Dwelling/Garden	0.15	0.22
Improved Grassland	3.55	5.13
Phase 1 category A Woodland and Scrub	0.16	0.24
Semi-improved Grassland (SI)	6.79	9.81
Rough ground	58.50	84.59
Miscellaneous	0.01	0.01
Total	**69.16**	

The steepest slope zone in the Bodrifty catchment was comprised of 84.59% seminatural habitats. The majority of this was land that was subject to NVC survey in 2013, 2014, & 2019 was comprised of Dry heath & Mire communities. Improved grassland was recorded to make up a relatively small proportion of total land cover and found in discrete fields in the north end of catchment and just to the south of the mire. There was a cluster of small fields found in the west of the catchment surrounding Brook cottage property that were more of a semi-improved nature. A pocket of woodland was also recorded adjacent to Brook cottage where thinning works were being carried out during the time of survey. A small cluster of fields at the south end of the catchment were also recorded as semi-improved grassland.

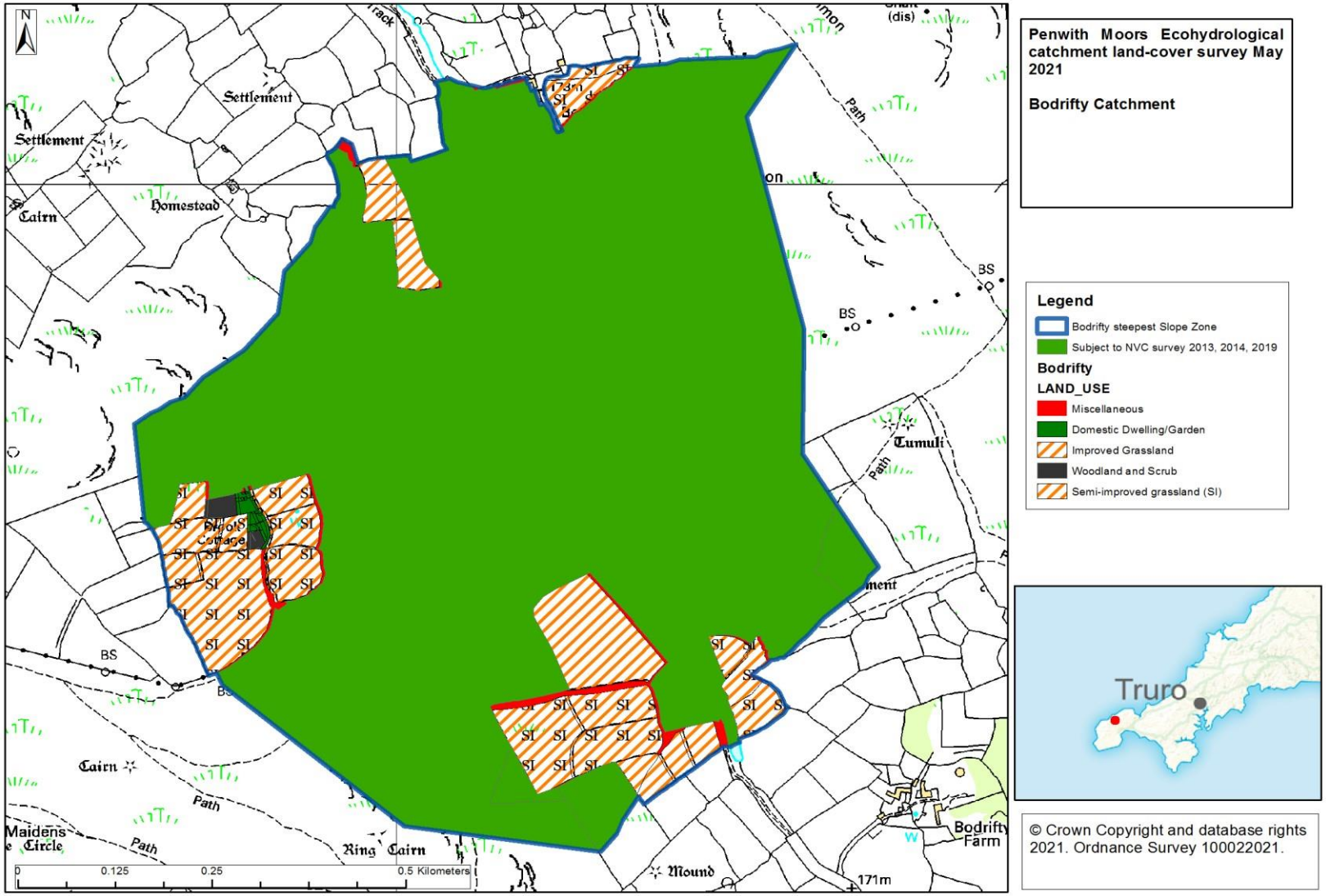

Figure 2: Landcover map of Bodrifty Steepest slope zone

Bosiliack Catchment

Total area of Steepest slope zone approximated to field boundaries: **62.42ha**

Table 2: Summary of Land cover within Bosiliack steepest slope zone

Land Use	Area (ha) (%)	Percentage
Domestic Dwelling/Garden	0.56	0.89
Farm buildings/yard/ infrastructure (in use)	1.00	1.60
Improved Grassland	20.63	33.06
Semi-improved Grassland (SI)	1.40	2.24
Rough Ground	36.19	57.98
Misc	2.64	4.23
Total	**62.42**	

Semi-natural vegetation was the most widespread habitat recorded in the Bosiliack, comprising of 57.98% of cover within the steepest slope zone. This area was subject to NVC survey in 2012, 2013 and was comprised mainly of Mire, Molinia and Dry heath communities. Belted Galloway cattle were observed to grazing in the mire vegetation at time of visit. Improved grassland made up 33% of land cover and was found in fields adjacent to the areas of semi-natural habitat. The majority of improved grassland was managed as part of Bosiliack Farm located in the north-east of the catchment, with the exception of 2 fields in the south of the catchment which were separated by a road and were under different tenure. A small area (2.24%) of semiimproved grassland was recorded in the south-east of the catchment was also part of Bosiliack Farm.

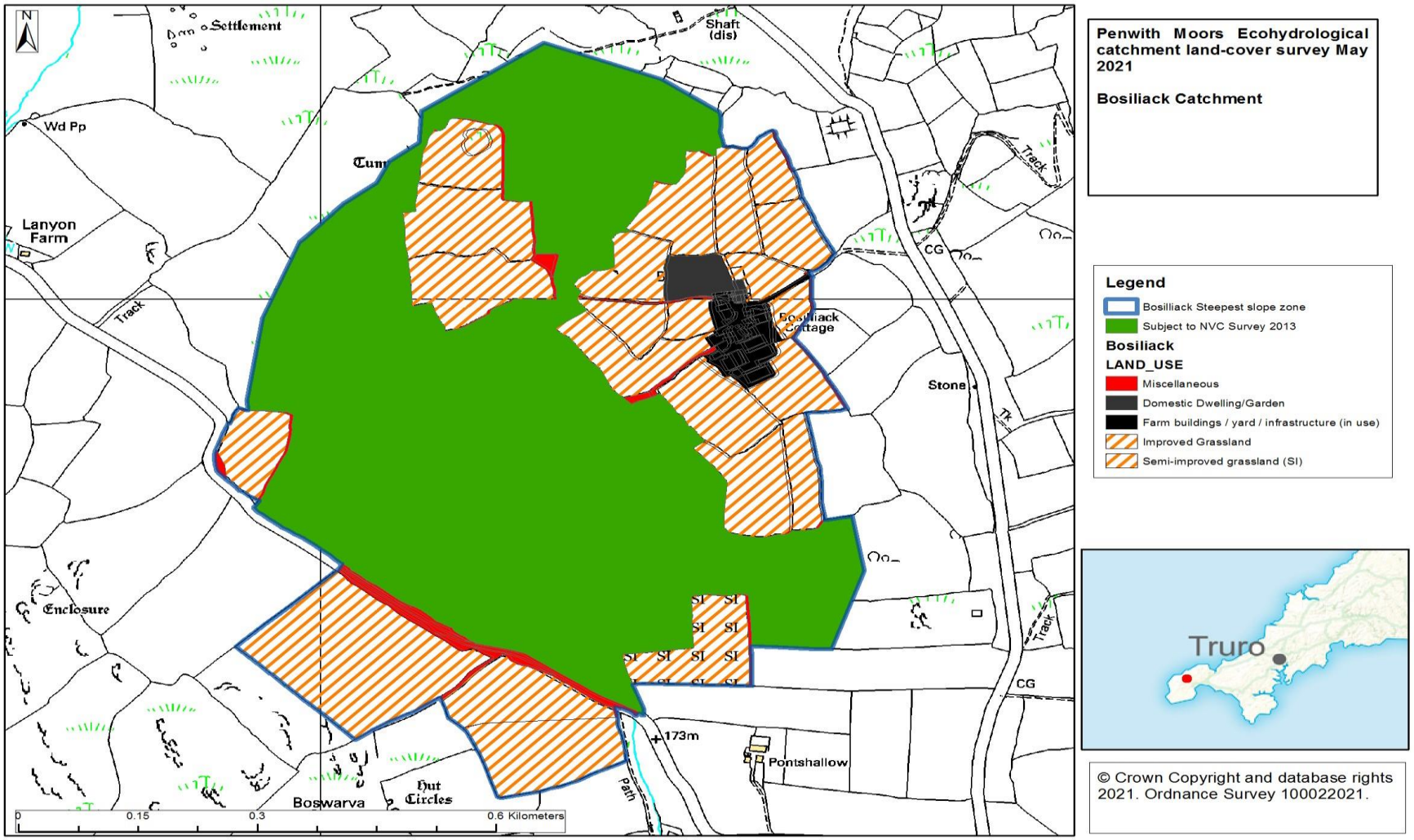

Figure 3: Landcover map of Bosiliack steepest slope zone

Bostraze Catchment

Total area of Steepest slope zone approximated to field boundaries: **165.65ha**

Table 3: Summary of Land cover within Bostraze steepest slope zone

Land Use	Area (ha)	Percentage (%)
Abandoned Buildings	0.003	0.002
Arable - Any	5.75	3.47
Arable - Horticulture	19.57	11.81
Arable - short-term grass-ley	9.88	5.96
Domestic Dwelling/Garden	0.71	0.43
Farm buildings / yard / infrastructure (in use)	1.91	1.16
Improved Grassland	29.55	17.84
Phase 1 category A	1.19	0.72
Phase 1 category C	3.69	2.23
Semi-improved Grassland	17.96	10.84
Rough ground	72.72	43.90
Miscellaneous	2.71	1.64
Total	**165.65**	

Bostraze was the largest catchment surveyed and the catchment with the most variation in land cover types. Improved grassland was the most prevalent land cover type accounting for 26.87 ha (16.22%) of land cover. Much of this was owned by 2 land holdings in the flatter basin of the catchment below the area of semi-natural vegetation that was surveyed in 2013,2014. Several large fields were observed to be growing Daffodil on the south-eastern slopes and also in the flatter basin in the southern end of the catchment. Two fields of unidentified arable crop (bare, cultivated soils) were also observed. Semi-improved grassland fields were present, largely in the southern end of the catchment, where they were primarily used as horse paddocks. Similarly, a cluster of small fields of semi-improved grassland were observed in the north of the catchment surrounding old abandoned farm buildings.

Temporary grass cover was recorded in 2 locations that formed part of an arable rotation. A block (3.69 ha) of bracken-dominated vegetation *Pteridium aquilinum* underscrub was recorded in what appeared to be old disused field network just below the B3318 adjacent to Boslow farm.

Plate 1: Unidentified arable crop in basin of Bostraze catchment

Plate 2: Arable field in Bostraze catchment growing

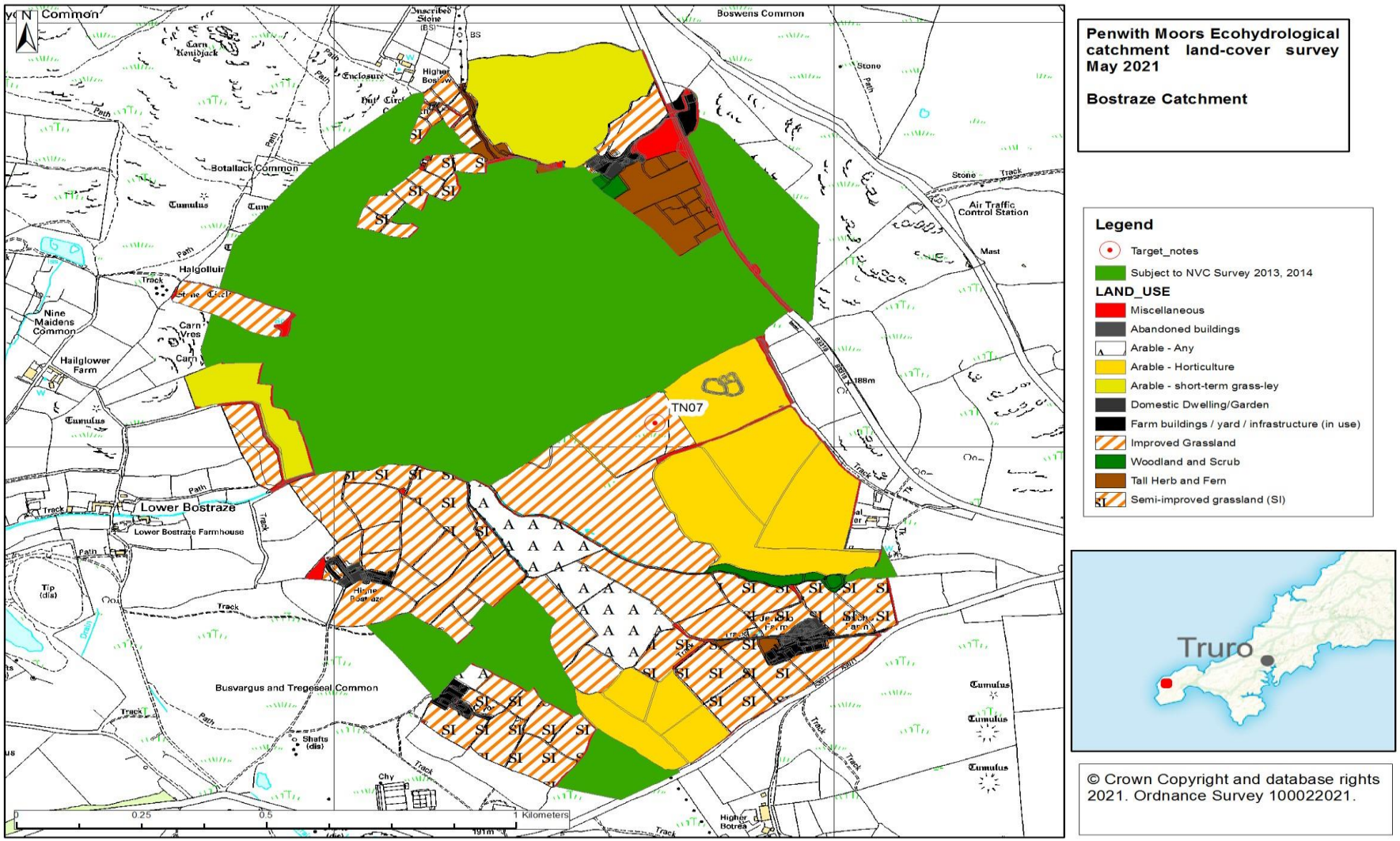

Figure 4: Landcover map of Bostraze steepest slope zone

Boswarva Catchment

Total area of Steepest slope zone approximated to field boundaries: **60.84 ha**

Table 4: Summary of Land cover within Boswarva steepest slope zone

Land Use	Area (ha) (%)	Percentage
Improved Grassland	6.17	10.14
Phase 1 category A Woodland and Scrub	1.37	2.25
Semi-improved Grassland (SI)	1.25	2.06
Rough ground	52.03	85.51
Miscellaneous	0.03	0.05
Total	**60.84**	

The majority of Boswarva steepest slope zone (85.51%) was comprised of seminatural habitat that was subject to NVC survey in 2013 & 2014 and found to be comprised of Mire & Dry heath communities. There was a network of field parcels on the northern slope of the semi-natural vegetation which was recorded to be improved grassland which accounted for 10.14% of total land cover and formed a management unit. Cattle were observed to be grazing the fields at time of survey. A single parcel of semi-improved grassland (1.25ha) was recorded adjacent to the fields of Improved grassland and adjacent to a block of scrub (1.37ha).

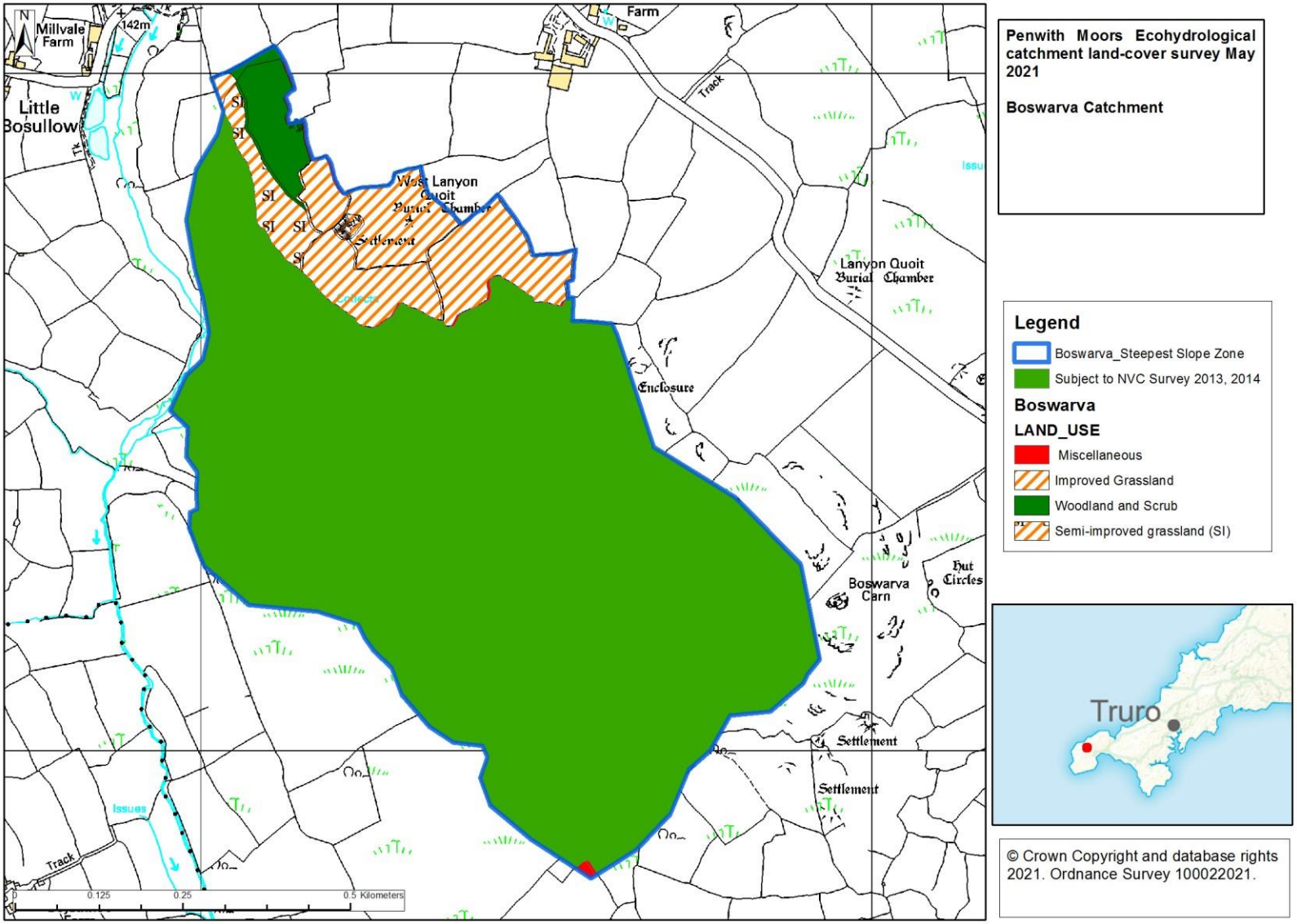

Figure 5: Landcover map of Boswarva steepest slope zone

Boswens Catchment

Total area of Steepest slope zone approximated to field boundaries: **84.25 ha**

Table 5: Summary of Land cover within Boswens steepest slope zone

Land Use	Area (ha)	Percentage (%)
Domestic Dwelling/Garden	0.11	0.13
Farm buildings / yard / infrastructure (in use)	0.16	0.19
Arable - Cereals	1.62	1.92
Improved Grassland	15.78	18.73
Phase 1 category C - Tall Herb and Fern	1.28	1.52
Semi-improved Grassland	25.86	30.69
Rough ground	38.21	45.36
Misc	1.24	1.47
Total	**84.25**	

The majority of Boswens steepest slope zone (45.36%) was comprised of seminatural habitat that was subject to NVC survey in 2013 & 2014 and found to be comprised of heathland (including dry and humid heath), mire, acid grassland and underscrub. The field parcels recorded in the northern half of the catchment were predominately improved grassland that was managed as part of Trehyllys Farm ownership and accounted for 20.65% (17.39ha) of land cover. One parcel adjacent to the improved grassland fields appeared to be dis-used was found to contain *Pteridium aquilinum,* and *Rubus fruticosus* scrub and was recorded as Tall herb & fern. The field parcels in the southern half of the catchment (with the exception of two improved fields) were predominately semi-improved grassland. They were managed as one grazing block as part of a horse breeding business. Horses were observed to be grazing in most the fields.

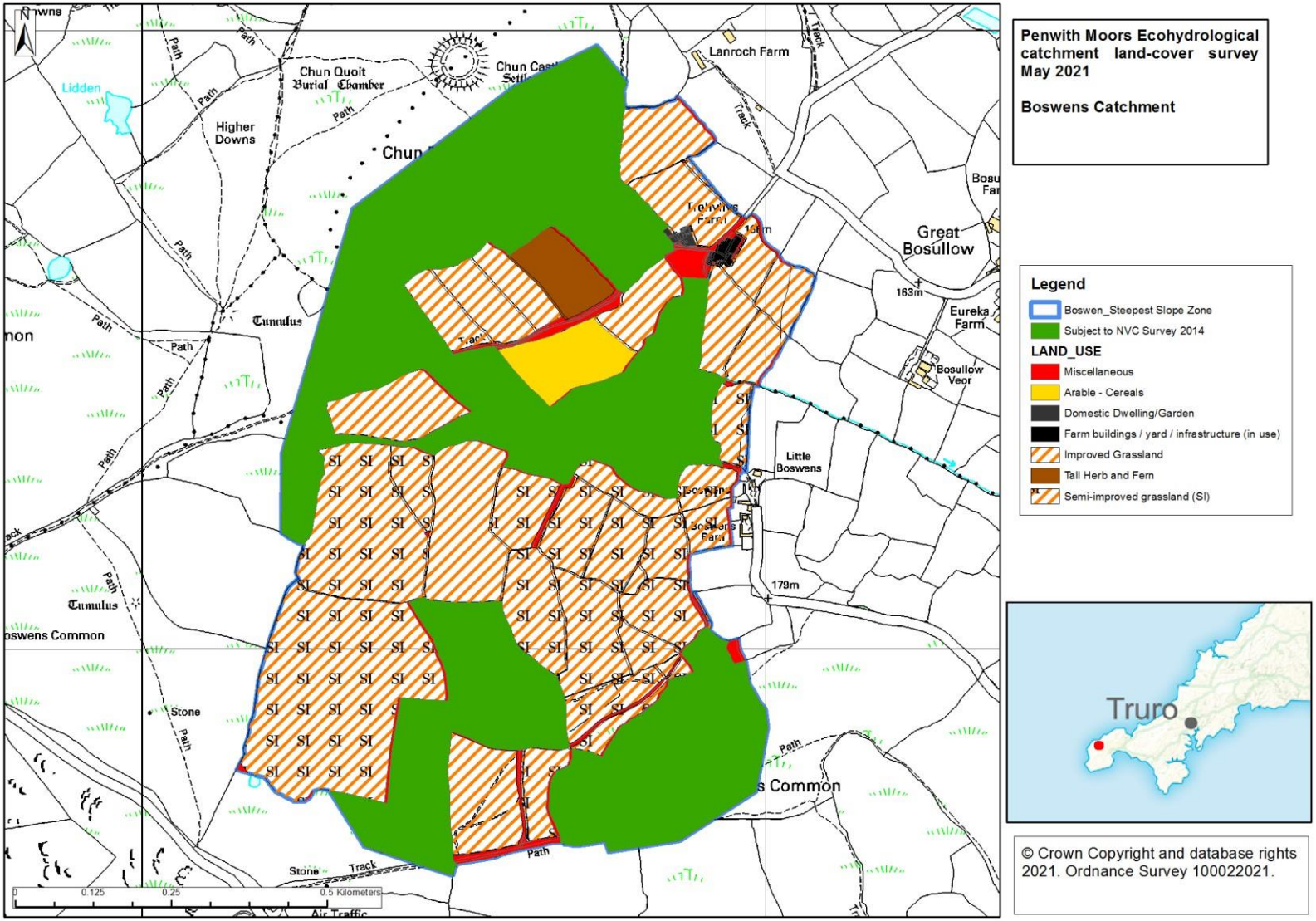

Figure 6: Landcover map of Boswens steepest slope zone

Bussow Catchment

Total area of Steepest slope zone approximated to field boundaries: **126.11 ha**

Table 6: Summary of Land cover within Bussow steepest slope zone

Land Use	Area (ha)	Percentage (%)
Domestic Dwelling/Garden	2.48	1.96
Farm buildings / yard / infrastructure (in use)	1.64	1.30
Improved Grassland	62.06	49.21
Phase 1 category A Woodland and Scrub	0.65	0.52
Phase 1 category B Grassland and Marsh	2.42	1.92
Phase 1 category C Tall Herb and Fern	9.18	7.28
Phase 1 category G Open Water	0.08	0.06
Semi-improved Grassland	20.15	15.98
Rough Ground including mire	23.00	18.24
Misc	4.45	3.53
Total	**126.11**	

Almost half of the land cover within Bussow steepest slope zone was recorded as Improved Grassland (49.21%), the majority of which related to Bussow Farm. Dairy apparatus was observed in the yard here indicating that much of the improved land was used as silage/intensive grazing. The improved grassland ran right up to edges of the semi-natural habitat in the centre of the catchment. Areas of semi-improved grassland (15.98%) were recorded, mainly being in the NW of the catchment where several individual small holdings/horse paddocks were located. One parcel was also noted to have a number of cultivated vegetable patches with some tree planting around the outside (see Target note 03). An area (2.42ha) of heavily-grazed transitional semi-improved/acid grassland with *Ulex* scrub was observed in the NW of the catchment just below a block of previously NVC surveyed land. (Target note 02, 04). A relatively extensive area of *Pteridium aquilinum* scrub was found in the south of catchment at Penderleath Common and recorded as Tall herb and fern. Other smaller discrete pockets of *Pteridium aquilinum,* and *Rubus fruticosus scrub* were also recorded throughout the catchment, such as in disused overgrown fields and verges, which were similarly recorded as Tall herb and fern.

Plate 3: Area of transitional acid-semi-improved grassland in North of Bussow catchment. Hyacinthoides non-scripta visible in sward

Plate 4: Area of transitional acid-semi-improved grassland in the north of the Bussow catchment. Hyacinthoides non-scripta visible in sward, Ulex scrub present in background

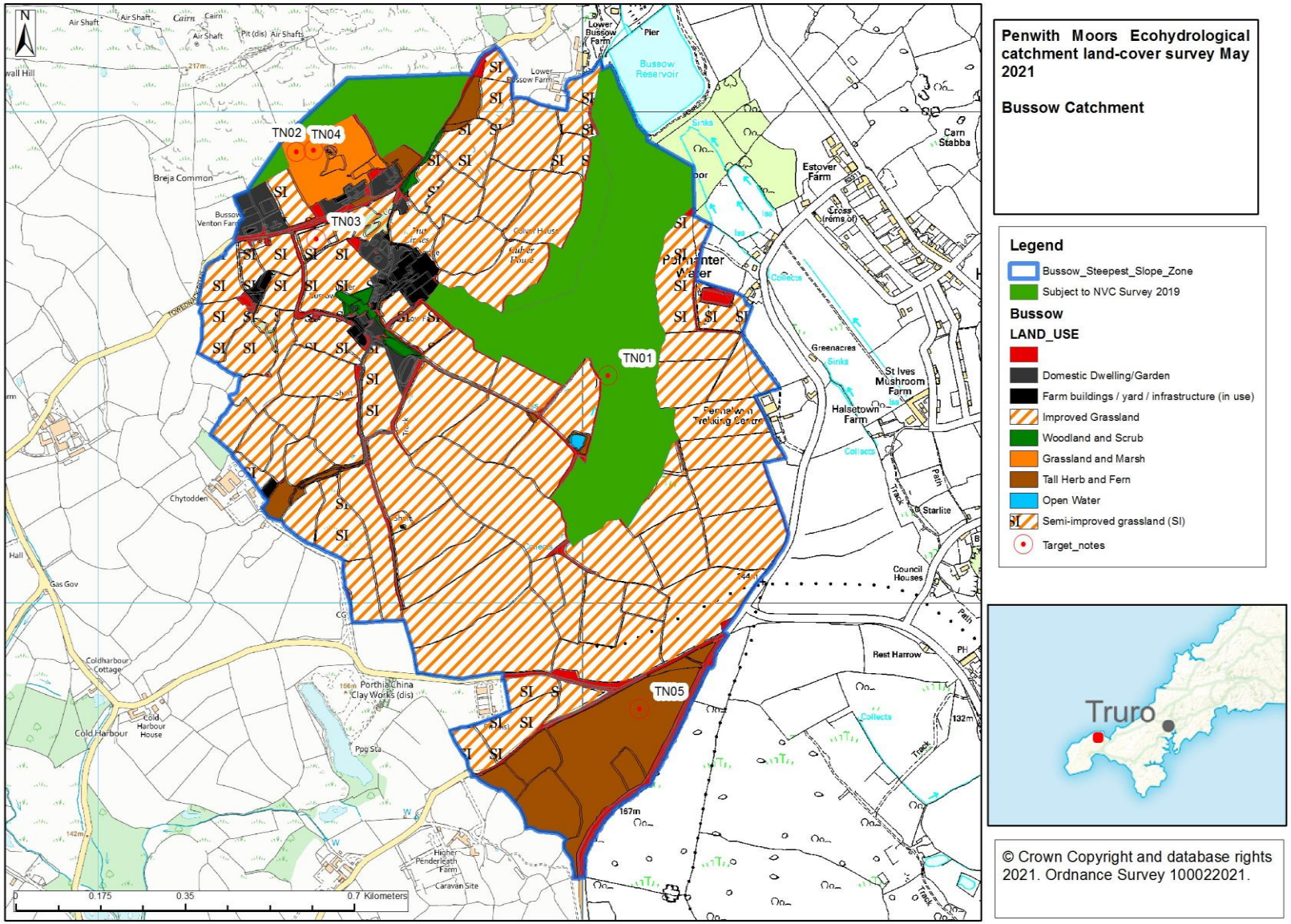

Figure 7: Landcover map of Bussow steepest slope zone

Embla Catchment

Total area of Steepest slope zone approximated to field boundaries: **64.19ha**

Table 7: Summary of Land cover within Embla steepest slope zone

Land Use	Area (ha)	Percentage (%)
Domestic Dwelling/Garden	1.84	2.87
Farm buildings / yard / infrastructure (in use)	0.48	0.75
Improved Grassland	10.34	16.11
Phase 1 category A Woodland and Scrub	1.60	2.49
Phase 1 category C Tall Herb and Fern	1.53	2.39
Semi-improved Grassland	38.32	59.69
Rough ground	9.00	14.02
Miscellaneous	1.08	1.68
Total	**64.19**	

Semi-improved grassland accounted for almost 60% of land cover within the Embla steepest slope zone (59.69%). Much of the semi-improved grassland was pasture fields centred around Embla Farm which are assumed to have had minimal fertiliser inputs for some time and which is largely managed under an agri-environment scheme. Other areas of semi-improved grassland were recorded in the north of the catchment towards Amalveor. Improved grassland formed 16.11% of the land cover and was predominately found in the NE-E end of the catchment. Unlike some of the other catchments the areas semi-natural habitat that had been previously NVC surveyed, were relatively small (9 ha) and comprised of discrete patches of *Salix* scrub and mire vegetation such as Purple Moor Grass & Rush Pasture (Wheeler, 2019). Other areas of semi-natural habitat were recorded as small blocks, *Salix* scrub and *Pteridium aquilinum* scrub.

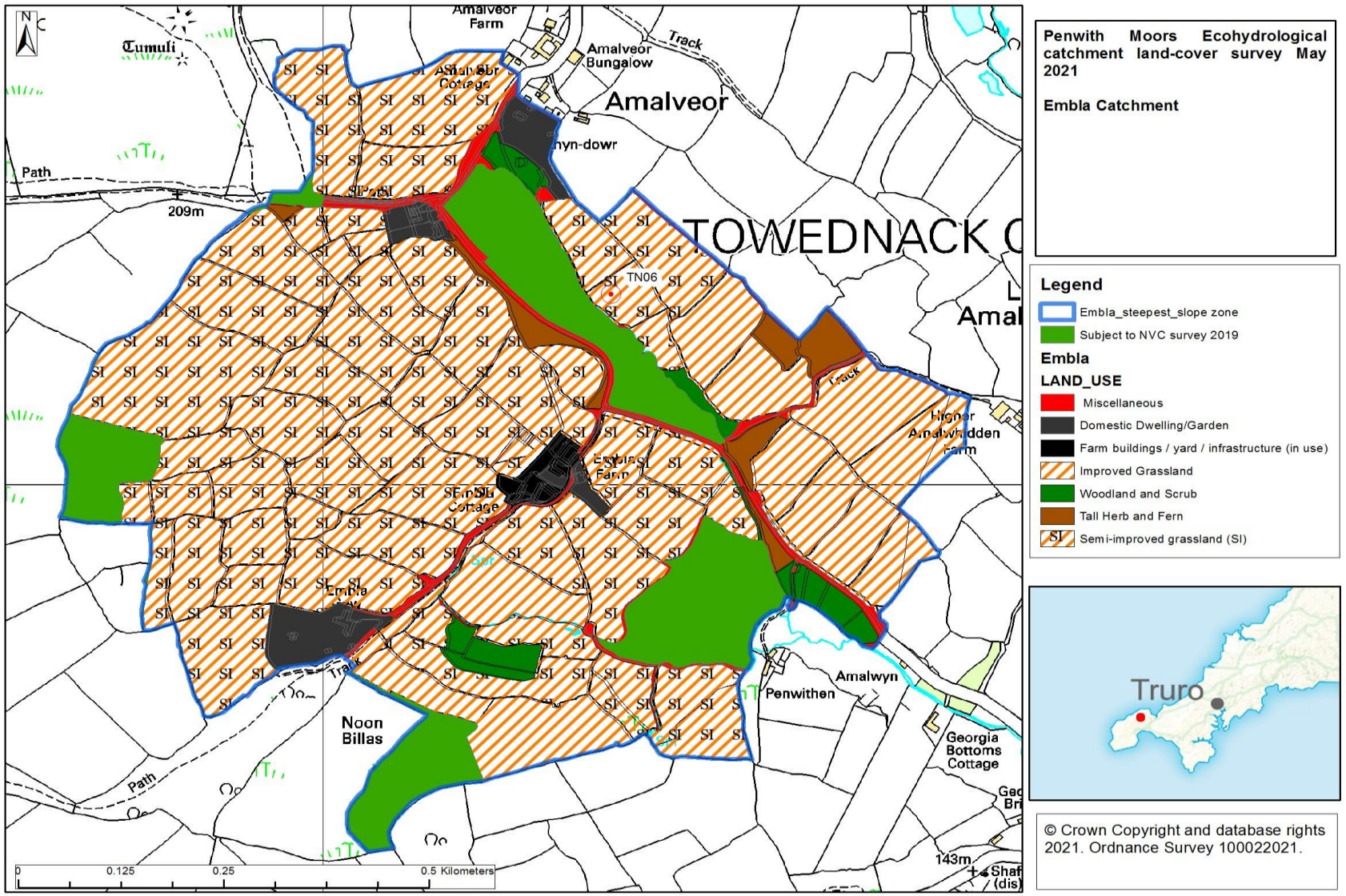

Figure 8: Landcover map of Embla steepest slope zone

Gear Catchment

Total area of Steepest slope zone approximated to field boundaries: **60.56 ha**

Table 8: Summary of Land cover within Gear steepest slope zone

Land Use	Area (ha)	Percentage (%)
Semi-improved Grassland	14.23	23.49
Rough ground	46.13	76.19
Misc	0.19	0.32
Total	**60.56**	

The landcover in Gear steepest slope zone was predominately made up of rough ground that had previously been NVC surveyed in 2014, which is reported to be comprised of three main habitats; heath, mire & scrub. Semi-improved grass fields abut the rough ground on the NE/SE edges which account for the remaining land cover within the steepest slope zone. No other semi-natural habitats were recorded.

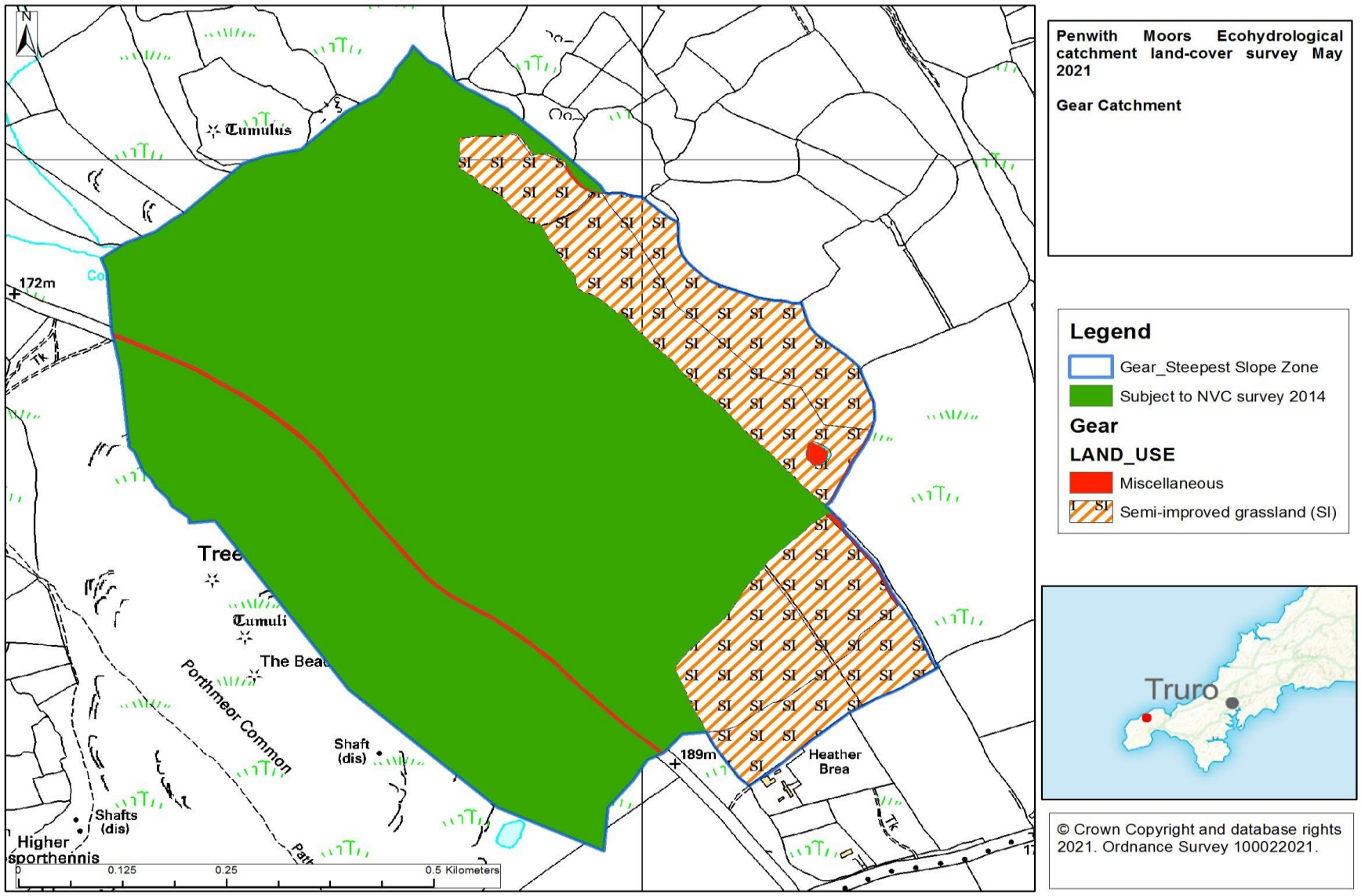

Figure 9: Landcover map of Gear steepest slope zone

Lanyon Catchment

Total area of Steepest slope zone approximated to field boundaries:
72.90ha

Table 9: Summary of Land cover within Lanyon steepest slope zone

Land Use	Area (ha) (%)	Percentage
Improved Grassland	3.56	4.88
Phase 1 category C Tall Herb & Fern	0.96	1.32
Semi-improved grassland	7.28	9.98
Rough ground	60.29	82.70
Misc	0.82	1.12
Total	**72.90**	

Other than the area of semi-natural habitat subject to NVC survey in 2013 which was comprised of heath, mire, grassland and scrub and accounted for 82.7% of land cover, the other main land cover types recorded were Improved grassland (4.88%), Semi-improved grassland (9.98%) and Tall herb and fern vegetation (1.32%). A small network of fields were present in the northern tip of the steepest slope zone. These fields were semi-improved pasture and cattle were observed to be grazing at time of survey. One field was found to be overgrown with *Pteridium aquilinum* underscrub. One fairly large (3.56 ha) field of improved grassland that had recently been cut for silage was located in the southern corner of the steepest slope zone.

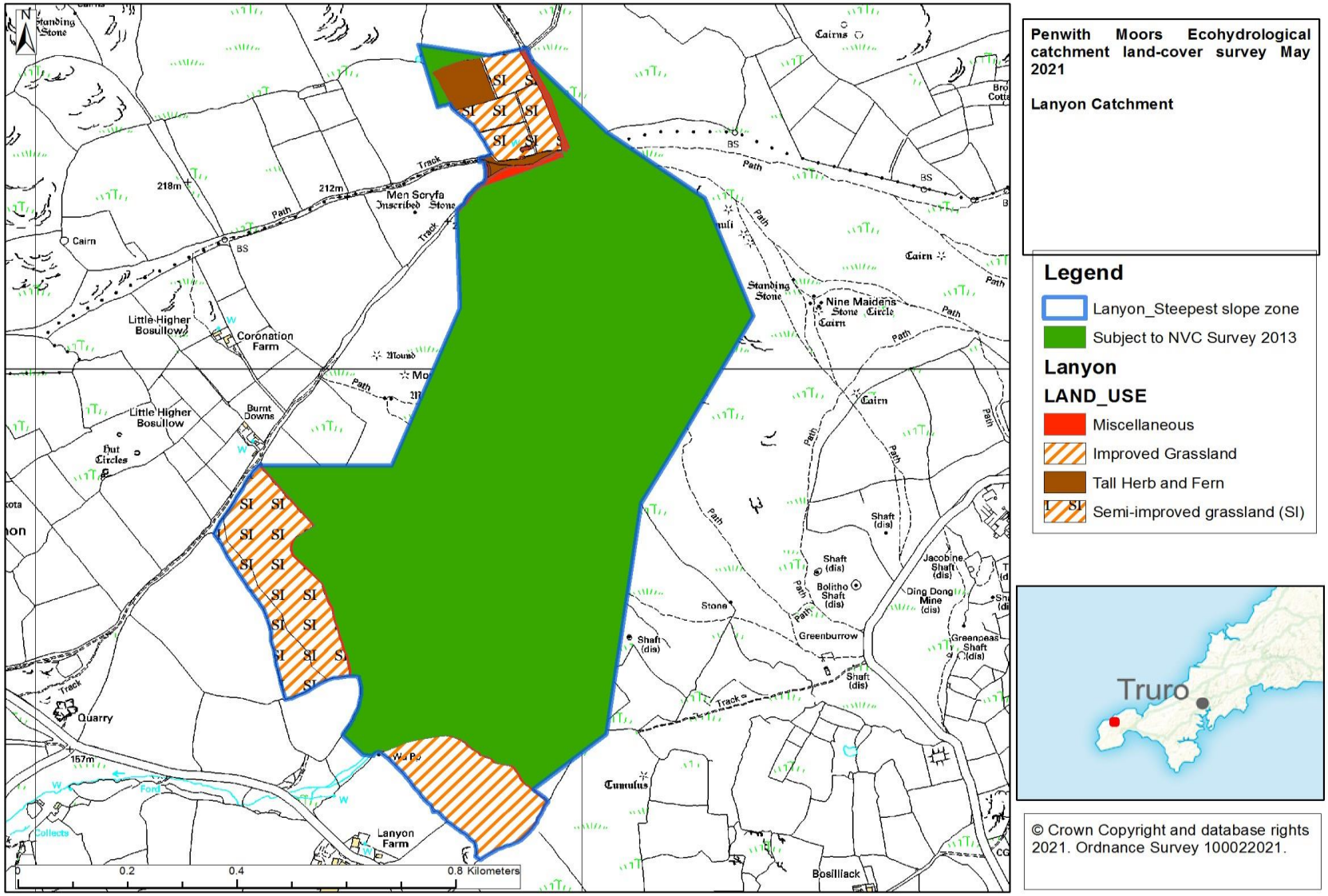

Figure 10: Landcover map of Lanyon steepest slope zone

Tredinnick

Total area of Steepest slope zone approximated to field boundaries: **35.68 ha**

Table 10: Summary of Land cover within Tredinnick steepest slope zone

Land Use	Area (ha)	Percentage (%)
Arable - Cereals	2.94	8.23
Arable - short-term grass-ley	0.15	0.43
Domestic Dwelling/Garden	1.73	4.86
Improved Grassland	9.78	27.41
Phase 1 category A Woodland and Scrub	1.88	5.26
Phase 1 category C Tall Herb and Fern	0.28	0.78
Semi-improved grassland (SI)	8.88	24.90
Rough ground	9.05	25.37
Misc	0.99	2.77
Total	**35.68**	

The main land cover types found within Tredinnick steepest slope zone were; Arable – Cereals (2.94ha), Arable – short term grass-ley (0.15ha), Improved grassland (9.78ha) and Semi-Improved grassland (8.88ha). Much of the improved grassland fields were in the southern half of the catchment and were managed as part of a dairy enterprise. The area of semi natural vegetation that was NVC surveyed in 2019 in the centre of the catchment that holds the main mire interest is separated from the improved grassland fields to the west by an unclassified road (public highway) running north to south. Two further improved grassland fields abut the semi-natural vegetation in the south-east but are considered to be downstream of the mire vegetation. The fields in the northern part of the catchment were generally of a smaller nature and were mostly found to be semi-improved grassland. Two fields of semi-improved grassland were also found adjacent to the block of NVC surveyed ground in the centre of the catchment. At the time of survey, these fields were being managed as permanent grassland with very low inputs under an agri-environment agreement. A cluster of fields that were growing cereals and temporary

grass-ley were recorded in the east of catchment. Woodland and scrub was the largest seminatural habitat that was recorded (1.88ha), mainly being mixed woodland adjacent to domestic dwellings in the NE of the catchment and along an old bridleway. Small pockets of discrete *Pteridium aquilinum* underscrub were also recorded along old hedge banks.

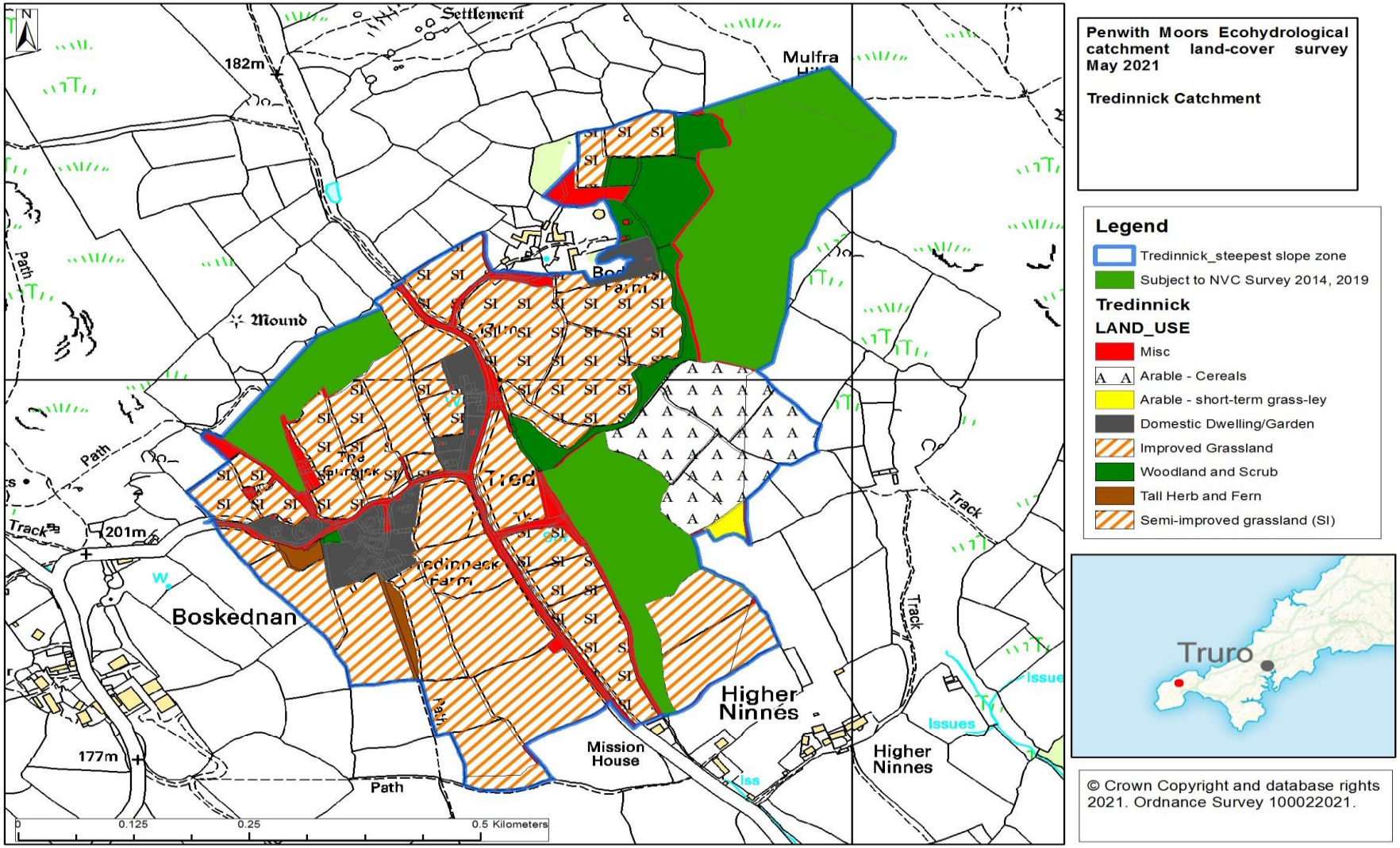

Figure 11: Landcover map of Tredinnick steepest slope zone

Tregerest Catchment

Total area of Steepest slope zone approximated to field boundaries: **44.79 ha**

Table 11: Summary of Land cover within Tregerest steepest slope zone

Land Use	Area (ha)	Percentage (%)
Domestic Dwelling/Garden	1.06	2.36
Farm buildings / yard / infrastructure (in use)	1.24	2.76
Improved Grassland	30.46	68.00
Phase 1 category A Woodland and Scrub	0.20	0.45
Phase 1 category C Tall Herb and Fern	0.60	1.34
Semi-improved Grassland (SI)	3.52	7.86
Rough ground	6.01	13.41
Miscellaneous	1.71	3.81
Total	**44.79**	

A large part of the Tregerest steepest slope zone was improved grassland, accounting for 68% (30.46ha). Much of the improved grassland is part of Middle Tregerest Farm which is an active dairy enterprise. Cattle were present in fields in northern part of the catchment at time of survey. Several fields of semi-improved grassland were recorded in the east of the catchment, adjacent to the area of seminatural vegetation that was surveyed in 2019. A small block of deciduous woodland was recorded above the track just opposite the mire vegetation. A field that was comprised of part tall herb vegetation and part semi-improved grassland was recorded adjacent to a semi-improved horse paddock in the south-west of the catchment.

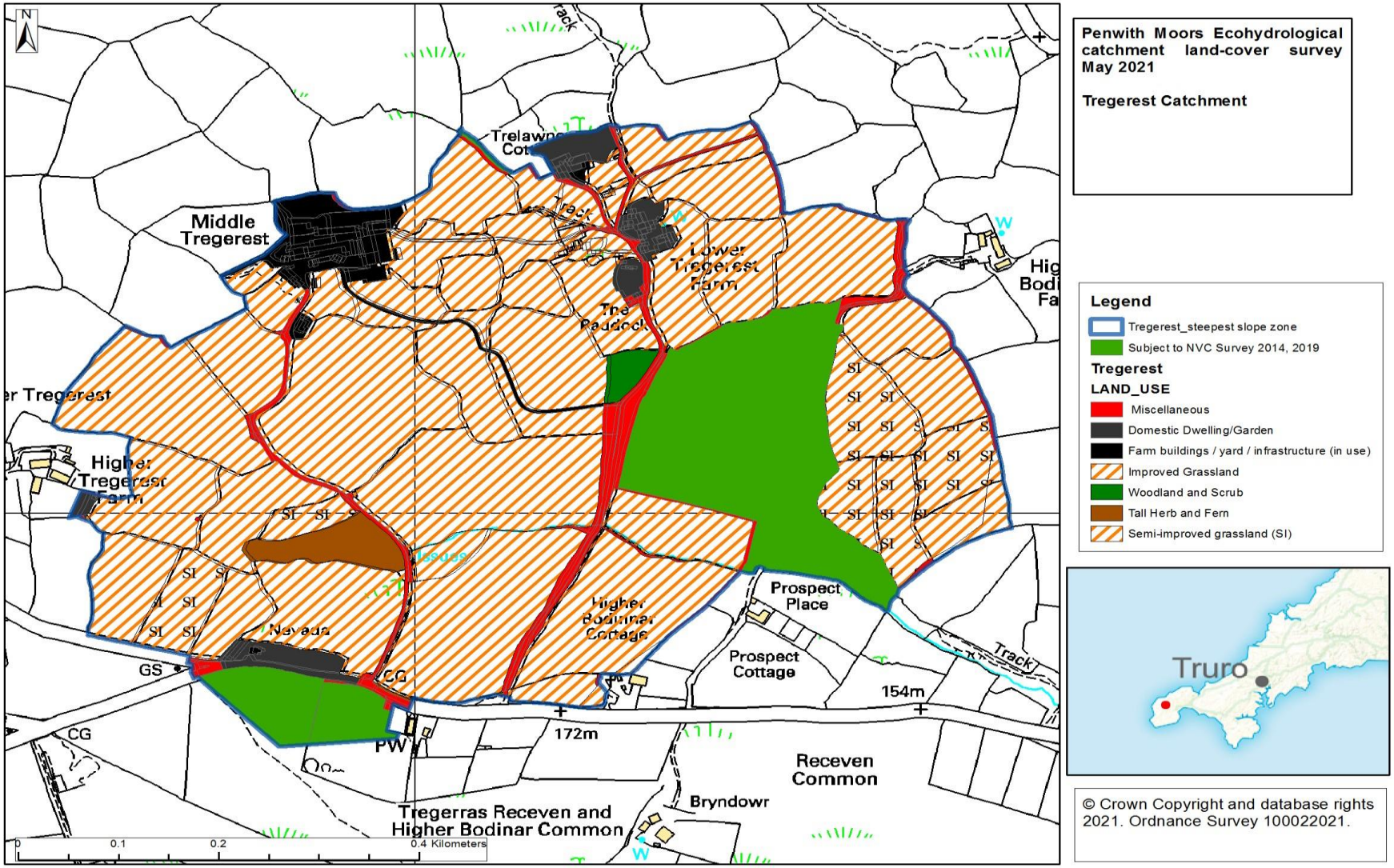

Figure 12: Landcover map of Tregerest steepest slope zone

Discussion

One of the aims of this report is to help inform the land management-based risk assessment undertaken as part of the ecohydrological assessment by providing a fieldverified and up-to-date record of landcover in 2021. It therefore does not intend to provide an interpretation of relative risk of catchment land-cover for the wetland (mires). An indepth interpretation of relative risk of catchment land cover can be found in *West Penwith Ecohydrological Investigation and Characterisation, Phase 3 2020-21, Miles, E. et. al.,* Atkins (2021).

Additional areas of semi-natural vegetation recorded

The most significant areas of semi-natural vegetation that were encountered during the land cover survey were;

- Bostraze catchment: 3.69ha of *Pteridium aquilinum* underscrub in small field system adjacent to Boslow Farm.
- Bussow catchment: 9.18ha of *Pteridium aquilinum* underscrub with scattered gorse scrub at Penderleath Common
- Bussow catchment: 2.42ha of transitional semi-improved/acid grassland with areas of *Ulex* scrub; relative to other stands of acid grassland in Penwith Moors, this area was considered probably of insufficient habitat quality to meet the SSSI selection guidelines for lowland grassland, though this is perhaps a marginal case. If this area were to be included on ecohydrological grounds, as is being considered, it would receive protection through SSSI regulation notwithstanding.

The semi-natural habitats encountered were of some limited ecological interest. Locally, bracken can be of value where it occurs mixed with other vegetation types, but in large stands of dense cover, such as the stands encountered at Penderleath Common, it can shade out other plants and reduce biodiversity. The area of grassland with *Ulex* scrub in Bussow catchment was considered transitional – between semi-improved and acid grassland, but probably not of sufficient quality to meet the SSSI selection guidelines *per se*, albeit of some local ecological interest.

No areas of sufficient quality habitat which would meet the SSSI selection guidelines on habitat grounds alone were encountered which had not already been surveyed in 2012-14 and 2019. However, as stated in the SSSI selection guidelines, any land should be included that is necessary to ensure the sustainability of features including processes such as hydrology, and more specifically that all land to the top of the steepest slopes should be considered for inclusion within the SSSI boundary. Therefore, there are grounds to consider inclusion of these areas of semi-natural habitat as well as agricultural land on ecohydrological grounds alone.

Variation in quality of grassland

The quality and composition of the grasslands encountered within the survey varied greatly from very improved silage fields which are assumed to receive relatively high nutrient inputs to some examples of semi-improved pastures which have clearly had minimal inputs for many years. The poorest quality grasslands (in ecological terms) were those encountered in catchments that were known to have active dairy enterprises such as Bussow and Tregerest. In comparison some of the semi-improved grasslands were of higher ecological quality. For example, the fields surrounding Embla Farm had clearly received minimal nutrient inputs and resulted in some moderately flower-rich semiimproved pastures, managed under an extensive beef/lamb enterprise and currently under an active agri-environment scheme.

Limitations

The separation of some examples of improved and semi-improved grasslands proved difficult in the field. Some examples were clearly improved, often bright green in appearance and/or characterised by agricultural swards with rye-grass *Lolium perenne* and white clover *Trifolium repens*. Others were clearly long-established semi-improved swards with low-yield grass density, wild graminoids such as sweet vernal grass *Anthoxanthum odoratum* and field woodrush *Luzula campestris* and associated herbs including ribwort plantain *Plantago lanceolata*, common sorrel *Rumex acetosa* and buttercups *Ranunculus* spp. However, many examples were transitional or intermediate between the two, either without obvious agricultural improvement but lacking in abundance of herbs or with an abundance of common herbs but with a 'bulky' sward, some with a high abundance of agricultural grasses. Some fields were heavily grazed further hampering grassland categorisation, though the frequent presence of thistles *Cirsium* spp. and/or docks *Rumex* spp. suggesting raised soil fertility. In these instances, professional judgement was applied in the field to assign a single landcover category to each grassland type based upon an overall impression relative to other grasslands in the survey area.

Improved grassland fields observed in the survey were assumed to be permanent grassland unless the land manager had been met in the field and advised of cases which were under temporary grass-ley as part of arable rotation. As not all land managers were met in the field it is possible that the 'Arable: short-term grass-ley' category has been under-recorded.

There was insufficient time in the field to record vegetation composition in any detail. Target notes were occasionally used to record some indicative species. Some grassland types may reveal greater ecological interest if surveyed using, for example, NVC methodology.

The data collected in this single survey event represents a 'snap-shot' at a point in time, and that land cover may subsequently change over time. It is beyond the scope of this survey to attempt to predict such change.

Appendix 1 – Target Notes

Table 12: Target notes to accompany maps

Target Note Reference	Grid ref	Target Note
TN01	SW5005338464	Pheasant Pen
TN02	SW4944438923	Transitional semi-improved / acid grassland, heavily grazed and mostly species-poor with patches of Rumex acetosella, Pteridium aquilinum and Hyacinthoides nonscripta
TN04	SW4940938920	Gorse Scrub
TN05	SW5011837786	W25 (with scattered gorse scrub)
TN06	SW4835037246	Juncus
TN07	SW3964232057	Field split, western improved grassland, eastern end Arable-horticulture
TN03	SW4945038742	Semi-improved field with small cultivated vegetable patches and tree planting around the outside

References

Adams, S. et al., (2012). NVC and Condition Assessment Surveys of West Penwith Moors, Cornwall 2012 Cornwall Environmental Consultants Ltd [online]. Available at: http://publications.naturalengland.org.uk/publication/4830128866852864

Atkins (2021) West Penwith Ecohydrological Investigation and Characterisation, Phase 3 2020-21.

HEWINS, E., GROOME, G. and . PILKINGTON, S. 2013. West Penwith Habitat Surveys 2013: NVC and Condition Assessment Surveys, West Penwith Moors, Cornwall. Hewins Ecology [online] Available at: http://publications.naturalengland.org.uk/publication/6461419991334912

HEWINS, E., GROOME, G. and PILKINGTON, S. 2014. West Penwith Habitat Surveys 2013 – 2014: NVC and Condition Assessment Surveys, West Penwith Moors, Cornwall. Hewins Ecology. [online]. Available at: http://publications.naturalengland.org.uk/publication/5537830224003072

Joint Nature Conservation Committee, 2022. Guidelines for the selection of SSSIs, SSSI guidelines [Online]. Available at: https://jncc.gov.uk/our-work/guidelines-for-selection-ofsssis/

Wheeler, B. 2019. NVC and Condition Assessment Surveys, West Penwith Moors, Cornwall (2019), Cornwall. Rigare Ltd [online]. Available at: http://publications.naturalengland.org.uk/publication/5406983374241792

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