Afon Claerwen Hydro Scheme

Breeding Bird Survey

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Version no.1

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1. Introduction

Environment Systems was commissioned to undertake ecological surveys to support the development design, planning submission and consenting for a hydro-electric scheme operating on the Afon Claerwen in the Elan Valley. This report presents the results of the Breeding Bird Survey (BBS) undertaken during May and June 2017.

1.1. Development Description

The development is located approximately 10 km southwest of Rhayader (National Grid Reference SN 89553 61784) between the Claerwen and Caban-coch reservoirs. The development is a run-of-river hydro-electric scheme with a capacity of 1.1 MW. Electricity will be generated by abstracting water from a location approximately 1.7 km downstream of the Claerwen Dam. A proportion of the flow (which has already been agreed and licenced by Natural Resources Wales) will be abstracted from the river and fed through either a pipe approximately 1.8 m in diameter or twin smaller (1.2 m) pipes. The pipe(s) will be laid underground and the alignment will broadly follow the southern side of the unclassified highway for approximately 2 km at which point it will return to the river via a hydro-electric turbine.

The turbine will be housed in a small building with dimensions of approximately 10 m x 8 m. In addition to the turbine house there will be a second building and compound containing electrical switchgear and transformer allowing connection to the Distribution Network Operator's (DNO) substation. Both buildings will be cladded in appropriate local materials. Power will be exported along an underground cable to be owned and operated by the local DNO. There will be no requirement for overhead lines. The power house. Access to this location will be made available by making improvements to an existing track including some realignment) which falls from the public highway road. The existing track is well used be off-road vehicles. This access route will remain after the construction work is complete to allow future vehicle access to the turbine house and transformer compound.

Construction works are intended to take place during the spring and summer period and are expected to extend to between six and nine months. Plant and machinery used will include small numbers of excavators, concrete mixers and standard HGVs. It is anticipated that no more than two abnormal loads will be in operation during the construction period. During the laying of the pipeline an excavation corridor of approximately 200 m in length would be operation at any one time. The average depth of the excavation is likely to be 2.8 or 2.2 m (maximum diameter of single or twin pipes plus 1 m cover) subject to the ground contours. Temporary French drains will be provided to divert surface water away from the excavation. The total construction corridor, including the areas identified for the temporary deposition of spoil and turves, could be up to approximately 40 m in width.

1.2. Development Details

1.2.1. Construction Aspects

During the construction phase, there will be direct loss of a linear strip approximately 2.5 km of land spanning approximately 20m wide plus associated construction compounds. The total land take required for construction is 6.22 ha. Construction details are described in Chapter 4.

In summary, the main construction elements are:

- Creation of a 1.7 km pipeline up to 2.8 m excavation
- Creation of a concrete tailrace
- Installation of Coanda screens and concrete conveyance channel into intake chamber. Intake chamber (including any pumps required) will be finished with stone facing.
- Powerhouse (0.008ha / 10m x 8m) block built with stone face
- Intake construction compound – approximately 0.06 ha temporary land take and powerhouse construction compound – approximately 0.11 ha temporary land take. Both will have turf removed and filled with gravel. Soils to be stockpiled and reinstated at end of construction phase.
- Pipeline will only be built in 200m sections with temporary French drains and silt traps installed. Soils will be stockpiled along the pipeline before reinstating and landscaping once each section is complete.
- In river works for watercourse crossings will include:
  - the fluming and surfacing of the streams to enable vehicle access up to the intake and upper penstock section
  - The removal of fluming/ access arrangement followed by temporary diversion of the tributary to enable burial of the penstock below the tributary bed
  - The reinstatement of the natural tributary bed and restoration of normal flow.
  - Each watercourse crossing will take up to three weeks and will take place between June and September.
- Construction to last between 9-12 months. Some works must be completed during spring/ summer due to abstraction license conditions

1.2.2. Operational Aspects

During operation, there will be no ongoing physical or direct works to the built hydro scheme. Activities will be limited to monitoring and maintenance. The coanda screens that will be installed are self-cleaning with the exception of large build-up such as branches, leaves and general river material. This will be cleaned out by hand, as will the intake channel, intake/syphon chamber and tailrace.

The powerhouse will require ongoing access and maintenance. This will be via a van or standard road going four-wheel drive vehicle. Maintenance to the powerhouse is largely restricted to the internal workings such as the turbine and control panels etc. The building fabric will be maintained as required with it being possible to use the access track to temporarily store material (i.e spare slates, scaffolding for re-roofing after approximately 60-100 years).

1.3. Rationale

1.3.1. Review of desk based information

The primary need for survey is the presence of designated sites which spread throughout the development's Zone of influence (ZoI). The development is located partly within the Elenydd-Mallaen Special Protection Area (SPA). The site covers an area of 30,022 ha and is qualified for its breeding season populations of peregrine *Falco peregrinus* (1.3% of UK population), red kite *Milvus milvus* (9.4% of UK population) and merlin *Falco columbarius* (0.5% of UK population). Habitats that support these breeding raptor species are found in the Elan Valley Woods SAC and Elenydd SAC & SSSI.

The Elan Valley Woods Special Area of Conservation (SAC) is primarily designated for its old sessile oak woods. European dry heath and Tilio-Acerion forests of slopes, screes and ravines are qualifying features but not primary reasons for designated. The habitat supports a rich invertebrate fauna, in

addition to plant assemblages and fungi. Notable local species of bryophytes and lichen species are also present. The habitat additionally serves to facilitate breeding red kites.

The Elenydd Site of Special Scientific Interest (SSSI) is of interest for its breeding raptors, owls, ducks, waders, game birds and passerines. The habitat that supports these bird species include blanket bog vegetation, mountain lakes supporting floating water-plantain, examples of watershed mires supporting rare plant species: such as the headwaters of the rivers Elan and Claerwen, the pool & hummock mire at Cors Lwyd and mire complex at Cors Goch.

The Caban Lakeside Woodlands SSSI supports a range of mosses and liverworts associated with humid situations with decaying wet wood. The SSSI supports a range of lichens typical of acid barks, naturally basic bark and standing dead wood and has suitable conditions for rare lichen species. The proposed cable route would run through the most westerly edge of the SSSI. The SSSI is not designated for its specific interest for breeding birds but is likely to provide feeding and nesting sites.

Caeau Penglaneinon SSSI features species rich grasslands. Nominated as county 'Coronation Meadow' due to being an outstanding example of species-rich grassland. The proposed cable route is adjacent to the eastern edge of the SSSI. The SSSI is not designated for its specific interest for breeding birds but is likely to provide feeding and nesting sites.

Species of interest from designated site citations are presented in Table 1. The Powys nature Recovery Action Plan (PRNAP) includes 55 bird species that are considered Locally Important (LI). These are species which are considered of importance due to changes in observations by local recorders, local bird experts and local professional ecologists. The list of LI bird species was provided via a Local Environmental Records Data (LERC) data search within 2km of the site boundary. The species included in within 2km and that are LI is provided in Appendix A.

The location of the designated sites in relation to the development is shown in Figure Series 1 – Designated Sites Plan.

1.3.2. Aims and Objectives

Given the diversity of protected and priority birds known to be present in the vicinity of the development the aim of the survey was to determine the current use of this site by birds, whether any species are present in significant densities and propose evaluations of each species in terms of their legislative, policy and most recent BoCC assessment (Eaton et al, 2015).

Based on these aims the objectives were to;

- Conduct a breeding bird survey using a transect method of the site;
- Evaluate the importance of each species present; and
- Suggest recommendations or/and mitigation based on the survey results to minimise negative impact the development might have on bird populations.

Table 1: bird species identified though review of designated sites citations.

Common Name	Scientific Name	Interest and/or Legal Status	Birds of Conservation Concern (BoCC) Status
Red kite	*Milvus milvus*	Annex 1 Birds Dir, Schedule 1 WACA	Green
Merlin	*Falco columbarius*	Annex 1 Birds Dir, Schedule 1 WACA	Red
Peregrine	*Falco peregrinus*	Annex 1 Birds Dir, Schedule 1 WACA	Green
Hen harrier	*Circus cyaneus*	Annex 1 Birds Dir, Schedule 1 WACA	Red
Short-eared owl	*Asio flammeus*	Annex 1 Birds Dir	Amber
Long-eared owl	*Asio otus*		Green
Red grouse	*Lapogus lapogus*	Env Act S7	Amber
Ring ouzel	*Turdus torquatus*	Env Act S7	Red
Wheatear	*Oenanthe oenanthe*		Green
Whinchat	*Saxicola rubetra*		Red
Stonechat	*Saxicola rubicola*		Green
Goosander	*Mergus merganser*		Green
Teal	*Anas crecca*		Amber
Dipper	*Cinclus cinclus*		Amber
Common sandpiper	*Actitis hypoleucos*		Amber
Dunlin	*Calidris alpine*		Amber
Golden plover	*Pluvialis apricaria*	Annex 1 Birds Dir, Env Act S7	Green
Snipe	*Gallinago gallinago*		Amber
Curlew	*Numenius arquata*	Env Act S7	Red
Lapwing	*Vanellus vanellus*	Env Act S7	Red
Pied flycatcher	*Ficedula hypoleuca*	Env Act S7	Red
Redstart	*Phoenicurus phoenicurus*		Amber
Warblers (general)	*Phylloscopus sp.*	Env Act S7	Red; Amber
Siskin	*Spinus spinus*		Green
Crossbill	*Loxia sp.*	Schedule 1 WACA	Green

Annex 1 Birds Dir - Birds Directive Annex 1
Schedule 1 WACA – Wildlfie and Countryside Act 1981 (as amended)
Env Act S7- Environment (wales) Act Section 7

2. Methodology

2.1. Breeding Bird Survey

The breeding bird survey was completed between April and June 2017 by Dave Thomas MSc BSc (Hons). Information on times and weather conditions during the survey are provided in Table 2. Dave is an ornithologist with over 25 years of experience including breeding bird and common bird census surveys, upland wader surveys, wetland bird survey and vantage point surveys for a range of projects including population monitoring for the British Trust for Ornithology, wind farms and power lines.

Table 2: Survey details

Date	Start Time	End Time	Weather conditions
29/04/2017	06:50	10:00	Cloud 8/8; 10°C; calm, dry and bright
08/05/2017	06:20	10:00	Cloud 0/8; 12°C; calm, good visibility
19/05/2017	06:00	09:15	Cloud 4/8; 13°C; calm, good visibility
01/06/2017	06:00	09:30	Cloud 8/8; 14°C; good visibility

A single transect following along the pipeline route and crossing the development areas was walked on each occasion recording activity for all species at 25m intervals. Records from all visits were combined into a final visit map using a Geographical Information System (GIS) to allow an estimate of territory numbers for each species. Birds were assumed to be breeding or holding territory at the recorded location if one or more of the following is observed:

- Courtship, displaying or singing;
- Presence of a nest, eggs or young (including newly fledged);
- Agitated behaviour, including alarm calls or distraction display;
- Pair of birds present in suitable habitat;
- Adults carrying food or nesting material; or,
- Territorial dispute.

In the absence of any of these indicative behaviours other records were considered to be of non-breeding birds.

Within visits, duplicate records of birds separated by less than a threshold distance of 500m for waders and raptors, and 200m for passerines were arbitrarily considered to correspond to birds of the same pair, while those separated by more than this threshold distance were considered to be from different pairs. Exceptions to this were when surveyors recorded birds seen within this threshold distance of each other clearly displaying breeding activity, i.e. identification of an actual nest, representing different pairs and vice versa.

3. Results

In total 49 species were recorded throughout the survey area with 12 species on the BoCC Red list, seven species on the BoCC Amber list and 29 on the BoCC Green list. One species, pheasant, is not assigned a conservation status category because it is a species that has been deliberately released into the wild (i.e. for game shooting). Two species, red kite and peregrine, are included on Annex I of the EU Birds Directive and Schedule 1 of the Wildlife and Countryside Act 1981 (as amended). Ten species are included on the Section 7 list of the Environment (Wales) Act 2016. A full list of species and number of observations per visit are provided in Table 3. The diversity of species recorded was typical of the mid-Wales region. The results of the survey and territories are shown in Figure Series 2 – Breeding Bird Survey Results. Example photographs of the different site habitats are provided in Appendix C – Photographic Plates.

Table 3: Frequency of observations by species and visit

Species	Scientific Names	29/04/2017	08/05/2017	19/05/2017	01/06/2017
Blackbird	*Turdus merula*	10	10	19	9
Blackcap	*Sylvia atricapilla*	1	5	3	5
Blue Tit	*Cyanistes caeruleus*	3	5	7	3
Bullfinch***	*Pyrrhula pyrrhula*			1	
Buzzard	*Buteo buteo*	1	1	1	6
Canada Goose	*Branta canadensis*	2	2	2	
Carrion Crow	*Corvus corone*	7	5	4	5
Chaffinch	*Fringilla coelebs*	12	8	12	16
Chiffchaff	*Phylloscopus collybita*	4	6	2	2
Coal Tit	*Periparus ater*		2	2	
Cuckoo***	*Cuculus canorus*				1
Dunnock***	*Prunella modularis*		1	1	
Goldcrest	*Regulus regulus*				2
Goldfinch	*Carduelis carduelis*		1		
Great tit	*Parus major*	9	8	8	8
Greater spotted woodpecker	*Dendrocopos major*			2	6
Greylag goose	*Anser anser*				1
Grey Wagtail	*Motacilla cinerea*	1	2	1	2
Grey Heron	*Ardea cinerea*				1
House martin	*Delichon urbica*			2	1
Jay	*Garrulus glandarius*	1			
Lesser Redpoll***	*Carduelis cabaret*	1		2	
Linnet***	*Carduelis cannabina*	1	1	1	
Long-tailed tit	*Aegithalos caudatus*				1
Magpie	*Pica pica*	1	2	2	2

Meadow Pipit	*Anthus pratensis*	1	6	3	5
Mistle thrush	*Turdus viscivorus*			1	
Nuthatch	*Sitta europaea*	1		1	
Pheasant	*Phasianus colchicus*		1		
Pied Flycatcher***	*Ficedula hypoleuca*		3	3	1
Pied Wagtail	*Motacilla alba*	1	2	3	4
Peregrine* & **	*Falco peregrinus*	1			1
Raven	*Corvus corax*	2	3	1	5
Redstart	*Phoenicurus phoenicurus*	6	9	7	12
Red Kite* & **	*Milvus milvus*	4	4	3	1
Robin	*Erithacus rubecula*	11	14	8	11
Siskin	*Carduelis spinus*		3		
Skylark***	*Alauda arvensis*				1
Song Thrush***	*Turdus philomelos*	4	6	2	4
Sparrowhawk	*Accipiter nisus*	1			
Stonechat	*Saxicola torquata*		1	1	1
Swallow	*Hirundo rustica*		2	3	
Tree Pipit***	*Anthus trivialis*	4	2	3	4
Wheatear	*Oenanthe oenanthe*	4	1	1	
Whinchat	*Saxicola rubetra*	1	1		1
Whitethroat	*Sylvia communis*	1			1
Willow Warbler	*Phylloscopus trochilus*	25	22	49	34
Wood pigeon	*Columba palumbus*	2	3	1	
Wood Warbler***	*Phylloscopus sibilatrix*	1	2	3	3
Wren	*Troglodytes troglodytes*	14	18	24	24

Colours denote the corresponding BoCC list in which the species appears.
* Species marker with * are protected under Annex 1 of Directive 2009/147/EC
** Species marked with ** are protected under Schedule 1 of the Wildlife and Countryside Act 1981 (as amended)
*** Species marked with *** are protected under Section 7 of the Environment (Wales) Act 2016.

3.1. Survey Visit Commentary

3.1.1. Visit 1 – 29/04/2017

Easy access along main trail beyond Rhiwnant Farm. Pretty typical habitat for upland mid-Wales – wet underfoot with some ffridd, improved grassland and rocky bits. Sparse bird population but could improve in warmer weather. No ground nesting birds (waders) noted. Migrants starting to appear notably wheatear. Only one raptor (red kite) noted at distance.

Easy access throughout along waymarked footpath. Range of habitats including ffridd, heath, clear fell, conifer and road. Varied and interesting avian population throughout. Buzzard, red kite and sparrowhawk all recorded. No obvious nests were noted. A peregrine was heard calling on crags (approx. SN920645) above the road between the bridge over Caban-coch reservoir and the visitor centre. If this is a permanent site, infrastructure works below are unlikely to disturb the birds as the road is very busy and noisy (scramblers/4x4's etc) on a regular basis. Migrants recorded throughout route including tree pipit, wood warbler, pied flycatcher and redstart.

3.1.2. Visit 2 – 08/05/2017

Surprised at the lack of skylark activity along the main development area (i.e. throughout the pipeline) Whinchat added to confirmed species list along the pipeline route.

Pied flycatcher and siskin in and around conifers and woodland along cable route (between the church and road section). Overflying red kite and buzzard were the only raptors. No signs of peregrine.

3.1.3. Visit 3 – 19/05/2017

No signs of active raptor nests along the cable route (i.e. in the woodland areas) however, remnant nests are visible. No signs of peregrine activity on the crags

3.1.4. Visit 4 – 01/06/2017

Two peregrines yikkering above the crags towards the end of the cable route by the car park and dam. The peregrine activity was noted in the same place as the noted during visit 1.

Number of observations of birds carrying food for chicks, notably redstart, tree pipit and pied flycatcher. A mixed flock of c14 adult and juvenile ravens passed over at the southern end of the cable route. This likely shows that the breeding bird season has advanced relatively early this year.

4. Discussion

Although 49 species were recorded in total and 18 species of conservation concern were recorded and confirmed as to be holding territory. Two protected species were recorded in the area with neither using and active nest within 100m of the development but likely to be part of their active nests range.

4.1. Birds of Conservation Concern

4.1.1. Bullfinch

A single observation of a singing bullfinch was made during the third visit. The observation was made on the edge of the mixed woodland and semi-improved grassland approximately 15m west of the cable route.

There will be no loss of woodland at this location. It is therefore unlikely that long term effects, i.e. during operation, will result in a change in breeding behaviour. During construction however the noise and disturbance close by may affect the specific location of territory. However, given the estimate of 190 thousand breeding pairs in Britain the loss of a single territory will be negligible. This is also likely to be reflected on a regional scale. More locally bullfinch is of concern as it is listed as a PRNAP LI species and the actual nesting location will need to be treated with care during construction. The effect is likely to be minor adverse.

4.1.2. Cuckoo

One observation was made of cuckoo which was calling. The observation was made during visit 4 and was approximately 106m from the transect and cable route. The distance to the construction ZoI is likely to be sufficient to prevent disturbance to cuckoo using the local area. The development is unlikely to have negative effects on the local breeding/mating population.

4.1.3. Dunnock

Two observations of dunnock were made during visits 2 and 3. Both observations were of individual birds singing. The observations were approx. 387m apart and were both along the most northern part of the cable route on the road.

Given that both records indicate that nesting was either imminent or had already taken place it is likely that the laying of the cable in the road will result in the disturbance (potentially leading to loss) to the territories. Dunnock are an Amber list species, protected under Environment Act Section 7, and is a PRNAP LI species. With an estimated 2.3 million territories in Britain the wider disturbance of nests and potential loss will be negligible. However, at a more local scale it will be necessary to ensure that the verge and hedge vegetation is retained throughout construction to help maintain and recovery post-construction.

4.1.4. Greylag goose

During visit 4 an individual graylag goose was observed flaying over the improved grassland and semi-improved acid grassland approximately 145m west of Rhiwnant Farm. It was considered that the bird was a vagrant or feral. The habitats surrounding the pipeline and cable route of generally of little interest for greylag goose. The development is unlikely to have negative effects on the local population.

4.1.5. Grey wagtail

Three observations of individual grey wagtails in flight were made of birds crossing along or over water. One flight was over the Afon Claerwen approx. 18m north of the proposed pipeline and within the construction ZoI. The other two were made during visits 2 and 4 and were both passing under the valve tower bridge along the cable route. This is considered to be one territory.

During visits 1, 3 and 4 three observation of stationary individual grey wagtails singing were made. All of the observations were within 100m of the pipeline route. Two observations (during visits 3 and 4) were within 115m of each other in the same habitat and considered to be a single territory. The total numbers of territories confirmed was four.

The riparian ZoI of the Afon Claerwen where the territories are confirmed and the underside of the barrels and walls of the bridge will not be lost during construction. So, there will be no long-term effect upon the available territories. However, disturbance from noise and vibration during construction may result in displacement and increase competition for other territories nearby. Given the estimate of 35 thousand breeding pairs in Britain the loss of up to four territories will be negligible. Locally the effect may be greater but the available habitat will be retained for re-colonisation within the same breeding year and it is likely that he ability to nest will not differ from routine maintenance works such as road tarmac replacements.

4.1.6. House martin

Three house martin flights were observed around Rhiwnant Farm and within 100m of Rhiwnant Farm. All observations were made during visits 3 and 4. The territories are all most likely to be found within the complex of farm buildings. The construction works will not affect the territories via land take but some disturbance from increased number of vehicles passing will occur. However, house martins are commonly found in and around active farms and it is considered that it is unlikely that this increase will affect the ability of house martins to maintain their nests and associated territories. The development is therefore unlikely to have negative effects on the local population.

4.1.7. Lesser redpoll

Three lesser redpoll observations were made. Two were of stationary individuals singing and a third was calling whilst in flight. The three observations were made during visits 1 and 3 and were all spatially separated from one another indicating that each was holding territory. This is also confirmed by the habitat in which the individual birds were recorded (i.e. woodland, birch scrub/ heath etc.). None of the territories were within the construction ZoI meaning that disturbance (noise and vibration) is likely to be the only slight effect.

4.1.8. Linnet

During the first visit two birds were observed calling in flight in an area of marshy grassland within 25m of the pipeline and within the construction ZoI. Acid grassland and rocky outcrops are also present close by. Supporting this observation was an individual bird calling from a stationary position during visit 3. These observations are within 25m of each other confirming an active territory. There will be temporary loss of some of the acid grassland and marshy grassland for this territory. There is likely to be displacement effects as a result of the construction works, however post-development once the habitats have been restored it will be possible for ongoing use of the territory.

A third observation was made of an individual bird calling in flight passing over cable route from heath and into woodland. The scale of works for laying the cable along the edge of the woodland and heath will result in mainly noise disturbance and some vibration. The temporary loss of habitat (heath only) is

unlikely to significantly displace a territory unless a nest is physically present in the area of construction (this is likely to be less than 5-10m working width for the cable route). As the loss is short-term it will be possible for a territory to re-establish rapidly.

4.1.9. Meadow pipit

Fifteen observations of meadow pipit were made spread across all four visits. All of these observations were made in the survey area surrounding the pipeline to the northwest of Rhiwnant Farm. Ten of the observations were within the construction ZoI with nine of stationary singing birds and one bird calling in flight. Reviewing the observations in terms of their location and distance to each other it is estimated that there are at least four (possibly five) territories present.

Meadow pipit are an abundant upland species with over 1.9 million breeding pairs throughout the UK. Meadow pipit are most commonly found in upland bog, moorland, grass/heath mosaic and marsh. However, they are an BoCC Amber List species due to a recent breeding population decline. The nature of the works includes the temporary loss of habitat in the construction ZoI to dig and store soils and vegetation before replacing in 200m lengths. All of the territories will be disturbed but subject to physically locating each nest displacement may be avoided. The effect on local populations is likely to be temporary and only last for one year of breeding. Given that meadow pipits often have two broods and age at first breeding is one year then it is likely that the local population will recover from displacement quickly without losing a significant number of individuals due to lack of fledged young. The impact locally (i.e. within the site boundaries and moorland edge area) will be minor adverse. With mitigation to avoid territories this could be reduced to a slight adverse impact.

4.1.10. Mistle thrush

A single observation of mistle thrush was recorded during visit 3. The bird was observed calling in flight as it passed over the road at the southern end of the cable route near Llanerch Cawr.

The works to lay the cable are likely to be limited to noise and vibration disturbance in the road at this location. The road is relatively busy with tourist/recreational and farm traffic (both vehicular and pedestrian). Although mistle thrush is a BoCC Red List species it is unlikely that the temporary and limited disturbance will result in abandonment of a nest. The effect on mistle thrush is therefore likely to be negligible.

4.1.11. Pied flycatcher

Seven observations of pied flycatcher were recorded representing three territories. All territories were found along the cable route section of the development. Observations of flights were recorded during visits 2 and 4 including presence of two birds to the most southerly territory. This is accompanied by a stationary singing individual during visit 3. These records were made in the deciduous woodland and semi-improved acid grassland. A fourth ‘calling whilst in flight’ record was made in the dry dwarf shrub heath accompanied by an individual singing bird 300m away. This was considered as one territory. The third territory was located in mixed woodland adjacent to the forest track and Nant Gwyllt. A single observation of a singing individual was made during visit 2.

The works along the cable route will include a limited working width and will avoid the woodlands all together. However, works will occur within the heath and grassland habitats which forms part of the territories. The disturbance has potential to lead the displacement if the nests are close (i.e. within 10m) of the construction works. In the absence of avoidance measures the loss is likely to be minor adverse to moderate adverse on a local scale.

4.1.12. Redstart

Thirty-four redstart observations were recorded. Seventeen of the records were located in the northern section of the cable route representing at least three territories. To the southern section of the cable route nine observations were made with two territories and potentially up to four territories. These were defined as a result of two concentrations of three observations and the other three records all spread out. Three observations of birds calling in flight were made along the southern section of the cable route which helps to qualify the likely four territories. Observations were all made either in woodland or close to woodland habitats (i.e. along grassland and heath ecotone).

Along the pipeline construction ZoI there were five observations that are likely to represent up to three territories. Two observations were close to an area of secondary deciduous woodland around the old mine whilst the other three observations were well spread out and in acid grassland.

The works along the cable route will avoid the woodland all together although the route will pass along the existing tracks. This will cause a disturbance effect that could lead to displacement if not managed. Works will occur in grassland and heath which forms part of the territories. The disturbance is likely to lead to displacement if the nests are close (i.e. within 10m) of the construction works.

4.1.13. Skylark

A single skylark singing observation was recorded during visit 4 in the heathland approximately 75m from the cable route. The distance at which the observation was made makes the likely effects of disturbance more limited and effects are likely to be negligible.

4.1.14. Song thrush

Sixteen observations of song thrush were made in seven territories. Four territories were along the cable route and three along the pipeline area. One of the territories overlaps with the cable route and is likely to be displaced during construction the remaining territories along the cable route will be disturbed by any noise and vibration aspects of construction. Although two of the observations along the cable route are within the 40m construction ZoI the actual nesting habitat is most likely to be in the woodland habitat along the riparian ZoI and other woodlands away from the works. Some territory will be temporarily affected as the works pass along the pipeline but these will be limited to a number of weeks rather than months.

The temporary displacement of one territory is unlikely to significantly affect the national (1.1 million breeding territories), regional or local (within scheme 15% of territories) populations. The effects nationally and regionally are considered to be negligible and locally minor adverse. The local minor adverse effect will only be temporary during construction and subject could be reduced to slight adverse or negligible if avoidance measures can be implemented.

4.1.15. Tree pipit

Thirteen observations of tree pipit were made with six birds singing from a stationary position and seven birds calling whilst in flight. Three observations were made along the pipeline route with two within the construction ZoI. These two observations were in marshy grassland, acid grassland and semi-improved acid grassland which is quite irregular for tree pipit as they usually prefer open woodland young plantations, and scrub and ffridd habitats. It is considered therefore that the two observations were likely part of the territories but at a distance from the nest. The nests are more likely to be present along the areas of taller and denser marshy grassland and acid grassland which is more difficult for predators to access and this places the likely nests outside of the construction ZoI.

Nine of the observations clearly defined three territories in scattered bracken, woodland and semi-improved acid grassland along the cable route. The remaining observation was in heath at approximately 65m north of the cable route and is unlikely to represent a territory that will be affected by the cable route as the cable works will all be in road at the nearest point. The cable construction ZoI will pass through two of the territories although will not result in direct land-take of woody vegetation that will be used to support the tree pipit nests themselves. Disturbance leading to displacement will only occur whilst tree pipits are present as they are a migrant breeding species generally present between April and September. The likely impact is the temporary loss of at least three territories due to disturbance leading to displacement. This impact will only occur if works are completed during the breeding season and would be minor adverse as the habitats themselves would be retained and can be readily recolonised. With the implementation of avoidance measures then the impact would be negligible.

4.1.16. Whinchat

Three whinchat observations were made during the survey. Two observations made during visit 1 and visit 4 were of a stationary singing bird and a bird calling in flight in an area of scattered bracken within the pipeline construction area. This territory will be temporarily lost during the construction phase of the development but will be re-established post-construction. It is likely that only part of the territory will be lost as there is further extensive scattered bracken and heath habitat throughout the area.

The third observation was of a bird calling in flight passing through mixed woodland along the cable route. The construction works at this location will only affect the width of the forest track and will be limited to noise and vibration disturbance. This will be limited to a short period of time meaning a temporary effect and minor adverse impact.

4.1.17. Willow warbler

In total, there were 130 observations of willow warbler either singing or in a pair. Observations were spread throughout the development boundary and in close proximity to the development. It is therefore almost certain that if the construction phase is timed during the breeding season that willow warbler territories will be at least disturbed.

Willow warbler are listed on the UK BoCC Amber List and have an estimated 2.2 million territories in Britain (BTO Birdfacts; 2009 estimate). It is clear therefore that there is unlikely to be such a loss that it would impact the national or regional populations. However, certainly on a local level it is possible that there will be a short-term (i.e. less than five years) effect on the population. Even though there is likely to be this effect the resulting impact is still likely to be regarded as minor as there will opportunity to re-establish the population post-construction and the operational phase of the development will not have an effect.

4.1.18. Wood warbler

Nine observations of wood warbler were made over all four survey visits. All observations were recorded on the cable route and represent four territories. Two territories are defined by single observations of singing birds. One of these territories was over 75m from the cable route in dense coniferous plantation woodland with the second again in dens dense coniferous woodland over 35m from the cable route. Both of these territories are likely to overlap with the cable route itself but it is considered that the short timeframe in which the works will be present and passing the territories is unlikely to significantly disturb breeding success.

A cluster of four observations forming one territory was made between 50 and 75m from the cable route in deciduous woodland. It is likely given the distance between the works and the territory that the disturbance effects will be buffered by the woodland itself, and as the works will be short-term as it passes the territory there will only be a temporary disturbance/displacement effect by the birds avoiding the area of heath through which the cable will be buried at this location. It is therefore considered that the effects will be negligible—slight adverse (without mitigation measures being employed).

The fourth territory (three observations in visits 1,2 & 3) were in mixed and coniferous plantation woodland and within 25m of the cable route. The cable at this location will be buried into the existing forest track with no loss of woodland. The effects are therefore related to disturbance and potential displacement. These effects will be temporary due to the short-term nature of the works passing through the forest track at this location. It is therefore considered that because the species is a migrant breeder effects will only occur if works are undertaken during spring and summer months. The loss of this territory is likely to be minor-moderate within the bounds of the development scheme, but more regionally it is likely that the population will not be affected in the long-term.

4.2. Protected Species

Both peregrine and red kite are protected under schedule 1 of the Wildlife and Countryside Act 1981 (as amended). This builds on the general provisions of section 1 and which makes it an offence to intentionally or recklessly disturb a schedule 1 bird (e.g. peregrine or red kite) while it is building a nest or is in, on or near a nest containing eggs or young; or disturb the dependent young of such a bird. Therefore, although the conservation status of both species will be maintained despite the effects of the development, there will be a requirement during the construction phase to ensure compliance with this legislation. This will be managed by employing an Ecological Clerk of Works ahead of the construction phase to establish nest locations within 500m of the works and apply mitigation measures.

4.2.1. Red kite

Twelve observations of 14 birds were recorded throughout the pipeline and cable route. The greatest density was between Rhiwnant Farm and valve tower and dam at the southwest end of Cabin Coch Reservoir where seven observations of nine birds were made. No actual nest location was confirmed and all birds were observed soaring suggesting that there is a nest close by but likely greater than 100m survey bandwidth used in the survey. This home range is likely to be part of an area covering up to 6km from the nest and is considered that available space will be retained for soaring and scavenging. The works will cause an element of disturbance that may affect a nest if within approximately 300m and not part of activities that are similar to general farming tasks. The works to be carried out will involve the digging up of the road and path and burying the cable before replacing the soil. It is likely therefore that the disturbance could occur that may reduce the ability of the birds to scavenge and raise young. This can be considered a loss of a single nest and due to the stable Welsh population of red kite is unlikely to affect the ability of the species to survive in its existing range.

The remaining observations were all of individual birds during visits 2 and 3 where all starting greater than 100m from the construction areas and passing over. Only one corresponds directly over plantation conifer woodland. The woodlands were searched as part of the survey effort and during the accompanying Preliminary Ecological Appraisal and found no active kite nests within 500m. It is

therefore considered unlikely that the development will have disturbance effects that will result in breach of the aforementioned legislation.

4.2.2. Peregrine

Peregrine was seen during visit 1 and visit 4 with both visits observing the birds at the northern end of the cable route. The observations were of a single bird during visit 1 at distance from the road and two birds 'yikkering' over a similar location during visit 4. The observations during visit 4 were closer to exposed crags which appear more suitable as a nesting site. During the survey, it was observed that the car park and road is very busy along this section and that regular operational works such as re-surfacing the road are unlikely to affect any nesting peregrine. It is therefore considered unlikely that disturbance will occur as a result burying the cable in the road and impacts will be negligible.

5. Recommendations

5.1. Ecological Clerk of Works (ECoW)

The construction of the hydro scheme will require an impoundment license and may require a flood risk activity permit. These often come with restrictions on construction times for in-river works and these are usually during summer periods. Therefore, the construction of the hydro scheme may need to be phased in order to account for the various effects on breeding birds.

The main priority is reducing disturbance to species using the pipeline construction area as the cable route does not include any specific new water course crossings. It is recommended that the intake weir, pipeline, power house and tailrace are constructed under a watching brief. As the timeframe for constructing these different elements will vary it is anticipated that nesting will remain possible along the route.

During this part of the construction works a nesting bird check will be completed by an experienced ecologist prior to the advancing works. If nests are found, an exclusion ZoI appropriate to the species and its use of the habitat (i.e. safe passage routes) will be marked and left around the nest until breeding is complete. Completion of nesting will be confirmed by an ecologist and a confirmation an activity log will be maintained for inspection by the development control and NRW as required.

5.2. Avoidance Measures

The burying of the cable along the road and primarily along existing forest tracks with some heath and grassland included could be phased to be largely outside of the breeding bird season. This means work should be planned between 1st August and 29th February for the cable route. This has the advantage of avoiding the times where migrant breeding bird returning from overwintering grounds in southern Europe and Africa can maintain their breeding cycle with limited disturbance from the construction process. On the occasions where works need to be undertaken during the breeding season along the cable route, this will be done under the supervision of the ECoW.

5.3. Habitat Re-establishment

A range of habitats will be temporarily lost to the construction works including acid grassland, scattered bracken, marshy grassland, improved grassland, heath and wet modified bog. A small permanent loss of improved grassland, acid grassland and wet modified bog will occur from the footprint of the intake, power house, tailrace and upgraded tracks. This has been assessed as unlikely

to affect the ability of birds to breed and hold territory in the area but will need re-establishment post-construction.

Details of habitat restoration and re-establishment which seek to improve condition and diversity of favourable habitats is detailed in the Preliminary Ecological Appraisal (Environment Systems, 2017). By implementing the habitat measures, which will form the Habitat Management Plan, it is likely that the habitat extent and condition will remain suitable to support the same diversity and abundance of bird species currently present.

6. Conclusion

Several species of conservation concern were recorded as holding territory and likely to be breeding during the surveys. Twelve species of BoCC Red list and seven of BoCC Amber list were recorded. Of these BoCC species ten are also protected under Welsh legislation. Two further species, peregrine and red kite are protected under European and British legislation. It is clear therefore that construction of the hydro scheme will have a negative effect due to disturbance during the breeding period and displacement due to temporary loss of habitat. These effects are likely to be minor as mitigation via habitat re-establishment can be undertaken both prior to and after construction.

During construction, there will be a need for phasing the development due to the in-river and near river works. These can be managed by employment of a watching brief who would provide survey and guidance around nesting birds during the breeding season. Where working outside of the riparian ZoI this can be phased to be undertaken outside of the winter period.

The target species encountered during the survey are all of interest but have sufficiently large enough populations locally and regionally to recover from the temporary disturbance and displacement. It is therefore not considered that this is likely to be a significant constraint to the development, however the above measure must be agreed and implemented to remain as minor effects.

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Figures

Figure Series 1 – Designated Sites Plan

Designated Sites Plan – Whole Development

Designated Sites Plan – Development

Designated Sites Plan – Cable Route Southwest

Designated Sites Plan – Cable Route Central South

Designated Sites Plan – Cable Route Central North

Designated Sites Plan – Cable Route Northeast

Figure Series 2 – Breeding Bird Survey Results

Breeding Bird Survey – Pipeline West

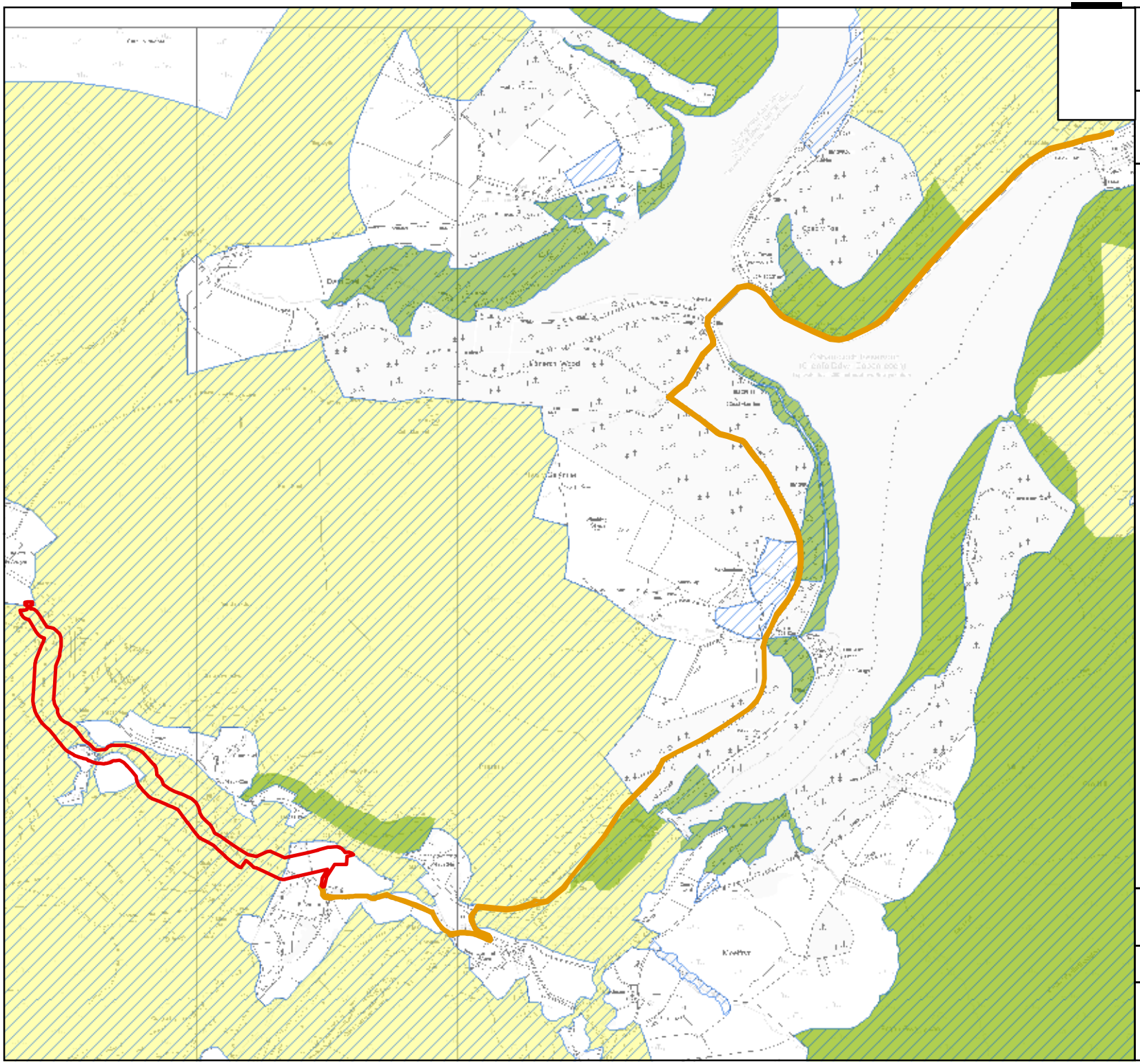
Breeding Bird Survey – Pipeline East

Breeding Bird Survey – Cable Route Southwest

Breeding Bird Survey – Cable Route Central South

Breeding Bird Survey – Cable Route Central North

Breeding Bird Survey – Cable Route Northeast



Afon Claewen Hydro Scheme

Designated Sites Plan - Whole Development

Key:

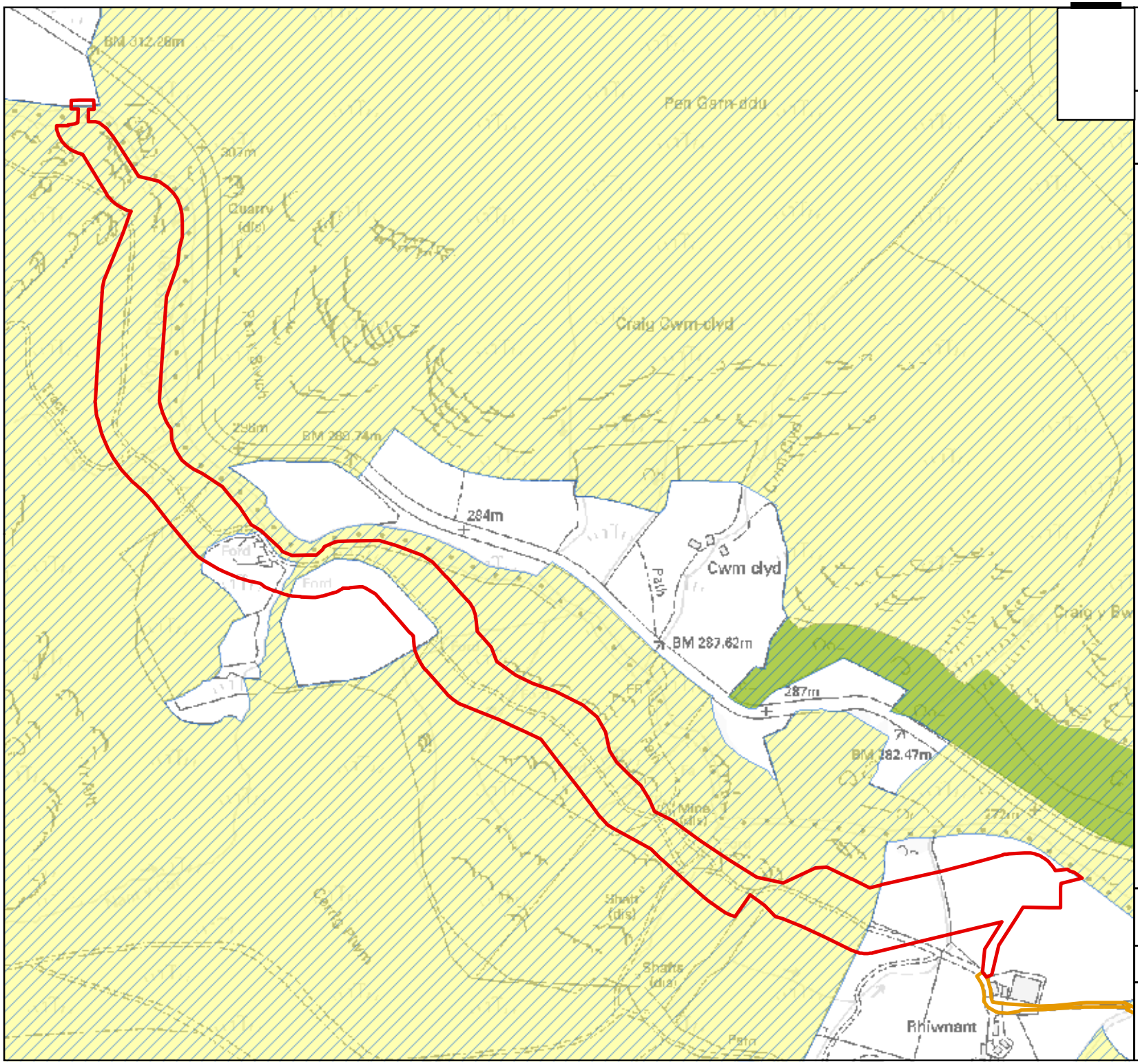
- Development Site Boundary
- Cable Route
- Site of Special Scientific Interest
- Special Area of Conservation
- Special Protection Area

0 — 1,000 Meters

Date: 19/06/2017

Scale: 20,000

Environment SYSTEMS
evidence and insight



Afon Claewen Hydro Scheme

Designated Sites Plan - Development Site

Key:

- Development Site Boundary
- Cable Route
- Site of Special Scientific Interest
- Special Area of Conservation
- Special Protection Area

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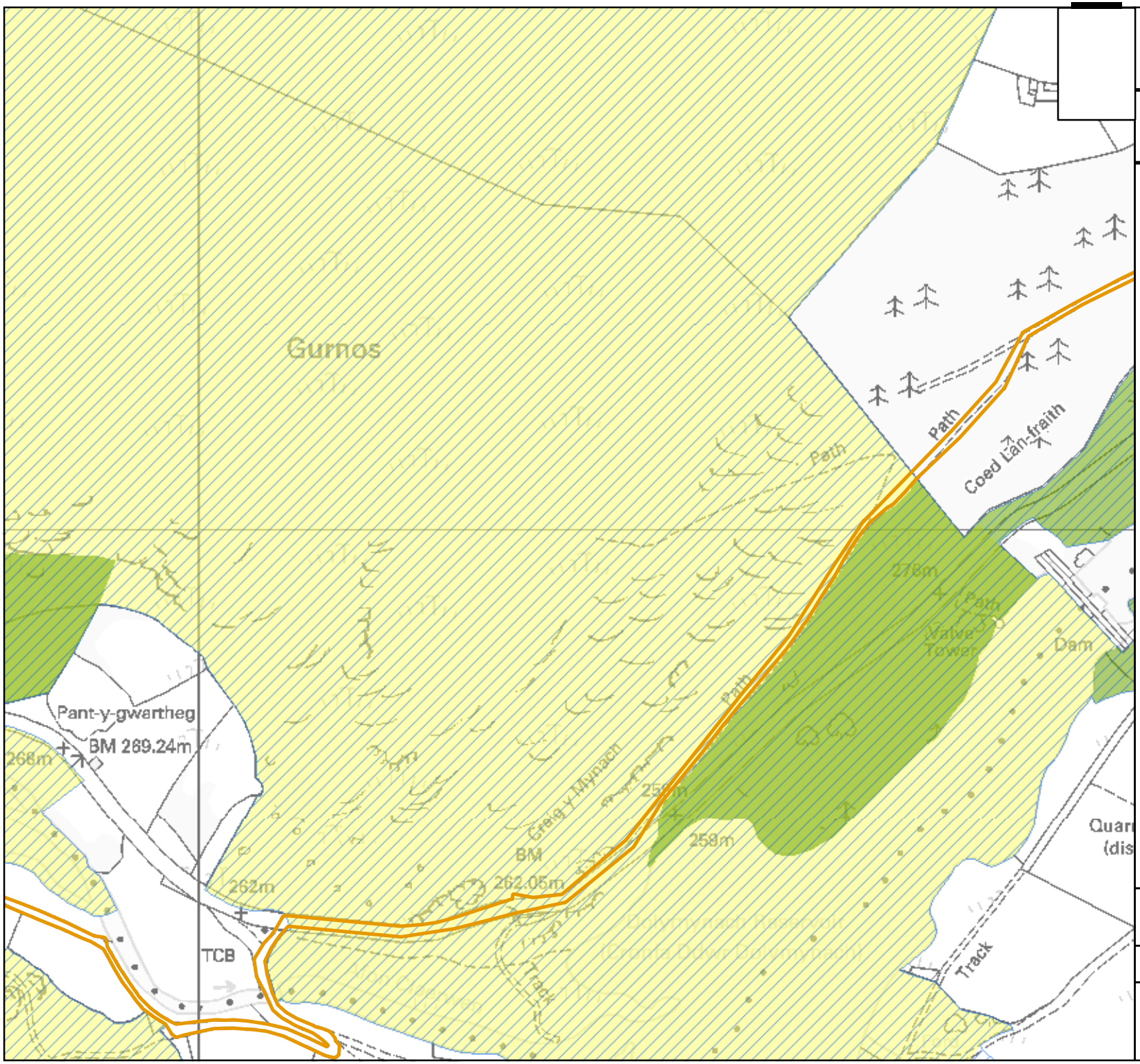
Date: 19/06/2017 | Scale: 6,500

Environment SYSTEMS evidence and insight



Afon Claewen Hydro Scheme

Designated Sites Plan - Cable Route Southwest

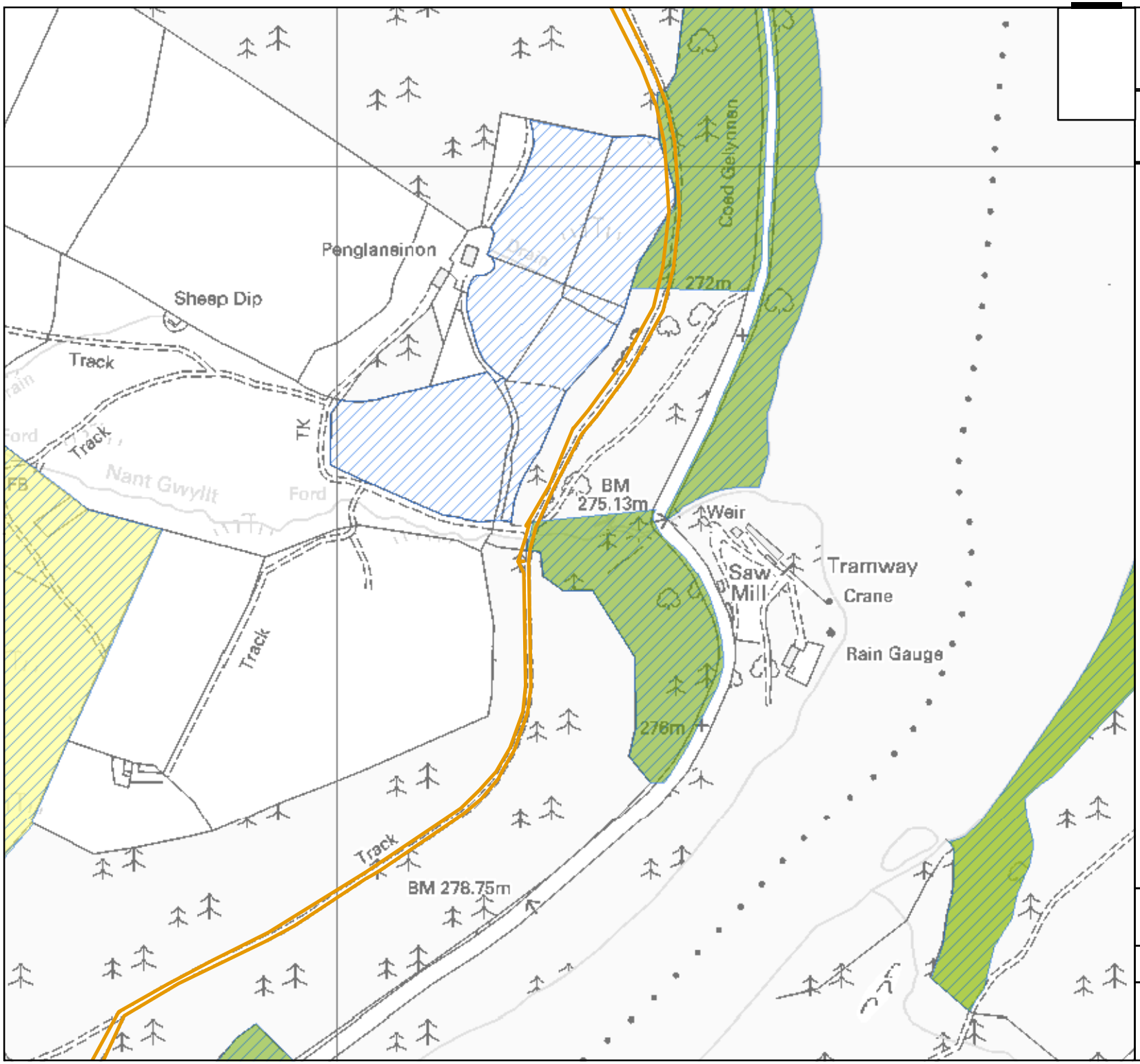
Key:

- Development Site Boundary
- Cable Route
- Site of Special Scientific Interest
- Special Area of Conservation
- Special Protection Area

0 — 250 Meters

Date: 19/06/2017 | Scale: 5,000

Environment SYSTEMS evidence and insight



Afon Claewen Hydro Scheme

Designated Sites Plan - Cable Route Central South

Key:

- Development Site Boundary
- Cable Route
- Site of Special Scientific Interest
- Special Area of Conservation
- Special Protection Area

0 — 250 Meters

Date: 19/06/2017 | Scale: 5,000

Environment SYSTEMS
evidence and insight

Afon Claewen Hydro Scheme

Designated Sites Plan - Cable Route Central North

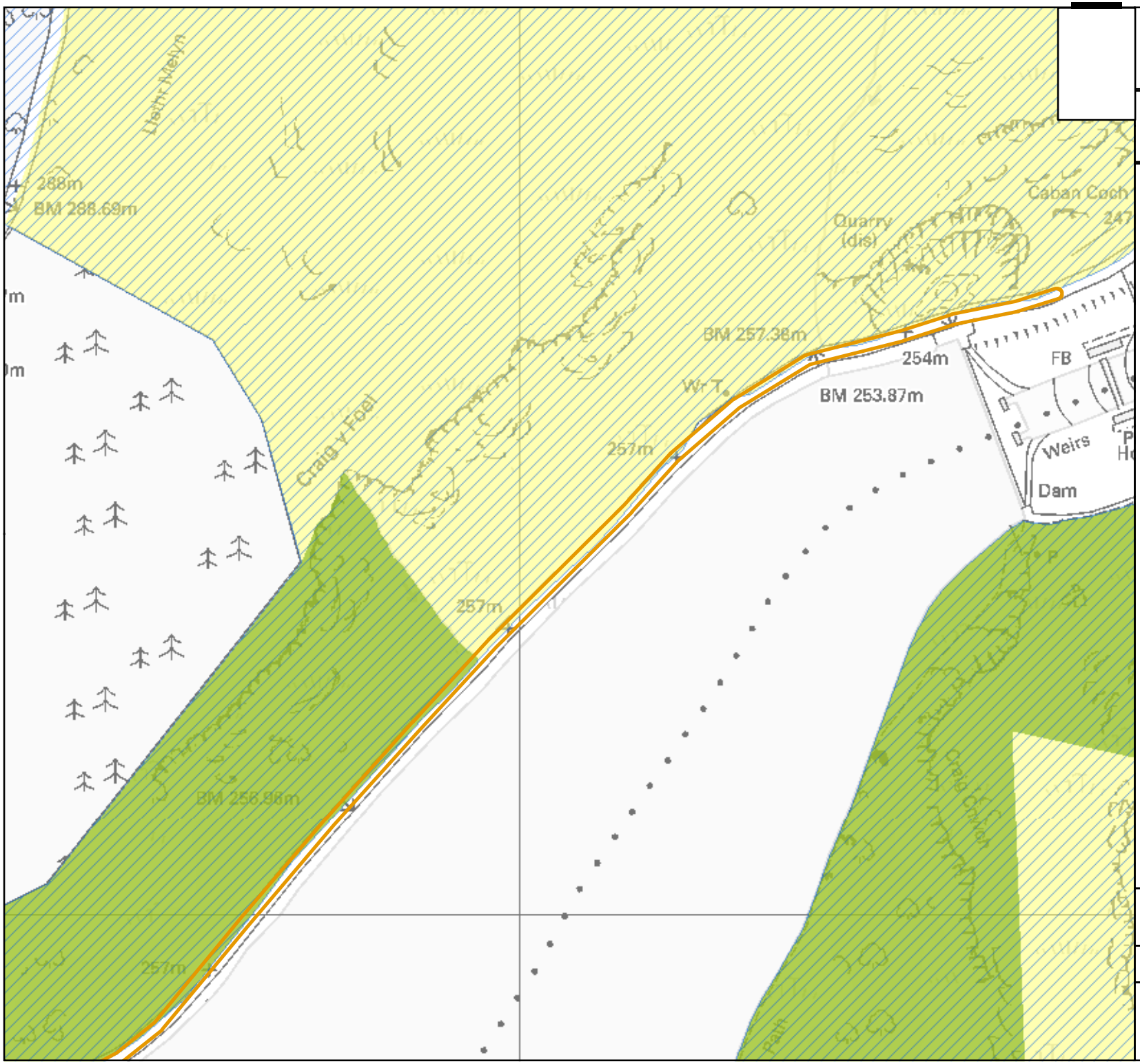
Key:

- Development Site Boundary
- Cable Route
- Site of Special Scientific Interest
- Special Area of Conservation
- Special Protection Area

0 — 250 Meters

Date: 19/06/2017 | Scale: 5,000

Environment SYSTEMS
evidence and insight



Afon Claewen Hydro Scheme

Designated Sites Plan - Cable Route Northeast

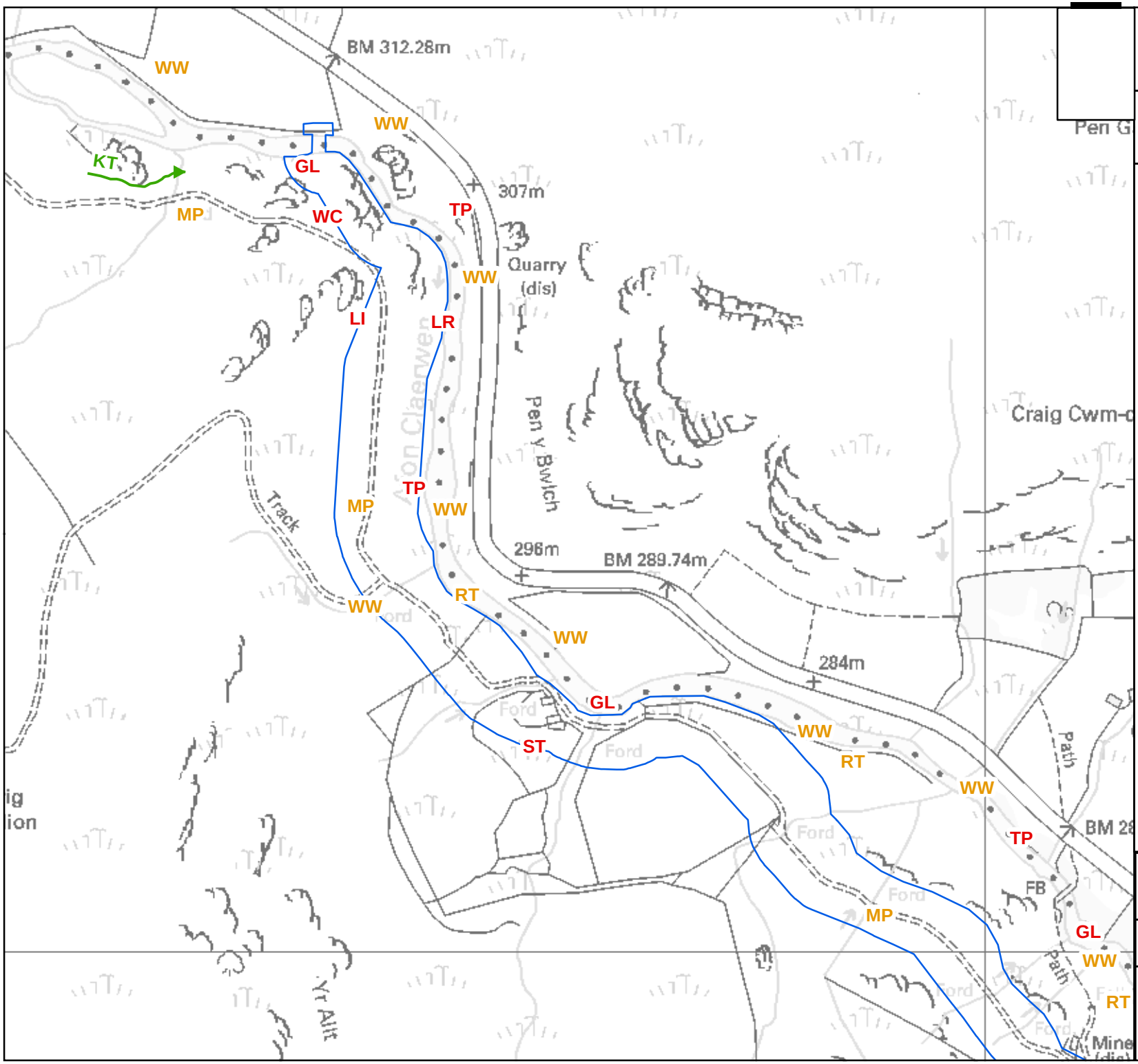
Key:

- Development Site Boundary
- Cable Route
- Site of Special Scientific Interest
- Special Area of Conservation
- Special Protection Area

0 — 250 Meters

Date: 19/06/2017 | Scale: 5,000

Environment SYSTEMS evidence and insight



Afon Claewen Hydro Scheme

Breeding Bird Survey 2017 - Pipeline West

Key:

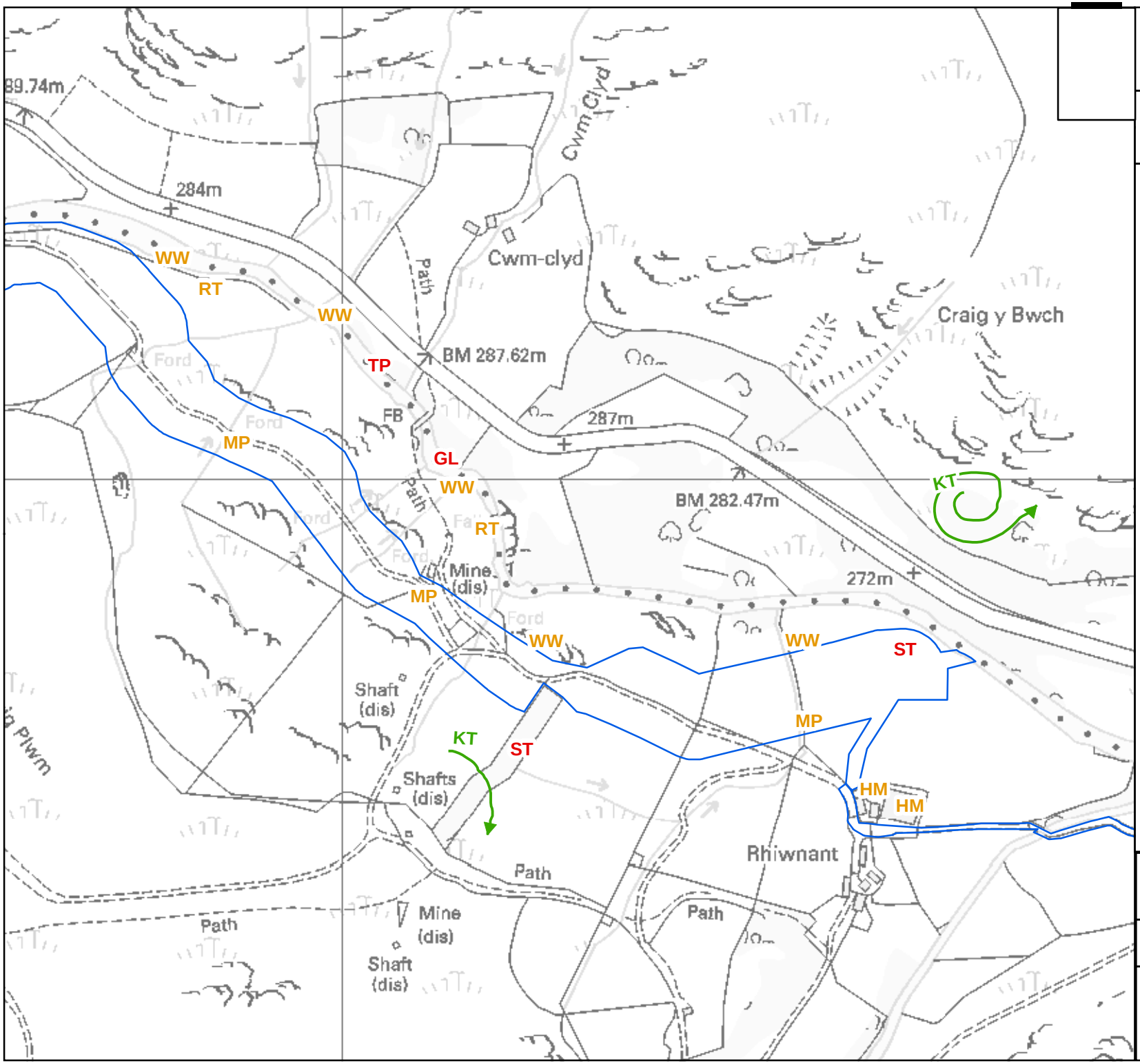
- Develpment area
- ST — BoCC red list species
- WW — BoCC amber list species
- Raptor (schedule 1 & annex 1)

Note:
BoCC = Birds of Conservation Concern
Schedule 1 = Schedule 1 of the Wildlaife and Countryside Act 1981 (as amended)
Annex 1 = Annex 1 of the EU Birds Directive

0 — 250 Meters

Date: 07/08/2017 | Scale: 5,000

Environment SYSTEMS
evidence and insight



Afon Claewen Hydro Scheme

Breeding Bird Survey 2017 - Pipeline East

Key:

- Develpment area
- ST BoCC red list species
- WW BoCC amber list species
- Raptor (schedule 1 & annex 1)

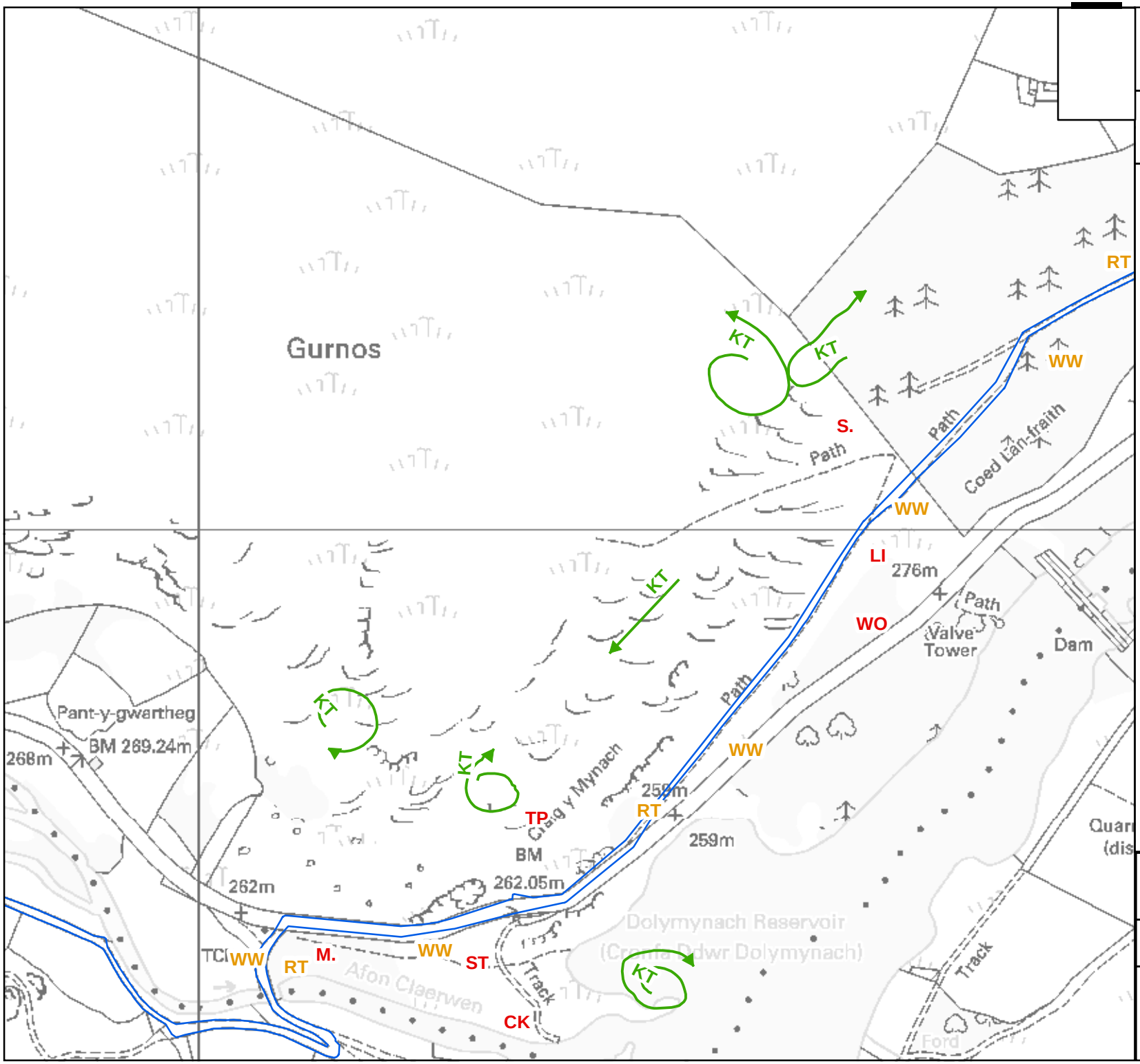
Note:
BoCC = Birds of Conservation Concern
Schedule 1 = Schedule 1 of the Wildlaife and Countryside Act 1981 (as amended)
Annex 1 = Annex 1 of the EU Birds Directive

0 — 250 Meters

Date: 07/08/2017

Scale: 5,000

Environment SYSTEMS
evidence and insight



Afon Claewen Hydro Scheme

Breeding Bird Survey 2017 - Cable Route Southwest

Key:

- Develpment area
- ST — BoCC red list species
- WW — BoCC amber list species
- Raptor (schedule 1 & annex 1)

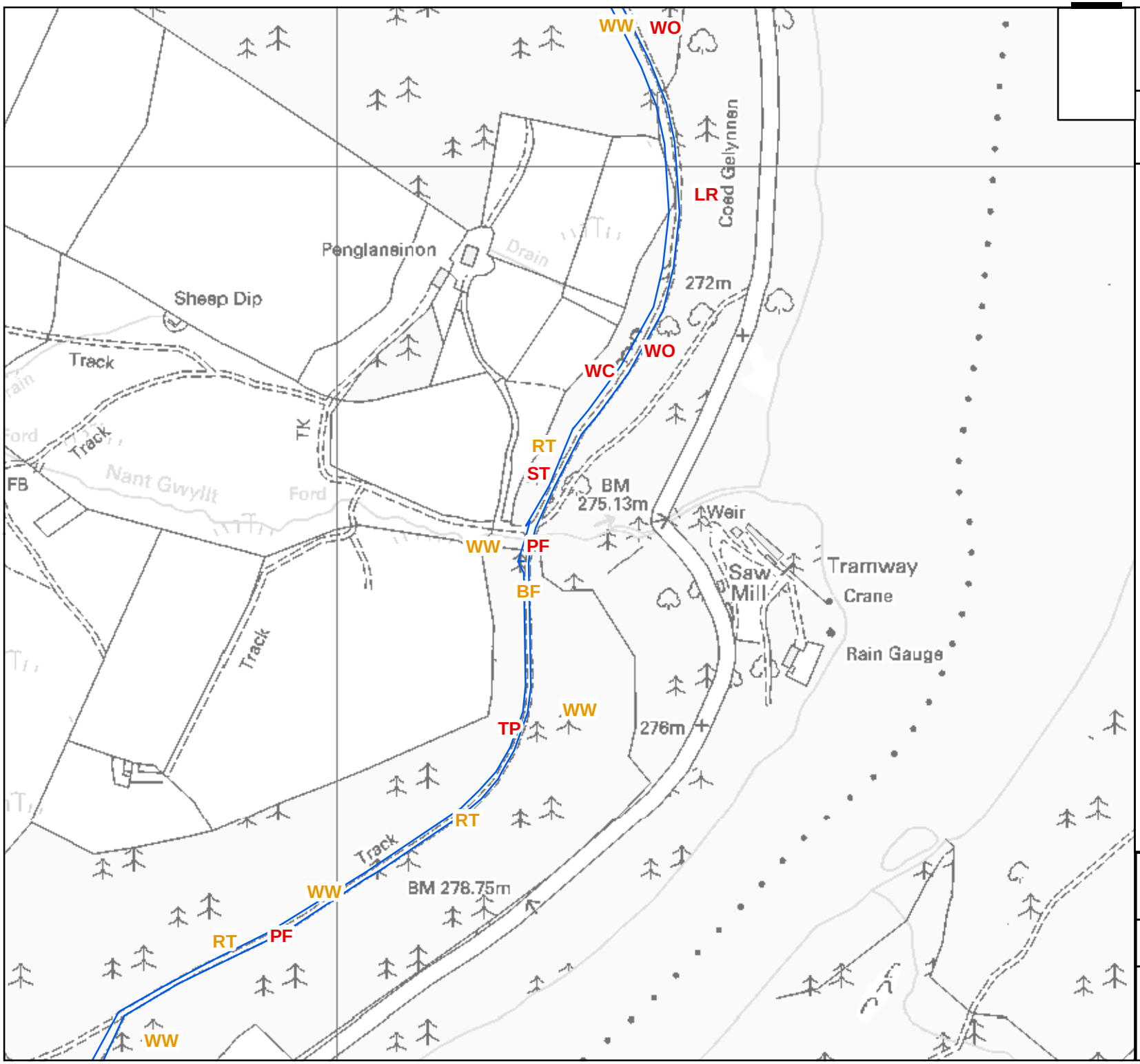
Note:
BoCC = Birds of Conservation Concern
Schedule 1 = Schedule 1 of the Wildlaife and Countryside Act 1981 (as amended)
Annex 1 = Annex 1 of the EU Birds Directive

0 — 250 Meters

Date: 07/08/2017

Scale: 5,000

Environment SYSTEMS
evidence and insight



Afon Claewen Hydro Scheme

Breeding Bird Survey 2017 - Cable Route Central South

Key:

- Develpment area
- ST — BoCC red list species
- WW — BoCC amber list species
- Raptor (schedule 1 & annex 1)

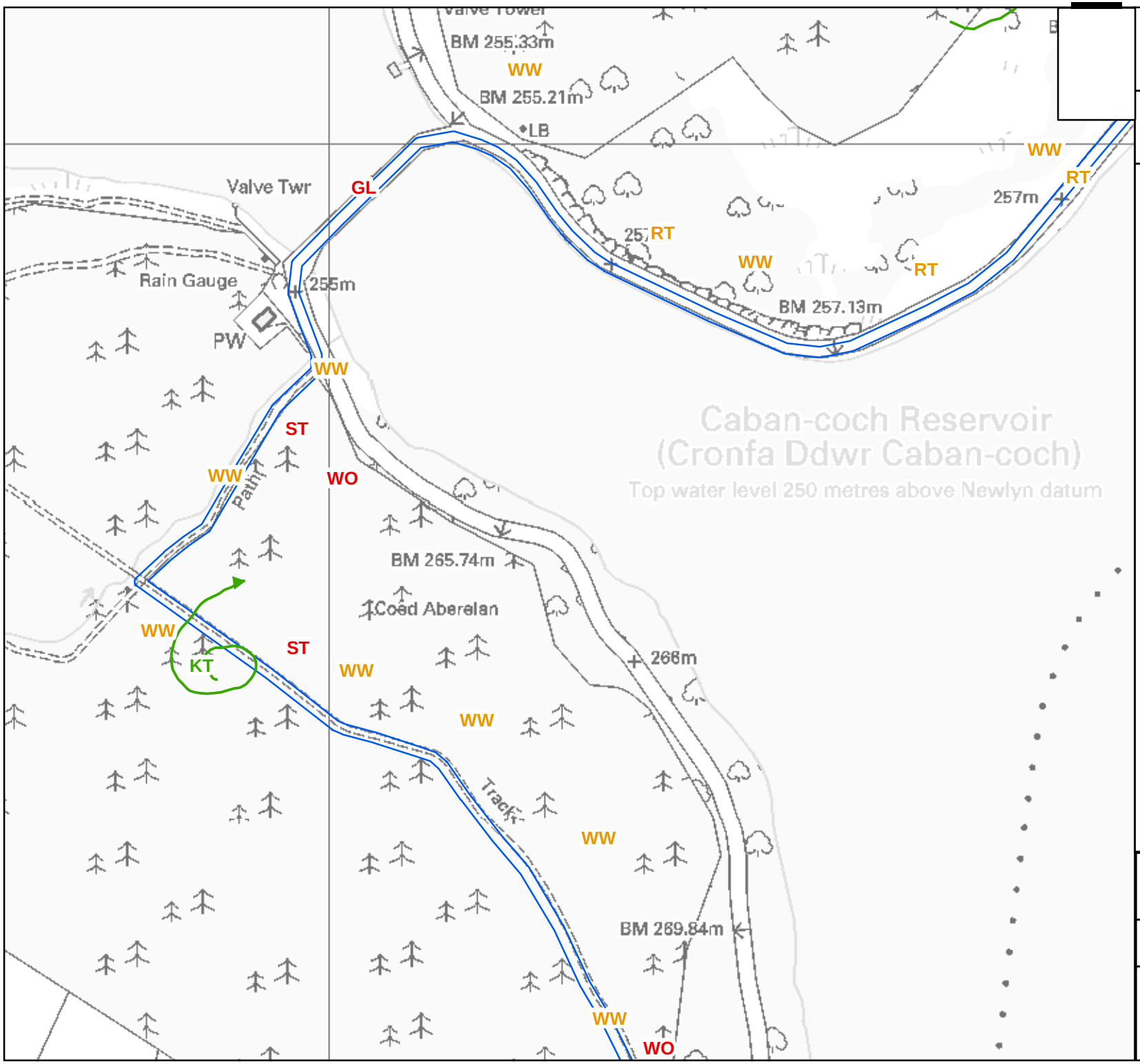
Note:
BoCC = Birds of Conservation Concern
Schedule 1 = Schedule 1 of the Wildlaife and Countryside Act 1981 (as amended)
Annex 1 = Annex 1 of the EU Birds Directive

0 — 250 Meters

Date: 07/08/2017

Scale: 5,000

Environment SYSTEMS
evidence and insight



Afon Claewen Hydro Scheme

Breeding Bird Survey 2017 - Cable Route Central North

Key:

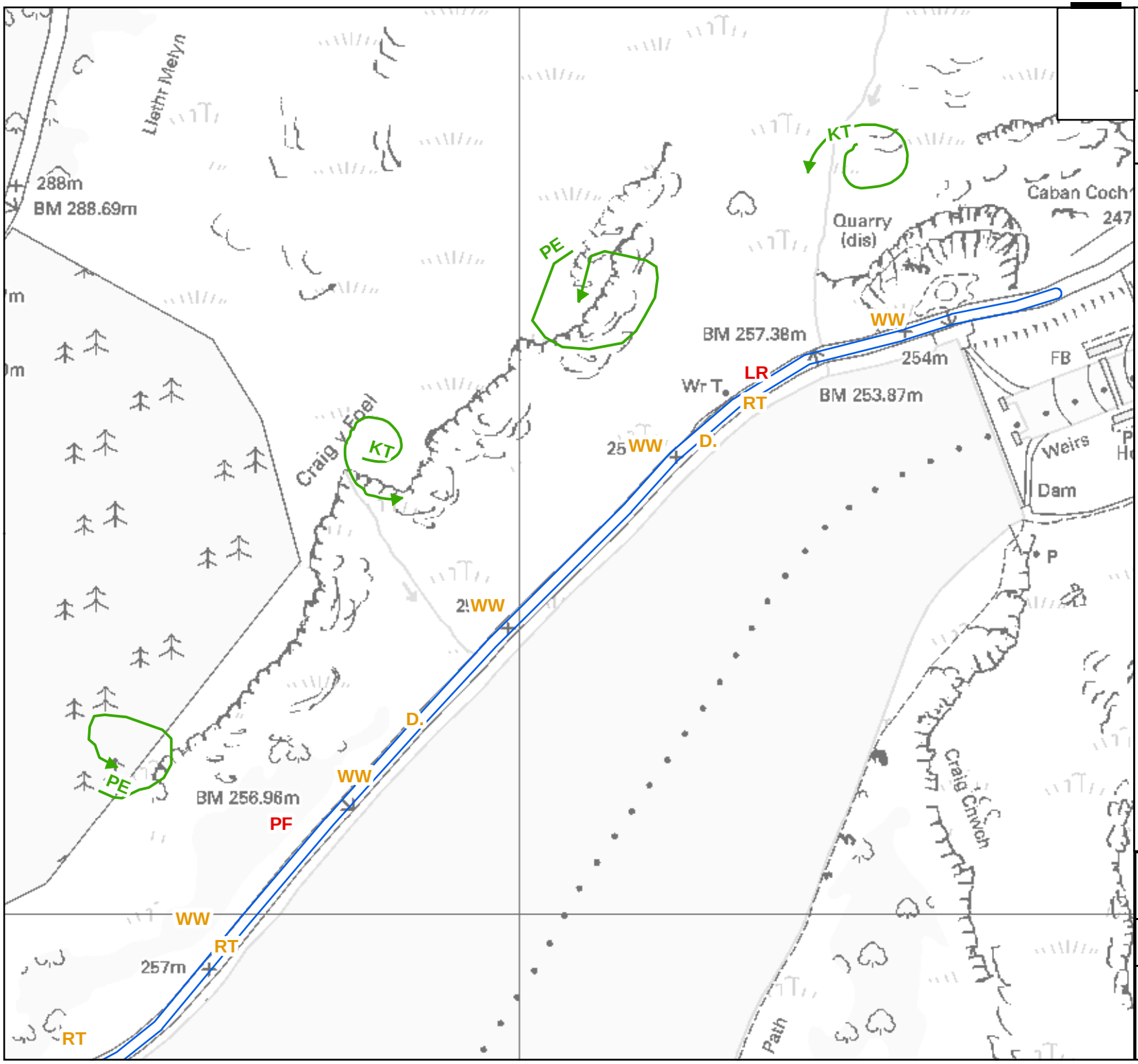
- Develpment area
- ST — BoCC red list species
- WW — BoCC amber list species
- Raptor (schedule 1 & annex 1)

Note:
BoCC = Birds of Conservation Concern
Schedule 1 = Schedule 1 of the Wildlaife and Countryside Act 1981 (as amended)
Annex 1 = Annex 1 of the EU Birds Directive

0 — 250 Meters

Date: 07/08/2017 | Scale: 5,000

Environment SYSTEMS
evidence and insight



Afon Claewen Hydro Scheme

Breeding Bird Survey 2017 - Cable Route Northeast

Key:

- Develpment area
- ST BoCC red list species
- WW BoCC amber list species
- Raptor (schedule 1 & annex 1)

Note:
BoCC = Birds of Conservation Concern
Schedule 1 = Schedule 1 of the Wildlaife and Countryside Act 1981 (as amended)
Annex 1 = Annex 1 of the EU Birds Directive

0 — 250 Meters

Date: 07/08/2017 | Scale: 5,000

Environment SYSTEMS
evidence and insight

Appendix A –BIS Protected and Priority, and Locally Important Bird Species

Scientific Name	Common Name	Taxon Group
Linaria cannabina	Linnet	Bird
Phoenicurus ochruros	Black redstart	Bird
Melanitta nigra	Common scoter	Bird
Chroicocephalus ridibundus	Black-headed gull	Bird
Bucephala clangula	Goldeneye	Bird
Passer domesticus	House sparrow	Bird
Cuculus canorus	Cuckoo	Bird
Phylloscopus sibilatrix	Wood warbler	Bird
Turdus philomelos	Song thrush	Bird
Loxia curvirostra	Red crossbill	Bird
Milvus milvus	Red kite	Bird
Prunella modularis	Dunnock	Bird
Pyrrhula pyrrhula	Bullfinch	Bird
Sturnus vulgaris	Starling	Bird
Muscicapa striata	Spotted flycatcher	Bird
Turdus iliacus	Redwing	Bird
Turdus viscivorus	Mistle thrush	Bird
Turdus pilaris	Fieldfare	Bird
Poecile montanus	Willow tit	Bird
Poecile palustris	Marsh tit	Bird
Lagopus lagopus	Red grouse	Bird
Turdus torquatus	Ring ouzel	Bird
Dryobates minor	Lesser spotted woodpecker	Bird
Alcedo atthis	King fisher	Bird
Aythya marila	Scaup	Bird
Emberiza schoeniclus	Reed bunting	Bird
Emberiza citrinella	Yellowhammer	Bird
Fringilla montifringilla	Brambling	Bird
Ficedula hypoleuca	Pied flycatcher	Bird
Tyto alba	Barn owl	Bird
Accipiter gentilis	Goshawk	Bird
Falco Subbuteo	Hobby	Bird
Caprimulgus europaeus	Nightjar	Bird
Coccothraustes coccothraustes	Hawfinch	Bird
Calidris maritima	Purple sandpiper	Bird
Alauda arvensis	Skylark	Bird
Acanthis cabaret	Lesser redpoll	Bird
Falco peregrinus	Peregrine falcon	Bird
Falco tinnunculus	Kestrel	Bird
Anthus trivialis	Tree pipit	Bird
Numenius arquata	Curlew	Bird

Appendix C – Photographic Plates

Pipeline route

Photograph 1: Area of improved grassland where proposed power house will be located. Photograph also shows plantation coniferous woodland to the south of the track and proposed pipeline route and the riparian broadleaved woodland to the north.

Photograph 2: The defunct species poor hedge that flanks a small slow flowing stream.

Photograph 3: Area of improved grassland pipeline will traverse that is dominated by rush species.

Photograph 4: Improved grassland and hedgerows with associated streams that the pipeline will traverse once leaving the track and directing down to the river Claerwen and powerhouse.

Photograph 4: Stand of broadleaved woodland north of the track and proposed pipeline route.

Photograph 5: Typical area of acid grassland that the pipeline route will traverse

Photograph 6: Area of modified bog (degrading) where the intake construction compound is to be located.

Photograph 6: Old stone building with willow species and modified bog and semi-improved grassland.

Photograph 7: Area of flush within the semi-improved grassland.

Photograph 8: Small stream located to the east of the defunct old stone buildings that runs from north to south into the River Claerwen.

Photograph 9: Example of marshy grassland dominated by purple moor grass that is to the north and south of the track and the proposed pipeline route.

Cable route

Photograph 10: Road and semi-improved grassland the cable route will traverse.

Photograph 11: Public footpath where the proposed cable route leads through dry heath and acid grassland mosaic.

Photograph 12: Public footpath and proposed cable route through dry heathland.

Photograph 13: Area of broadleaved woodland leading down to road east of the proposed cable route.

Photograph 14: Area where coniferous forest has been clear felled, habitat is that of dry heath and acid grassland, more dominated by grasses.

Photograph 15: Forestry track and cable route through coniferous woodland to the east and broadleaved woodland to the west.

Photograph 16: Forestry track through clear-fell forest and coniferous forest.

Photograph 17: Public footpath and proposed cable route leading off forestry track down to the main road.

Photograph 18: Cable route to traverse bridge.

Photograph 19: Public footpath south west of road adjacent to the Caban-coch Reservoir.

Photograph 20: Road and proposed cable route with heathland to the west and the public footpath with verges and the Caban-coch reservior to the east.

Photograph 21: Public footpath with associated verges.