

A30 Chiverton to Carland Cross Environmental Statement

**Volume 6 Document Ref 6.4 ES Appendix 8.16
Otter Survey Report**

HA551502-ARP-EBD-SW-RP-LE-000028

August 2018

Planning Act 2008
Infrastructure Planning (Applications: Prescribed Forms and Procedure)
Regulations 2009 (as amended)
APFP Regulation 5(2)(a)

A30 Carland Cross to Chiverton Cross Improvement Scheme

Report on otter surveys and proposed mitigation

Report by Dr. Paul Chanin, Mammal Ecologist, for WSP and Highways

England, January 2018

Brief

- To carry out surveys in otter habitat along the proposed line of the A30 dual carriageway in order to inform mitigation plans and decisions about the need for a licence to disturb otters.
- To recommend locations for crossing points intended as mitigation for the increased risk of otter road casualties and comment on the ability of existing culverts at Zelah to fulfil this function.

Note that I have some existing knowledge of this section of road from a study of otter road casualties in Highways England Area 1 carried out in 2000 (Chanin, 2000) and have drawn on this where appropriate.

Methods

Background: existing evidence of otter presence

Otters have been present on the Fal and St Austell Catchment Area since the first National Survey of Otters in England (Lenton et al., 1981). During the fourth survey, 2000-2002, (Crawford, 2003) they were recorded at 80% of the 46 sites searched within the catchment which compares with the 80% positive sites (out of 158) throughout Cornwall during the fifth national survey, 2009-10, (Crawford, 2010). Five spot checks on the small North Coast Streams west of the Camel and north of Truro were also positive in 2009-10 (Crawford, 2010).

In an investigation into otter road casualties on roads in Highways Agency Area 1, Chanin (2000) reported that there was a disproportionate number along the watershed between the catchments of the Camel and Fowey and between the North Coast Streams and the Fal catchment. Several of these had occurred on the section between Carland Cross and Chiverton (Chanin, 2000). There have been more since (information supplied by the Environment Agency). It was also noted that, at some of the Cornwall watershed sites, multiple casualties had occurred. There are very few culverts along this stretch of road and most otters have been killed while moving between catchments, not while moving along a watercourse. Chanin (2000) pointed out that river catchments in west Cornwall are relatively small in relation to otter home ranges, so the animals are likely to move between them more frequently. Since such movements are likely to be across the A30, the small otter population in this area is particularly vulnerable to losses on the road.

Given these data, it must be assumed that, as throughout the rest of the Southwest region, all streams in the area are actively used by otters.

Background: survey methods

National protocols

At present, there are no nationally agreed protocols for surveying for otters in connection with development. The Design Manual for Roads and Bridges (DMRB) Volume 10: Section 4, Part 4 Nature Conservation Advice in Relation to Otters," London, 2001 published by the Highways Agency provides guidelines for trunk roads and motorways but has not been updated for some time and was written at a time when the otter population was at a much earlier stage in its recovery. Today, in many parts of the UK, including the whole of southwest England, otters have recolonised their original range and the need to establish whether otters are present or not is redundant.

Presence/absence

The evidence from national surveys and the frequency of road casualties demonstrates clearly that the otter population has been well established in this area for some time. It is more difficult to find signs of otters on small streams than large and there is no benefit in carrying out spraint surveys in an area like this since absence of signs does not mean absence of otters. All water courses, and most water bodies, in southwest England will be used by otters to a greater or lesser extent.

Accordingly, otter signs were recorded when found but survey effort was concentrated on finding potential resting sites and breeding sites.

Resting sites

Otters use many different resting sites around their ranges, some only once or a few times (Green et al., 1984). Often, they will lie up above ground under dense vegetation in places which could not be detected other than by radio-tracking. Sites such as these are typically plentiful in otter ranges and are not a limiting resource for the species. Although otter resting sites are technically all legally protected, in practice it is only practical to detect, and therefore protect, those which are normally described as *holts*.

Typically, these consist of a physical structure, usually a tunnel at the river's edge under the roots of a tree. They are frequently found where roots are eroded by water and in a study in the Welsh borders Macdonald and Mason (1983) found that Ash and Sycamore trees were particularly likely to provide potential otter holts. Sometimes artificial structures such as bridges or bank protection may also be used or the burrows of other animals such as rabbits. When used regularly by otters these structures can be recognised as holts by the presence of signs such as spraints (droppings), footprints and scraping or wear on the sides of a tunnel.

Above-ground resting sites, sometimes referred to as *couches* are frequently used by otters but cannot normally be detected by conventional survey methods.

Breeding sites

Good breeding sites are of considerable value to otters and, where development occurs, it is extremely important to identify potential sites and determine whether they are used so that appropriate mitigation may be devised at an early stage. They are however, uncommon and few have been described in detail.

In a review of the conservation and management of otter breeding sites, Liles (2003) described seven which he and colleagues had identified. From these he concluded that habitats likely to provide suitable cover for otter breeding sites were:

- Extensive reed beds.
- Lakes and ponds.
- Deciduous woodland.
- Young conifer plantations.
- Extensive areas of scrub.
- Features such as large areas of blockstone or boulders, and buildings/structures immediately adjacent to watercourses.

Liles stated that field signs which could be used to indicate breeding include:

- The sudden appearance of a heavily used path or paths, from the water, usually into dense cover or an enclosed structure, such as a tree root system or a hollow trunk.
- A natal den, usually only visible at above-ground sites such as scrub thickets and reed beds.
- A latrine containing a very large number of spraints at the natal den, and usually within 1 to 2m of it.
- A cub play area – for example, a well-worn path around a tree or in a circle up and down the bank.

Of these, the presence of heavily worn paths and substantial latrines can be used in short-term surveys, such as here.

Liles reported that the areas of habitat in which otter breeding sites were found ranged in size from two to 50 hectares. All the breeding sites he described were close to water but there are records of females giving birth to young away from the water side. James Williams reported two breeding dens, one beside the water and one 'quite away' from it.

It is also considered likely that female otters favour sites where there is a good food supply close to where the young are born or raised.

There are several ponds with woodland or scrub adjacent to them within the survey area.

Survey methods used

Resting sites

Since otters use several different resting sites within their home range and frequently change between them (Green et al. 1984), disturbance caused by development will not have a major impact on them. Nevertheless, it is an offence to damage or disturb an otter resting site. Accordingly, surveys were concentrated in a buffer zone 250m from the A30. To allow for possible small changes in road alignment, water courses within 100m of the 250m buffer were also checked where possible.

Searches were confined to water courses and ponds which were surveyed from the water, where it was safe and practical to do so, from the bank where not. Tunnels, cavities or shelter large enough to conceal an otter were checked for the presence of signs at the entrance.

Resting sites were numbered W1 – W15; grid references are listed in table 3 and maps showing the location of each are in Figures 1-5.

Breeding sites

The small size of streams in this area means that fish will not be very numerous within them. However, ponds and lakes, particularly if they are stocked, may have sufficiently high densities and numbers of fish to be suitable as breeding sites. Surveys were therefore confined to these.

In order to obtain an overview of potential sites within the area all ponds within 500m of the route were surveyed and assessment made of their suitability based on the presence of adequate dense concealing cover, suitable den sites and extent of anthropogenic disturbance. A few ponds just beyond this buffer were also surveyed to allow for changes in road alignment or if they were larger than average.

Evidence for use as breeding sites was based on indicators identified by Liles. As breeding sites are only used for a few months each year (or every other year) absence of signs does not mean that they are not used for this purpose.

Accessible margins were checked for the presence of den sites and potential den sites (islands) were also recorded.

Information recorded at ponds and lakes

- Distance from road
- Area of pond
- Area of woodland around pond
- Extent of concealing cover around pond
- Distance from nearest watercourse
- Presence of otter signs:
 - Footprints or spraints, including large accumulations at latrines
- Potential den sites, including islands
- Runs and playing areas
- Foraging potential
 - Evidence of fish stocking
- Evidence of human disturbance
- Impact of livestock on margins

These factors were taken into consideration when assigning a subjective score reflecting the probability of a pond being a breeding site. A score of 1 indicates a very low probability and 5 a very high probability. Ponds which were close together (<100m apart) were aggregated in assigning these scores.

Potential breeding sites were numbered LR1 – LR7 and HR1 - HR5; grid references are listed in table 3 and maps showing the location of each are in Figures 1-5.

Crossing points and culverts

Initially, Ordnance Survey maps at 1:25,000 scale and online aerial photographs with overlays showing the location of water courses were used to identify parts of the road which otters might cross when moving

between catchments. These locations were refined in places where otter road casualties had occurred using information provided by the Environment Agency.

Where practical and safe to do so, these places were visited during the resting site survey. Finally, detailed plans of the proposed road showing the locations of proposed attenuation ponds and their drainage were inspected. Otters are known to follow dry water courses at watersheds and since some of these might lead otters towards the ponds, crossing points will be required at all sites where such ponds are constructed.

Identification of suitable crossing points was therefore based on the risk of further otter mortality occurring using the following indicators:

- Distribution of headwaters of streams on either side of the road;
- Locations of attenuation ponds;
- Records of road casualties;
- Land form;
- Road layout.

Maps in Appendix B show how sites selected for otter crossing points provide linkage across the watershed between catchments north and south of the proposed road.

Crossing points are numbered CP1 –CPW15; grid references and locations are in Appendix B.

Limitations to surveys

Permission to gain access to site W08 to carry out the resting site survey could not be obtained, although the same site had previously been surveyed for the breeding site survey. Given the short length of water course to be surveyed (c75m), the fact that there were no suitable holt sites at the pond (LR6) and the lack of holt sites on all other small watercourses surveyed it is considered unlikely that one will be present there. Refer to Figures 1-4 in Appendices for locations.

Weather conditions were favourable for surveying on all days. The streams were very shallow and could be surveyed from within the watercourse where the vegetation was not too dense. The ponds were too deep for wading but access to the edges was sufficient to permit adequate surveys to be undertaken.

Results and conclusions

Field surveys were carried out in 2017, on May 17th (breeding sites) and July 17th and 18th (resting sites and crossing points).

Evidence of otter presence

- Spraints were found at LR7c (1) and HR3 (2).
- Footprints were found at LR7.
- The owner of HR1 reported the presence of a female otter with two cubs downstream of the site. The sighting was approximately 10 years ago.
- Road casualty records provided by the Environment Agency

Locations of these are shown in Appendix A and Figure 3.

Resting sites

All the watercourses surveyed were small due to their proximity to the watershed. Many were dry or at least not flowing. For the most part, they were <1m wide and <50mm deep. The principle exception was W10, the River Allen, which runs parallel to, and just outside, the 250m buffer and was up to 2m wide and 150mm deep. W07 and W11 were connected to ponds, LR7 and LR2&3, respectively which had been previously checked for the presence of den sites during the breeding site survey.

Most otter holts are constructed at the base of trees (Mason and Macdonald, 1983) where the action of fast flowing water causes erosion, leading to the creation of a cavity which may then be excavated further to create a tunnel. In headwater streams like these, such conditions do not normally exist, and none were found. Rabbit burrows and out of use badger sett may be used by otters and, where found, these were also checked for evidence of use by otters. None was found.

There are extensive areas of good quality concealing groundcover in which otters could lie up in temporary above-ground couches. The extent of this is noted in Table 1 together with brief notes on the areas surveyed.

Islands may also be used as resting sites and although none were present along streams there were two with sufficient cover for lying-up on ponds: HR1 and HR4. These are both >300m from the proposed road and are only suitable for couches, not holts.

In summary, no evidence of otter holts was found but the availability of suitable habitat for couches is high.

Breeding surveys

Table 2 lists the sites and information recorded from each pond. All are small, even when the areas of neighbouring ponds were aggregated, none reached 1ha of water in area. No site reached a score of 5 and only two had scores of 3 (HR4) or 4 (HR1 + HR3).

HR1 and HR3 are close together; have a combined area of approximately 0.73ha; were in a substantial area of woodland providing good cover and the level of disturbance was moderate to low. The larger of these, HR1, was accessible to livestock around the whole perimeter; had a bridle path along its west side and an informal path around the rest of it. HR3 was very close by and had much better cover and much less disturbance. Fish were present in HR1 which is stocked and the land owner reported evidence of breeding in the area (though not at the site) approximately 10 years ago. However, both are outside the 500m buffer and, given the substantial area of woodland around them it is extremely unlikely that road construction would be sufficiently disturbing to these animals to risk causing an offence. Otters, including breeding females, being reasonably tolerant of human activities (Kruuk 1995).

HR4 is considerably smaller and therefore less likely to be used for breeding. It is within the 500m buffer and although it falls within a substantial area of woodland it is at the southern edge of this. It is only moderately likely to be used for breeding (score of 3).

All other sites are unlikely or very unlikely to be used for breeding.

Crossing points and culverts

As far as possible, locations for crossing points have been made in places where otters would find them easily by following natural features of the environment, mainly watercourses and field boundaries. Despite this it will be necessary or beneficial to incorporate fences or hedges into the design to guide otters to safe crossings, particularly where disruption to existing linear features will be a consequence of road construction. Where animals are deflected by fencing to move parallel to the road towards a tunnel, it is important to locate the entrance to the tunnel so that the animals are guided into it (see guidance in the Design Manual for Roads and Bridges).

Recommendations

Resting sites

No further action is required in connection with otter resting sites.

Breeding sites

The only site where further observations should be made is HR4 which has a moderate probability of being used as a breeding site and is within the 500m buffer. I recommend that the site be visited every 4 months in the period up to construction, for a minimum of 18 months. Between 6 months and 3 months prior to construction, observations should be reviewed and if there is evidence to indicate that this area is being used for breeding, Natural England should be consulted about the need for a licence. Note that at the time of writing there are no clear guidelines as to the distance between a construction site and a breeding site which might lead to it being disturbed and a licence being required. My personal view is that breeding otters at this site would not be disturbed by the proposed development.

Crossing points and culverts

It was found that in all cases, provision of crossing points for otters in locations close to, or amongst, attenuation ponds, was also beneficial in terms of providing suitable linkage between the headwaters of catchments on either side of the road.

Locations of recommended crossing points are shown in Appendix C. These are positioned to maximise the probability of otters using them, taking into account such features of the scheme as are visible on the available plans. It is possible that engineering, landscaping and other considerations may need to influence the exact location of these, in which case ecological advice should be sought as to the impact of the changes.

Note that although the term fencing is used throughout Appendix C, the purpose is to persuade otters to move towards underpasses or culverts which will enable them to cross under the road. In practice other linear features, particularly traditional Cornish hedges may also be effective at this.

Fencing

The recommendations for fencing in the DMRB Volume 10: Section 4, Part 4 Nature Conservation Advice in Relation to Otters," London, 2001 are based on the requirements to stop captive animals escaping from their enclosure and are excessive for guiding wild animals towards safety. Mitigation for otter casualties at a site on the A30 at Trewint (45 Km NE of Carland Cross) was installed by the Environment Agency and is much lower (see below). It included provision of a ramp to allow otters to climb over weirs plus fencing to discourage them from crossing the road. No casualties have been recorded there since. The fence is chain link and is <1m high.

In addition to using fencing to direct otters towards a safe crossing, it is also beneficial to use fencing to prevent otters from crossing the road, particularly sections where concrete barriers are used along the central reservation. Under these circumstances, standard badger fencing will be sufficient.



References

- Chanin, P. 2000. *Otter road casualties: A survey of the A30, A38 and M5 in Devon and Cornwall*. Unpublished report submitted to the Highways Agency.
- Crawford, A.K., 2003. *Fourth Otter Survey of England 2000-02*. Environment Agency, Bristol.
- Crawford, A.K., 2010. *Fifth Otter Survey of England 2009-10*. Environment Agency, Bristol.

Green, J., Green, R. and Jefferies, D.J. 1984. A radio-tracking survey of otters *Lutra lutra* on a Perthshire river system. *Lutra* 27, pp 85-145.

Highways Agency, "Design Manual for Roads and Bridges. Volume 10: Section 4, Part 4 Nature Conservation Advice in Relation to Otters," London, 2001.

Lenton, E.J., Chanin, P.R.F. and Jefferies, D.J. 1981. *Otter survey of England 1977 - 1979*. Nature Conservancy Council, London.

Liles, G. 2003. *Otter Breeding Sites. Conservation and Management*. Conserving Natura 2000 Rivers Conservation Techniques Series No. 5. English Nature, Peterborough.

Macdonald, S.M. and Mason, C.F. 1983. Some factors affecting the distribution of otters (*Lutra lutra*). *Mammal Review* 13 pp 1-10.

Table 1. Notes on resting site survey

Stream	Notes	Den	Couch
W01	Water running after heavy rain, normally only flows in winter. Runs beside or between Cornish hedges. A few large sycamores. No suitable sites and little cover. Eastern 'tributary' is dry and choked with grass.	-	+
W02	No potential or actual sites. Dry at downstream end, under road. Some potential lying up around pond at upstream limit of survey.	-	+
W03	Daffodil farm. At start stream is beside farm buildings then open fields with no large trees. From c 100m outside buffer there is cover on north bank and a few large trees.	-	-
W04	Network of water channels including run-off from road – new since last survey. Need to align crossing with that. Dense rhododendron in places and considerable area with potential for lying up.	-	+++
W05	No potential for holts but see comments on pond HR4 which is outside 250m buffer. Stream is dry after c 50m and may be piped under field.	-	+++
W06	<i>No potential for holts. Wet woodland and bramble with potential for lying up.</i>	-	+++
W07	<i>Lake LR7 surveyed during breeding site survey. Disturbance by people and guard dogs present.</i>	-	++
W08	No Access		
W09	Two small streams with culverts under existing road. Little flow. A few large trees with no cavities some cover on the embankment. Eastern culvert impassable due to drop.	-	+
W10	<i>River Allen. A little larger than others. Up to 2m wide and 150mm deep. Wet woodland along southern bank.</i>	-	+++
W11	Outflow from pond LR2. Few large trees but much dense cover. Little water flowing, none from pond.	-	+++
W12	Stream very open and subject to trampling.	-	-
W13	<i>Dense impenetrable scrub at upper end. Impossible to access lower down until 250m+ beyond buffer. At this point heathland to west and dense scrub to east. No mature trees. High level of dense scrub.</i>	-	+++

W14	Dense woodland along whole length surveyed. Rabbit burrows and an out-of-use badger sett (probably outlier) present.	-	+++
W15	<i>Along hedge bank between two arable fields. No cover or substantial trees. Western section shown on some maps but piped for drainage.</i>	-	-

Notes:

Green background: wholly outside 250m buffer. **Orange background:** not surveyed due to problems with access

Den: Presence (+) or absence (-) of physical structure with evidence of use as resting site.

Couch: presence of dense, low-growing, concealing cover which might be used for lying up above ground.

-	Absent
+	Present but < 20% of area
++	>20% <50% of area
+++	>50% of area

Table 2. Summary of results from breeding site survey

Ref. num.	Signs	Concealing cover	Livestock %	Disturb.	Island	Food	Size (ha)	Canopy cover (ha)	Distance to stream (m)	Estimated distance to road	Score
LR1	-	H	0	0	-		0.13	0.95	250	<100m	1
LR2	-	L	60	M	-		0.07	0.60	Adjacent	<100m	2
LR3	-	H	0	L	-		0.02	0.60	Adjacent	<100m	2
LR4	-	L	5	L	-		0.03	0.00	500	<100m	1
LR5	-	M	70	L	-		0.09	0.14	500	150	1
LR6	-	M	0	H	-		0.07	0.37	Adjacent	150	2
LR6a	-	L	100	M	(+)	+	0.09	1.10	Adjacent	>500	2
{LR7	Fp	0	0	H	(+)	+	0.41	0.00	Adjacent	200	2
{LR7a	-	0	0	M	-		{		Adjacent	300	
{LR7b	-	0	0	M	-		{ 0.10	0.10	Adjacent	350	
{LR7c	1 Spr	0	0	M	-	+	{		Adjacent	400	
{HR1	Seen*	L	100	M	+	+	0.43	4.00	Adjacent	>500	4
{HR3	-	M	0	L	-	+	0.30	2.20	Adjacent	>500	
HR2	2 Spr	H	0	L	-		0.10	4.00	10	>500	2
HR4	-	H	0	M	+	+	0.20	28.00	Adjacent	300	3
HR5	-	M	0	M	-		0.40	0.28	15	500	2

Signs: Fp = footprints; Spr = spraint; * sighting of female with 2 cubs reported

Cover and Disturbance: 0 = none; L = low; M = moderate; H = high.

Livestock: % of perimeter with access by livestock

Island: + = present; (+) = present but unsuitable for den site

Food: Evidence of fishing or fish stocking

{ = aggregated because close to one another (gaps <100m); shaded with heavy border around group.

Score (probability of being used for breeding): 1 = very low; 2 = low; 3 = moderate; 4 = fairly high; 5 = very high.

NOTE: No potential den sites were recorded other than on islands.

Table 3. Grid References of survey sites

a) Resting sites

Water course	Grid Reference
W01	SW746464
W02	SW746476
W03	SW754476
W04	SW770485
W05	SW775491
W06	SW793490
W07	SW792494
W08	SW800502
W09a	SW810515
W09b	SW812518
W10	SW814516
W11	SW825529
W12	SW834531
W13	SW836543
W14	SW848544
W15	SW848539

b) Breeding sites

Pond	Grid Reference
LR1	SW840537
LR2	SW825530
LR3	SW825530
LR4	SW819529
LR5	SW819528
LR6	SW800502
LR6a	SW806501
LR7	SW793494
LR7a	SW794493
LR7b	SW794493
LR7c	SW795493
HR1	SW786502
HR3	SW786501
HR2	SW790502
HR4	SW775492
HR5	SW759476

Figure 1. Survey Sites



Figure 2. Survey Sites

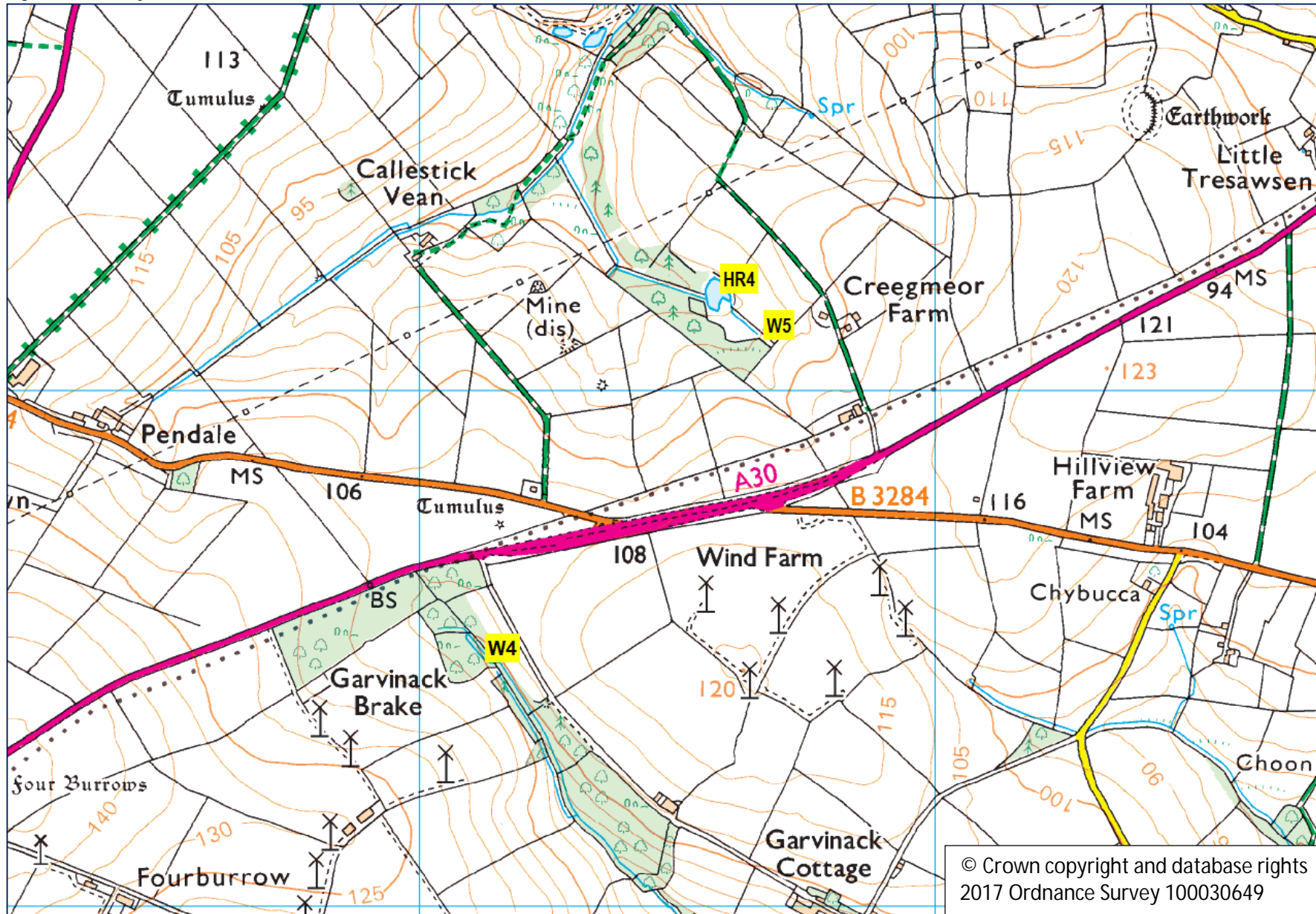


Figure 4. Survey Sites

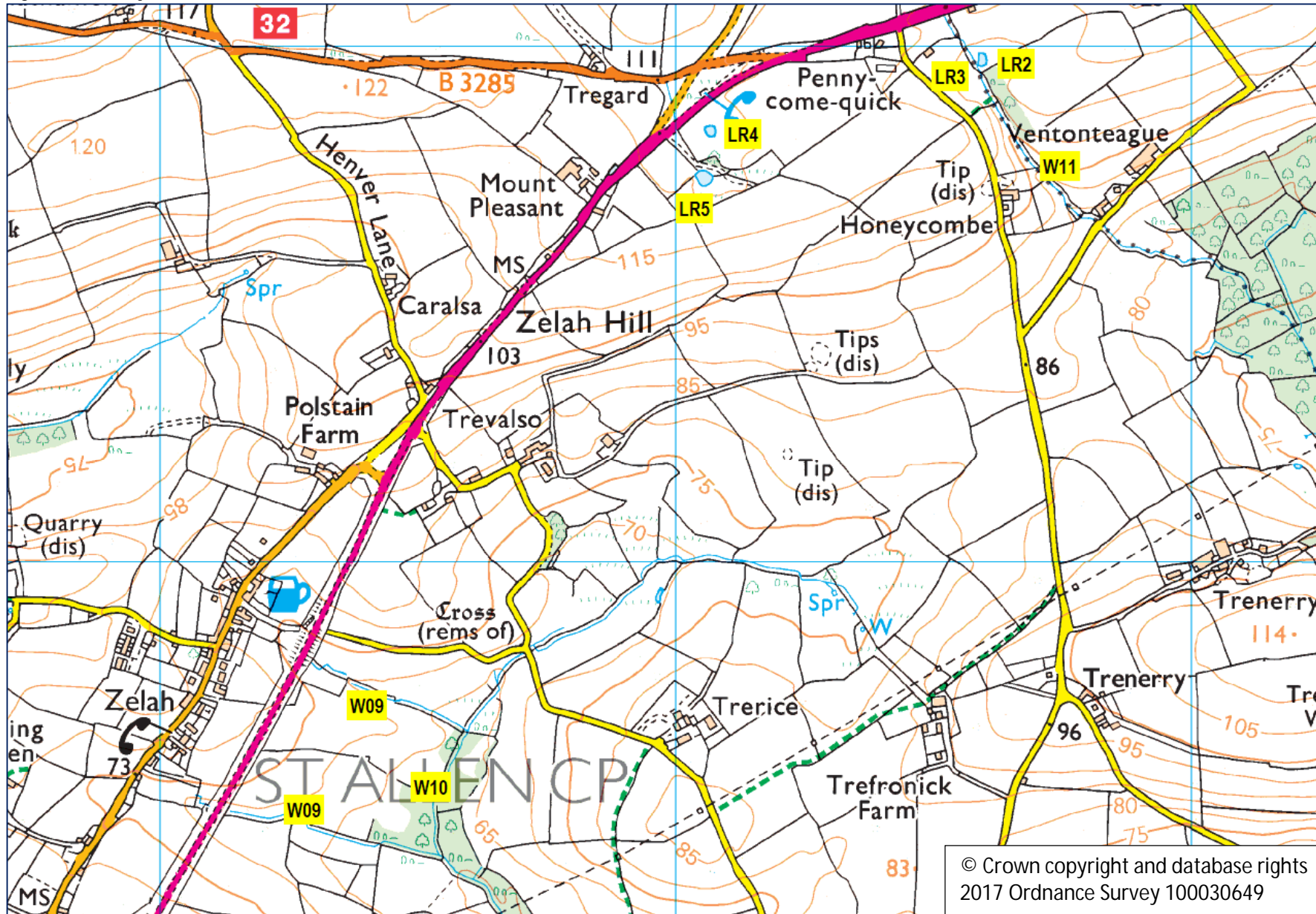
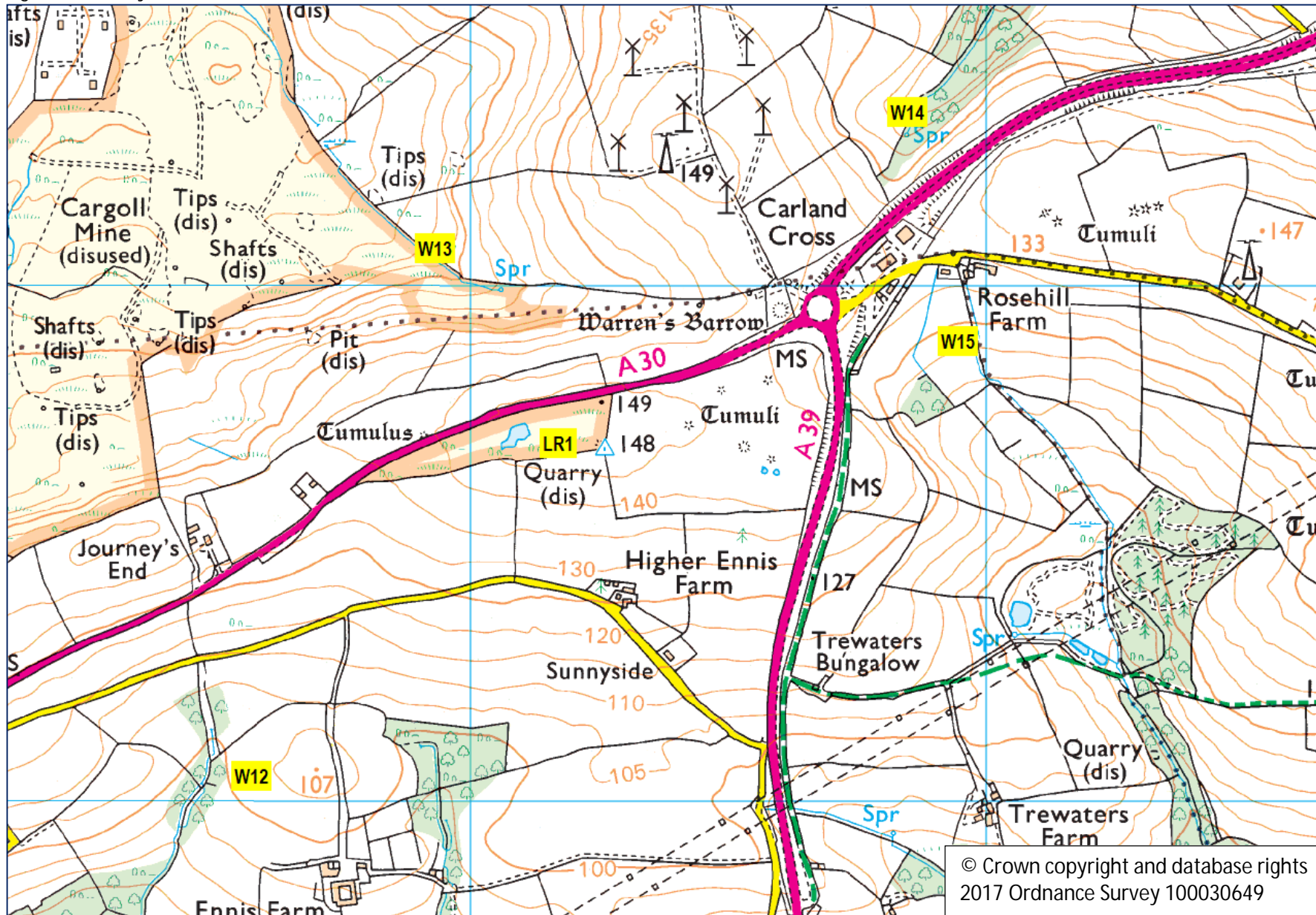
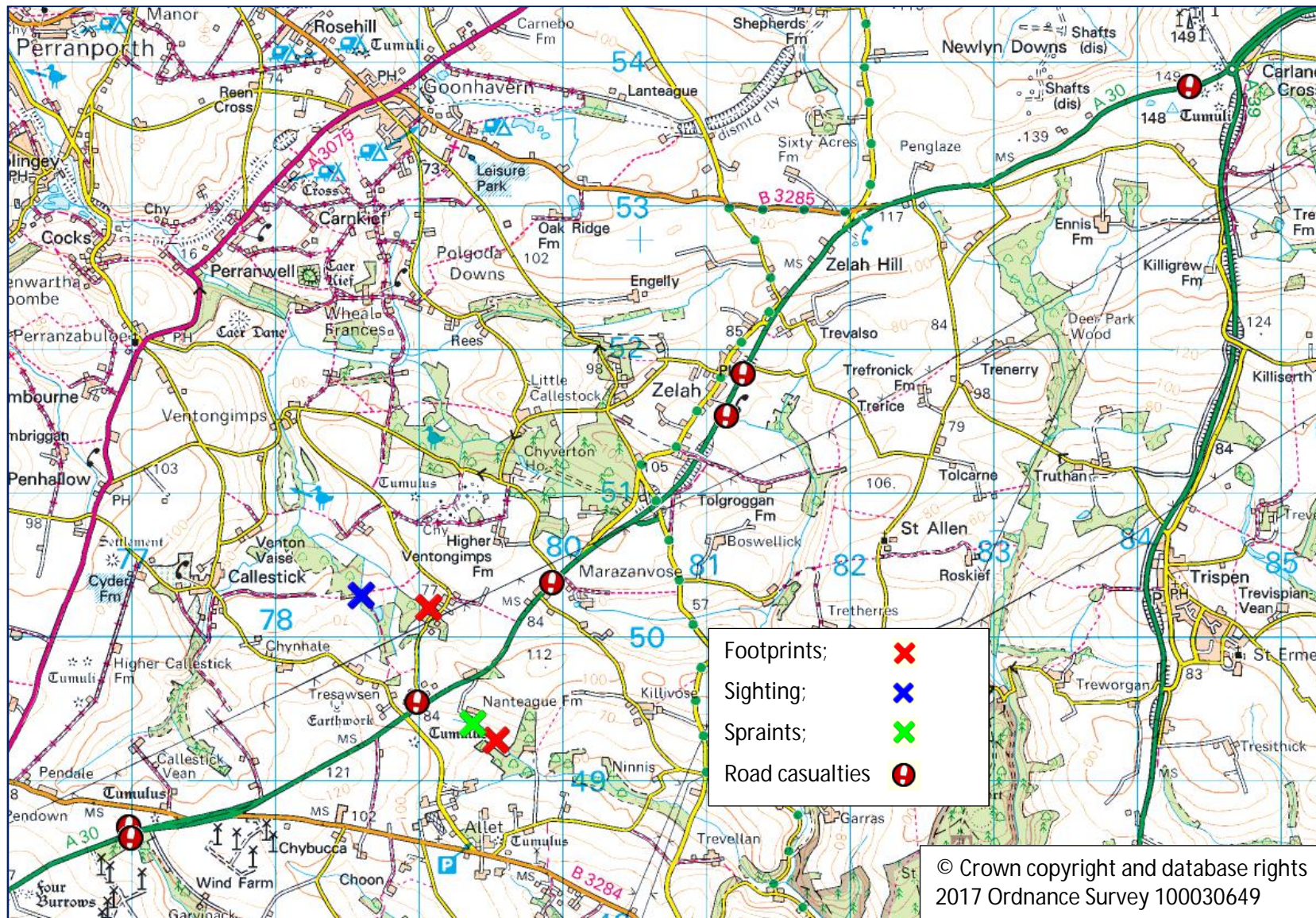


Figure 5. Survey Sites



APPENDIX A

Evidence for the Presence of otters

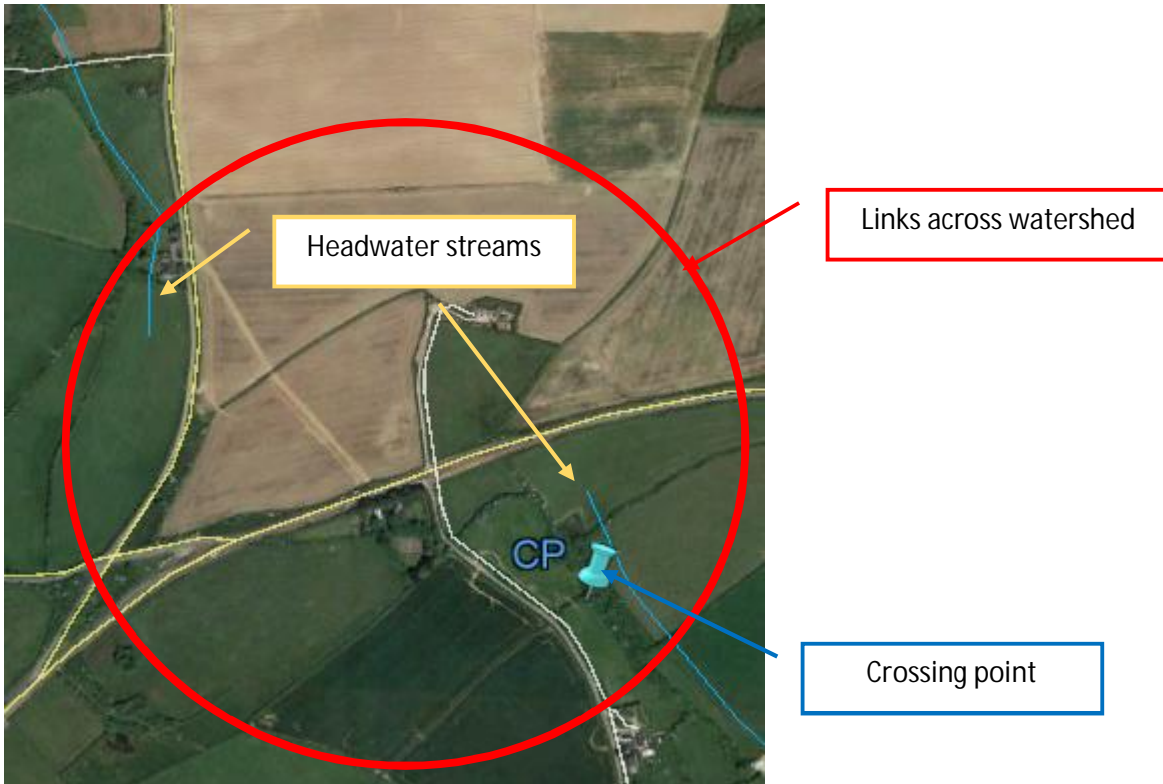


APPENDIX B

Location of Crossing Points in relation to watersheds

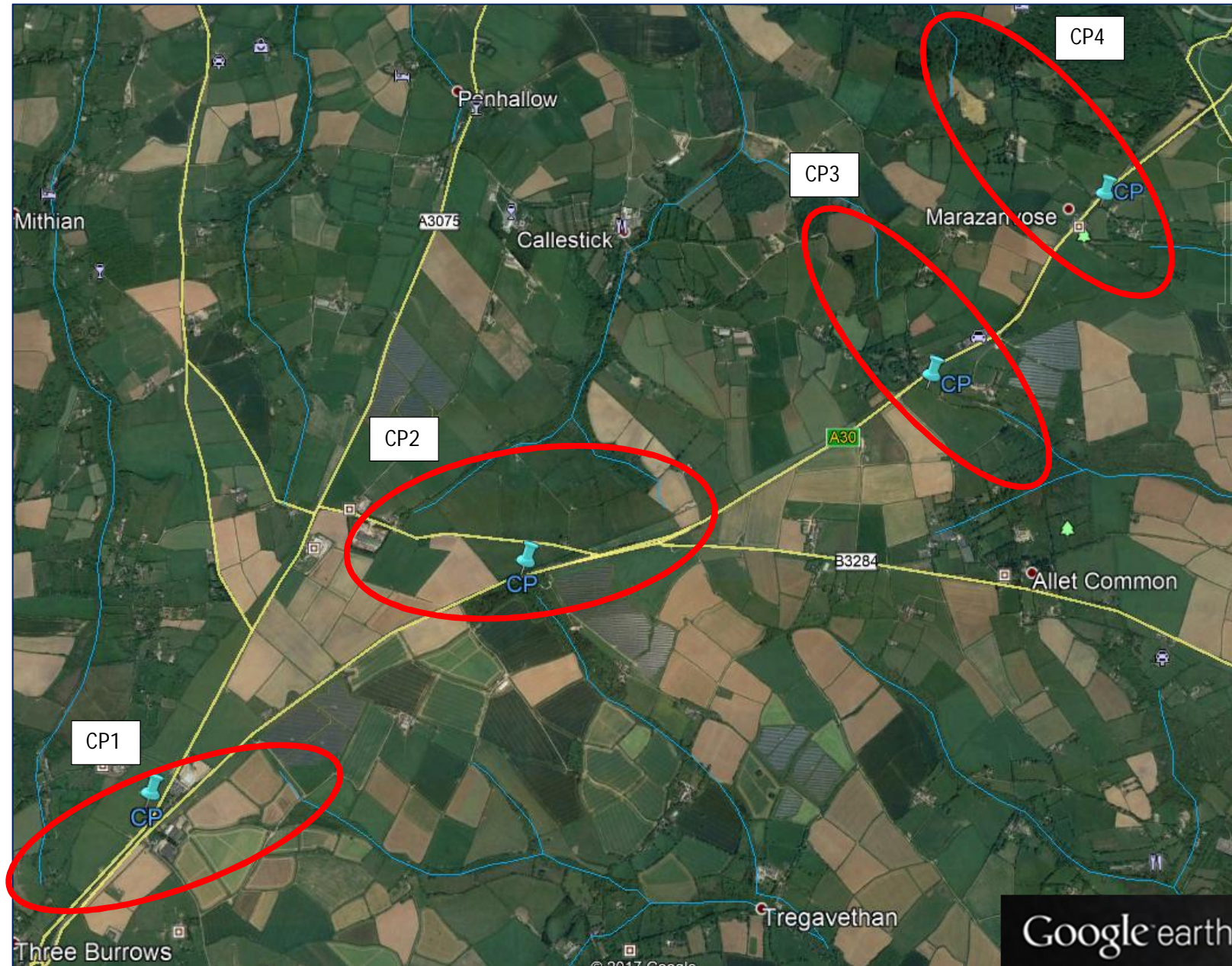
The following maps show the locations of proposed crossing points and nearby headwater streams, illustrating how otters crossing between catchments north and south of the road will have a crossing point in the vicinity.

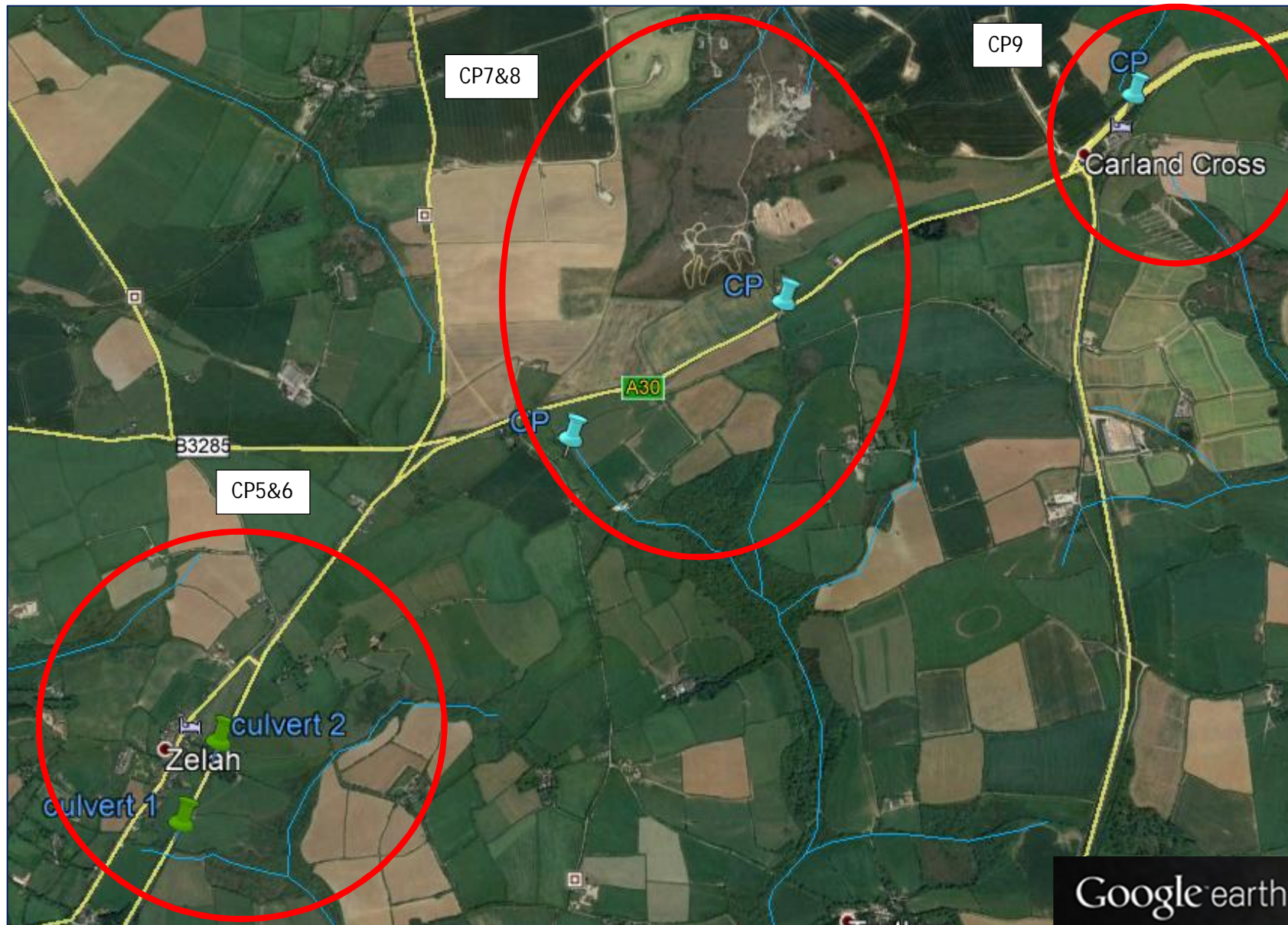
KEY:



Grid references of Crossing Points

	Grid Reference
CP1	SW751477
CP2	SW769487
CP3	SW789495
CP4	SW799504
CP5	SW810515
CP6	SW812518
CP7	SW825529
CP8	SW833534
CP9	SW847542





APPENDIX C

Proposed crossing points for otters

General points

Location of fencing is intended to show the need for funneling otters towards crossing point and is indicative. In most cases it will be beneficial to extend it as far as possible along the road away from the crossing point to at least 100m beyond potential access to the road from streams or attenuation ponds.

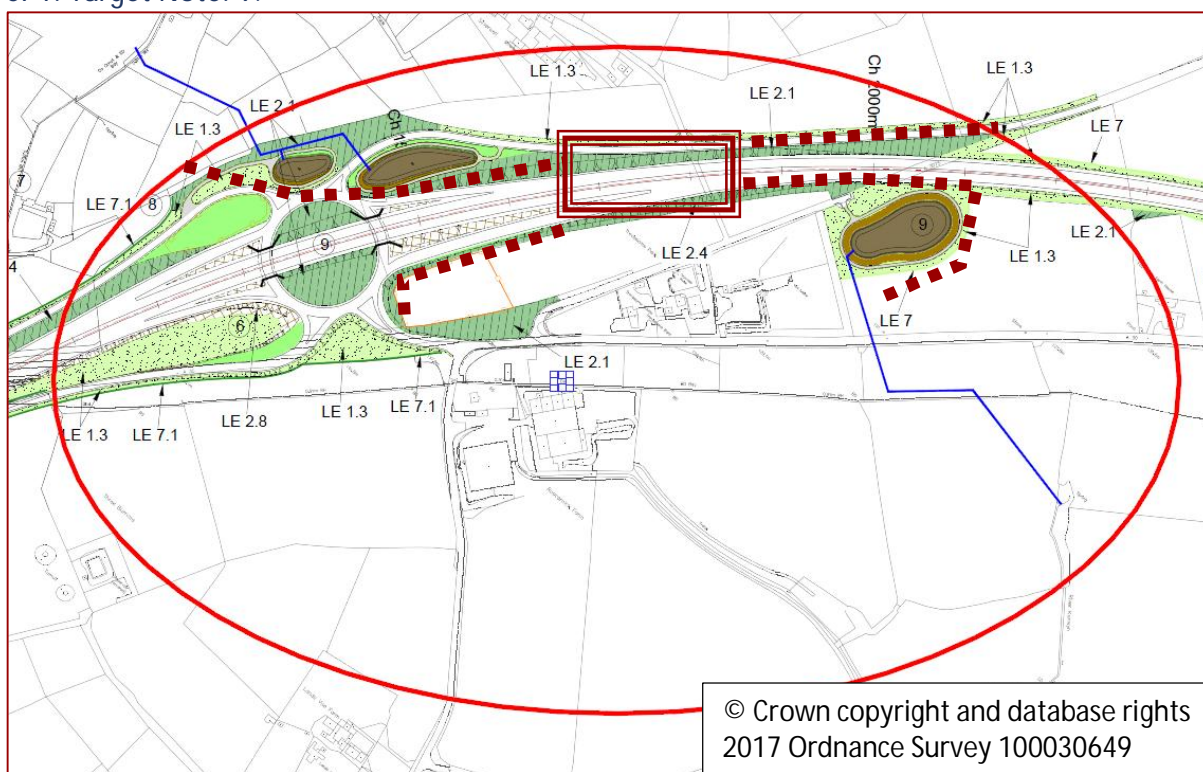
Although water will not always flow from attenuation ponds, otters are known to travel along dry watercourses near watersheds and may therefore be attracted into them. Fencing will be required to ensure that otters do not venture from the ponds out onto the adjacent road.

Apart from the two culverts at Zelah Hill it is assumed that the crossing will be affected by an underpass or tunnel.

Note: Drawings below are overlaid on maps provided. Relevant features are keyed below them. Keys to other features are on original maps.

Map HA551502-WSP-EGN-0000-DR-EN-00105: Sheet 1 of 4

CP1: Target Note: 9.



Requirement: To ensure that otters travelling upstream to attenuation ponds on either side of the road are guided towards safe passage beneath the road.

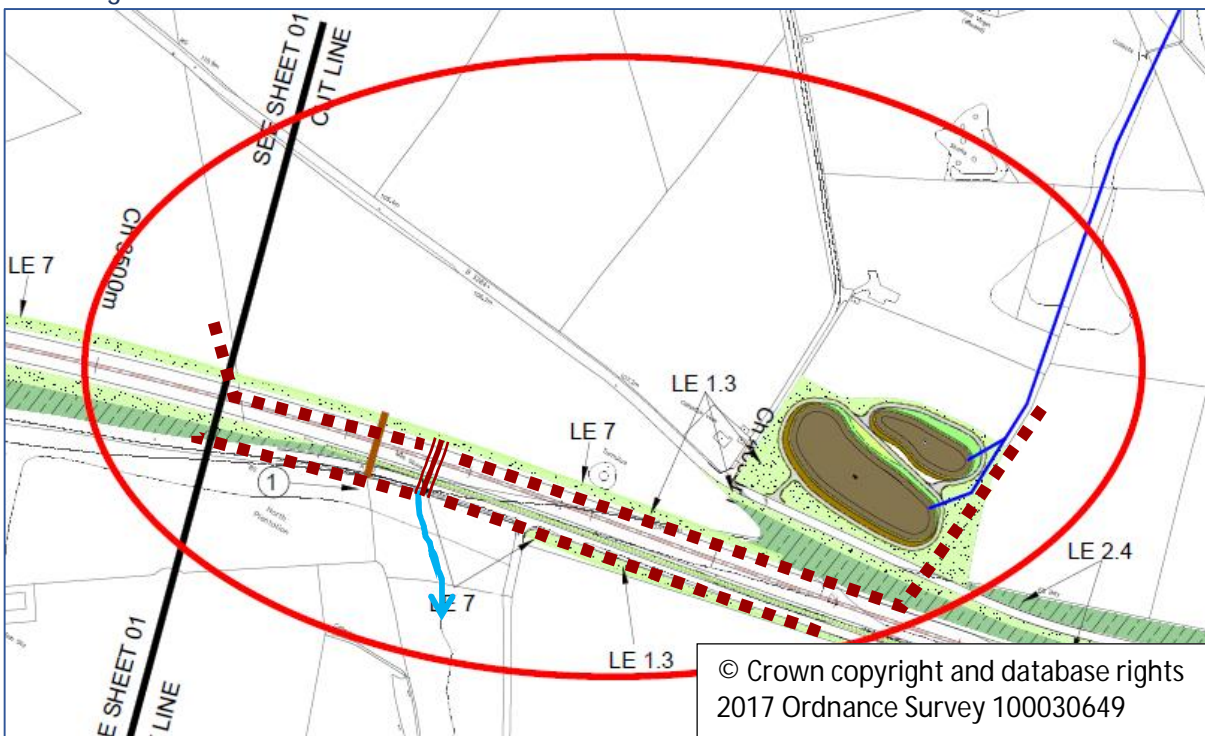


Minimum fencing required at actual site needs to funnel otters into underpass





Recommended area within which underpass could be constructed.

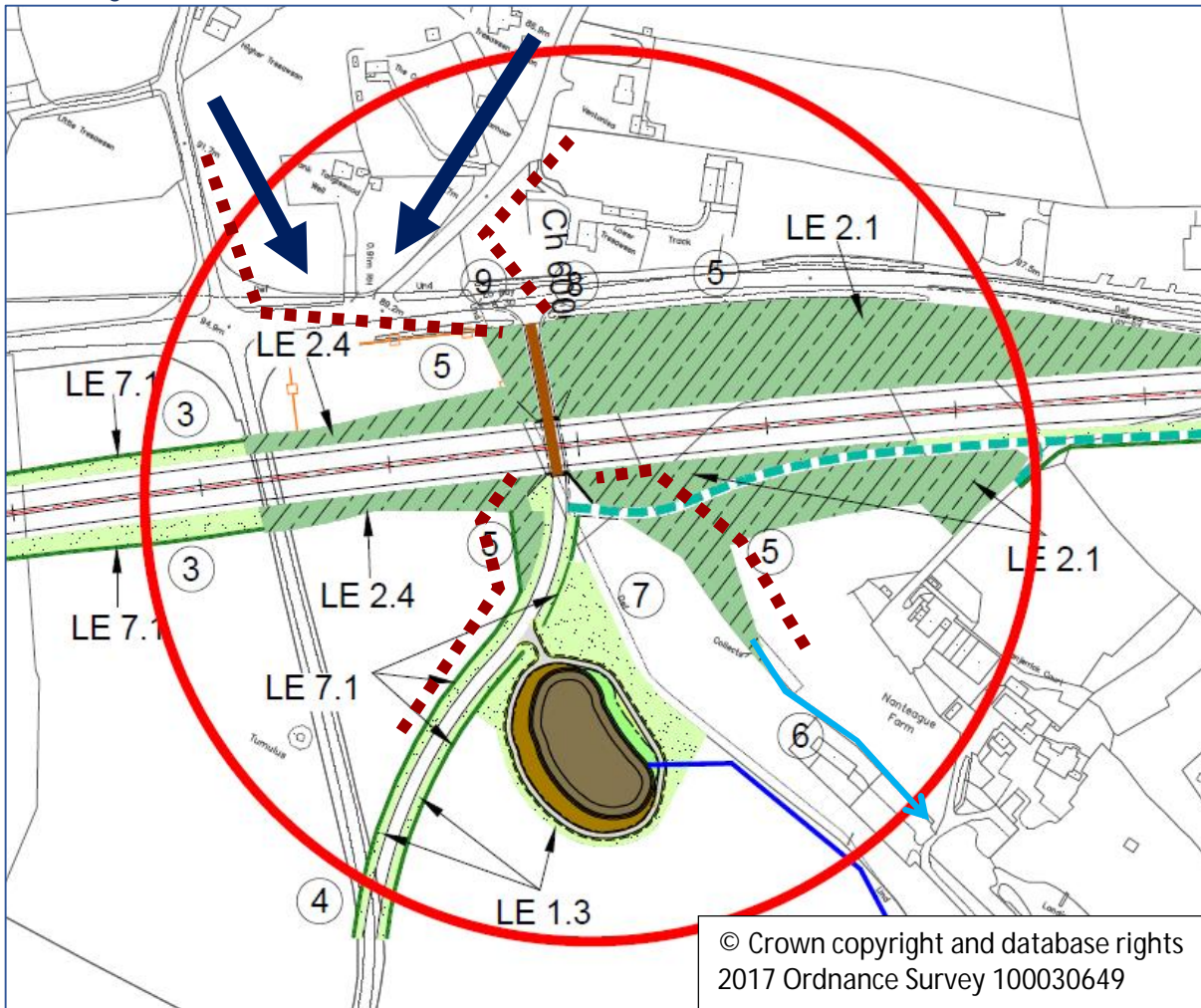
CP2: Target Note: 1.




Requirements: Align underpass with channel taking drainage water from road to south of carriageway. Use fencing to guide otters from attenuation pond to east and hedgerow to west (which links with water course c500m to north).

-  Recommended position for underpass
-  Estimated location of drainage channel

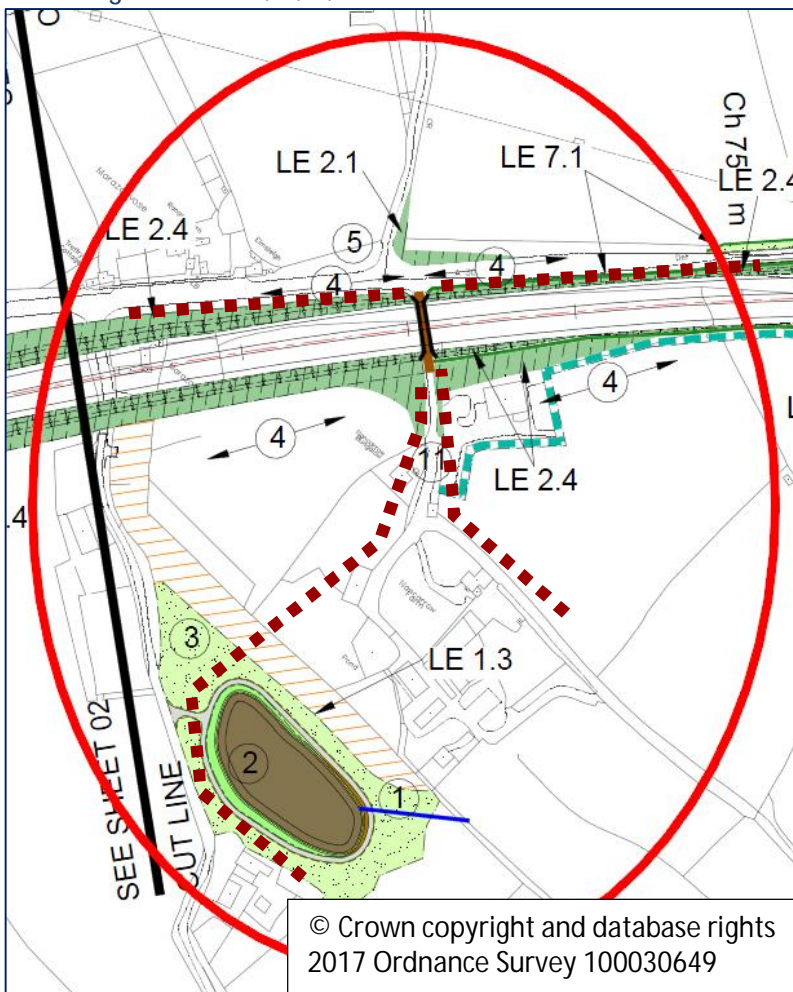
CP3: Target Notes: 6, 7, 8, 9.



Requirements: Funnel otters travelling north either via attenuation pond or via stream to west of Nanteague farm towards underpass. Funnel otters travelling south from stream and ponds between 500m and 800m north of road towards underpass.

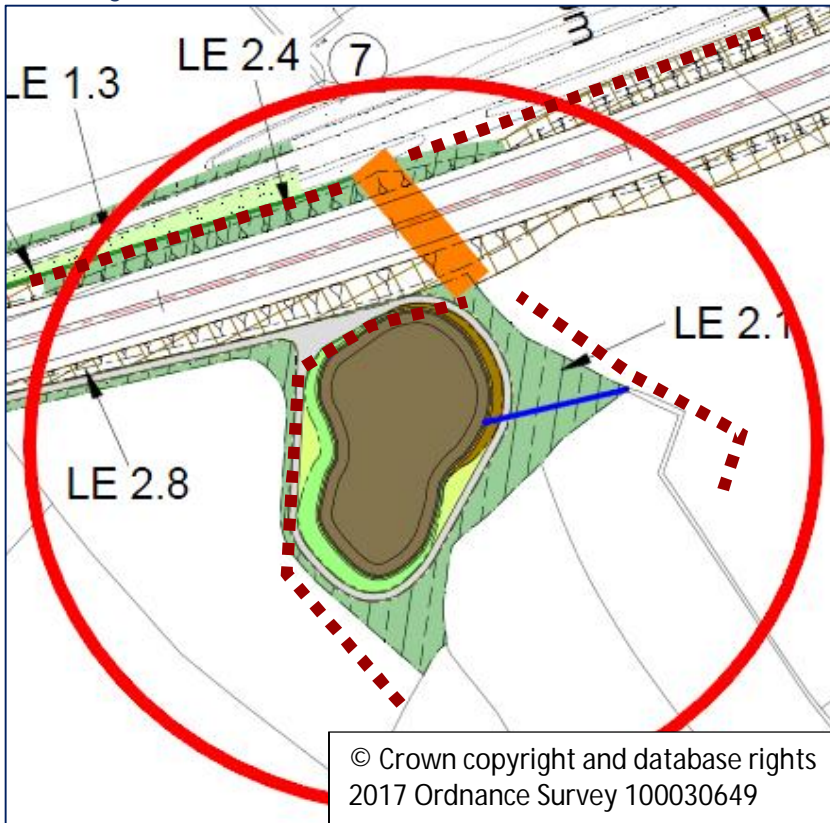
 Likely routes of otters travelling south

Comments. The complex of roads and tracks at this site makes it extremely difficult to provide detailed recommendations for fencing. The underpass is well placed to be used by otters travelling northwards and adequate for those travelling south.



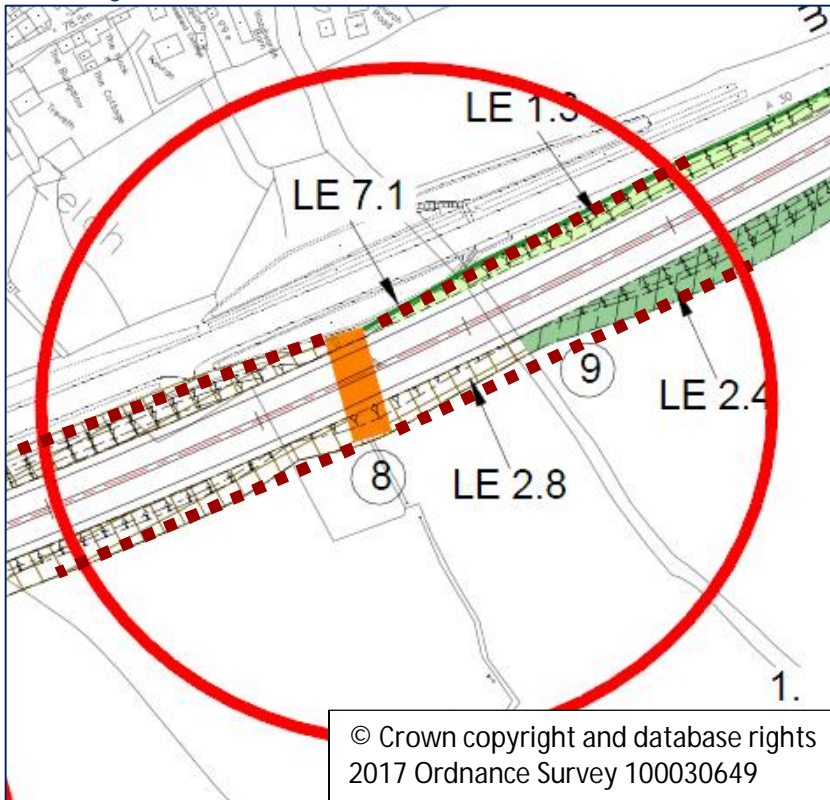
Requirements: Funnel otter travelling north from attenuation pond or pond at Nancarrow Farm towards underpass.

CP5: Target Note: 7.



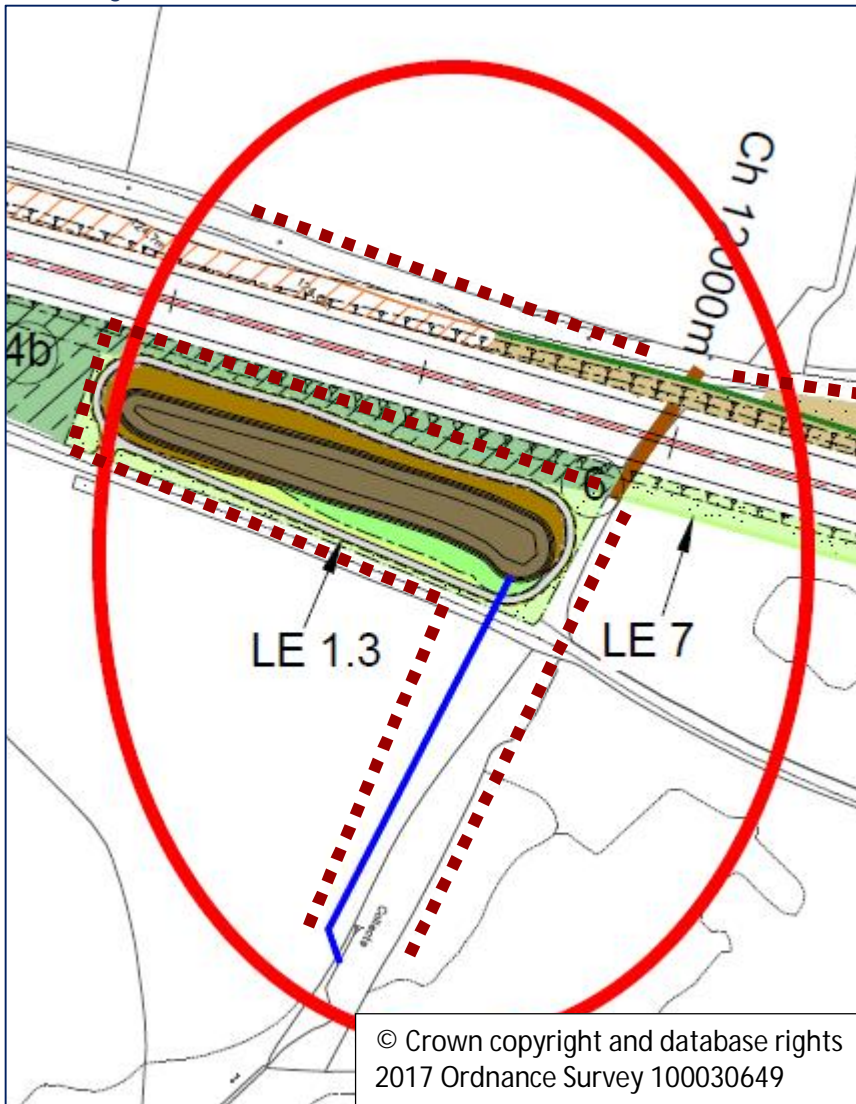
Requirements: Install fencing to funnel otters towards culvert. If possible, replace pipe culvert with box section culvert large enough to ensure that otters can pass through at times of flooding (as recommended in DMRB Volume 10: Section 4, Part 4 Nature Conservation Advice in Relation to Otters," London, 2001). Alternatively, a separate, dry, underpass could be provided.

CP6: Target Note: 8.



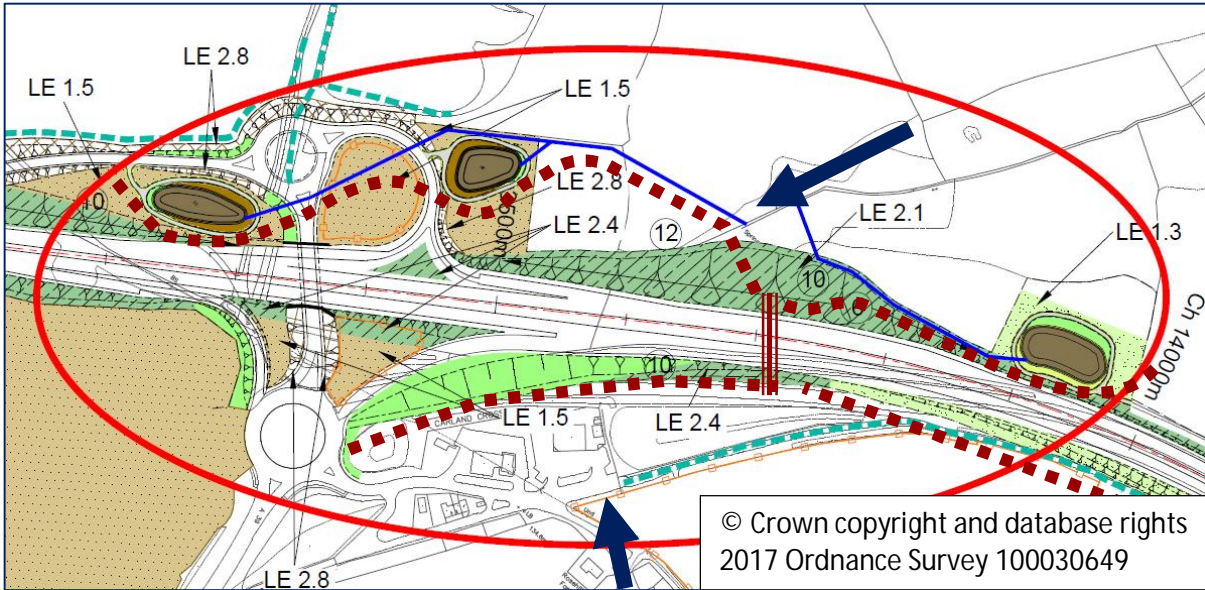
Requirement: Reconstruct culvert to ensure that it is passable by otters or provide alternative underpass. Install fencing to deter otters from climbing embankment onto road.

CP8: Target Note: 6



Requirements: Provide fencing to funnel otters travelling between streams on Newlyn Downs SAC and tributaries of the River Allen into underpass.

CP9: Target Note: 12



Requirements: To guide otters from the network of attenuation ponds draining into a tributary of The Gannel north of the road to the stream arising at Rosehill farm and flowing south to the Tresillian river.



Routes likely to be taken by otters approaching the site.



Preferred location of underpass.

Comments: The complex nature of the road intersections combined with the presence of the service station and housing here create difficulties. In addition, the road is embanked, at least on its northern side. The length of underpass may be reduced by placing it towards the top of the embankment. Locations further east would be acceptable if engineering considerations require it.

Consideration was given to using the road beneath the A30 connecting the two roundabouts. The presence of the Services and the fact that the A39 south to Truro is likely to be heavily used, indicate that this is probably not viable without additional underpasses.

Note that drainage for the western attenuation pond goes under two roads connected to the roundabout. The culverts for these should be designed to ensure that otters can use them.

Grid references of Crossing Points

	Grid Reference
CP1	SW751477
CP2	SW769487
CP3	SW789495
CP4	SW799504
CP5	SW810515
CP6	SW812518
CP7	SW825529
CP8	SW833534
CP9	SW847542

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