

GUIDELINES FOR
THE TREATMENT OF BADGERS
PRIOR TO THE CONSTRUCTION
OF NATIONAL ROAD SCHEMES



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INTRODUCTION

The badger is one of the larger wild mammals in Ireland and is relatively common and widespread throughout most of the country. Badgers are omnivorous, feeding on insects, small mammals, grains and wild fruits - but the main component of their diet is earthworms. Consequently, their density is often higher in landscapes of agricultural pasturelands and lower in areas where habitats provide a poorer food supply, such as bogs, moors and upland areas.

Badgers live in social groups, usually comprised of between two and six adults and their young. Each group defends a territory, which varies in size between 25 and 200ha (with mean territory size of c. 80ha). The average density of badgers in the country is one social group per 2 km² but in many lowland areas is often as much as one or more social groups per km².

Badgers create burrows (known as setts); larger setts may possess very extensive tunnel systems with many entrances and underground chambers. There may be a number of setts within a group's territory, varying in size, complexity and use. Usually, there is just one principal sett (the 'main' sett), which is generally used for breeding and is inhabited

by badgers throughout the year. It is usually located centrally within the badger group territory. Setts closer to the boundary of a territory are usually referred to as 'outlier' setts. Other types of sett include annexe, subsidiary and minor setts, depending on their use and importance to the badger group. Setts vary in size from those with one entrance to complexes stretching over 100m and with 40 or more entrances.

The most frequent location of badger setts in the Irish countryside is within or close to hedgerows and treelines, as these provide cover and safety from disturbance from agricultural and other activities. Setts are also frequently located in deciduous woodlands and areas of scrub, and they do occur in urban areas as well as in the open countryside.

Setts are used by generations of badgers and some setts may be of considerable antiquity. Cubs are born (litters consist of two to four cubs) towards the end of January and through February, emerging above ground in April or May.



Badger sett with several entrances located in a woodland.

Badgers live in social groups, usually comprised of between two and six adults and their young.

IMPACT OF ROAD SCHEMES

New road infrastructure may directly or indirectly impact on badgers. Construction may result in death or injury to badgers within setts, as well as the destruction of setts, loss of foraging habitat or dissection of their foraging areas. Construction works close to breeding setts can cause serious disturbance to badgers and mortality of cubs.

Where loss of habitat is likely to be greater than 25%, the impact may be considered as significant on the affected social group. Badgers may be killed or injured by road traffic as they attempt to access their feeding areas. This can significantly affect the viability of badger groups in an area. They may also pose a road safety issue for motorists as badgers attempt to cross roads to and from foraging areas.



Badgers are commonly found in woodland areas.
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Where loss of habitat is likely to be greater than 25%, the impact may be considered as significant on the affected social group.

LEGISLATION FOR THE PROTECTION OF BADGERS

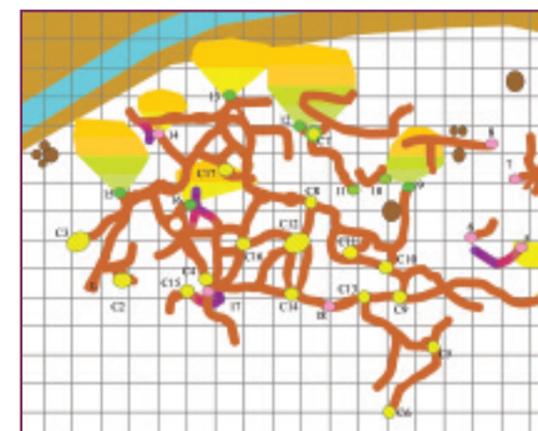
Badgers and their setts are protected under the provisions of the Wildlife Act, 1976, and the Wildlife Amendment Act, 2000. It is an offence to intentionally kill or injure a protected species or to wilfully interfere with or destroy the breeding site or resting place of a protected wild animal. It is standard best practice to ensure that mitigation measures are taken to limit impacts on badgers and badger populations and to contribute to safety by reducing collisions between badgers and vehicles. On road schemes, such measures might include removal of badgers from affected setts, provision of badger-resistant fencing and wildlife underpasses (that allow badgers access to their foraging areas). Where significant badger setts have to be removed, alternative artificial setts may need to be created.

The removal of badgers from affected setts and subsequent destruction of these setts must be conducted under licence by experienced badger experts or other suitably qualified personnel. The National Parks and Wildlife Service

(NPWS) of the Department of the Environment, Heritage and Local Government grant licences to the experts undertaking the badger operations and not to the developer or contractor. An application for a wildlife licence should be submitted to the NPWS with the relevant ecological information from the detailed badger survey. At least three weeks is normally required to process a licence application, but early discussions with NPWS can expedite the procedure.

Conditions are usually attached to each wildlife licence granted in respect of badgers. It is normal practice to impose seasonal constraints e.g. that breeding setts are not interfered with or disturbed during the badger breeding season (December to June inclusive).

No active sett should be interfered with or disturbed during the breeding season as any sett category may contain cubs. Closure of setts during the breeding season would require monitoring to demonstrate no sett activity.



Sett excavation revealed the underground tunnel system of a sizeable main sett located next to a stream. The sett had 18 entrances, 17 chambers, and was 24m across. Total tunnel length approximately 132m.

It is an offence to intentionally kill or injure a protected species or to wilfully interfere with or destroy the breeding site or resting place of a protected wild animal.

PRE-CONSTRUCTION BADGER SURVEYS

All significant setts and badger activity as well as mitigation measures will already be reported within the Environmental Impact Statement (EIS) for the respective scheme. In general, badger group territories tend to remain remarkably stable over time. However, badgers create new setts regularly and existing setts may change in terms of breeding status or level of use by badgers. Therefore, in order to ensure that there are no significant changes to the badger territory's identified in the EIS and the mitigation measures specified, pre-construction survey should be undertaken prior to the commencement of any works. The priority of any badger pre-construction surveys along the proposed route is to ensure that the prescribed mitigation measures in the EIS are adequate to address possible impacts on badgers.

In general, a survey of setts within 50m of the scheme (150m where piling or blasting will be undertaken) is required no more than 10-12 months in advance of construction. This will ensure that there will be sufficient time to comply with all licensing requirements and that the necessary actions are undertaken to protect the badger populations prior to the commencement of construction. The survey should be supplemented by a further

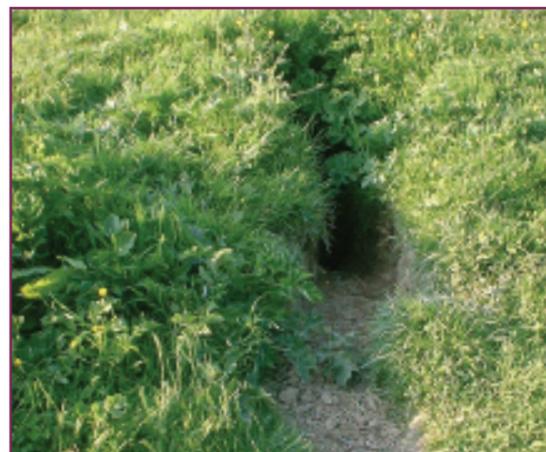


Large spoil heap with copious discarded bedding at a main sett located in a hedgerow next to a stream.

inspection of the development area immediately prior to site clearance to ensure that no new setts were established in the intervening period and that setts previously identified continue to be used by badgers. The additional survey information will allow specialists to modify, where appropriate, the extent and location of badger-resistant fencing and wildlife underpasses.

Where 36 months or more has elapsed between obtaining statutory approval of a road scheme and initiation of the construction phase, an appropriate level of resurvey will be required because the baseline data may be altered during this time. This will allow adjustments to be made to the mitigation strategy specified in the EIS, if necessary (e.g. lengths of fencelines and locations of underpasses etc.).

Badger surveys are significantly constrained by vegetational cover and season, and are best conducted from November to April. All areas have to be systematically searched for setts and both sides of hedgerows and boundaries checked. Badger territorial activity is high from mid-January to March and surveys at this time are most efficient in identification of badger paths, latrines and feeding signs.



A single entrance sett in grassland.

EXCLUSION OF BADGERS FROM DEVELOPMENT SITES

Exclusion of badgers should only be considered where a development would unavoidably destroy a badger sett (or any part of its underground tunnel and chamber system), or its immediate surroundings, making it unsuitable for continued occupancy. In some circumstances, it is possible to exclude badgers on a temporary basis and allow them to return when the site works have been completed. Exclusion of badgers from any currently active sett should only be carried out during the period of July to November (inclusive) in order to avoid the badger breeding season. Closure of any active sett during this period (i.e. a potential breeding sett) would result in the exclusion of adult badgers, while, if present, dependent young are likely to remain below ground. Knowledge of alternative setts within the particular social group's territory is required to ensure that excluded badgers are able to relocate to a suitable alternative refuge. The objective is to allow the badgers to remain within their territory, even though a

portion of their current territory may be lost as a result of a particular development.

Exclusion of badgers from disused or currently inactive setts, may be entertained during any season. Confirming that a sett is inactive during the breeding season (i.e. as described above, with no possibility of cubs below ground) will usually require a brief period of sett monitoring (e.g. five or more days of checking activity either with sticks or with sand pads on the spoil heaps to identify footprints).

In circumstances where there are difficulties in identifying alternative setts available to the affected badger group, specialist studies (e.g. bait-marking) may have to be undertaken to ascertain the group's territory and to locate alternative setts. Where no alternative setts are available within the territory of the animals, an artificial sett will need to be constructed within the affected group's territory. While individual situations may require different approaches, exclusion will generally follow the steps outlined in the next section.

Exclusion of badgers from disused or currently inactive setts, may be entertained during any season.



Badger paths are normally alongside hedges and treelines, but may cross open fields. Badgers maintain traditional paths and a hedge may have been removed from here in the past.

BADGER EVACUATION PROCEDURES

Prior to any work commencing in the vicinity of a badger sett that will be affected by a road scheme, it must be ensured that badgers are excluded and evacuated from the sett. Badgers will not necessarily make regular use of all of the setts in their territory; some setts may be used only intermittently. Nevertheless, all setts should be considered as resting places under the Wildlife (Amendment) Act, 2000.

The methodology by which a licensed operative evacuates a sett depends largely on the number of sett entrances, the observed activity at the sett, terrain and topography,

likelihood of interference by people and livestock, and other considerations; therefore, it should be determined on a case-by-case basis. The activity status of a sett is adjudged by field signs at and around the sett: evidence of paths, rooting, bedding etc. will suggest recent or intermittent use.

The procedures below are usually sufficient to ensure that badgers are not present within a sett prior to its destruction.



Wire mesh around the gate needs to be buried or securely pegged.



Examples of a one-way gate in place over one of several sett entrances at setts being evacuated.

DISUSED AND INACTIVE SETTS

In the instance of disused setts or setts verified as inactive, and to prevent their reoccupation, the entrances may be lightly blocked with vegetation and a light application of soil (soft blocking). The purpose of soft-blocking is to confirm that an apparently inactive sett is not occupied by badgers. If all entrances remain undisturbed for approximately five days, the sett should be destroyed immediately using a mechanical digger, under the supervision of the licensee. Should there be any delay in sett destruction, the soft-blocked entrances should be hard-blocked and the sett destroyed as soon as possible, again under the supervision of the licensee. Hard-blocking is best achieved using buried fencing materials and compacted soil with further fencing materials laid across and firmly fixed to blocked entrances and surrounds.

ACTIVE SETTS

Where field signs or monitoring reveal any suggestion of current or recent badger activity at any of the sett entrances, the sett requires thorough evacuation procedures.

Inactive entrances may be soft and then hard-blocked, as described for inactive setts, but any active entrances should have one-way gates installed (plus proofing around sides of gates as illustrated) to allow badgers to exit but not to return. The gates should be tied open for three days prior to being set to exclude. Sticks should be placed at arm's

length within the gated tunnels to establish if badgers remain within the sett.

Gates should be left installed, with regular inspections, over a minimum period of 21 days (including period with gates tied open) before the sett is deemed inactive. Any activity at all will require the procedures to be repeated or additional measures taken. Gates might be interfered with by other mammals or members of the public - hence the importance of regular exclusion monitoring visits. Sett destruction should commence immediately following the 21 day exclusion period, provided that all badgers have been excluded.

Badgers will often attempt to re-enter setts after a period, and if gates are left in place for any long period, they may attempt to dig around them or even create new entrances and tunnels into the sett system.

Where an extensive sett is involved, an alternative method of evacuating badgers is to erect electric fencing around the sett (ensuring all entrances are included) with one-way badger-gates installed within the electric fence at points where the fence crosses badger paths leading to and from the sett. The exclusion should again take place over a minimum period of 21 days before sett destruction; this monitoring period would be contingent upon no badger activity being observed within the fenced area. Fencing may not be practical in many situations due to the topography or the terrain – and can be difficult to install effectively. If no activity is observed, then the sett may be destroyed, under supervision by the licensed wildlife expert.

BADGER SETT DESTRUCTION

The destruction of a successfully evacuated badger sett may only be conducted under the supervision of qualified and experienced personnel under licence from the NPWS. The possibility of badgers remaining within a sett must always be considered; suitable equipment should be available on hand to deal with badgers within the sett or any badgers injured during sett destruction.

Destruction is usually undertaken with a tracked 12-25 ton digger, commencing at c. 25m from the outer sett entrances and working towards the centre of the sett, cutting c. 0.5m slices in a trench to a depth of 2m. Exposed tunnels may be checked for recent badger activity, with full attention paid to safety requirements in so doing.

The sett should be destroyed from several directions, in the above manner, until only the central core of the sett remains.

Once it is ensured that no badgers remain, the core may then also be destroyed and the entire area back-filled and made safe. Sett excavation should, preferably, be concluded within one working day, as badgers may re-enter exposed tunnels and entrances.

A report detailing evacuation procedures, sett excavation and destruction, and any other relevant issues should be submitted to the NPWS, in fulfilment of usual wildlife licence conditions.



A main sett being destroyed. The complex tunnel system and chambers are revealed along the face.

Once it is ensured that no badgers remain, the core may then also be destroyed and the entire area back-filled and made safe.

ARTIFICIAL SETTS

Where survey indicates that suitable alternative natural setts are not present, a badger expert may recommend the construction of an artificial sett to replace a breeding sett that will be affected by the road scheme.

Artificial setts should be constructed several months in advance of the closure of a breeding sett. In this interval, the affected badgers should be encouraged to utilise the artificial sett by means of attractive food baits (peanuts etc.) and materials from the breeding sett added (such as bedding and spoil). The construction of an effective artificial sett is an exercise best conducted by experienced personnel. The sett should be constructed as close as

reasonably possible to the natural main sett, and within the group's territory, but, obviously, away from the route of the road scheme. The constructed tunnel and chamber system should be located in well-drained soils, and be landscaped and planted to ensure cover and lack of disturbance. Correct location of an artificial sett is necessary to ensure its successful occupation by the affected badgers. Suitably designed and well-situated, artificial setts are usually successfully occupied by the badgers being re-located. Translocation of badgers from an affected site to a distant locality is rarely considered feasible or practical.

Artificial setts should be constructed several months in advance of the closure of a breeding sett.



An example of an artificial sett under construction, with pipe tunnels and eight chambers.

BADGER UNDERPASSES

The majority of badger road casualties occur where traditional badger paths cross roads. Where badger pathways cross a proposed new road, where feasible, a badger underpass (as outlined in Figure 1) should be provided at the location of each of these pathways. The underpass is usually a 600mm concrete pipe, but may form part of a watercourse culvert or bridge. Badgers are guided into the underpasses by mesh fencing, which also prevents them entering directly onto the road. The lower part of the fence is buried to prevent badgers digging under the fence.

Where an underpass cannot be provided at the exact location, it should be sited as close as feasible to the existing pathways across the proposed road route, preferably following wildlife corridors, e.g. hedgerows.

There will usually be a requirement to provide more than one underpass - should there be numerous pathways intersected by the proposed road. The number and location of underpasses will need to be assessed on a site-by-site basis. The underpasses should be installed at the earliest possible stage in construction and appropriate permanent badger-resistant fencing erected to encourage the badgers to utilize them. Where feasible, permanent fencing should be erected immediately following underpass construction. In addition to the specifications outlined in Figure 1, the following guidelines should be followed in construction of an underpass:

- The exit and entrance to tunnels should be flush with badger-proof fencing and the invert set at ground level. A concrete surround will provide a solid connection to the uprights of the fence and inhibit any efforts to dig. Drainage should be adequate to prevent waterlogging at the entrances and within the underpass.
- Where stream culverts are being laid, structures greater than 1m in diameter/width should be fitted with a raised mammal ledge along one or both sides (where recommended by the wildlife experts; see *Guidelines for the Crossing of Watercourses During the Construction of National Road Schemes*, National Roads Authority, 2005). The ledge should be elevated above normal flood levels. An alternative approach to the provision of a ledge is a separate pipe culvert (600mm) set above flood level adjacent to the stream culvert. Badger-resistant fencing and landscaping measures will be required to guide animals to the culvert.
- The entrances to the underpass may be planted with appropriate hedgerow planting (e.g. holly, hawthorn and blackthorn) to encourage badger use (see *A Guide to Landscape Treatments for National Road Schemes in Ireland*, National Roads Authority, 2005). Such planting should not obscure the entrances to the underpass.

BADGER-RESISTANT FENCING

The requirements for badger-resistant fencing are specified in Figure 2. Fencing is required to prevent badgers from crossing the road at points other than at the underpasses provided. The fencing must extend to a sufficient distance from underpasses to ensure that badgers will not find easy ways around them. Underpass entrances should be recessed in the fence line, thereby guiding animals to them.

The extent of fencing proposed for a scheme should be determined by the locations at which badgers are likely to encounter it and the frequency with which they would be expected to attempt to cross the road. As badgers are found throughout most of the Irish countryside, it may often be necessary to incorporate badger-resistant fencing

along continuous lengths of the road. It is of particular importance to avoid gaps or weak points in fencing at awkward features such as undulating ground or streams as badgers may exploit such weaknesses, thus negating the effectiveness of fencing. Badger-resistant fencing should never be installed asymmetrically; it should be installed in parallel on both sides of the road and care taken to avoid any gaps, which may occur where fencing abuts other features such as hedgerows, footbridges, gates or stiles.

The constructed underpasses and badger-resistant fencing at all sites should be checked to ensure compliance with the specifications.

As badgers are found throughout most of the Irish countryside, it may often be necessary to incorporate badger-resistant fencing along continuous lengths of the road.

GUIDELINES FOR SITE WORKS IN THE VICINITY OF BADGER SETTS

The following provisions should apply to all construction works:

- Badger sett tunnel systems can extend up to c. 20m from sett entrances. Therefore, no heavy machinery should be used within 30m of badger setts (unless carried out under licence); lighter machinery (generally wheeled vehicles) should not be used within 20m of a sett entrance; light work, such as digging by hand or scrub clearance should not take place within 10m of sett entrances.
- During the breeding season (December to June inclusive), none of the above works should be undertaken within 50m of active setts nor blasting or pile driving within 150m of active setts.
- Following consultation with the NPWS and badger experts, works closer to active setts may take place during the breeding season provided appropriate mitigation measures are in place, e.g. sett screening, restricted working hours, etc.

All contractors/operators on site should be made fully aware of the procedures pertaining to each sett on site.

In order to comply with these constraints:

- All affected badger setts should be clearly marked and the extent of bounds prohibited for vehicles clearly marked by fencing and signage. Bunting is an option on a temporary basis. Hazard tape is inadequate as it is prone to deterioration and damage by wind or cattle etc.
- All contractors/operators on site should be made fully aware of the procedures pertaining to each sett on site.
- Construction activities within the vicinity of affected setts may commence once these setts have been evacuated and destroyed under licence from the NPWS. Where affected setts do not require destruction, construction works may commence once recommended alternative mitigation measures to address the badger issues have been complied with.
- In almost all circumstances, works close to badger setts may only be conducted under the supervision of a qualified expert under licence from the NPWS.

POST-CONSTRUCTION MONITORING AND MITIGATION

Depending on the type of contract, post-construction monitoring requirements should be stipulated in the Employer requirements or Maintenance requirements for the local authorities.

In order to ensure that mitigating measures are operating effectively, badger-resistant fencing needs to be properly maintained and underpasses checked periodically in the first two years to ensure that they remain clear of debris or have not become waterlogged.

Upon completion of the road construction, quarterly monitoring should be carried out to determine the success of the measures employed. Monitoring should be continued for at least one year after construction work ceases.

Any deficiencies in the measures should be reported to the relevant authority and corrected where possible. Where the site in question is outside the road land take, such monitoring can only be undertaken with the permission of the landowner.



Badger in open location. © Colin Seddon/naturepl.com

FIGURE 1: SPECIFICATIONS FOR THE CONSTRUCTION OF A BADGER UNDERPASS

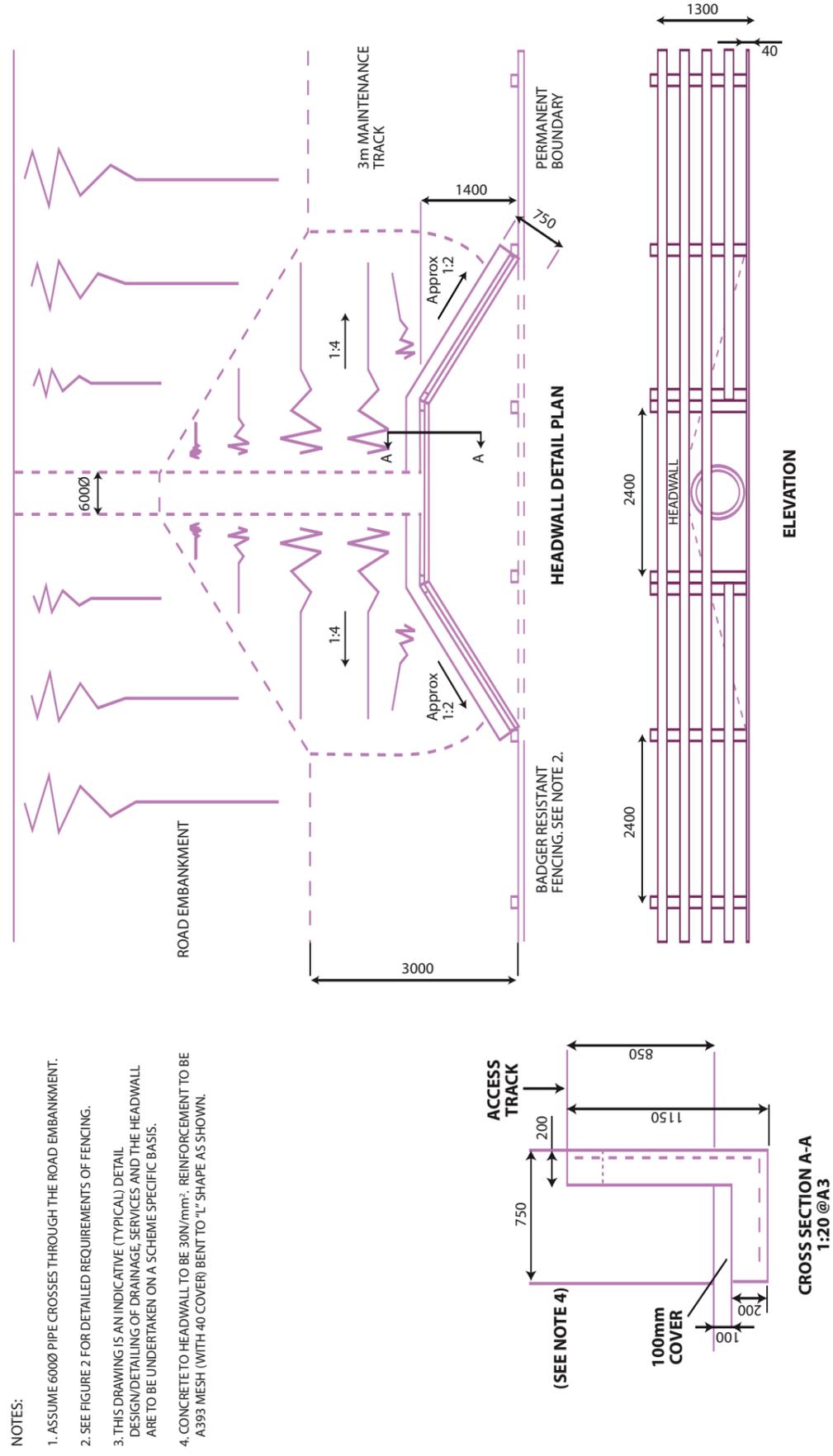
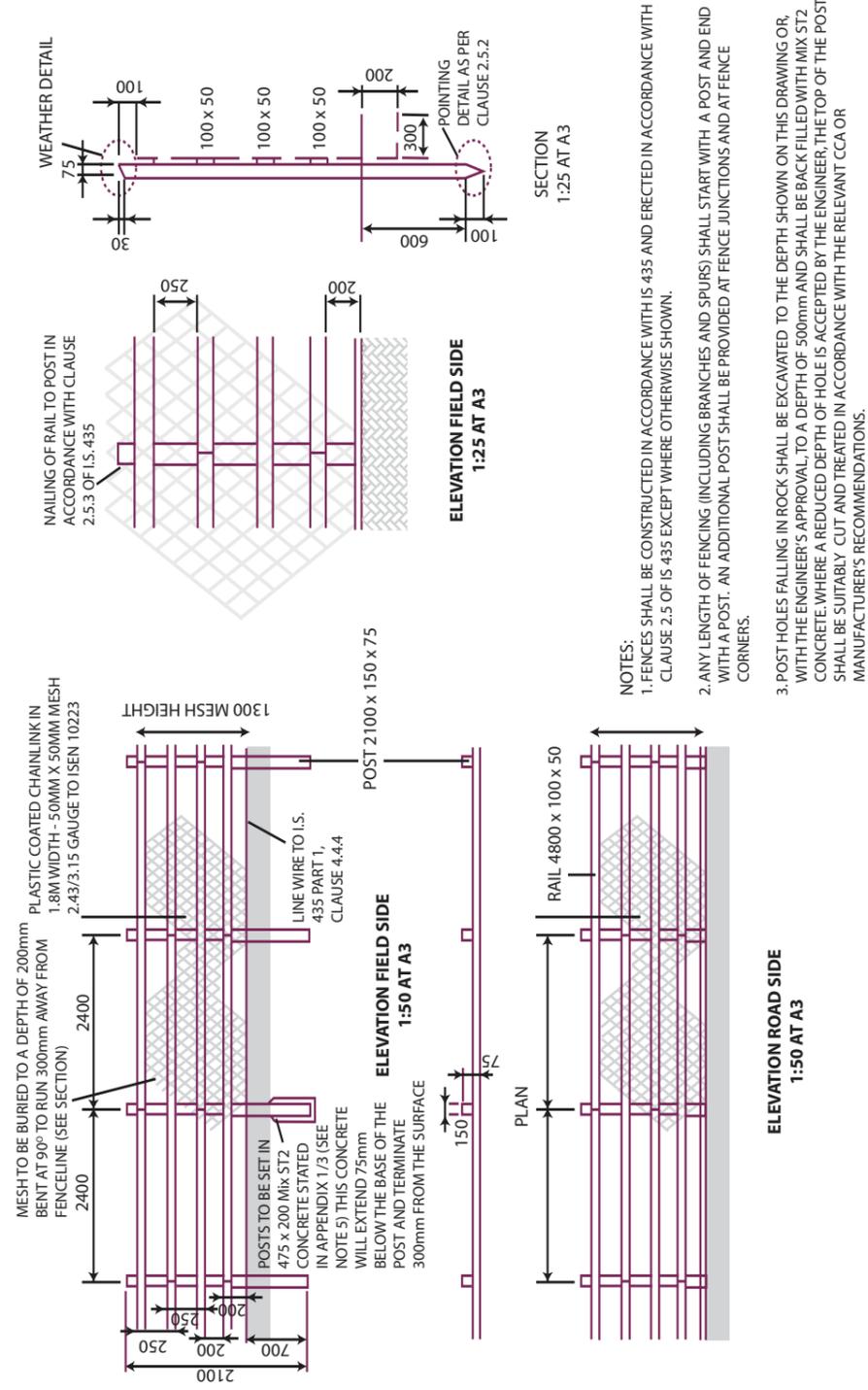


FIGURE 2: SPECIFICATIONS FOR THE DEVELOPMENT OF BADGER-RESISTANT FENCING



FIXING

1. FIX 1 LINE WIRE TO THE FIELD SIDE OF POSTS AS CLOSE TO GROUND LEVEL AS POSSIBLE.

2. SECURE CHAINLINK MESH TO THE FIELD SIDE OF RAILS WITH 4 STAPLES PER LIN. METRE ON THE TOP RAIL AND 1 STAPLE PER LIN. METRE ON THE OTHER RAILS. SECURE TO LINE WIRE WITH 2mm TYING WIRE OR WITH APPROVED GALVANISED HOG-RINGS AT 4 TIES/HOG-RING PER METRE 2mm GALV. M.S. TYING WIRE TO COMPLY WITH BS 1722 WIRE. STAPLES SHALL BE GALV. 30mm x 3.75mm ROUND.

