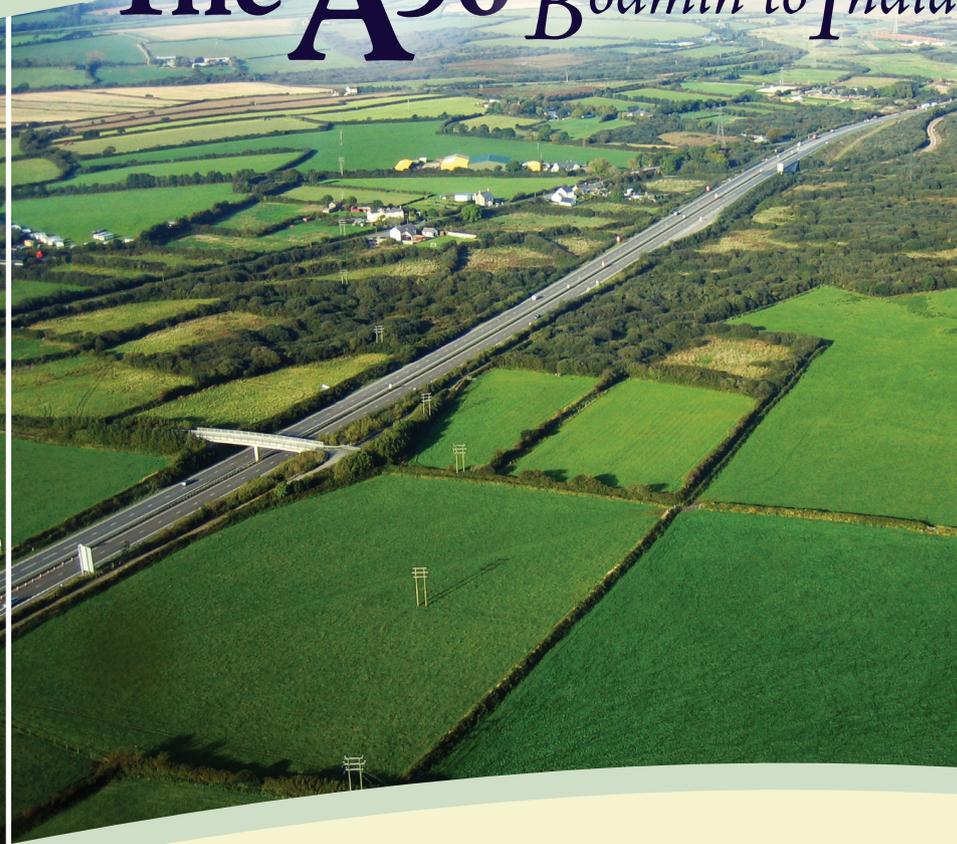
An aerial photograph of a lush green rural landscape, showing a patchwork of fields separated by stone walls and hedgerows. In the distance, a small village with a church is visible. The image is overlaid with a semi-transparent green banner at the bottom and a white curved banner on the right side. A dark green silhouette of a church with a tall spire is positioned on the right, partially overlapping the white banner. Two stylized purple flowers with dark green stems and leaves are also visible on the right side, overlapping the white banner and the church silhouette.

# *A30 Bodmin to Indian Queens Road Improvement Scheme*

**Archaeology & Ecology**

July 2007

# The A30 Bodmin to Indian Queens Road Scheme



The A30 trunk road runs the length of Cornwall, linking Penzance with Exeter in Devon. The Bodmin to Indian Queens section has formed a bottleneck on the route for many years. The road was a single carriageway and became notorious for accidents caused by the low head-room 'Iron Bridge' on Goss Moor.

In 2002 the Highways Agency appointed Alfred McAlpine and their designer Scott Wilson to design and construct the necessary road improvements. The team has now finished building 11.5km of new dual carriageway, nine bridges, 6.5km of side road, as well as extensive landscaping and environmental works. Through the lifetime of the project, Mouchel Parkman and RPS have provided Highways Agency with expert advice. The 'Early Contractor Involvement' scheme has enabled the team to adopt a strong partnering approach, dealing with archaeological and ecological matters in a positive and proactive manner.

Plans for the new road have been under consideration since the 1970s. However, the need for an improvement has grown dramatically over the last 10 years. Daily traffic has increased by 73%, leading to increased congestion and traffic delays, particularly in the holiday periods. Design work on the £93 million road scheme began in earnest in 2002. Our aim was to reduce congestion, improve reliability and road safety, while respecting the environment.

The road scheme had to be built through some important areas for wildlife, including a National Nature Reserve at Goss and Tregoss Moors, which is protected under British and European law. We have taken this as an opportunity to improve the local environment.

## *Natural England have praised the scheme ...*

*"We are proud to have worked with the Highways Agency to broker a unique solution which is truly win-win-win: delivering economic, social and environmental benefits.*

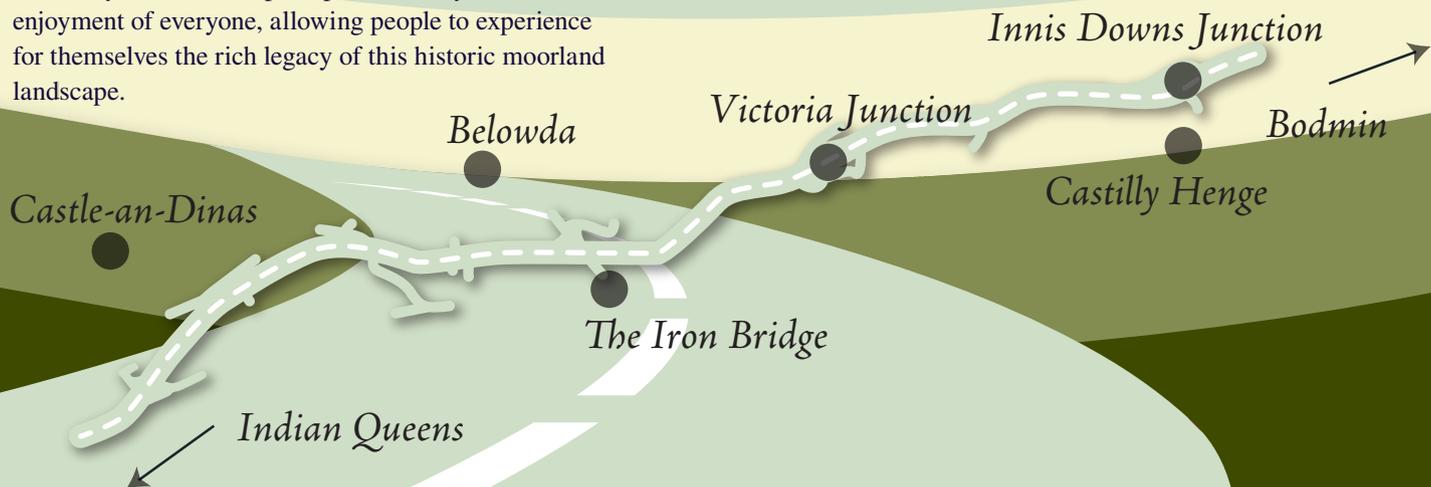
*Rare beauties like the marsh fritillary butterfly, in sharp decline with the old A30 slicing its habitat in two, will benefit directly and the area will become a peaceful oasis for walkers, cyclists and horse riders. Highways Agency investments have also attracted more money from Europe to set up the mid Cornwall Moors LIFE Project to reconnect parts of the moorland landscape once again."*

# introduction

The route considered at the Public Inquiry made it possible for us to re-create a link between Goss and Tregoss Moors, while also satisfying the needs of road users. Our aim has been to ensure the long-term survival of the plants and animals that live alongside the new route, which include rare species in danger of extinction, such as the Marsh Fritillary butterfly.

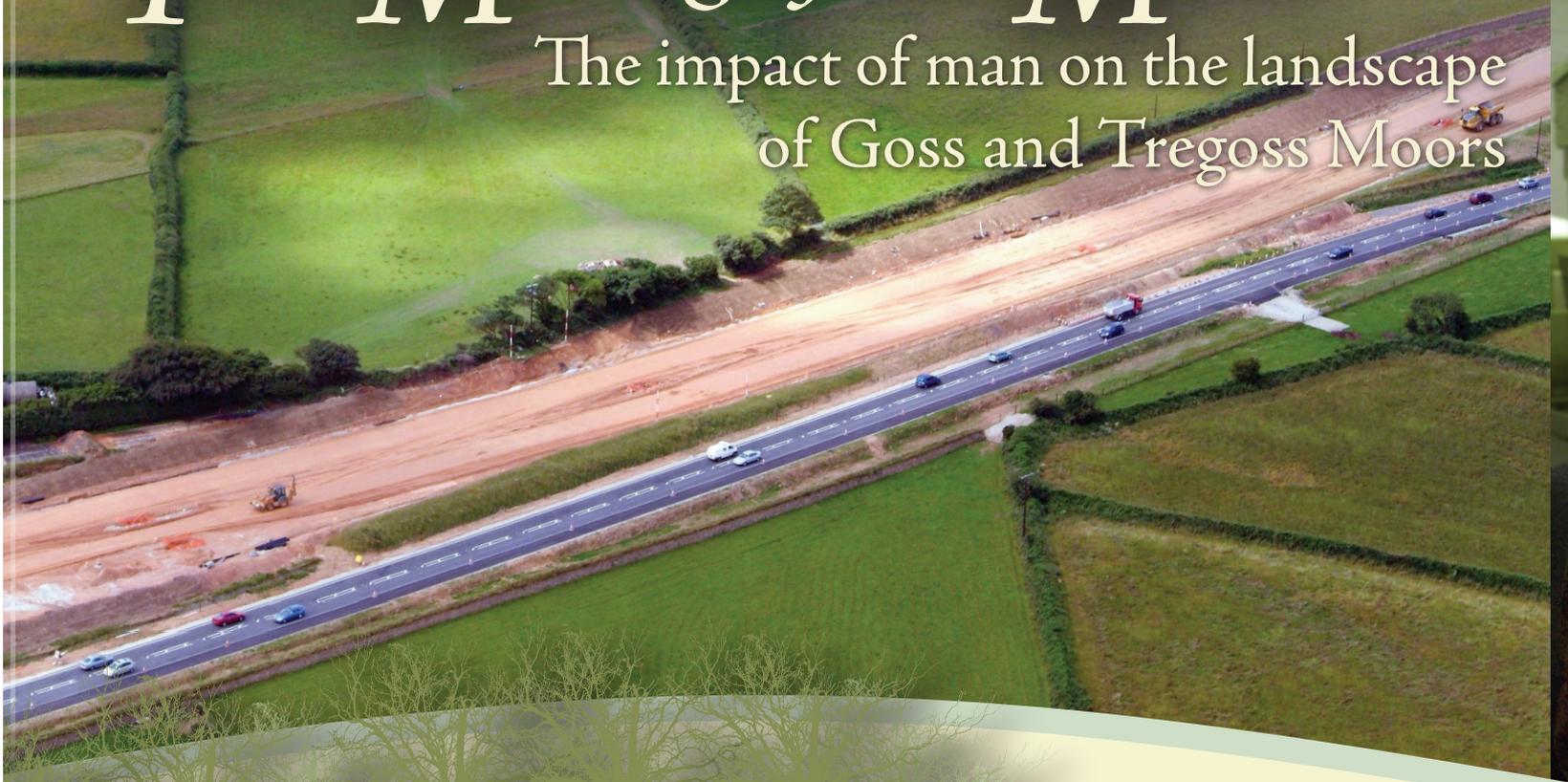
The distinctive character and ecology of the modern landscape has been shaped as much by thousands of years of human activity as by natural processes. Prehistoric earthwork monuments, fossilised medieval strip fields and the overgrown traces of old tin-workings, can all be seen alongside the road. The new road was carefully designed to avoid damaging known ancient monuments, but its construction was also an opportunity to make new discoveries. A team from Oxford Archaeology carried out large scale investigations which will help to build up a picture of human life and environmental change in Cornwall over the last 4,500 years - a venture that would not have been possible without the construction of the new road.

The old road across Goss Moor has been reduced to a bridleway, which will open up the countryside for the enjoyment of everyone, allowing people to experience for themselves the rich legacy of this historic moorland landscape.



# The Making of the Moors

The impact of man on the landscape  
of Goss and Tregoss Moors



Goss Moor today is a haven for rare moorland wildlife species, but scientific analysis of pollen preserved in waterlogged conditions in bogs and stream channels has shown that climate change and unsustainable economic activity are not new problems for the upland areas of Cornwall: As the last Ice Age ended, around 9,500 BC, sub-arctic tundra conditions gave way to woodland, which spread over much of Cornwall. Much later, about 3000 BC,

farmers began to clear the woodland to make way for agriculture. By the early Bronze Age (about 1800 BC) there were extensive settlements on Bodmin Moor and Dartmoor.

In the late Bronze Age (about 1000 BC) the climate became cooler and wetter, making the uplands less attractive for settlement. At the same time, the thin soil was eroded and exhausted as prehistoric farmers brought ever larger areas into cultivation.

These developments, and wider changes in society, led to permanent settlements on Dartmoor and Bodmin Moor being abandoned by the end of the Bronze Age. The A30 excavations suggest a similar pattern on Goss Moor and the surrounding area, although we did find evidence for short-lived or seasonal settlement in the Late Iron Age and Roman periods (about 200 BC - AD 100).

# ancient environment

Thereafter the landscape of Goss Moor became damp, open moorland which, by around AD 1300, was used as pasture, and as a source of tin ore and also peat for fuel.

The area around Belowda and Tregoss seems to have remained quite attractive for settlement, as permanent hamlets were established by the early medieval period (about AD 1000 - 1350) surrounded by isolated pockets of open arable strip fields. The pattern of these ancient strip fields was preserved when they were converted into pasture in the late medieval period (about AD 1350 - 1600). They were enclosed with Cornish hedges, which have survived to the present day, providing cover and habitats for wild animals such as dormice and adders.

Rich natural deposits of 'stream tin' on Goss Moor certainly attracted settlers to the area from the 12th century onwards, and may have done so in earlier periods, allowing people to supplement a meagre living from farming by panning or streaming for tin. During the Industrial Revolution, from the late 1700s, the extraction of surface deposits of 'stream tin' and deep mining both became big business. The tin-workings once formed dramatic scars on the landscape, but today the overgrown spoil heaps and settling ponds alongside the old A30 are ideal habitats for a wide range of plant and animal species, particularly reptiles.

In the early 1800s, large expanses of moorland were enclosed by landlords to provide small-holdings for a growing population of miners and agricultural workers. Many of these farmsteads were abandoned by the late 19th century, following the decline of the Cornish tin industry and some of the fields have returned to rough pasture.



Bracken spore



Pollen of Bog Myrtle and holly

# Circles in the Landscape

Late Neolithic and Bronze Age monuments



*Near Royalton we found a circle of post-holes, enclosed within a second ring of larger oval pits. The excavated soil from the pits may have been used to form a low bank around the outside of the monument. The entrance was on the south side.*

*Among the most exciting new discoveries are the traces of three prehistoric circular monuments, used for ritual purposes about 3000 - 1600 BC.*

This kind of grinding stone is called a saddle quern. They were mainly used for grinding corn by hand but this one is unusually narrow, and particularly well-made from very fine sandstone. We can only speculate as to its real use. Although it was by no means worn out, the quern was carefully buried in the top of a pit, with the grinding surface upwards. This was probably a ritual activity, perhaps an offering of some kind. The quern stone dates to around 1500 BC, the middle of the Bronze Age.

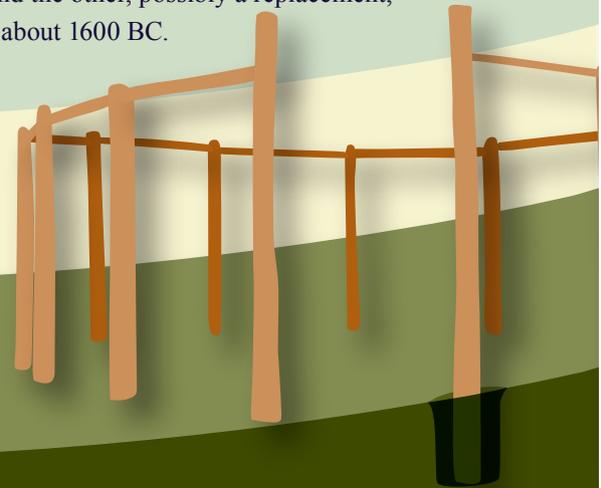
# early prehistory



Castilly Henge, near the Innis Downs roundabout, is a large oval earthwork enclosure that was probably built in the late Neolithic period. The new road junction was designed to avoid damaging the monument or its immediate surroundings. When our archaeologists stripped the topsoil in the nearest areas, no prehistoric archaeology was found, even though the henge is just across the field. The visual impact of the junction in this area has been reduced by building the road in a cutting.

The early farming communities of Britain built such monuments during the Neolithic and early Bronze Age. They vary greatly in size - Stonehenge is the most famous example. The Royalton circle is much smaller by comparison. Some were simple circular or oval enclosures, usually with one or two entrances, and an earth bank around the outside. Others, like the Royalton circle, enclose settings of timber posts or stones.

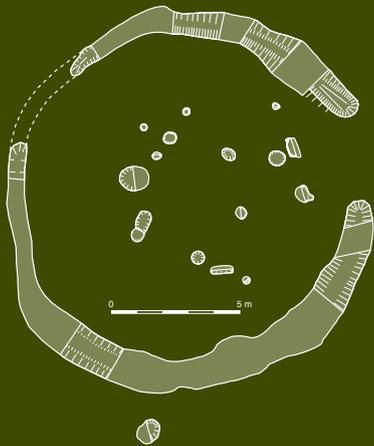
The purpose of these monuments is still a mystery, although it is generally accepted that they were used as arenas for ceremonial gatherings and rituals, including animal and (rarely) human sacrifice. Some sites also served as cemeteries for human cremation burials. Prehistoric timber circles are sometimes found on their own. Our archaeologists found two circles of pits, again for supporting upright timbers, at Belowda. We have radiocarbon dated the circles to the early Bronze Age - one was built about 1800 BC and the other, possibly a replacement, about 1600 BC.



# Roundhouses and Ramparts

Iron Age and early Romano-British settlement

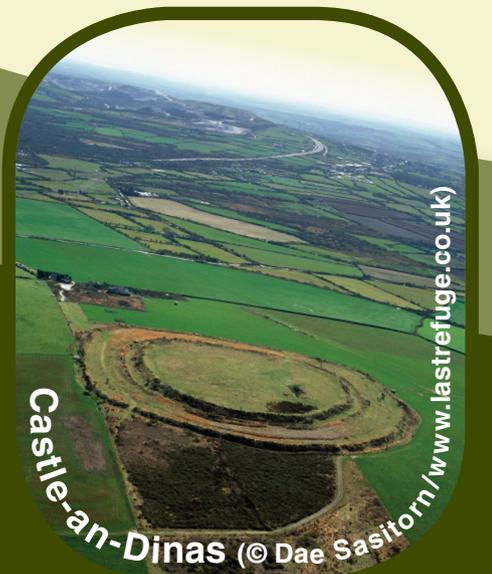
We found the remains of two roundhouses, about 800m apart, in the Belowda area. The finds from these sites, and the radiocarbon dates, show that the houses were lived in during the Late Iron Age and early Roman period (c 250 BC - AD 100). This means they were probably occupied at the same time as the nearby Castle-an-Dinas hillfort. Both roundhouses were 12 metres in diameter, and they had low dry stone walls with an east-facing doorway. The roofs would have been made of thatch. Charred fragments of heather and straw were found, both of which are suitable for thatching. Around each house was a gully to collect rain-water from the eaves.



Reconstruction of roundhouses in winter

The A30 route across Goss Moor is overlooked by the hillfort of Castle-an-Dinas. The form and scale of the fort tell us that it was probably built in the Iron Age, perhaps about 300-200 BC.

In local folklore Castle-an-Dinas hillfort is associated with tales of the mythical King Arthur; it was reputedly the place from which he rode out to hunt on Tregoss Moor.



www.lastrefuge.co.uk

Castle-an-Dinas © Dae Sasitorn

# later prehistory

Truro College Archaeology Foundation Course students worked on the Belowda roundhouses during a training dig organised by the A30 project team. The group of 12 students were taking part in a one-week training excavation hosted by our professional archaeologists from Oxford Archaeology. Finds from the excavations included pottery cooking jars and small amounts of charred grain. This suggests that the houses were lived in, at least for a short time. They may have been used as seasonal dwellings.



(© Sam Morgan Moore)

Pottery cooking jar (© Sam Morgan Moore)



Our archaeologists have studied ancient plant remains, preserved in waterlogged conditions in a stream valley to the south-east of Castle-an-Dinas, close to the Belowda roundhouses. These show that the area was a generally damp, open, moorland environment, not very attractive for agriculture. Nevertheless, as a result of the A30 excavations we can now say that the area around the hillfort was inhabited and farmed, at least on a seasonal or short-term basis, in the late Iron Age and Roman periods.



# Strip-Fields and Stream Tin

The A30 follows the main ancient east-west route into west Cornwall. It probably follows the line of a Roman road, and may even have its origins in a prehistoric track. In the 1760s the route was established as a Turnpike road, which included straightening and improving the section across Goss Moor, diverting it away from the narrow sunken lane through Belowda. An anonymous diarist described it, writing in 1795:

*“Bodmin to the Indian Queen - 11 miles of most excellent road mostly upon a level. All moorland, not a tree to be seen on this road”*

The new A30 route passes through a series of well-preserved strip fields which surround the ancient hamlets of Belowda and Tregoss. Strip fields are typical of medieval (AD 1066-1550) ‘open-field’ farming in Cornwall, but rarely survive in the county today. The hamlets of Belowda and Tregoss are first mentioned in documents dating from the 13th century AD, but they may pre-date the Norman conquest.

Tinners’ settlements on Tregoss Moor are recorded for the first time in 12th century documents, although the rich tin deposits were probably being exploited long before that. By the early 14th century many inhabitants of the area were tinners first and farmers second. A document of 1309 tells us that the parson Ralph de Arundell, one of the major landowners in the area, was forced to take refuge in the Parsonage at St. Columb from an angry mob of tinners from Ruthvoes and Trevarren, after he tried to enforce the payment of dues on tin ore.

Aerial photograph showing fossilised Medieval strip fields

# medieval and post-medieval



16th Century woodcut showing tanners prospecting

The heyday of large-scale Cornish tin extraction was between 1840 and 1860. A slump in the worldwide price of tin from the 1860s led to a collapse in the Cornish market and the mass emigration of miners from Cornwall. Deserted mining features from the most intensive phase of tin extraction can be clearly seen beside the new A30 road, including the scars of large-scale streamworks around the headwaters of the River Fal on Goss Moor, the Royalton Mine buildings, and engine houses on the slopes of Belowda Beacon and Castle-an-Dinas.

Before the industrial revolution, most Cornish tin was extracted by 'streaming' or 'panning'. This involved prospecting for tin ore, usually by digging trial pits in the gravel laid down by streams. Some tanners used dowsing to locate promising spots. Once an ore-bearing lode was discovered, the tanners excavated the deposit and used flowing water to wash away the

unwanted material, leaving the heavy pebbles of tin ore (Cassiterite) on the bottom of settling ponds. The new A30 route carefully avoided the well preserved streamworks on Goss Moor, but our archaeology team discovered three groups of prospecting pits nearby, one of which was radiocarbon dated to the medieval period.



# The Marsh Fritillary Butterfly

*As our archaeologists excavated evidence of past environments, our ecologists studied today's heathland and grassland habitats, seeking not only to minimise disturbance, but to provide positive environmental gains. Here, with examples of the species that benefited, is how we did it.*



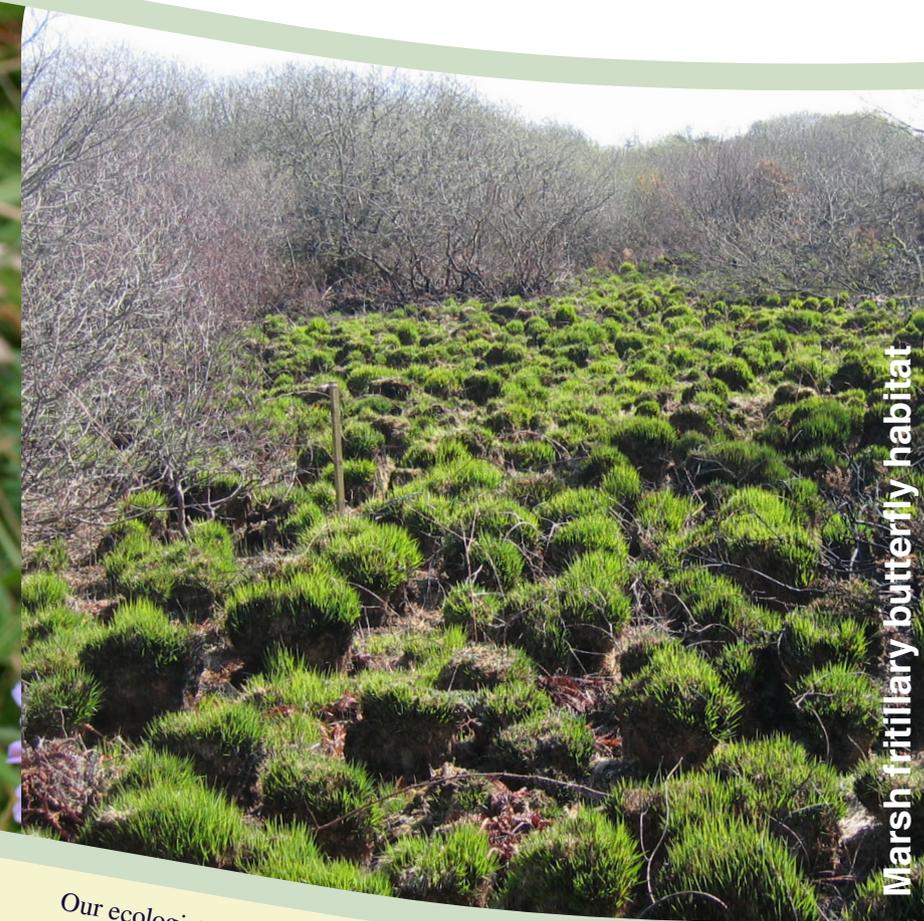
Marsh fritillary butterfly (© Adrian Spalding)

The rare marsh fritillary butterfly lives on heathland and grassland areas around the A30. We planted numerous seeds and seedlings of a plant called the devil's bit scabious, which is the only food eaten by the marsh fritillary caterpillars. They weave a web around the plant while they feed, to protect themselves from predators.

The caterpillars spend all winter in clumps of grass and emerge as butterflies in May or June. Marsh fritillaries only travel short distances, remaining in their home patch for their entire adult life. Both the heathland and grassland derive from man's past activities, particularly tree clearance and agriculture.

Devil's bit scabious

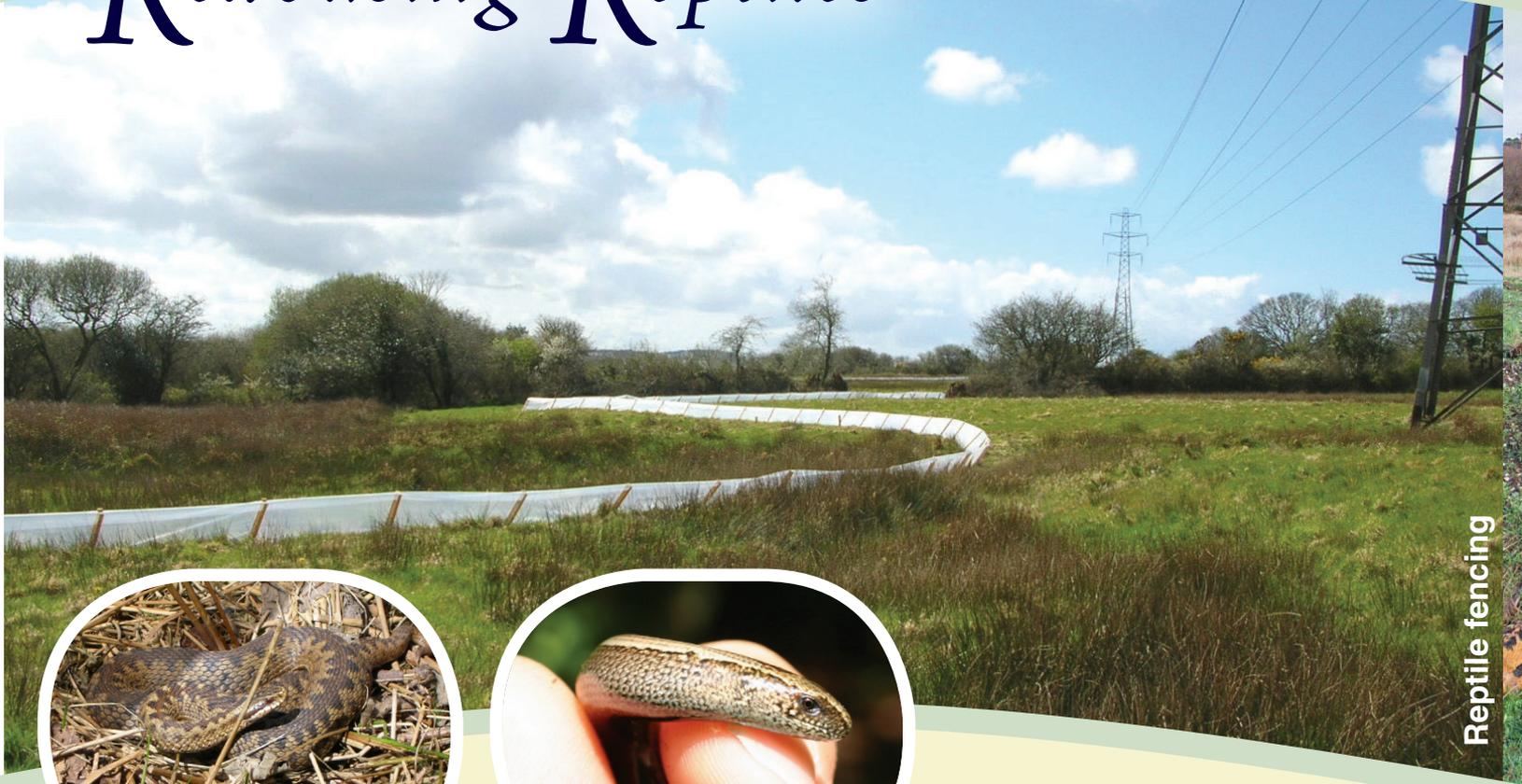
# *insects*



Our ecologists sowed wildflower and heather seeds along the sides of the new road, to create new habitats for the marsh fritillary. By downgrading the old road, we also made it possible to join two areas of Goss Moor, reuniting two habitat areas.



# Rehousing Reptiles



Reptile fencing



Adder



Slowworm



Common lizard



Grass snake

Four types of reptile were found along the A30 corridor: adder, common lizard, slowworm and grass snake. These are all protected species, and we captured and moved them carefully, by hand, to more favourable areas.

# reptiles



Reptile hibernation feature



Reptile tin

We temporarily fenced off large areas and then laid down a number of 'tins' - metal sheets. Some 2000 tins were used during the project. Reptiles like to bask and hide under these tins, making it easier for us to capture them. We created new or improved habitats using logs, stones and rocks, or by making new wildlife ponds.

# Dormice and Otters



Dormouse

Dormice live in scrub and hedgerow areas, so we searched these by hand, before using machinery to clear vegetation. This was done when the dormice were active (they hibernate in the winter) but not during the breeding season, allowing them to move to other areas away from the road building. We linked dormice habitats by planting Cornish hedges, including their favourite food plants, and we also put up some dormouse nest boxes. Our ongoing conservation work will include monitoring of the nest boxes.



Dormouse nest box

# mammals

Otter tunnel



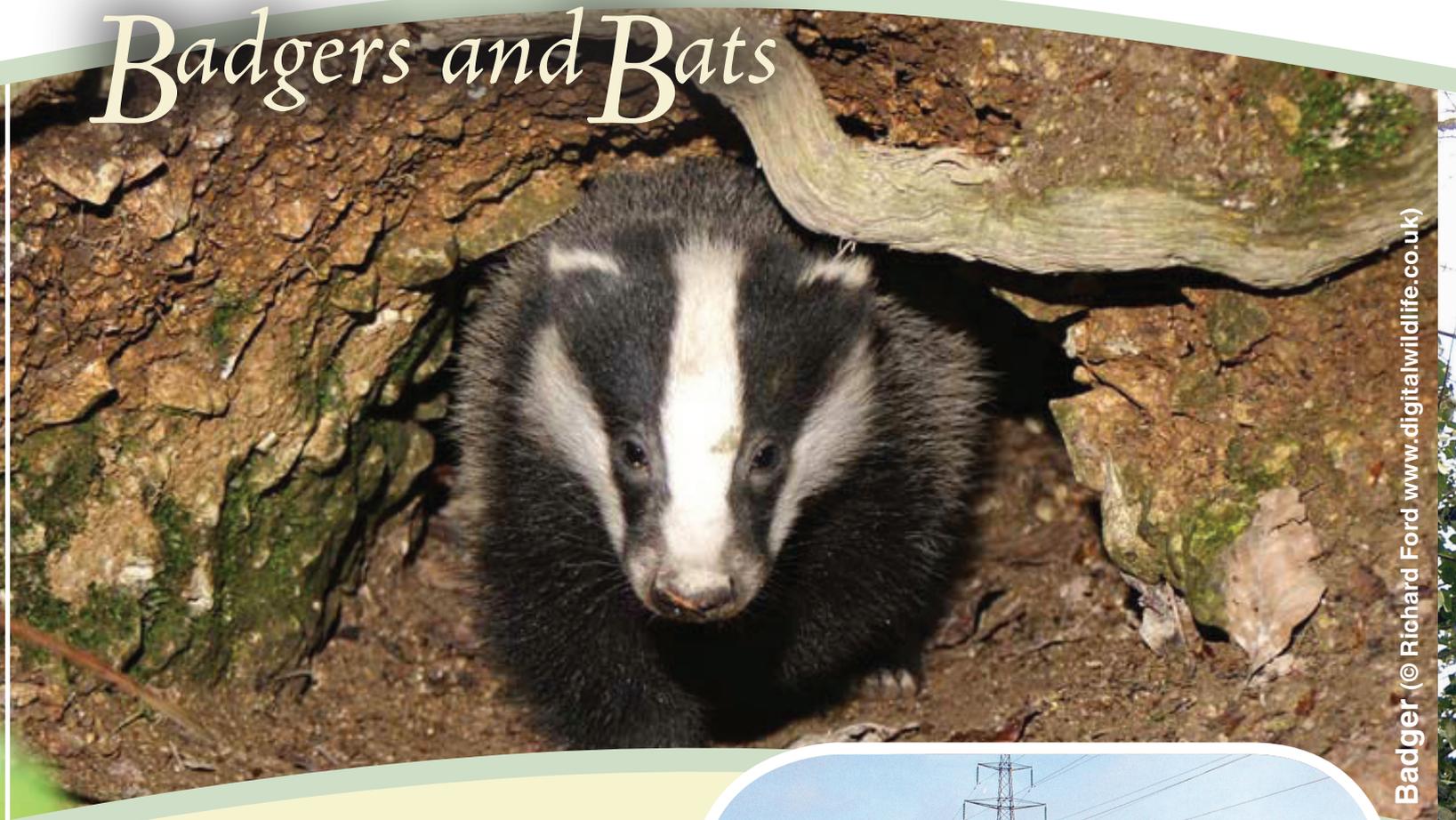
Otters



Otters regularly use the Goss and Tregoss Moors as part of their home range. A male or dog otter can occupy a territory of up to 6 kilometres and travel long distances to its feeding area, crossing roads where they cross its territory. In the past, otters have been killed on the A30. We have now built permanent otter tunnels under the new road, with fencing to keep them away from the traffic.



# Badgers and Bats



Badger (© Richard Ford [www.digitalwildlife.co.uk](http://www.digitalwildlife.co.uk))

We needed to move some badger setts away from the new road, so we fitted the setts with a gate that allowed badgers to leave but not re-enter. The badgers respond to this by exploring other nearby setts and then choosing one to settle in. The road can divide badger feeding areas, so we built special badger underpasses, combined with fencing to keep them off the dual carriageway.



Badger fencing

# mammals



Installing a bat box

Four species of bat are known to use the fields and hedgerows around the A30 - the common pipistrelle, brown long-eared bat, natterer's bat and Daubenton's (or whiskered) bat. It was important that we planted new trees and hedgerows to replace any that were removed, as these are used by bats to find their way to feeding areas. We also put bat boxes up in trees, for bats to roost in during the summer months. As part of our ongoing conservation work we will be monitoring these boxes.



Pipistrelle bats

*The A30 Bodmin to Indian Queens road improvement scheme has shown that positive conservation benefits can be achieved as part of a major road development.*

*By improving access to the west of Cornwall the road scheme has created opportunities for tourism, industry and rural communities in the South-West. At the same time, engineers, ecologists and archaeologists have worked together to safe-guard rare and protected wildlife species and ancient monuments. In doing so we have taken the opportunity to improve the environment for the benefit of wildlife conservation, cultural heritage and public enjoyment.*

