



TY NANT A5 GLYN BENDS IMPROVEMENTS

NORTH WALES

Archaeological Survey



Oxford Archaeology North

September 2007

CADW

Issue No: 2007-08/716

OAN Job No: L9788

NGR: SH 9930 4430

Document Title: TY NANT A5 GLYN BENDS IMPROVEMENTS, NORTH WALES

Document Type: Archaeological Survey Report

Client Name: CADW

Issue Number: 2007-08/716

OA Job Number: L9788

National Grid Reference: SH 9930 4430

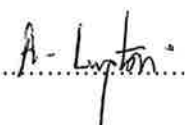
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Document File Location Projects\9788tynant\

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SUMMARY

Rick Turner, of Cadw, commissioned Oxford Archaeology North (OA North) to undertake an archaeological survey of the Ty Nant Embankment of Thomas Telford's Holyhead Road, North Wales. The Ty Nant section of Thomas Telford's road had formerly been detrunked, as a result of the construction of the Glyn Bends Bypass. However, because of the risk of collapse of the bypass cutting, this required considerable stabilisation works; as a consequence traffic was diverted back along the Ty Nant embanked section of Thomas Telford's road (centred on SH 9930 4430). Extensive scaffolding was erected along the face of the embankment to monitor any deterioration in the wall, and this enabled the implementation of a detailed survey of the wall, and has provided a mitigative record in the event of any damage to the structure.

The survey was undertaken in January 2007 and entailed a descriptive and photographic record of the embanked section of the road through the Glyn Dyffwys bends, producing a plan of the road structure, and a series of six profiles across it.

The construction of the road through the Glyn Dyffwys bends was a major challenge during the construction of the Holyhead Road, itself one of the greatest civil engineering projects to have been undertaken before the railway-building era. The road was constructed between 1815 and 1826 and was financed by Government as a result of an Act of Parliament. Telford constructed the road so as to enable the fast passage of a carriage between London and Dublin, by way of North Wales. The Welsh section was the most difficult of the whole route, and the Ty Nant section in particular requiring the construction of an enormous embankment through the Afon Ceirw gorge.

The survey revealed that the embanked section of the road survives in a fair condition, and contains several elements other than the retaining walls themselves, including two viewpoint turrets, quarries and depots, associated with the construction of the road. The majority of the parapet walling has been rebuilt, reflecting, for the most part, damage as a result of accidents and it is this element of the structure that has most evidence of damage.

Whilst detailed specifications were drawn out for each section, or Lot, within the length of the road, Ty Nant appears to have been an exceptional circumstance, and the construction differs in several subtle ways. Not only was the angle of batter of the retaining walls significantly reduced (from 16° to 10°), but the walls along the inner edge of the road were also substantially lower than that specified. These modifications appear to have been so as to maintain the greatest carriageway width possible through the narrow gorge; however, even with the alterations to the specification, the road was typically 4' (1.22m) narrower than originally intended and seen elsewhere on the route.

ACKNOWLEDGEMENTS

Oxford Archaeology North (OA North) would like to thank Rick Turner of Cadw for commissioning the project, and for assistance throughout the project. Thanks are also due to Mark Jones of Conwy County Council for arranging access to the site, and for his enthusiasm and assistance during the fieldwork.

The fieldwork was undertaken by Chris Wild and Andy Lane. The report was written by Chris Wild; and the illustrations were by Anne Stewardson and Chris Wild. Jamie Quartermaine managed the project and edited the report.

1. INTRODUCTION

1.1 CIRCUMSTANCES OF THE PROJECT

- 1.1.1 The Ty Nant section of Thomas Telford's Holyhead Road, through North Wales, had formerly been detrunked, as a result of the construction of the Glyn Bends Bypass in the 1990's (Plate 1; Fig 1). However, when instabilities in the embankment of the bypass became apparent, it was necessary to close the road and divert the traffic back along the original Ty Nant section of Telford's road (centred on SH 9930 4430), while stabilisation works were undertaken to the bypass.
- 1.1.2 Extensive scaffolding was erected along the face of the embankment to monitor for any deterioration in the wall, caused either by the re-opening of the road, or by blasting work associated with the bypass stabilisation work. This provided the opportunity for a detailed survey of the wall, which was to provide a mitigative record in the event of any damage to the structure.
- 1.1.3 At the request of, and to a verbal brief by, Rick Turner, of Cadw, Oxford Archaeology North (OA North) produced a project design for an archaeological survey of the embanked section of the road (*Appendix 1*). The work was undertaken by OA North in January 2007, and provides a mitigative record in the event of any damage to the structure.

2. METHODOLOGY

2.1 PROJECT DESIGN

2.1.1 A project design (*Appendix 1*) was submitted by OA North in response to a verbal brief by Rick Turner, of Cadw, to carry out an archaeological survey of the embanked wall, the road and a turnpike bridge over the Glyn Diffwys falls. This project design was adhered to in full, and the work was consistent with the relevant standards and procedures of the Institute of Field Archaeologists, and generally accepted best practice.

2.2 DETAILED SURVEY

- 2.2.1 **Site Plan:** it had originally been hoped that a modern, accurate survey of the historic Ty Nant section of the road would be available for enhancement as part of the present survey. However, upon investigation, it became apparent that no such plan exists and, therefore, it became necessary to create one. This was undertaken by means of a total station survey, which created an accurate ground plan showing all historic features of the road, the surrounding topography, and all modern improvements. The plan was undertaken at road level, and included the adjacent eighteenth century bridge crossing over the Afon Ceirw.
- 2.2.2 **Survey Control:** survey control was established over the site by closed traverse and internally was accurate to +/- 15mm; the control network was located onto the Ordnance Survey National Grid by locating the site to the current topography shown on the Ordnance Survey 1:10,000 base map.
- 2.2.3 **Detail Survey:** the surface features were surveyed by EDM tacheometry using a total station linked to a data logger, the accuracy of detail generation being appropriate for a 1:500 output. The digital data was transferred onto a portable computer for manipulation and later transferred to other digital or hard mediums. The archaeological detail was drawn up in the field as a dimensioned drawing on paper plots with respect to survey markers. The survey drawings were generated within a CAD system (AutoCAD 2004) and were merged with existing topographic data.
- 2.2.4 **Cross-Sections:** a series of six cross-sections were recorded across the line of the road. All sections included the embankment wall, the rock outcrops and the topography on both sides of the road; the locations of these cross-sections are shown on the main survey plan. The cross-sections were produced by means of a reflectorless total station that was set up on the scaffolding lifts / road surface, and was linked into the plan survey.
- 2.2.5 **Photographic Recording:** a photographic record of significant features, repairs and general views was generated. This included photographs of the elevations from the scaffolding, and any original features, such as drains, the two projecting turrets, and the eighteenth century turnpike bridge at the western end of the embankment. Photography was undertaken using black and white 35mm film for general record shots, as well as high resolution digital photography for archaeological detail and

features. The photographs are accompanied by a photographic index record, and the locations of the photographs have been depicted on the site plan.

- 2.2.6 ***Monument Description:*** a detailed description of the embankment and eighteenth century bridge has been compiled in conjunction with the plans, cross-sections and photographs. It records the extent, character and survival of the original fabric. The report text has been prepared in conjunction with the description of the embankment from the original Telford specifications (PRO WORK 6/89/90) allowing an assessment of the degree to which the extant fabric varies from the original proposed construction. The description also records the repairs and alterations that have been made to the road fabric.

3. BACKGROUND

3.1 BACKGROUND TO THE HOLYHEAD ROAD

- 3.1.1 The construction of the Holyhead Road developed from the passing of the Act of Union between the Irish Parliament in Dublin and the British Parliament in Westminster, which came into force on 1 January 1801 (Beckett 1966, 259). From then on, the Irish MPs and peers sat in the parliament of the United Kingdom. The need for fast and reliable communication between the two largest cities of the United Kingdom, for the transport of mail, Irish parliamentarians, and government officials became of pressing importance. The Holyhead Road was to provide this link between Ireland and the rest of Britain. The need for communications through North Wales was set within the context of the earlier road system, which was the result of turnpike trusts. These were developed around the main centres of population and their markets, while in rural areas, such as North Wales, they did not afford adequate communications. At the end of the eighteenth century, travellers in North Wales and on their way to Ireland from Holyhead faced long and often dangerous journeys despite these new turnpike roads, and had to cross the Afon Conwy and the Menai Straits by ferry (Quartermaine *et al* 2003).
- 3.1.2 In 1810, a Parliamentary Select Committee was established to inquire into the possible routes that could be improved from London to Holyhead. It was chaired by Sir Henry Parnell (1770-1842), the MP for Queen's County in Ireland. It was this committee that appointed Thomas Telford to prepare a survey and report on the line of the Holyhead Road (Telford 1838a, 228). The Parliamentary Select Committee recommended that the Government should take direct control for the financing and building of the improvements from Shrewsbury to Holyhead. This was to be achieved by buying out the interests of six turnpike trusts and two ferry operators, and putting Telford in charge of specifying, commissioning and managing the building works (Telford 1838a). In 1815 an Act of Parliament provided the powers and finance for a newly-founded Parliamentary Commission to carry out the construction of the Holyhead Road, making this the first major civilian, state-funded infrastructure scheme of modern times (55 Geo III c.152 (1815)).
- 3.1.3 Work on the road began in the autumn of 1815, and Telford made it his first priority to improve what he regarded as the worst sections of the road in Wales, particularly that from Betws-y-Coed across the Afon Conwy and along the three miles long (5 km) face of Dinas Hill to Rhydllanfair (BPP 1817 III.179). Within 11 years of the establishment of the Holyhead Road Commission, the principal engineering works in Wales were completed. The road through the pass of Nant Ffrancon, the pass of Ty Nant, the new road across Anglesey (completed in the spring of 1822), the Stanley Embankment, Chirk Bank, and the Menai Suspension Bridge [0215], were all opened by 30 January 1826. Later in that year Telford reported that 'this great length of road in north Wales continues to be maintained by the Commissioners in a perfect state, and the merits of the substantial plan on which it has been constructed become every year more apparent' (BPP 1826 XI.47), and in 1827 he reported that 'from Chirk along the Parliamentary Road to Holyhead, the surface of the road is

uniformly hard and smooth, constant attention being bestowed in maintaining it in perfect order' (BPP 1826-27 VII.81).

3.2 CONSTRUCTION OF THE TY NANT EMBANKMENT

- 3.2.1 At Ty Nant (Glyn Dyffwys), Telford was faced with a major obstacle in the form of a southerly spur of the Mwdwl-eithin hill. If he took the road over the top of the spur then he would either have to cross diagonally in order to achieve the 1:30 standard, which would take the road off the direct line, or he could follow the line of the river and the existing turnpike, thus maintaining a level gradient. While the latter would seem the preferable option, this took a route through the very steep-sided Glyn Dyffwys gorge, which provided little natural terracing or gentle incline for the construction of a road to Telford's specification. Indeed, the pre-Telford turnpike through this pass had been a source of considerable concern. This was highlighted by an accident, shortly prior to Telford's improvements, when the mail carriage overturned while rounding an acute bend and the luggage fell over the precipice into an abyss, the guard nearly following it (Telford 1838a).
- 3.2.2 Despite the difficulties, Telford chose to take his road through the pass and along the line of the earlier turnpike, which entailed the construction of a massive embankment set against the northern side of the gully in order to provide an adequate terrace. The disadvantages of this option was, in part, the considerable labour and cost involved, but also because it led to a meandering course as the road followed the sinuous line of the river valley. It is for this reason that this section was one of the few that has been bypassed in recent years as it impeded modern traffic, and widening the road presented considerable engineering difficulties. The modern solution to the engineering constraints was to blast an enormous cutting through the spur for the adjacent Glyn Bends bypass, built in the 1990s.
- 3.2.3 Telford's Road involved considerable cutting back of the cliff face on the northern side of the gully, with corresponding embankments on the south; these were typically c6m high, but up to 9m in places and, as such are the highest embankments constructed on the Holyhead Road. Despite the scale of the embanked road, the specifications (PRO WORK 6/89 and 6/90) show that this followed a standardised design, with the exception that where the road faced straight onto a vertical rock face, there was no need for a breast wall to be constructed. Revetment walls were built onto the steeply sloping valley side and, despite the apparent instability of the foundations, survive in generally good condition; the parapet wall on top, however, now incorporates concrete coping, and there are modern drains within the road.

4. SURVEY RESULTS

4.1 INTRODUCTION

- 4.1.1 The objectives of the project were to provide a representative survey of the Ty Nant section of the Holyhead Road. This entailed the production of a detailed plan, the production of cross-sections, and the creation of a photographic archive. These are linked to the detailed descriptive text, and Telford's specifications.
- 4.1.2 In total, 27 separate elements of the embanked section of the road were identified, comprising not only the embankment walls themselves, but also areas of probable quarrying, cut rock faces, and other associated features (Fig 2). The results are described below for each of these elements, along with their sub-divisions, and the overall site is discussed in the following section (*Section 5*).

4.2 EMBANKMENT WALLS

- 4.2.1 ***Embankment Wall - Introduction:*** the embankment wall, which is the most striking feature of the site, retains the south-western side of the road-bed, creating the platform for Telford's road to snake through the very steep-sided Glyn Dyffwys gorge along an even gradient. It comprises four sections (Features **01-04**) each separated by natural outcropping rock below the level of the parapet wall alongside the road.
- 4.2.2 ***Feature 01, Embankment Wall, western section:*** the western section, **01**, measures 97.75m in length, and has a retained height of up to 6.07m above ground level on its external face. The wall was built of random rubble, typically local Ordovician slate, but with occasional erratics, most commonly sandstone (Plate 2). It is roughly coursed, comprising angular laminar stones, few of which appear to have had any form of dressing. Below parapet level the wall has been battered, at an angle of approximately 10°. It is bonded with a pale-lime mortar, although with many hungry joints and large areas of subsequent repair (Fig 10). The parapet wall (Features **100-104**, **106-120**, **122**) has been almost entirely rebuilt, although three sections of original parapet (**111**, **115**, and **117**) complete with flat slate cappings, typically 0.6m long and 0.1m thick, were observed in this section of the wall. The northern end of the parapet wall (**100**) is possibly also original, and is set below a late, replacement saddlebacked concrete capping, which was used along substantial sections of the parapet, and most probably dates to the mid/late-twentieth century. Rebuilds and repairs of the parapet wall typically used larger, more rectangular and less angular blocks, often comprising higher proportions of other rock types, particularly sandstone. Although most of the repaired length of the parapet is covered with a concrete coping, several sections, presumably earlier, have edge-set topstones, which are generally flat-topped, but with two sections of irregular cappings (**104** and **107**). Two further sections of rebuilt parapet have no topstones at all (**110** and **112**), revealing the double-faced nature of the wall, with rubble and mortar core. Several areas of rebuild, particularly **104**, are the most poorly preserved aspects of the entire embankment; the facework at the junction between the original wall and the rebuilt parapet is regularly missing on the outer, southern face, with significant bulging often present in the rebuild above. Only one original drainage

aperture was observed in the southern face of the wall (**123**), which measured 0.25m wide, 0.45m high, and had a projecting drip stone, to prevent water gushing down the wall face. It is positioned approximately 1.5m below the level of the present road, at which level a later, 0.2m diameter, cast iron pipe projects slightly from the wall (**124**). It is unclear whether the original drain relates to the level of the original road surface, or was a sub-surface drain, possibly located at the base of the rubble bed, which, if the construction followed the specifications, overlies earth infill above the bedrock level. Two further later drains, **106** and **125**, were located approximately 20m and 45m to the west, both at present road surface level (Plate 3). Both had slight gullies on their northern, internal face, with cast-iron and ceramic pipes respectively projecting from the southern side of the wall. Approximately 11m from the eastern end of wall **01**, a turret (**10**) projects from the southern face of the embankment wall (Section 4.3, below). The parapet to either side (**113** and **114**) has been rebuilt, but the turret appears to have been keyed into the embankment wall at lower levels.

- 4.2.3 **Feature 02, Embankment Wall, western central section** (Figs 4 and 5): the western central section of the embankment, **02**, is the shortest, measuring only 15.75m in length. It also has the lowest retained height, up to 4.23m above ground level on its external face. It spans a short section between two large areas of natural outcropping slate, demonstrating the use of the local topography in the positioning of the route of the road. It is of similar construction and fabric to wall **01** to the west, and is heavily overgrown below road level, the parapet being entirely rebuilt, with the exception of a 4.3m length (**201**) which retains its original slate copings, one course below the present concrete saddleback capping. A further section of parapet wall, **203**, between embankment walls **02** and **03**, appears to have had the original slate topstones replaced on a later rebuild (Plate 4).
- 4.2.4 **Feature 03, Embankment Wall, eastern central section**: the eastern central section of the embankment, **03**, is slightly longer than that to the immediate west, measuring 19.60m in length. It is however, significantly deeper, having a retained height of up to 7.70m, almost double that of wall **02**. It again spans a short section between two areas of natural outcropping slate, and is of similar construction and fabric to wall **01**, with heavy ivy overgrowth at lower levels. The majority of the parapet wall has again been rebuilt, with either saddlebacked cement copings or a plain cement render capping (Plate 5). However, one section of original parapet, between walls **03** and **04**, is preserved (**306**). This represents the longest survival of original parapet, measuring approximately 11.5m in length (Fig 5).
- 4.2.5 **Feature 04, Embankment Wall, eastern section** (Figs 5 and 6): the eastern section of the embankment, **04**, is the most substantial section, measuring 130m in length, and has a maximum height of 10.84m. At its eastern end, the parapet wall continues for approximately 50m. It is of similar construction to the other sections of embankment walls, and is battered at approximately 8° along its entire external face, with areas damaged and obscured by ivy and tree root growth. The majority of the parapet has again been substantially rebuilt, with the majority having a late saddlebacked or convex concrete capping, although some original sections do remain. The projecting viewpoint turret (**23**) is similar to, but larger than that in wall **01** (**10**), and suggests that the parapet has been raised in this area by 0.61m (2ft), as the original cappings of the turret are retained within the wall at this height.

4.3 ASSOCIATED FEATURES

- 4.3.1 **Feature 05, Road Bridge across Afon Ceirw** (Fig 3): beyond the western retaining wall (01), the parapet continues along the southern side of the road, returning south, approximately 25m beyond the embankment wall, joining it to the eighteenth century turnpike road bridge across the deep Afon Ceirw gorge (Plate 6). The bridge is also of local slate construction, and is similar in coursing and bonding to the embankment walls, with a string course at road bed level on the external face (Plate 7). The road is supported on a single span of edge-set larger slates. This springs from two large natural rock outcrops, at differing height on either side of the gorge, but providing a stable base for the bridge footings. Beyond the arch at either end, the bridge splays slightly (Fig 3), and the angled bridge parapet (500) is joined to the road parapet by 0.5m x 0.5m posts, which are of similar height to the bridge parapet (Plate 8). This appears to have been entirely rebuilt, although the original slate topstones have been re-used on both sides of the bridge. Two further phases of repairs were also observed in the western parapet (501 and 502). The bridge parapet has a row of 24 wrought-iron posts along both parapets, each with a 2 x ½" profile. These are set into the top of the topstones, and secured with lead seals, and were probably contemporary with the wrought-iron post and rail fence which borders the section of the Holyhead Road to the immediate west of the bridge. Road-side retaining walls (505 and 506) butt the southern face of the bridge, continuing along the road to the south, both are of similar fabric to the parapet walls of the bridge, but are of drystone construction. The present road bed is cambered and is drained through the parapet wall on either side at the southern end of the bridge. That on the western side (504) is positioned immediately to the north of the bridge post (Fig 3), whilst that on the eastern side (508) is positioned below the northern end of the retaining wall, immediately to the south of the bridge itself.
- 4.3.2 **Feature 10, western Viewpoint Turret:** within the western retaining wall (01), a viewing turret was constructed, affording views of both the Glyn Dyffwys gorge and the bridge constructed over it (05). Positioned 11m from the eastern end of this section of the embankment wall, at the northern end of the most pronounced bend in the road, it gave the traveller the best view of the bridge (Plate 9), and the waterfall in the Glyn Dyffwys gorge below. The turret has a horse-shoe shaped plan, open on the road side, with externally battered walls, and was constructed on a natural projection of bedrock, and would also have served to buttress the embankment wall. It was built to the same height as the adjacent parapet walls, and has a single original, slightly projecting, dressed sandstone capping surviving on its southern side (Plate 10).
- 4.3.3 **Feature 23, eastern Viewpoint Turret:** the eastern viewpoint turret is similar in construction and style to that to the west (Plate 11), but is considerably taller, and the retained height of the wall is 5.35m at this location. The feature makes considerable use of the local topography, being sited on a natural outcrop of slate, which is partially incorporated within the construction of the turret, not only saving on materials, but also providing a firm foundation. This is most especially noticeable on the western face of the turret, where the almost vertically-bedded outcrop has been incorporated into the turret from 3.5m below its top (Plate 12). The turret is footed on the outcrop from around 4.9m below the parapet, but this footing has been bolstered on the southern and eastern sides by a layer of concrete, comprising a 2.1m height of concrete-filled sandbags laid around the base of the

turret and the outcropping bedrock beneath (Plate 13). At its upper level, the turret has been extended, presumably for safety reasons, increasing the parapet height by 0.5m. The original slate cappings were retained within the wall face, subsequently forming an attractive corbel band (Plate 14). The extension was constructed in a similar material, to the width of the original cappings, but has been topped with rough, pebbled concrete. Examination of the profile of the road bed in this position (Fig 8), reveals that it was not cambered, and instead sloped uniformly down towards the inside of the curve. It is probable that this represents a deviation from the original profile, with extra material added on the southern side of the road, rendering the parapet wall too low.

4.4 OTHER RETAINING WALLS

- 4.4.1 The inner side of the road through the Glyn Dyffwys bends hugs the steep-sloping hillside. In order to protect the carriageway from any slumping of the slope into which it is cut, retaining walls were constructed at the edge of the road bed. Unlike those below the road bed on the southern, downslope side, the retaining walls are of dry-stone construction, and although they only general survive to a few courses, profiles recorded across them at various locations (Figs 7-10), suggest they have little or no batter. This suggests that they were similar in construction to the general parapet walls that were constructed along the length of the Holyhead Road, comprising rough coursing of local slate rubble. Use was also made of sections of naturally outcropping rock as retaining walls, and parts of these required blasting or cutting to maintain the width of the carriage.
- 4.4.2 **Feature 06, Retaining Wall:** a relatively long section of retaining wall, 41m in length, at the western end of the Glyn Dyffwys bends (Fig 4). It comprises a fairly typical length of retaining wall, and, as with all other sections of such wall, it is almost entirely earthfast, merging into earthen banks at each end, and is heavily ivy-covered.
- 4.4.3 **Feature 07, Retaining Wall and possible depot:** a short 20m section of retaining wall, similar in construction to **06**, but with a possible depot at its eastern end. Although somewhat putative, evidence for the depot comprises a secondary retaining wall, which survives for a length of approximately 0.8m, and is positioned c0.5m to the rear of the lower retaining wall, which appears offset by approximately 1m in this position (Fig 4). Unfortunately, the area is heavily overgrown, and much of the fabric is either earthfast or missing.
- 4.4.4 **Feature 08, Retaining Wall:** two very short sections of retaining wall, 5.5m apart, and measuring 2.75 and 2.1m in length (Fig 4). It is highly probable that the area between, and to either side, represents a lesser survival of the same length of wall, which survives to only two courses in height, below c0.5m of overburden (Fig 10). The earthfast bank to the south of the extant wall face butts an area of outcropping rock face (**09**).
- 4.4.5 **Feature 11, Retaining Wall:** a section of retaining wall, 11m in length, which is almost entirely earthfast, but survives to a height of c0.5m (Fig 4). At its western end it becomes an earthfast bank, whilst at its eastern end it appears to define an entrance for quarry structure **12**.

- 4.4.6 **Feature 14, Retaining Wall:** a short section of retaining wall, 5.3m in length, to the east of Structure **12** (Fig 5). An earthfast bank that extends a further 4m to the west is probably a badly eroded continuation of the wall, and it defines the eastern edge of a c3.5m wide entrance to Structure **12**. At its eastern end the low retaining wall butts a natural rock outcrop (**15**).
- 4.4.7 **Feature 16, Retaining Wall:** a relatively well-preserved section of retaining wall, 40m in length, but which is possibly continues from both visible ends buried within earthfast banks (Fig 5). It was exposed to three courses below edge-set capping stones (Plate 15), having a maximum height of 0.7m (Fig 9). In places, particularly towards the eastern end, the wall was interrupted by tree trunks, but these appear to be later intrusions that have collapsed the wall. Several areas of collapse were observed within the exposed length of wall, forming earthfast banks, whilst the eastern end of the wall has also merged into an earthfast bank.
- 4.4.8 **Feature 17, Retaining Wall:** a relatively well-preserved short section of retaining wall, 6.2m in length, and which was most probably a continuation of wall **16** to the west (Fig 5). It comprises between three and four extant courses, but lacks the cappings observed in wall **16**. At its eastern end it butted a small outcrop of rock, 2.3m in length.
- 4.4.9 **Feature 18, Retaining Wall:** a well-preserved section of retaining wall, 33m in length, that forms a continuation of wall **17**, beyond a small outcrop of rock (Fig 5). Its preservation is better at its western end, where five courses of slate rubble were observed. There was only a single course below edge-set cappings at its eastern end (Plate 16).
- 4.4.10 **Feature 21, Retaining Wall:** this is a 10.7m section of retaining wall between two outcrops of rock (Fig 5; Plate 17). At its north-western end, the wall appears to have a northern return, forming the entrance to a possible depot (**20**), but at the south-eastern end it is obscured by vegetation and overgrowth. Although the retained face measures up to 0.8m in height (Fig 7), only the lower 0.25m comprises the wall, the rest being solid earth overburden, suggesting that the retained part of the wall may have been insufficient in this position to hold back the soil.
- 4.4.11 **Feature 24, Retaining Wall:** this is the longest section of retaining wall, extending 85m from the eastern end of the Glyn Dyffwys bends to the first of several large sections of natural rock outcrop. It is heavily overgrown with ivy, and has a larger proportion of trees applying pressure on its rear face than other sections of the wall; however, it typically survives to a height of six courses of random slate rubble, below edge-set round-headed cappings (Plate 18). At a 13.4m distance from the western end of this section of retaining wall, there is incorporated a 1.7m wide section of outcropping bedrock (Fig 6); this is recessed from the face of the wall, by up to 0.4m, and possibly served as a pedestrian refuge.

4.5 OTHER FEATURES

- 4.5.1 Several other types of feature associated with the road through the Glyn Dyffwys bends were observed during the survey. These comprise quarries and associated structures, the basal remains of a building and a further possible depot, sections of worked rock-face, parapet walling, and service features.

- 4.5.2 **Feature 09, Worked Rock Outcrop** (Fig 4): an outcrop of natural slate, approximately 70m in length, formed the retaining wall on the inner bend of the road platform around the most winding part of the Glyn Dyffwys gorge. It is up to 3.2m in height, at its exposed front face, and is covered in vegetation over the majority of its length. It is most exposed near its eastern end, forming the inner radius of the tightest bend in the road (Plate 19), where it shows some tooling evidence. This was presumably undertaken to smooth the curve of the bend as much as practicable, and so as to improve traffic safety. At its eastern end, the outcrop returns to the north, perpendicular to the road, and here also shows evidence of tooling. At this point it appears to form the rear of structure **13** (Section 4.5.4), which butts the lower part of the rock-face, and is located within the south-western corner of a quarry (**12**).
- 4.5.3 **Feature 12, Quarry**: at the eastern end of the natural rock outcrop **09**, is an amorphous-shaped area, which appears to represent the heavily overgrown and infilled remains of a quarry (Fig 4). The north-east return of the outcrop appears to represent a working face, that is up to c4m high, with a possible further face forming the north-eastern rear wall of the quarry; this latter face projects c0.5m above what appears to be slumped or dumped infill.
- 4.5.4 **Feature 13, Structure**: this feature represents the only visible extant remains of any buildings associated with the road in the Glyn Dyffwys bends, and is located in the south-western corner of possible quarry **12**, against natural rock outcrop **09**. It comprises three sections of what appear to be dry-stone rubble walling, forming an internal area of 4.0 x 2.4m (Fig 4). The south-western wall is the best preserved element (Plate 20) and is extant to a height of six courses (0.9m) at its junction with the rock-face. It is of double-faced construction, 0.7m wide, with loose rubble infill, and appears to have a return to the south-east at its southern end, where it only survived at ground level. The south-west facing, front wall, 1.6m in length, only survived for a single course above ground level; it was offset from the previous wall by 1.4m, which presumably reflects the entrance into the structure. At its eastern end the return to the rock-face was observed, and survives up to only two courses and is within an earthfast bank. The structure was possibly a shelter for both quarrymen and other workers involved in the construction of the road, or alternatively may have served as a gang master's 'office'.
- 4.5.5 **Feature 15, worked Rock Outcrop**: this is the most striking outcrop of the natural slate bedrock within this section of the road (Fig 5). It is only c13m long, but outcrops to a height of approximately 9m at its centre (Plate 15). As with the outcrop to the west (**09**), it appears to have been cut or blasted, and in this case to eliminate the need for a bend in the road.
- 4.5.6 **Feature 19, Incline**: this feature, situated at approximately one-third distance from the eastern end of the retained section of the road (Fig 5), comprises an approximately 8m wide ramp or incline from the hilltop to the north (Plate 21). Its eastern side is formed, over the lower c15m of the slope, by a fault in the natural outcropping bedrock that was possibly exploited to create an edge perpendicular to the road platform. Its western side is more indeterminate, and appears to be marked by the resumption of a more uneven ground surface, but also by a significant change in the density and type of vegetation. The feature appears to have a slightly concave profile across it, and possibly represents an area down which quarried stone was

transported to the road platform from quarry sites that would not have impinged on the structural integrity of the embanked platform.

- 4.5.7 **Feature 20, possible Depot:** an area of approximately 36m², situated on the inner face of the Glyn Dyffwys bends, comprising a roughly flat, irregular platform, approximately 4.5m deep from the edge of the road (Fig 5). Its eastern edge is defined by an apparent return in the retaining wall (21), with its back edge defined by a steep bank, presumably of earthfast rubble. The part of the feature fronting the road has no retaining wall, and forms an opening that is approximately 10m wide. Thus it appears that the platform was open to the road, and may have formed a storage area. It was not formally defined or edged by walling in the manner of the typical depot (Quartermaine et al 2003), which would suggest that it was not a depot for storing material for on-going maintenance; however, it may have served as a storage area during road construction.
- 4.5.8 **Feature 22, Worked Rock Outcrop:** a substantial crag outcrop that has been cut back to widen the road at a critical section of the gully (Plate 11). Sections of wall 21 and 24 butt against it, but for the principle curve in this section of the road it defines the internal edge of the road.
- 4.5.9 **Feature 25, Quarry:** at the eastern end of the retained section of road, on its southern side, is a quarry that was probably either used during the construction of Telford's road, or quite possibly the earlier turnpike. It comprises a U-shaped working face, approximately 20m in diameter, perched on the edge of the Glyn Dyffwys gorge, with an exposed rock-face height of c3m (Plate 22). Its association with the road is demonstrated by a trackway from the working face along the edge of the gorge to the road. This is unlikely to merely represent access to the transport network, as the total quantity of stone that could have been extracted from such a feature would only have been suitable for local use, and the abundance of other areas of outcropping rock suggest that it would have been utilised for road construction in the immediate vicinity of the quarry.
- 4.5.10 **Feature 26, wall:** a 15.7m length of parapet wall, 0.45m wide, butting the eastern end of retaining wall 24 (Fig 6). It differs from the retaining walls to the west in that it functions purely as a boundary wall, rather than as a structural element of the Glyn Dyffwys bends; as such, it marks the eastern end of the retained section of walling along the embankment. It appears to be a typical parapet wall, but is almost entirely submerged below vegetation, particularly ivy. Further investigation revealed it to be of double-faced construction, 0.45m wide, and was exposed to three courses in height above present ground level.
- 4.5.11 **Feature 27, hedge:** at the eastern end of the retaining wall of the southern side of the carriageway, the position of the return to the standard roadside boundary of the Holyhead Road is marked by a hawthorn hedge. There was no sign of collapsed walling and it is to be presumed that this was an original feature.
- 4.5.12 **Modern Services:** within the road surface, in the widest part of the carriageway on the bend opposite rock outcrop 09, was a three-piece rectangular 'Telecom' inspection cover (121) in the road surface. This evidently affords access to telecommunications cables, suggesting that services run along the internal face of the embankment wall. Whilst no other utility inspection covers were observed, it is possible that further services follow a similar route. Within the entrance to the possible depot, 20, by a further rectangular inspection cover, 409, measuring 6 x

2.5' (1.8 x 0.75m). It comprises three sections, similar to Feature **121**, but is of metal-framed concrete construction, and was unmarked; however, it probably relates to electricity cabling, which appears to have been routed around the inner side of the road through the Glyn Dyffwys gorge.

- 4.5.13 Four cast-iron circular inspection covers (**303, 403, 408, and 413**), 6" (0.15m) (Fig 5) in diameter, have been cut through the latest road surface affording access to boreholes cut into the road-bed. Each has an associated concrete-filled channel that butts the parapet wall in each instance.

5. DISCUSSION

5.1 CONDITION OF THE MONUMENT

- 5.1.1 The principle element of the survey has been to record the retaining walls of the Glyn Dyffwys bends, and this has incorporated an overview of the condition of the principle structures as part of the monument description. Conwy County Council have a programme of monitoring works for the retaining walls, and are responsible for their maintenance. A detailed Principal Inspection Report was undertaken of the major retaining walls (Features **01-04**) following the erection of the scaffold in October 2006 (North Wales Trunk Road Agency 2006).
- 5.1.2 At the time of the survey in January 2007, the majority of extant structural elements were covered, in some part, by vegetation; the most prevalent being loosely attached ivy. All but the major retaining walls (Features **01-04**) are almost entirely obscured by the ivy, which rather than damaging them, affords greater protection against the harsh conditions of cold and wet, prevalent in the area during the winter. Many of the retaining walls along the inner face of the gorge are also covered by earthfast banks, which has afforded some protection to the walls; consequently, there is no obvious evidence of recent collapse or bowing of the walls. The major walls also have significant ivy cover, almost exclusively below parapet level in walls **01** and **02**; the latter wall is the least covered overall, possibly due to its more exposed aspect.
- 5.1.3 Trees have been cut back where they protrude from the external faces of the major walls, but several relict stumps remain. This is not a significant issue in walls **01** and **03**, where only a single stump was observed, c15m from the western end of wall **01**, but is more serious a hazard to walls **02** and **04**. Although only around 20m in total length, wall **02** has six trees and several saplings growing from it, generally between 1 and 2m below the parapet head, and, with the exception of one example near the eastern end, all are located in the centre of the wall. Wall **04** has a single concentration of three stumps, between 10 and 15m from its eastern end.
- 5.1.4 Each of the walls contains areas of loose stones and hungry joints, too numerous to mention, although the condition of each wall overall is fair. Many of the voids are associated with the tree stump damage, or particularly dense areas of ivy, or with drains. Many of these do not project far enough through the wall to empty beyond the angle of batter, resulting in run-off directly down the wall face. This is not only a problem with later drains inserted at the parapet base, but also with the original drains, which only had sills projecting slightly beyond the face (Fig 7).

5.2 COMPARISON WITH THE ORIGINAL SPECIFICATION

- 5.2.1 The various elements forming the Holyhead Road were constructed to pre-determined specifications for each Lot of the road. The general specification for embanked and retained sections of the road (PRO WORK 6/89) is for the most part consistent, with the individual specifications for the Ty Nant section (Lot 13), and Lot 3 to the east (Quartermaine *et al* 2003, 32). The illustrated section from the general specification for 'sloping ground' shows a carriage width of 28' (8.53m)

between walls, but this was not practicable through the Glyn Dyffwys bends, where the gorge is particularly steep. Instead the road bed is typically 23' (7.0m) wide, with some sections slightly narrower. The retaining wall is shown as having a height of 6' (1.83m) below carriageway level, with a batter of 12" (0.3m), at an angle of approximately 17°. The parapet above the wall is shown as being 5' (1.52m) high, with a reduced batter of 7½" (0.19m) on both faces, at an angle of 12.5°. The retaining walls on the upslope side of the slope were specified to be the same as the outer parapets. At Ty Nant, however, there is a significant deviation from the specification, due no doubt in part to the exceptional nature of the structure required to deal with this extreme topography. For the majority of its length, the retained section is significantly over 6' (1.83m) in height, and was constructed to almost half the batter angle of the specification. The feasible platform that could be created upon which to build the road through the Glyn Dyffwys bends was evidently significantly narrower than elsewhere, and thus the carriageway width had to be reduced. If the retaining walls had been erected at the batter angle of the original specification, this would have further reduced the carriageway width, to what would have been an unacceptable level. The parapet wall also differs, in that the batter angle was the same as that of the retaining walls, and the inner face is vertical, most probably to maximise the carriageway width.

- 5.2.2 An interesting aspect of the specification for the retained sections (PRO WORK 6/89-90) is the engineering principle of the wall heights; a line drawn from the top of the inner retaining wall to the base of the outer retaining wall, should pass through the centre of the carriageway. This was consistent along all sections of the road, and is drawn as such onto the specification for Lot 13, which includes the Glyn Dyffwys bends embankment. This, however, proved impractical at Ty Nant, given the depth of most of the outer retaining walls. Of the six profiles recorded through the Glyn Dyffwys bends section of the road, only one follows this principle (Profile 2, Fig 8), where the inner face of the road butts a 24' (7.3m) high section of outcropping bedrock (Feature 15). Constructing walls of similar height around the inner edge of the road would not only have been a considerable and expensive undertaking, it would most probably have provided a much greater hazard than the much shorter walls present, which appear to have been constructed to a height more appropriate to the angle of the upsloping ground immediately behind them. However, the quantity of earthfast material that has built up over many sections might suggest that a slightly greater height would have been more appropriate in several places.

6. BIBLIOGRAPHY

6.1 PRIMARY SOURCES

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APPENDIX 1: PROJECT DESIGN

**OXFORD
ARCHAEOLOGY
NORTH**

November 2006

**TY NANT – A5 GLYN BENDS
NORTH WALES**

ARCHAEOLOGICAL SURVEY

Proposals

The following project design is offered in response to a request from Rick Turner, Cadw, for an archaeological survey of the Ty Nant Embankment section of Thomas Telford's Holyhead Road, North Wales.

1. INTRODUCTION

1.1 CIRCUMSTANCES OF PROJECT

1.1.1 The following project design is offered in response to a request from Rick Turner, Cadw, for an archaeological survey of the Ty Nant Embankment section of Thomas Telford's Holyhead Road, North Wales. The Ty Nant section of Thomas Telford's road was formerly detrunked, as a result of the construction of the Glyn Bends Bypass. However, there is now a risk of collapse of the bypass cutting, which is requiring considerable stabilisation works; as a consequence traffic has been diverted back along the Ty Nant embanked section. Extensive scaffolding has been erected along the face of the embankment to monitor for any deterioration in the wall, and this provides the opportunity for a detailed survey along the wall, which will provide a mitigative record in the event of any damage to the structure.

1.1.2 A programme of recording of the embankment and the adjacent eighteenth century bridge is proposed in accordance with a verbal brief by Rick Turner, Cadw.

1.2 HISTORICAL BACKGROUND

1.2.1 At Ty Nant (Glyn Dyffwys), Telford was faced with a further major obstacle in the form of a southerly spur of the Mwdwl-eithin hill. If he took the road over the top of the spur then he would either have to cross diagonally in order to achieve the 1:30 standard, which would take the road off the direct line, or he could follow the line of the river and the existing turnpike, thus maintaining a level gradient. While the latter would seem the preferable option, this took a route through the very steep-sided Glyn Dyffwys gorge, which provided little natural terracing or gentle incline for the construction of a road to Telford's specification. Indeed, the pre-Telford turnpike through this pass had been a source of considerable concern. This was highlighted by an accident, shortly prior to Telford's improvements, when the mail carriage overturned while rounding an acute bend and the luggage fell over the precipice into an abyss, the guard nearly following it.

1.2.2 Despite the difficulties he faced, Telford chose to take his road through the pass and along the line of the earlier turnpike, which entailed the construction of a massive embankment set against the northern side of the gully in order to provide an adequate terrace. The disadvantages of this option was, in part, the considerable labour and cost involved, but also because it led to a meandering course as the road followed the sinuous line of the river valley. It is for this reason that this section was one of the few that has been bypassed in recent years as it impeded modern traffic, and widening the road presented considerable engineering difficulties. The modern solution to the engineering constraints was to blast an enormous cutting through the spur for the adjacent Glyn Bends bypass, built in the 1990's.

1.2.3 Telford's Road involved considerable cutting back of the cliff face on the northern side of the gully, with corresponding embankments on the south; these were typically c6m high, but up to 9m in places and, as such are the highest embankments constructed on the Holyhead Road. Despite the scale of the embanked road, the specifications (PRO WORK 6/89 and 6/90) show that this followed a standardised design, with the exception that where the road faced straight onto a vertical rock face, there was no need for a breast wall to be constructed. Revetment walls were built onto the steeply sloping valley side and, despite the apparent instability of the foundations, survive in generally good condition; the parapet wall on top, however, now incorporates concrete coping, and there are modern drains within the road.

1.3 OXFORD ARCHAEOLOGY NORTH (OA NORTH)

1.3.1 Oxford Archaeology North (OA North) has considerable experience of the survey and excavation of sites of all periods, having undertaken a great number of small and large scale projects during the past 19 years. One of its particular specialisms is in the sphere of landscape recording and assessment. OA North has the professional expertise and resource to undertake the project detailed below to a high level of quality and efficiency. OA North is registered with the Institute of Field Archaeologists, and its members of staff adhere to the IFA Code of Conduct.

1.3.2 Since 1982 OA North has been undertaking extensive upland landscape surveys throughout Northern England which include the Lake District National Park Survey, the Torver Common surveys (Lake District), Haweswater and Thirlmere estate surveys (Lake District), that of Lyme

Park (Peak District), the whole of the Arnside / Silverdale AONB, much of the Forest of Bowland AONB and a multitude of smaller landscape projects. OAN can therefore claim to be one of the foremost specialists in the field of upland landscape recording. OA North has undertaken numerous excavations and surveys of sections of Roman Roads from around the region, and includes the probable Roman timber constructed ford crossing of the Lune. In particular OA North undertook a survey of Telford's Holyhead Road, the results of which have been the subject of a recent publication (Quartermaine *et al* 2003).

2. OBJECTIVES

- 2.1 The objectives of the programme are to provide a representative survey of the Ty Nant section of the Holyhead Road. This will entail the production of a detailed plan, the production of cross sections, and the creation of a photographic archive. Detailed descriptions of the embankment and will be linked to the cross sections, plan and the Telford specifications. In addition it is required that the survey also record an adjacent eighteenth century bridge (Site 818) that crosses the Afon Ceirw just west of the embankment.

3. METHODS STATEMENT

- 3.1 The following work programme is submitted in line with the stages and objectives of the archaeological work summarised above.

3.2 PLAN SURVEY

- 3.2.1 To the best of our knowledge there is no accurate survey of this section of the road; however, it will be necessary to create one. It is proposed to use a combination of GPS and total station survey in order to create an accurate ground plan, which will show all historic features of the road, the surrounding topography, and all modern improvements. It will show areas of repair to the historic fabric as well as areas of erosion. The survey will record spot heights along the length of the road.
- 3.2.2 **Survey Control:** survey control will be established over the site by closed traverse and internally will be accurate to +/- 15mm. It is proposed that the control network be located onto the Ordnance Survey National Grid by the use of Differential Global Positioning Survey (GPS), which will locate to an accuracy of +/- 0.05m.
- 3.2.3 **Detail Survey:** where possible the survey will be undertaken using the differential GPS, which can achieve accuracies of +/- 0.05m, but in some instances the adjacent crags and tree will restrict satellite visibility, and therefore in some areas the survey will be completed by means of reflectorless total station. In addition because of the traffic using the road, it may be safer to use the reflectorless total station to capture data rather than using a GPS in the carriageway. The data from both techniques will be combined in CAD and paper plots will be produced for completion by hand survey. The final drawings will be generated within a CAD system and can be output at any scale, and can also be provided in digital format for incorporation within a GIS system. This stage of the survey will involve a detailed assessment of the site and its general context and will be undertaken by an experienced landscape archaeologist.
- 3.2.4 It is also required that the survey record the eighteenth century bridge crossing over the Afon Ceirw (Site 818), and this will be incorporated within the plan survey.

3.3 CROSS SECTIONS

- 3.3.1 A series of cross sections will be surveyed across the road and will include the embankment, as well as the outcrop and topography on both sides of the road; the locations of these cross sections will be recorded on the main survey plan. They will be recorded by means of a reflectorless total station that will be set up on the scaffolding lifts, and on the road surface. Raw data provided by the instrument will be plotted up and drawn in the field. Given that the Telford specifications incorporate cross sections through the Ty Nant section of road, this will provide the opportunity to test the accuracy of the Telfordian cross sections.
- 3.3.2 Initially it is proposed to record six cross sections, but if more are required then they can be added as appropriate.

3.4 PHOTOGRAPHIC RECORDING

3.4.1 In conjunction with the archaeological survey a photographic archive will be generated, which will record significant features, repairs and general landscape views. It will include photographs of the elevations from the scaffolding, and will include any original features such as drains. The photography will include the eighteenth century bridge at the western end of the embankment. Photography will be undertaken using black and white film for general record shots as well as digital photography for archaeological detail and features. The photographs will be accompanied by a photographic index record, and the locations of the photographs will be depicted on the site plan.

3.5 RECTIFIED PHOTOGRAPHIC ELEVATION RECORDING (OPTIONAL)

3.5.1 It is not feasible to produce a comprehensive rectified photographic record of the retaining wall because it is not possible to get far enough away from the wall. However, as an option, it is proposed to produce a rectified photographic record of a 5m width section of the wall. The section of wall to be recorded will be selected to ensure that it a large amount of original masonry, and will incorporate significant detail such as a drain outfall. The wall is extensively covered in ivy, and it is proposed to cut back the ivy to the wall with shears across the extent of the proposed section. This survey would be undertaken by taking semi-rectified photographs using a digital camera, in conjunction with an instrument survey to provide control points. The photographs will then be digitally rectified using Archis software and the raster images will be combined within AutoCAD. The masonry will then be digitised to produce a sample section up the wall.

3.6 MONUMENT DESCRIPTION

3.6.1 A detailed description of the embankment and eighteenth century bridge will be compiled in conjunction with the plans, cross sections and photographs. It will record the extent, character and survival of the original fabric; this will be prepared in conjunction with the description of the embankment from the original Telford specifications allowing an assessment of how much of the extant fabric derives from the original construction. It will describe the repairs and alterations that have been made to the road fabric.

3.7 REPORT

3.7.1 **Archive:** the results of Stages 3.1-5 will form the basis of a full archive to professional standards, in accordance with current English Heritage guidelines (*Management of Archaeological Projects, 2nd edition, 1991*). The project archive represents the collation and indexing of all the data and material gathered during the course of the project. It will include summary processing and analysis of any features and finds recovered during fieldwork.

3.7.2 **Report:** bound copies of a written summary report will be submitted to the Cadw, the National Monuments Record, the Clwyd Powys Sites and Monuments Record and the Highways Department. The report will include a copy of this project design, and indications of any agreed departure from that design. It will present, summarise, and interpret the results of the programme detailed above and will include a full index of archaeological features identified in the course of the project, together with appropriate illustrations, including a map of known or suspected sites identified within or immediately adjacent to the study area. It will also include a complete bibliography of sources from which the data has been derived, and a list of further sources identified during the programme of work, but not examined in detail.

3.7.3 This report will examine the significance of the monument within a national and regional context. It will specifically present the evidence for the survival of the Telfordian fabric and will assess the extent of subsequent repairs. Illustrative material will include a location map, survey plans, cross sections and photographs.

3.7.4 **Confidentiality:** the report is designed as a document for the specific use of the client, for the particular purpose as defined in the project brief and this project design, and should be treated as such; it is not suitable for publication as an academic report, or otherwise, without amendment or revision. Any requirement to revise or reorder the material for submission or presentation to third parties beyond the project brief and project design, or for any other explicit purpose, can be fulfilled, but will require separate discussion and funding.

3.8 OTHER MATTERS

- 3.8.1 **Access:** liaison for basic site access will be undertaken through the Highways Department.
- 3.8.2 **Health and Safety:** full regard will, of course, be given to all constraints (services etc) during the excavation of the trenches, as well as to all Health and Safety considerations. OA North provides a Health and Safety Statement for all projects and maintains a Unit Safety policy. All site procedures are in accordance with the guidance set out in the Health and Safety Manual compiled by the Standing Conference of Archaeological Unit Managers (1991) and risk assessments are implemented for all projects. The embankment is at the edge of a very steep and dangerous gorge. Unless, a safe working practice can be established, the survey will not be undertaken from the sides of this gorge. Instead all recording will be undertaken from the relative security of the scaffolding. Similarly the photographic recording of the bridge will be undertaken only from safe locations within the sheer sided gully.
- 3.8.3 **Insurance:** the insurance in respect of claims for personal injury to or the death of any person under a contract of service with the unit and arising out of an in the course of such person's employment shall comply with the employers' liability (Compulsory Insurance) Act 1969 and any statutory orders made there under. For all other claims to cover the liability of OA North, in respect of personal injury or damage to property by negligence of OA North or any of its employees, there applies the insurance cover of £ 10m for any one occurrence or series of occurrences arising out of one event.

4. WORK TIMETABLE

The phases of work will comprise:

- 4.1 **Plan, Descriptions and Photographic Survey**
A one week period is required for the topographic survey
- 4.2 **Cross section Recording**
A four day period is required to undertake the cross section recording
- 4.3 **Sample Elevation Recording**
One day period is required to undertake the recording of the sample elevation
- 4.3 **Prepare Survey Report**
An eight day period would be required to complete this element.
- 4.4 OA North can execute projects at very short notice once an agreement has been signed with the client.

4.5 STAFF

- 4.5.1 The project will be under the management of **Jamie Quartermaine BA DipSurv** (OA North Project Manager) to whom all correspondence should be addressed. He will supervise the survey and will monitor the progress of the project ensuring adherence to all agreed programmes and timetables. He will also provide technical back-up, advice, and will have editorial control over the compilation of the full report. He has many years experience of surveying upland landscapes, particularly in the Lake District and Yorkshire Dales National Parks.

ILLUSTRATIONS

FIGURES

- Fig 1: Site Location
- Fig 2: Ty Nant: Extent of survey showing figure locations
- Fig 3: Detail of Bridge 05
- Fig 4: Western section of embanked road showing the locations of Profiles 5 and 6
- Fig 5: Central section of embanked road showing the locations of Profiles 2 to 4
- Fig 6: Eastern section of embanked road showing the locations of Profile 1
- Fig 7: Profiles 1 and 3
- Fig 8: Profile 2
- Fig 9: Profiles 4 and 5
- Fig 10: Profile 6

PLATES

- Plate 1: The Glyn Bends Bypass before stabilisation works
- Plate 2: The random rubble build of the embankment wall (Section Site **01**)
- Plate 3: An example of a drain aperture (Site **01**)
- Plate 4: The original slate topstones have been replaced on a later rebuild of the parapet (Site **02**)
- Plate 5: Section **03** of the embankment wall showing the concrete copings on the rebuilt parapet wall
- Plate 6: The steep-sided, deep tree-covered Afon Ceirw gorge looking in the direction of the waterfall
- Plate 7: The eighteenth century turnpike bridge across the Afon Ceirw looking south-east (Site **05**)
- Plate 8: The top of the turnpike (Bridge Site **05**), looking south
- Plate 9: Western viewpoint turret (Site **10**) looking north
- Plate 10: The horse-shoe shape of the western view-point turret (Site **10**) with the original coping stone to the south
- Plate 11: Turret Site 23, opposite the worked rock outcrop (Site **22**), looking west
- Plate 12: Turret 23 viewed from the east
- Plate 13: Turret 23 bolstered on the southern and eastern sides by a 2.1m height of concrete-filled sandbags laid around the base of the turret
- Plate 14: Viewing Turret **23**, looking south-west
- Plate 15: Retaining Wall **16**, set against a section of worked outcrop

- Plate 16: The well-preserved section of retaining wall - Site 18, separated from Wall **17** by a small crag
- Plate 17: A short section of retaining wall (Site **21**) at the base of a small quarry (Site **20**)
- Plate 18: The longest section of retaining wall (Site **24**) at the eastern end of the embanked road section
- Plate 19: A large section of worked outcrop (Site **09**) at the western section of the embanked road
- Plate 20: Decayed dry-stone structure (Site **13**), set within a quarry (Site **12**)
- Plate 21: Substantial inclined plane extending down from the top of hill-side, and possibly allowed the movement of quarried materials (Site **19**)
- Plate 22: A small quarry set at a remote distance from the eastern end of the embanked section, but which probably provided stone for the embankment (Site **25**)

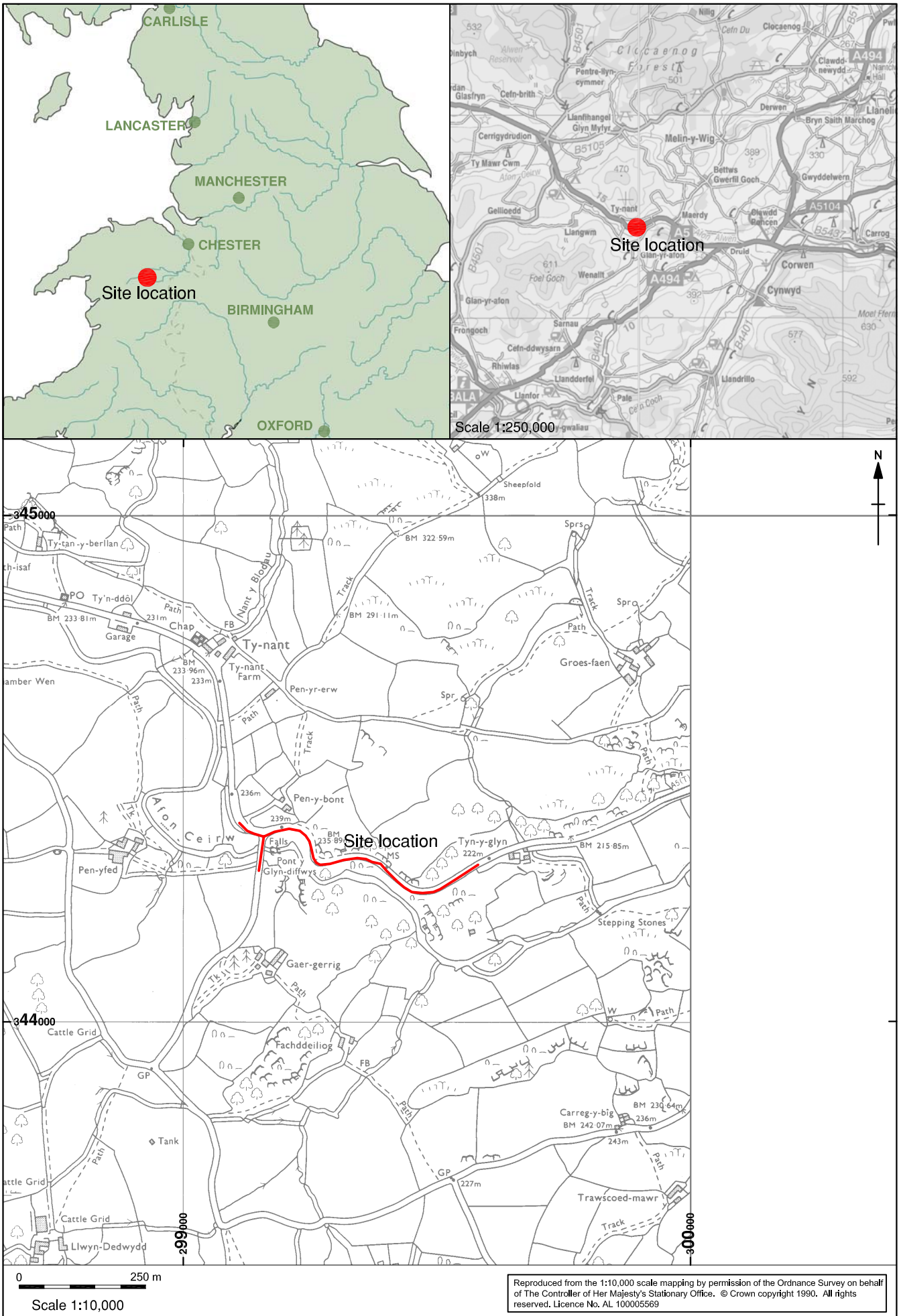


Figure 1: Site location

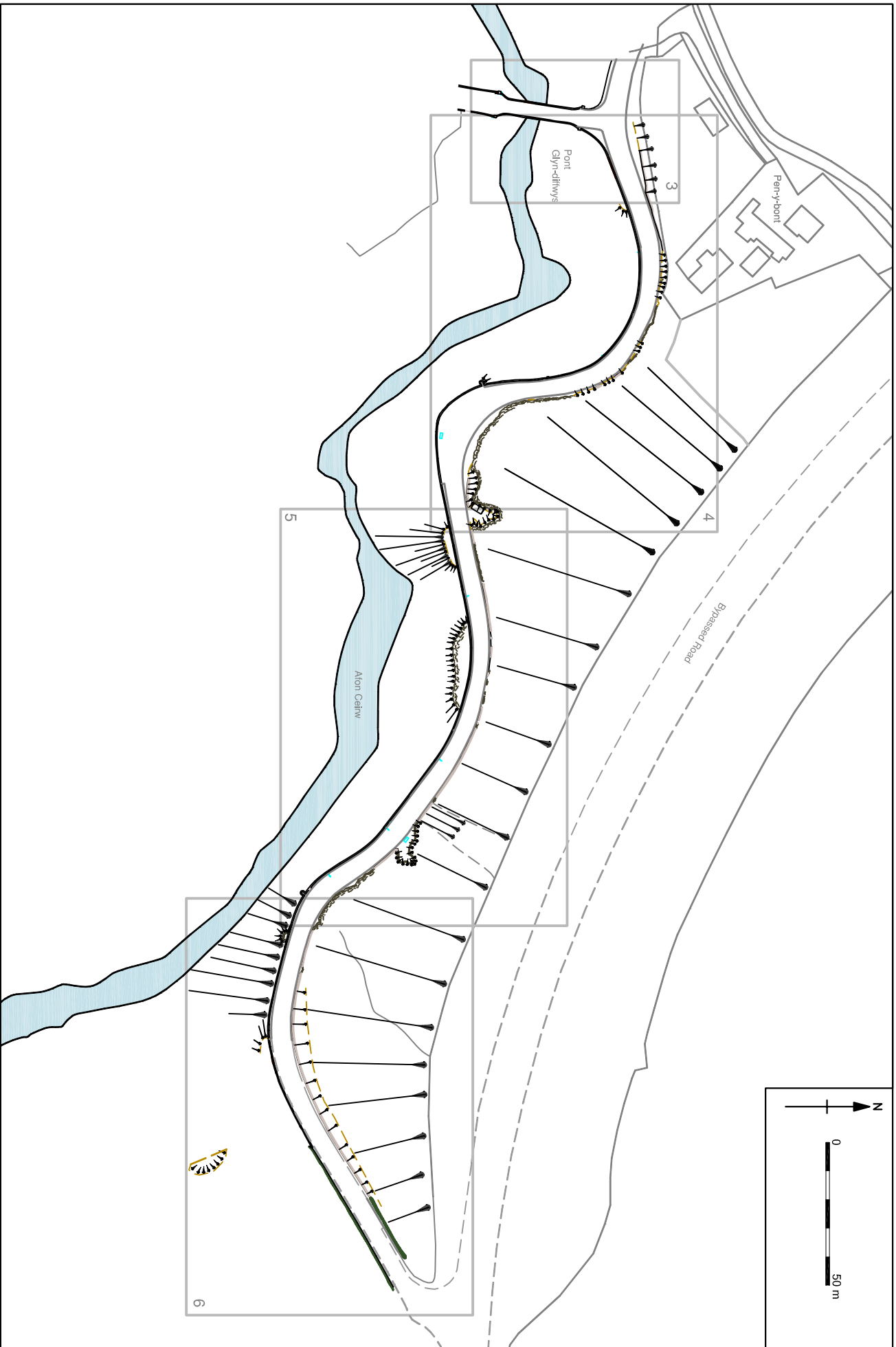


Figure 2: Ty Nant; extent of survey showing figure location

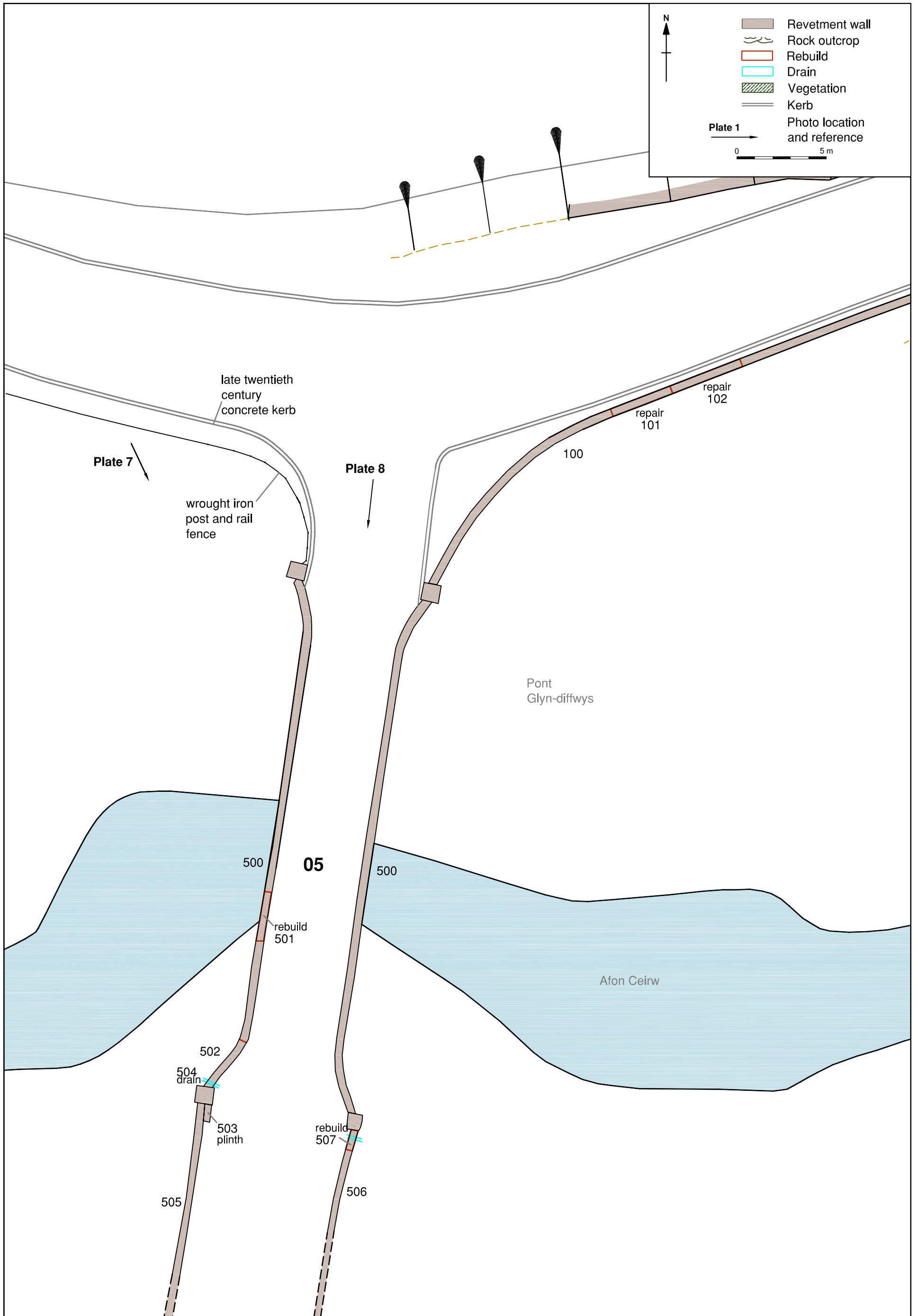


Figure 3: Detail of bridge 05

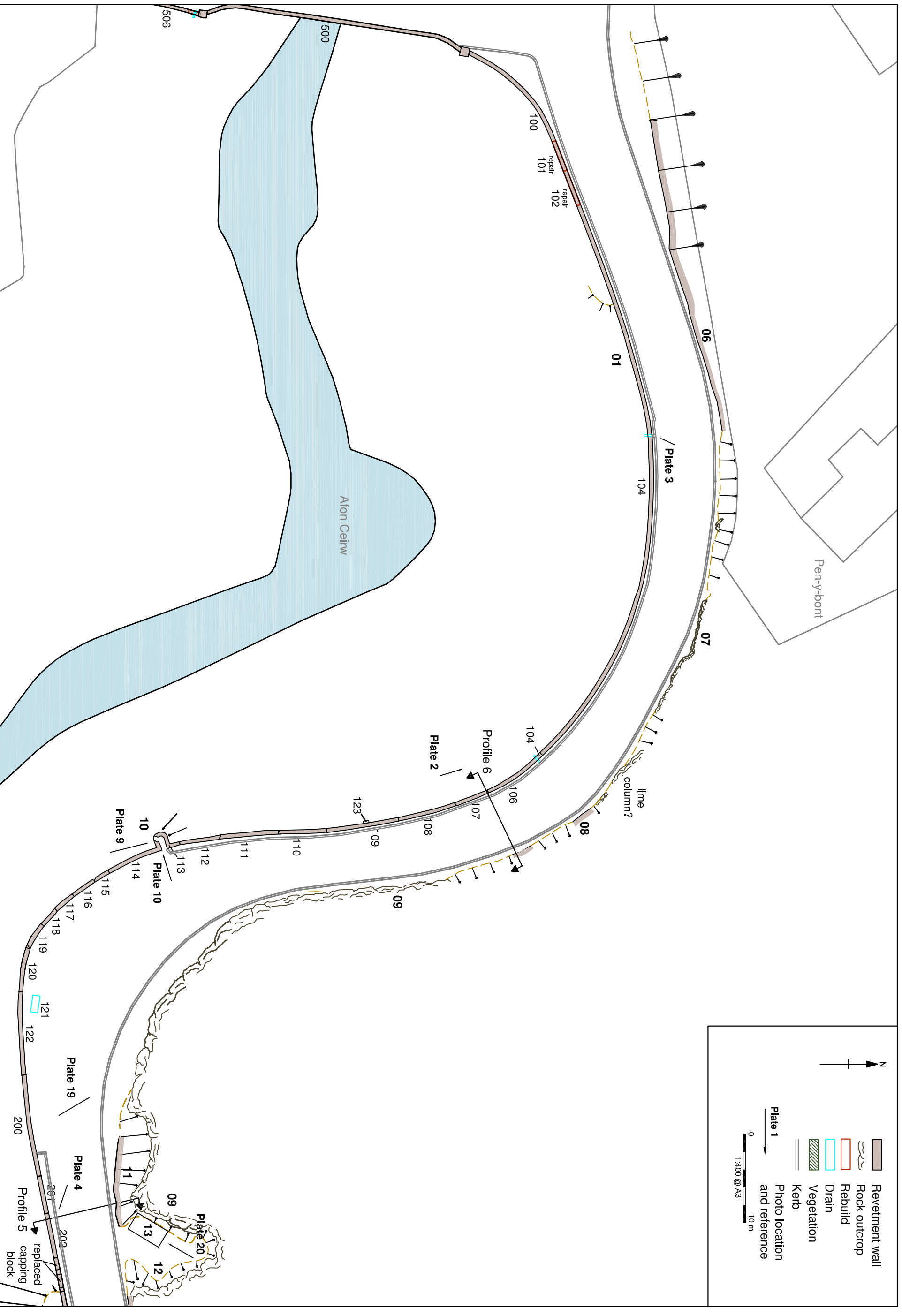


Figure 4: Western section of embanked road showing the location of Profiles 5 and 6

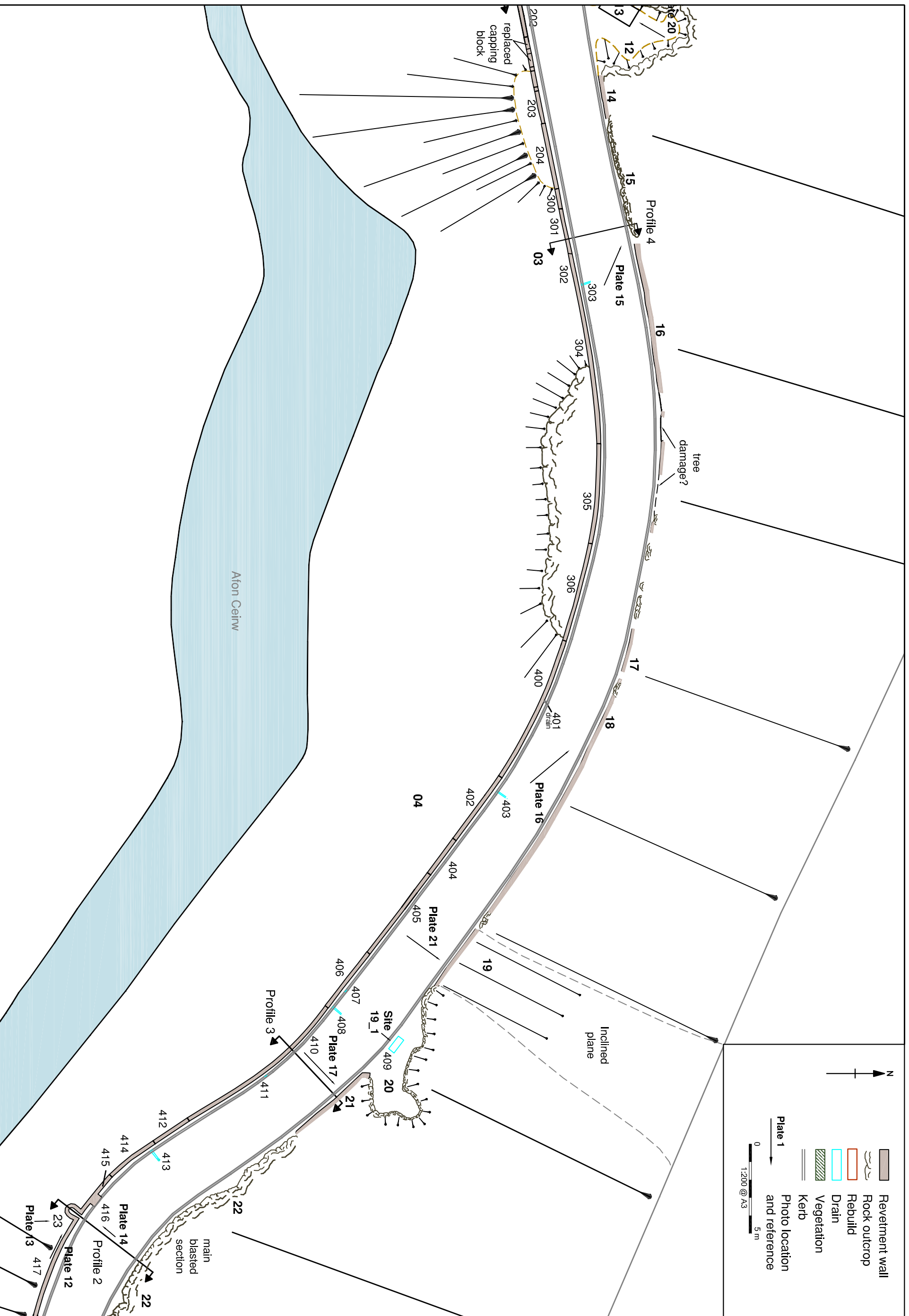


Figure 5: Central section of embanked road showing the location of Profiles 2 to 4



Figure 6: Eastern section of embanked road showing the location of Profile 1

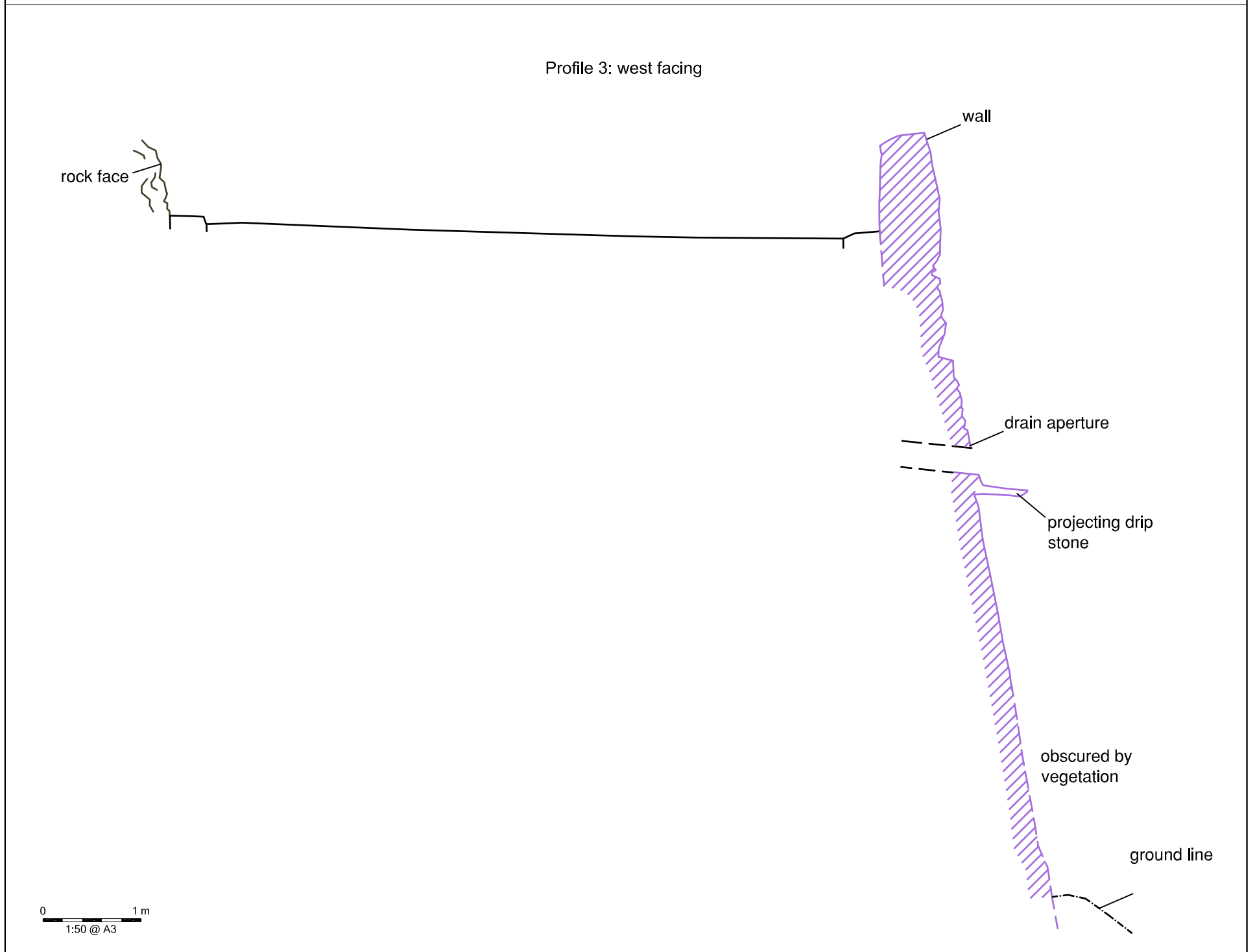
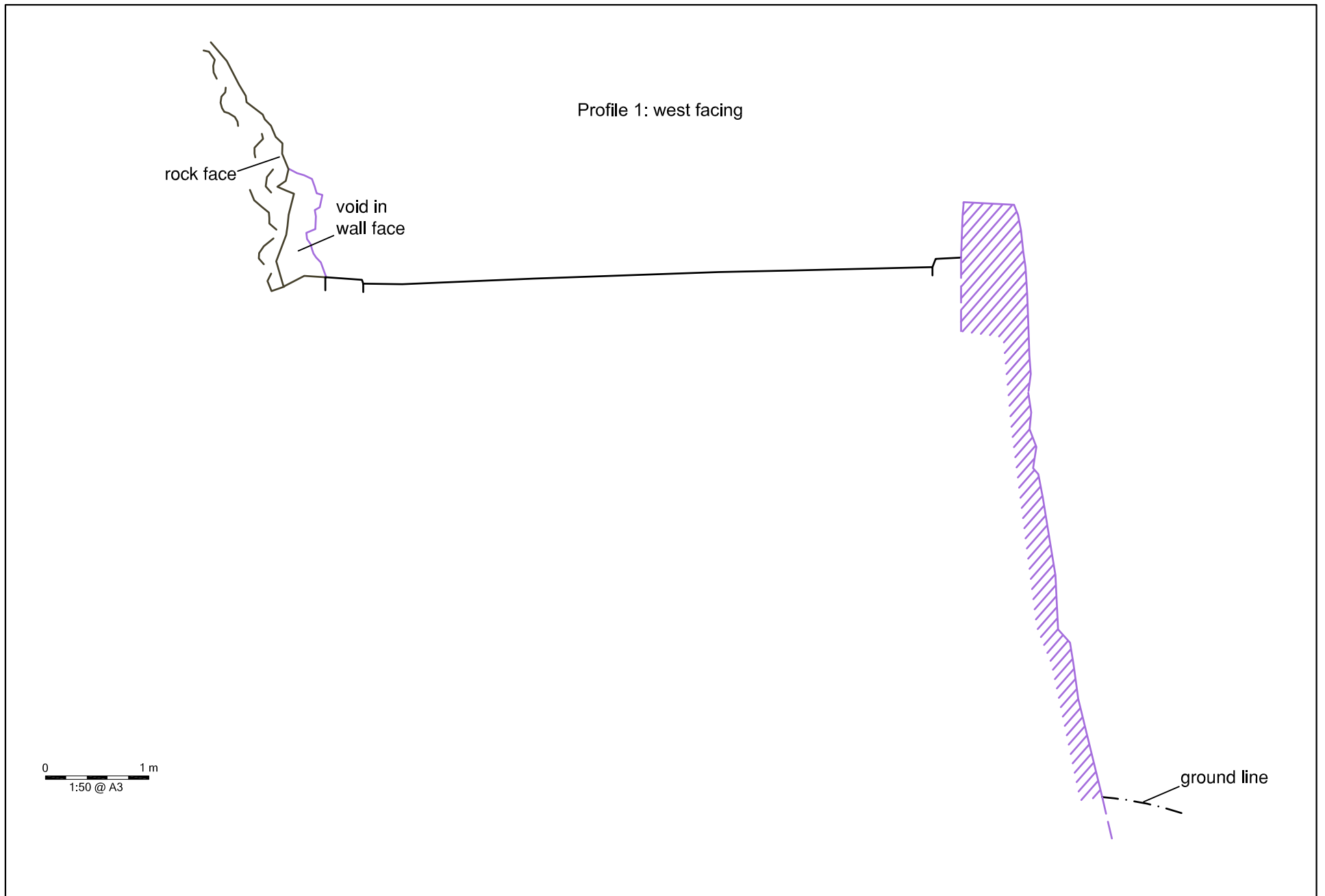


Figure 7: Profiles 1 and 3

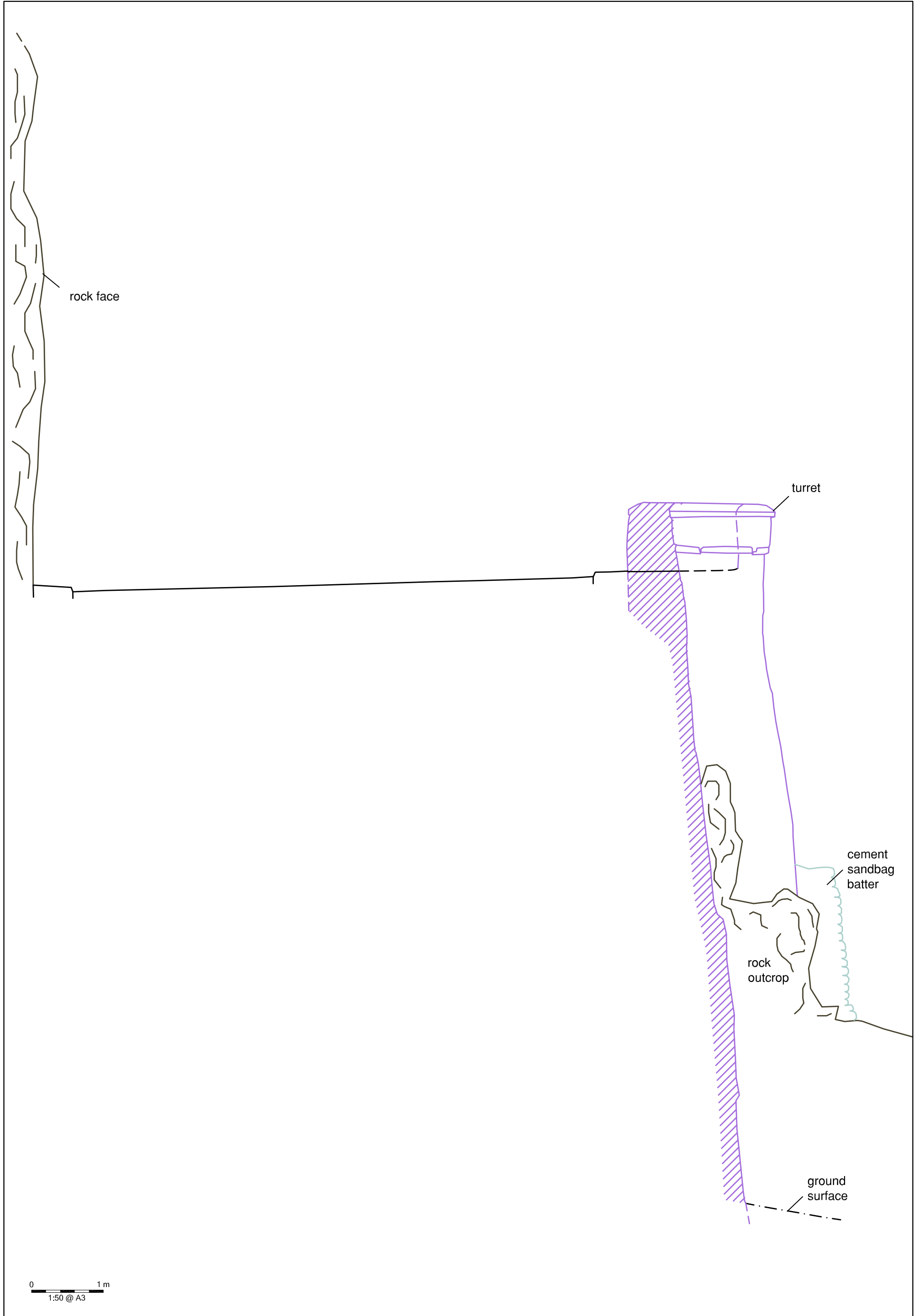
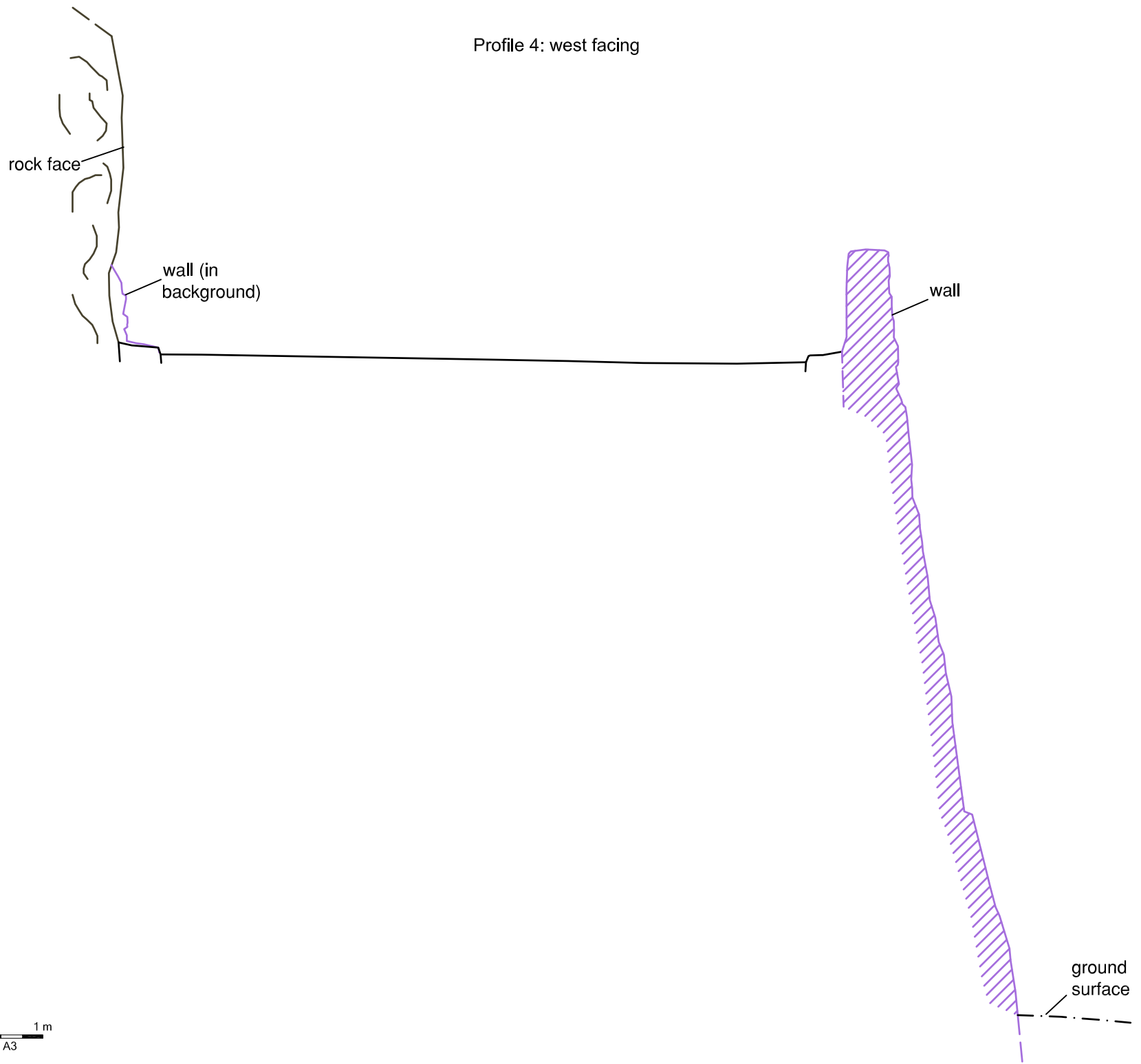


Figure 8: Profile 2

Profile 4: west facing



Profile 5: west facing

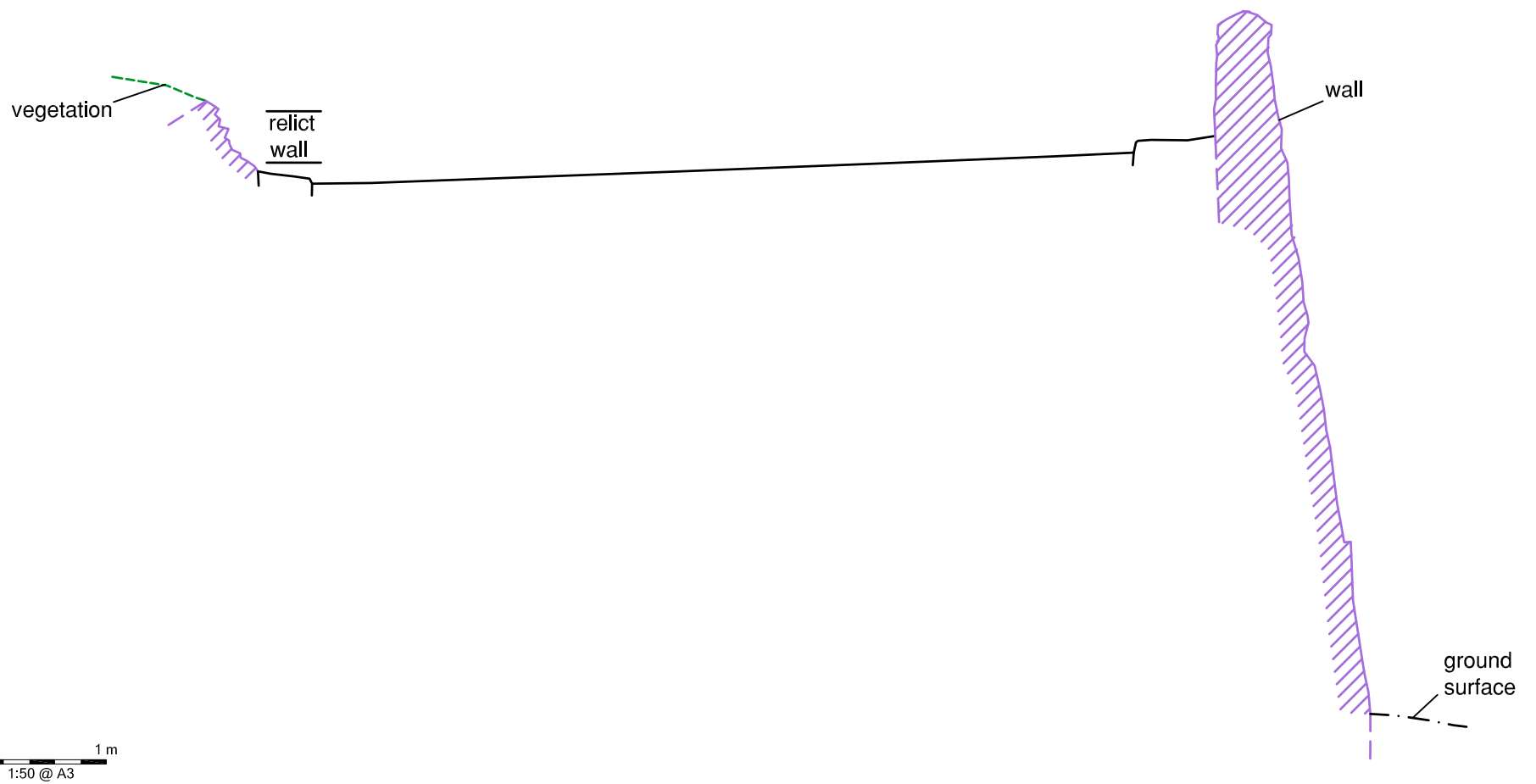


Figure 9: Profiles 4 and 5

Profile 6: west facing

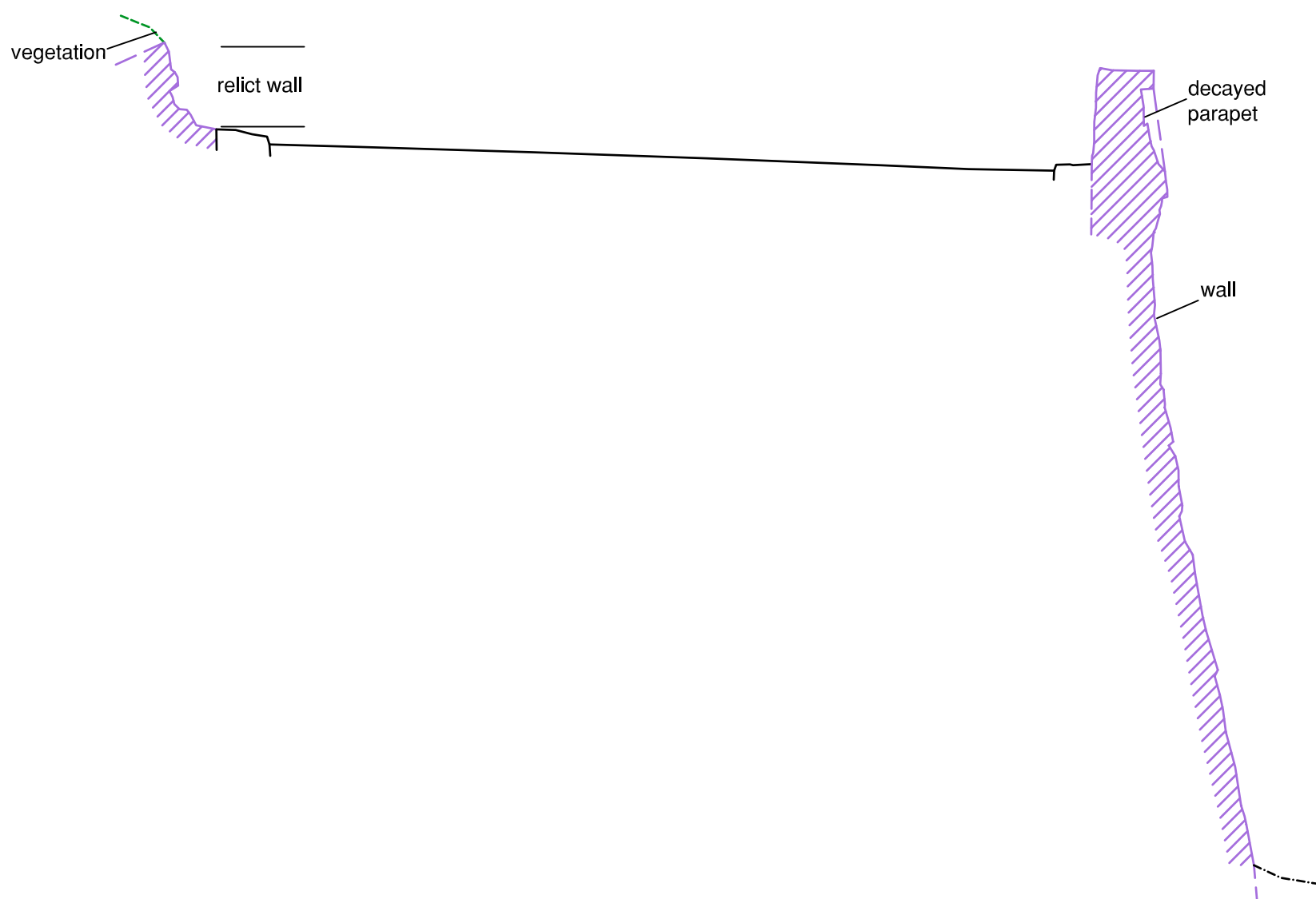


Figure 10: Profile 6



Plate 1: The Glyn Bends Bypass before stabilisation works



Plate 2: The random rubble build of the embankment wall (Section Site 01)



Plate 3: An example of a drain aperture (Site 01)



Plate 4: The original slate topstones have been replaced on a later rebuild of the parapet (Site 02)



Plate 5: Section 03 of the embankment wall showing the concrete copings on the rebuilt parapet wall



Plate 6: The steep-sided, deep tree-covered Afon Ceirw gorge looking in the direction of the waterfall



Plate 7: The eighteenth century turnpike bridge across the Afon Ceirw looking south-east (Site 05)



Plate 8: The top of the turnpike bridge (Site 05), looking south



Plate 9: Western viewpoint turret (Site 10) looking north



Plate 10: The horse-shoe shape of the western viewpoint turret (Site **10**) with an original coping stone to the south



Plate 11: Turret Site **23**, opposite the worked rock outcrop (Site 22), looking west



Plate 12: Turret **23** viewed from the east



Plate 13: Turret **23** bolstered on the southern and eastern sides by a 2.1m height of concrete-filled sandbags laid around the base of the turret



Plate 14: Western viewing Turret **23**, looking south-west



Plate 15: Retaining Wall **16**, set against a section of worked outcrop



Plate 16: The well-preserved section of retaining wall - Site **18**, separated from Wall **17** by a small crag



Plate 17: A short section of retaining wall (Site **21**) at the base of a small quarry (Site **20**)



Plate 18: The longest section of retaining wall (Site **24**) at the eastern end of the embanked road section



Plate 19: A large section of worked outcrop (Site **09**) at the western section of the embanked road



Plate 20: Decayed dry-stone structure (Site **13**), set within a quarry (Site **12**)

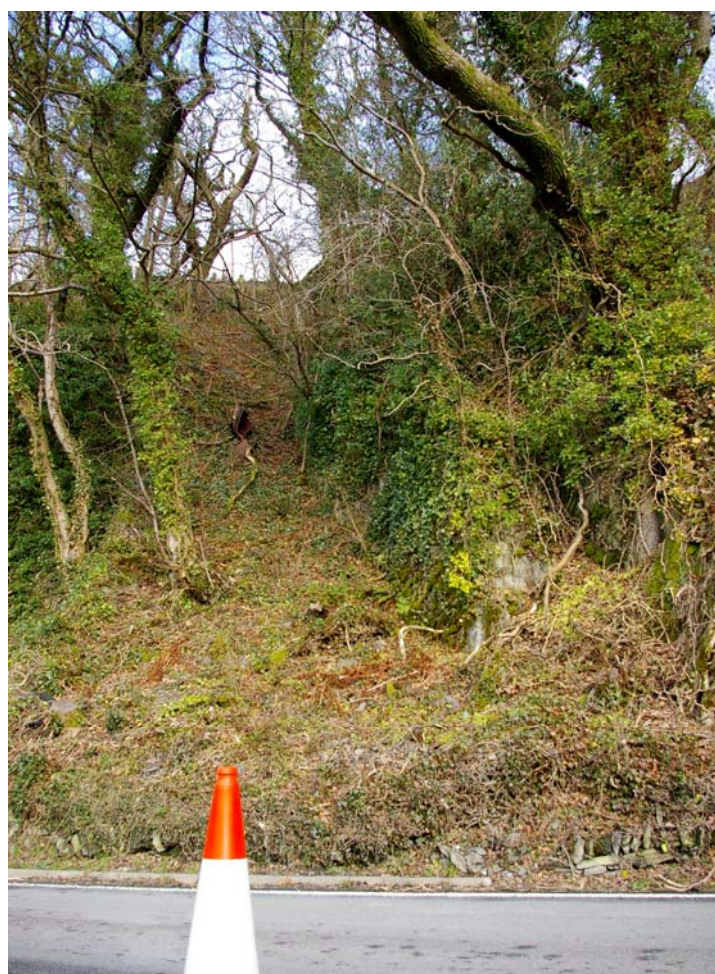


Plate 21: Substantial inclined plane extending down from the top of hill-side, and possibly allowed the movement of quarried materials (Site **19**)



Plate 22: A small quarry set at a remote distance from the eastern end of the embanked section, but which probably provided stone for the embankment (Site 25)