A470 BLAENAU FFESTINIOG TO CANCOED IMPROVEMENT

ARCHAEOLOGICAL WATCHING BRIEF AND RECORDING

G1891

Report number : 717 revision 2

Prepared for
Richards Moorhead and Laing
April 2009

Ymddiriedolaeth Archaeolegol Gwynedd
Gwynedd Archaeological Trust

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A470 BLAENAU FFESTINIOG TO CANCOED IMPROVEMENT (G1891)

ARCHAEOLOGICAL WATCHING BRIEF AND RECORDING

1. INTRODUCTION

Gwynedd Archaeological Trust was contracted by Richards Moorhead and Laing on behalf of Gwynedd Council to carry out a programme of archaeological mitigation during improvement works on the A470 between Blaenau Ffestiniog and Cancoed. The mitigatory measures represent the second part of a two phase programme of archaeological recording. This phase comprised a watching brief on several sites along the road corridor along with a general watching brief on all areas affected by the scheme. In addition basic recording was required in two areas after clearance of vegetation and in advance of works.

1.1 Scheme background

The northern part of the road scheme runs across bleak moorland, mostly minor archaeological sites were identified here. It then drops down towards Blaenau Ffestiniog and passes through a complex industrial landscape. Of particular importance is Llechwedd Exchange sidings and hydroelectric power station. These are part of a nationally important complex of industrial structures and transport systems. The Power Station is Grade II* listed and the girder bridges Grade II. The area is included in the Cadw, ICOMOS & CCW Register of Landscapes of Special Historic Interest in Wales.

An initial survey of the proposed improvements was undertaken in 1992 (GAT project G1070), as part of a wider assessment that examined the proposed improvements from Blaenau Ffestiniog to Betws y Coed. The assessment was updated in 1995 to take into account minor changes to the improvements, changes in site condition, and to ensure conformity with *Design Manual for Roads and Bridges, Volume 11, Section 3, Part 2* (GAT Project G1286). Subsequent field visits were made in 1996, 1999 and 2000 (GAT Projects G1413 and G1614). The results of the final assessment formed Technical Appendix B *Cultural Heritage* of Volume 2 of the Environmental Statement (July 2003). Additional detailed reports were produced for the Public Enquiry comprising a Conservation Management Plan for the Pant yr Afon Site (Govannon Consultancy, 2005) and a report on sites 3(10) and 3(25), the two girder bridges at Pant-yr Afon (Fitzgerald c.2005).

Technical Appendix B *Cultural Heritage* of Volume 2 of the Environmental Statement (July 2003) included recommendations for further assessment of several sites and specified measures to mitigate the effects of the scheme on the archaeological resource. A two phase programme of archaeological mitigation was carried out.

The first phase comprised pre-construction work involving both the assessment of sites of unknown potential and the recording of known features to a basic or detailed standard (Hopewel1 2005 and 2006). The second phase is reported on in this volume and consists of a watching brief during ground clearance along the whole scheme and a series of more intensive watching briefs at specific archaeological sites. In addition archaeological recording was carried out in two areas after dense vegetation was cleared and detailed recording was carried out during the removal of the Grade II listed crane at Llechwedd Exchange Sidings. Some areas within the sidings required reinstatement works at the end of the project. A record of the results of the reinstatement is included in this report.

2. METHODOLOGY

2.1 Introduction

The aim of the fieldwork was defined in the Archaeological Method Statement (Alfred McAlpine MS08 2006):

- To successfully complete the archaeological mitigation works described in the Environmental Register, and defined during a subsequent meeting with Cadw to consider the siting of a temporary embankment across the Llechwedd Exchange Sidings.

The specific objectives of the mitigation fieldwork were defined as (ref numbers indicate individual commitments defined in the Environmental register):

- Ref 1.1 (also part of 1.30) The remains of the demolished Crimea Inn (site 31) are to be avoided during ground works. This can readily be achieved by fencing and demarcating the area prior to commencement of clearance activities.

- Ref 1.2 (also ref 1.14, 1.19, 1.20, 1.24, 1.28) The area of Llechwedd Sidings (site 3) contains many individual sites which require protection. This area will be stripped of vegetation after which additional survey will be undertaken to supplement earlier records made by GAT. The survey will consist of location, photography and a written description consistent with the earlier recording undertaken by GAT. This area will have a temporary embankment built across it, requiring special measures to protect the archaeological remains, which are detailed in the methodology below. Any newly identified structures will be recorded and/or protected as appropriate.

- Ref 1.3 A watching brief will be maintained across the route of the scheme during intrusive ground works with provision for recording of exposed archaeological remains.

- Ref 1.4 (also part of 1.30 and 1.31) A number of individual monuments (sites 9, 20 and 32) will be removed and safely stored prior to commencement of ground works, and relocated during the final stages of works.

- Ref 1.5 A small circular banked enclosure (site 25) will be totally archaeologically excavated prior to the commencement of clearance activities.

- Ref 1.6 Two small roadside scoops/borrow pits (site 36) will be protected from disturbance during ground works. These will be fenced off prior to clearance activities and labeled with a notice board, specifying that the area is an exclusion zone not to be used for scheme purposes.

- Ref 1.7 Track at Oakley Complex slate tips are to be retained and any disturbance to the adjacent stone shelters (site 43) will only take place under archaeological monitoring. The shelters will be fenced off prior to clearance activities, with a notice board to inform sub-contractors that any disturbance must only happen in the presence of an archaeologist.

- Ref 1.8 The pre-construction recording of numerous sites has already been undertaken, it is to be supplemented by additional limited survey of the area at Llechwedd Sidings (site 3), and north-east (site 8) and east of Pont yr Afon bridges after the removal of vegetation during the site clearance works. Any newly identified structures will be recorded and/or protected as appropriate.

- Ref 1.13 The crane located at Llechwedd Sidings (site 3(13)) is to be removed under watching brief conditions to a safe place prior to ground works. It is to be relocated at the end of the scheme at the sidings. Access is to be maintained for conservation work by third parties during the intervening period. The removal and recording of the foundation is to be arranged between the archaeological contractor and Fay Newham of Gifford.

- Ref 1.15 Results of the structural reports on the hydro-electric powerhouse will be considered for integration into the final archaeological report.

- Ref 1.23 A short length of boundary wall, close to the diversion, is to be removed and subsequently reconstructed after removal of the diversion road and embankment. This wall is to be recorded by photography prior to dismantling, and the archaeological contractor is to ensure that the procedures are in place for storage and re-use of original stonework in its reconstruction.

Although not listed as a specific commitment, site 62, St Mihangel's Stone and Well is within the site boundary, and potentially vulnerable to accidental damage. This site should therefore be fenced off and labeled as in Refs 1.1, 1.6 and 1.7 above. As a result of minor changes to the alignment of the road sites 9 (graffiti stones) and 25 (small circular feature) were unaffected by the scheme and no mitigation was required.

The report describes the watching brief and other recording starting from the northern end of the scheme. General observations are followed by site specific information. Topsoil and peat was cleared from the new line of the road in short sections that were immediately filled with slate waste. Archaeological remains were therefore only briefly visible and were constantly being truncated. Recording was mostly written and photographic with measured sketch plans produced where possible.

Definitions of mitigatory measures are as follows:

Detailed recording - Detailed recording requires a photographic record, surveying and the production of a measured drawing prior to the commencement of the works on site. Plans and elevation drawings will be completed for standing structures, though these will not consist of a stone-by-stone record, though specific features will be noted. Archaeological excavation works may also be required depending upon the particular feature and the extent and effect of the impact. Some of the sites would require additional recording if they are to be subsequently dismantled by hand, to provide a detailed record of the method of construction and in the case of a listed structure, for re-use and re-building.

Basic Recording - Recording by photograph and description requires a photographic record and written description, and limited measured survey, or sketch survey, where applicable.

Watching brief - At the commencement of the improvement works on site, all sites affected by the works would need to be observed at relevant stages of construction.

3. RESULTS: WATCHING BRIEF AND RECORDING FROM CRIMEA PLANTATION TO TAL-Y-WAENYDD

The location of sites identified in the assessment phases of the project are shown on Figs 1 to 6.

The northernmost 2.3km of the scheme from the Crimea Plantation to Tal-y-Waenydd (known as the Crimea pass) passes through uninhabited uplands at a height of between 300m and 385m. The landscape consists of rough grassland with frequent rock outcrops.

An intermittent watching brief was kept across this area. Soils were found to range from shallow peaty loams to blanket peat bogs. The peat to the west of Llyn Fridd-y-bwlch at SH69634809 was found to be between 1.5 and 1.8m deep. Frequent roots and wood from small trees were found at a depth of between 0.5 and 1.25m suggesting that this relatively sheltered area had been covered in scrubby woodland within the last few hundred years. The modern treeless upland landscape is at least in part a result of intensive sheep grazing and the loss of trees in this area was probably a result of changes in agricultural practice. Peat to the north of site 20 (Esgidiau Meirw-boot dump) was found to be in excess of 4m deep and contained frequent deposits of gravel and silt. This area sits in a natural hollow and may once have held a small lake. The construction of the embankment for the turnpike road in the late 19th century further impeded drainage.

No new sites were discovered in the upland part of the scheme but the following sites were affected and watching briefs were carried out during disturbance.

The pre-turnpike road and associated features. Sites 39, 16, 38, 35, 36, 61, 34, 30, 26, 26a, 26b and 26c (Figs 1 to 6)

The current A470 dates from the mid-late19th century. Two attempts to build and maintain a road between Blaenau Ffestiniog and Dolwyddelan were made, probably both along the line of the current road. The first was between 1854 and 1857. An inn was erected after the road was completed, its name commemorating the recently concluded Crimean War. Contemporary accounts suggest that the

road was poorly maintained and in 1864 the Portmadoc and Beaver Pool Turnpike Trust was set up to oversee the continued maintenance and construction of roads in the area.

It is clear that a trackway preceded this road. A route is shown on Evans' map of 1796 and on the OS 1" of 1841. Unfortunately these maps are not detailed enough to show its exact line. It was surveyed and sectioned during the first phase of the mitigation works. This showed it to be a simple but much-used trackway. In some places there was clear evidence of construction in others there was nothing more than a series of eroded hollow ways. Several short lengths of the trackway were destroyed during the construction of the new road and details were recorded during the general watching brief and are described below. A recently published book 'The Roman Roads of North Wales: Recent Discoveries' by Edmund Waddelove (1999) claims to be able to trace a Roman road across the pass. His evidence was reviewed during the first phase of the mitigation works and no convincing road of Roman military style was identified. Further investigation was carried out as construction works progressed.

Watching briefs were carried out as follows:

Site 38 SH70334958 The track split into two as it ran up to the line of the pre-improvement A470. The northernmost line was visible as an eroded 0.7m wide hollow way, the southern as a barely discernible terrace. Both lines were truncated by the road improvements, neither showed signs of metalling or revetment and it seems likely that they were a later addition to the trackway, designed to tie in with the turnpike road. The track to the north of this point is shown on the 1901 6 inch Ordnance Survey map and probably functioned as a link between the turnpike road and farms in the valley.

Site 34 SH70164920 The trackway was visible as a regular, 1.6m wide, flat bottomed hollow in this area. It followed a dry route through the bogs. This was found to be due to the presence of well drained coarse gravel subsoil. The trackway appears to have been constructed by removing a thin layer of peaty topsoil and exposing the gravelly surface of the subsoil. This technique appears to have been successful because this was one of the few areas where there was no serious erosion.

Site 30 SH70124887 The trackway was cut by the pre-improvement A470 at this point. There was little visible on the surface and upon excavation it appears that the trackway had been destroyed during the construction of the turnpike road or subsequent upgrading.

Site 26 SH7012 4884 The trackway to the north of the south of the Crimea Inn was shown on the 1891 OS 6" map and is still well preserved as a 1.8m wide terrace is cut into the base of the slope. The northernmost 30m of the trackway was destroyed by the road improvements. This was visible as clearly delineated 1.8m wide area of darker soil when the turf was removed. The trackway was running over a well drained area of stony subsoil. The method of construction was similar to that recorded further to the north where the topsoil had been stripped to reveal the gravelly subsoil. In this case the road had been slightly terraced into the slope and any larger stones placed on the edge of the road presumably to act as markers or a rough kerb.

Site 26a SH69904853 This was visible on the surface on the west of the road as an irregular hollow way. Excavation revealed nothing more than a hollow eroded into the subsoil. This was fairly typical of the parts of the trackway that were on slopes or wet ground and therefore more prone to erosion. This length of track was described as a Roman road by Waddelove (1999). Roman military roads were constructed to a uniform design, even a basic road would include a metalled surface about 5m wide with flanking drainage ditches. None of these features were encountered here, or at any other point along the pass, demonstrating that the remains described belonged to a different period. The Roman road linking the forts at Bryn-y-Gefeiliau and Tomen-y-mur has been shown to run along the uplands above Cwm Penamnen (Hopewell 2007).

The trackway on the eastern side of the road had been partly destroyed by previous road improvements elsewhere it was visible as a simple hollow way.

Site 62 St Mihangel's Well

Information from Steffan ab Owain at Caernarfon Archives suggest that the well is more correctly called Fynnon Fach. It is recorded that it was in use during the 1859 revival when some of the

revivalists knelt down to pray beside it (Morgan 1906). It would not have been close to the early track so it probably dates from the time of the first turnpike in the 1850s.

This site was shown to be just outside the scheme corridor on the drawings provided for the original archaeological assessment. On later drawings (e.g. Gwynedd Council 192/GA/1003) it was shown to be cut by drainage works. A minor change was made to the design of the drains in order to preserve the well and stone. This involved the removal of a drain and culvert on the edge of the pre-improvement A470. The status of this was unknown and it was dismantled under archaeological supervision. It was found to be a stone and concrete culvert that had been inserted to collect the runoff from the spring that feeds the well. The base of the culvert was left *in situ* and a new headwall was constructed along this alignment.

The well was not disturbed but was examined in detail. The well itself appeared to be little more than a natural spring that had been marked by an upright stone. The stone formerly stood above the well and is covered with incised graffiti. Local tradition suggests that people carved their initials into the stone for good luck before going to war etc. They may also reflect the popularity of the well as a watering place for travellers and perhaps a belief in the properties of the water. The earliest visible date is 1887. The stone presumably stood above the well and at some point fell forward to its current position. The graffiti appears to be confined to the upper surface of the stone suggesting that the stone fell before the tradition of carving initials was established. The orientation of letters along the length of the stone also suggests that they were not carved when the stone was upright.

Sites 36 and 61 Quarry Scoops

These sites were outside the area of the Compulsory Purchase Order (CPO) for the scheme and were unaffected.

Sites 33a and 33b Embanked curvilinear feature and possible cairn

No further information was discovered about these features

Site 31 Remains of the Crimea Inn

This site lies on the eastern edge of the scheme and was within the CPO. Mitigation for the site was avoidance by the scheme. The site was however mistakenly disturbed during the creation of an access for works further to the south. The damage was relatively minor, close examination showed that only the surface layer of rubble had been disturbed and that no *in situ* structures had been damaged. The site was reinstated under archaeological supervision.

Site 32 Slate turnpike milestone

The milestone had been concreted into a reconstructed revetment wall and had cracked along the line of the slate cleavage plane. The contractors removed the milestone without causing any additional damage. The milestone was replaced close to its original position.

Site 19 Slate dump

A roughly rectangular 9x by 4m area of slate debris was visible as a low grassed-over mound to the north-west of the former A470. The initial interpretation of the site as a trial shaft and spoil heap was confirmed during the watching brief. The mound was shown to consist of a 0.4m deep spread of slate waste that appeared to be a spoil heap that had been partially cleared. A hollow at the north-east end of the dump was surrounded by iron fence posts with the remains of a substantial steel rope. Upon clearance of the topsoil this could be seen to be a square shaft that was full of silt and water. No detailed recording was possible because the sides of the shaft were extremely unstable. The shaft had to be emptied and backfilled with slate waste in order to provide a stable foundation for the new road. This was carried out by a tracked excavator and a written and photographic record was made of features as they were revealed. The shaft was vertical and cut through clay and rock. It was square in plan and roughly 1.5m wide. The sides were lined with wooden planks that collapsed as soon as the shaft was emptied. Its base was cut into bedrock but the shaft did not extend below about 4m. The spoil suggests it was cut into slate and this was presumably an unsuccessful trial, cut either in search of

good quality slate or minerals. Similar features mostly dating from the 19th or early 20th-century can be found scattered around the mountains in this area.

Sites at Fridd-y-bwlch (20, 21, 22, 26a and 56)

Sites 21 (remains of stone wall) and 22 (rectangular enclosure) were both destroyed. Both had been fully recorded in advance of destruction (see Hopewell 2005). The watching brief showed them to be single-phase structures and no new information was recovered. Sites 27 (Peat cutting), 56 (Ffridd-y-bwlch) and 20 (Esgidiau Meirw) were outside the CPO and were unaffected by the works.

Site 25 –Small circular feature

This site was originally on the line of the proposed road. A subsequent realignment resulted in it being outside the CPO. The site was unaffected and no further action was taken.

Site 33a Embanked curvilinear enclosure

This was described in the original assessment report as 'An embanked semicircular shallow ditch-like feature, possibly part of a pre-turnpike trackway or relatively recent drainage feature. Its exact nature is unknown'. The site was examined in the pre construction assessment phase and it was found to be a drainage ditch. No further information was forthcoming during the general watching brief.

Site 33b Possible cairn

A possible small cairn was identified just to the west of site 33a during the assessment. It is 2.2m in diameter, 0.4m high, flat-topped and roughly circular in plan. The site was examined in the pre construction assessment phase and found to be a natural feature. No further action was taken during the watching brief

Site 17 – Sub-rectangular scoop

This feature had been found to be modern disturbance in the pre-construction evaluation and no further action was taken.

Sites to the north of Bryntirion:

Sites 18 (small quarry), 17 (sub-rectangular scoop), 16 short length of track, 15 (track to Ffridd-y-bwlch reservoir 14 (roadside quarry scoops) and 13 (drystone field boundary) had all been fully recorded in advance of the construction works and no further information was recovered during the watching brief.

Site 12 Tip south of Bryntirion

This site was entirely removed by the improvement works. An intermittent watching brief was kept. It was a 36m long, 1m high and 5m wide raised bank running between the boundary of Bryntirion and the Oakeley Complex access road. The bank was flat topped and stood at the edge of an area of landscaped slate tips dating from the first half of the 20th century. The feature was removed in short lengths allowing a basic record to be made of sections cut through it.

A section close to the N end of the feature showed the main body to be made of dumped clay with some slate waste. This changed within 5m to slate waste covered by a thin layer (about 0.2m) of clay and soil (Plate 1). A small stream was carried beneath the bank through a reused cast iron pipe. The remainder of the feature, up to the current quarry entrance, was built from slate waste.

There were no obvious clues to its function but it may have been an early access to the Ffestiniog/Oakley quarry. A small iron gate adjacent to the quarry entrance perhaps preserves the line of the former access. The feature could alternatively be interpreted as tipping run associated with the construction of the current road into the quarry. This sits on top of an area of infilled ground revetted by a tall drystone wall (feature 11). This interpretation would however seem to be less likely because the infilling material would probably have come from the adjacent quarry and not via the A470. The

bank and nearby tips are not shown on the 1920 Ordnance survey map suggesting that the area was open fields at this time. The 1953 edition shows the modern quarry entrance.

Site 11 Retaining wall, Oakley terrace.

The upstanding wall beside the entrance road was demolished. The rest of the retaining wall was preserved but was, however, buried beneath the new road. The area to the south of the wall was infilled to form the base for the new carriageway.

Site 10 Field Barn Tal-y-Waenydd

This feature was fully recorded during the pre-construction phase of works and no further action was taken.

Site 9 Graffiti stones Tal-y-Waenydd

The stones were retained *in situ.*

Site 8 Revetting/walls alongside stream

This area was covered in thick trees and vegetation that prevented detailed assessment and recording of site 8 and associated features in the Llechwedd Plantation. The basic recording of this area was therefore delayed until the trees had been felled. The area was surveyed using a total station after the trees had been felled but before the clearance of brash. Further details were added by hand after further clearance and during topsoil stripping.

Ordnance survey mapping of the area from 1889 to 2006 showed two parallel walls running towards the Afon Barlwyd. The 1889 edition showed a series of paths running through the woodland one of which led into the area between the walls (Fig. 7). There have been several other significant changes to the area since 1889. The slate tips on the south of the Afon Barlwyd have extended and the line of the river has moved to the north.

The results of the survey are shown on Fig. 8. The revetment on the east side of the feature was extant and well preserved standing to a height of around 0.7m (Plate 2). There were several collapses in the masonry but it survived to its original height for most of its length. It had been truncated at the south end presumably when the line of the river changed. A stream passes under the entrance to the Llechwedd complex and runs south. The southern half of the stream runs along the centre of site 8. This does not appear to be an original element of the site because it is not shown on the 1889 OS map. The western bank of the stream was steeply sloping and topped by a few boulders. The bank was disturbed in several places during the removal of tree roots but no traces of revetment were revealed. The line of the bank turned to the west at the north of the feature, following the line of the path shown on the 1889 map, suggesting that there had been no major disturbance in this area. It therefore seems likely that there had never been a revetment on the west side of feature 8. A wall built against the road revetment and shown on the 1889 map apparently blocked the southern end of site 8. This survived in good condition on the western side and had mostly collapsed on the east.

The edge of the CPO ran along the line of the stream. The eastern revetment was therefore largely unaffected by the construction works apart from some minor damage caused by wind-blown trees. There has been some remodelling of the western bank but much of the main part of site 8 will be preserved.

Two minor additional sites were discovered during clearance between site 8 and the pre-improvement A470. Site 8a (see Fig. 8) was an 18m length of ruinous slate wall apparently acting as a revetment on the western side of the stream immediately to the south of the Llechwedd entrance. The wall stood to a height of between 0.4m and 0.5m and was 0.2m to 0.5m wide. Site 8b was a 26m length of 0.6m wide wall built from field stone. It ran from the edge of the stream in a WSW direction with only the basal course surviving for most of its length. This appeared to be the remains of a boundary wall that predated the woodland around Plas-waenydd. There were a considerable amount of boulders alongside the pre-improvement A470 at the south of the area that in places formed a rough terrace. The road was terraced into the side of the valley at this point

Site 8: Conclusions and summary

The features in this area with the exception of site 8b appear to date from the 19th century or later and were latterly associated with the grounds of Plas-waenydd. The 1889 map shows a series of paths or tracks running through grounds of the house. These are generally depicted without boundary walls. The path running south from the main entrance is shown to fork, with the western side running into feature 8. Feature 8 appears to have been a sunken track. The eastern side was bounded by a revetment wall that continued to the east where it formed the revetment to the Afon Barlwyd. The western side appears to have been bounded by a steep bank. The south end of the feature was blocked by a drystone wall. This suggests that the track predated Plas-waenydd and was subsequently blocked off. It seems likely that blocked off track was part of the first phase of turnpike constructed between 1854 and 1857. and that it was eventually truncated by the encroaching tips at the south. A new road was engineered after 1863 on the line of the current A470 (Govannon Consultancy 2005) and this presumably marked the beginning of the A470 causeway and the diversion of the river into the roadside channel. It thus seems likely that site 8 is one of the few surviving elements of this earlier turnpike road.

The local drainage pattern was changed probably due to quarrying and a stream was subsequently diverted along the line of the former road. A revetment wall was added at the north (site 8b) in order to channel the water in the correct alignment.

Site 7 Slate tip: Llechwedd Slate Quarry

This site was mostly unaffected by the construction work and no further information was recovered.

Site 6 Afon Barlwyd culvert

The site had been recorded in advance of the construction phase of the works. The river was to be realigned during the construction phase to run through an underground culvert and the original channel was to be destroyed or infilled during this process.

The central part of the original culvert was covered by slate slabs. These were removed revealing a large drainage adit about 0.6m wide and 1.0m high carrying water under the slate tips and disgorging into the culvert. The walls of the adit were built from rough slate blocks and the roof from slate slabs. The base of the adit was about 0.5m lower than the base of the river culvert. The adit was still functional and carrying fast flowing water.

The eastern wall of the river culvert was a simple drystone wall revetting the slate tips. The western wall was formed by the raised carriageway of the road. This was revealed on the eastern side and was found to consist of a drystone slate revetment wall with slate waste infilling on its western side.

Site 43 Slate tips Oakley Complex including track and shelters

The eastern side of the tips adjacent to the road were truncated and reprofiled. The track was affected in places and the two dry stone shelters were demolished. The demolition of the shelters was not carried out under archaeological supervision but the site was visited shortly afterwards and the remains showed no evidence for anything other than simple single phase structures. It therefore seems likely that all available information was recovered in the pre-construction phase of recording.

Site 5b Foundations

A watching brief was carried out here but the area was not disturbed and was buried beneath the temporary diversion.

4. RESULTS: LLECHWEDD EXCHANGE SIDINGS (Fig. 9)

The Llechwedd Exchange Sidings contain over 30 different elements. This area is part of a nationally important complex of industrial structures and transport systems. The exchange siding is one of only two surviving examples of a system for exchanging goods from a narrow gauge to a standard gauge railway. All other examples have now been destroyed, except that at Minffordd on the Ffestiniog

Railway, which has been considerably altered. This is the only example to retain the narrow gauge rails, a crane and weighing machine.

The Power Station, site 3(1), is Grade II* listed and the girder bridges, sites 3(10) and (25), Grade II. The area is included in the Cadw, ICOMOS & CCW Register of Landscapes of Special Historic Interest. The Llechwedd quarry incline forms part of the Ffestiniog Railway feeder system. The Ffestiniog Railway was of great importance in the development of narrow gauge railways in both Britain and abroad.

Most of the site was recorded in detail in the pre-construction phase of the project. The northern end of the sidings on both sides of the road causeway was too overgrown to allow full recording to take place. This area included site 3(16), the Llechwedd Quarry to Ffestiniog Railway Link,), slate retaining wall 3 (17), railway 3(4) and parts of 3(32), the road causeway. Detailed recording was therefore carried out after clearance of vegetation either at the beginning of the current phase or along side the watching brief.

Llechwedd Quarry to Ffestiniog Railway Link 3(16)

The area was very overgrown with gorse, Rhododendron and small trees. This was cut down and chipped and a detailed record was made of the Railway link. All standing masonry was photographed using a digital SLR camera. The side walls of the link trackbed were photographed as a series of overlapping images with a levelled camera and two scales per frame which were set upright using a spirit level. The scales were set at a standard width of either 2m or 3m apart. General photographs were taken of the area as works progressed. A written description was made of all structures that were revealed after the clearance of the vegetation. Plate 3 shows the area after clearance

Site 3(16) comprised a 4.0 to 4.8m wide sunken trackbed. The base of the trackbed was of pitched slate. This had been covered by 0.2 to 0.4m of silt that had been washed through the incline tunnel. Some water was found to run through the tunnel and along both sides of the trackbed at all times. This was passing from the Afon Barlwyd channel through the slate and into the tunnel. When the river was in spate it would overflow its banks and a large amount of water would run down the trackbed. The side walls were of stone and slate and contained several phases of masonry probably reflecting the changes in ground level as slate waste was added to the area.

The basal course and lower wall on both sides consisted of rounded field stone standing to a height of 0.25 to 0.4m possibly indicating the original ground surface (phase 1). A photograph from 1879 (Plate 4) shows the track before the side walls were built and is presumably a record of this phase.

The eastern wall was mostly of unmortared slate built to a flat face with a coping of large slate slabs typically 3m long and 0.2m thick. The western wall stood to a height of around 2.6m, the lower 1.2m was of unmortared slate topped with a further phase of mortared slate with a random coping of vertical slate blocks. The drystone slate appears to belong to the second phase of building on both walls with the mortared phase of the western wall added as the ground level rose (phase 3).

There were some variations and inserts to the basic phasing described above. The lower part of the southern 6m of the western wall was contemporary with and built in the same style as girder bridge (25) abutment and probably belonging to the phase 2 masonry. The upper part of the wall appeared to be a later insertion, abutting the phase 3 masonry to the south. The phase 3 mortared slate masonry did not continue to the northern end of the wall and the link tunnel but turned to the west to abut slate retaining wall 3(17). The northernmost 9m of the wall was 0.5m high and consisted of phase 1 and 2 drystone masonry only.

The southern 9m of the eastern wall was noticeably different from rest, the face having been roughly built from field stone and slate slabs. It is built in the same style as the phase 1 masonry but abuts phase 2 masonry at both ends and does not appear to be on the 1879 photograph. It would therefore appear to be a later insertion. It suggests that there was a break in the wall at some point in its history. This may have been an accidental collapse or a functional change but no further information has been discovered that would allow further interpretation. The northern end of the wall gradually falls in height to around 1m. The lower part of the wall consists of mainly phase 1 fieldstone masonry with a few courses of phase 2 unmortared masonry.

The trackbed was covered with geotextile and the sidewalls protected with plywood. The trackbed was then filled with slate waste. The raised coping on the western side was protected by laying wooden sleepers alongside it. All other upstanding parts of the western wall were demolished and the stone was stored in order that the walls could be reconstructed. The temporary diversion was built on top of the infilled trackbed (Plate 19).

The temporary diversion was removed at the end of the construction phase. A short length of the western trackbed wall collapsed during the removal of the slate waste. This revealed another wall face set back by 0.4m. This presumably marked an earlier phase but there was no opportunity for further study. The collapsed masonry was rebuilt in the same style as the original wall and using the original stone. The base of the trackbed was left with a covering of slate waste at the request of the landowner. The parts of the western wall that had been demolished prior to the construction of the temporary diversion were reconstructed using the stored stone (see Plate 20).

Llechwedd Quarry to Ffestiniog Railway Link 3(16): Conclusions and summary

The incline and 1'11½" gauge railway were built in 1854 (Lewis 1988) and predated the standard gauge LNWR railway which was completed in 1879. The 1'11½" gauge railway originally ran on level ground next to the Afon Barlwyd (phase 1). On completion of the LNWR railway the area to the west of the road causeway was at least partially infilled to allow the construction of the exchange sidings and weighbridge house. A photograph from the 1880s (Plate 5) shows a low wall beside the track corresponding to the phase 2 masonry in the sidewalls of the trackbed. There was further modification to the area when the powerhouse was built in 1904-5. This included another rise in the general ground level and it seems likely that the phase 3 masonry dates from this time. The set-back facing revealed by the collapse may have been an interim revetment holding back the encroaching slate waste before the upper part of the trackbed wall was built.

Slate retaining wall 3(17)

The eastern part of the slate retaining wall 3(17) was photographed in three sections. The retaining wall marks the end of the sidings area and was presumably built at the same time as the road revetment. It was found to stand to a maximum height of 9.0m and to contain three phases of masonry (Plate 6). The lower 4m adjacent to the road revetment was built from large slate blocks. This extended 12m to the west of the road revetment. A second phase of masonry characterised by smaller flatter stones was standing above this. A third phase of masonry was standing in front of the phase 2 wall further to the west. The upper wall in this area was also of a later phase characterised by upright slate-block coping. Part of the upper wall was demolished to accommodate the temporary diversion. The stone was stored and was reused to reconstruct the masonry. The temporary diversion was built against the remaining wall which was protected by geotextile. The wall immediately adjacent to the A470 was dismantled during the demolition of the causeway.

The temporary diversion was removed without causing any major damage. The eastern end of the phase 3 masonry was however beginning to slump before the project started and was showing further signs of instability after removal of the diversion. A short length of this masonry was rebuilt as part of the reinstatement process. All previously demolished masonry was rebuilt, using the stored stone, in the same style as the original (see Plate 20)

Railway bridges 3(4) and 3(8) and linking rails

The area between the dwarf wall and the Afon Barlwyd was heavily overgrown with Rhododendron. All visible structures (Railway bridges 3(4) and 3(8) and upstanding masonry) had been recorded in the pre-construction recording programme. The overgrown area had not been recorded and was to be recorded as clearance progressed in the construction phase. It should also be noted that the rails to the north of railway bridge 3(3) had not been fully recorded during the pre-construction phase and were allocated for detailed recording during the current work programme. This feature had however been destroyed by the land-owners while upgrading the supply pipe to the hydro-electric power station and no further action could be taken.

The recording of the rest of the area was carried out when the road revetment had been partially demolished in order to provide access for plant. A watching brief was kept during clearance of the vegetation and silt. A basic record was made of all discoveries (Fig 10). Much of the area flooded as soon as the ground level was reduced thus hampering recording. The area was subsequently covered with slate waste to provide a working platform for the works on the road causeway. Railway bridge 3(3) was removed under archaeological supervision in order to make room for the new road causeway. This action was approved by Cadw at a site meeting before works commenced. Railway bridge 3(8) was removed and slate waste was cleared from the river channel by the contractors under a private arrangement with the land-owners, Greaves Welsh Slate Company Ltd. A watching brief was not requested.

The rails between the bottom of the incline and bridge 3 (3) were preserved beneath a layer of silt. These belonged to the final phase of railway shown on a photograph from the 1950s (Plate 7). Two sets of rails ran down the incline, across the incline bridge and curved around to bridge 3 (3). Only the western part of the rails was uncovered. The rails adjacent to bridge 3 (3) were subsequently removed. The rest of the rails were probably removed at the same time as the incline bridge and were not recorded. The remains of a revetment wall could be traced running from the north-west side of the incline bridge 3 (8) towards the incline tunnel. This marked the edge of an earlier phase of railway that ran through the tunnel and joined the Ffestiniog Railway.

Bridge 3 (3) was removed in advance of the construction of the new road causeway. This had previously been recorded in detail (Hopewell 2005) and no further information was forthcoming during the watching brief. The remains of five iron attachments points could be seen embedded in two large slate slabs in the riverbed. These were beneath the bridge and did not appear to be part of the structure. These may have been part of an earlier bridge but there were no further extant remains.

Clearance of the river channel showed that the river bed at the base of the cascade (where water flows from the culverted river beside the A470 to the river bed) and beneath the bridge at the base of the incline (3(8)) was of pitched stone. The channel had become partially blocked with slate waste.

On completion of the project, the area was landscaped using the material from the immediate area. Almost all archaeological features had been removed from the area and the new, wider road causeway had encroached on the area. The reinstated ground level is a little higher than the original to prevent the river from running through the new incline tunnel when in spate. A row of boulders were placed along the side of the Barlwyd channel close to the base of the cascade in order to prevent erosion by the fast-flowing water. Bridge 3(3) was replaced by a new bridge built from large iron girders close to its original position. This abuts the new road causeway. Refer to Plate 21 for a general view of this area after reinstatement.

Summary and discussion: railways

The physical and documentary evidence demonstrates that there were several phases of railway in this area. The earliest, as shown on the 1879 photograph (Plate 4), was a simple link from the incline through the incline tunnel to the Ffestiniog Railway. The ground level was probably lower at this time. The edge of the river channel contains an early phase of field-stone masonry that is similar to the phase 1 masonry on the western side of the road viaduct. It should be noted that the west end of the incline bridge 3 (8) had previously been recorded as having collapsed. It now appears that the girders were *in situ* and indicated the angle of the rails running towards the incline tunnel.

The construction of the exchange sidings in the 1880s led to the construction of a second line (phase 2) that ran through the link tunnel 3 (2). No detailed plans or photographs are available of these phases but the 25” OS map of 1889 shows rails running through both of the tunnels.

The Ffestiniog Railway link subsequently fell out of use. The incline tunnel was partially infilled with a concrete deck perhaps in response to instability in the tunnel. A date of 1935 is painted on the underside of the deck. This reduced the height of the tunnel and may have marked the end of its use as a railway. It could not have continued in use beyond 1946 because the Ffestiniog Railway was closed at this time.

The approach to the incline tunnel presumably ran through a cutting at least during phase 2 because the level of the rail link to the link tunnel ran at a higher level than the incline tunnel and the ground level must have been raised in order to accommodate this. Revetment walls were visible on either side of the trackbed at the tunnel mouth but were buried beneath slate waste. The northernmost wall continued as a revetment as far as the river. The corresponding wall on the south did not continue this far. The ground levels, at least to the south of the northern revetment must have been below the level of the later ground surface. The entrance to the tunnel was probably also below the contemporary ground level. The river was only slightly below modern levels (demonstrated by pitched stone below railway bridge 3(8)) and flooding had presumably been a problem when the Barlwyd was in spate.

The base of the tunnel was between 1.5m and 2m below the modern ground level and it is clear that the area must have been infilled with slate waste before the last phase of railway, a simple route between the incline and the link tunnel, was built. This is shown on the 1950s photograph (Plate 7). Two sets of rails can be seen coming down the incline. These would have accommodated the functioning of a balanced incline with the weight of the loaded wagons coming down pulling the empty wagons up. The lines passed over the bridge, crossed over and ran roughly in parallel, across bridge 3 (3) before points led to a single track through the link tunnel.

Girder bridge 3 (10)

This was spanned by the temporary diversion bridge and was unaffected by the works. The upper part of the river revetment immediately adjacent to the north-east abutment of the bridge was dismantled by hand in order to accommodate a concrete pad that would act as a support to one side of the temporary diversion bridge. The stone was stored and the wall was rebuilt after the removal of the temporary diversion (See Plates 22 and 23 for a general view of this area after reinstatement).

Girder bridge 3 (25)

This bridge was also spanned by the temporary diversion. The timber elements of the bridge were rotten and fairly fragile and several minor timbers running between the main girders were lost during the construction of the temporary diversion. One of the beams of the temporary diversion bridge was found to be very close to the top of one of the bridge pilasters – and the bridge was found to be settling thus risking contact with the masonry. It was not possible to remove the heavy capstone so it was lifted slightly and the mortar was chipped from beneath it to lower its overall height. This was re-set and re-mortared after the temporary diversion was removed.

Gateposts 3 (27)

Two concrete gateposts marked the boundary between the former LNWR property and Llechwedd quarry. These were removed in advance of the construction of the temporary diversion and stored. They were reinstated after the removal of the temporary diversion.

Sidings 3 (15)

The exchange sidings comprised a raised platform on the east side. The western side had previously been disturbed by the landowner. The trackbed was infilled with slate waste in advance of works. The southern half of the siding was truncated by the new road carriageway. A watching brief was kept but no new information was recovered.

Crane 3 (13)

The crane was removed from the site for storage in advance of reinstatement in a different location after the completion of the new road causeway. The removal followed a method statement previously submitted to Cadw. All accessible parts of the crane had been recorded previously (Hopewell 2006). The upper rotatable part of the crane (Figs. 11-13) was supported by a cradle, principally to add stability and prevent sideways loading on the jib. This was then lifted from the base using a crane (Plate 8). This was transported to the works compound and at the time of writing is being stored in the cradle.

The cast iron base pillar was then removed under archaeological supervision. All archaeology was recorded by photographic, drawn and written description where health and safety considerations allowed. A measured sketch drawing of the pillar was produced.

The pillar was held upright, using chains and padding, by a mobile crane. The area around the base was then dug out using two mechanical excavators. The base was found to extend to a depth of close to three metres and was attached to a slate block. As much slate, concrete and packing material as possible was removed from around the base and block using the excavators. Percussion was kept to a minimum and peckers were not used because of the potential fragility of the cast iron. The base and block were then lifted from the hole. The base and block were separated and placed in storage with the upper part of the crane.

The rotatable part of the crane was supported by a fixed, 2.7m high, cast iron pillar. The crane rotated on and around this pillar and was attached in two places. The jib and the base were joined by a series of 6 iron braces to a cast iron head containing further rollers that rotated on top of the pillar. The base of the crane was held in place by a wheel that was designed to run around a flange on the base of the supporting pillar. This was stabilised by two rollers mounted inside the front plate of the base that were forced against the supporting pillar by the weight of the jib. The crane would have been turned by manually moving the load hanging from the jib.

The lower parts of the crane were housed within a three-sided box framework formed by three cast iron plates. The front plate housed the stabilising rollers, the rotation support wheel and the base of the jib. Two side plates were bolted on to this which housed two axles bearing the winching mechanism. The side plates were held apart at the rear by a threaded iron bracing rod and bolts.

The rear axle carried a small cog and a ratchet and had square-section ends designed to hold a turning handle. The winch drum, a large cogwheel, and a brake/clutch wheel were mounted on the front axle. They interacted as follows: The small and large cogwheels were mounted on the left side. These provided the necessary gearing to lift heavy loads by winding two cables (no longer present) around the winch drum and over a double pulley at the end of the jib. The right side was dedicated to the braking mechanism. A simple ratchet was mounted on the rear axle that would have stopped the load from falling back down when being lifted. The front axle mechanism included a friction break or clutch consisting of a central wheel surrounded on its circumference by a steel band. The band could be tightened by pulling on a lever thus acting as a brake on the rotation of the winch drum. The end of the brake lever had however been broken off

The angle of the jib was fixed. The central part was wooden and octagonal in section was housed in a socket in a projection from the front plate. A further cast iron section fitted onto the upper end, holding the double pulley and the fixing point for the stays.

The head carried the name plate of the manufacturer W. & J. Galloway, Manchester. They were a major firm of engineers, boilermakers and iron founders who patented the Galloway boiler in 1848 and also carried out many large civil engineering projects.

The upper par of the crane was generally in good condition although most of the moving parts were rusty and seized. The jib and the head were slightly twisted in relation to the lower parts of the crane. The cast iron section on the end of the jib was also slightly twisted. There was a patch of rot at the bottom of the wooden part of the jib.

The base pillar was in the form of a hollow cast iron tube (Fig.14 and Plate 9). The above-ground part was 2.5m high with a flat top with a protruding pivot. The upper part of the crane rotated around the pivot, with the weight being supported by the rollers within the head box. The flange that supported the rotation support wheel was close to the ground surface.

The buried portion of the crane was 2.6m high and was a simple tube with flanges at the base. The flanges were used to attach the pillar to a 1.6m square and 0.35m deep slate block using four bolts (Plate 10). The nuts and bolts were uncorroded and were easily undone with a spanner when the two elements were separated. There were steel shims beneath three of the flanges suggesting that the slate base had been placed in the hole first and the pillar added, with shims used to ensure that it was perpendicular. An iron loop was found to run through the centre of the slate block and this had

presumably been used to lower it into the hole (Plate 11). The base had been buried in a steep-sided hole about 1.75m in diameter. The lower metre of the hole was filled with slate slabs set around the pillar and set in very hard concrete. The upper part was filled with long slate slabs packed long-side on to the pillar. These were arranged in closely packed overlapping layers without mortar or concrete.

The crane was reinstated after the construction of the new road causeway. The slate block was not reused due to health and safety considerations. The crane had to be replaced in a different position due to the realignment of the road causeway (as agreed with Cadw). It has been retained in a functionally correct position beside the sidings (See Plate 22 for a general view of this area after reinstatement).

Rails and loading area 3 (14)

Rails had survived at the north end of the sidings (see Fig. 9). The southern end of the surviving rails was truncated by the new road carriageway. No further remains were uncovered.

Weighbridge house 3 (11) (Grade II listed)

The weighbridge house dates from the 1880s and comprised a square building of slate blocks along with a later lean-to on the eastern side. This was mostly unaffected by the works. It was noted before works commenced that the remains of the roof were in an unstable condition. Most of the major timbers were intact but rotten and a few slates had survived. Several of the roof timbers collapsed during a storm in January 2007. There has also been deterioration in other timber elements, most notably a window frame on the southern side. It should be noted that the deterioration in the condition of the structure was not a result of the road improvements.

The foundations for the new road revetment were dug close to the edge of the eastern lean-to. This was carried out under archaeological supervision. The ground beneath the building was found to be sound and the foundation trench was dug without disturbing the building.

Raised area to the north of Weighbridge House – including tank 3 (30)

The area to the north of the weighbridge house consisted of a raised area abutting the road causeway 3 (32). This contained a gate, railings and slate path which formed the pedestrian access to the powerhouse. This had previously been damaged by a road traffic accident and was truncated by the new road carriageway. The damaged railings were repaired as part of the reinstatement process. To the north of this was a raised area that supported tank 3 (30) and contained a shelter, cut into the revetment wall and roofed with large slate slabs. A second shelter formerly stood at the northern end. A record of this area had been made during the pre-construction recording (Hopewell 2005). It was truncated on the eastern side by the new road carriageway. The revetment wall on the western side was however retained for much of its length and the shelter was undisturbed. The tank was removed and stored at Llechwedd quarries. It was noted that there were supports for a second tank to the north of tank 3 (30) but there was nothing to suggest that a second tank had been present. The northern end of the raised area was truncated by the construction work. Most of the removed revetment wall was reinstated but the change in alignment and added width of the new road causeway resulted in some truncation and it was not possible to reinstate the tank.

The Road causeway 3 (32), Llechwedd sidings link tunnel 3 (2), Afon Barlwyd tunnel 3 (7) and incline tunnel 3 (5)

The road causeway and the three tunnels were demolished in advance of the construction of the new causeway. The western side of the causeway was re-photographed after removal of trees as a supplement to the pre-construction phase of detailed recording. A watching brief was kept during most of the demolition. The demolition was carried out in stages using a tracked excavator. The upper part of the causeway was removed in 1.0m to 1.5m deep layers. The lower part including the tunnels was dug out from above starting at the southern end. The demolition method allowed some details of the phasing of the various parts of the causeway to be seen although there was little opportunity for detailed recording. The findings of the watching brief are shown on Fig. 10.

The road causeway was shown to be a complex multiphase construction that had been added to and modified in order to accommodate changes to the rail and road systems. There were two principal phases visible although both were modified at various times. Phase 1 was a road that was only slightly raised and was offset a few metres to the east of the pre-improvements A470 road causeway. Phase 2 was the A470 road embankment. The phase 1 road was most clearly visible in the area around the Afon Barlwyd tunnel. A straight joint and a keystone had been previously recorded within the tunnel roof indicating that an earlier, narrow bridge had been incorporated into the road causeway. Further fragments of the earlier roadway were uncovered as demolition progressed. A length of block stone revetment was uncovered within the base of the phase 2 causeway (i.e. at the modern ground level) between the link tunnel and the Afon Barlwyd tunnel (Plate 12). This marked the western edge of the earlier road and ran 4m to the east of the western edge of the road viaduct and was aligned with the straight joint in the bridge masonry. No remains of the road surface were identified and the eastern edge of the road could not be recognised. The base of the phase 1 road consisted of orange clay which could be traced across the lower parts of the bridge tunnel and on the northern side of the river.

The tunnel arch was exposed during the demolition confirming that two phases of masonry were present. The straight joint was found to be parallel to the skewed eastern arch of the tunnel and the position of the keystone in the eastern portion of the masonry confirmed that this belonged to the earliest phase of construction. This comprised a 5.6m wide bridge set at an angle to the later road causeway. The western edge of the phase 1 road revetment continued on the northern side of the river but could not be traced for more than 6 or 7m. The eastern side was initially visible as a length of rough facing running from the bridge abutment to the dwarf wall. As demolition progressed it became obvious that the facing continued and that the dwarf wall was a later addition and had been built in front of the phase 1 revetment. Fig. 15 shows a semi diagrammatic section through the road causeway and was compiled from photographs and on site sketches. It is drawn to scale but the individual stones were not recorded. The stonework on the drawing illustrates the different masonry styles and size of the stones used, and was extrapolated from samples of each phase that were recorded as demolition progressed.

The western wall of the phase 2 road causeway was built in front of the phase 1 wall in two stages. The lower 3m was built from large stones the largest of which were 0.7m square blocks. This part of the revetment utilised slate and a variety of other stones. The space between the outer wall of the phase 2 causeway and the phase 1 road revetment was infilled with flat slate slabs, laid horizontally. This construction style extended above the phase 1 road. The slate infill could be seen to overlie the phase 1 road, with the interlocking slabs tying the two phases of masonry together. The rest of the causeway facing was built from small slate blocks and slabs, some laid as headers and some as stretchers, with distinctive protruding long stretchers tying the facing into the core of the structure. The eastern wall of the road causeway was set back from the western edge of the phase 1 revetment, and was built directly on top of the clay infill of the phase 1 road (Plate 13 and Fig. 15).

The core of the upper phase 2 causeway consisted of small slate waste. General construction details previously recorded during the pre-construction recording were mostly confirmed during the demolition process. The facing appeared to have originally been drystone and was pointed at a later date. The southern half had been rendered with spray concrete. The facing on both sides incorporated protruding piers. These were not bonded into the rest of the facing and appeared to represent an intermediate stage of the construction, perhaps indicating that the causeway was built in sections.

The demolition of the causeway between the Afon Barlwyd Tunnel and the Incline Tunnel was carried out in several stages not all of which were accompanied by a watching brief. As a result the alignment of the phase 1 masonry as it approached the incline tunnel was not recorded. The Incline Tunnel was demolished in several stages under difficult conditions making detailed archaeological recording difficult. Enough detail was however recovered to allow the phasing to be recorded.

A detailed record had been made of the tunnel before demolition and this was supplemented by a survey carried out by Gwynedd County Council in 1975. This survey had been conducted in order to assess the tunnel for an engineering project that would have entailed running a pipe through it and blocking it up. The proposed works were not carried out but the causeway and tunnel were probably rendered in concrete at this time.

The tunnel stood close to the base of the incline from the Llechwedd quarry and formerly carried the 1'11½" railway to a link with the Ffestiniog Railway. The arch on the western side was still open and consisted of very rough uncut slate voussoirs (stones forming the arch) with an equally rough uncut keystone. The arch was 3.7m high and 3.1m wide. It was set at a slight angle to the embankment wall with the southern side set back 0.9m below the wall above. The arch sprang from rough block masonry of the same style as the lower 2m of the embankment. The inside of the tunnel had been spray concrete rendered and was partially blocked 3.0m from the tunnel mouth by a reinforced concrete deck. This reduced the height of the tunnel to 1.5m. Three phases of propping and supports were visible suggesting that the arch may have become unstable. The earliest was the rotten remains of wooden props, this was succeeded by curving iron supports. The iron supports were superseded by the concrete deck which was supported by iron girders. A stone wall blocked the western end of the arch above the concrete deck. A date of 1935 was painted on the tunnel roof close to the eastern end.

The partially blocked end of the original archway was visible in the eastern wall of the road causeway (Plate 14). The reduced height tunnel continued beneath the dwarf wall. This end of the tunnel was 2m wide, mostly below ground level and was almost completely blocked with slate rubble.

Further information about the incline tunnel was recovered during the demolition process. A straight joint was visible on the southern side of the tunnel 4m from the eastern side of the revetment (Plate 15). This was also close to the line of the blocking wall above the concrete deck suggesting that the deck had been put in place because the phase 1 masonry was unstable. Unfortunately this could not be confirmed because little was seen of the tunnel roof on the east side of the revetment because of limited access during demolition. The remains of the western side of the phase 1 road revetment were uncovered within the lower part of the phase 2 road causeway to the north of the tunnel (Plate 16). The western end of the tunnel abutted the revetment, demonstrating that the eastern side of the tunnel was part of the phase 1 road. The line of the eastern edge of the phase 1 road was less clear. The end of the arch, partly hidden by the dwarf wall, was visible within the masonry of the road causeway (Plate 14). The end of the arch was however not aligned with the inner end and was within phase 2 masonry suggesting that it had been truncated and modified when the later road causeway was built. No further details were uncovered during the demolition.

The link tunnel was demolished and was of a markedly different construction to the other two. It consisted of a segmented brick arch, running at an angle to the embankment, consisting of four unbonded courses, springing from stone piers. Rectangular piers extended from the facing 0.45m to either side of the archways on both the east and west side and a series of slate slabs ran above the brickwork on both sides. The tunnel was 2.02m high and 4.3m wide. The foundations were fairly shallow and it could be seen that the tunnel stood at a higher level than both the river and incline tunnels. It appeared to have been inserted into the causeway as opposed to being part of the phase 2 masonry.

The new road causeway

The old causeway was replaced with a new concrete structure faced with slate. This was constructed in a way that reflected but did not copy in detail the original structure. Three new tunnels were constructed in order to retain the functional understandablity of the site using galvanised steel formers. The causeway was faced with slate that included protruding stone piers and the distinctive regularly-spaced protruding stones that characterised the original masonry (see Plates 21 and 23)

The Hydro-electric Powerhouse 3(1)

The powerhouse was not directly affected by the works but an iron pressure vessel and pipes that were formerly joined to the powerhouse (Plate 17) were removed from the site and taken to Llechwedd. The function of this device is unknown. It was one of a pair that was formerly fixed to the powerhouse (see 1960s photograph Plate 18). They appear to have been deigned to resist pressure so they could have formed some kind of pressure relief system.

5. CONCLUSIONS AND SUMMARY

The watching brief successfully recovered a considerable amount of new information particularly in the area of Llechwedd Sidings. The development of the causeway from a low structure bridging the river and tramway, to the final 7.3m raised embankment is of particular interest. Detailed recording in the sidings also identified several phases of development. This has allowed us to produce a fairly detailed account of the development of the site (see Fig. 10):

The earliest structures were probably the incline and railway which were built in 1854 (Jones and Hatherhill 1977). The 1840 OS map shows the road running to the east of its present position. The first improved road toward Dolwyddelan was completed in 1855 (Pritchard 1961). This road appears to have run slightly to the west of the present road (Caernarfon Record Office X Plans RD 17). The road was adopted by the Porthmadog and Beaver Pool Turnpike Trust by 1863. Records of subsequent improvements were lost but the road was running on its present alignment by 1871 (Caernarfon Record Office LNWR plans 8). The phase 1 road at the exchange sidings was therefore presumably built by the Turnpike Trust.

The phase 2 raised road causeway was in place when the standard gauge railway was opened in 1879 (see Plate 4). A temporary station was located immediately outside the Pant yr Afon tunnel mouth. The phase 1 railway arrangement was still in operation at this time with a simple link from the incline to the Ffestiniog railway. By 1881 the phase 2 railway arrangement was operational (Plate 5). The exchange sidings and weighbridge had been completed allowing Llechwedd slates to be transferred to the standard gauge LNWR railway. The Ffestiniog Railway link was still running. The temporary station had been replaced with a more convenient station close to the centre of town. A new tunnel linking the sidings to the incline had been inserted into the road causeway and ground levels beside the sidings and river were significantly higher than in 1879.

The hydro-electric turbine station was added in 1904. The concrete deck was added to the incline tunnel in 1935. The tunnel would have been low but still potentially operational. It is not known if remained in use beyond this time but it would certainly have been abandoned when the Ffestiniog railway ceased operations in 1946. The area around the tunnel mouth was infilled with slate after abandonment and the phase 3 railway arrangement, consisting of a simple link between the incline and the exchange sidings was constructed. The sidings continued in use and were used from around 1958 to transfer slates to both the standard gauge railway and lorries. In 1964 lorries could access the working levels at Llechwedd and the incline and exchange sidings were finally abandoned (Jones and Hatherill 1977).

The temporary diversion successfully avoided damage to the listed structures on the western side of the sidings and preserved (with some minor reconstruction work) all of the features not truncated by the road causeway. The features between the eastern side of the causeway and the Afon Barlwyd were mostly destroyed principally as a result of the wider footprint of the replacement road causeway.

There was some significant archaeology across the Crimea pass. The remains of the Crimea Inn were mostly unaffected by the road and several minor industrial and transport related sites such as a dump of boots and a roadside well were also avoided. The most significant new information was the detailed line of the pre-turnpike road that went out of use in about 1854. This was a narrow meandering track, significant enough to be shown on Evans' map of Wales in 1796. This road was cut by the current road improvements in several places and was shown to vary from a simple trackway cleared of stones with some very basic metalling to an unimproved and eroded multi-stranded trail.

6. REFERENCES

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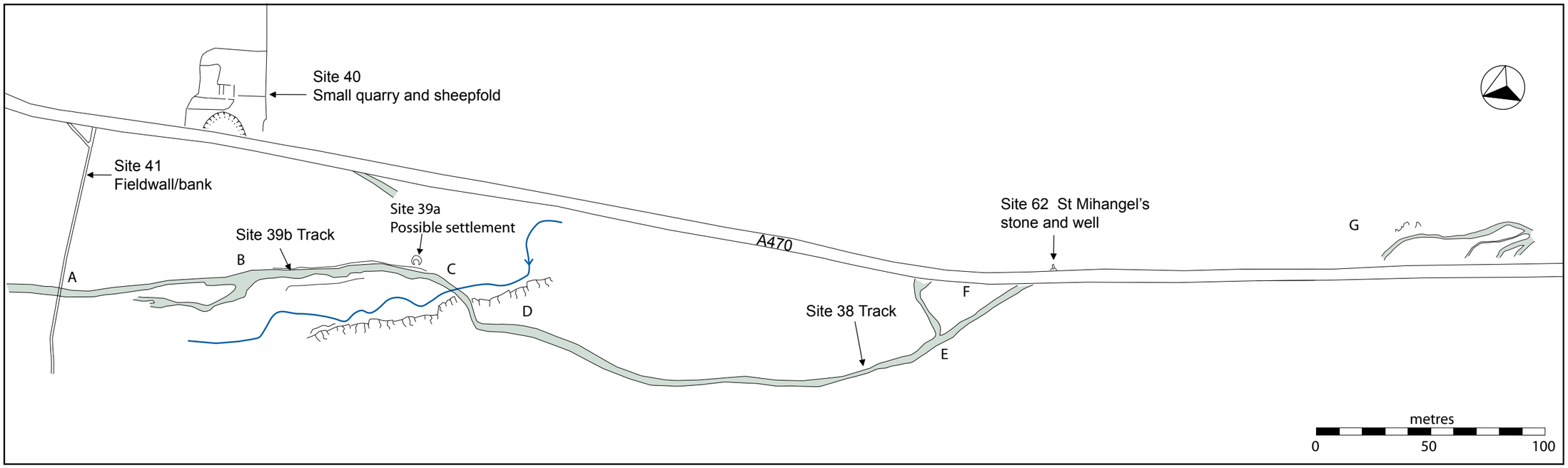

Fig. 1 Location of sites part 1 of 6

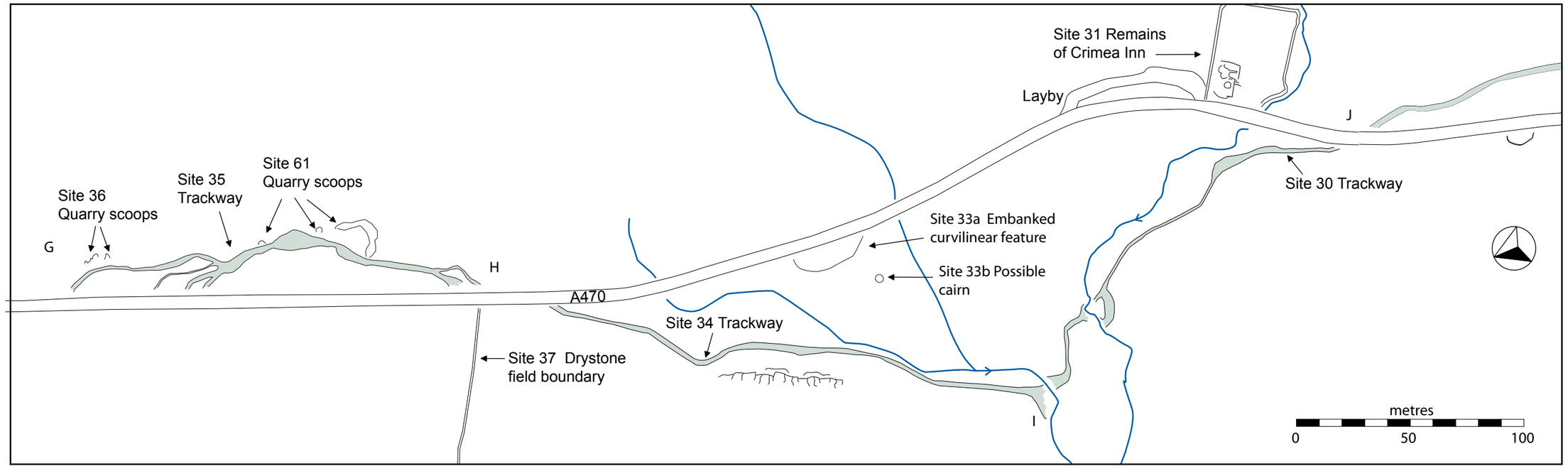

Fig. 2 Location of sites part 2 of 6

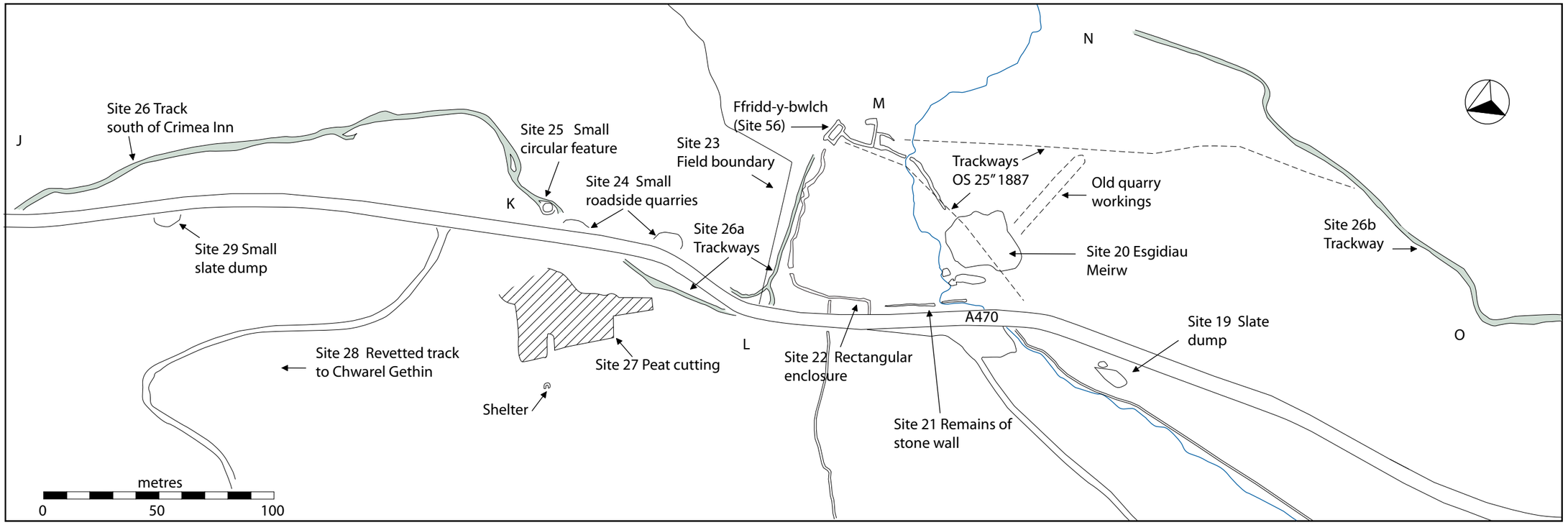

Fig. 3 Location of sites part 3 of 6

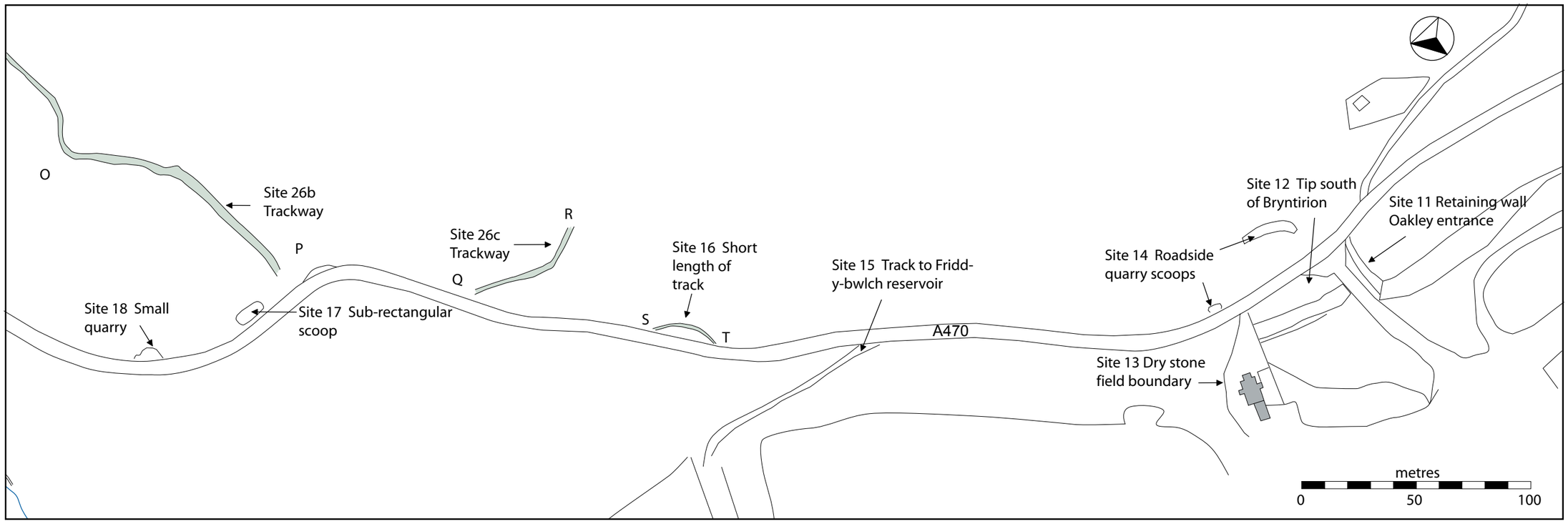

Fig. 4 Location of sites part 4 of 6

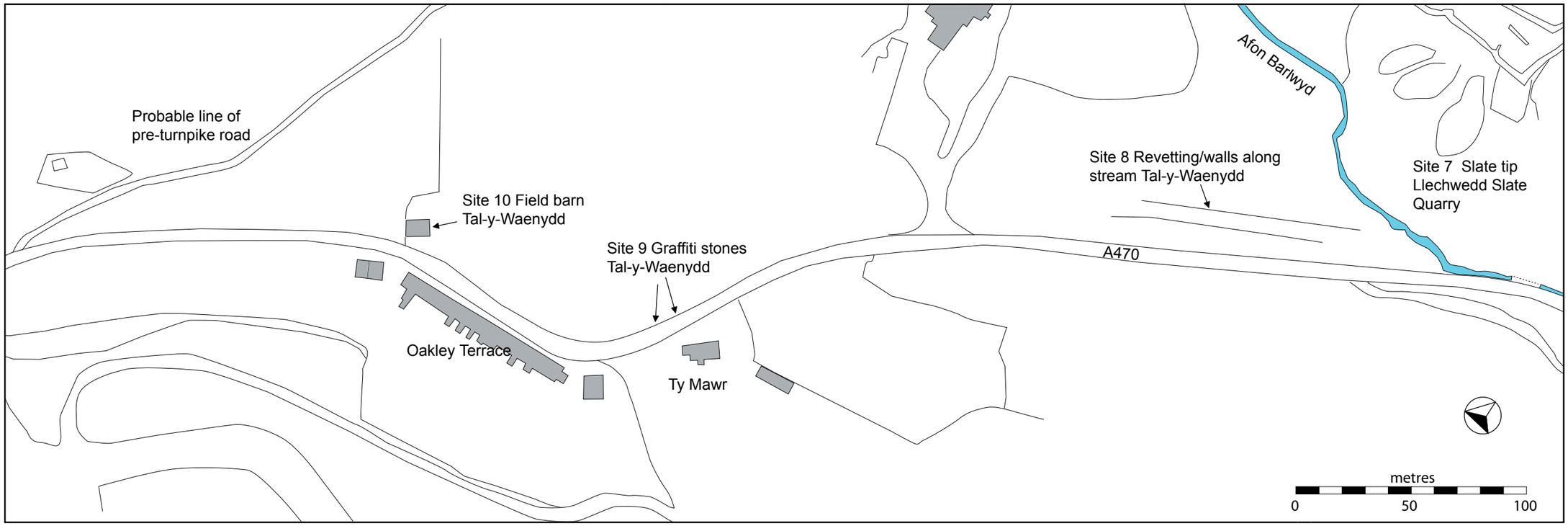

Fig. 5 Location of sites part 5 of 6

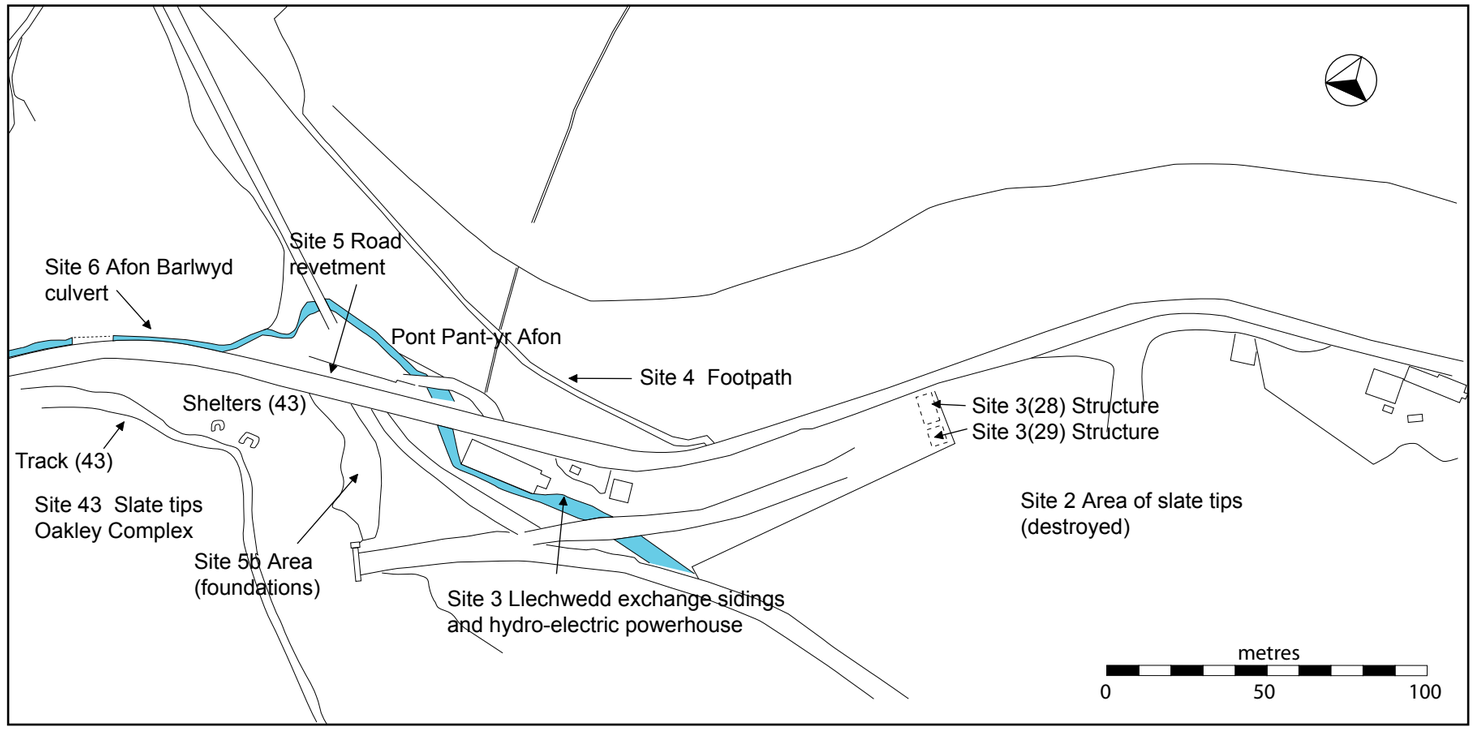

Fig. 6 Location of sites part 6 of 6

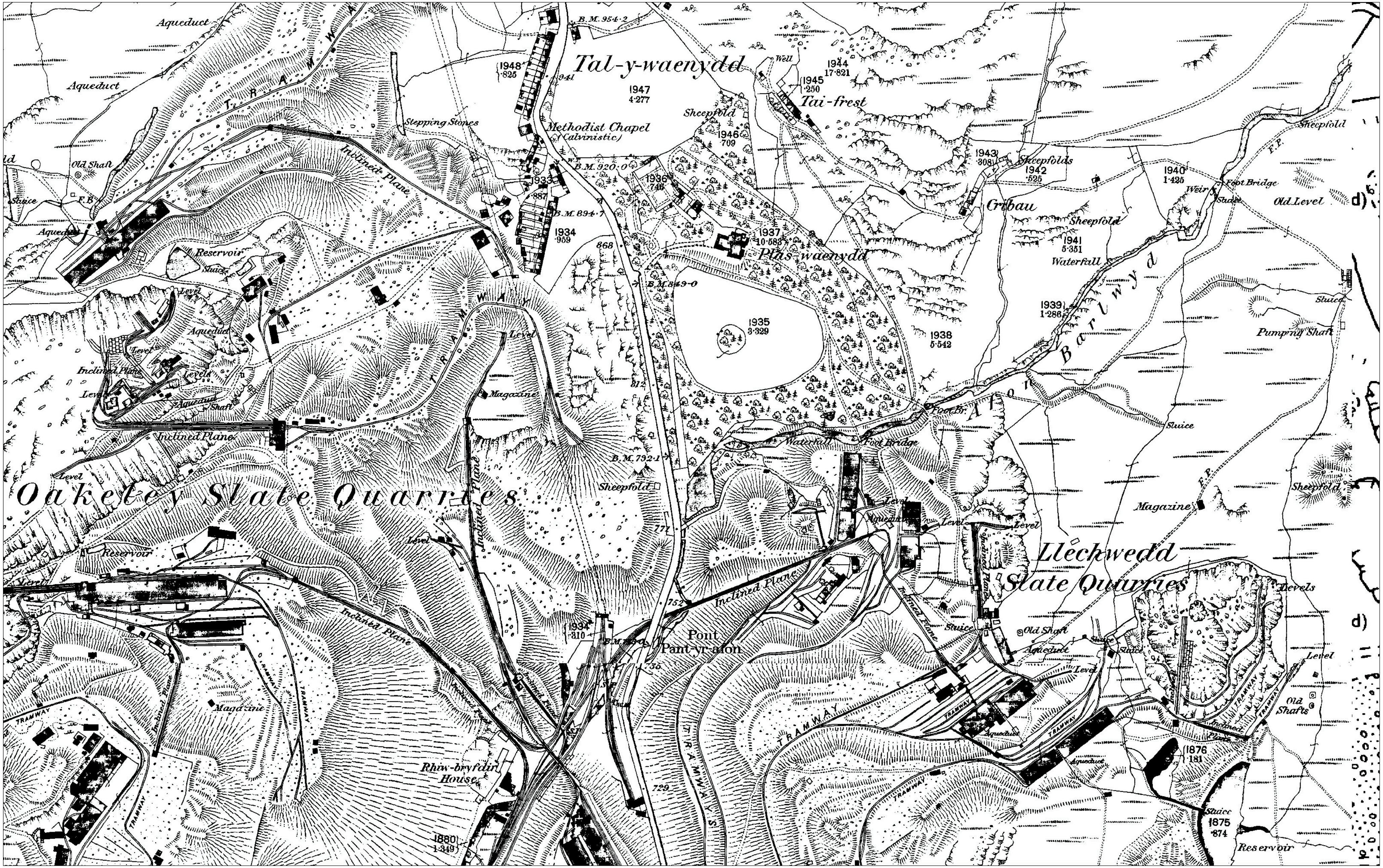

Fig. 7 Ordnance survey 25" 1889

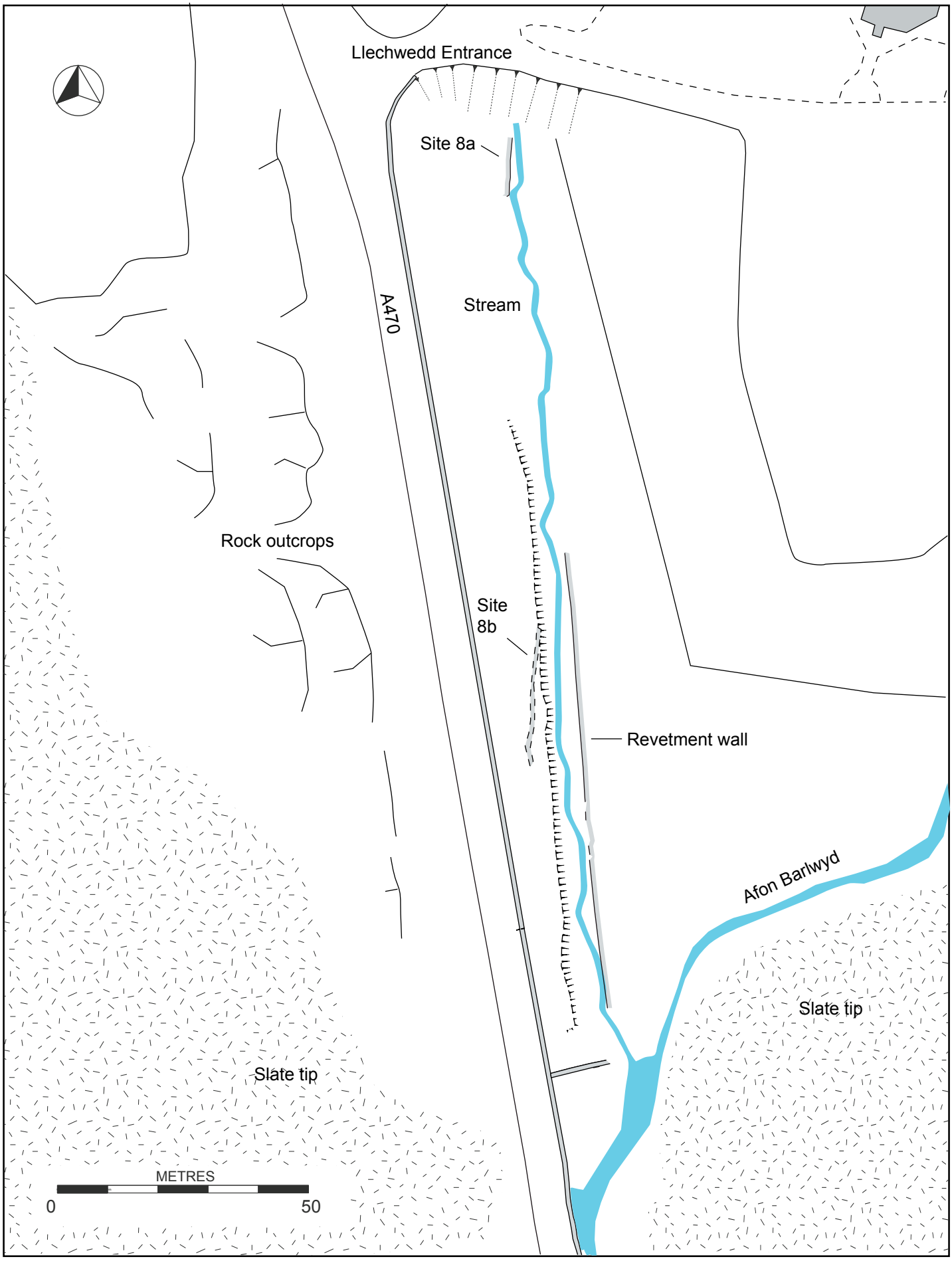

Fig. 8 Site 8 revetting/walls alongside stream

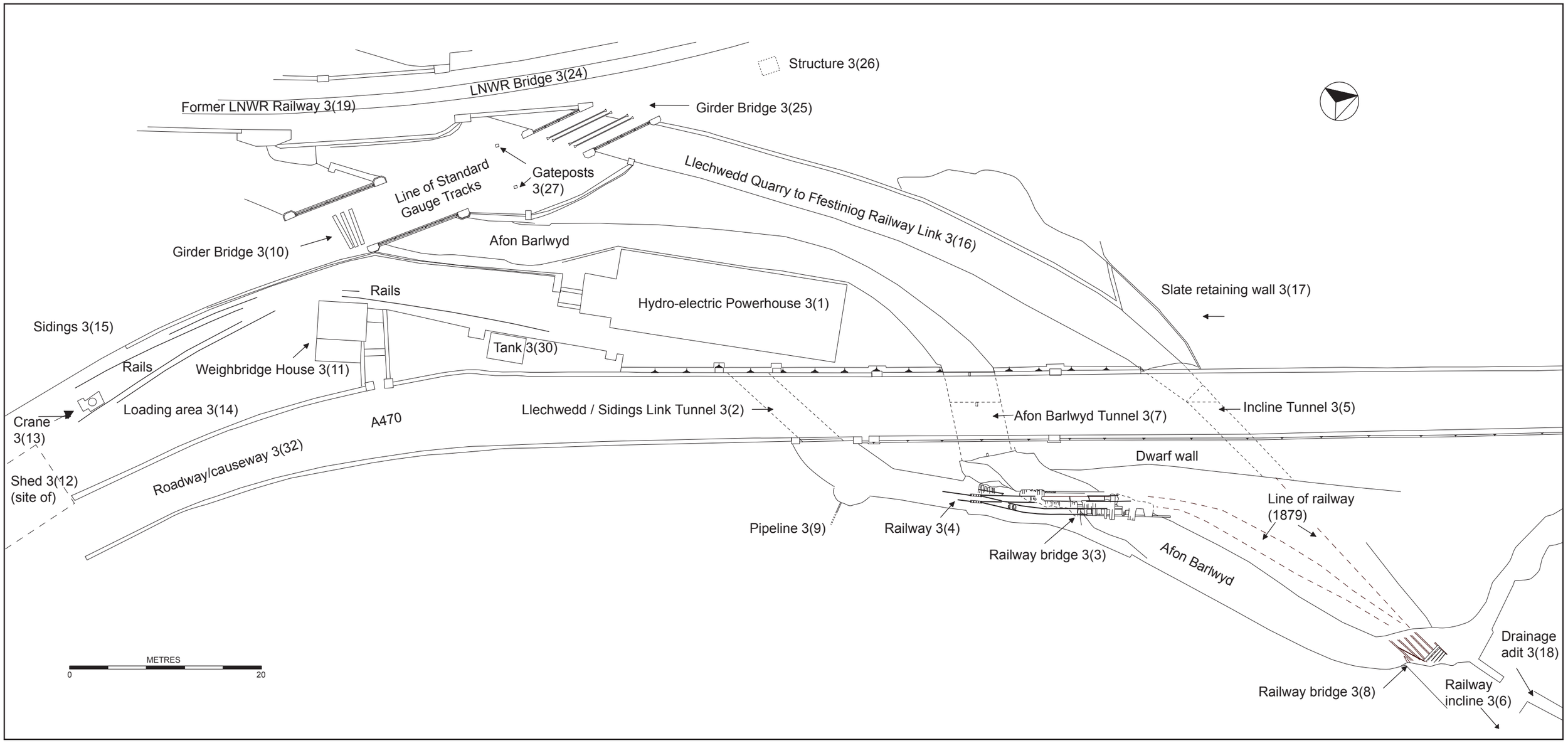

Fig. 9 Site 3 Llechwedd exchange sidings

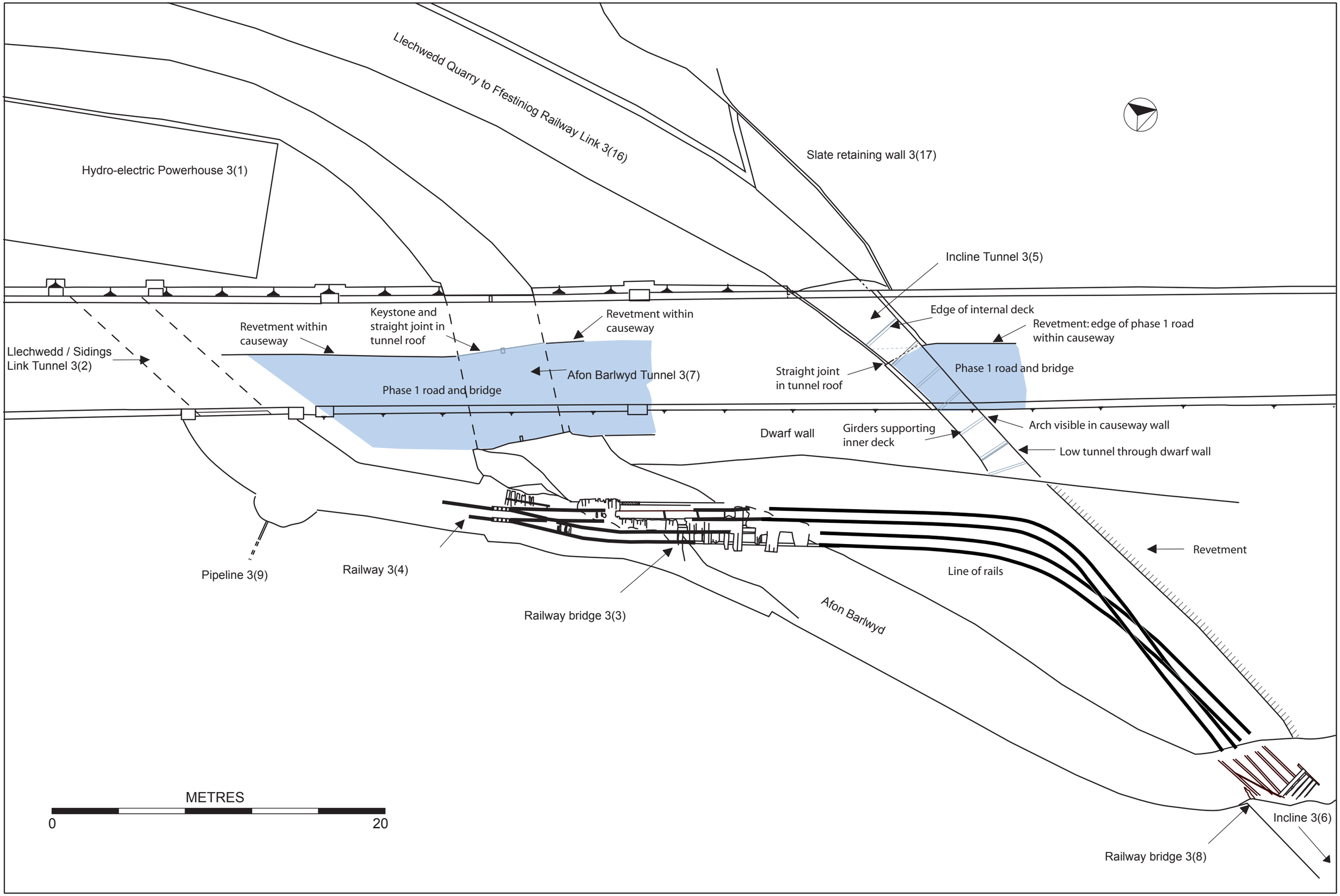

Fig. 10 Llechwedd exchange sidings, north end showing details of the railway 3(4) and road causeway 3(32)

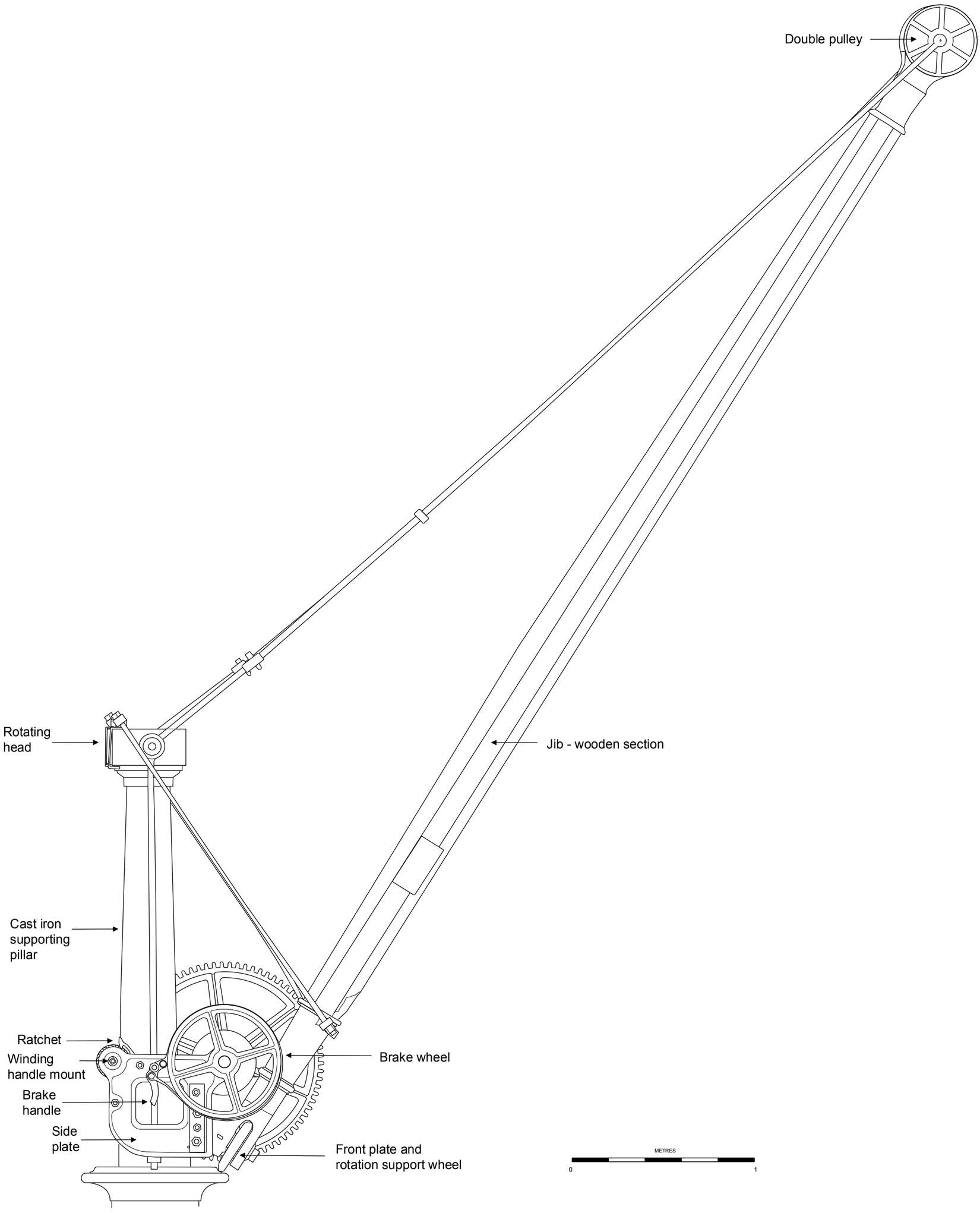

Fig. 11 Site 3(13) Crane right elevation

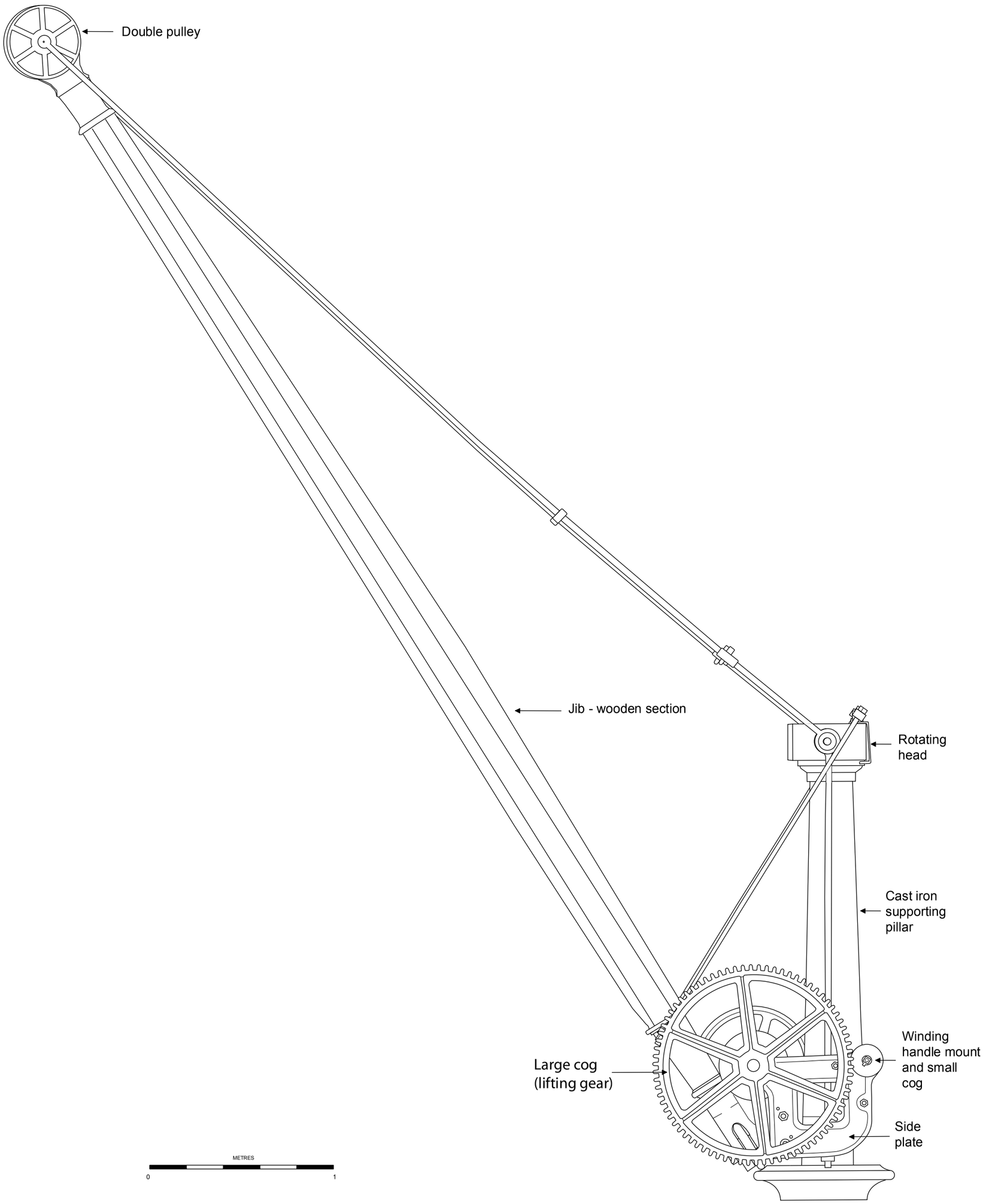

Fig. 12 Site 3(13) Crane left elevation

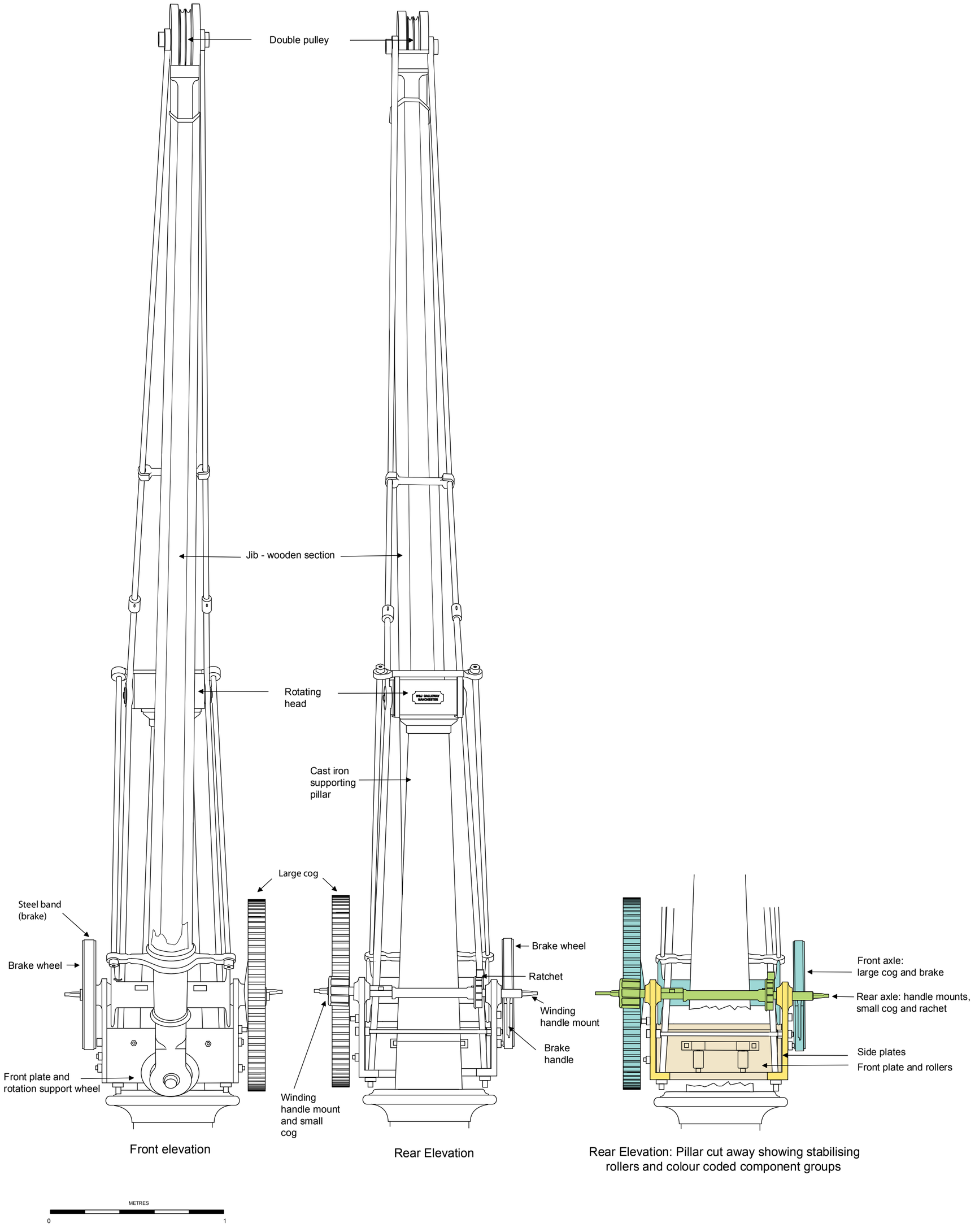

Fig. 13 Site 3(13) Crane front and rear elevations and cut away

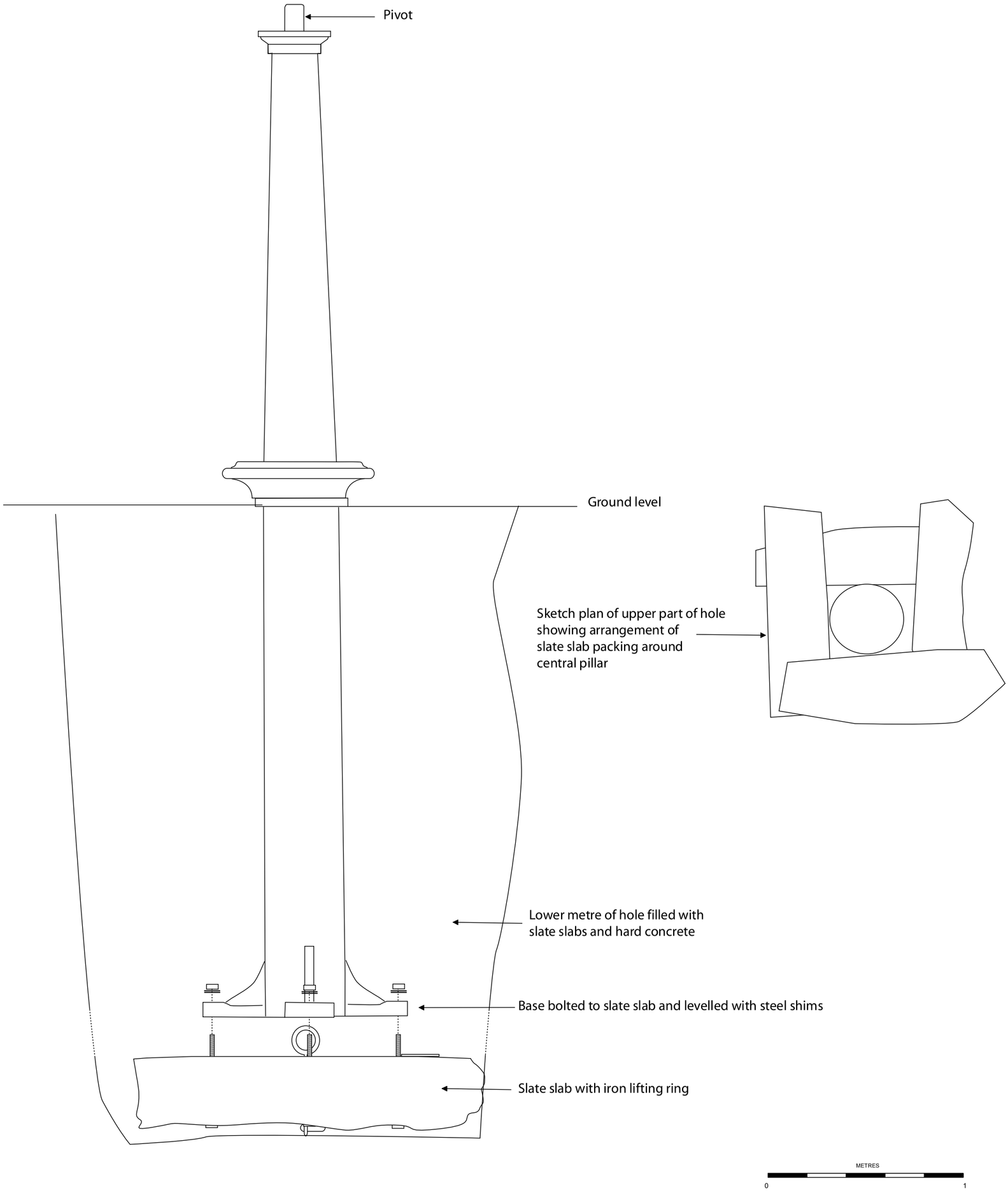

Fig. 14 Site 3(13) Crane base

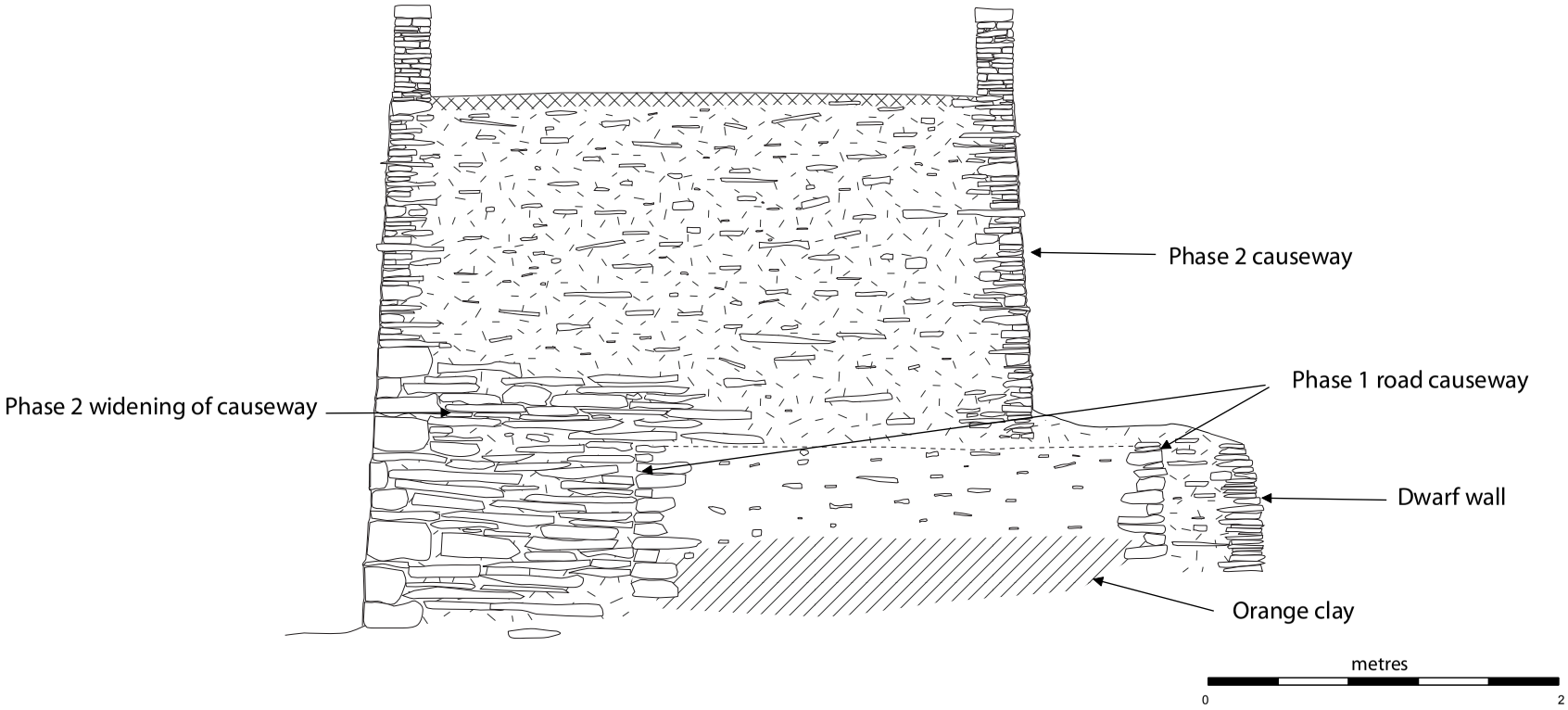

Fig. 15 South facing sketch section through site 3(32) road causeway 5m north of Afon Barlwyd tunnel

Plate 1 Section through Site 12, tip south of Bryntirion

Plate 2 Site 8, Revetting/ walls along stream

Plate 3 Site 3(16) Llechwedd to Ffestiniog Railway link after clearance

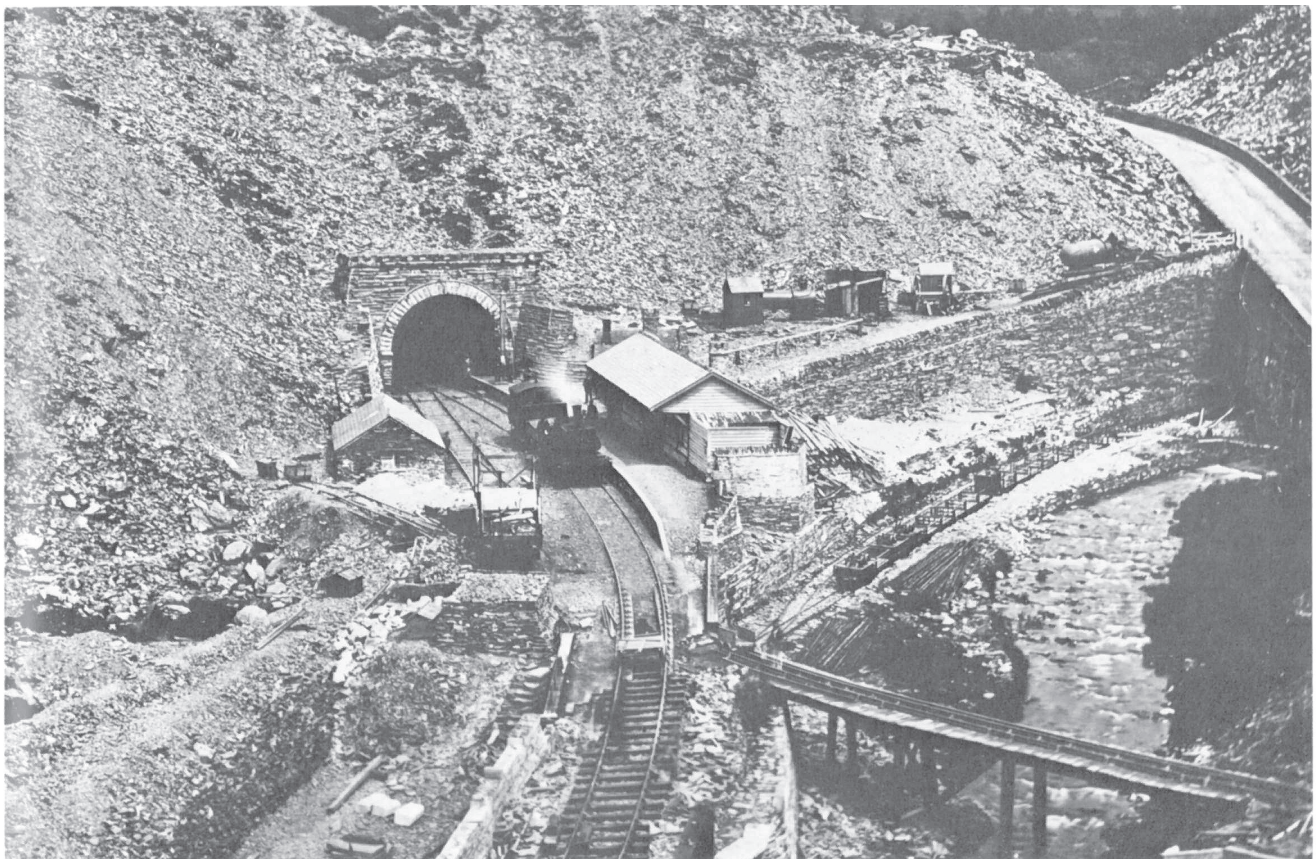

Plate 4 Pant yr Afon in 1879 (British Railways L.M. Region)

Plate 5 Pant yr Afon in the 1880s (R. H. Bleasdale)

Plate 6 Site 3(17) Slate retaining wall

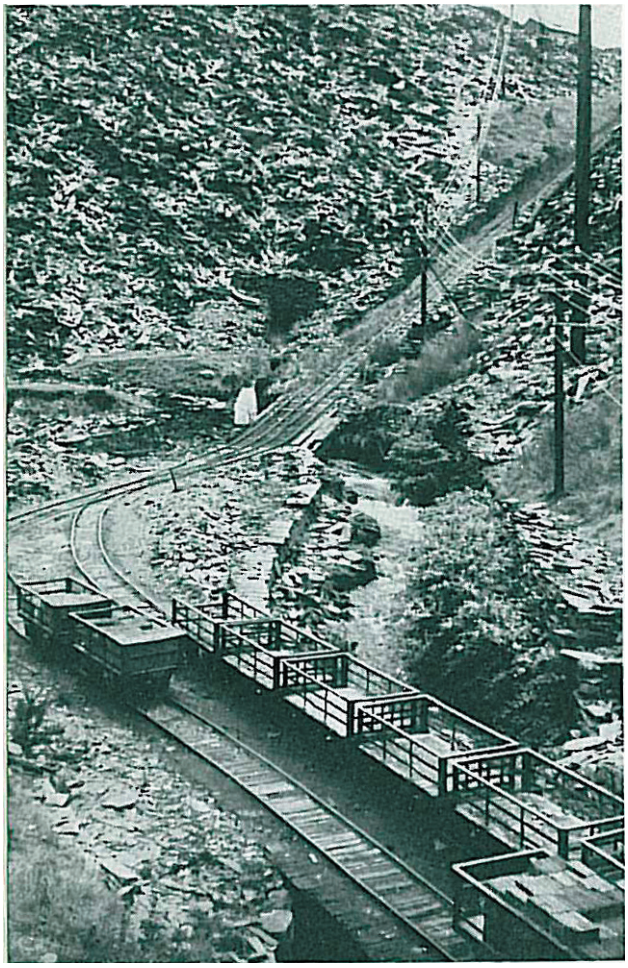

Plate 7 Incline 3(16) in the 1950s (N. F. Gurley)

Plate 8 Removal of the upper part of Crane 3(13)

Plate 9 Site 1(13) The crane pillar

Plate 10 Site 1(13) The crane pillar: flanges and block

Plate 11 Site 1(13) The crane: Slate block showing hook, shims and bolts

Plate 12 Site 3(3) Road Causeway: Phase 1 revetment between Link and Barlwyd tunnels

Plate 13 Site 3(32) Road causeway: Section through causeway and phase 1 road, N of Barlwyd tunnel

Plate 14 Site 3(32) Road causeway: Blocked incline arch in E side of causeway

Plate 15 Site 3(5) incline tunnel after removal of road causeway, joint in masonry

Plate 16 Site 3(3) Road causeway: Phase 1 revetment to the east of the incline tunnel

Plate 17 Site 3(1) Hydroelectric power station: Iron vessel

Plate 18 Pant yr Afon in the 1960s (Maurice Spencer)

Plate 19 The temporary diversion

Plate 20 Llechwedd Quarry to Ffestiniog Railway Link 3(16). Trackbed after reinstatement

Plate 21 The east side of the exchange sidings after reinstatement

Plate 22 Llechwedd exchange sidings after reinstatement

Plate 23 Llechwedd exchange sidings after reinstatement

Plate 24 The replacement road causeway, west side

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