

RATCOED RESERVOIR, GWYNEDD

Archaeological Mitigation



Ymddiriedolaeth Archaeolegol Gwynedd
Gwynedd Archaeological Trust

Ratcoed Reservoir, Gwynedd

Archaeological Mitigation

Historic Environment Record Event Primary Reference Number 45407

Prosiect Rhif / Project No. G2609

Adroddiad Rhif / Report No. 1483

Prepared for: Natural Resources Wales

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Written by: Michael S Lyles

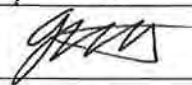
Front cover image: View of reservoir PRN 9514 from top of dam (SE side). (No Scale or ID). View from south-east. (archive reference: G2609_021).

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FIGURE 03 Reproduction of Arcadis Darwing Number 10019759-X-ARC-00-XX-DR-CE-RAT0100-02

FIGURE 04 Reproduction of Arcadis Darwing Number 10019759-X-ARC-00-XX-DR-CE-RAT0103-02

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Plate 23: View of pool and modern outflow pipe/sluice within PRN 9153. (No Scale or ID). View from south-east. (archive reference: G2609_024).

CRYNODEB ANNHECHNEGOL

Ym mis Mawrth 2019, Comisiynwyd Ymddiriedolaeth Archeolegol Gwynedd (GAT) gan Cyfoeth Naturiol Cymru (CNC) i ymgymryd â lliniaru archaeolegol fel rhan o gynllun terfynu cronfa ddŵr yn Ratcoed, Aberllefeini, Gwynedd. Roedd y lliniaru archeolegol yn cynnwys cofnod sylfaenol o'r gronfa ddŵr, yr argae a'r ffrydiau bwydo. Nododd y cofnod sylfaenol un nodwedd newydd ffrwd bwydo bosibl ar ymyl ogledd-orllewinol yr argae.

NON-TECHNICAL SUMMARY

Gwynedd Archaeological Trust was commissioned by Natural Resources Wales to undertake archaeological mitigation as part of a reservoir discontinuance scheme at Ratcoed, Aberllefeini, Gwynedd. The archaeological mitigation consisted of a basic record of the reservoir, dam and feeder leats. The mitigation also identified a possible additional feeder leat on the north-western edge of the dam.

1 INTRODUCTION

Gwynedd Archaeological Trust (GAT) was commissioned by Natural Resources Wales (NRW) to undertake archaeological mitigation as part of a reservoir discontinuance scheme at Ratcoed Reservoir, Aberllefenni, Gwynedd (NGR SH78651232; postcode: SY20 9RY; Figure 01 and 02). The archaeological mitigation targeted a reservoir system incorporating three reservoirs with associated feeder leats that were associated with Ratcoed slate quarry to the southwest. The main focus of the mitigation was the largest reservoir (Primary Reference Number (PRN) 9154), comprising a triangular-shaped reservoir with a dam at the southwest end that measures 2m wide and c.1m high. The reservoir no longer holds water as the dam has been breached and the stream that was once held back now flows through (Figure 03). The discontinuance works will include formalising the breach to leave it stable to comply with safety requirements under the Reservoirs Act; as detailed on Arcadis drawing no. 10019759-X-ARC-00-XX-DR-CE-RAT0100-02 (Figure 03), this will include widening the breach, with the resultant fill being placed on one of the shoulders of the dam (Figure 04).

The archaeological mitigation comprised a record of the affected reservoir and associated earthworks. This included a photographic record, a brief written description and an archaeological survey, combining a topographic survey and archaeological interpretation. As well as reservoir 9154, a basic record was also completed of the other elements of the reservoir system that were accessible, to place the information in context.

The archaeological mitigation was undertaken in March 2019 and was completed in accordance with the following guidance:

- Standard and Guidance for the archaeological investigation and recording of standing buildings or structures (Chartered Institute for Archaeologists, 2014);
- Management of Archaeological Projects (English Heritage, 1991);
- Management of Research Projects in the Historic Environment: The MoRPHE Project Managers' Guide (Historic England, 2015).

Gwynedd Archaeological Trust is certified to ISO 9001:2015 and ISO 14001:2015 (Cert. No. 74180/B/0001/UK/En) and is a Registered Organisation with the Chartered Institute for Archaeologists and a member of the Federation of Archaeological Managers and Employers (FAME).

The GAT HER Enquiry Number for this project is GATHER1077 and the Event PRN is 45407.

1.1 Fieldwork Aims and Objectives

The key aims and objectives of the mitigation were to:

- Complete a record and survey of the reservoir and associated earthworks located within the discontinuance area;

2 ARCHAEOLOGICAL AND HISTORICAL BACKGROUND

Ratgoed Reservoir (Primary Reference Number (PRN) 9154) is one of a group of three reservoirs that appear to have supplied Ratgoed slate quarry (PRN 20489) downslope to the southwest. The original quarry workings at Ratgoed date back to before 1840; the quarry expanded in the 1850s and was being run under the auspices of the Alltgoed Consols, a partnership that also owned the nearby Gaewern and Braich Goch quarries. In 1864, a tramway was opened connecting the quarry with the newly opened Corris Railway at Aberllefenni, which prompted significant expansion work at the quarry. The quarry declined in output in the late nineteenth century and in 1900 the remaining workforce was dismissed. Quarry work resumed in the early twentieth century, but in 1946 the quarry finally shut for good (Richards, 1994). A report on the quarrying landscapes of Gwynedd, prepared by GAT (Davidson, et. al. 1994), described the quarry as a “remarkably well-preserved site despite having been engulfed by a conifer plantation” (ibid.: 25). The three reservoirs (PRN 9152, 9153 and 9154) are shown on the First and Second Editions of the Meirionithshire 1-inch to 25-mile Ordnance Survey County Series Map Sheet VIII.13, published in 1889 and 1901 respectively (Figures 05 and 06). The reservoirs are shown in close proximity to each other, with reservoir 9154 shown as the largest of the three. A series of leats (PRNs 9155 and 9160) are shown feeding reservoir 9154, which in turn appears to overflow into the smaller reservoirs to the west and south, as well as to the local stream.

3 METHODOLOGY

3.1 Introduction

The archaeological mitigation comprised a record of reservoir 9154 and associated earthworks. This included a photographic record, a brief written description and an archaeological survey, combining a topographic survey and archaeological interpretation. The archaeological mitigation was undertaken during March 2019. In addition, the associated reservoirs (PRN 9152 and PRN 9153) and leats were visited and recorded, , although access was restricted due to extensive forestry plantations.

Photographic images were taken using a digital SLR (Nikon D40) camera set to maximum resolution (3008 × 2000 6.1 effective megapixels) in RAW format; a photographic record was maintained on site using GAT pro-formas and digitised in Microsoft Access as part of the fieldwork archive and dissemination process. Photographic images were archived in TIFF format using Adobe Photoshop; the archive numbering system was G2609_001 to G2609_024 ([Appendix II](#)). A photographic ID board was used where practical to record site code and image orientation. The written description was completed using a GAT pro-forma and described the current form of the reservoir dam as well as any associated earthworks.

The topographic survey was completed using a combination of offset measurements and review of the client supplied topographic data. This information was then used in tandem with the photographic and written record to prepare an archaeological interpretation of the reservoir and associated earthworks.

4 RESULTS

4.1 Introduction

GAT visited the former reservoir of Ratgoed slate quarry, Gwynedd on a cold, misty and drizzly day. Access to the former reservoir was gained via an established and well maintained forest trackway from Aberllefenni to the west of Ratgoed (Figure 02; Plate 1). The trackway led straight up to the reservoir system, with the current water course discharging through a modern sluice placed under the trackway (Plates 2 and 24). The area was heavily overgrown, including scrub and forestry plantations. As a result, visibility of the individual dams was limited, and there was no opportunity to view the reservoirs and associated leats as a collective whole in the landscape. Access was possible for reservoirs 9154 and 9153, but reservoir 9152 was overgrown with trees and was not accessible.

The general outlines for reservoirs 9154 and 9153, as well as for feeder leat 9158 could be discerned despite the overgrowth, and corresponded with the outline displayed on Ordnance Survey historic mapping (Figures 05 to 07). In particular, the embankment break of slope was still prominent on PRN9153 (Plate 4 and 5). For the purposes of the basic record, the dam crest and embankment on the western side of reservoir 9154 (Figure 07), was assigned a new PRN number, 77200.

A possible additional leat was identified to the north-west of reservoir 9154, near the dam edge (PRN 77201; Figure 07: Plates 13 to 14) comprising a trench leading to reservoir 9154 from higher ground. The trench was snake like in shape with vertical sides, with a length of 14m, width of 2.5m and a depth of 0.90m. Due to its elevation leading down to the reservoir it can most likely be interpreted as part of the existing feeder system. As it was not visible on the Ordnance Survey historic mapping, it was possibly associated with later quarry workings.

4.2 Gazetteer of features

For the purposes of the basic record, the reservoir system was recorded as a series of features that are presented below as a gazetteer (cf. Figure 07). Where deemed appropriate, further recommendations are given based on the current understanding of the scheme and discontinuance methodology. Any amendments to this methodology may result in a requirement to amend the recommendations. In total 5 features were identified and recorded.

Feature Number	01 - Plate (7-12, 17-18)
Site name	Ratcoed Reservoir
PRN number	9154
Grid reference	Centred on NGR SH786123
Period	19 th Century
Site type	Reservoir
Assessment category	C
Description	Reservoir PRN 9154 is the larger of the infrastructure in conjunction with Ratcoed quarry. The reservoir is silted up and has a dense coverage of young elder brush trees growing within (Plate 7 and 11). Similar to PRN 9153, the conditions are very wet and deep in parts, meaning that access into the reservoir was not possible and could only be seen properly from atop of the dam. Visually the contours of the old reservoir could be made out with the cut being a steeper gradient on the south-eastern side although mostly blocked on the northern side by tree cover (Plate 11). The current watercourse could also be seen running through the middle of the old reservoir and exiting through the breach within the old dam (Plate 19). In addition, the feeder leat PRN 9158 could be seen running into the reservoir from north-east to south-west (Plate 17 and 18), but could not be accessed due to the wet conditions along with the foliage impeding the way. The dam crest and embankment on the western side of the reservoir was recorded as Feature 03 and assigned PRN number 77200.
Impact	Slight
Recommendation for further assessment/evaluation	None
Recommendation for mitigatory measures	None

Feature Number	02 – Plates (2 to 6,24)
Site name	Ratcoed Reservoir
PRN number	9153
Grid reference	Centred on NGR SH786123
Period	19 th century
Site type	Reservoir
Assessment category	C
Description	Reservoir PRN 9153 is the smallest of the three reservoirs. It has a length of c.36m down its longest axis (NE-SW) and 26 meters in width. The reservoir has silted up with dense tree growth within the interior; trees are of a young elder brush variety (Plate 2 and 4). In addition, evidence of forestry management with cut trees, tree stumps and logs are present within the reservoir. Very wet within the interior with only a pool of water still standing next to/abutting the forestry track (Plate 2 and 24). This is the result of the breached water course running through and discharging through a modern sluice which runs under the trackway and discharging to the south-west. No earthworks relating to the initial cutting of the reservoir were observed. However, the cut was fairly prominent on the north-western side with a fairly vertical drop down to the bed (Plate 4 and 5). From the roadside to the south-west the gradient could be seen, however, the forestry track would have truncated it slightly at this point and modified its appearance (Plate 24). On the south-eastern side the gradient was less sharp but still present. The overflow of the main dam would have drained into this reservoir; signs of the overflow are seen on the south-eastern edge of the dam.
Impact	Unlikely
Recommendation for further assessment/evaluation	None
Recommendation for mitigatory measures	Avoidance

Feature Number	03 - Plates (8-9, 15-16, 19-20)												
Site name	Ratcoed Reservoir												
PRN number	77200												
Grid reference	Centered on NGR SH786123												
Period	19 th Century												
Site type	Dam												
Assessment category	C												
Description	Large earthwork dam which runs north-west south-east forming the reservoir PRN 9154 (Plate 20). Although vegetated over, the makeup of the dam is made up of earth and stone with a height of around 22m, a total length of 96m and a depth of 39m from bottom of crests. It has been breached in the centre with the current water course running through (Plate 19). The breach opening measures 14.5 meters width on the south-western side and 5.4 meters on the north-eastern side. On the south-eastern side of the dam there is evidence of the dam failing and being repaired while also the emergency overflow just about evident and seen on the south-eastern crest edge running downwards towards PRN 9153 (Plate 15 and 16). Dimensions:- <table> <tr> <td>North-western crest</td><td>North-eastern crest</td></tr> <tr> <td>L: 53m</td><td>L: 50.6m</td></tr> <tr> <td>W: 12.6m (Widest)</td><td>W: 25.2m (Widest)</td></tr> <tr> <td>South-western crest</td><td>South-eastern crest</td></tr> <tr> <td>L: 41.8m</td><td>L: 46m</td></tr> <tr> <td>W: 9.4m (Widest)</td><td>W: 26.5m (Widest)</td></tr> </table>	North-western crest	North-eastern crest	L: 53m	L: 50.6m	W: 12.6m (Widest)	W: 25.2m (Widest)	South-western crest	South-eastern crest	L: 41.8m	L: 46m	W: 9.4m (Widest)	W: 26.5m (Widest)
North-western crest	North-eastern crest												
L: 53m	L: 50.6m												
W: 12.6m (Widest)	W: 25.2m (Widest)												
South-western crest	South-eastern crest												
L: 41.8m	L: 46m												
W: 9.4m (Widest)	W: 26.5m (Widest)												
Impact	Slight												
Recommendation for further assessment/evaluation	None												
Recommendation for mitigatory measures	None												

Feature Number	04 – Plates (17-18, 23)
Site name	Ratcoed Reservoir
PRN number	9158
Grid reference	Centred on NGR SH787124
Period	19 th Century
Site type	Feeder leat
Assessment category	C
Description	Feeder leat PRN 9158, could be made out from the top of the dam running north-east south-west (Plate 17 and 18). The leat is silted up with wetland weeds growing throughout and most likely does hold some water. The leat was linear in plan and no earthworks were evident within the immediate vicinity. The feeder leat could only be documented from afar as the conditions did not make it viable to have closer observations.
Impact	None
Recommendation for further assessment/evaluation	None
Recommendation for mitigatory measures	None

Feature Number	05 – Plates (13-14)
Site name	Ratcoed Reservoir
PRN number	77201
Grid reference	Centred on NGR SH786123
Period	19-20 th Century
Site type	Possible small feeder leat
Assessment category	C
Description	A smaller possible feeder leat was observed on the north-western edge of the dam running from west to east and feeding into the reservoir PRN 9154 from higher ground. The vertical sided trench was not linear in shape but rather snake like and fed down into the reservoir to the west with water still present and running through slightly. Some stones were visible on the northern section so could once be stone lined (Plate 13-14). Length of 14m, width of 2.5m and a depth of 0.90m. Not present on any historic 19 th century OS maps. Possibly a 20 th century feature when the quarry re-opened in the 1940s.
Impact	None
Recommendation for further assessment/evaluation	None
Recommendation for mitigatory measures	None

5 CONCLUSION

Gwynedd Archaeological Trust was commissioned by Natural Resources Wales to undertake archaeological mitigation as part of a reservoir discontinuance scheme at Ratcoed Reservoir, Aberllefenni, Gwynedd. The discontinuance scheme included formalising and stabilising a breach in reservoir PRN 9154, to leave it stable to comply with safety requirements under the Reservoirs Act. This reservoir formed part of a larger reservoir system associated with the former Ratcoed slate quarry that included three reservoirs and associated leats. The mitigation comprised a photographic record, a brief written description and an archaeological survey, combining a topographic survey and archaeological interpretation. In addition to reservoir 9154 a basic record was also completed of the other elements of the reservoir system that were accessible. General access was limited due to overgrowth and forestry plantations and there was no real opportunity to view the reservoir system as a collective whole within the local industrial landscape. A possible additional feeder leat (PRN 77201) was identified and recorded, which fed into the northern end of reservoir 9154. This leat was not visible on the late nineteenth/early twentieth century historic mapping and may have been a later edition prior to the abandonment of the quarry in 1946.

6 SOURCES CONSULTED

1. Chartered Institute for Archaeologists, 2014, Standard and guidance for the creation, compilation, transfer and deposition of archaeological archives
2. Davidson, A., Gwyn, D. Rh., Jones, G. P. & Riley, H. , 1994 , Gwynedd Quarrying Landscapes: Slate Quarries. Gwynedd Archaeological Trust Report 129.
3. English Heritage, 1991, Management of Archaeological Projects (MAP2)
4. Gwynedd Archaeological Trust Historic Environment Record
5. Historic England, 2015, Management of Research Projects in the Historic Environment (MoRPHE)
6. Ordnance Survey First Edition 1-inch to 25-mile County Series Map Sheet VIII.13, published 1889
7. Richards, A. J. 1994. Slate Quarrying at Corris
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9. Standard and Guidance for the archaeological investigation and recording of standing buildings or structures
10. The Welsh Archaeological Trusts, 2018, Guidance for the Submission of Data to the Welsh Historic Environment Records (HERs)

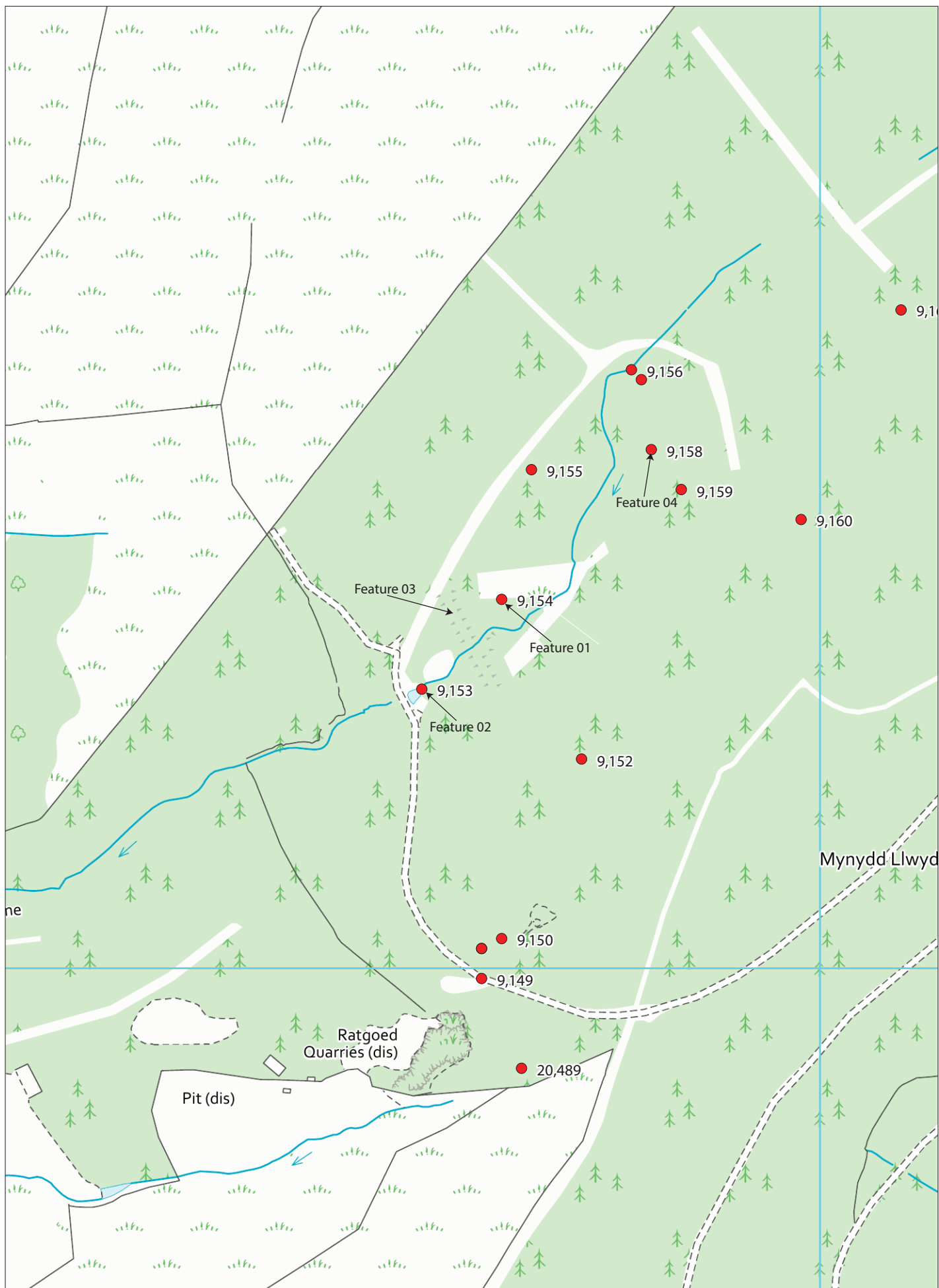


FIGURE 01 Location Map. Based on Ordnance Survey County Series 1:10000 Map Sheet SH74NW. Scale 1:7500@ A4. © Crown Copyright. All Rights Reserved; licence number A1100020895.



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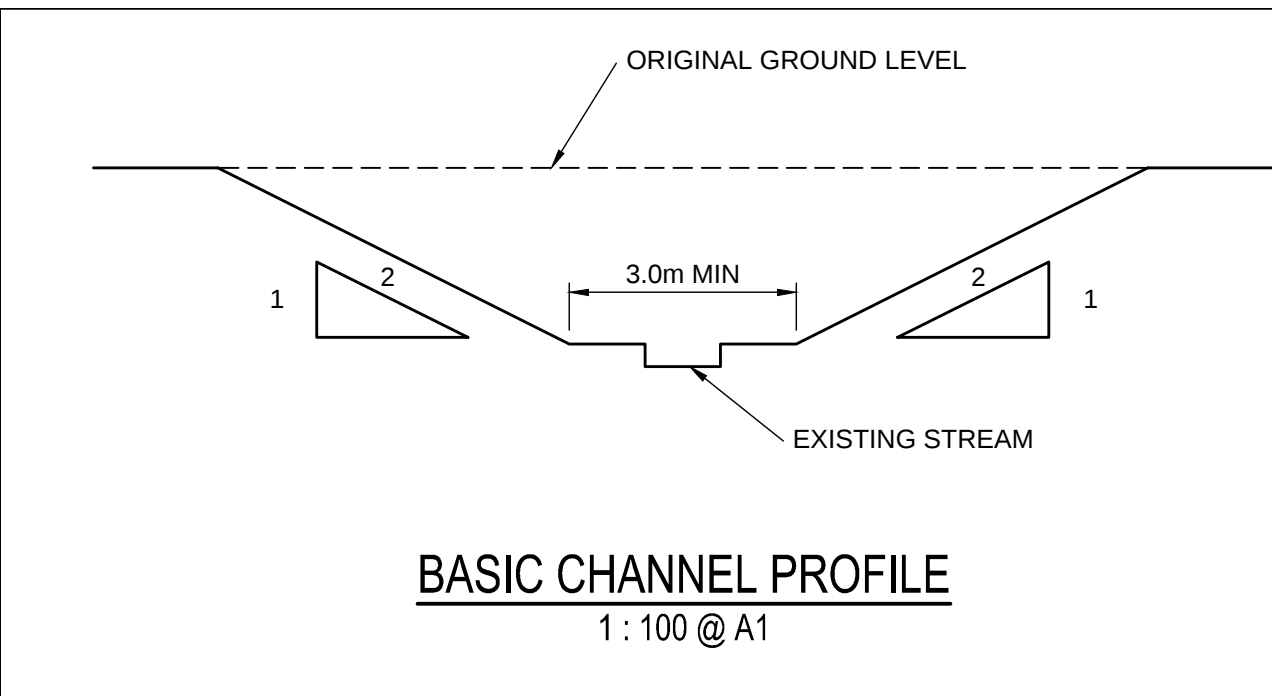
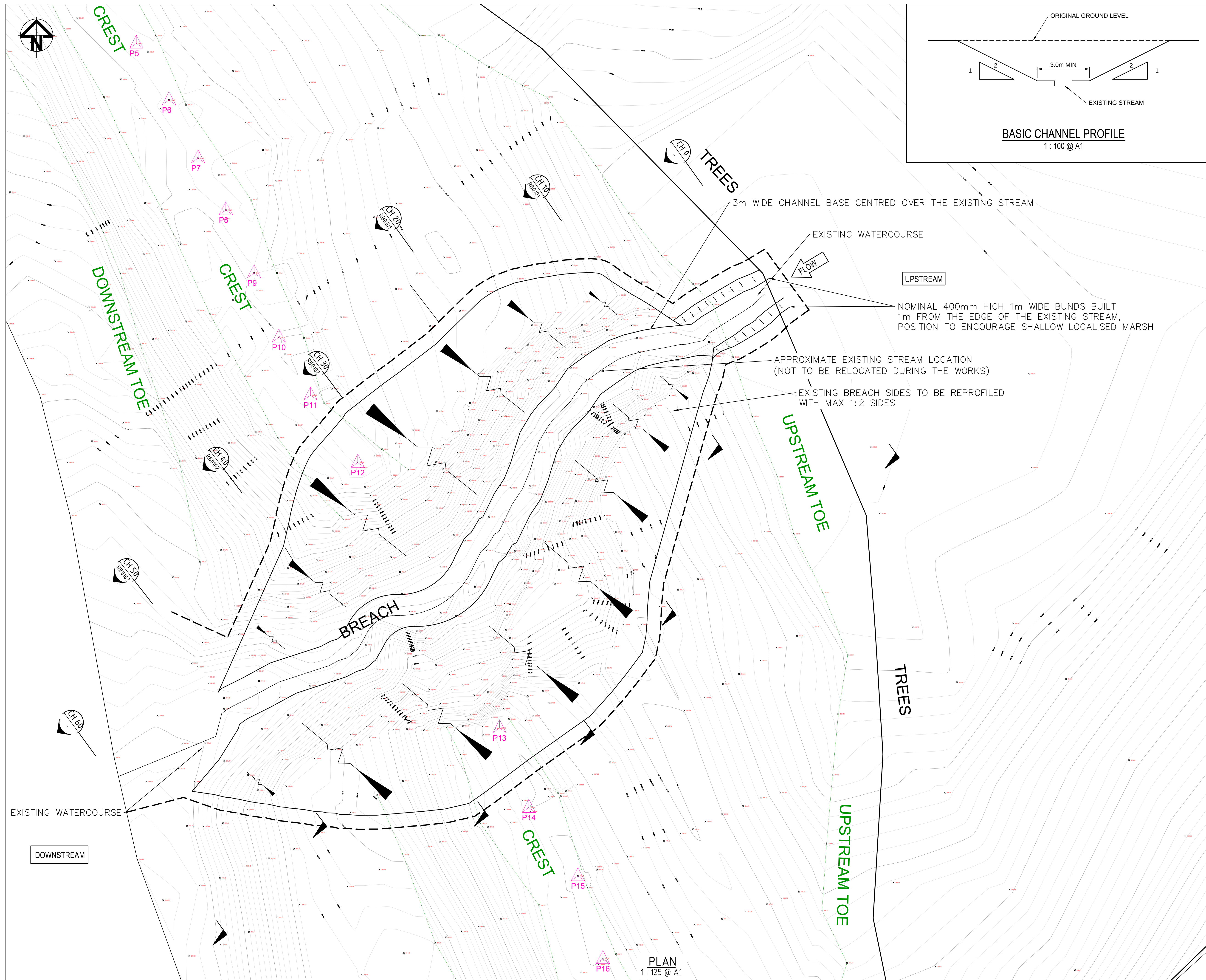
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SITE LAYOUT

Suitability Description:	
PRELIMINARY FOR DISCUSSION	
Drawing Number:	Revision:
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SITE PLAN
1:500 @ A1 1:1000 @ A3





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LEGEND:

— — — — WORKING BOUNDARY

02	08MAR19	UPDATED	MH	JP	
P2	18FEB19	EXISTING STREAM LOCATION	MH	JP	
	13FEB19	UPDATED	MH	JP	
P1	14DEC18	ISSUE FOR INFORMATION	RRS	TP	JP
Date	Description	Drawn	Check	Check	Approv

Client

NATURAL
RESOURCES WALES



PROJECT:
RATCOED
DISCONTINUANCE

Client

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Tel: 44 (0)1483 803 000

www.arcadis.com

TITLE:

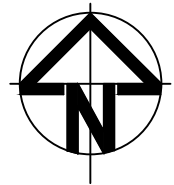
PLAN OF
BREACH FORMALISATION

Designed	J. PRATTEN	Signature	Date 26NOV18
Drawn	R. SEARLE	Signature	Date 12DEC18
Checked	T. PEARSON	Signature	Date 12DEC18
Approved		Signature	Date
	AS SHOWN	Datum:	AOD
Original Size:	A1	Grid:	OS
Suitability Code:	Sx	Project Number:	10019759

PRELIMINARY FOR DISCUSSION

Drawing Number:
10019759-X-ARC-00-XX-DR-CE-RAT0100

02



EARTHWORK COMMENCES AT GROUND LEVEL

2m GAP FROM BASE OF DAM TOE

6m

1:2

FUTURE
MAINTENANCE
AREA PLATFORM

DOWNSTREAM TOE

CREST

UPSTREAM TOE

AREA TO BE REPROFIED
TO OPEN BREACH

1:2 SLOPE

1:2 SLOPE

6m

1:2 SLOPE

EARTHWORK COMMENCES 3m ABOVE THE EXISTING GROUND LEVEL

TOPSOIL REDISTRIBUTION
OVER THE EARTHWORK

TOPSOIL STRIPPED

INDICATIVE SECTION THROUGH WORK AREA

1:125 @ A1 1:250 @ A3 RAT103

PLAN

1:125 @ A1 1:250 @ A3 RAT103

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- EXACT LEVELS TO BE CONFIRMED ON-SITE. THE EARTHWORK IS TO USE ALL MATERIAL DUG FROM THE BREACH FORMALISATION.
- TOPSOIL IS TO BE STRIPPED FROM THE UNDERSIDE OF THE EARTHWORK AND THEN EVENLY SPREAD OVER THE FINISHED EARTHWORK, THEN SEEDED.

LEGEND

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02	08MAR19	UPDATED		MH	JP
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P1	10JAN19	ISSUE FOR INFORMATION		MH	JP
	Date	Description		Drawn	Check
				JP	JP

Client

NATURAL
RESOURCES WALES



PROJECT:
RATCOED
DISCONTINUANCE

Client

NATURAL RESOURCES
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TITLE:

PLAN OF
DOWNSTREAM FUTURE
WORK AREA

Designed	M. HOOLE	Signed	Date
Drawn	M. HOOLE	Signed	10JAN19
Checked	J. PRATTEN	Signed	10JAN19
Approved		Signed	
Scale	1:125	Datum:	AOD
Original Size:	A1	Grid:	OS
Suitability Code:	Sx	Project Number:	10019759

Suitability Description:		PRELIMINARY FOR DISCUSSION	
Drawing Number:	10019759-X-ARC-00-XX-DR-CE-RAT0103	Revision:	02

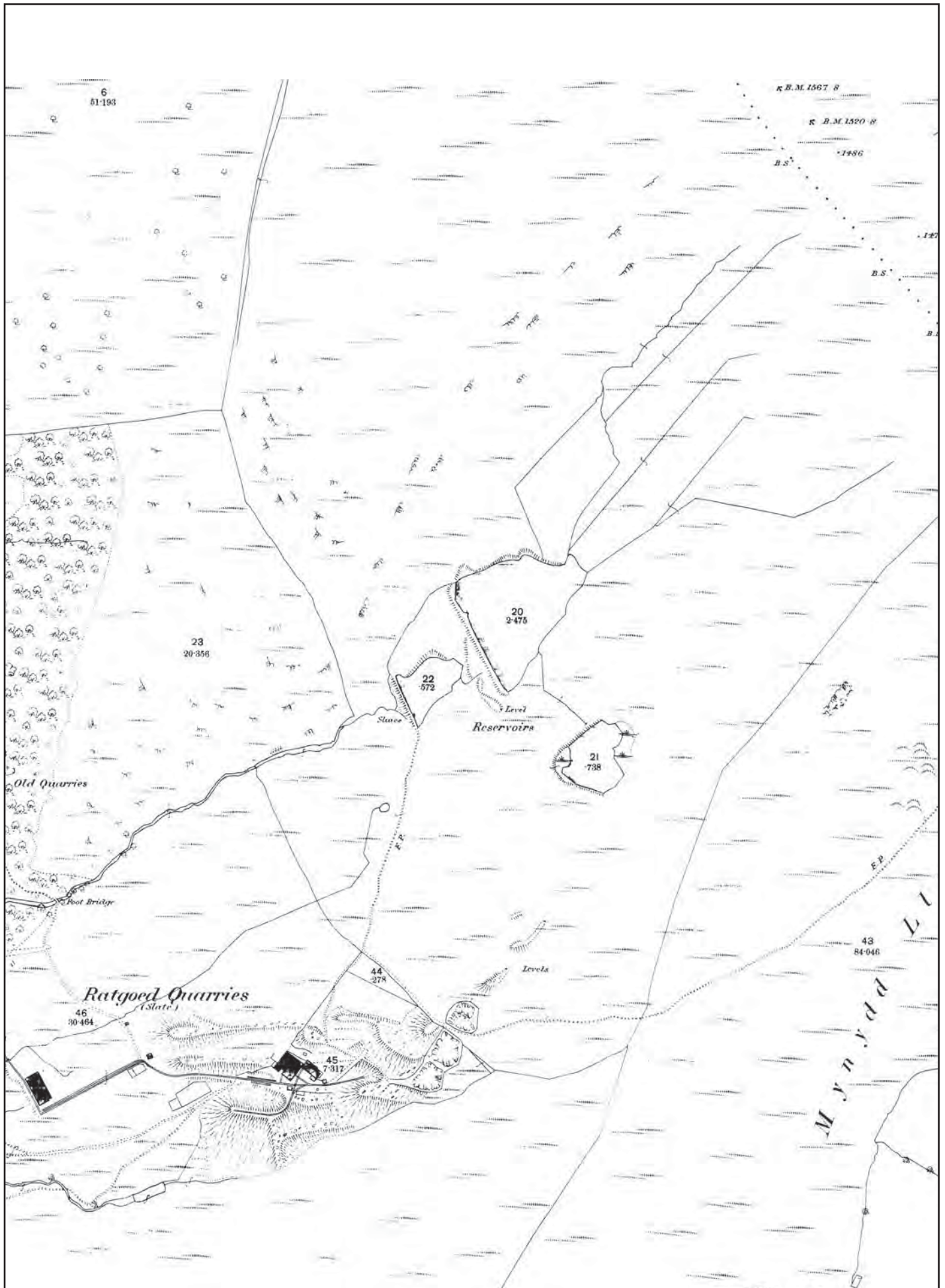


FIGURE 05 Reproduction of Ordnance Survey First Edition 1-inch to 25-mile County Series Map Sheet VIII.13, published 1889. Scale 1:5000@ A4.

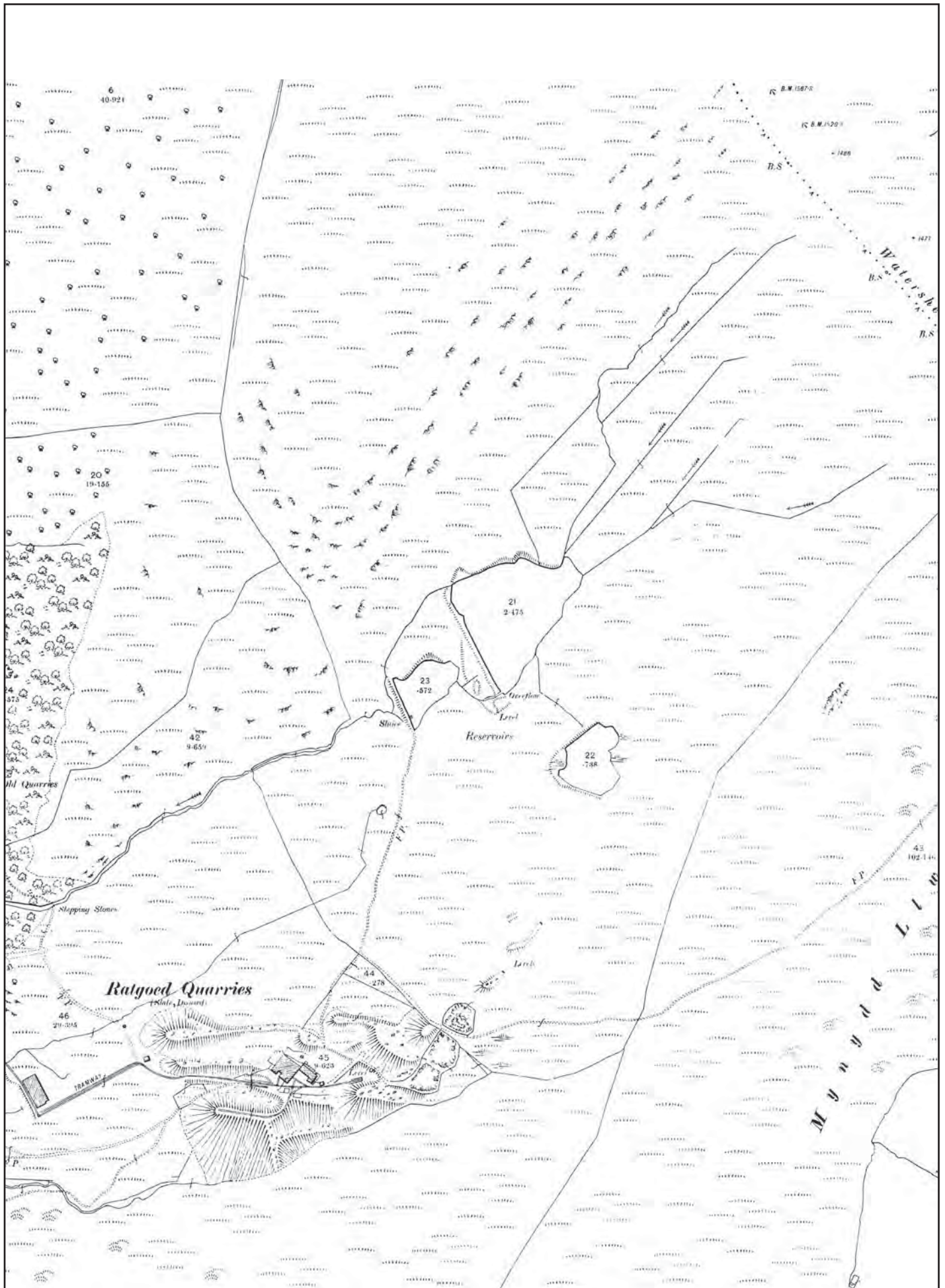


FIGURE 06 Reproduction of Ordnance Survey Second Edition 1-inch to 25-mile County Series Map Sheet VIII.13, published 1901. Scale 1:5000@ A4.

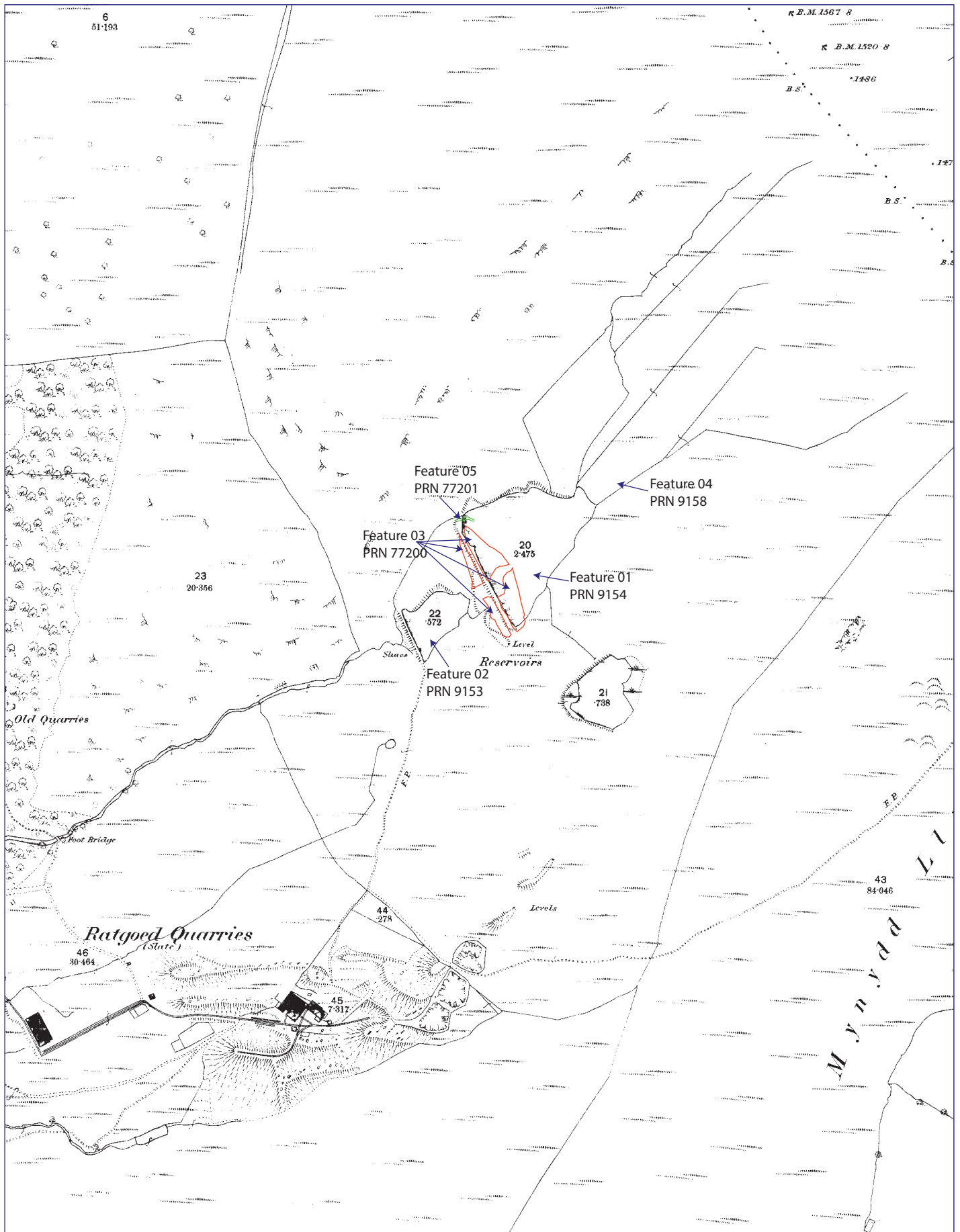


FIGURE 07 Reproduction of Ordnance Survey First Edition 1-inch to 25-mile County Series showing location of features. Scale 1:50000@ A4.



Plate 1: General view of forestry track leading to site (archive reference: G2609_001).



Plate 2: View of reservoir PRN 9153 from the access road showing extent of silting and tree growth; scale: 2x1m (archive reference: G2609_002).



Plate 3: View of gradient on north-western side running down to reservoir PRN 9153 also showing extent of tree growth; scale: 2x1m (archive reference: G2609_003).



Plate 4: View of PRN 9153 showing cut of reservoir on north-western side ; scale: 2x1m (archive reference: G2609_004).



Plate 5: View of PRN 9153 showing cut of reservoir on north-western side (archive reference: G2609_005).



Plate 6: General view of reservoir PRN 9153 from top of dam (archive reference: G2609_006).



Plate 7: View of reservoir PRN 9154 from top of dam looking north-east; scale: 2x1m (archive reference: G2609_007).



Plate 8: View of north-eastern gradient of dam down to reservoir PRN 9154; scale: 2x1m (archive reference: G2609_008).



Plate 9: View of north-eastern gradient of dam down to reservoir PRN 9154; scale: 2x1m (archive reference: G2609_009).



Plate 10: Portrait view of reservoir PRN 9154 from top of dam; scale: 2x1m (archive reference: G2609_010).



Plate 11: View of reservoir PRN 9154 from top of dam; scale: 2x1m (archive reference: G2609_011).



Plate 12: View of reservoir PRN 9154 from top of dam; scale: 2x1m (archive reference: G2609_012).



Plate 13: View along possible feeder leat [01] on the north-west edge of dam; scale: 2x1m (archive reference: G2609_013).



Plate 14: View along possible feeder leat [01] on the north-west edge of dam; scale: 2x1m (archive reference: G2609_014).



Plate 15: View of possible old breach in dam along with overflow; scale: 2x1m (archive reference: G2609_015).



Plate 16: View of possible old breach in dam wall (archive reference: G2609_016).



Plate 17: View across reservoir PRN 9154 and showing feader leat PRN 9158; scale: 2x1m
(archive reference: G2609_017).



Plate 18: General view across reservoir PRN 9154 and showing feader leat PRN 9158
(archive reference: G2609_018).



Plate 19: View of north-eastern side of dam showing breach (archive reference: G2609_019).



Plate 20: View along length of dam; scale: 2x1m (archive reference: G2609_020).



Plate 21: View of reservoir PRN 9514 from top of dam (SE side) (archive reference: G2609_021).



Plate 22: View of reservoir PRN 9514 and feeder leat PRN 9158 (archive reference: G2609_023).



Plate 23: View of pool and modern outflow pipe/sluice within PRN 9153 next to track (archive reference: G2609_024).

APPENDIX I

Reproduction of Gwynedd Archaeological Trust Written Scheme of Investigation

RATCOED RESERVOIR (G2609)

WRITTEN SCHEME OF INVESTIGATION FOR
ARCHAEOLOGICAL MITIGATION

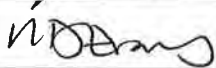
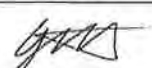
Prepared for

Natural Resources Wales

February 2019



Ymddiriedolaeth Archaeolegol Gwynedd
Gwynedd Archaeological Trust

Approvals Table				
	Role	Printed Name	Signature	Date
Originated by	Document Author	Jon ⁿ ROBERTS		27/02/19
Reviewed by	Document Reviewer	ROBERT EVANS		27/02/19
Approved by	Principal Archaeologist	Jon ⁿ ROBERTS		27/02/19

Revision History			
Rev No.	Summary of Changes	Ref Section	Purpose of Issue

All GAT staff should sign their copy to confirm the project specification is read and understood and retain a copy of the specification for the duration of their involvement with the project. On completion, the specification should be retained with the project archive:

Name

Signature

Date

RATCOED RESERVOIR (G2609)

WRITTEN SCHEME OF INVESTIGATION FOR AN ARCHAEOLOGICAL MITIGATION

Prepared for *Natural Resources Wales*, February 2019

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1 INTRODUCTION

Gwynedd Archaeological Trust (GAT) has been commissioned by Natural Resources Wales (NRW) to prepare a Written Scheme of Investigation (WSI) for archaeological mitigation as part of a reservoir discontinuance scheme at Ratgoed Reservoir, Aberllefenni, Gwynedd (NGR SH78651232; postcode: SY20 9RY; Figure 01 & 02). The reservoir is one of a group of three reservoirs with associated feeder leats that are shown on late 19th century Ordnance Survey mapping (Figure 05) and appear to have supplied Ratgoed slate quarry downslope to the southwest. The reservoir is a triangular-shaped reservoir with a dam at the southwest end that measures 2m wide and c.1m high. The reservoir no longer holds water as the dam has been breached and the stream that was once held back now flows through (Figure 03). The discontinuance works will include formalising the breach to leave it stable to comply with safety requirements under the Reservoirs Act; as detailed on Arcadis drawing no. 10019759-X-ARC-00-XX-DR-CE-RAT0100-02 (Figure 03), this will include widening the breach, with the resultant fill being placed on one of the shoulders of the dam (Figure 04).

The archaeological mitigation will comprise a record of the affected reservoir and associated earthworks. This will include a photographic record, a brief written description and an archaeological survey, combining a topographic survey and archaeological interpretation. The archaeological mitigation will be undertaken during March 2019.

The mitigation will be completed in accordance with the following guidance:

- Standard and Guidance for the archaeological investigation and recording of standing buildings or structures (Chartered Institute for Archaeologists, 2014);
- Management of Archaeological Projects (English Heritage, 1991);
- Management of Research Projects in the Historic Environment: The MoRPHE Project Managers' Guide (Historic England, 2015); and

Gwynedd Archaeological Trust is certified to ISO 9001:2015 and ISO 14001:2015 (Cert. No. 74180/B/0001/UK/En) and is a Registered Organisation with the Chartered Institute for Archaeologists and a member of the Federation of Archaeological Managers and Employers (FAME).

1.1 Fieldwork Aims and Objectives

The key aims and objectives of the mitigation is to:

- Complete a record and survey of the reservoir and associated earthworks located within the discontinuance area;

1.2 Monitoring Arrangements

The archaeological mitigation will be monitored by the Gwynedd archaeological Planning Service (GAPS); the content of this WSI and all subsequent reporting by GAT must be approved by GAPS prior to final issue. GAPS have stated that the Ratgoed quarry complex was assessed in a thematic study in the 1990s as being of regional to national importance but that the study didn't include the reservoir system. Whilst the individual value of the reservoirs was not included in the thematic study, GAPS stated that they have group value as part of the local quarrying landscape. The reservoirs were added to the Forest Enterprise Welsh Historic Assets Project: Dyfi Archaeological Assessment in 1998 but the reservoirs weren't recorded at the time.

The GAPS Archaeologist will need to be informed of the project timetable and of the subsequent progress and findings.

1.3 Historic Environment Record

In line with the Gwynedd Historic Environment Record (HER) requirements, the HER will be contacted at the onset of the project to ensure that any data arising is formatted in a manner suitable for accession to the HER and follows the guidance set out in *Guidance for the Submission of Data to the Welsh Historic Environment Records (HERs)* (The Welsh Archaeological Trusts, 2018). The HER will be informed of the project start date, location including grid reference, estimated timescale for the work, and further relevant information associated with the project.

The GAT HER Enquiry Number for this project is GATHER1077 and the Event PRN is 45407.

2 ARCHAEOLOGICAL AND HISTORICAL BACKGROUND

Ratgoed Reservoir (Primary Reference Number (PRN) 9154) is one of a group of three reservoirs that appear to have supplied Ratgoed slate quarry (PRN 20489) downslope to the southwest. The original quarry workings at Ratgoed date back to before 1840; the quarry expanded in the 1850s and was being run under the auspices of the Alltgoed Consols, a partnership that also owned the nearby Gaewern and Braich Goch quarries. In 1864, a tramway was opened connecting the quarry with the newly opened Corris Railway at Aberllefenni, which prompted significant expansion work at the quarry. The quarry declined in output in the late nineteenth century and in 1900 the remaining workforce was dismissed. Quarry work resumed in the early twentieth century, but in 1946 the quarry finally shut for good (Richards, 1994). A report on the quarrying landscapes of Gwynedd, prepared by GAT (Davidson, et. al. 1994), described the quarry as a “remarkably well-preserved site despite having been engulfed by a conifer plantation” (ibid.: 25). The three reservoirs (PRN 9152, 9153 and 9154) are shown on the First and Second Editions of the Meirionithshire 1-inch to 25-mile Ordnance Survey County Series Map Sheet VIII.13, published in 1889 and 1901 respectively (Figures 05 and 06). The reservoirs are shown in close proximity to each other, with reservoir 9154 shown as the largest of the three. A series of leats (PRNs 9155 to 9160) are shown feeding reservoir 9154, which in turn appears to overflow into the smaller reservoirs to the west and south, as well as to the local stream.

3 METHODOLOGY

3.1 Introduction

The archaeological mitigation will comprise a record of reservoir 9154 and associated earthworks. This will include a photographic record, a brief written description and an archaeological survey, combining a topographic survey and archaeological interpretation. The archaeological mitigation will be undertaken during March 2019.

3.2 Methodology

- The photographic record will be taken using a digital SLR (Nikon D40) camera set to maximum resolution (3008 × 2000 6.1 effective megapixels) in RAW format; a photographic record will be maintained on site using GAT pro-formas ([Appendix I](#)) and digitised in *Microsoft Access* as part of the fieldwork archive and dissemination process. Photographic images will be archived in TIFF format using Adobe Photoshop; the archive numbering system will start from G2609_001. A photographic ID board will be used where practical to record site code and image orientation.
- The written description will be completed using a GAT pro-forma ([Appendix II](#)) and will describe the current form of the reservoir dam as well as any associated earthworks;
- The topographic survey will be completed using a *Trimble* R8 GPS unit and/or offsets. This information will then be used in tandem with the photographic and written record to prepare an archaeological interpretation of the reservoir and associated earthworks. The survey information will also be used to prepare a general location plan, showing the reservoir within the overall quarry area, and a more detailed site plan.

3.3 Fieldwork Archiving

Following the completion of the mitigation on site, fieldwork archiving will be completed based on following task list:

1. Pro-formas: all cross referenced and complete;
2. Photographic Metadata: completed in *Microsoft Access* and cross-referenced with all pro-formas;

3. Survey data: downloaded using a Computer Aided Design package;

All data will be processed, final illustrations will be compiled and a report will be produced which will detail and synthesise the results.

4 REPORTING

Following completion of the fieldwork, a separate report will be produced within one month incorporating the following:

1. Non-technical summary (Welsh and English)
2. Introduction
3. Background
4. Methods and techniques, including details and location of project archive
5. Results
6. Summary and conclusions
7. List of sources consulted.
8. Appendix I – approved GAT written scheme of investigation

Illustrations will include plans of the location, site plans and individual plans and sections of archaeological features identified as appropriate. Historical maps, when appropriate and if copyright permissions allow, will be included. A draft copy of the report will be sent to the client prior to production of the final report.

The mitigation will be completed in March 2019. The report will include a written description and photographs of the reservoir, supplemented with a general location map and more detailed site plan.

5 DISSEMINATION AND ARCHIVING

The following dissemination will apply:

- A digital report will be provided to the client and GAPS (draft report then final report);
- A paper report plus a digital report will be provided to the Gwynedd Historic Environment Record; this will be submitted within six months of report completion (final reports only);
- A digital report and archive (including photographic and drawn) data will be provided to the Royal Commission on Ancient and Historic Monuments Wales (RCAHMW; final report only). This will be in accordance with the RCAHMW Guidelines for Digital Archives Version 1. Digital information will include the photographic archive and associated metadata;

6 PERSONNEL

The project will be managed by John Roberts, Principal Archaeologist GAT Contracts Section and attended by a project archaeologist. The project archaeologist will be responsible for completing the fieldwork pro-formas and the fieldwork archive itemised in Sec 3.7. The project archaeologist will also be responsible for submitting a draft final report (to the project manager for review and approval. The reports will then be submitted as per the arrangements defined in Sec 5.

7 HEALTH AND SAFETY

The GAT Project Archaeologist(s) will be CSCS certified. Copies of the site specific risk assessment will be supplied to the client and site contractor prior to the start of fieldwork. Any risks and hazards will be indicated prior to the start of work via a submitted risk assessment. All GAT staff attending will be issued with required personal safety equipment, including high visibility jacket, steel toe-capped boots and hard hat.

Due to the location and terrain, specific allowance will need to be made for accessing the site on foot over uneven terrain with an intermittent phone signal and the presence of trees within local forest areas and the risk of falling trees/ falling branches in high winds.

8 SOCIAL MEDIA

One of the key aims in the GAT mission statement is to improve the understanding, conservation and promotion of the historic environment in our area and inform and educate the wider public. To help achieve this, GAT maintains an active social media presence and seeks all opportunities to promote our projects and results. With permission, GAT would like the opportunity to promote our work on this scheme through our social media platforms. This could include social media postings during our attendance on site as well as any postings to highlight results. In all instances, approval will be sought from client prior to any postings.

9 INSURANCE

9.1 Public/Products Liability

Limit of Indemnity- £5,000,000 any one event in respect of Public Liability

INSURER Aviva Insurance Limited

POLICY TYPE Public Liability

POLICY NUMBER 24765101CHC/UN/000375

EXPIRY DATE 21/06/2019

9.2 Employers Liability

Limit of Indemnity- £10,000,000 any one occurrence.

The cover has been issued on the insurers standard policy form and is subject to their usual terms and conditions. A copy of the policy wording is available on request.

INSURER Aviva Insurance Limited

POLICY TYPE Employers Liability

POLICY NUMBER 24765101 CHC / UN/000375

EXPIRY DATE 21/06/2019

9.3 Professional Indemnity

Limit of Indemnity- £5,000,000 in respect of each and every claim

INSURER Hiscox Insurance Company Limited

POLICY TYPE Professional Indemnity

POLICY NUMBER 9446015

EXPIRY DATE 22/07/2019

10 SOURCES CONSULTED

1. Chartered Institute for Archaeologists, 2014, *Standard and guidance for the creation, compilation, transfer and deposition of archaeological archives*
2. Davidson, A., Gwyn, D. Rh., Jones, G. P. & Riley, H. , 1994 , Gwynedd Quarrying Landscapes: Slate Quarries. Gwynedd Archaeological Trust Report 129.
3. English Heritage, 1991, *Management of Archaeological Projects (MAP2)*
4. Gwynedd Archaeological Trust Historic Environment Record
5. Historic England, 2015, *Management of Research Projects in the Historic Environment (MoRPHE)*
6. Ordnance Survey First Edition 1-inch to 25-mile County Series Map Sheet VIII.13, published 1889
7. Richards, A. J. 1994. *Slate Quarrying at Corris*
8. Royal Commission on Ancient and Historic Monuments of Wales, 2015, *Guidelines for digital archives*
9. Standard and Guidance for the archaeological investigation and recording of standing buildings or structures
10. The Welsh Archaeological Trusts, 2018, *Guidance for the Submission of Data to the Welsh Historic Environment Records (HERs)*

FIGURE 01

Location Map. Based on Ordnance Survey County Series 1:10000 Map Sheet SH74NW. Scale 1:7500@ A4. © Crown Copyright. All Rights Reserved; licence number AI100020895.

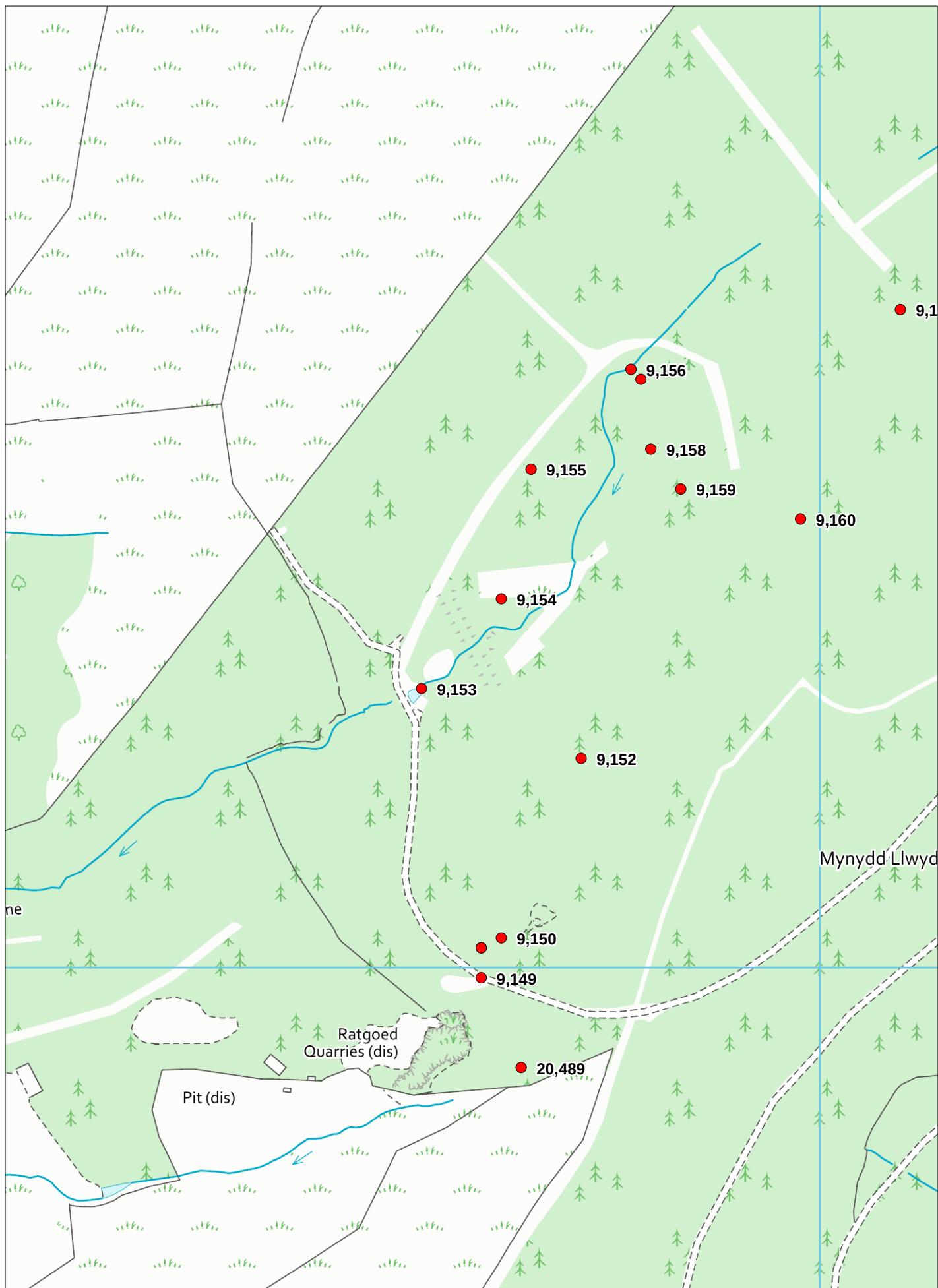
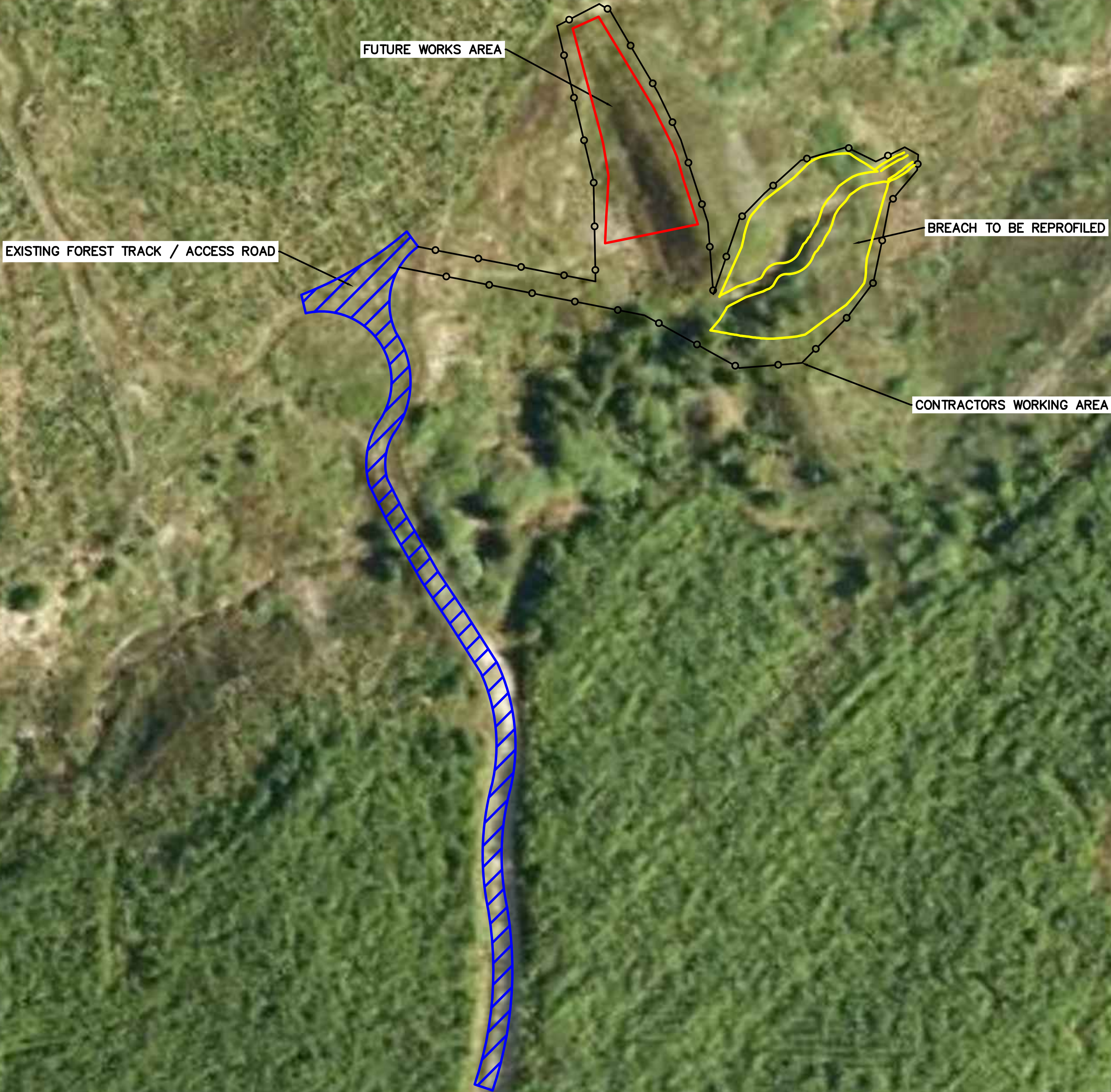


FIGURE 02

**Reproduction of Arcadis Darwing 10019759-X-ARC-00-XX-DR-CE-
RAT0300-02**



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02	08MAR19	UPDATED		MH	JP
01	19FEB19	UPDATED AREAS		MH	JP
P1	11JAN19	ISSUE FOR INFORMATION		MH	JP
	Date	Description		Drawn	Check
				Approv	

Client

NATURAL RESOURCES WALES

Cyfoeth Naturiol Cymru Natural Resources Wales

PROJECT: RATCOED DISCONTINUANCE

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ARCADIS

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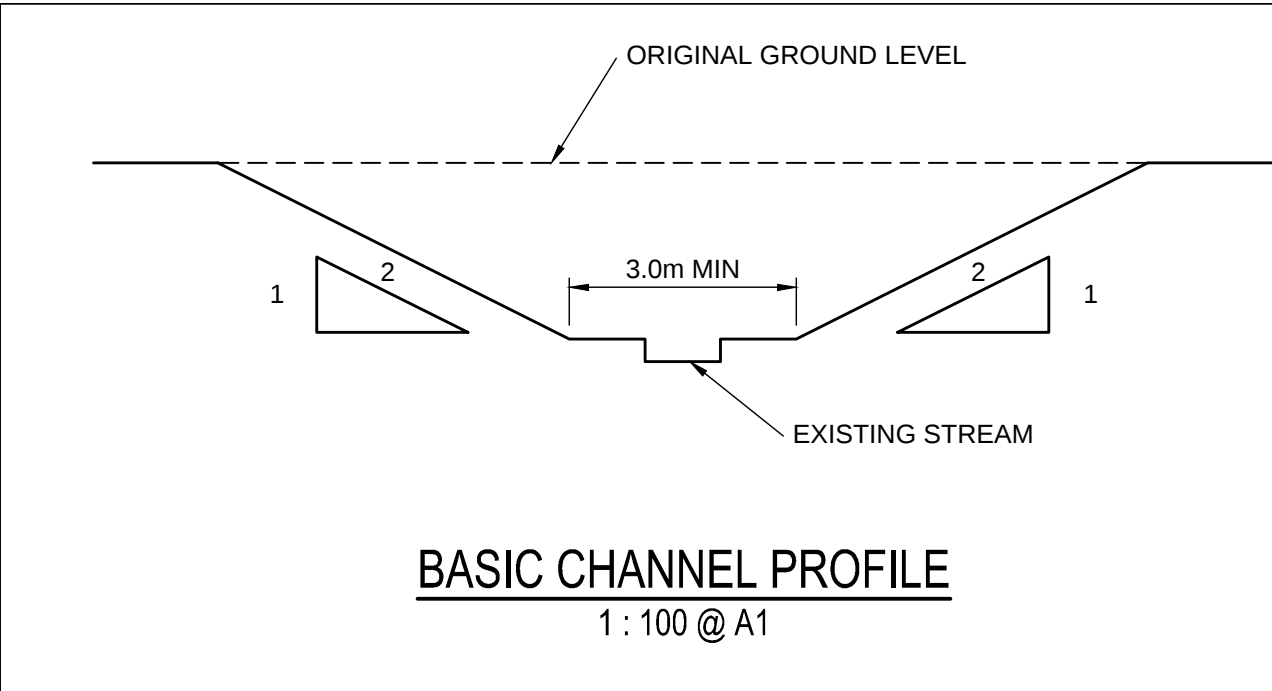
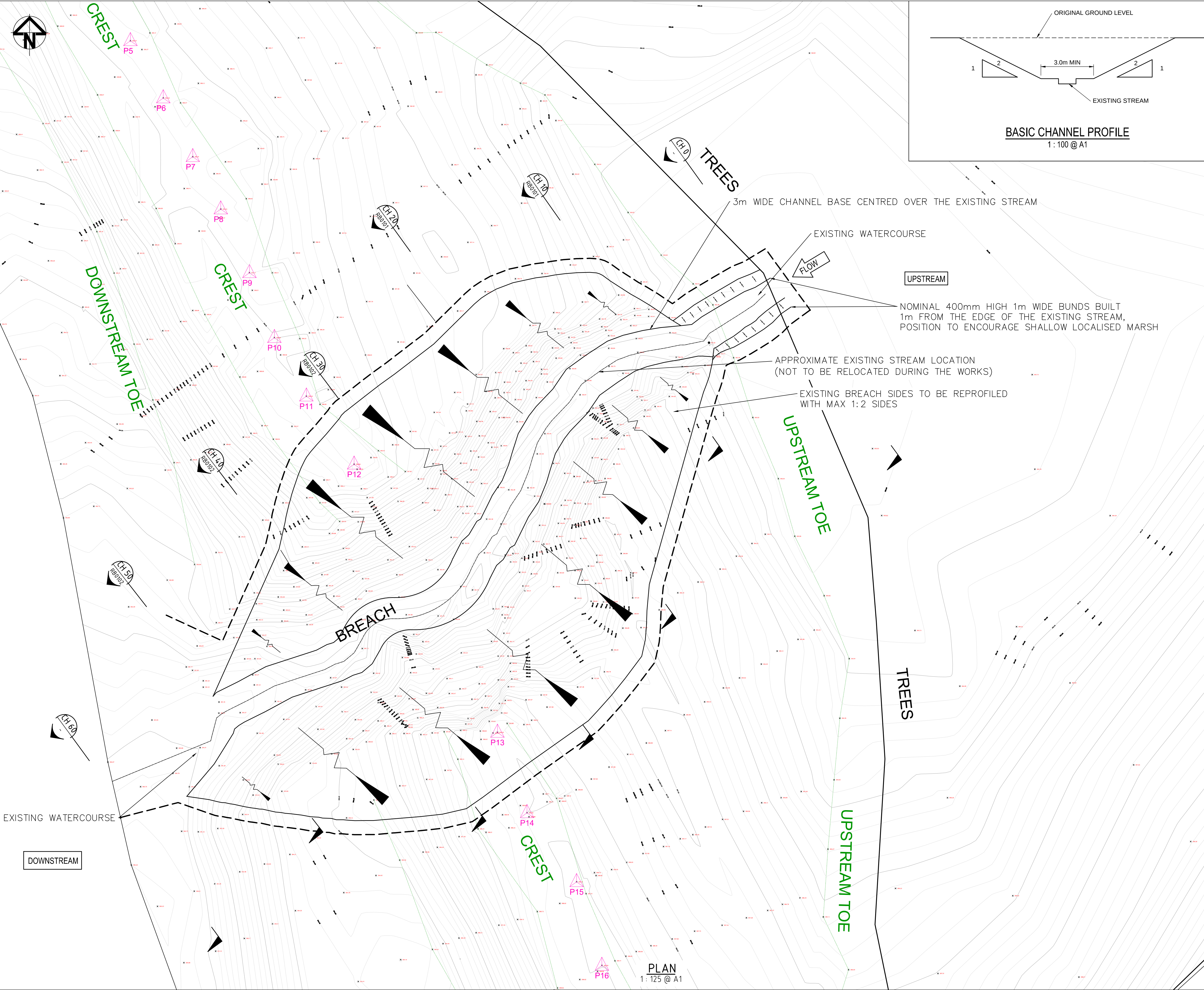
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TITLE:			
SITE LAYOUT			
Designed	M. HOOLE	Signed	Date: 11JAN19
Drawn	M. HOOLE	Signed	Date: 11JAN19
Checked	J. PRATTEN	Signed	Date: 11JAN19
Approved		Signed	Date:
Scale:	AS SHOWN	Datum:	AOD
Original Size:	A1	Grid:	OS
Suitability Code:	Sx	Project Number:	10019759
Suitability Description:			
PRELIMINARY FOR DISCUSSION			
Drawing Number: 10019759-X-ARC-00-XX-DR-CE-RAT0300			Revision: 02

SITE PLAN
1:500 @ A1 1:1000 @ A3

FIGURE 03

**Reproduction of Arcadis Darwing Number 10019759-X-ARC-00-XX-DR-
CE-RAT0100-02**



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 - ALL LEVELS IN METRES RELATIVE TO ORDNANCE DATUM NEWLYN.
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LEGEND:

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02	08MAR19	UPDATED		MH	JP
01	18FEB19	EXISTING STREAM LOCATION		MH	JP
P2	13FEB19	UPDATED		MH	JP
P1	14DEC18	ISSUE FOR INFORMATION	RRS	TP	JP
	Date	Description		Drawn	Check
				Approv	

Client
NATURAL
RESOURCES WALES

Natural Resources Wales

PROJECT:
RATCOED
DISCONTINUANCE

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Infrastructure and Built Assets

Coordinating office:
The Surrey Research Park
10 Medaware Road
Guildford GU2 7AR
Tel: 44 (0)1483 803 000

www.arcadis.com

TITLE:

PLAN OF
BREACH FORMALISATION

Designed	J. PRATTEN	Signed	Date
Drawn	R. SEARLE	Signed	26NOV18
Checked	T. PEARSON	Signed	12DEC18
Approved		Signed	12DEC18
	AS SHOWN	Datum:	AOD
Original Size:	A1	Grid:	OS
Suitability Code:	Sx	Project Number:	10019759

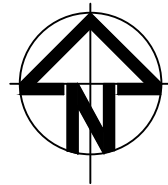
Suitability Description:

**PRELIMINARY
FOR DISCUSSION**

Drawing Number: 10019759-X-ARC-00-XX-DR-CE-RAT0100	Revision: 02
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FIGURE 04

Reproduction of Arcadis Darwing Number 10019759-X-ARC-00-XX-DR-CE-RAT0103-02



EARTHWORK COMMENCES AT GROUND LEVEL

2m GAP FROM BASE OF DAM TOE

6m

1:2 SLOPE

FUTURE
MAINTENANCE
AREA PLATFORM

DOWNSTREAM TOE

CREST

UPSTREAM TOE

AREA TO BE REPROFIED
TO OPEN BREACH

1:2 SLOPE

1:2 SLOPE

6m

6m

EARTHWORK COMMENCES 3m ABOVE THE EXISTING GROUND LEVEL

TOPSOIL REDISTRIBUTION
OVER THE EARTHWORK

TOPSOIL STRIPPED

INDICATIVE SECTION THROUGH WORK AREA

1:125 @ A1 1:250 @ A3 RAT103

PLAN

1:125 @ A1 1:250 @ A3 RAT103

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LEGEND

WORKING BOUNDARY

02	08MAR19	UPDATED		MH	JP
01	18FEB19	REDRAWN		MH	JP
P1	10JAN19	ISSUE FOR INFORMATION		MH	JP
	Date	Description		Drawn	Check
				JP	JP
				JP	JP

Client

NATURAL
RESOURCES WALES



PROJECT:
RATCOED
DISCONTINUANCE

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Tel: 44 (0)1483 803 000

www.arcadis.com

TITLE:

PLAN OF
DOWNSTREAM FUTURE
WORK AREA

Designed	M. HOOLE	Signed	Date
Drawn	M. HOOLE	Signed	10JAN19
Checked	J. PRATTEN	Signed	Date
Approved		Signed	10JAN19
Scale	1:125	Datum:	AOD
Original Size:	A1	Grid:	OS
Suitability Code:	Sx	Project Number:	10019759

Suitability Description:
**PRELIMINARY
FOR DISCUSSION**

Drawing Number:
10019759-X-ARC-00-XX-DR-CE-RAT0103

Revision:
02

FIGURE 05

**Reproduction of Ordnance Survey First Edition 1-inch to 25-mile
County Series Map Sheet VIII.13, published 1889. Scale 1:5000@ A4.**

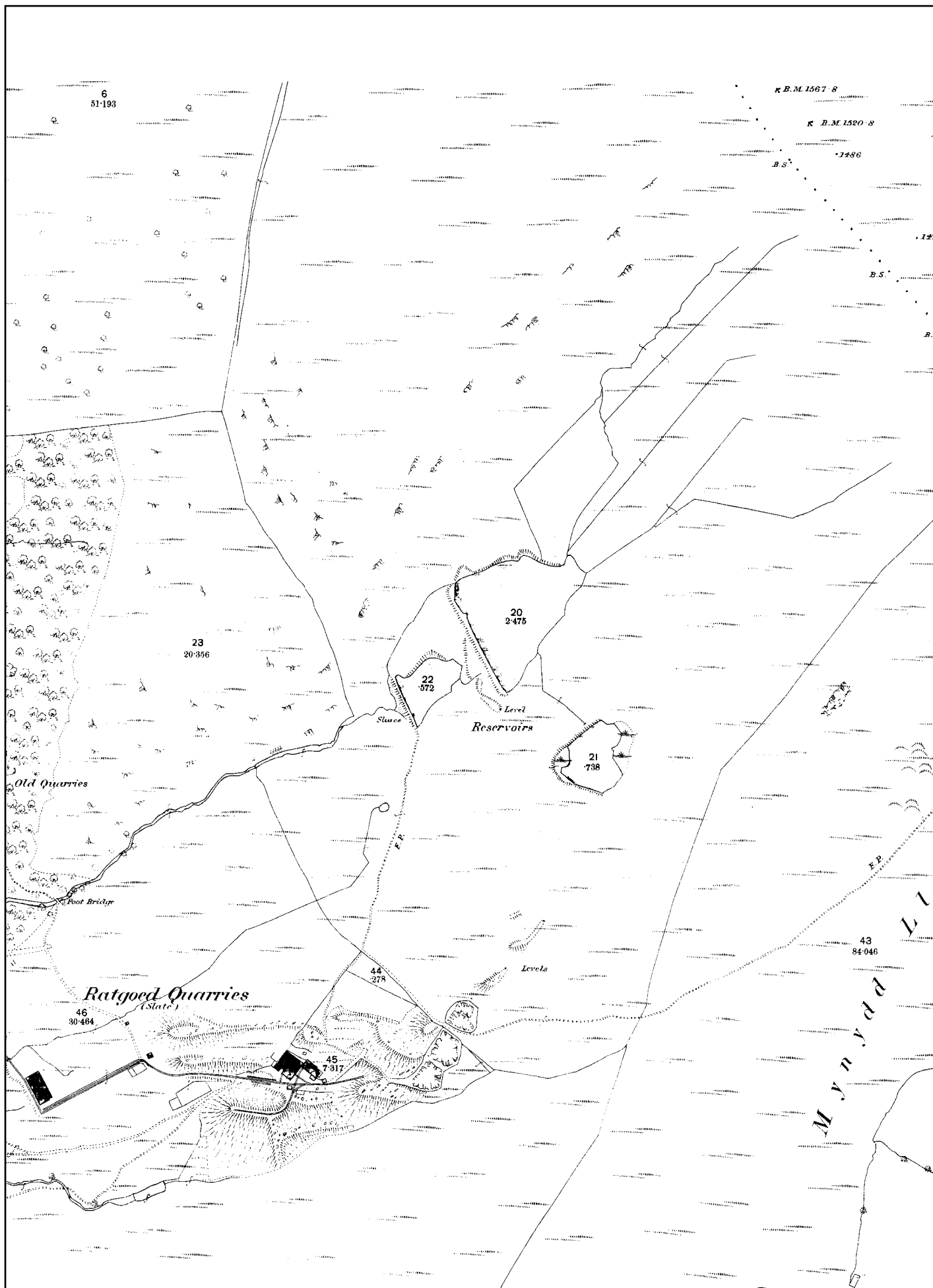
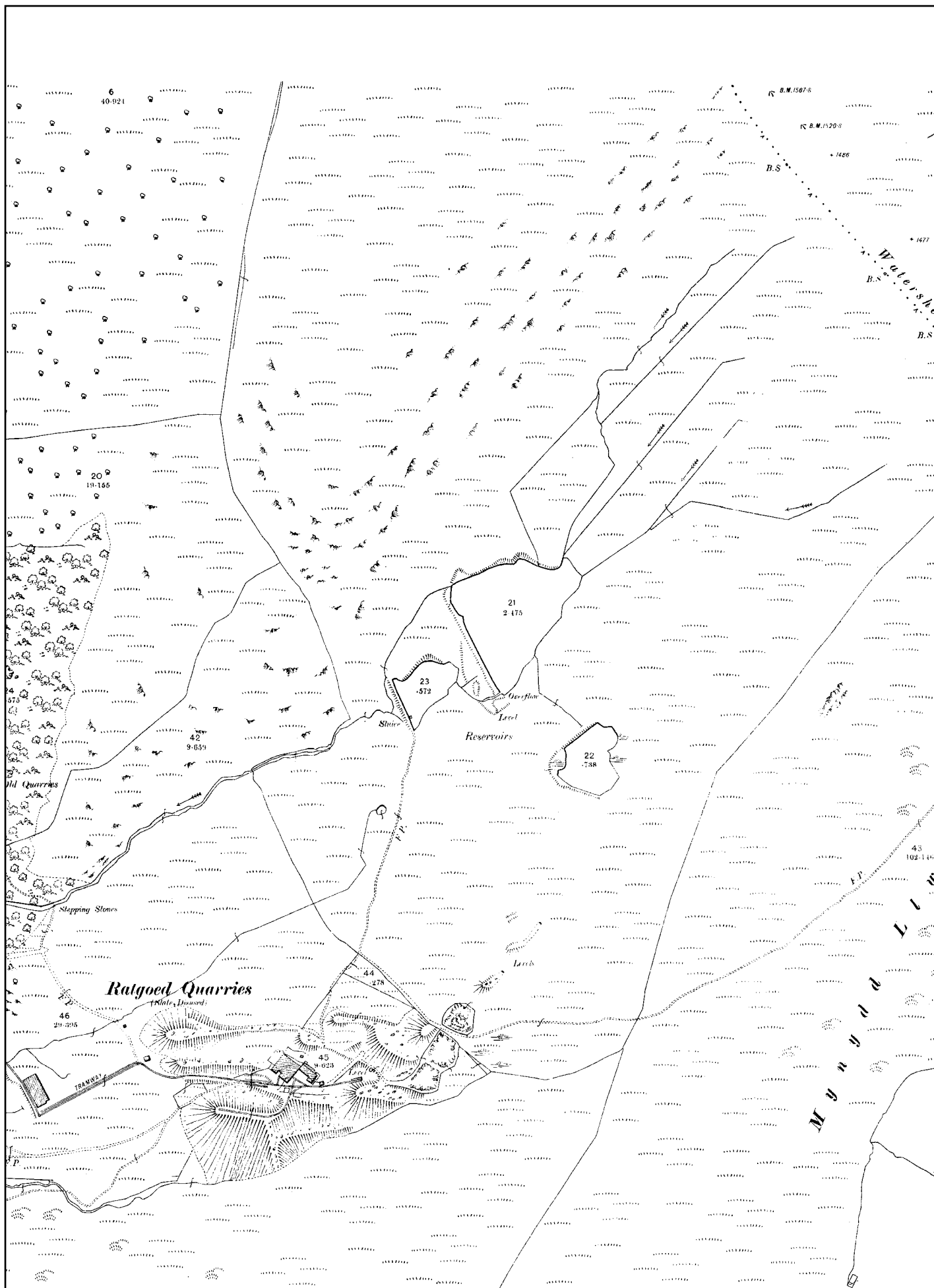


FIGURE 06

**Reproduction of Ordnance Survey Second Edition 1-inch to 25-mile
County Series Map Sheet VIII.13, published 1901. Scale 1:5000@ A4.**



APPENDIX I

Gwynedd Archaeological Trust photographic metadata pro-forma



Digital Photographic Record

Include main context numbers for each shot, drawing numbers for sections and any other relevant numbers for cross referencing.

Delete any unwanted photos **immediately** from the camera.

Regularly upload photographs to computer.

[illegible]

APPENDIX II

Gwynedd Archaeological Trust basic recording pro-forma

[illegible]

APPENDIX II

Gwynedd Archaeological Trust Photographic Metadata

PHOTO RECORD NUMBER*	NGR*	DESCRIPTION*	VIEW FROM	SCALE(S)	CREATOR OF DIGITAL PHOTO*	ORIGINATING ORGANISATION	PLATE
G2609_001	SH78651232	Road to site (misty conditions)	N	Not used	MSL/CF	Gwynedd Archaeological Trust	01
G2609_002	SH78651232	Shot of PRN 9153 from roadside showing extent of overgrowth- pool in photo	SW	2x1m	MSL/CF	Gwynedd Archaeological Trust	02
G2609_003	SH78651232	Shot of PRN 9153 from roadside showing gradient (NW-SE) side running down to reservoir	SW	2x1m	MSL/CF	Gwynedd Archaeological Trust	03
G2609_004	SH78651232	Shot of PRN 9153 showing cut of reservoir leading down on N-W side	NE	2x1m	MSL/CF	Gwynedd Archaeological Trust	04
G2609_005	SH78651232	Shot of PRN 9153 showing cut of reservoir leading down on N-W side	NE	Not used	MSL/CF	Gwynedd Archaeological Trust	05
G2609_006	SH78651232	Shot of PRN 9153 from top of dam. No scale + ID	NE	Not used	MSL/CF	Gwynedd Archaeological Trust	06
G2609_007	SH78651232	Shot of PRN 9154 from top of dam looking NE	SW	2x1m	MSL/CF	Gwynedd Archaeological Trust	07
G2609_008	SH78651232	Shot of PRN 9154 from top of dam looking SE along gradient of reservoir	NW	2x1m	MSL/CF	Gwynedd Archaeological Trust	08
G2609_009	SH78651232	Shot of PRN 9154 from top of dam looking SE along gradient of reservoir	NW	2x1m	MSL/CF	Gwynedd Archaeological Trust	09
G2609_010	SH78651232	Portrait shot of PRN 9154 from top of dam looking east	W	2x1m	MSL/CF	Gwynedd Archaeological Trust	10
G2609_011	SH78651232	Shot of PRN 9154 from top of dam looking east	W	2x1m	MSL/CF	Gwynedd Archaeological Trust	11
G2609_012	SH78651232	Shot of PRN 9154 from top of dam looking east	W	2x1m	MSL/CF	Gwynedd Archaeological Trust	12
G2609_013	SH78651232	Shot along possible feeder leat [01]	E	2x1m	MSL/CF	Gwynedd Archaeological Trust	13
G2609_014	SH78651232	Shot along possible feeder leat [01]	E	2x1m	MSL/CF	Gwynedd Archaeological Trust	14

PHOTO RECORD NUMBER*	NGR*	DESCRIPTION*	VIEW FROM	SCALE(S)	CREATOR OF DIGITAL PHOTO*	ORIGINATING ORGANISATION	PLATE
G2609_015	SH78651232	Shot of possible old breach in dam wall on SW side	NW	2x1m	MSL/CF	Gwynedd Archaeological Trust	15
G2609_016	SH78651232	Shot of possible old breach in dam wall on SW side	SW	Not used	MSL/CF	Gwynedd Archaeological Trust	16
G2609_017	SH78651232	Shot across reservoir PRN 9154 also showing feeder leat PRN 9158	SW	2x1m	MSL/CF	Gwynedd Archaeological Trust	17
G2609_018	SH78651232	Shot across reservoir PRN 9154 also showing feeder leat PRN 9158	SW	Not used	MSL/CF	Gwynedd Archaeological Trust	18
G2609_019	SH78651232	Shot of NE side of dam showing breach. No scale + ID.	SE	Not used	MSL/CF	Gwynedd Archaeological Trust	19
G2609_020	SH78651232	Shot along top of dam looking NW. No scale + ID)	SE	Not used	MSL/CF	Gwynedd Archaeological Trust	20
G2609_021	SH78651232	Shot of reservoir PRN 9154 from top of dam from SE side looking NW. No scale + ID.	SE	Not used	MSL/CF	Gwynedd Archaeological Trust	21
G2609_022	SH78651232	Shot of reservoir PRN 9154 + feeder leat PRN 9158. No scale + ID.	S	Not used	MSL/CF	Gwynedd Archaeological Trust	
G2609_023	SH78651232	Shot of reservoir PRN 9154 + feeder leat PRN 9158. No scale + ID.	S	Not used	MSL/CF	Gwynedd Archaeological Trust	22
G2609_024	SH78651232	Shot of pool + modern outflow pipe next to PRN 9158. No scale + ID.	SE	Not used	MSL/CF	Gwynedd Archaeological Trust	23



Gwynedd Archaeological Trust
Ymddiriedolaeth Archaeolegol Gwynedd

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