MINLLYN SLATE QUARRY
WITH
CAE ABATTY

(SH 853 140)

SURVEY OF AUGUST 2011
REPORTS AND DIAGRAMS

Andrew Hurrell, August 2011

Snowdonia National Park Centre, Plas Tan y Bwlch
2013

Snowdonia National Park Study Centre, Plas Tan y Bwlch, Maentwrog, LL41 3YU,
01766 772 600
plas@eryri-npa.gov.uk

These collected reports form part of an Industrial Archaeology archive held at Plas Tan y Bwlch

They are some of the results of a practical surveying course carried out by volunteers, based at the Plas for a week in August over many years, primarily studying the slate industry. Some work has also been carried out on metal mine sites.

The reports and drawings are held at the Plas, along with the surveys of other sites, and can be accessed by *bona fide* students of the industrial history of the region. Prior arrangement would be advisable.

Additionally, the results of some independent research are lodged there. Donations of such independent research are always welcome.

The course members engaged on this survey were:

Dr David Gwyn	) leading	Andrew Hurrell
Celia Hancock	)	Chris Lester
Tony Beardsell		Stan Owen
Hazel Fleming		Mark Simpson
Dave Gunning		Peter Swift
Peter Hay		Ian Walters
Ken Hollamby		

Introduction

The previous two pages form the title page and its reverse of the collected reports for the site given to the course members once all the drawings and reports had been indexed and archived. They were not in the same order as the archive as that generally starts with maps and plans followed by the drawings and then reports. Historical notes/research is at the end of the archive file and is not usually included in the collected notes as, with the exception old OS maps, consists of the work of the survey.

The records in the HER are individual and in number order. Each record starts with the numbered datasheet giving details of the record. There can be gaps in the numbering, left to allow for additional material should it transpire, and sometimes for expected material that never arrived…

The pages following this in the introduction are of the indices, both Alphabetic by Subject and by Document type. Also, there is the full database. Original document; this category has become less relevant with time with CAD drawings and computer generated reports etc.

Scales are as drawn but it is very unlikely that they will print out accurately

Individuals are only identified by initials in the database but usually they are identified on the record itself. All group members involved on any survey are listed on the reverse title page.

All, surviving, group members are happy for their material to be available but please refer to Heneb:Gwynedd HER for conditions/restrictions to their onward use.

Some reports may have notes for jobs to be done if a further visit was possible – but given the limitations of having one week per year for the surveys this was frequently not possible. If any users of these records can fill in any of the gaps, please contact Heneb:Gwynedd HER

Celia Hancock, April 2024

Minllyn Slate Quarry — *Alphabetic by subject*

Subject	*Doc No*	*Doc Type*	*Drawing Type*
Bastion, Cae Abatty, floor 2	ML042	drawing	plan
Bearing blocks, Cae Abatty	ML035	drawing	plan/elevations
Bearing, upper mill, floor I	ML004-1	drawing	plan/elevation
Boiler House and pillars, floor I	ML003-1	drawing	plan
Boiler House, chimney, floor I	ML003-3	drawing	elevation
Boiler House, detail, floor I	ML003-2	drawing	plan/elevations
Boiler House, floor I	ML021-1	report	
Boiler House, floor I	ML022-1	report	
Boiler, types of	ML022-2	extract	
Brake band and rim, Cae Abatty	ML034	drawing	plan
Cae Abatty, artefacts	ML030	report	
Cae Abatty, artefacts	ML039	photos	
Cae Abaty	ML044	report	
Crane anchor etc, floor M	ML007-2	drawing	plan
Crane base and anchors, floor M	ML024-1	report	
Drum axle, end casting, Cae Abatty	ML031	drawing	plan/elevation
Drum, winding, reconstruction, Cae Abatty	ML032-1	drawing	section
Drum, winding, reconstruction, Cae Abatty	ML032-2	drawing	elevation
Drumhouse, Cae Abatty, floor 2	ML040	drawing	plan/elevation
Drumhouse, exit incline, floor I	ML006	drawing	plan
Drumhouse, exit incline, floor I	ML021-3	report	
Drumhouse, floor M	ML007-1	drawing	plan
Drumhouse, floor M	ML024-1	report	
Fire Bar, Boiler House, floor I	ML004-4	drawing	plan/elevation
Floor I, plan, Mill area	ML002-1	drawing	plan
Floor index	ML001-6	map	map
Floor M plan	ML007-3	drawing	plan
Gear, broken, upper mill, floor I	ML004-2	drawing	plan/elevation
Gearwheel, Cae Abatty	ML037	drawing	plan/sections
General Location	ML001-1	map	map
Historical background	ML050	report	
Map, old	ML001-5	drawing	map
Map, OS old, Cae Abatty	ML028	map	map
Map, OS, old	ML001-3	map	map
Map, OS, old	ML001-4	map	map
Mill, Lower	ML009	drawing	plan/elevation
Mill, Upper, floor I	ML002-2	drawing	plan

Subject	*Doc No*	*Doc Type*	*Drawing Type*
Mill, Upper, floor I	ML002-3	drawing	elevation
Mill, Upper, floor I	ML002-4	drawing	plan
Mill, Upper, floor I	ML021-1	report	
Overall Site Plan	ML001-2	map	plan
Pelton wheel	ML002-5	drawing	plan/elevation
Pillars	ML021-1	report	
Roller, upper mill, floor I	ML004-3	drawing	plan/section
Site plan, Cae Abatty	ML029	map	plan
Structure, floor M	ML008	drawing	plan
Structure, floor M	ML024-2	report	
Structure, small, Cae Abatty, floor 2	ML040	drawing	plan
Structure, small, Cae Abatty, floor 2	ML041	drawing	plan
Structure, small, Cae Abatty, floor 3	ML043	drawing	plan
Structures, floor N	ML025-1	report	
Structures, floor N	ML025-2	drawing	plan
Tramway, exit, from Weighhouse, floor I	ML005-3	drawing	profile
Tramway, to exit incline	ML021-3	report	
Turntable base, Cae Abatty	ML033-1	drawing	plan
Turntable top, Cae Abatty	ML033-2	drawing	plan
Underground plan	ML001-7	map	map
Water supply routes	ML023	report	
Weighhouse and pillars, floor I	ML005-2	drawing	plan
Weighhouse, floor I	ML005-1	drawing	plan
Weighhouse, floor I	ML021-2	report	
Winch, geared shaft, Cae Abatty	ML036	drawing	plan/section
Winder, tramway, Cae Abatty, reconstruction	ML038	drawing	plan/elevation
Workings	ML020	report	

Minllyn Slate Quarry — *Index by Document Type*

Doc Type	*Subject*	*Drawing Type*	*Doc No*
drawing	Bastion, Cae Abatty, floor 2	plan	ML042
drawing	Bearing blocks, Cae Abatty	plan/elevations	ML035
drawing	Bearing, upper mill, floor I	plan/elevation	ML004
drawing	Boiler House and pillars, floor I	plan	ML003
drawing	Boiler House, chimney, floor I	elevation	ML003
drawing	Boiler House, detail, floor I	plan/elevations	ML003
drawing	Brake band and rim, Cae Abatty	plan	ML034
drawing	Crane anchor etc, floor M	plan	ML007
drawing	Drum axle, end casting, Cae Abatty	plan/elevation	ML031
drawing	Drum, winding, reconstruction, Cae Abatty	section	ML032
drawing	Drum, winding, reconstruction, Cae Abatty	elevation	ML032
drawing	Drumhouse, Cae Abatty, floor 2	plan/elevation	ML040
drawing	Drumhouse, exit incline, floor I	plan	ML006
drawing	Drumhouse, floor M	plan	ML007
drawing	Fire Bar, Boiler House, floor I	plan/elevation	ML004
drawing	Floor I, plan, Mill area	plan	ML002
drawing	Floor M plan	plan	ML007
drawing	Gear, broken, upper mill, floor I	plan/elevation	ML004
drawing	Gearwheel, Cae Abatty	plan/sections	ML037
drawing	Map, old	map	ML001
drawing	Mill, Lower	plan/elevation	ML009
drawing	Mill, Upper, floor I	plan	ML002
drawing	Mill, Upper, floor I	elevation	ML002
drawing	Mill, Upper, floor I	plan	ML002
drawing	Pelton wheel	plan/elevation	ML002
drawing	Roller, upper mill, floor I	plan/section	ML004
drawing	Structure, floor M	plan	ML008
drawing	Structure, small, Cae Abatty, floor 2	plan	ML040
drawing	Structure, small, Cae Abatty, floor 2	plan	ML041
drawing	Structure, small, Cae Abatty, floor 3	plan	ML043
drawing	Structures, floor N	plan	ML025
drawing	Tramway, exit, from Weighhouse, floor I	profile	ML005
drawing	Turntable base, Cae Abatty	plan	ML033
drawing	Turntable top, Cae Abatty	plan	ML033
drawing	Weighhouse and pillars, floor I	plan	ML005
drawing	Weighhouse, floor I	plan	ML005
drawing	Winch, geared shaft, Cae Abatty	plan/section	ML036

Doc Type	*Subject*	*Drawing Type*	*Doc No*
drawing	Winder, tramway, Cae Abatty, reconstruction	plan/elevation	ML038
extract	Boiler, types of		ML022
map	Floor index	map	ML001
map	General Location	map	ML001
map	Map, OS old, Cae Abatty	map	ML028
map	Map, OS, old	map	ML001
map	Map, OS, old	map	ML001
map	Overall Site Plan	plan	ML001
map	Site plan, Cae Abatty	plan	ML029
map	Underground plan	map	ML001
photos	Cae Abatty, artefacts		ML039
report	Boiler House, floor I		ML021
report	Boiler House, floor I		ML022
report	Cae Abatty, artefacts		ML030
report	Cae Abaty		ML044
report	Crane base and anchors, floor M		ML024
report	Drumhouse, exit incline, floor I		ML021
report	Drumhouse, floor M		ML024
report	Historical background		ML050
report	Mill, Upper, floor I		ML021
report	Pillars		ML021
report	Structure, floor M		ML024
report	Structures, floor N		ML025
report	Tramway, to exit incline		ML021
report	Water supply routes		ML023
report	Weighhouse, floor I		ML021
report	Workings		ML020

Doc No	Doc Date	Subject	Grid Ref	Doc Type	Scale	Drawing Type	Drawing Medium
ML001-1	1921	General Location	SH 853 140	map	1 in to 1 mile	map	photocopy
ML001-2	2011	Overall Site Plan	SH 853 140	map	25in to 1 mile	plan	photocopy
ML001-3	1889	Map, OS, old	SH 853 140	map	25in to 1 mile	map	photocopy
ML001-4	1901	Map, OS, old	SH 853 140	map	25in to 1 mile	map	photocopy
ML001-5	1851	Map, old	SH 853 140	drawing	?	map	photocopy
ML001-6	2011	Floor index	SH 853 140	map	25in to 1 mile	map	photocopy
ML001-7	2011	Underground plan	SH 853 140	map	red	map	photocopy
ML002-1	2011	Floor I, plan, Mill area	SH 853 140	drawing	1:300	plan	CAD
ML002-2	2011	Mill, Upper, floor I	SH 853 140	drawing	1:200	plan	CAD
ML002-3	2011	Mill, Upper, floor I	SH 853 140	drawing	1:200	elevation	photocopy
ML002-4	1972	Mill, Upper, floor I	SH 853 140	drawing	?	plan	photocopy
ML002-5	1972	Pelton wheel	SH 853 140	drawing	?	plan/elevation	photocopy
ML003-1	2011	Boiler House and pillars, floor I	SH 853 140	drawing	1:100	plan	CAD
ML003-2	2011	Boiler House, detail, floor I	SH 853 140	drawing	1:50	plan/elevations	CAD
ML003-3	2011	Boiler House, chimney, floor I	SH 853 140	drawing	1:50	elevation	CAD
ML004-1	2011	Bearing, upper mill, floor I		drawing	1:1	plan/elevation	CAD
ML004-2	2011	Gear, broken, upper mill, floor I		drawing	1:1	plan/elevation	CAD
ML004-3	2011	Roller, upper mill, floor I		drawing	1:2	plan/section	CAD
ML004-4	2011	Fire Bar, Boiler House, floor I		drawing	1:2	plan/elevation	CAD
ML005-1	2011	Weighhouse, floor I	SH 853 140	drawing	1:50	plan	CAD
ML005-2	2011	Weighhouse and pillars, floor I	SH 853 140	drawing	1:200	plan	CAD
ML005-3	2011	Tramway, exit, from Weighhouse, floor I	SH 853 140	drawing	1:200	profile	CAD
ML006	2011	Drumhouse, exit incline, floor I	SH 853 140	drawing	1:100	plan	CAD
ML007-1	2011	Drumhouse, floor M	SH 851 140	drawing	1:100	plan	CAD
ML007-2	2011	Crane anchor etc, floor M	SH 851 140	drawing	1:200	plan	CAD
ML007-3	2011	Floor M plan	SH 851 140	drawing	1:200	plan	CAD
ML008	2011	Structure, floor M	SH 852 139	drawing	1:200	plan	CAD
ML009	2011	Mill, Lower	SH 857 137	drawing	1:500	plan/elevation	CAD
ML020	2011	Workings	SH 853 140	report			photocopy
ML021-1	2011	Boiler House, floor I	SH 853 140	report			comp gen
ML021-1	2011	Pillars	SH 853 140	report			comp gen
ML021-1	2011	Mill, Upper, floor I	SH 853 140	report			comp gen
ML021-2	2011	Weighhouse, floor I	SH 853 140	report			comp gen
ML021-3	2011	Drumhouse, exit incline, floor I	SH 853 140	report			comp gen
ML021-3	2011	Tramway, to exit incline	SH 853 140	report			comp gen
ML022-1	2011	Boiler House, floor I	SH 853 140	report			comp gen
ML022-2	?	Boiler, types of		extract			photocopy
ML023	2011	Water supply routes	SH 85 14	report			photocopy
ML024-1	2011	Drumhouse, floor M	SH 851 140	report			comp gen
ML024-1	2011	Crane base and anchors, floor M	SH 851 140	report			photocopy
ML024-2	2011	Structure, floor M	SH 852 139	report			comp gen
ML025-1	2011	Structures, floor N	SH 853 140	report			comp gen
ML025-2	2011	Structures, floor N	SH 852 139	drawing	1:100	plan	photocopy
ML028	2011	Map, OS old, Cae Abatty	SH 846 136	map	25" to 1 mile	map	photocopy
ML029	2011	Site plan, Cae Abatty	SH 846 136	map	25" to 1 mile	plan	photocopy
ML030	2011	Cae Abatty, artefacts	SH 846 136	report			photocopy
ML031	2011	Drum axle, end casting, Cae Abatty	SH 848 137	drawing	1:5	plan/elevation	photocopy
ML032-1	2011	Drum, winding, reconstruction, Cae Abatty	SH 846 136	drawing	1:20	section	photocopy
ML032-2	2011	Drum, winding, reconstruction, Cae Abatty	SH 846 136	drawing	1:20	elevation	photocopy
ML033-1	2011	Turntable base, Cae Abatty	SH 846 136	drawing	1:10	plan	photocopy
ML033-2	2011	Turntable top, Cae Abatty	SH 846 136	drawing	1:10	plan	photocopy
ML034	2011	Brake band and rim, Cae Abatty	SH 848 137	drawing	1:10	plan	photocopy
ML035	2011	Bearing blocks, Cae Abatty	SH 848 137	drawing	1:5	plan/elevations	photocopy
ML036	2011	Winch, geared shaft, Cae Abatty	SH 848 137	drawing	1:10	plan/section	photocopy
ML037	2011	Gearwheel, Cae Abatty	SH 851 138	drawing	1:10	plan/sections	photocopy
ML038	2011	Winder, tramway, Cae Abatty, reconstruction	SH 848 137	drawing	1:20	plan/elevation	photocopy
ML039	2011	Cae Abatty, artefacts	SH 846 136	photos			photocopy
ML040	2011	Drumhouse, Cae Abatty, floor 2	SH 846 136	drawing	1:100	plan/elevation	photocopy
ML040	2011	Structure, small, Cae Abatty, floor 2	SH 846 136	drawing	1:100	plan	photocopy
ML041	2011	Structure, small, Cae Abatty, floor 2	SH 846 136	drawing	1:50	plan	photocopy
ML042	2011	Bastion, Cae Abatty, floor 2	SH 846 136	drawing	1:100	plan	photocopy
ML043	2011	Structure, small, Cae Abatty, floor 3	SH 846 136	drawing	1:100	plan	photocopy
ML044	2011	Cae Abaty	SH 846 136	report			comp gen
ML050	2011	Historical background	SH 85 14	report			photocopy

Doc No	Drawing Mediu	Doc Material	Doc Status	Origin	Doc Size	Author(s)	Source	See Also	Notes
ML001-1	photocopy	paper	complete		A4	OS			see OS Landranger Sheet 124
ML001-2	photocopy	paper	complete		A3	OS	Plas Course		
ML001-3	photocopy	paper	complete		A4	OS			
ML001-4	photocopy	paper	complete		A3, 3 pg	OS			
ML001-5	photocopy	paper	complete		A3				from auction particulars
ML001-6	photocopy	paper	complete		A3	PH, AH, SO	Plas Course		
ML001-7	photocopy	paper	complete		A4	AH, PH, SO	Plas Course	020	
ML002-1	CAD	paper	complete		A4	CH, CL, DFG	Plas Course		
ML002-2	CAD	paper	complete		A4	CH, CL, DFG	Plas Course	021	
ML002-3	photocopy	paper	complete		A4	CH, CL, DFG	Plas Course	021	
ML002-4	photocopy	paper	complete		A3	?	DRO	021	
ML002-5	photocopy	paper	complete		A3	?	DRO		
ML003-1	CAD	paper	complete		A4	CH, CL, DFG	Plas Course	021, 022	
ML003-2	CAD	paper	complete		A4	CH, CL, DFG	Plas Course	021, 022	
ML003-3	CAD	paper	complete		A4	CH, CL, DFG	Plas Course	021, 022	Height calculation drawing
ML004-1	CAD	paper	complete		A4	IW	Plas Course		
ML004-2	CAD	paper	complete		A4	IW	Plas Course		
ML004-3	CAD	paper	complete		A4	IW	Plas Course		
ML004-4	CAD	paper	complete		A4	IW	Plas Course	021, 022	
ML005-1	CAD	paper	complete		A4	CH, CL, DFG	Plas Course	021-2	
ML005-2	CAD	paper	complete		A4	CH, CL, DFG	Plas Course	021-2	
ML005-3	CAD	paper	complete		A4	CH, CL, DFG	Plas Course	021-3	
ML006	CAD	paper	complete		A4	CH, CL, DFG	Plas Course	021-3	
ML007-1	CAD	paper	complete		A4	CH, CL, DFG	Plas Course	024	
ML007-2	CAD	paper	complete		A4	CH, CL, DFG	Plas Course	024	
ML007-3	CAD	paper	complete		A4	CH, CL, DFG	Plas Course	024	
ML008	CAD	paper	complete		A4	CH, CL, DFG	Plas Course	024	
ML009	CAD	paper	complete		A4	DG, KH	Plas Course		
ML020	photocopy	paper	complete		A4, 20 pg	AH, PH, SO	Plas Course	001-7	
ML021-1	comp gen	paper	complete		A4, 10 pg	CL, CH, DFG	Plas Course	003	
ML021-1	comp gen	paper	complete		A4, 10 pg	CL, CH, DFG	Plas Course	003-1	
ML021-1	comp gen	paper	complete		A4, 10 pg	CL, CH, DFG	Plas Course	002	
ML021-2	comp gen	paper	complete		A4, 2 pg	CL, CH, DFG	Plas Course	005	
ML021-3	comp gen	paper	complete		A4, 3 pg	CL, CH, DFG	Plas Course	005	
ML021-3	comp gen	paper	complete		A4, 3 pg	CL, CH, DFG	Plas Course	006	
ML022-1	comp gen	paper	complete		A4, 7 pg	PS, TB, DRG	Plas Course	002, 003, 004-4	
ML022-2	photocopy	paper	complete		A4, 2 pg			003	
ML023	photocopy	paper	complete		A4, 4 pg	KH, TB, PS	Plas Course		
ML024-1	comp gen	paper	complete		A4, 6 pg	CH, CL, DFG	Plas Course	007	
ML024-1	photocopy	paper	complete		A4, 6 pg	CH, CL, DFG	Plas Course	007	
ML024-2	comp gen	paper	complete		A4, 6 pg	CH, CL, DFG	Plas Course	008	
ML025-1	comp gen	paper	complete		A4, 3 pg	PS, TB, DRG	Plas Course		
ML025-2	photocopy	paper	complete		A4	PS, TB	Plas Course		Fig 12
ML028	photocopy	paper	complete		A3	OS	Plas Course		
ML029	photocopy	paper	complete		A4	HEF, CH	Plas Course		
ML030	photocopy	paper	complete		A4, 7 pg	PS, TB	Plas Course	031 - 039	
ML031	photocopy	paper	complete		A4	PS, TB	Plas Course	030, 039	Fig 2
ML032-1	photocopy	paper	complete		A4	PS, TB	Plas Course	030, 039	Fig 3
ML032-2	photocopy	paper	complete		A4	PS, TB	Plas Course	030, 039	Fig 4
ML033-1	photocopy	paper	complete		A4	PS, TB	Plas Course	030, 039	Fig 5
ML033-2	photocopy	paper	complete		A4	PS, TB	Plas Course	030, 039	Fig 6
ML034	photocopy	paper	complete		A4	PS, TB	Plas Course	030, 039	Fig 7
ML035	photocopy	paper	complete		A4	PS, TB	Plas Course	030, 039	Fig 8
ML036	photocopy	paper	complete		A4	PS, TB	Plas Course	030, 039	Fig 9
ML037	photocopy	paper	complete		A4	PS, TB	Plas Course	030, 039	Fig 10
ML038	photocopy	paper	complete		A4	PS, TB	Plas Course	030, 039	Fig 11
ML039	photocopy	paper	complete		A4, 17 pg	PS, TB	Plas Course	030 - 038	
ML040	photocopy	paper	complete		A4	IW, HF	Plas Course	044	
ML040	photocopy	paper	complete		A4	IW, HF	Plas Course	044	
ML041	photocopy	paper	complete		A4	IW, HF	Plas Course	044	
ML042	photocopy	paper	complete		A4	IW, HF	Plas Course	044	
ML043	photocopy	paper	complete		A4	IW, HF	Plas Course	044	
ML044	comp gen	paper	complete		A4, 14 pg	HF, IW	Plas Course	040 - 043	
ML050	photocopy	paper	complete		A4, 6 pg	DRHG	Plas Course		

Site	Minllyn Slate Quarry			**Doc No**	**ML001-1**
Subject	**General Location**				
Doc Date	1921		See also		
Doc Type	map		Grid ref	SH 853 140	
Drawing Type	map		Scale	1 in to 1 mile	
Drawing Medium	photocopy		Author(s)	OS	
Doc Material	paper		Source		
Doc Status	complete	Original		Doc Size	A4
Notes	see OS Landranger Sheet 124				

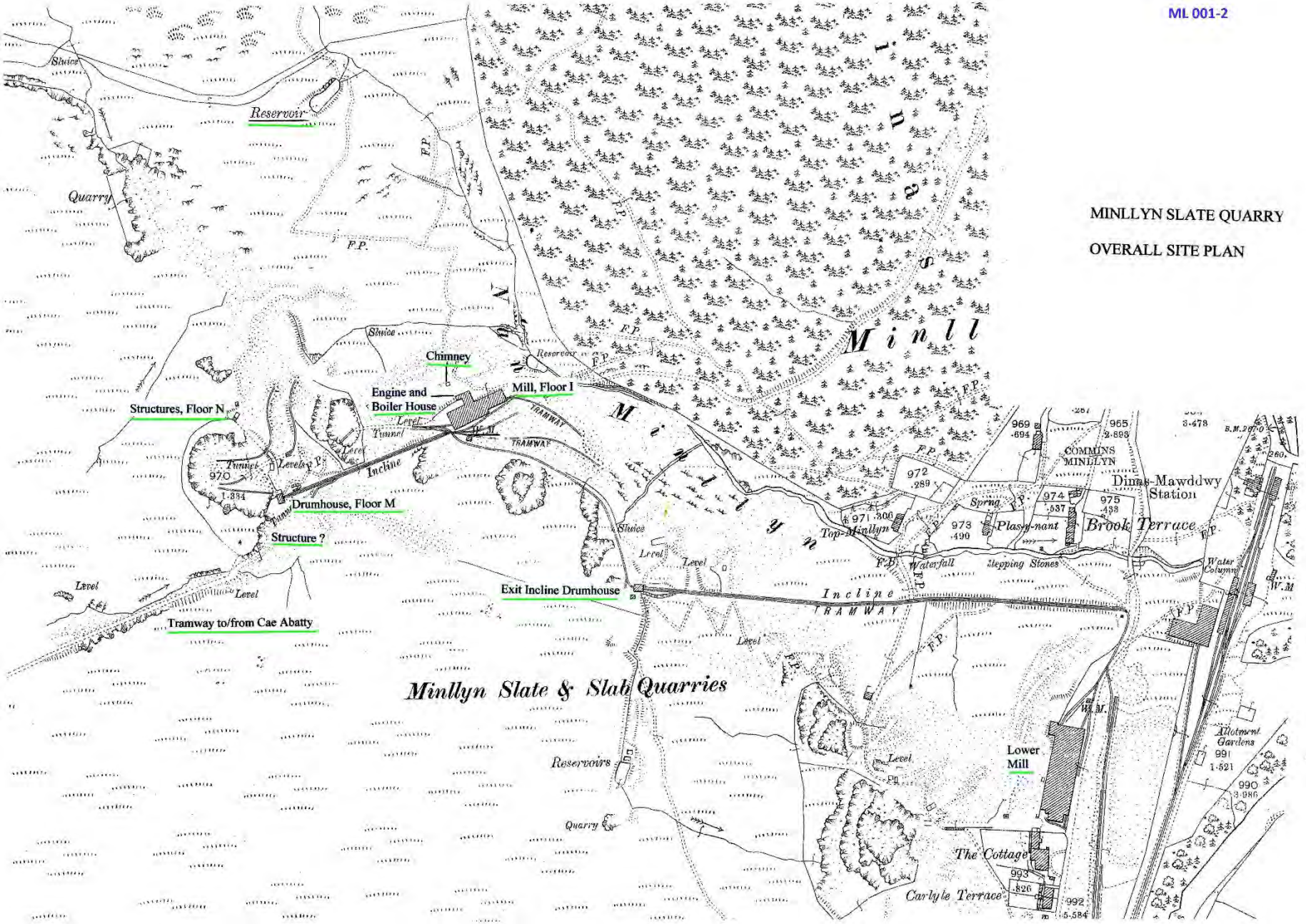

Llanfachreth
DOLGELLEY
Brithdir isaf
Camlan
I D R I S
Mallwyd
2 km

Site	Minllyn Slate Quarry	**Doc No**	**ML001-2**
Subject	**Overall Site Plan**		
Doc Date	2011	See also	
Doc Type	map	Grid ref	SH 853 140
Drawing Type	plan	Scale	25in to 1 mile
Drawing Medium	photocopy	Author(s)	OS
Doc Material	paper	Source	Plas Course
Doc Status	Original	Doc Size	A3
Notes			

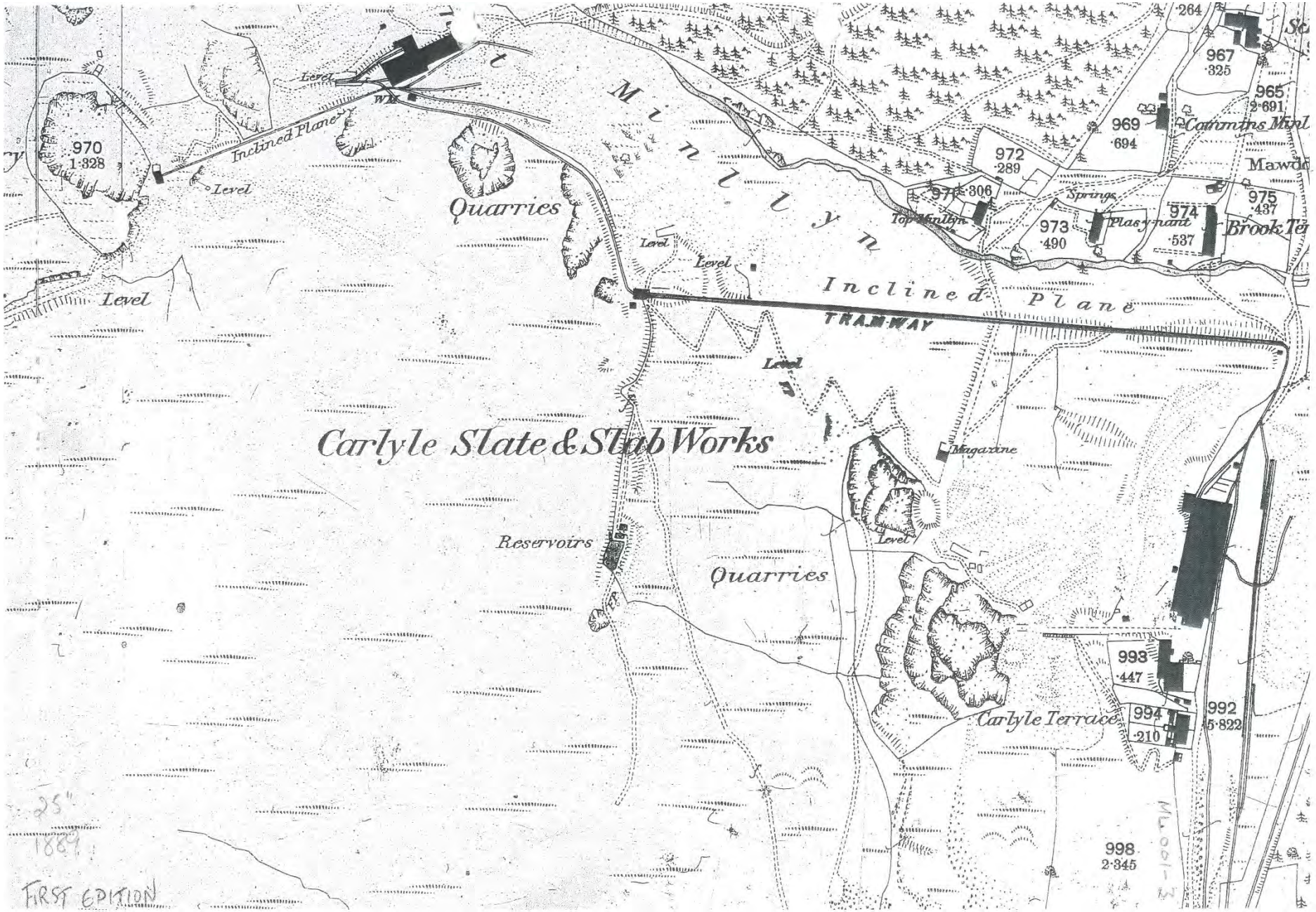
ML 001-2

MINLLYN SLATE QUARRY

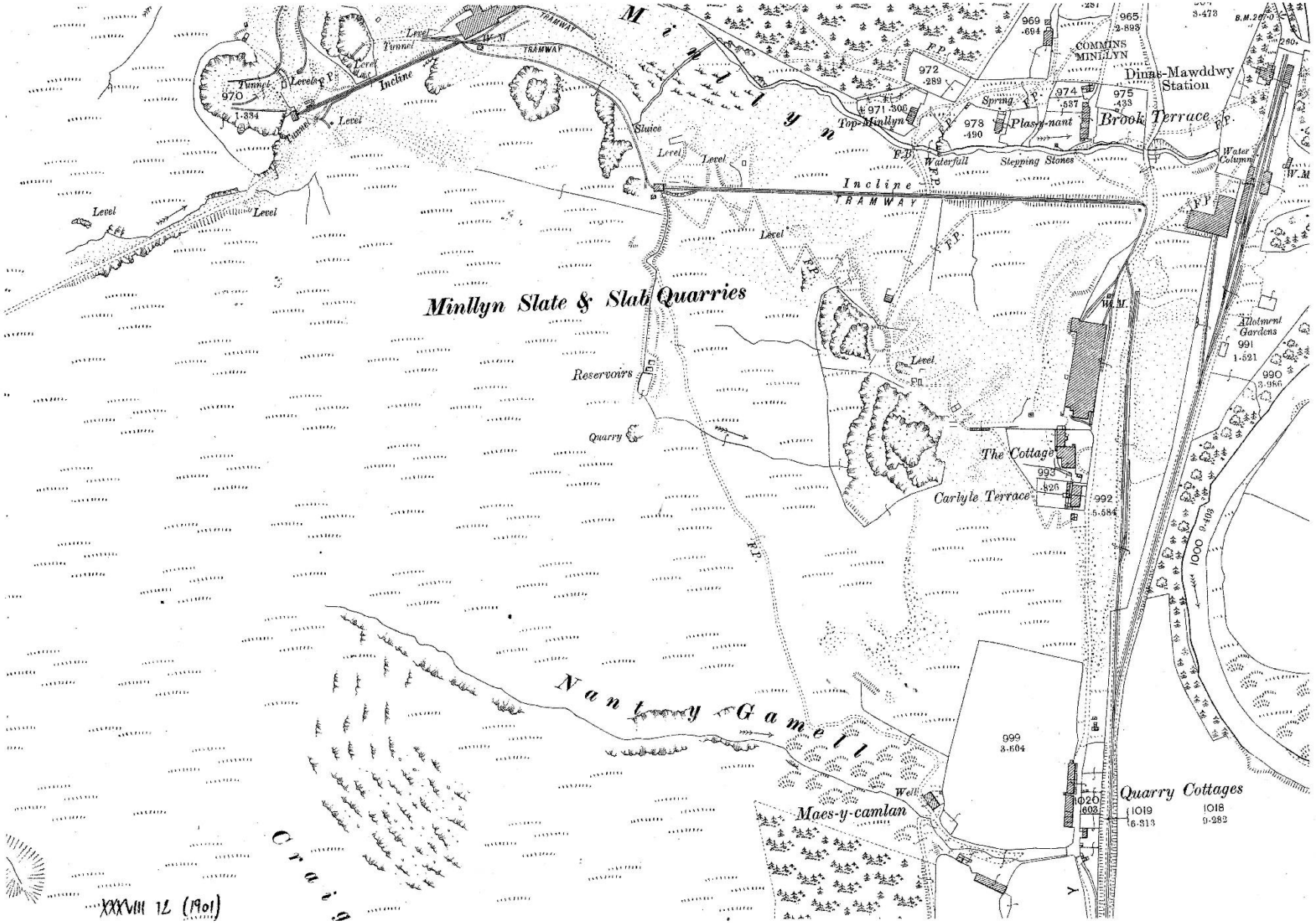
OVERALL SITE PLAN

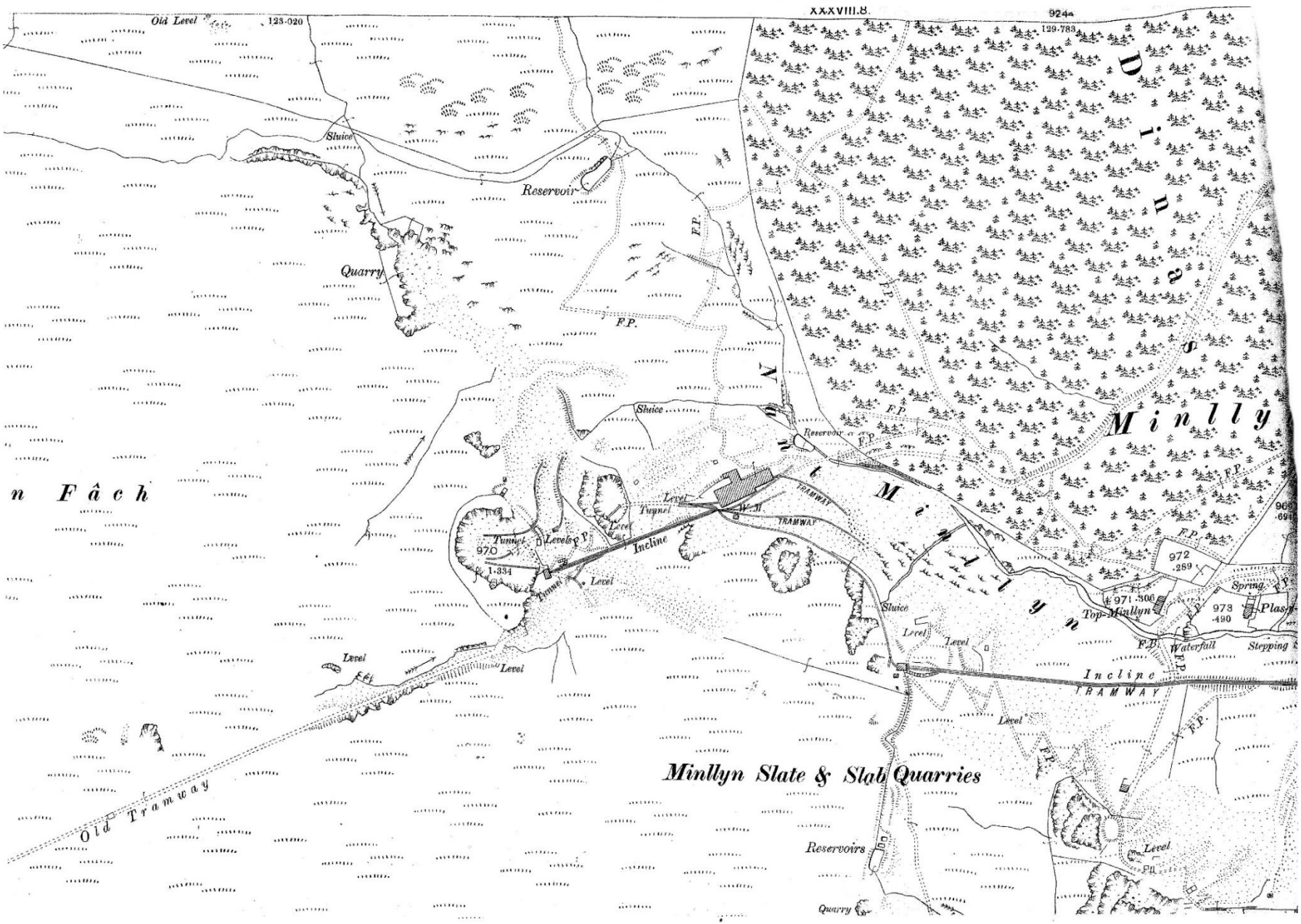


Site	Minllyn Slate Quarry			**Doc No**	**ML001-3**
Subject	**Map, OS, old**				
Doc Date	1889		See also		
Doc Type	map		Grid ref	SH 853 140	
Drawing Type	map		Scale	25in to 1 mile	
Drawing Medium	photocopy		Author(s)	OS	
Doc Material	paper		Source		
Doc Status		Original		Doc Size	A4
Notes					


Carlyle Slate & Slab Works
Quarries
Quarries
Reservoirs
Incline Plane
TRAMWAY
Incline Plane
Level
Level
Level
Level
Level
Level
Level
Magazine
Springs
Carlyle Terrace
970
1·328
967
·325
965
2·691
969
·694
972
·289
971
·306
973
·490
974
·537
975
·437
993
·447
994
·210
992
5·822
998
2·345
·264
25"
1889
FIRST EDITION

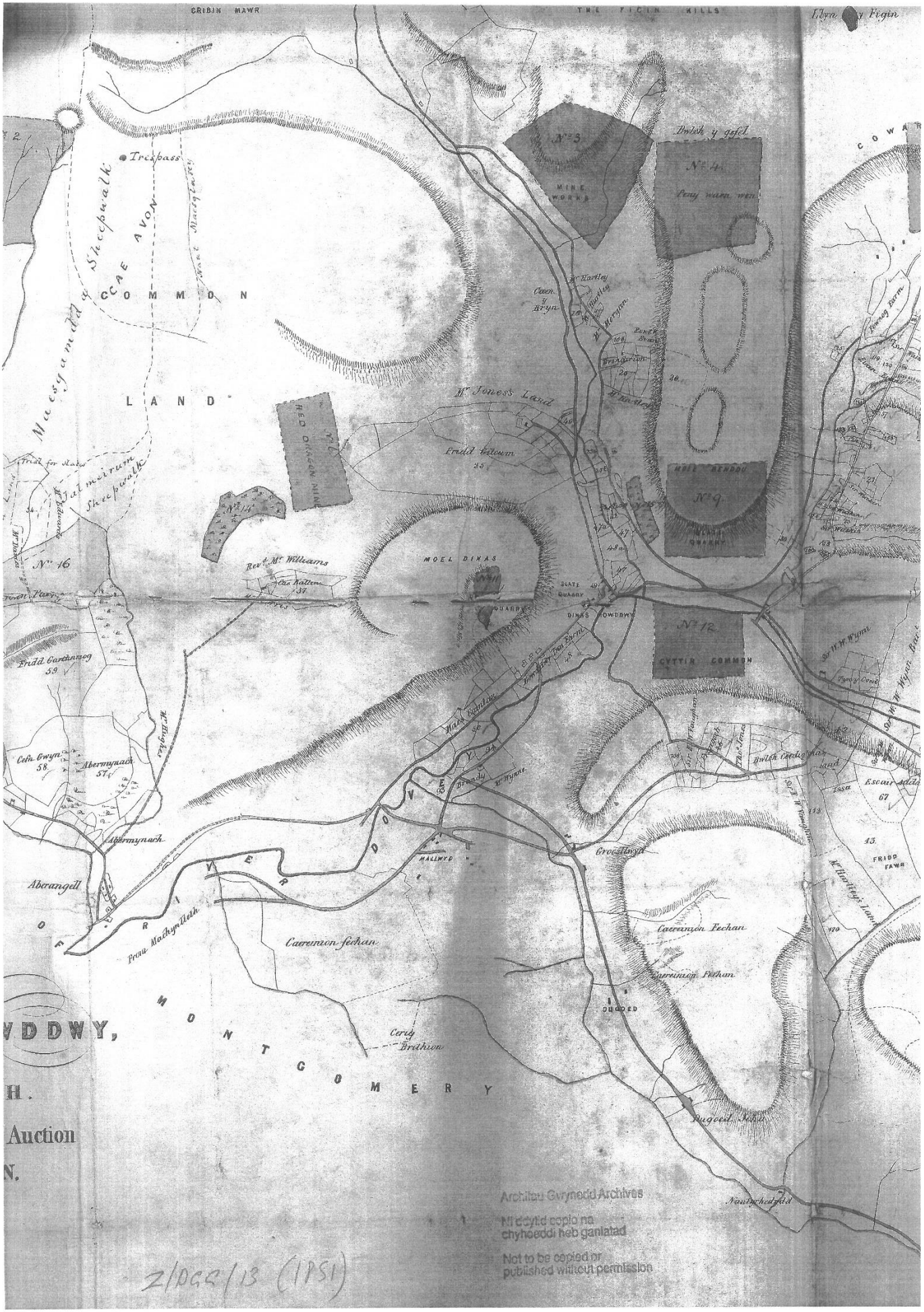
Site	Minllyn Slate Quarry			**Doc No**	**ML001-4**
Subject	**Map, OS, old**				
Doc Date	1901		See also		
Doc Type	map		Grid ref	SH 853 140	
Drawing Type	map		Scale	25in to 1 mile	
Drawing Medium	photocopy		Author(s)	OS	
Doc Material	paper		Source		
Doc Status		Original		Doc Size	A3, 2 pg
Notes					


Minllyn Slate & Slab Quarries
Minllyn
Incline
TRAMWAY
Reservoirs
Quarry
Level
Tunnel
Sluice
Waterfall
Stepping Stones
Top-Minllyn
Plasyn-nant
Brook Terrace
Dinas-Mawddwy Station
COMMINS MINLLYN
Water Column
Allotment Gardens
The Cottage
Carlyle Terrace
Quarry Cottages
Maes-y-camlan
Well
Nant-y-Gamel
Craig
F.P.
W.M.
970
971
972
973
974
975
978
991
990
992
993
999
1000
1018
1019
1020
XXXVIII 12 (1901)


XXXVIII.8.
924a
Old Level
123·020
Sluice
Reservoir
Quarry
F.P.
129·783
Minlly
n Fâch
Sluice
Reservoir
Level
Tunnel
TRAMWAY
Tunnel
Levels
Incline
970
1·334
Level
Level
Level
Level
Sluice
Top-Minllyn
Level
Level
Waterfall
Stepping
Incline
TRAMWAY
Minllyn Slate & Slab Quarries
Old Tramway
Reservoirs
Quarry
Level
Spring
Plas

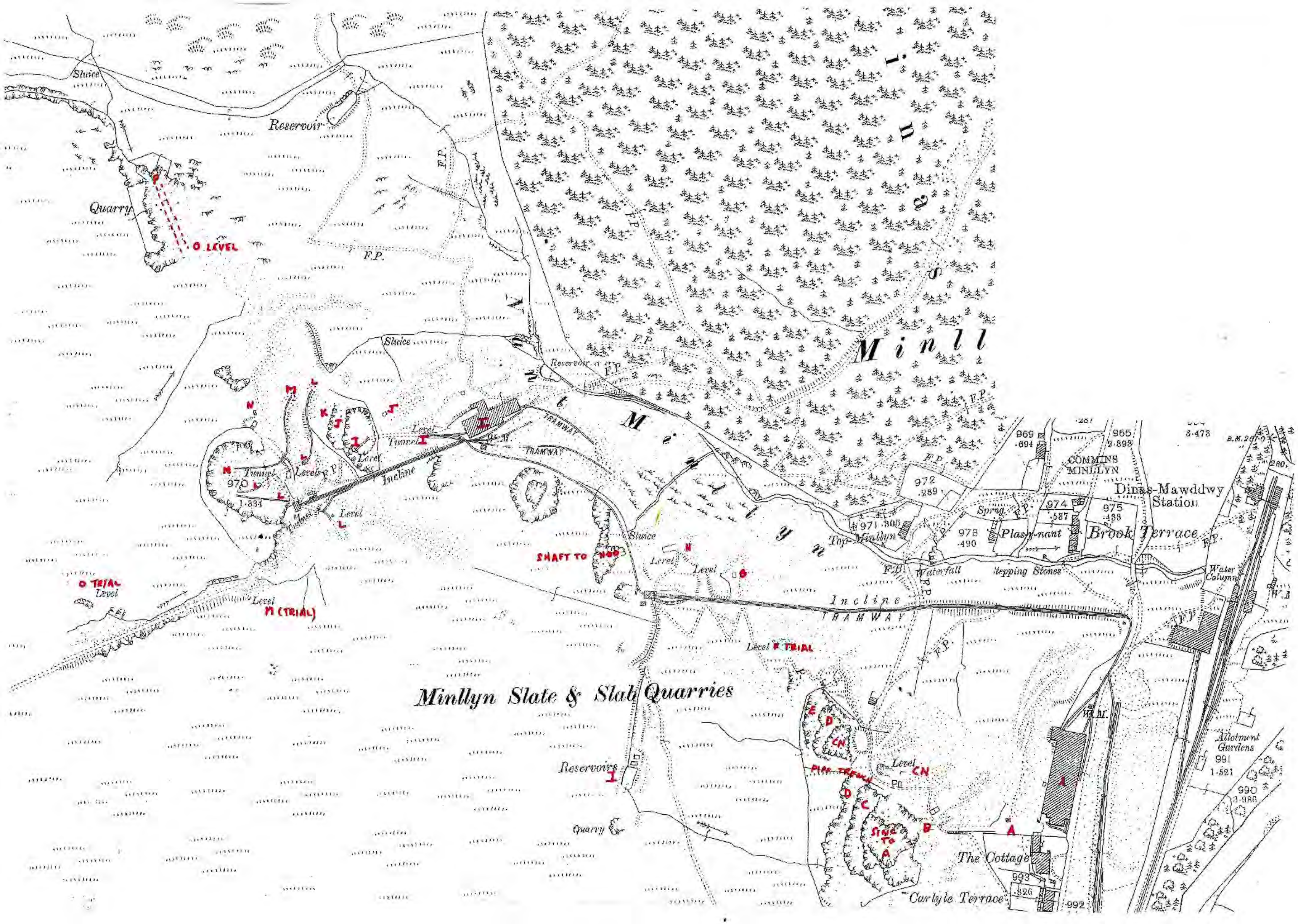
Site	Minllyn Slate Quarry			**Doc No**	**ML001-5**
Subject	**Map, old**				
Doc Date	1851		See also		
Doc Type	drawing		Grid ref	SH 853 140	
Drawing Type	map		Scale	?	
Drawing Medium	photocopy		Author(s)		
Doc Material	paper		Source	DRO	
Doc Status	complete	Original		Doc Size	A3
Notes	from auction particulars				

Document is a copy of one in Dolgellau Record Office so may be removed from this record

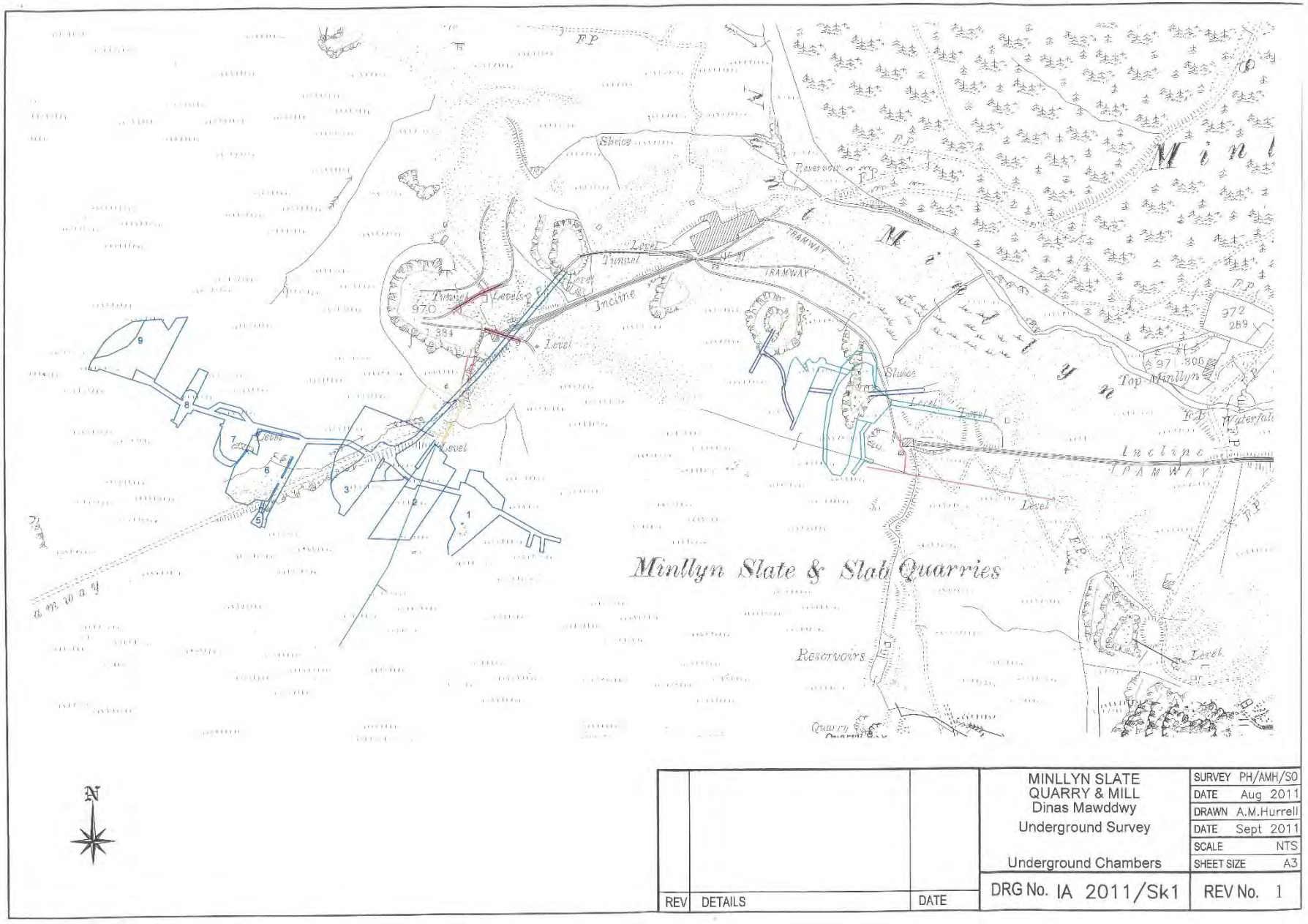


Site	Minllyn Slate Quarry			Doc No	ML001-6
Subject	**Floor index**				
Doc Date	2011		See also		
Doc Type	map		Grid ref	SH 853 140	
Drawing Type	map		Scale	25in to 1 mile	
Drawing Medium	photocopy		Author(s)	PH, AH, SO	
Doc Material	paper		Source	Plas Course	
Doc Status		Original		Doc Size	A3
Notes					

The floors are lettered rather than numbered, A to O, low to high


Sluice
Reservoir
Quarry
O LEVEL
F.P.
Minllyn
Minllyn
Sluice
Reservoir
Tunnel
Level
Incline
TRAMWAY
TRAMWAY
Levels
970
1.334
SHAFT TO
Sluice
Level
Level
O TRIAL
Level
Level
M (TRIAL)
Incline
TRAMWAY
Level F TRIAL
Minllyn Slate & Slab Quarries
Reservoirs
Quarry
Level
PIPE TRENCH
SINK TO A
The Cottage
Carlyle Terrace
993
992
969
965
972
971
978
974
975
COMMINS MINLLYN
Dinas-Mawddwy Station
Top-Minllyn
Plas-y-nant
Brook Terrace
Waterfall
Stepping Stones
Water Column
W.M.
Allotment Gardens
991
1.521
990
3.986

Site	Minllyn Slate Quarry			**Doc No**	**ML001-7**
Subject	**Underground plan**				
Doc Date	2011		See also	020	
Doc Type	map		Grid ref	SH 853 140	
Drawing Type	map		Scale	red	
Drawing Medium	photocopy		Author(s)	AH, PH, SO	
Doc Material	paper		Source	Plas Course	
Doc Status	complete	Original		Doc Size	A3
Notes					



REV	DETAILS	DATE

MINLLYN SLATE
QUARRY & MILL
Dinas Mawddwy
Underground Survey

Underground Chambers

SURVEY	PH/AMH/SO
DATE	Aug 2011
DRAWN	A.M.Hurrell
DATE	Sept 2011
SCALE	NTS
SHEET SIZE	A3

DRG No. IA 2011/Sk1

REV No. 1

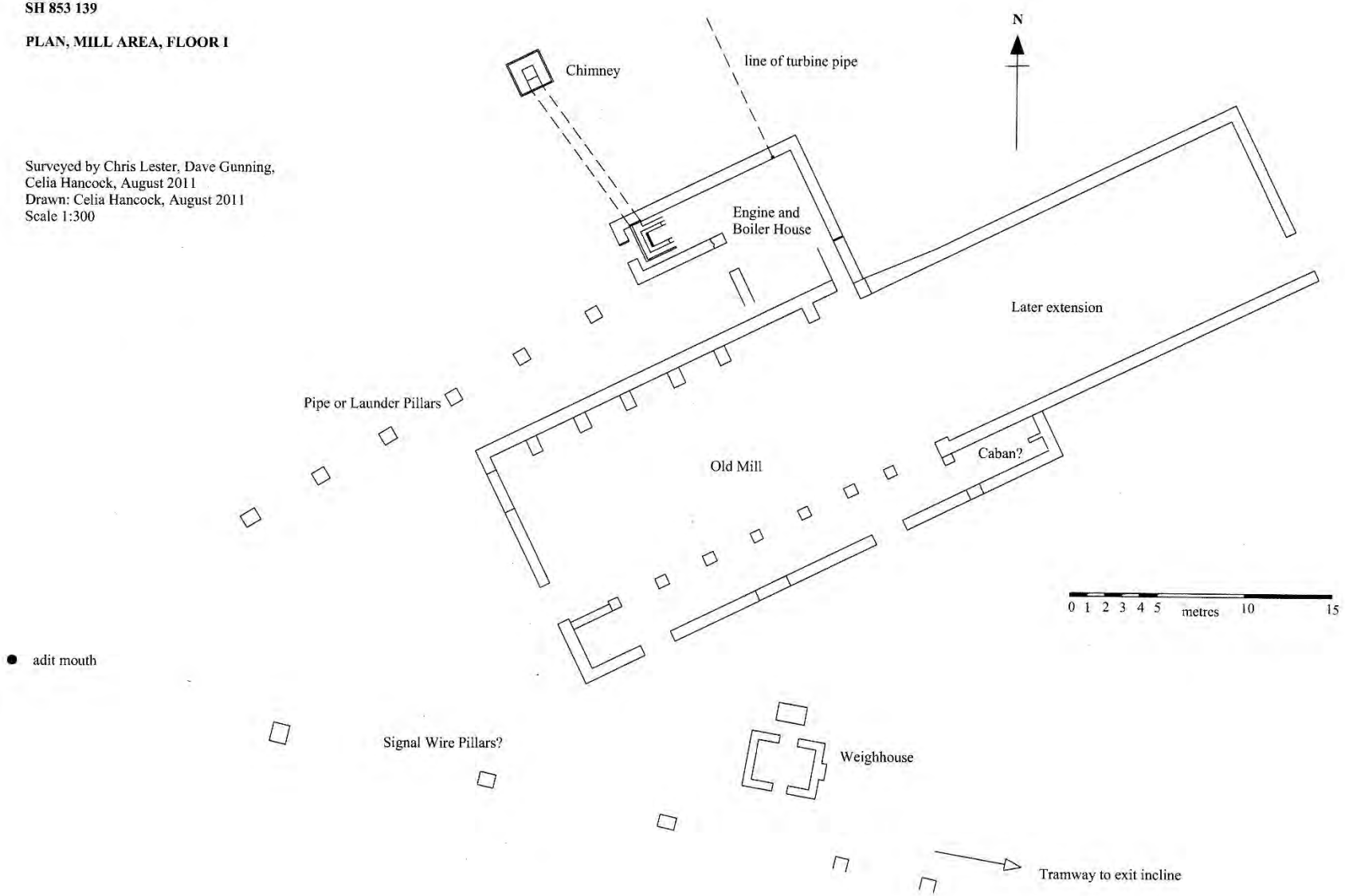
Site	Minllyn Slate Quarry			**Doc No**	**ML002-1**
Subject	**Floor I, plan, Mill area**				
Doc Date	2011		See also		
Doc Type	drawing		Grid ref	SH 853 140	
Drawing Type	plan		Scale	1:300	
Drawing Medium	CAD		Author(s)	CH, CL, DFG	
Doc Material	paper		Source	Plas Course	
Doc Status	complete	Original		Doc Size	A4
Notes					

MINLLYN SLATE QUARRY

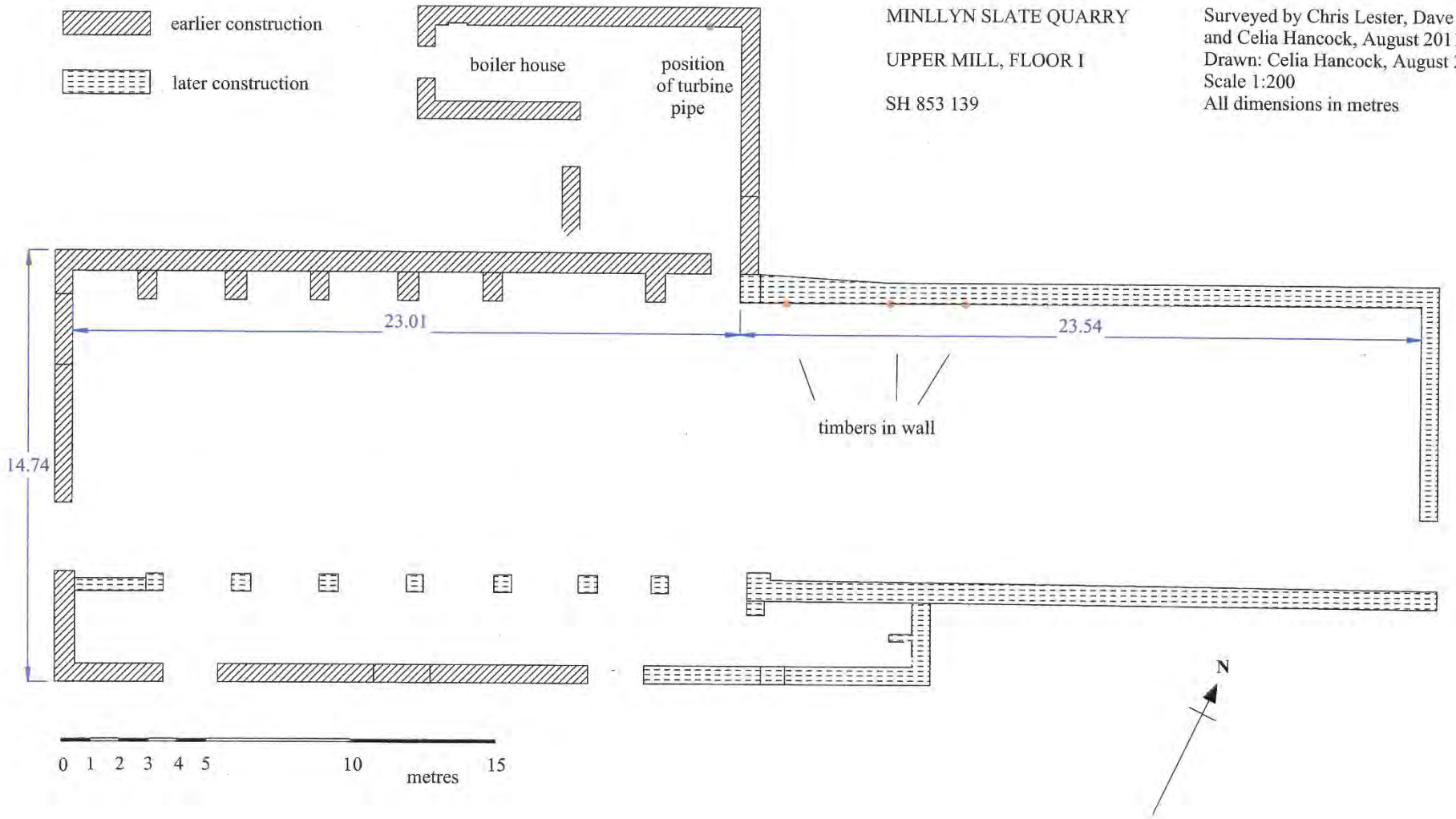
SH 853 139

PLAN, MILL AREA, FLOOR I

Surveyed by Chris Lester, Dave Gunning,
Celia Hancock, August 2011
Drawn: Celia Hancock, August 2011
Scale 1:300



Site	Minllyn Slate Quarry			**Doc No**	**ML002-2**
Subject	**Mill, Upper, floor I**				
Doc Date	2011		See also	021	
Doc Type	drawing		Grid ref	SH 853 140	
Drawing Type	plan		Scale	1:200	
Drawing Medium	CAD		Author(s)	CH, CL, DFG	
Doc Material	paper		Source	Plas Course	
Doc Status	complete	Original		Doc Size	A4
Notes					

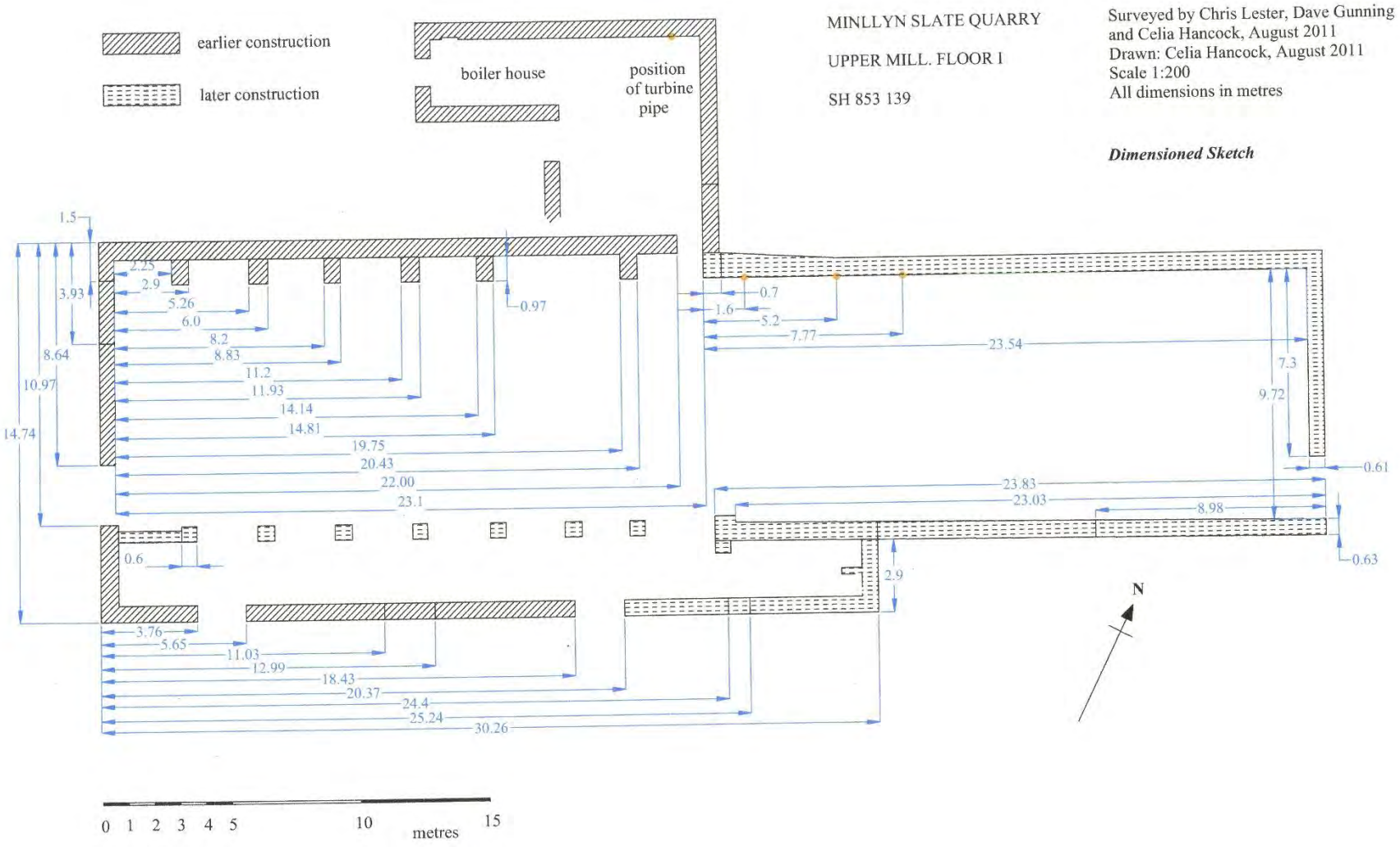


MINLLYN SLATE QUARRY

UPPER MILL, FLOOR I

SH 853 139

Surveyed by Chris Lester, Dave Gunning and Celia Hancock, August 2011
Drawn: Celia Hancock, August 2011
Scale 1:200
All dimensions in metres


earlier construction
later construction
boiler house
position of turbine pipe
MINLLYN SLATE QUARRY
UPPER MILL. FLOOR I
SH 853 139
Surveyed by Chris Lester, Dave Gunning and Celia Hancock, August 2011
Drawn: Celia Hancock, August 2011
Scale 1:200
All dimensions in metres
Dimensioned Sketch
1.5
3.93
8.64
10.97
14.74
2.25
2.9
5.26
6.0
8.2
8.83
11.2
11.93
14.14
14.81
19.75
20.43
22.00
23.1
0.97
0.7
1.6
5.2
7.77
23.54
7.3
9.72
0.61
23.83
23.03
8.98
0.63
2.9
0.6
3.76
5.65
11.03
12.99
18.43
20.37
24.4
25.24
30.26
N
0 1 2 3 4 5 10 15
metres

Site	Minllyn Slate Quarry	**Doc No**	**ML002-3**
Subject	**Mill, Upper, floor I**		
Doc Date	2011	See also	021
Doc Type	drawing	Grid ref	SH 853 140
Drawing Type	section	Scale	1:200
Drawing Medium	CAD	Author(s)	CH, CL, DFG
Doc Material	paper	Source	Plas Course
Doc Status	complete Original	Doc Size	A4
Notes			

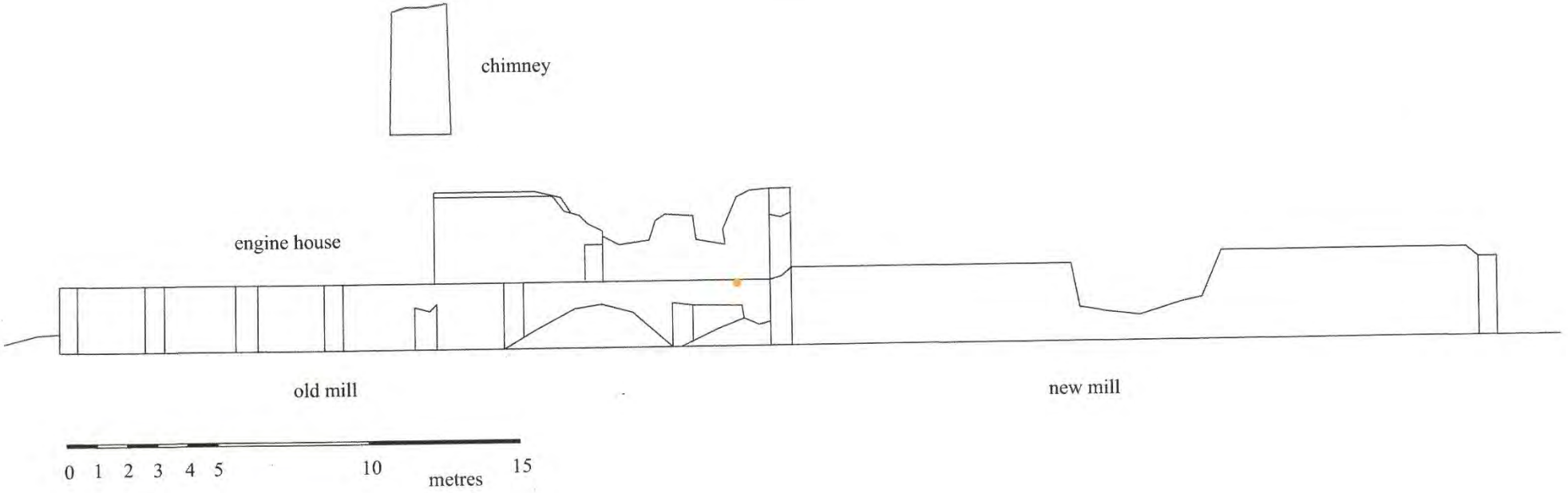
MINLLYN SLATE QUARRY

UPPER MILL, ENGINE HOUSE AND CHIMNEY, FLOOR I

SECTION, NORTH WALL

SH 853 139 (mill)

Surveyed by Chris Lester, Dave Gunning and Celia Hancock, August 2011
Drawn: Celia Hancock, August 2011
Scale 1:200
All dimensions in metres



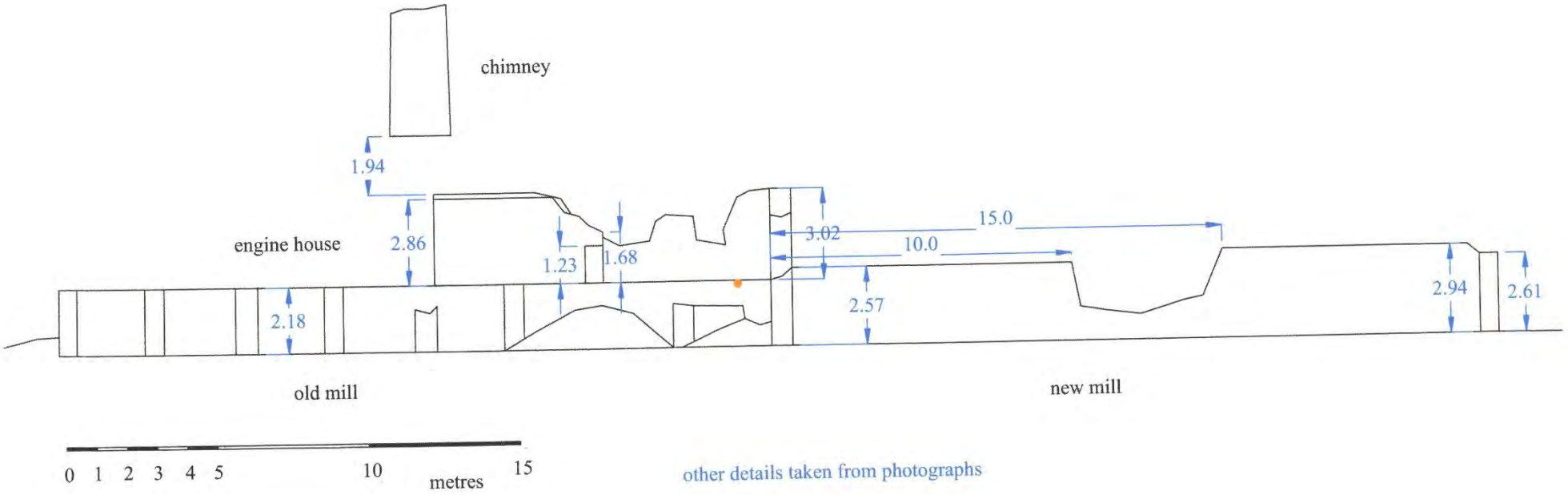
MINLLYN SLATE QUARRY

UPPER MILL, ENGINE HOUSE AND CHIMNEY, FLOOR I

SECTION, NORTH WALL

SH 853 139 (mill)

Surveyed by Chris Lester, Dave Gunning and Celia Hancock, August 2011
Drawn: Celia Hancock, August 2011
Scale 1:200
All dimensions in metres



other details taken from photographs

Site	Minllyn Slate Quarry			Doc No	ML002-4
Subject	**Mill, Upper, floor I**				
Doc Date	1972		See also	021	
Doc Type	drawing		Grid ref	SH 853 140	
Drawing Type	plan		Scale	?	
Drawing Medium	photocopy		Author(s)	?	
Doc Material	paper		Source	DRO	
Doc Status	complete	Original		Doc Size	A3
Notes					

Site	Minllyn Slate Quarry			Doc No	ML002-5
Subject	**Pelton wheel**				
Doc Date	1972		See also		
Doc Type	drawing		Grid ref	SH 853 140	
Drawing Type	plan/elevation		Scale	?	
Drawing Medium	photocopy		Author(s)	?	
Doc Material	paper		Source	DRO	
Doc Status	complete	Original		Doc Size	A3
Notes					

These two documents are in Gwynedd Archives and are (rather poor photo) copies of a measured? survey from 1972 by an unknown, to me, individual and add little if anything to our later survey. However, had we not been to Minllyn at least this would be a record of the remains.

Reference number unknown

Celia Hancock 2024

Site	Minllyn Slate Quarry			**Doc No**	**ML004-1**
Subject	**Bearing, upper mill, floor I**				
Doc Date	2011		See also		
Doc Type	drawing		Grid ref		
Drawing Type	plan/elevation		Scale	1:1	
Drawing Medium	CAD		Author(s)	IW	
Doc Material	paper		Source	Plas Course	
Doc Status	complete	Original		Doc Size	A4
Notes					

ML 004-1

MINLLYN SLATE QUARRY

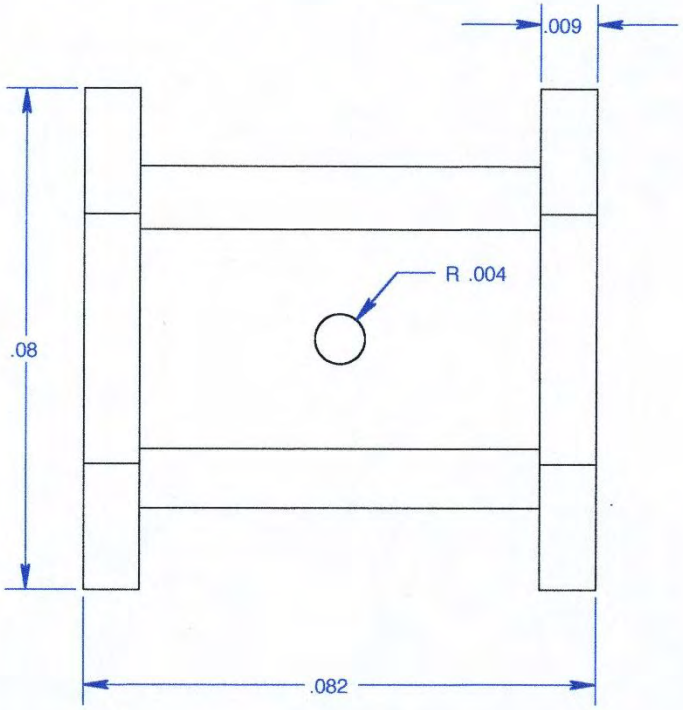
Bearing Upper Mill

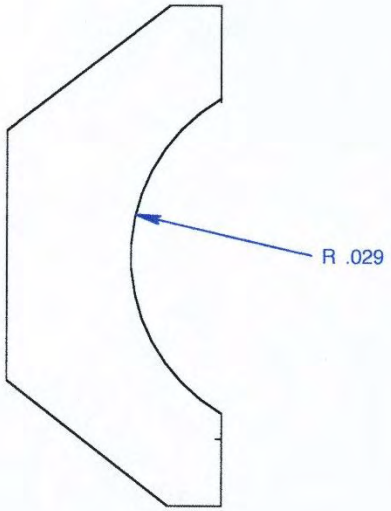
DATE 28/10/2011

Survey by I Walters

SCALE 1 : 1

Scale cm





Damaged bearing metal drawn from measurments and photographs

Site	Minllyn Slate Quarry			**Doc No**	**ML004-2**
Subject	**Gear, broken, upper mill, floor I**				
Doc Date	2011		See also		
Doc Type	drawing		Grid ref		
Drawing Type	plan/elevation		Scale	1:1	
Drawing Medium	CAD		Author(s)	IW	
Doc Material	paper		Source	Plas Course	
Doc Status	complete	Original		Doc Size	A4
Notes					

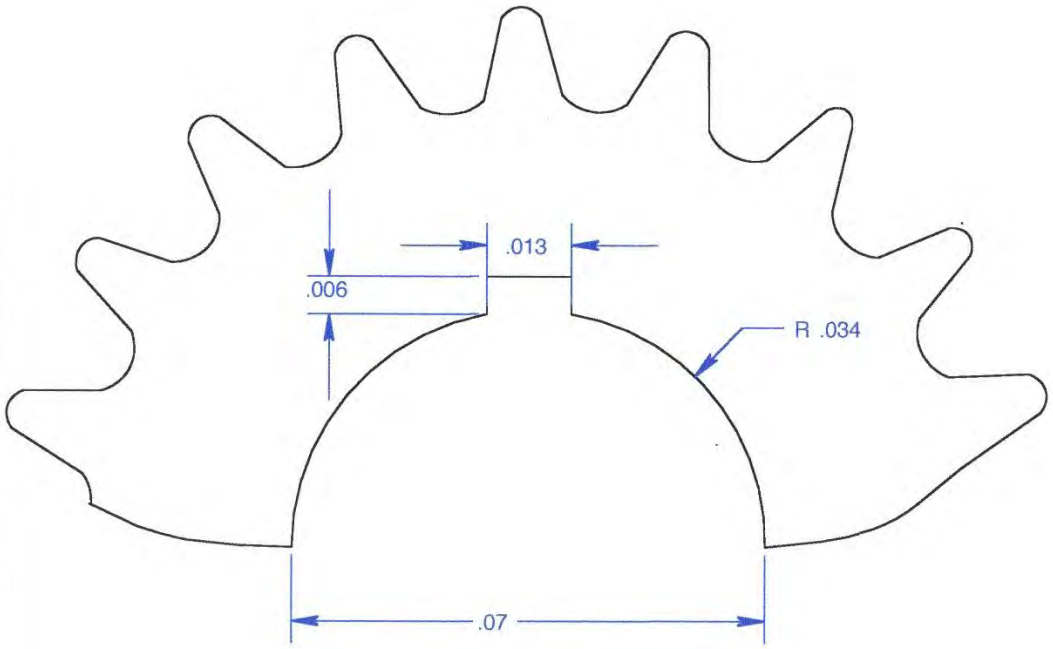
MINLLYN SLATE QUARRY
Broken Gear Upper Mill

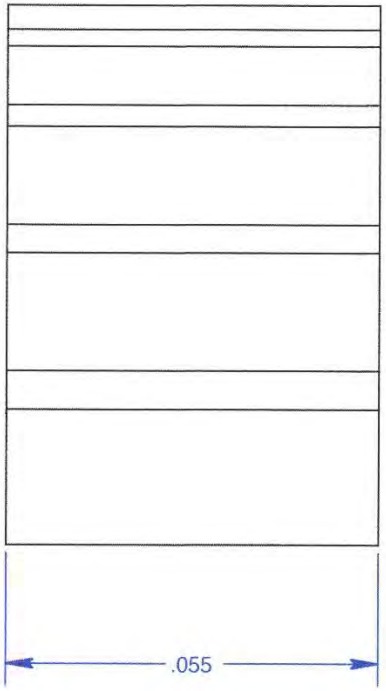
DATE 16/10/2011

Survey by I Walters

Scale 1 : 1

Scale cm





Site	Minllyn Slate Quarry			**Doc No**	**ML004-3**
Subject	**Roller, upper mill, floor I**				
Doc Date	2011		See also		
Doc Type	drawing		Grid ref		
Drawing Type	plan/section		Scale	1:2	
Drawing Medium	CAD		Author(s)	IW	
Doc Material	paper		Source	Plas Course	
Doc Status	complete	Original		Doc Size	A4
Notes					

ML 004-3

MINLLYN SLATE QUARRY

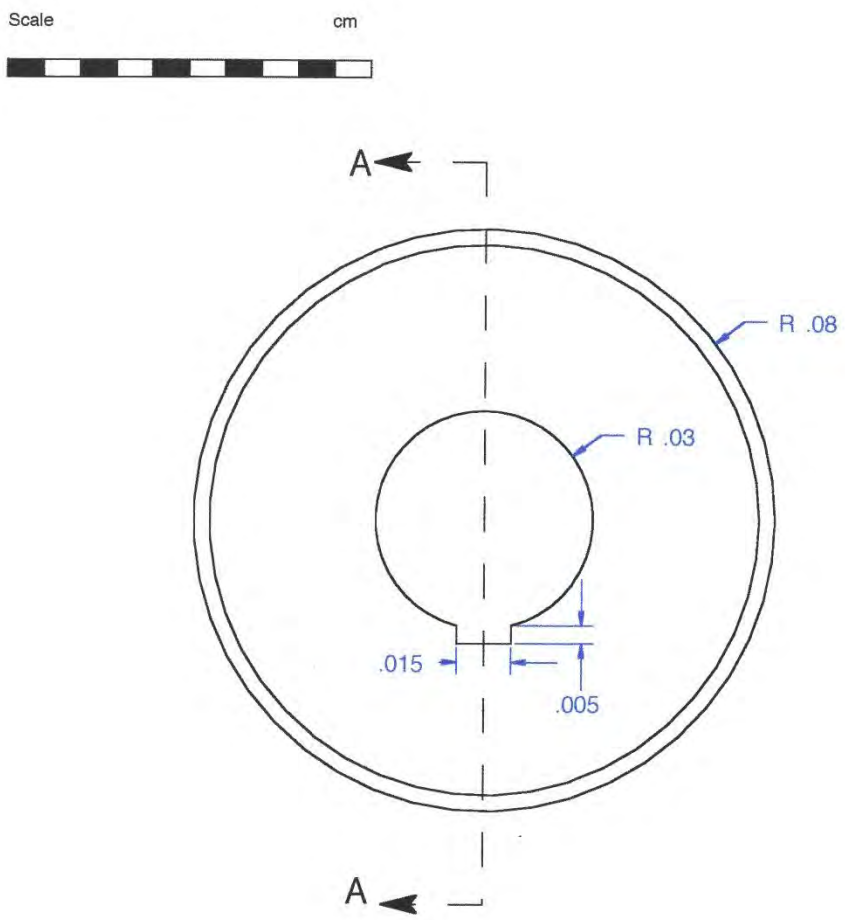
Roller Upper Mill

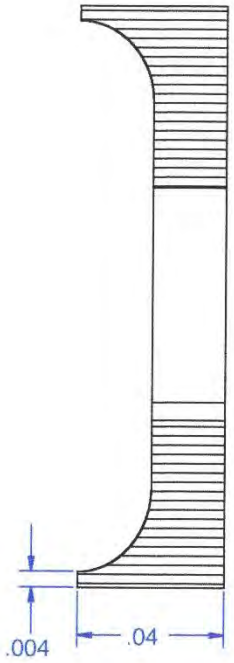
DATE 18/10/2011

Survey by I Walters

SCALE 1 : 2

Scale cm





Section A -A

Site	Minllyn Slate Quarry			**Doc No**	**ML004-4**
Subject	**Fire Bar, Boiler House, floor I**				
Doc Date	2011		See also	021, 022	
Doc Type	drawing		Grid ref		
Drawing Type	plan/elevation		Scale	1:2	
Drawing Medium	CAD		Author(s)	IW	
Doc Material	paper		Source	Plas Course	
Doc Status	complete	Original		Doc Size	A4
Notes					

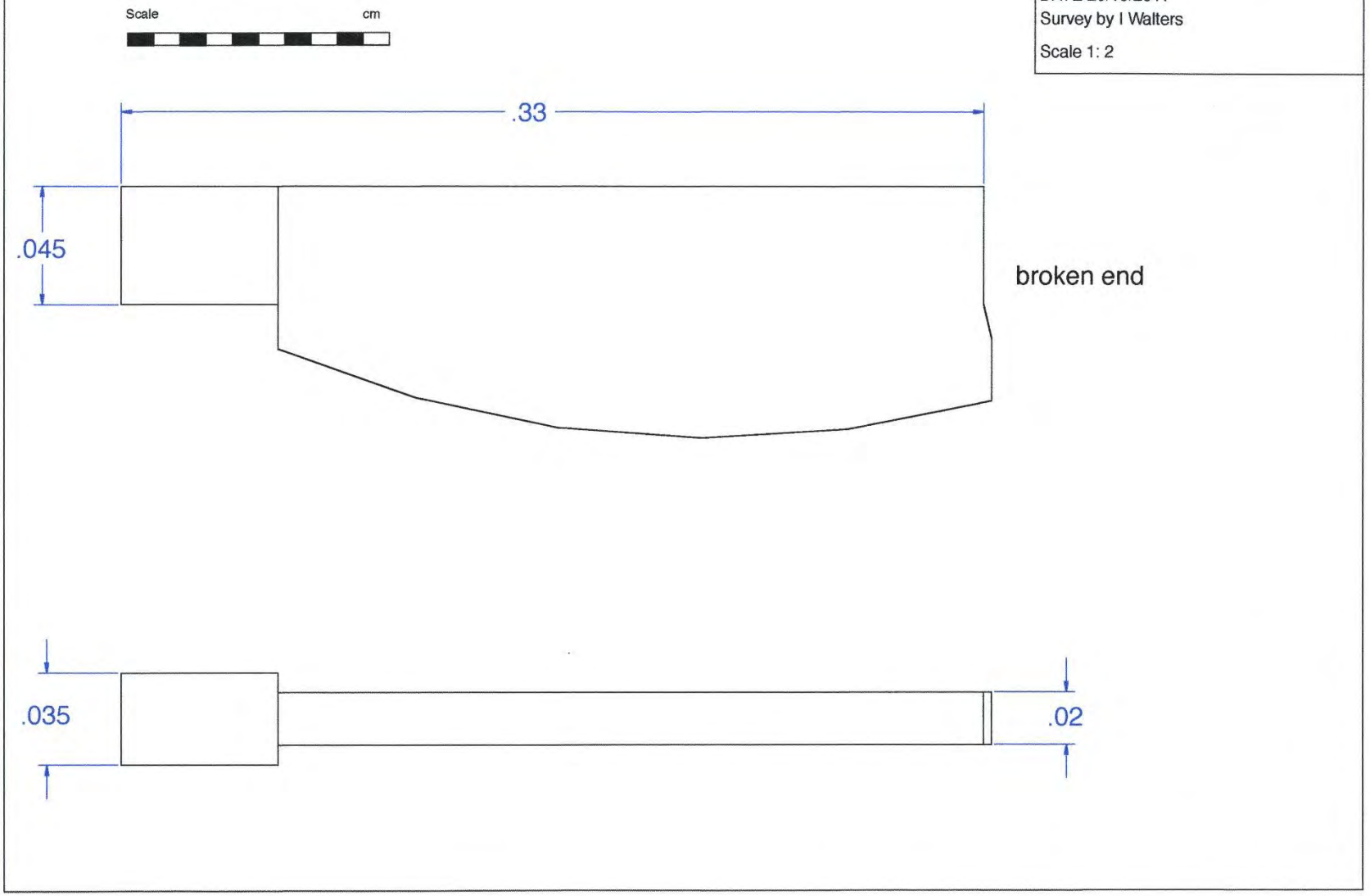
MINLLYN SLATE QUARRY

Fire Bar Upper Mill

DATE 20/10/2011

Survey by I Walters

Scale 1: 2



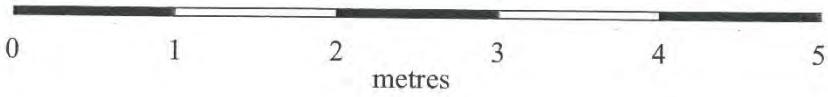
Site	Minllyn Slate Quarry	**Doc No**	**ML005-1**
Subject	**Weighhouse, floor l**		
Doc Date	2011	See also	021-2
Doc Type	drawing	Grid ref	SH 853 140
Drawing Type	plan	Scale	1:50
Drawing Medium	CAD	Author(s)	CH, CL, DFG
Doc Material	paper	Source	Plas Course
Doc Status	complete Original	Doc Size	A4
Notes			

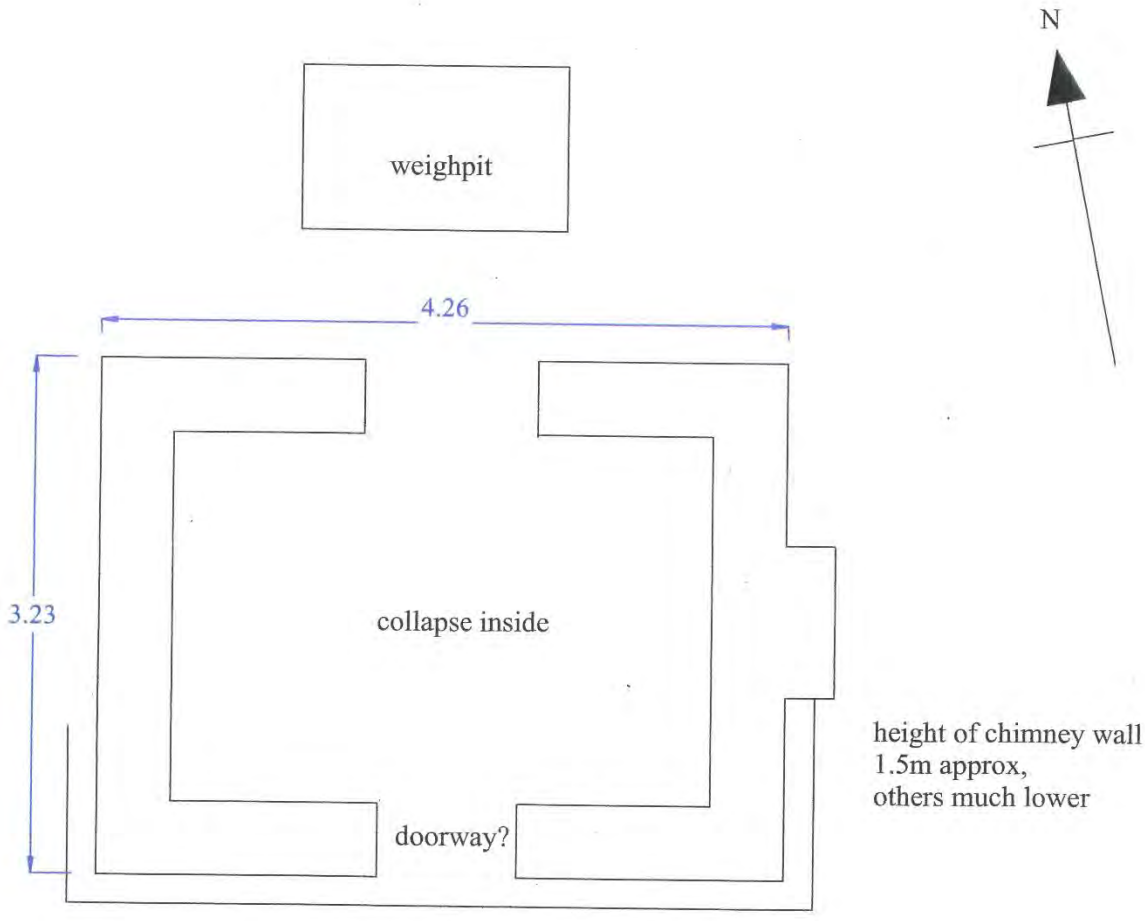
MINLLYN SLATE QUARRY

SH 852 139

WEIGHHOUSE NEAR MILL, FLOOR I

Surveyed by Chris Lester, Dave Gunning
Celia Hancock, August 2011
Drawn: Celia Hancock, August 2011
Scale 1:50
Dimensions in metres





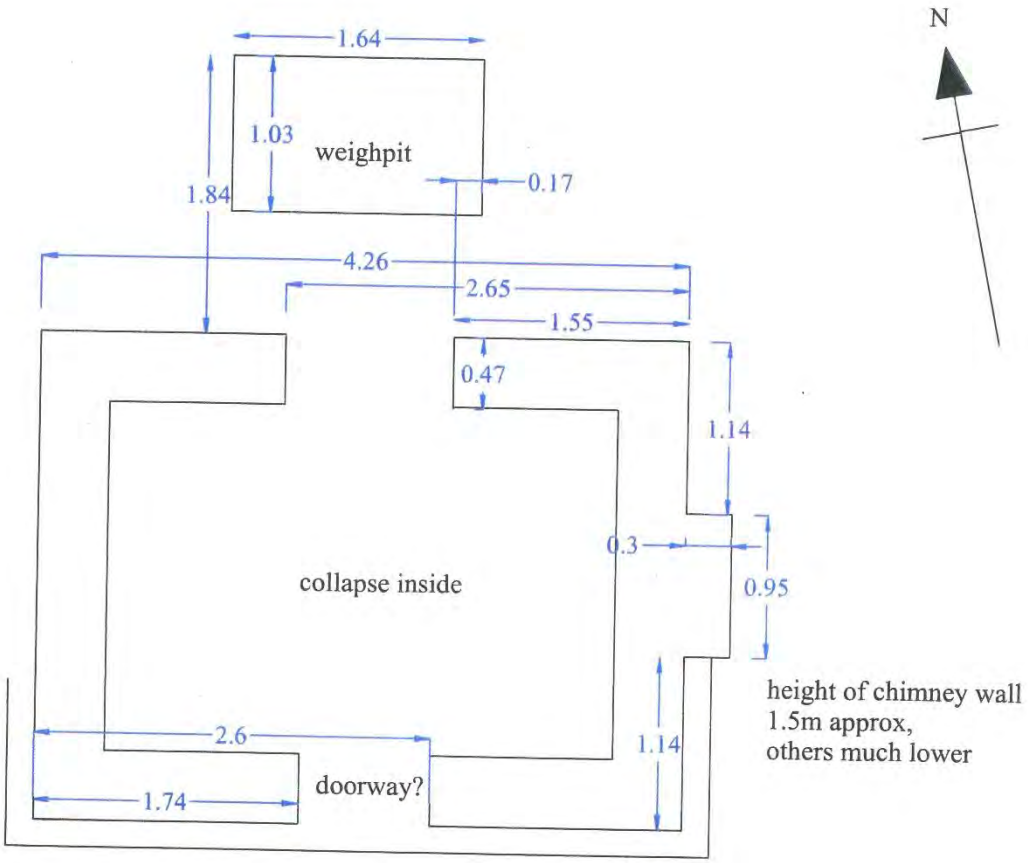
MINLLYN SLATE QUARRY

SH 852 139

WEIGHHOUSE NEAR MILL, FLOOR I

Surveyed by Chris Lester, Dave Gunning
Celia Hancock, August 2011
Drawn: Celia Hancock, August 2011
Scale 1:50
Dimensions in metres

Dimensioned Sketch



tramway here 1.0m down and no steps evident

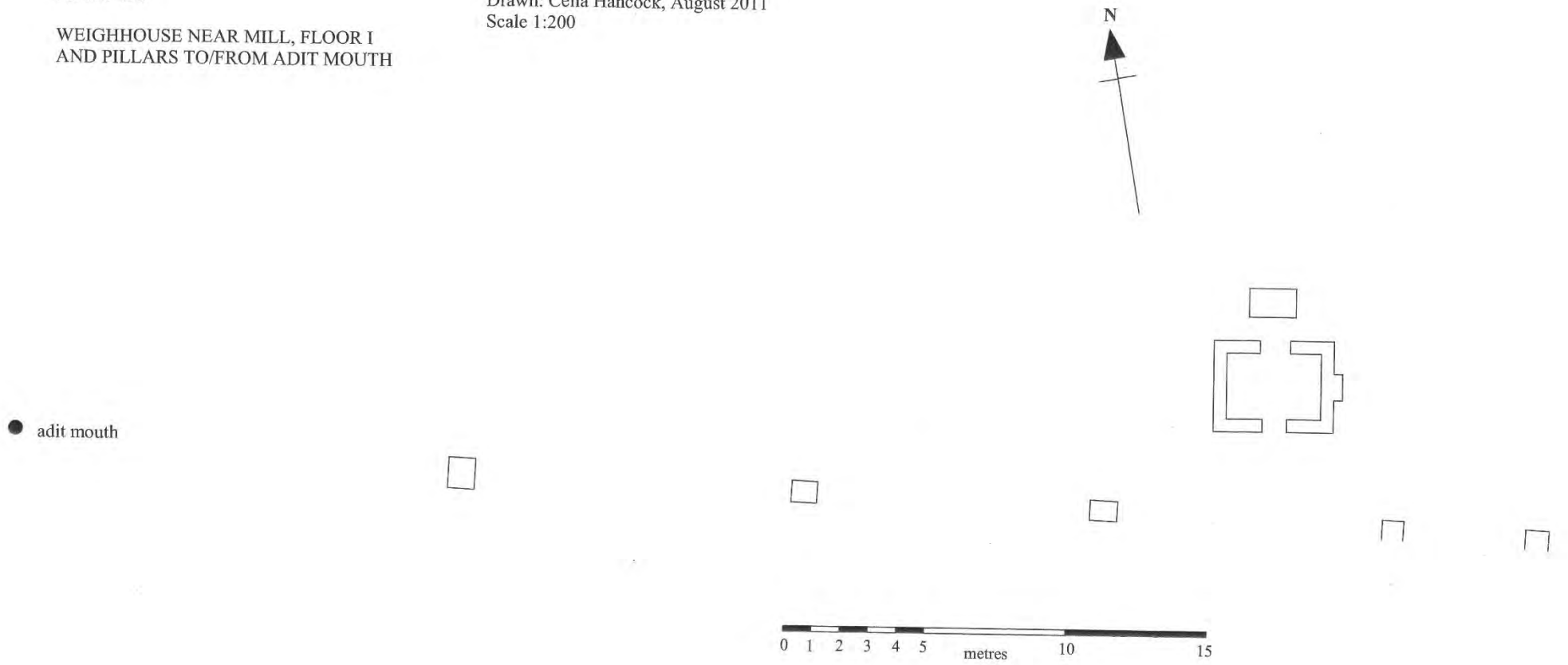
Site	Minllyn Slate Quarry			**Doc No**	**ML005-2**
Subject	**Weighhouse and pillars, floor I**				
Doc Date	2011		See also	021-2	
Doc Type	drawing		Grid ref	SH 853 140	
Drawing Type	plan		Scale	1:200	
Drawing Medium	CAD		Author(s)	CH, CL, DFG	
Doc Material	paper		Source	Plas Course	
Doc Status	complete	Original		Doc Size	A4
Notes					

MINLLYN SLATE QUARRY

SH 853 139

WEIGHHOUSE NEAR MILL, FLOOR I
AND PILLARS TO/FROM ADIT MOUTH

Surveyed by Chris Lester, Dave Gunning,
Celia Hancock, August 2011
Drawn: Celia Hancock, August 2011
Scale 1:200



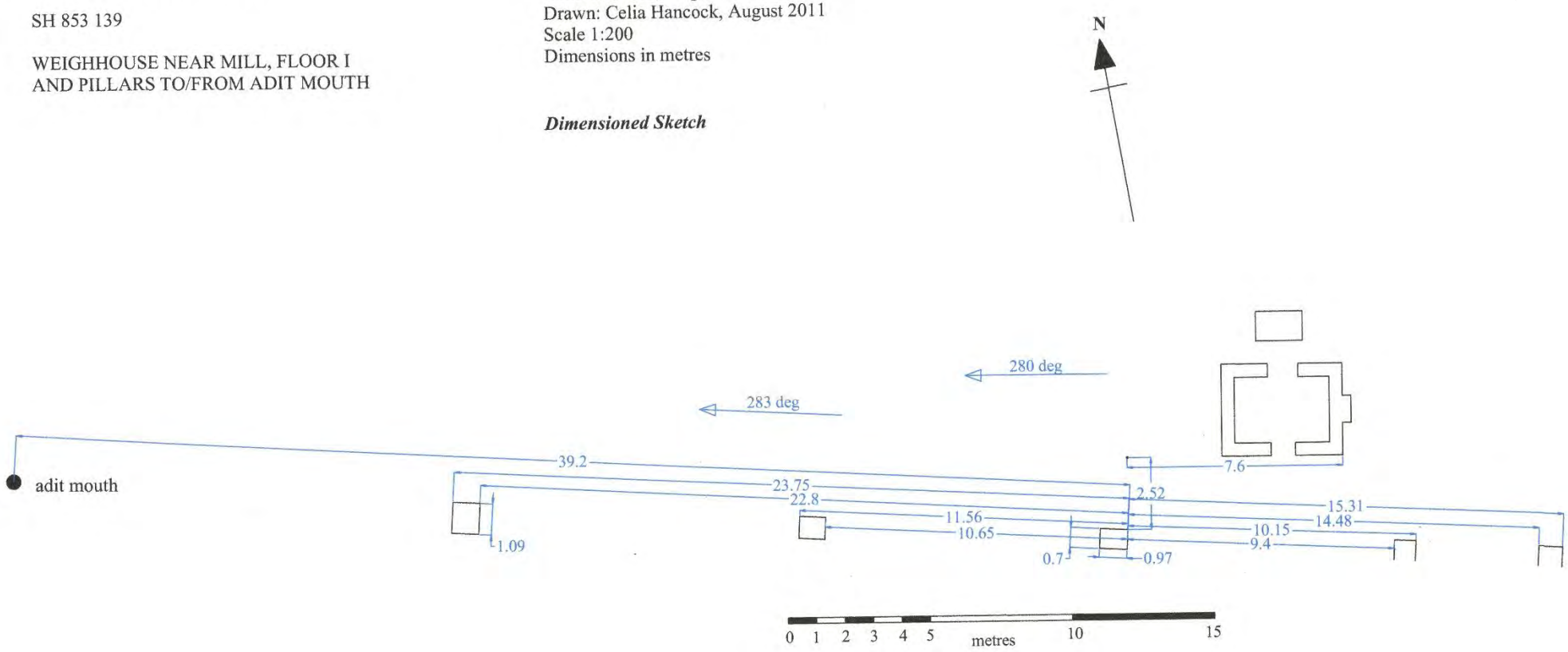
MINLLYN SLATE QUARRY

SH 853 139

WEIGHHOUSE NEAR MILL, FLOOR I
AND PILLARS TO/FROM ADIT MOUTH

Surveyed by Chris Lester, Dave Gunning,
Celia Hancock, August 2011
Drawn: Celia Hancock, August 2011
Scale 1:200
Dimensions in metres

Dimensioned Sketch



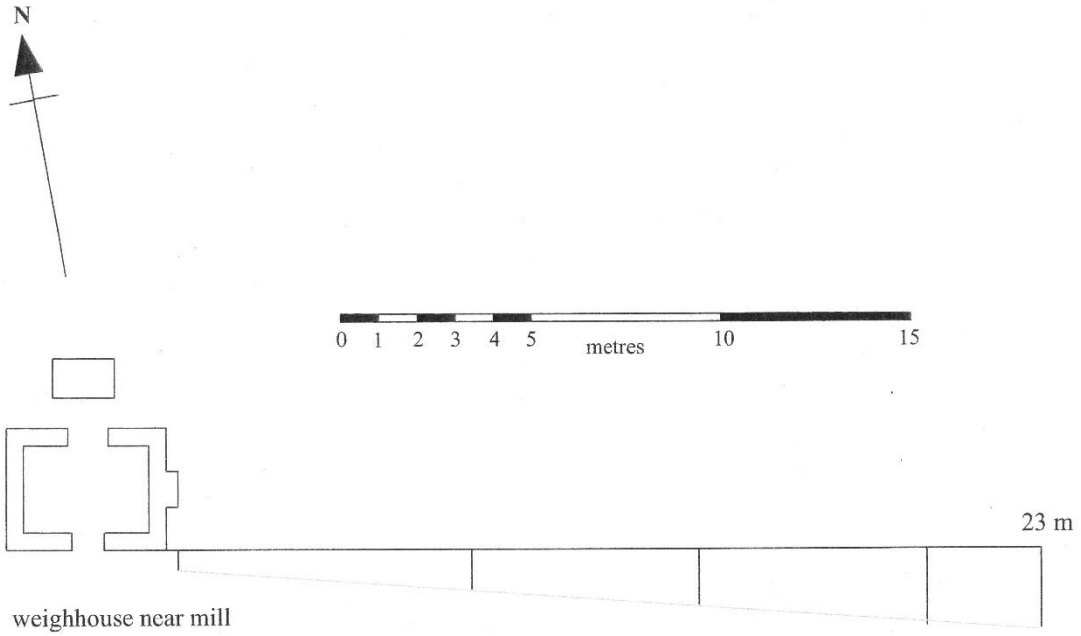
Site	Minllyn Slate Quarry	**Doc No**	**ML005-3**
Subject	**Tramway, exit, from Weighhouse, floor I**		
Doc Date	2011	See also	021-3
Doc Type	drawing	Grid ref	SH 853 140
Drawing Type	profile	Scale	1:200
Drawing Medium	CAD	Author(s)	CH, CL, DFG
Doc Material	paper	Source	Plas Course
Doc Status	complete Original	Doc Size	A4
Notes			

MINLLYN SLATE QUARRY

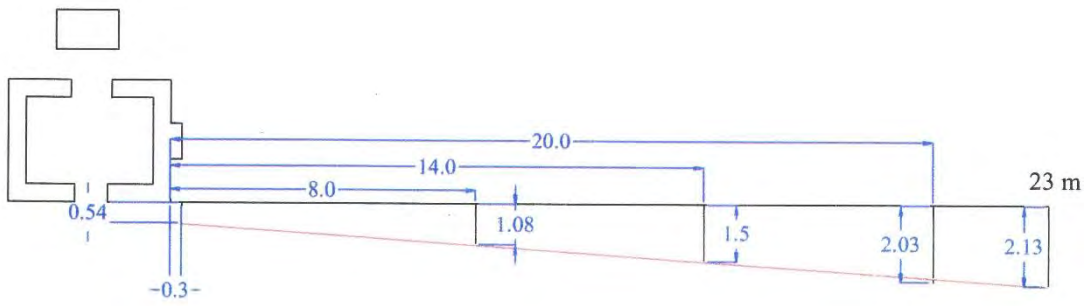
SH 852 139 (WH)

EXIT TRAMWAY PROFILE
FIRST SECTION, FLOOR I

Surveyed by Dave Gunning, Chris Lester
Celia Hancock, August 2011
Drawn: Celia Hancock, August 2011
Scale 1:200
Dimensions in metres



dimensioned



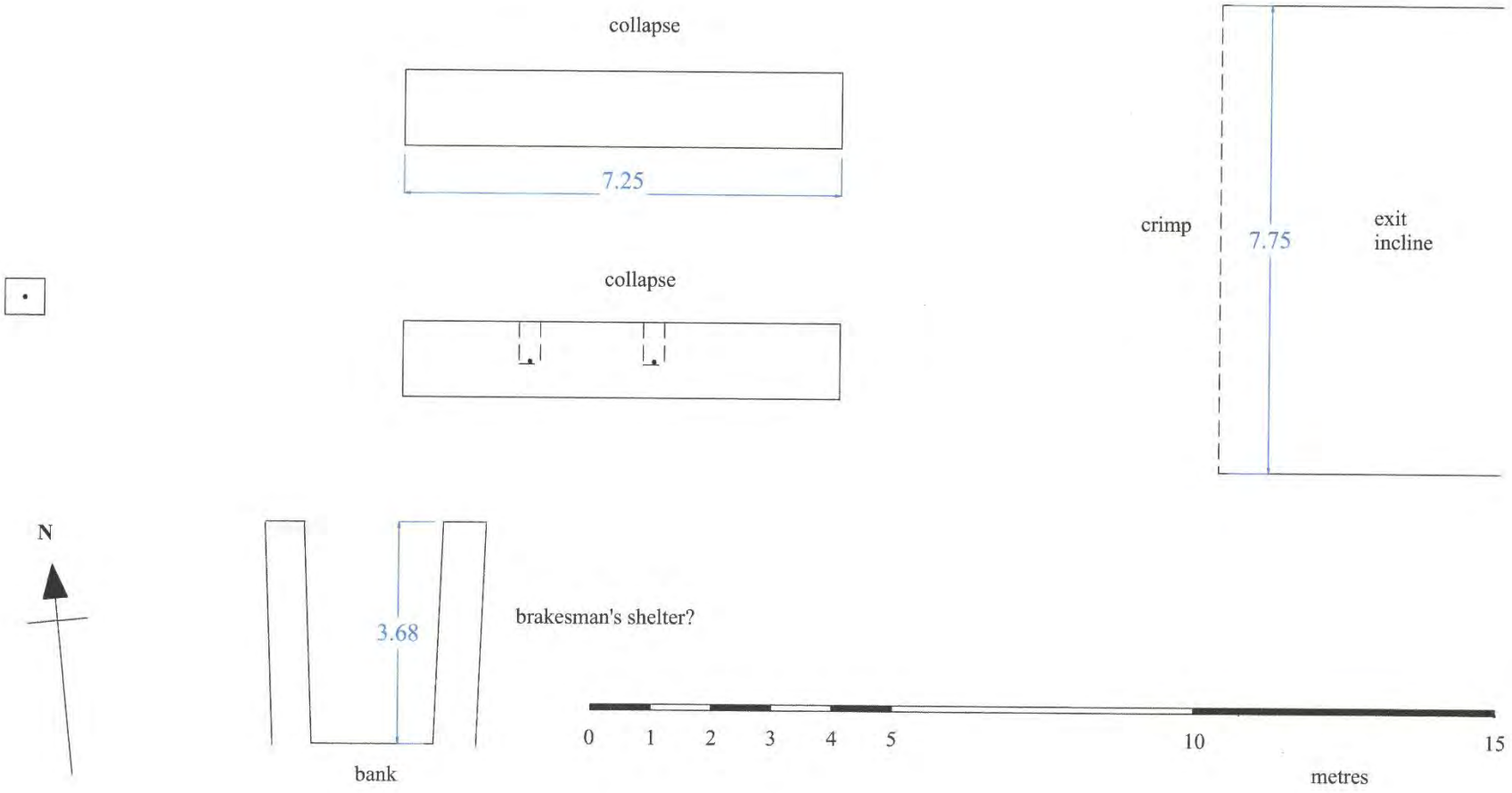
Site	Minllyn Slate Quarry			**Doc No**	**ML006**
Subject	**Drumhouse, exit incline, floor I**				
Doc Date	2011		See also	021-3	
Doc Type	drawing		Grid ref	SH 853 140	
Drawing Type	plan		Scale	1:100	
Drawing Medium	CAD		Author(s)	CH, CL, DFG	
Doc Material	paper		Source	Plas Course	
Doc Status	complete	Original		Doc Size	A4
Notes					

MINLLYN SLATE QUARRY

DRUMHOUSE, EXIT INCLINE

SH 854 138

Surveyed by Chris Lester, Dave Gunning and Celia Hancock, August 2011
Drawn: Celia Hancock, August 2011
Scale 1:100
All dimensions in metres



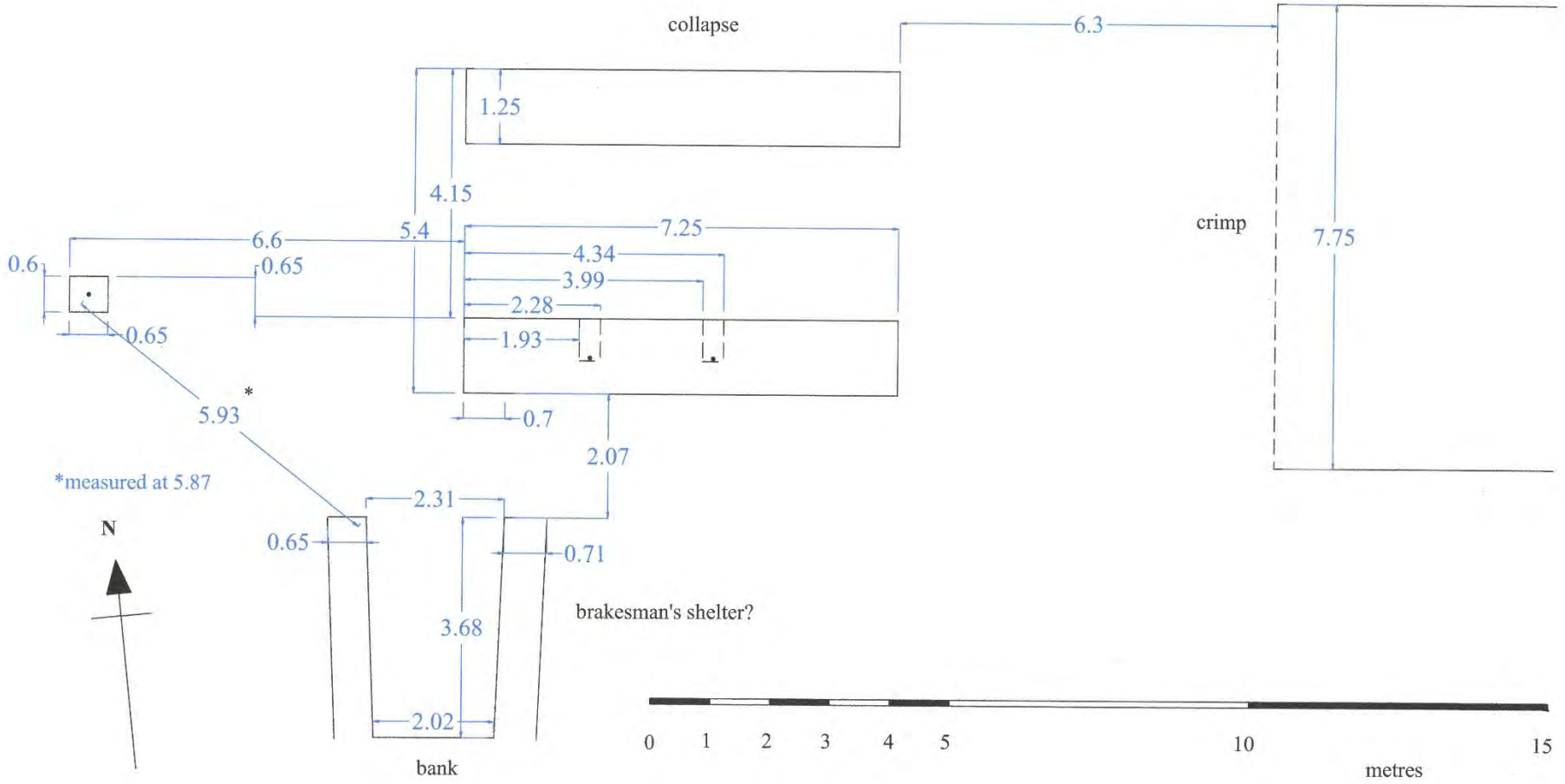
MINLLYN SLATE QUARRY

DRUMHOUSE, EXIT INCLINE

SH 854 138

Surveyed by Chris Lester, Dave Gunning
and Celia Hancock, August 2011
Drawn: Celia Hancock, August 2011
Scale 1:100
All dimensions in metres

Dimensioned Sketch



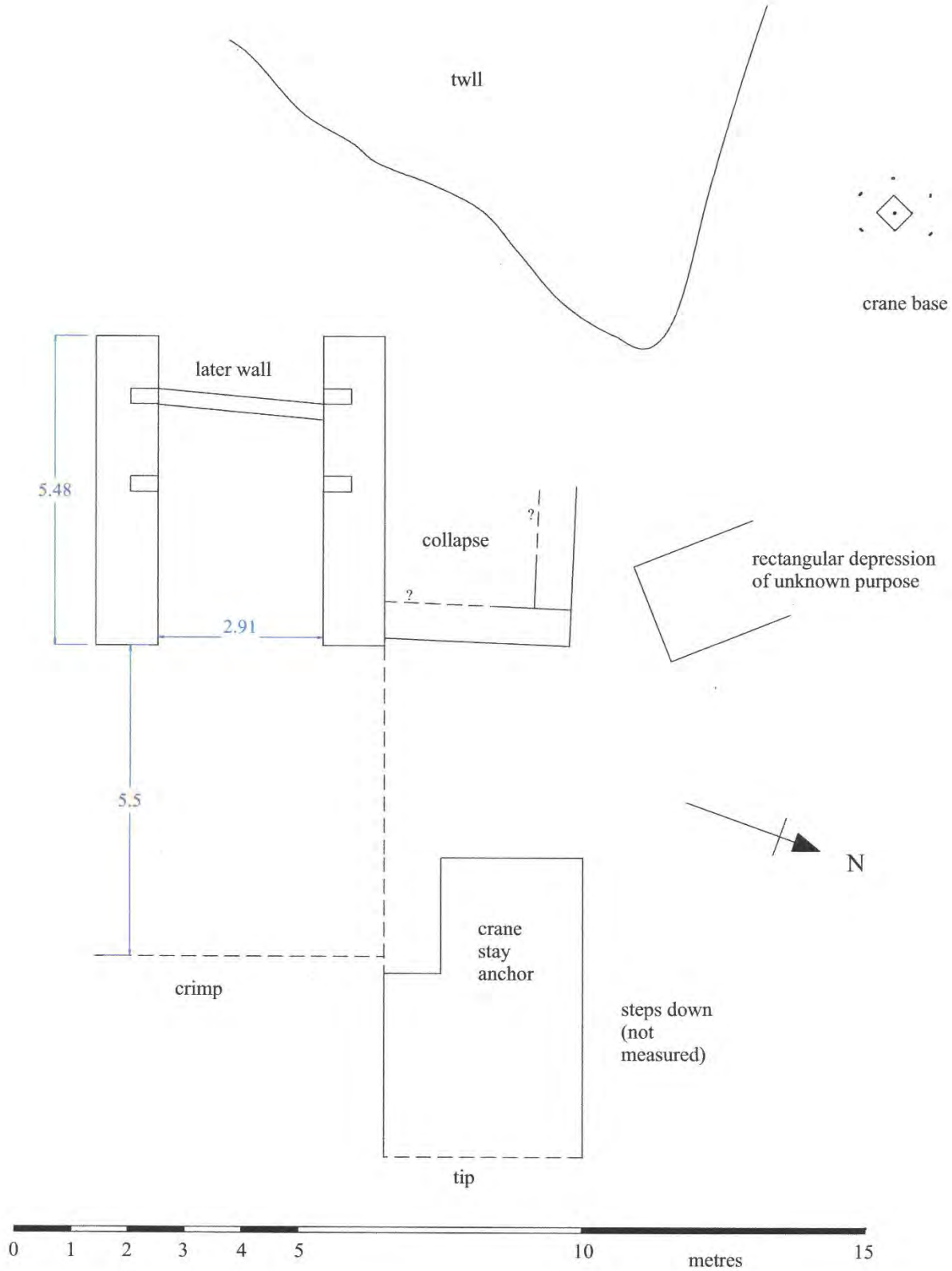
Site	Minllyn Slate Quarry			**Doc No**	**ML007-1**
Subject	**Drumhouse, floor M**				
Doc Date	2011		See also	024	
Doc Type	drawing		Grid ref	SH 851 140	
Drawing Type	plan		Scale	1:100	
Drawing Medium	CAD		Author(s)	CH, CL, DFG	
Doc Material	paper		Source	Plas Course	
Doc Status	complete	Original		Doc Size	A4
Notes					

MINLLYN SLATE QUARRY

DRUMHOUSE, FLOOR M

SH 85180 13915

Surveyed by Chris Lester, Dave Gunning and Celia Hancock, August 2011
Drawn: Celia Hancock, August 2011
Scale 1:100
All dimensions in metres

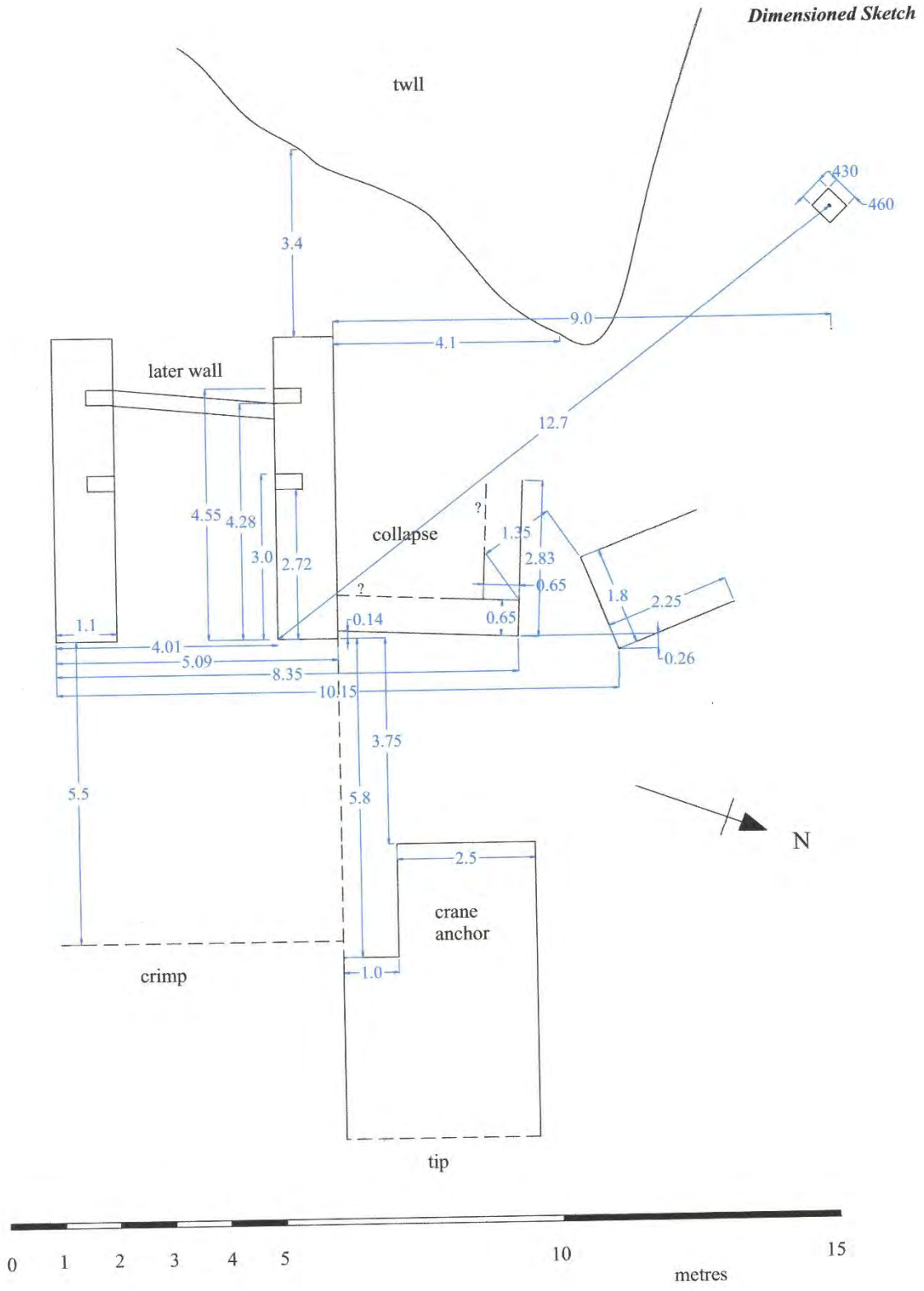


MINLLYN SLATE QUARRY

DRUMHOUSE, FLOOR M

SH 85180 13915

Surveyed by Chris Lester, Dave Gunning and Celia Hancock, August 2011
Drawn: Celia Hancock, August 2011
Scale 1:100
All dimensions in metres



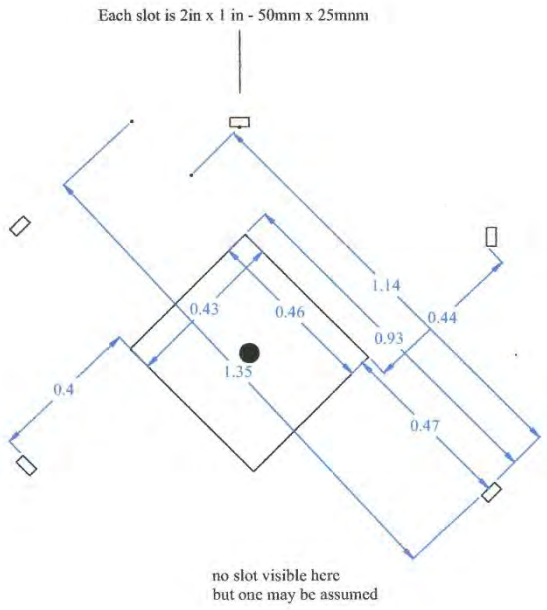
MINLLYN SLATE QUARRY

CRANE BASE NEAR TWLL
FLOOR M

SH 85180 13915

Surveyed by Chris Lester, Dave Gunning and Celia Hancock, August 2011
Drawn: Celia Hancock, August 2011
Scale 1:20
All dimensions in metres

Dimensioned Sketch



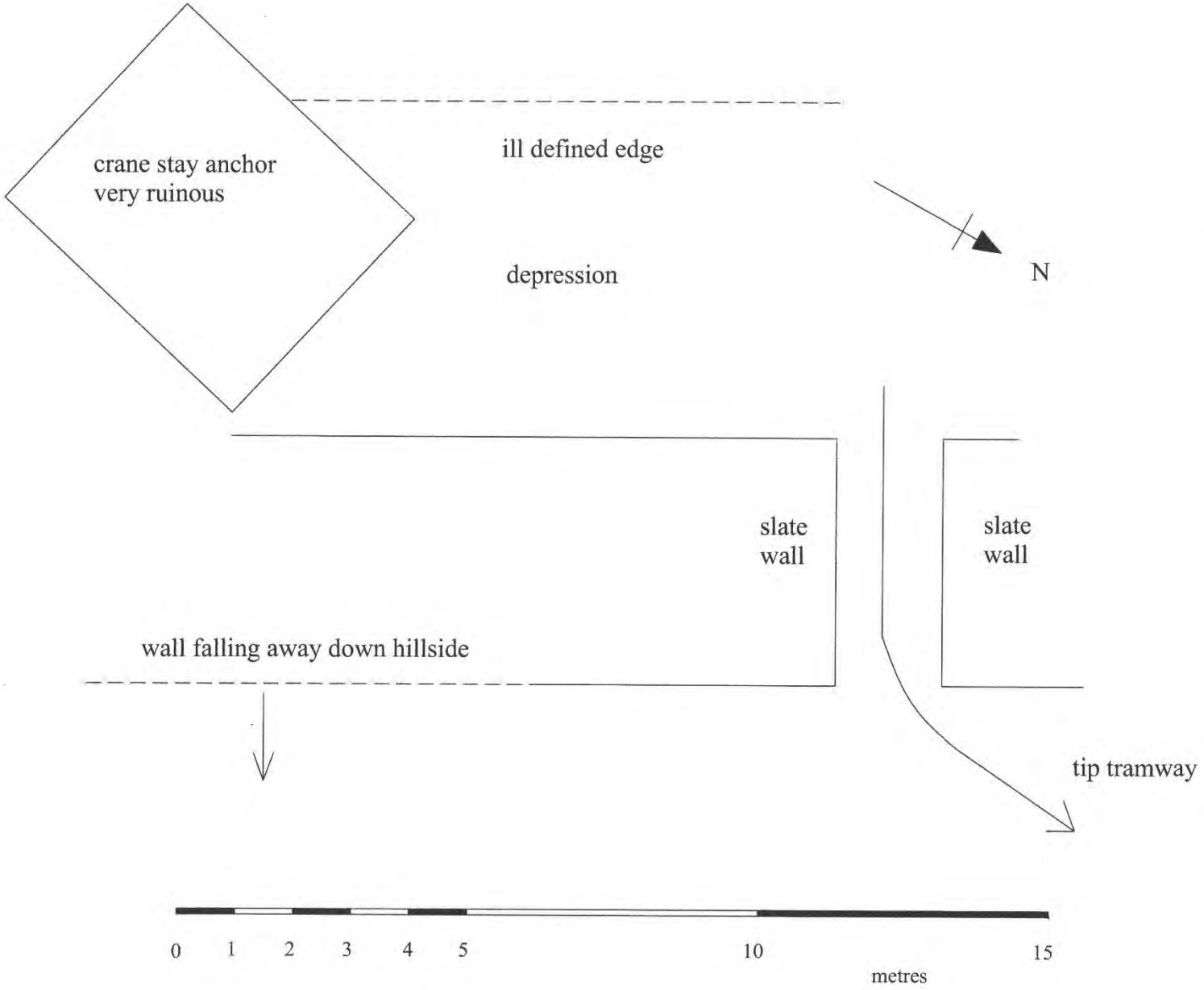
Site	Minllyn Slate Quarry			**Doc No**	**ML007-2**
Subject	**Crane stay anchor etc, floor M**				
Doc Date	2011		See also	024	
Doc Type	drawing		Grid ref	SH 851 140	
Drawing Type	plan		Scale	1:200	
Drawing Medium	CAD		Author(s)	CH, CL, DFG	
Doc Material	paper		Source	Plas Course	
Doc Status	complete	Original		Doc Size	A4
Notes					

MINLLYN SLATE QUARRY

FLOOR M, NORTH

SH 85170 13954

Surveyed by Chris Lester, Dave Gunning
and Celia Hancock, August 2011
Drawn: Celia Hancock, August 2011
Scale 1:100
All dimensions in metres

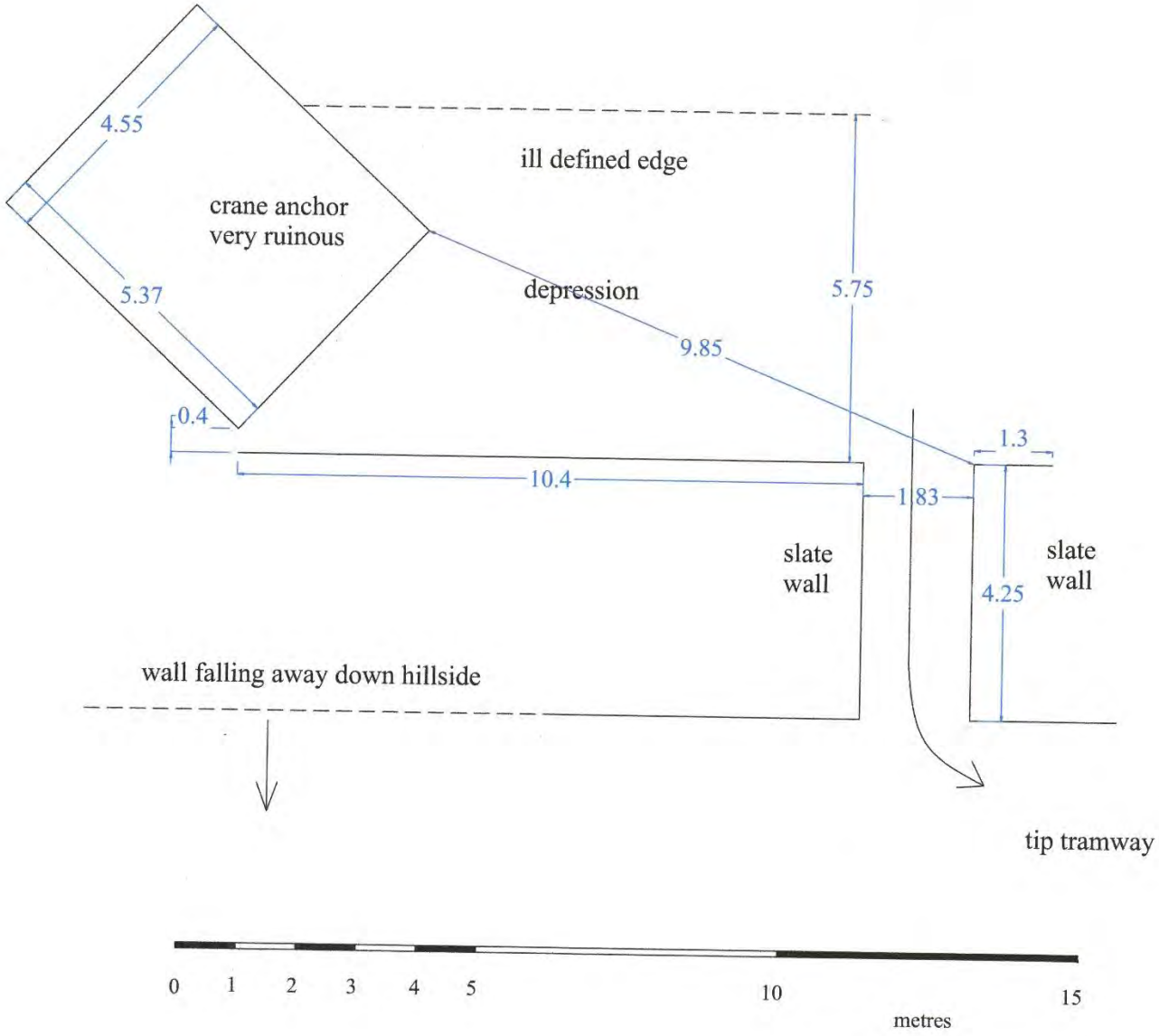


MINLLYN SLATE QUARRY

FLOOR M, NORTH

SH 85170 13954

Surveyed by Chris Lester, Dave Gunning
and Celia Hancock, August 2011
Drawn: Celia Hancock, August 2011
Scale 1:100
All dimensions in metres



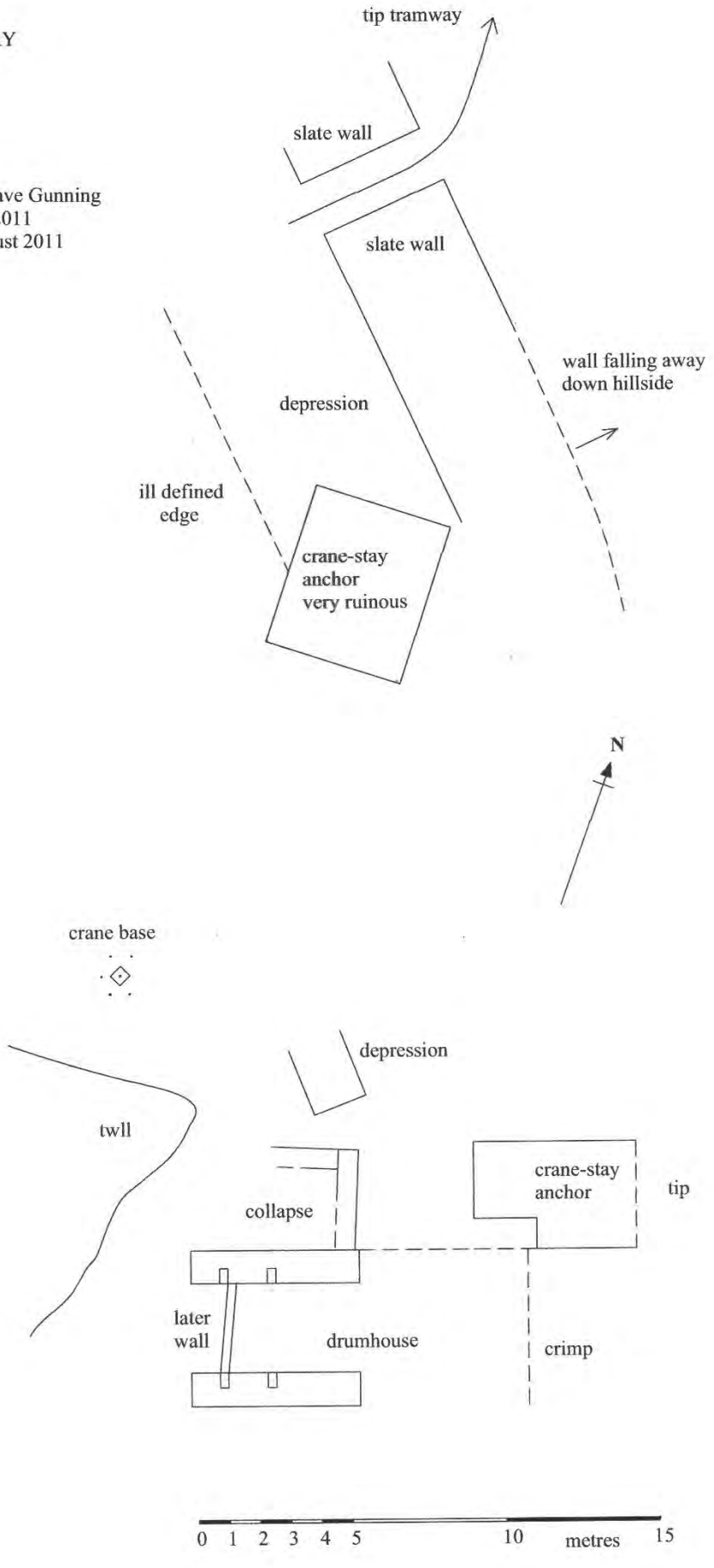
Site	Minllyn Slate Quarry	**Doc No**	**ML007-3**
Subject	**Floor M plan**		
Doc Date	2011	See also	024
Doc Type	drawing	Grid ref	SH 851 140
Drawing Type	plan	Scale	1:200
Drawing Medium	CAD	Author(s)	CH, CL, DFG
Doc Material	paper	Source	Plas Course
Doc Status	complete Original	Doc Size	A4
Notes			

MINLLYN SLATE QUARRY

FLOOR M, PLAN

SH 852 139

Surveyed by Chris Lester, Dave Gunning
and Celia Hancock, August 2011
Drawn: Celia Hancock, August 2011
Scale 1:200
All dimensions in metres

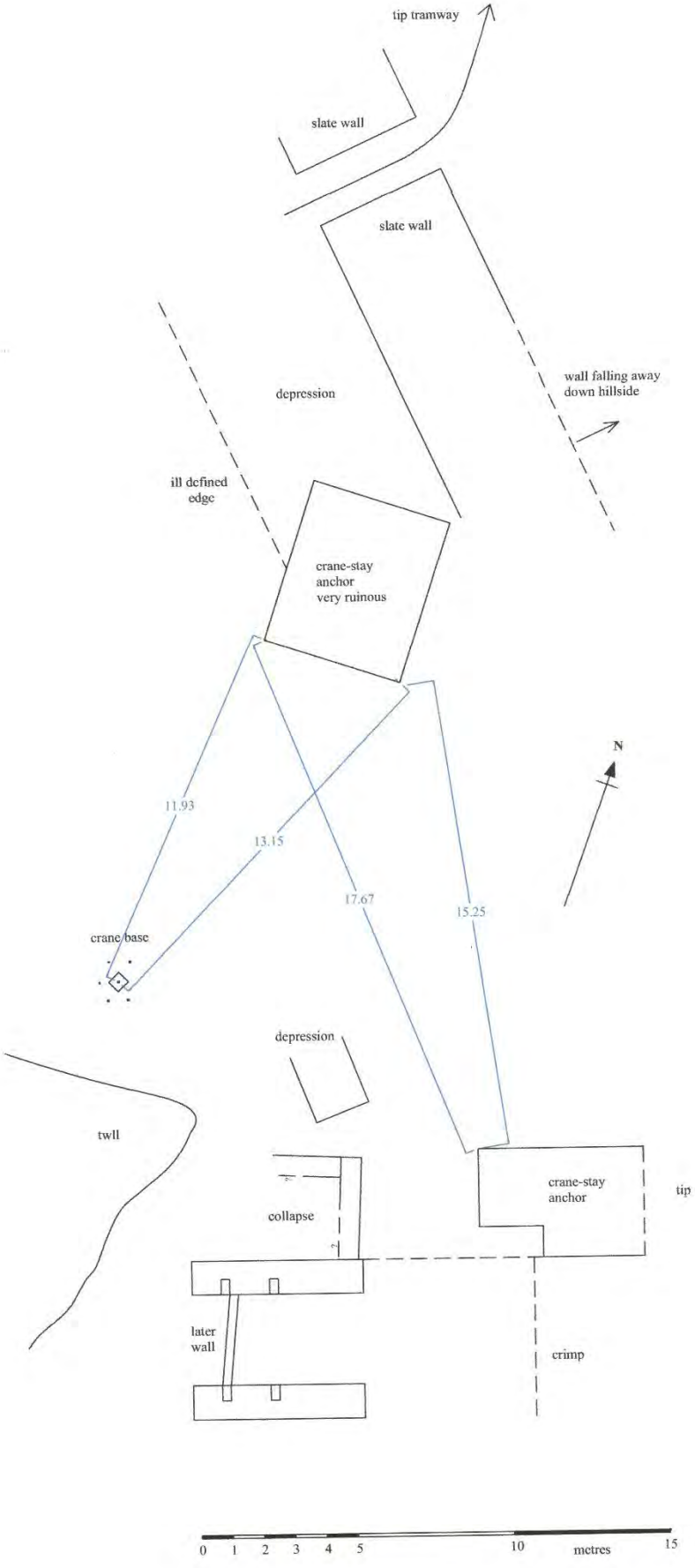


MINLLYN SLATE QUARRY

FLOOR M, PLAN

SH 852139

Surveyed by Chris Lester, Dave Gunning
and Celia Hancock, August 2011
Drawn: Celia Hancock, August 2011
Scale 1:100
All dimensions in metres



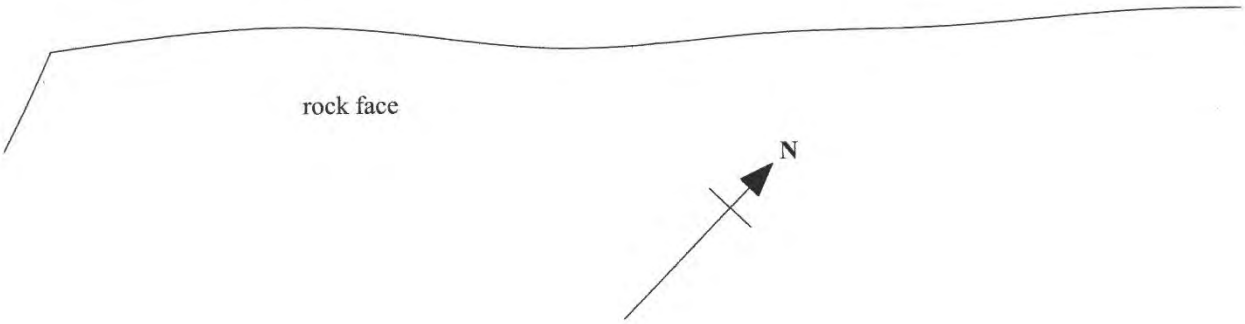
Site	Minllyn Slate Quarry	**Doc No**	**ML008**
Subject	**Structure, floor M**		
Doc Date	2011	See also	024
Doc Type	drawing	Grid ref	SH 852 139
Drawing Type	plan	Scale	1:200
Drawing Medium	CAD	Author(s)	CH, CL, DFG
Doc Material	paper	Source	Plas Course
Doc Status	complete Original	Doc Size	A4
Notes			

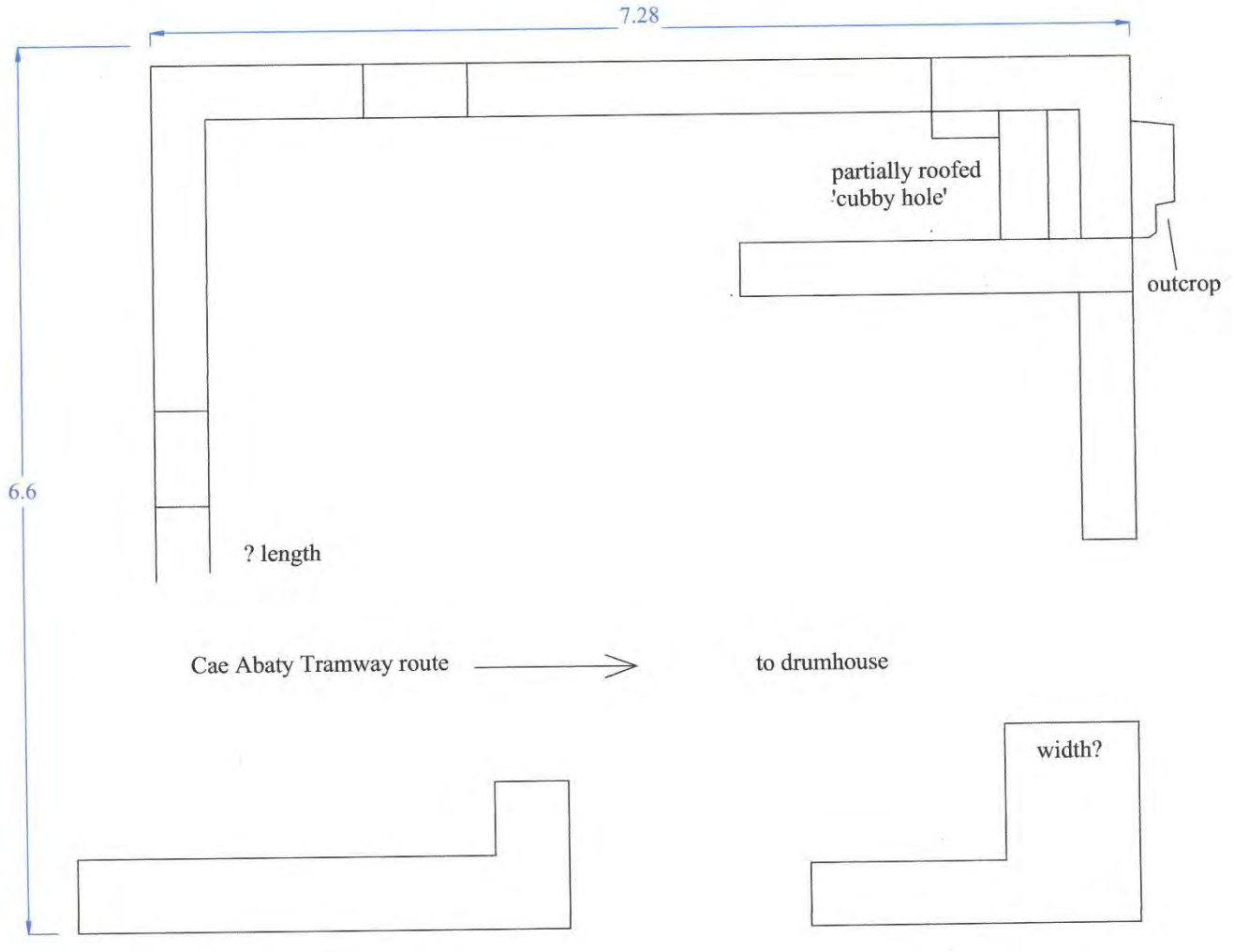
MINLLYN SLATE QUARRY

SH 85167 13896

STRUCTURE, FLOOR M

Surveyed by Chris Lester, Dave Gunning
Celia Hancock, August 2011
Drawn: Celia Hancock, August 2011
Scale 1:50
Dimensions in metres





MINLLYN SLATE QUARRY

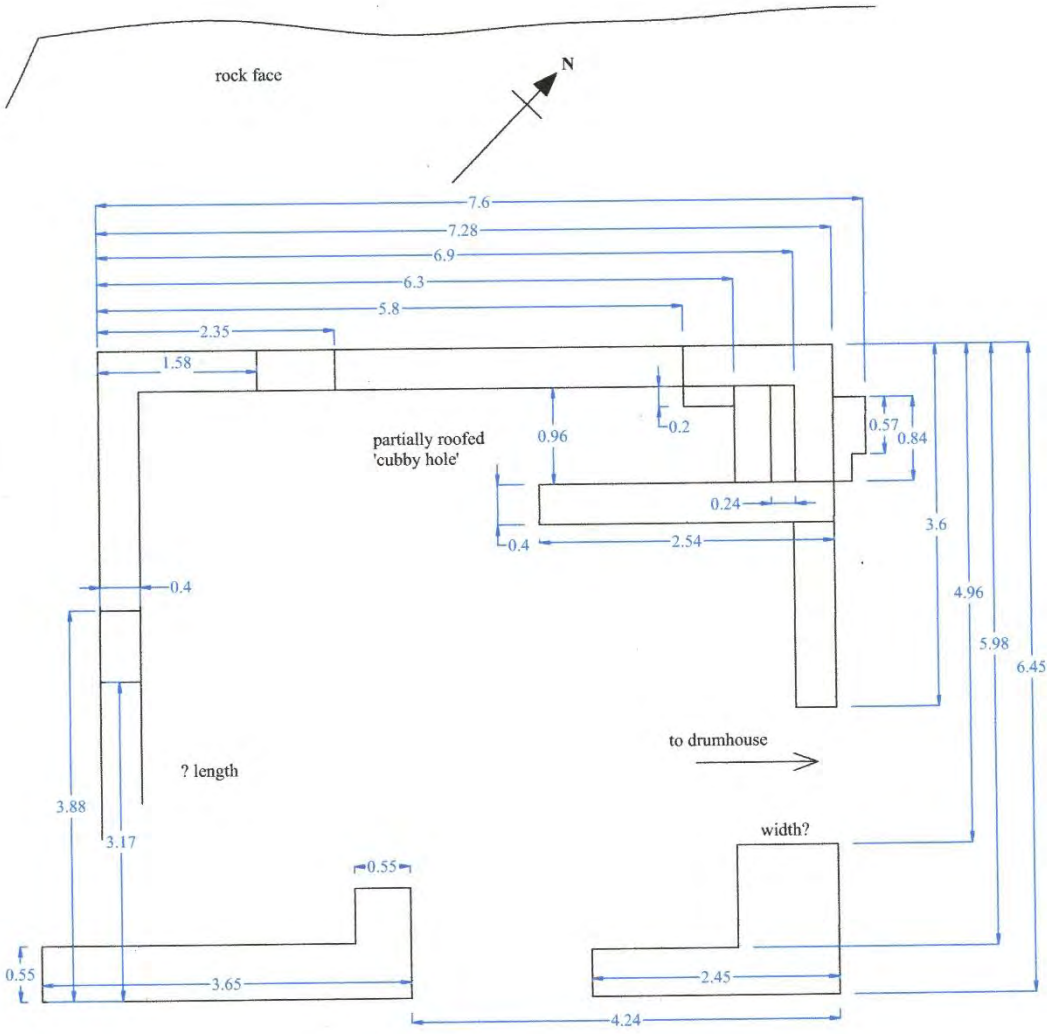
SH 85167 13896

STRUCTURE, FLOOR M

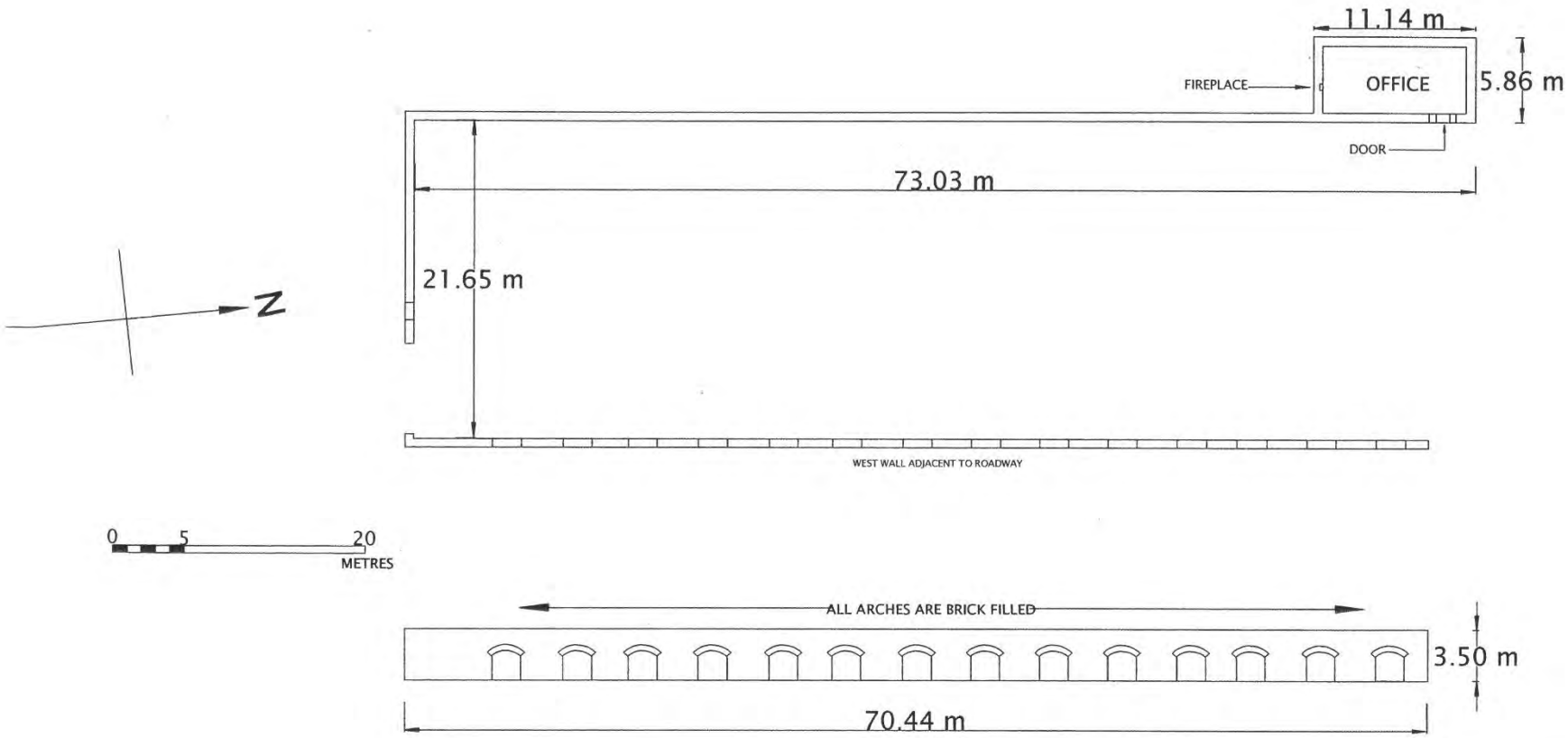
Surveyed by Chris Lester, Dave Gunning
Celia Hancock, August 2011
Drawn: Celia Hancock, August 2011
Scale 1:75
Dimensions in metres

0 1 2 3 4 5
metres

Dimensioned Sketch



Site	Minllyn Slate Quarry			**Doc No**	**ML009**
Subject	**Mill, Lower**				
Doc Date	2011		See also		
Doc Type	drawing		Grid ref	SH 857 137	
Drawing Type	plan/elevation		Scale	1:500	
Drawing Medium	CAD		Author(s)	DG, KH	
Doc Material	paper		Source	Plas Course	
Doc Status	complete	Original		Doc Size	A4
Notes					



MINLLYN LOWER MILL (remains)

Surveyed: KEN HOLLAMBY 3-8-2011

Drawn: DAVE GUNNING 18-11-2011

Print scale 1:500

Site	Minllyn Slate Quarry			**Doc No**	**ML020**
Subject	**Workings**				
Doc Date	2011		See also	001-7	
Doc Type	report		Grid ref	SH 853 140	
Drawing Type			Scale		
Drawing Medium	photocopy		Author(s)	AH, PH, SO	
Doc Material	paper		Source	Plas Course	
Doc Status	complete	Original		Doc Size	A4, 19 pg
Notes					

Minllyn Slate Quarry

Minllyn lower workings seen from across the valley, August 2010

Description of Main Quarry Workings

The Minllyn Slate Quarry incorporates both surface and underground workings and is typical of a slate working that developed from small surface scratchings to a productive, mid-sized quarry. However, in the case of Minllyn work has stopped before much of the surface workings have been obliterated by large scale extraction and waste tipping.

During the first week of August 2011 the Industrial Archaeology Week from Plas Tan y Bwlch[1] explored and recorded the Minllyn Slate Quarry site. Peter Hay, Andrew Hurrell & Stan Owen took responsibility for recording the quarry areas. This report is written using the findings of the weeks exploration together with addition information as referenced.

For the purposes of this report, the obvious working levels within the quarry have been given identification lettering (A to P) working from bottom to top. There is little evidence of an original numbering system[2] and not enough information to correlate this to the actual levels which are visible.

A Tentative Chronology

It would appear that the earliest working was at the highest part of the Minllyn site (Levels O and P) where erosion from a small stream seems to have exposed an outcrop of slate. Where the slate was processed is not clear but it may have been carried out in the open or even off site. The presence of slate may have prompted the opening of quarries down (Levels N to J) in a natural hollow convenient for slate processing (Level I, the Upper Mill).

These first main workings show every sign of having started as open quarries that developed into pits with short adits allowing access and drainage. A single chamber was opened (possible at a later stage) as the pits worked downwards towards the mill level.

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1 The Practical IA week is an independent group that has been run since 1970 and has since 1976 been based at Plas Tan y Bwlch, the Snowdonia National Park Study Centre where an archive of archaeological reports for the IA group is kept.

2 There is a reference to the original slate workings being at “what is now level 5”.

Sometime after Buckley came on the scene and perhaps anxious to show friends and or potential investors the scale and importance of his enterprise, he caused the Valley Floor Mill to be erected. This could have been supplied, via the main exit incline, from the existing workings. The lower open pit workings (levels A to E) would also have contributed, being directly above the mill. It is also possible that the earlier open workings above the upper mill may have been failing because of difficulty in working or lack of slate.

The new mill may also have caused new underground level H and later G to be opened adjacent to the exit incline and which also fed the lower mill. A further tunnel (level F) may have been a third production floor that was never developed. If indeed the workings below the upper mill level ceased to be useful as contributors to the enterprise, this may account for production reverting to the Upper Mill.

As there are no remains and there are no accounts of uphaulage around the exit incline and tramway, it must be concluded that once the Valley Floor Mill had closed and production was centred on the Upper Mill, all production was centred on the undergound workings accessed from the Level I adit. These sizeable underground workings show the signs of mechanised working and of the desperate acts (such as serious pillar robbing[3]) that take place to produce slate with little or no development costs. The resultant chambers are up to around 100 feet from floor to ceiling.

If this sequence is indeed correct, it would seem that the final working of slate at Minllyn was underground at the level of the Upper Mill, and here the story ended.

Detailed Descriptions

The productive workings can be split into fours distinct working area (although inevitably there will have been overlaps) and these four zones are used below as a basis of the quarry description.

1) Lower Open Workings.

The five lowest levels of working are predominantly open with minor underground adits that are assumed to be access/drainage levels for the open pits that developed. The whole area down to the valley floor had been planted with coniferous trees as part of the post WWII tree planting programme, these have been clear felled during 2009/10. By August 2011, some replanting (of deciduous trees) had taken place. While features of quarry works could be seen with ease, debris from the felling operation has blocked some features and progress across the site was difficult. Damage has also been done by the forming of roads for the felling and access tracks for the later replanting.

Level A. Starting at the Valley Floor Mill, there is an open adit close to the level of the mill. The opening of this adit is partially blocked but leads to a very wet level giving access to trial underground workings which connect with the level above.[4]

This adit is designated as Level A. It is possible that an additional (sub) level can be identified between this adit and the next positively identified level.

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3 Pillar Robbing is the removal of the rock that should be left in place to support the roof, an unfortunately common act which normally leads to the collapse of the working and often loss of the most productive areas.

4 J Knowles report 2009 (See References)

Level B is the lowest open gallery of the open quarry. There are now two distinct cuttings leading into the quarry with the raised area between showing signs of tipping and it is not totally impossible that this mound is predominantly made up of tip. Most of the quarry floor has been extracted to form a pit which has been used as a dump for old car tyres[5].

Tips extend from the southern side of the quarry with a run out directly and a second smaller tip somewhat to the south with a tramway formation just visible.

From the northern opening an incline extends down to the Valley Floor Mill which includes a distinct formation with cutting and retaining wall and has a stone staircase on the south side, clearly visible towards the top. The Drumhouse consists of two parallel walls built out of slate blocks and is similar to other drumhouses at Minllyn with a raked front wall. While there are signs of holding down bolts there is no sign of there having been a roof.

The remains of several small buildings are adjacent to the drumhouse.

Level C exists as a shelf across most of the quarry face with tip runs to the north and south. As on level B, the southern tip is some distance from the quarry.

At the northern side of Level C there is an adit leading to the higher of the open pits (pit 2). This currently forms a discrete level from the lower open pit which is on the same horizon but now shows no sign of a tramway connection. A number of low walls close to the adit mouth may well have included a weigh house but are too degraded to interpret fully.

The adit is now blocked at the inner end by loose material that may well have been tipped in recently during the construction of a forestry road .

Looking down from the forest road, August 2010.
Level C adit cutting (lower left); Level C weighbridge & Level B Drumhouse (right of centre)

5 Locally this quarry is know as the “Tyre Pit”

Level D. This level and quarry face has been obscured by the building of a forestry road This road was widened for the felling in 2009/10 when winch equipment was set up on a platform close by, but may date from the original tree planting. The current rock face at the side of the road shows all the signs of being very recent and not from slate production.

Level D also extends into the upper pit but is not clearly defined as this pit is obscured by forestry debris. A tip can be made out to the north.

Logging Equipment on the road above Level D. The rock face behind may be a quarry face cut further back when the road was built. August 2010

Level E is mostly defined by a small tip to the north of the upper pit although once again this is covered in forestry debris. The level is probably the remains of the surface material removed prior to the upper pit being developed.

2) Lower Underground Workings

It would appear that these isolated workings represent an intermediate stage of working where it was clear that the best rock required underground chambering. All the evidence suggests that the sequence of workings was strictly downwards and inbye and while there are three identified levels/adits there was only one truly underground production floor.

Level F. This is a blind tunnel running approximately 100 metres into the hillside, starting a little to the south of the Exit Incline. A visible tip is believed to contain the rock from the tunnelling operation. At its innermost end, this tunnel divides with the short curving side tunnel. The main tunnel is partially walled up at this point (the wall possibly demolished by mine explorers in modern times) and the tunnel actually ends in loose/poor material. As the side tunnel ends in solid rock, it is suggested that the tunnel hit poor rock and had to be diverted, shortly after which work stopped.

Level G has the most extensive underground workings below the Upper Mill. The adit is to the north of the Exit Incline with an obvious tip immediately outside. A horizontal tramway is still traceable between the adit mouth and the incline. Although the junction is much degraded, it is clear that there could have been a junction with the incline tracks (there is no sign of a landing for a Trunk type incline[6]) and thus allowing rock to be lowered to the lower mill by gravity.

The entrance to the Level G Adit

After 40 metres, the level G adit opens out into a considerable chamber. This chamber has been developed in several directions and still contains various workings shelves at the top of the working faces but has not been developed downwards, instead it retains a relatively flat floor. This first chamber is unique in having the remains of a bridge crossing on what is assumed to be Level H above. On the wall of this chamber is a fine carving of a plough.

The continuation of the adit into the second chamber is partially blocked by waste or a fall. This opening (particularly at its most restricted point) has noticeably draughts, indicating a through connection to the surface. Characteristic of this site (see Level I) is an enlargement of the connecting tunnel within the wall.

Chamber 2 is smaller but higher with a shelf at level H giving access to a further tunnel. A roofing shaft in the far corner has been opened out upwards but has not been used for extraction. The water running down the wall in chamber 2 is coming in down this shaft from the surface at the rear of the incline drum house. Also, at high level within chamber 2 there is a possible connection to the bridge in the first chamber.

The fall blocking the connection between the two chambers causes an obvious choke point for the water entering from the roofing shaft and the resulting high-water level is demonstrated by water marks in the chamber walls (waist deep).

6 The Exit incline roughly follows the slope of the hillside and is approximately to a catenary profile. The top of the incline is at least as steep as many trunk (transporter) inclines although the bottom is considerably shallower.

Level H. An obvious blocked adit can be identified approximately halfway (vertically) between level G and the level of the exit tramway and horizontally a little further to the north. The correspondence between the Level H, Level G and level F adits leads to the conclusion that the Level H adit was opened first and then the Level G adit was by necessity to the south of the tip created by the Level H workings. In the same way, Level F adit was further to the south (and south of the incline) to avoid the tip from the Level G workings.

No access was possible to Level H at any point during the August 2011 survey.

Level I Tramway Workings - A small series of workings adjacent to the Exit Tramway are not thought to represent any large-scale production, especially when compared with other areas of the Minllyn site. At least one working could have produced usable quantities of slate while the others are better classed as trials and these fit nicely with proving the location of the slate vein as later worked on levels G & H.

At the rear of the exit incline drumhouse is a small quarried area. This is likely to have been to provide space for the tramway & sidings rather than a production area.

A little back towards the Upper Mill is a very small quarried area connecting with the line of the tramway by a small cutting. In the middle of the cutting is a vertical shaft down to Horizontal tunnels and hence the underground workings seen on level G [7].

Further round and close to the Upper Mill is the largest of the isolated workings. Much of the floor has been quarried away into a sinc, which is self-draining, indicating an underground connection that is believed to eventually connect to the inner chamber on Level G.

Almost in line with the end of the Upper Mill is the last of the small workings, The high face could only have produced a small amount of usable slate rock.

It is postulated that the large sink and the vertical shaft both connect to tunnels on Level H and that it is production from these areas that necessitated the bridge over the first chamber on level G. This route was then cut as the second chamber was developed.

7 J Knowles report 2009 (See References)

3) Main Underground Workings

Mill Level – Level I – Close to the south end of the mill the main adit leads to the underground major workings. Extending out from the mill extensive tips have filled in part of the natural gulley in which this part of the quarry is situated and may have obscured early surface workings.

Close to the adit is the foot of the main internal incline and the main (only obvious) connection from the upper workings.

Underground on Level I (Mill Level)

The main entrance to the underground is a large arched tunnel immediately to the south of the mill. The arching stops after a few metres and the remainder of the tunnel is rough rock. The tunnel runs west into the base of an open pit (pit 3). Within the pit the route of the tramway turns to the south west and heads to the main underground workings. Here a large quantity of tipped or fallen material has raised the floor level by more than a metre and caused the underground workings to flood to this approximate depth during wet weather.

Starting in to the inner section of the adit there is a dilapidated wagon a short distance from the entrance. This is a typical open ended waste wagon with wooden frames and loose wheels on loose axles. It is notable that the end is missing (removed rather than rotted?) and that the wheels are single flanged although one is very heavily worn on the tread. There are no signs of couplings. Apart from the wheels and couplings, this is a typical slate quarry wagon.

The Waste Wagon in Level I adit

The main adit ends in a junction where it hits the slate vein. Twin openings lead to a single large chamber (chamber 3) while tunnels to the left and right lead to other chambers.

For the purposes of this report, the chambers have been numbered from south east to north west (left to right when entering via the main adit) but as quarry levels, there is no evidence of the original number.

To the south east of Chamber 1 – The furthest reach of the mine in this direction is in the form of three short trials off the main tunnel that may mark either the start of a chamber development or possibly the end of the workable slate. Whichever is correct, no obvious start has been made on developing a chamber above the tunnel level.

Chamber 1 – This is a medium sized chamber in which production has stopped before it has been fully worked out. Across the north side waste rock has been tipped but the main floor area is generally clear of debris. The rock in the South West corner is clearly the last area to be worked with a shoulder of rock having a ledge cut at high level and an exposed face being undercut at floor level using a channelling machine[8]. A length of chain ladder hangs from the roof (or thereabouts) and more (presumably a broken section) is on the chamber floor directly below. This ladder would have given access to the high-level ledge. A chain (probably a climbing chain) hangs close by the ladder.

Channelling Holes at the base of the working face in Chamber 1

Close to the entrance of the tunnel that heads further inbye, is a wooden framed winch. This is typical of the winches found in the Corris/Merioniedd district with a winch drum, double reducing gears from the winding handles and the capability of the handles also being put on the counter shaft for "fast winding". The wooden frame is badly rotted with some parts missing but all ironwork looks to be intact. The alignment of the winch is generally towards the working face at the southern side of the chamber and close to the area of undercutting channelling.

Chamber 2 – This is the only chamber on this floor with a sinc below adit level. A narrow tramway shelf has been retained with the sinc to one side and waste rock and a machine platform to the other. It is now flooded up to floor level but a distinct shelf can be made out below the water (6-7m below the surface) along the side of the tramway shelf. A modern climbing rope has been used to form a safety barrier around the flooded sinc.

A crane has been installed within this chamber, various part of which remain. It is assumed (from the remains) that this was a steam derrick crane. The remains of the base show that it had powered (hand or steam) slewing[9] while the wooden jib and one of the timber stays are still in the chamber. To the side of the crane base is a vertical boiler on a stone-built foundation. It is clear that "Underground Explorers" have been lighting fires within the old boiler as the firebox is full of ash, etc., however looking upwards from the ash pan it is clear that the original fire grate remains.

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8 This is a series of closely spaced drill holes made by a rock drill mounted on a special frame. The rock between the holes is then removed.

9 Slewing is the rotation of a crane jib (and superstructure) keeping the hook at a particular radius. When powered, it is usual for a driven pinion to engage in a ring gear fixed to the static frame (foundations or chassis).

Also on the crane platform are the broken parts of a slate-built water tank and up against the side of the chamber is a linkage which could have allowed some control of the crane (the brake?) from the edge of the tramway shelf or even beyond.

Clay Pipes, coated with soot stacked against the back wall of Chamber 2

Above and to the rear of the crane are various remains of the flue. Judging from the fitting on top of the boiler, the flue has consisted of a metal (steel?) tube spanning to the bank and then clay drainage pipes (Vitrified Clay Pipe – VCP) running across the slate waste. The clay pipes are currently stacked neatly against the back wall of the chamber but all show clear signs of smoke blackening. There is an opening and two tunnels at this approximate level in the sides of the chamber that could possibly have been used to conduct the smoke out of the mine. The two tunnels have been backfilled with waste rock.

Chamber 2 seen from the adit into Chamber 1.
Behind the vertical boiler is the massive hole through to Chamber 3

The wall between chambers 2 & 3 has been extensively robbed to the point where an opening approximately 10m square has been formed together with a small rough opening close by that shows just how thin some areas of the remaining wall are.

Chamber 3 – This is the most obvious chamber when entering the workings from the main adit and has two actual openings side by side. This is a large chamber notable for being wide, high and having connections broken through into other chambers (chambers 2 & 4). It has the highest roof of any chamber and proof of how stable the ground here is that this area has not suffered extensive collapses.

The chamber floor is generally cluttered with rock, mostly waste with obvious signs of a working area on top of this waste against several of the side walls.

It is assumed that some of the desperate acts to remove rock without developing new chambers have taken place here and has resulted in the chamber being worked behind and above the adit entrance until eventually breaking into a chamber above (chamber 4).

Rock has been systematically removed from the eastern wall until it has broken through into chamber 2 in several places (as detailed above).

Chamber 4 – this chamber is the only chamber with a floor above the adit level. It is medium sized with no area of clear floor. It is above and to the side of the main adit, generally being north of chamber 3.

An opening between chambers 3 & 4 seems to have been created from chamber 3 as it was enlarged northwards, the working level in chamber 3 being below the current floor in chamber 4. This is however very much an assumption as the opening is lined with waste that looks to have been tipped in chamber 4.

A large opening to daylight is in the north east corner of the chamber and opens into pit 4 on level L. This opening is more than large enough to have been used as an access incline/haulage way, an idea that is confirmed by rope marks on the floor. It is on the approximate line of the two filled in shafts that appear to be roofing shafts and/or flues from chamber 2.

[To Add]

As well as a broken iron pulley wheel, the chamber contains more sections of the VCP pipe used as a flue from the crane boiler (see chamber 2, above).

See notes below for further ideas on the possible development of Level L & chamber 4

Chamber 5 – This is a small chamber accessed from a tunnel that runs through the 3/6 wall. This low chamber has a working shelf just below the roof line that breaks into the back of chamber 6.

This method of working, with a long tunnel through the wall is a little peculiar when much shorter access could be obtained from an adjacent chamber. It perhaps suggests a weak area of rock was being bypassed (possibly in chamber 6) or a new chamber was being developed in such a way as to allow the adjacent chambers to be backfilled with waste.

There is very little clear floor space and little room for the production of usable slate blocks.

Chamber 6 – This is a very large chamber, notable for its clear smooth floor, vertical walls and distinctively square footprint. While this is not the tallest of chambers, and not the largest, the lack of debris on the floor and the working galleries around most of the perimeter immediately below the roof make it impressive. The lack of fall material again demonstrates the soundness of the roof in this quarry.

The route of the tramway is taken around the north side of the chamber in a separate tunnel that must be a quite deliberate move to keep the through route clear of the working area. There is no alternative opening for the tramway between chambers 6 & 7, confirming that this bypass was not an afterthought but a deliberate act from the planning/development stage.

Bypass Tunnel with Chamber 6 to the left

The routes to chambers 3, 5 & 7 all meet in the north eastern corner under a partial overhang of rock. Immediately at the side of this junction the chamber opens up to its full height. It is assumed that this overhang has been left in to protect the tramway route.

A large opening exists from chamber 6 into the tunnel leading to chamber 5 about half way along its length. Within this opening and partially obstructing the tunnel is a wooden winch frame. The design of the winch is clearly similar to that in chamber 2 but this example lacks most of its working parts and some timber. A number of winch parts are located close by but within the main area of chamber 6. It is possible that these are all the missing parts.

Chains and a chain ladder hang from the chamber roof on the southern wall, an area that was obviously in the process of being worked. At high level is the characteristic ledge and below that a clear bulge in the rock face. About half way up in the south east corner is a shelf and the opening into chamber 5. Below this is a very clear and smooth area of slate with free edges for working from.

Chamber 6 – Lower Left to Upper Right
Tunnel to Chamber 5 & winch frame

A massive section of the west wall is missing to leave a V shaped opening into chamber 7 extending from floor to roof. Steps in the wall line suggest that this opening has been worked from chamber 6.

Three small irregular opening have been formed from chamber 6 into the tramway tunnel close to where it connects into chamber 7. Above these are more chains and several iron pins driven into the rockface. One of these chains looks to lead to an opening onto the high-level ledge in chamber 7.

The small openings from Chamber 6.
leading into Chamber 7 (left) and the Tramway bypass tunnel (2 on right)

Chamber 7 – This is neither as large nor as regular as chamber 6. Most of the floor is clear but towards the south it is piled with waste and large area of unworked rock suggests the rock here is less desirable (distinctly curved along the cleavage from observations). This area is also noticeably wet, although the water is not actually flowing, it is seeping down the walls.

Chamber 7 looking east to the entrances from the bypass tunnel and chamber 6
Note the high-level gallery/opening

The tramway again has a bypass tunnel although it is not as separate as that in chamber 6. In this case there are two viable routes for the tramway – through the bypass or via the chamber.

Chamber 8 – In common with chamber 3, chamber 8 exists on both sides of the main tunnel. It is small and has the feel of being a "work in progress". To the north of the tramway, the chamber has waste piled up that slopes upward to near roof level and from here the high level ledge can be clearly seen.

The south side of the chamber shows the method of working with extraction taking the chamber out away from the tramway and then opened out to the right (the west). On the working face, a vertical channel has been cut from the high-level ledge down to the floor and this looks to be a way of getting two open faces that can then allow blocks to be removed.

Chamber 9 looking towards the east wall, the chamber entrance is off to the right
Note the high level, diagonal and vertical workings

Chamber 9 – A huge chamber by almost any standard, being wide, deep and high. It is the last chamber of the workings and it is not beyond belief that this was originally two chambers.

Uniquely for Minllyn, all extraction was to the north of the tunnel. The tunnel alignment, which remains traceable, swings a little to the south. The route onwards finally stops at a stub into the western wall of the chamber.

Where the tunnel from chamber 8 opens into chamber 9 it does so at an overhang of low roof. Presumably this has been left from a desire not to work too close to the chamber's only means of access. On the face of the this overhang, as it opens out to the main chamber, is a very distinct run of channelling. Across the remainder of the chamber, the ceiling climbs steeply up from around 2m at the entrance to a maximum height of 18m in the north east corner.

There are no obvious signs of the chamber having been two separate workings opened out into one, but the size and pattern of working elsewhere suggests this is possible.

Remains within this chamber are limited to a length of air piping across the floor and a few parts from a winch, while at least 3 pulley blocks are still hung from the roof or walls. All the indications are that the winch was located under the overhang close to the chamber entrance.

Discontinuous channels and ledges have been cut in the eastern wall to provide a working face for another layer of slate to be removed. The first is vertical and close to the chamber entrance, the next is diagonal up against the steeply sloping roof, while the third is horizontal near the highest point of the roof.

Chamber 9 – the unusual overhead channelling close to the adit from Chamber 8

An amount of waste rock remains in the chamber, generally over towards the western side and the furthest point of the air pipe.

As in Chamber 7, some areas of the chamber appear permanently wet from water ingress.

4) Upper Open Workings

Level J – A short adit directly above level I adit and opens out into pit 3. Most of rest of floor has been quarried away. A surface tip run to near mill chimney with a long run before the actual tipping area.

A small tip exists a little above Level J, this has not been given a separate number being considered as nothing more than a tip from clearing overburden and having no significance to the main working of the quarry.

Level K – A surface level only visible in pit 3 – It is possible that this level equates to the floor level in Chamber 4, but this is has not been measured in any way. Again this has been quarried away to leave very little apart from a tip shadowing that of Level J behind the mill. The tip also shows signs of a second run of tipping having been formed from the same tramway connection.

Level L – Two adits have been developed on this floor according the OS map, both are now blocked on the surface. The adit to the south of the incline can be traced to an open pit (pit 4) behind the head of the main incline where the inner end is still open. At the outer end, extensive tips from this adit form a distinctive feature of the upper quarry, with classic fingers of tip lined with waste blocks. Close to the entrance is the remains of a weighbridge and adjacent is the obvious site of a connection onto the main incline down to the mill.

The second adit is shown on maps to be to the north of the incline. No sign of a connection to the incline remains but a tip run extends to the north in the direction of the stream and gulley, and clear of the lower open pit (pit 3).

Pit 4 is to the rear of the drum house on level M but its floor is down on level L. This has clearly been worked for slate on at least three levels. To the north, the pit has been partially backfilled with waste (probably from developing this pit at the higher levels) while the rock face of the south side is pierced by the opening into Chamber 4. Close by on the east wall is the inner end of the first adit (to larger tip & weighbridge).

See below for further notes on the possible development of Level L & chamber 4

Level M – The drum house for the main internal incline is here. Immediately behind the drum house is pit 4. A Tip run round towards the gulley to the north, this also extends to south to form the route to Cae Abatty.

The tip run to the north extending round to the stream and a little way beyond. Before it gets to the stream, the tip from Level N above has overrun the tramway although its course in clear beyond this.

Level N – Is just discernible in pit 4 but has four distinct tip areas -

1. First (Northerly) tip, possibly from working in the Gulley and on far side of stream
2. Second tip on south side of stream & overrunning stream – no obvious route from 4 pit although obviously developed from that direction.
3. Third tip possibly developed after loss of route to second tip. This is the main tip overrunning the level M tip below.
4. Fourth tip close to open pit consisting of a short leg off third tip.

There are the remains of a possible weighbridge and two bay building close to pit, generally similar to those seen on level B and similarly degraded.

It has been considered that the second tip identified on this level could be from an adit but all signs of any such working are now lost.

The Upper Workings
The Mill level (I) is left of centre & level L to the right
Pit 4 with level M & L is lower right

Level O North – Consists of a cutting in south side of stream gulley, leading to an adit curving round to the north west. The adit ends in a blockage that consisting of rocks from a pit open to surface (See level P)[10].

There are small walls on level O partially buried in the tip.

Visible on Level O is the line of a track leading down to the north east (towards the Minllyn / Dinas Mawddwy township).

Level P North – Here there is a small open working to south of stream and an open face slightly higher to north of stream. An open pit in the floor of northern working (approx 5m x 3m) drains through the level O adit. Around here the stream is within a distinct channel that is almost certainly man made.

Behind the pit is a narrow cutting less than 3m wide heading into the gulley and not extending below working floor level. It has the look of having been worked at some time and could possibly be where slate was first discovered. The ground above shows no sign of workings.

10 J Knowles report 2009 (See References)

The Gulley above and to the North of the main site, seen from Level M
Levels O & P tip runs are visible towards the top of the loose material. Mr Owen adds scale

Level M South – around the corner and entering a second gulley (this time dry) there is an adit in south wall of the small valley. This is a trial that heads generally south for 155m to blind end.

There are sleeper marks on floor of this trial and a single length of bridge rail at the inner end. Water is flowing in through the roof at the inner end while around two thirds of the way in there is a short side tunnel on the eastern side.

Level N South – Possible level and remote possibility of a lost adit close to the Cae-abatty route.

Level O South – An adit is shown here on the OS map and a possible site of a run in opening close to top of steep section of Cae-abatty route was identified. With no obvious tip and no depth of cover above this level, this is unlikely to have been anything more than a trial.

Notes & Ideas

Notes on the Buckley period working

It is recorded that during the Buckley period of working, there was an obsession with keeping the quarry chambers clear of waste. This is assumed to be the reason why most of the underground quarry is smooth floored and adds to the chonology of the working, showing that several chambers (notably No.6) have not been worked since that time while chamber 3 most probably has seen the most later work.

Notes on Steam Crane Installation – Level I, Chamber 2

It is assumed that the crane is a "Scotch Derrick" type with a vertical mast extending up from the rotating superstructure and then stayed back to the solid walls of the chamber to help support the main jib that would have extended out over the sinc.

A sizeable timber with an iron end-piece protruding out of the flooded sinc is assumed to be the crane jib. The end-piece is complete with a tubular bearing that would work as a pivot for the jib when being raised and lowered. The alignment also fits with it being dropped off the crane when it was dismantled (scrapped?).

The boiler is a vertical type, typical of those fitted to steam cranes, and is mounted on a base constructed from stone blocks shaped to form an ash pit. The flue comes off the top of the boiler concentric to the boiler barrel and has had an elbow to a short length of horizontal metal flue bridging to the solid ground behind the boiler. The length of this would have been just sufficient to reach the vitrified clay pipe (VCP) flue on the tip area above.

All that remains of the superstructure of the crane is a collection of holding down bolts on the platform adjacent to the boiler. This is likely to have consisted of several large iron castings that would have been worth taking out for scrap if not for reuse. The holding down bolts still secure small sections of the original base which has the teeth of a ring gear (the slewing ring). It cannot be discounted that this is a reused item and that the ring gear was not needed or used at Minllyn.

A linkage extends from close to the cranes location to the back wall of the chamber and then forwards again, over the tunnel opening (that leads to chamber 1) and ends with an angle bracket at the edge of the sinc

Notes and reasoning behind working methods

Unanswered questions -

Why has only one chamber been taken below adit level?

Was it clear that the vein was not worth working to the east or west of the working, or did the money run out?

Why are all the flue pipe neatly stacked?

References -

Knowles, J.D. - Various notes made during and after an exploration by 5 members of CAT during 2009, primarily to explore the minor underground workings.

Richards, A. J. - Gazetteer of Welsh Slate Quarries, 1992

Outstanding Work -

1) Check for Level A Adit and a lower adit
2) Measure Level B drumhouse
3) Measure/plot Level F tunnel
4) Photograph/plot Level G graffiti
5) Plot Level M chamber details – where are the HL working shelves

November 2012 – Draft Copy

Site	Minllyn Slate Quarry			Doc No	ML021-1
Subject	**Mill, Upper, floor I**				
Doc Date	2011		See also	002	
Doc Type	report		Grid ref	SH 853 140	
Drawing Type			Scale		
Drawing Medium	comp gen		Author(s)	CL, CH, DFG	
Doc Material	paper		Source	Plas Course	
Doc Status	complete	Original		Doc Size	A4, 10 pg
Notes					

This document has two other entries in the index::***Boiler House*** and ***Pillars***

Minllyn Slate Quarry,

Report on the Principal Features of Floor I

Survey by Celia Hancock, Dave Gunning and Chris Lester. Report by Celia Hancock and Chris Lester. Date of survey: August 2011.

Introduction.

Alun Richards in his Gazeteer of Slate Quarrying in Wales of 2007 states that there were ancient workings which were commercially worked from the 1840s onward, never very successfully and not continuously, finally closing in 1925. Dr David Gwyn, elsewhere in these reports has extracted information from and listed both primary and secondary sources in *Minllyn and Cae Abaty Slate Quarries,* hereafter referred to as *Notes* in this report. Figure 1 shows the features on Floor I in the Mill area and Figure 2 is the ground plan.

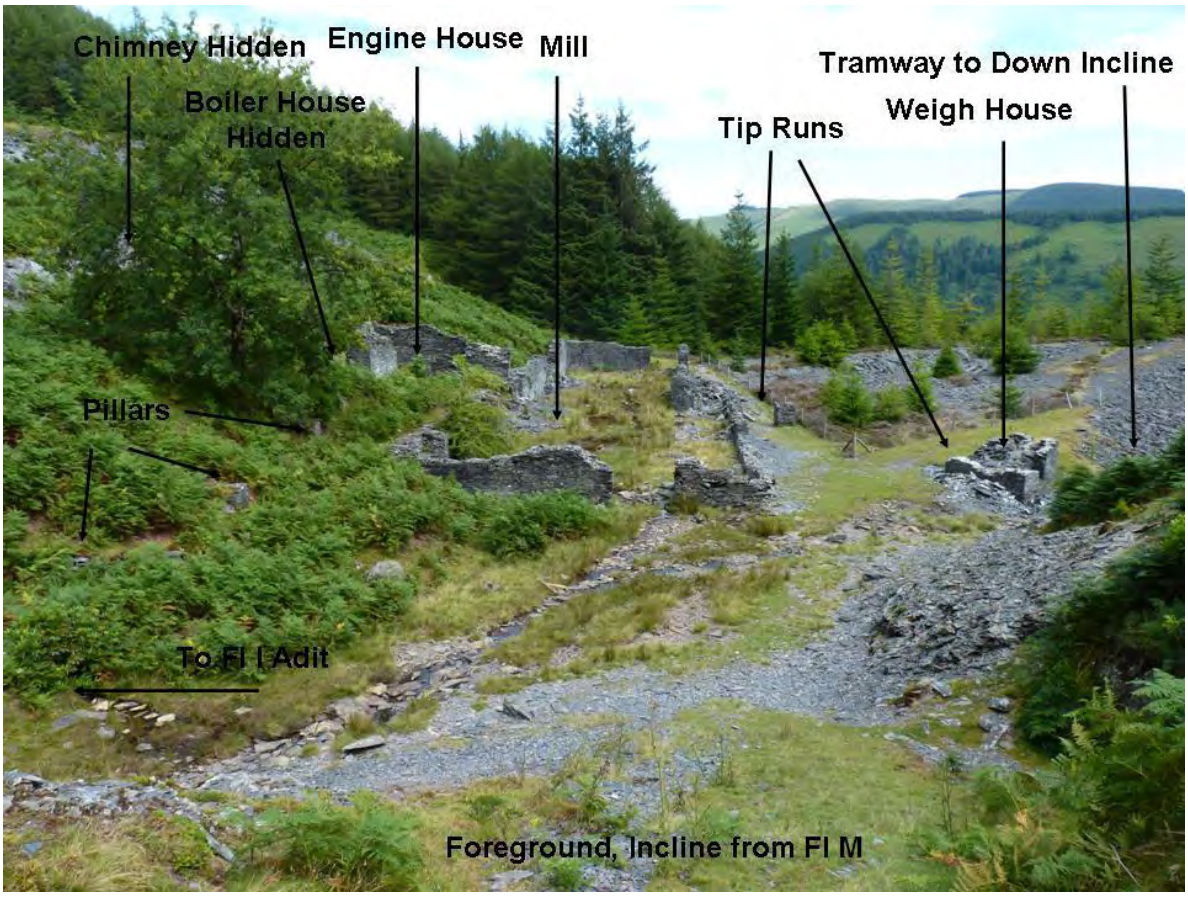


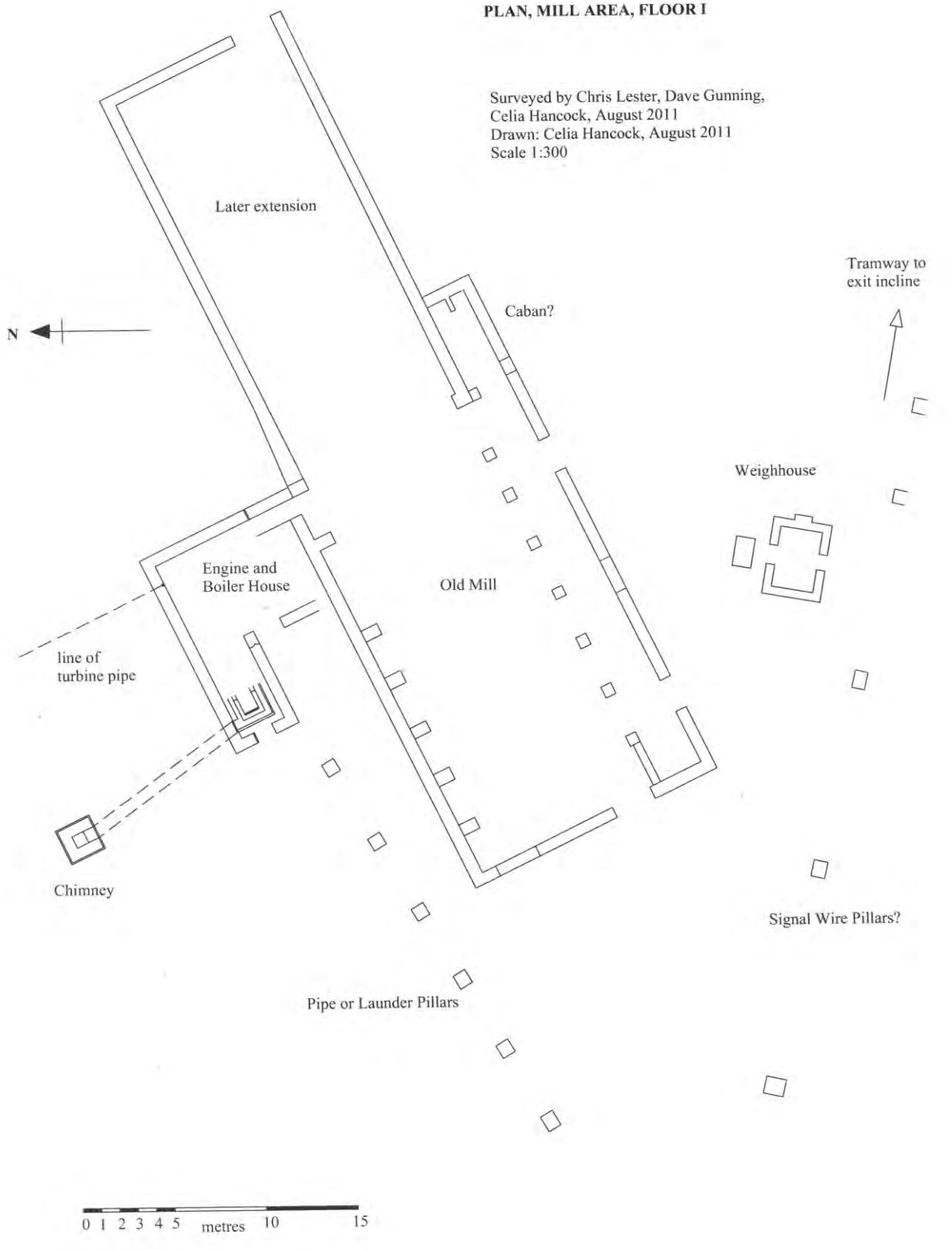
Fig 1. Main features of Floor I.

MINLLYN SLATE QUARRY **FIGURE 2**

SH 853 139

PLAN, MILL AREA, FLOOR I

Surveyed by Chris Lester, Dave Gunning,
Celia Hancock, August 2011
Drawn: Celia Hancock, August 2011
Scale 1:300



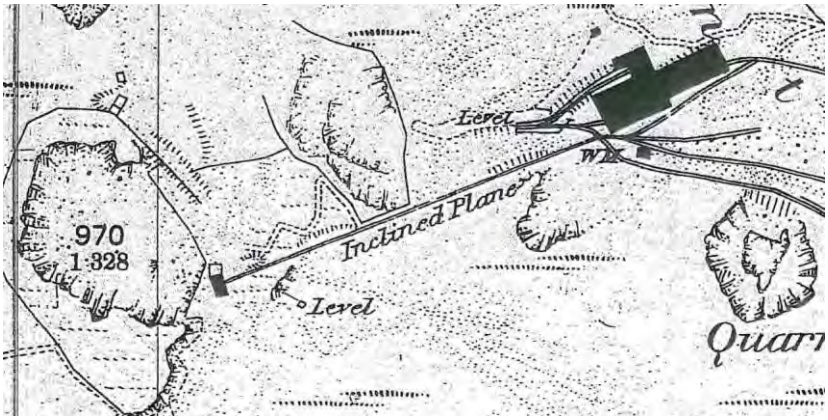


Fig 3 25" OS map,1889

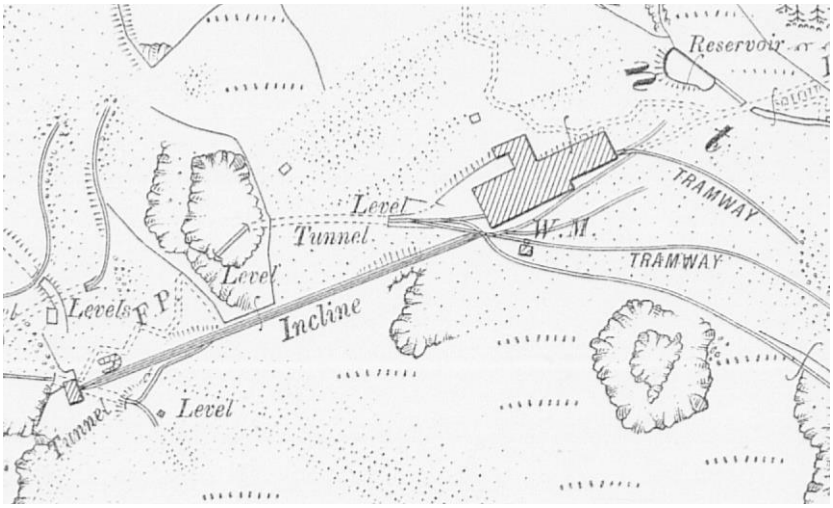


Fig 4 25" OS map, 1901

Fig 5 Floor I from M-I incline, engine house behind tree photo A Hurrell

MINLLYN SLATE QUARRY

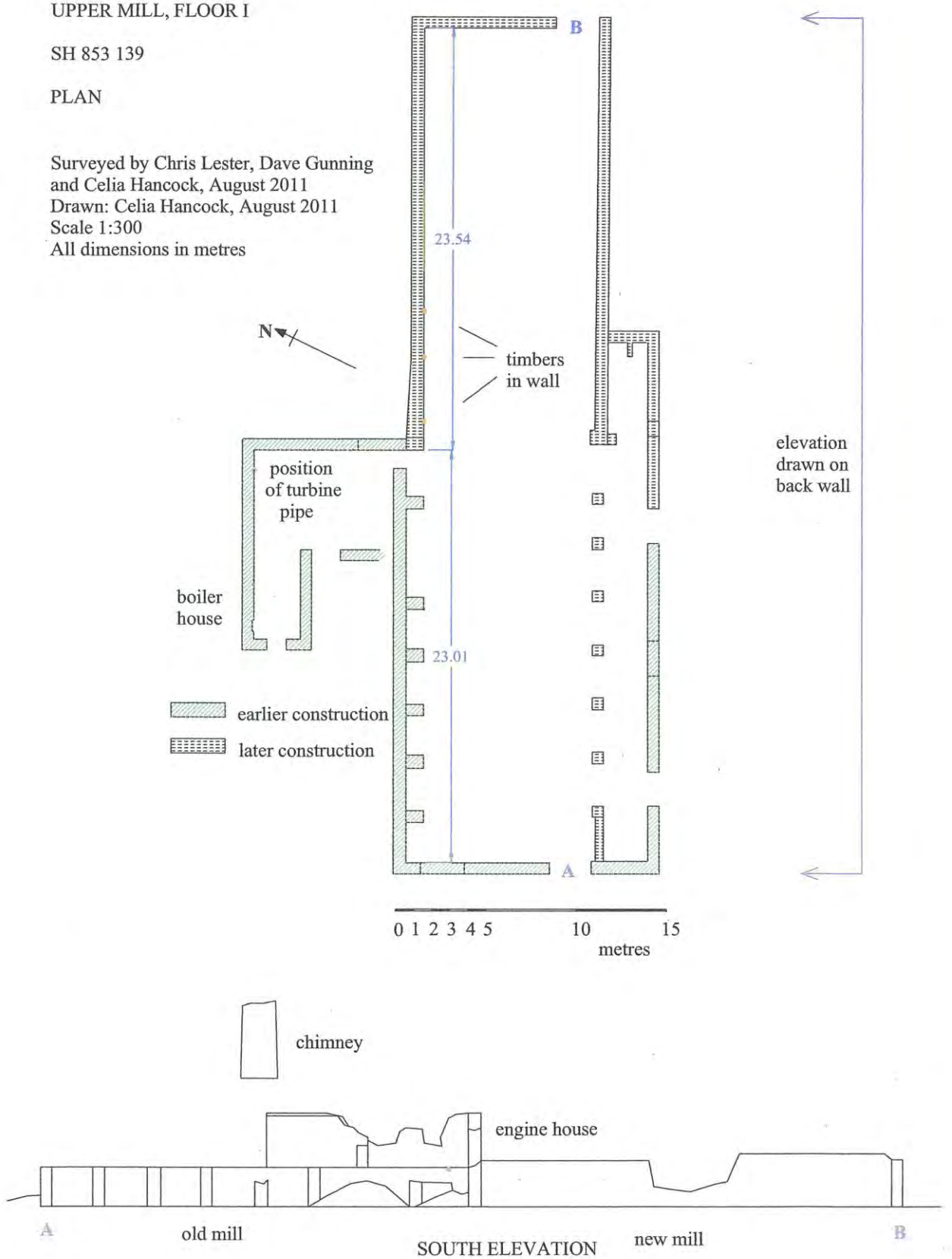
UPPER MILL, FLOOR I

SH 853 139

PLAN

Surveyed by Chris Lester, Dave Gunning
and Celia Hancock, August 2011
Drawn: Celia Hancock, August 2011
Scale 1:300
All dimensions in metres

FIGURE 6



4

Part 1. Mill, Engine and Boiler House, Chimney, Pillars to West.

1. Mill. The main feature of Floor I is a large mill with an attached boiler house, engine house and separate chimney on rising ground to the rear. For clarity these are described separately. In the *Notes* it will be seen that in 1845 the mill was described as powered by a 6 HP steam engine which drove “three circular saw machines for cutting slate slabs; three superior planing machines, two of them on the rotary principle, the whole of large dimension and great power’.”

The centre of the mill is located at approx. SH85330 13982 and it lies with a NE-SW long axis at the foot of the incline down from floor M. Its shape is the same as represented on the 25” OS map of 1889. It measures 46.5 x 14.7 m overall and the surviving walls consisting of sawn slate slabs have a nominal thickness of 0.6 m. The rear (north) wall butts up to rising ground and most of it survives upto approximately wall-plate height. Along this wall there are five pillars which may be buttresses to support the wall against pressure from the rising ground. The other walls are more ruinous. Without excavation no details of machine beds or other features in the floor were visible apart from some low pillars of unknown purpose. They appear to be later additions

Fig 6 is the plan of the mill. The NE part appears to be a later extension and is made from slate from a different source which is stained red from iron. The front wall (south) has two openings and two blocked apertures. The west wall has two apertures, one of which is blocked. Traces of soot were found in the area tentatively identified as a caban in the east end close to the mill wall and an anonymous drawing of 1972 in the DRO indicates a chimney in the corner of this area. Interestingly for a mill of this size and the importance of this floor generally, no traces of a smithy were identified. Figs 7 to 10 illustrate the mill.

Fig 7. The mill looking NE, later pillars just visible.

Fig 8. The mill looking SW, incline from floor M seen beyond.

Fig 9 Rear wall of mill, with engine house and chimney photo A Hurrell

Fig 10 Mill from East end photo A Hurrell

2. Engine House. The engine and boiler house form an L-shaped structure adjacent to the rear wall of the mill on rising ground such that its floor appears to be at about the level of the mill wall plate. The walls, some 0.6 m thick, survive to a height of approx. 2 m. See Fig 11.

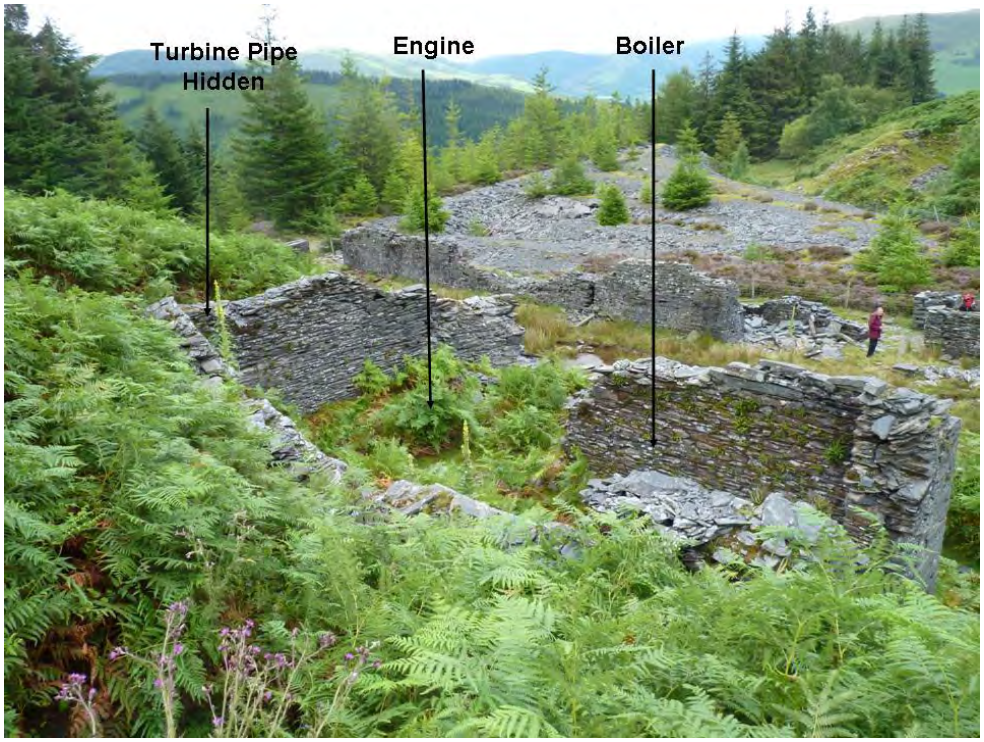


Fig 11. Engine and boiler house.

The steam engine was reported in 1845 (see *Notes*) to be manufactured by Blackburn of the Minories and rated at 6 HP. No trace of this manufacturer has been found using Internet (only) sources. It is believed that after the steam engine was removed the mill was powered by a water turbine using water from a reservoir located at SH 85220 14214, 102 m above the turbine pipe entry level. A high pressure water pipe of 0.15 m internal diameter was found (see Fig 12) and there appeared to be a pit in the floor where the turbine would have been. No other traces of the engine or turbine were found.

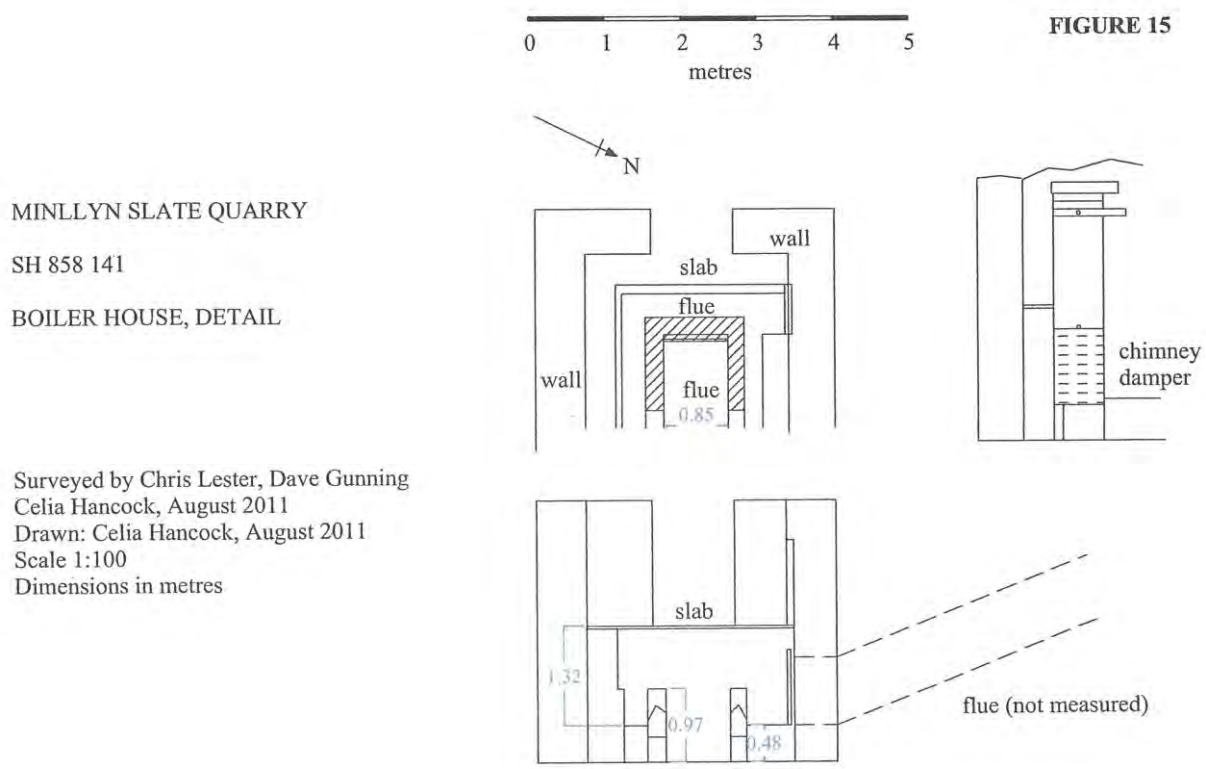
Fig 12 Turbine pipe

3. Boiler House and Chimney. Excavation of the boiler house floor revealed large numbers of refractory bricks arranged to support a Cornish boiler. The bricks bear the inscription “Lambert, Shrigley, Macclesfield”. This is Lambert of Pott Shrigley, a brick-making business of 1830 to approx 1870. The successor company, William Hammond Ltd., still owns their premises. The flue damper was also found. See Figs 13 and 14 for illustration and Fig 15 for a detailed drawing.

The excavation of the floor of the boiler house is described in a separate report by Peter Swift.

Fig 13. Boiler house.

Fig 14 Flue damper



The chimney is located 5.0 m above the boiler house. It stands approx 4.2 m tall and it is 2.0 m at the base. The top of the flue aperture was located but the flue itself was not found. It is thought that the top flue bricks may have been removed and the rest subsequently buried by natural process. However, a flue brick was found in the boiler house. This is illustrated in Fig 16 and the chimney itself in Fig 17. Fig 18 is a cross-sectional drawing of the boiler house, flue and chimney.

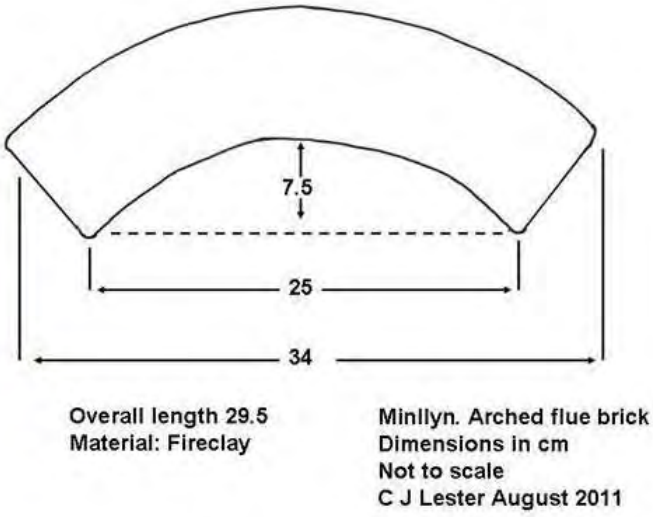


Fig 16. Arched flue brick.

Fig 17 Chimney (photo A Hurrell)

FIGURE 18

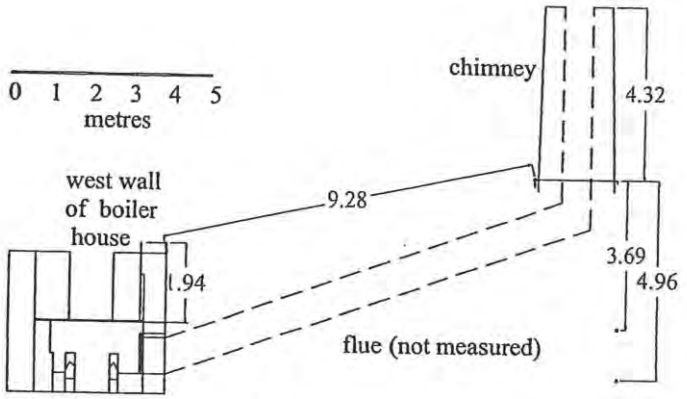
MINLLYN SLATE QUARRY

SH 858 141

BOILER HOUSE AND CHIMNEY

SECTION

Surveyed by Chris Lester, Dave Gunning
Celia Hancock, August 2011
Drawn: Celia Hancock, August 2011
Scale 1:200
Dimensions in metres



orange mark on wall is eye level
angle to base of chimney = 12 deg
angle to top of chimney = 34 deg

4. Pillars Running West from Mill. There is a line of six pillars extending west from a position immediately behind the mill towards the adit (see Fig 2). They vary in size from 0.74 m to 0.82 x 0.75 m across and heights are typically 0.6 m above the ground. Their purpose has not be ascertained; they may have carried flatrods, piping or a launder. Although their proximity to the steam engine/turbine suggests flatrods, relative heights imply that they would meet the roof of the adit which would be impractical. They could have supported a pipe carrying compressed air to the adit, carried at roof level for convenience. However, no base for a compressor or air receiver has been found. A third possibility is a launder carrying water to the steam engine from a sluice in the stream feeding the (now lost) lower reservoir.

Site	Minllyn Slate Quarry			Doc No	ML021-2
Subject	**Weighhouse, floor I**				
Doc Date	2011		See also	005	
Doc Type	report		Grid ref	SH 853 140	
Drawing Type			Scale		
Drawing Medium	comp gen		Author(s)	CL, CH, DFG	
Doc Material	paper		Source	Plas Course	
Doc Status	complete	Original		Doc Size	A4, 2 pg
Notes					

Originally part of 021-1, report split to assist in indexing

Part 2. Weighhouse and Associated Pillars

1. Weighhouse. The weighhouse is a simple structure to the N of the exit tramway from the adit with a machine pit in the tip run. It measures 4.26 x 3.23 m overall and the walls, which only survive at low level, are nominally 0.6 m thick and constructed from roughly sawn slab. The ground plan is shown in Fig 19 and it is illustrated in Figs 20 and 21. An anonymous drawing of 1972 at the DRO indicates that there was a window in the west wall as well as above the weighpit (which would have been expected).

It appears to have only served the tip run and not the mill output going to the exit incline.

FIGURE 19

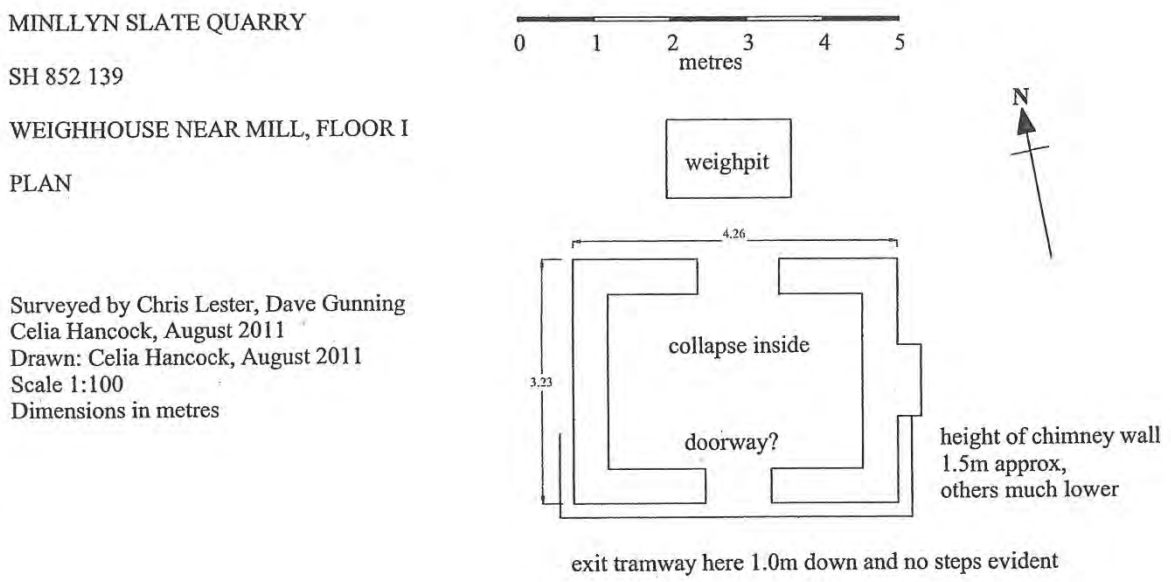


Fig 20 Weighhouse. The machine pit is under slate waste in the bottom left of the picture

Fig 21 weighhouse with exit tramway to right

2. Pillars

Five pillars extend in a line from the adit mouth to the back of the weighhouse parallel with the tramway to the main exit incline. They are similar to the pillars described in Part 1 although they appear to be more randomly spaced. A sixth pillar is situated about half way to the incline. Fig 2 (in part 1) shows the relationship between the pillars, the weighhouse and the adit mouth. The random spacing suggests that they were unlikely to have carried piping and could possibly have carried some sort of signal wire between the mill area and the incline. One may speculate that a winch may have used to wind up empty wagons given the relatively steep gradient on the exit incline (see next section of report).

Fig 22. Pillars looking toward adit mouth

Report: Chris Lester and Celia Hancock; also on survey: Dave Gunning

Site	Minllyn Slate Quarry			Doc No	ML021-3
Subject	**Tramway, to exit incline**				
Doc Date	2011		See also	006	
Doc Type	report		Grid ref	SH 853 140	
Drawing Type			Scale		
Drawing Medium	comp gen		Author(s)	CL, CH, DFG	
Doc Material	paper		Source	Plas Course	
Doc Status	complete	Original		Doc Size	A4, 3 pg
Notes					

Originally part of 21-1, report split to aid indexing

This document has an additional entry in the database/index – ***Drumhouse, Exit incline, Floor I***

Part 3. Exit Tramway and Incline

1. **Tramway**. The tramway is some 300 m long and follows the contour of the hillside to reach the drum house at the head of the incline. Although the mill end of the tramway is visible, thereafter approx. half of it is lost in boggy ground. From the east end of the weigh house a profile of the first 23 m was drawn and the rate of descent was found to average around 1 in 14, see Fig 23.

Fig 23 Exit tramway descending behind the tip tramway weighhouse

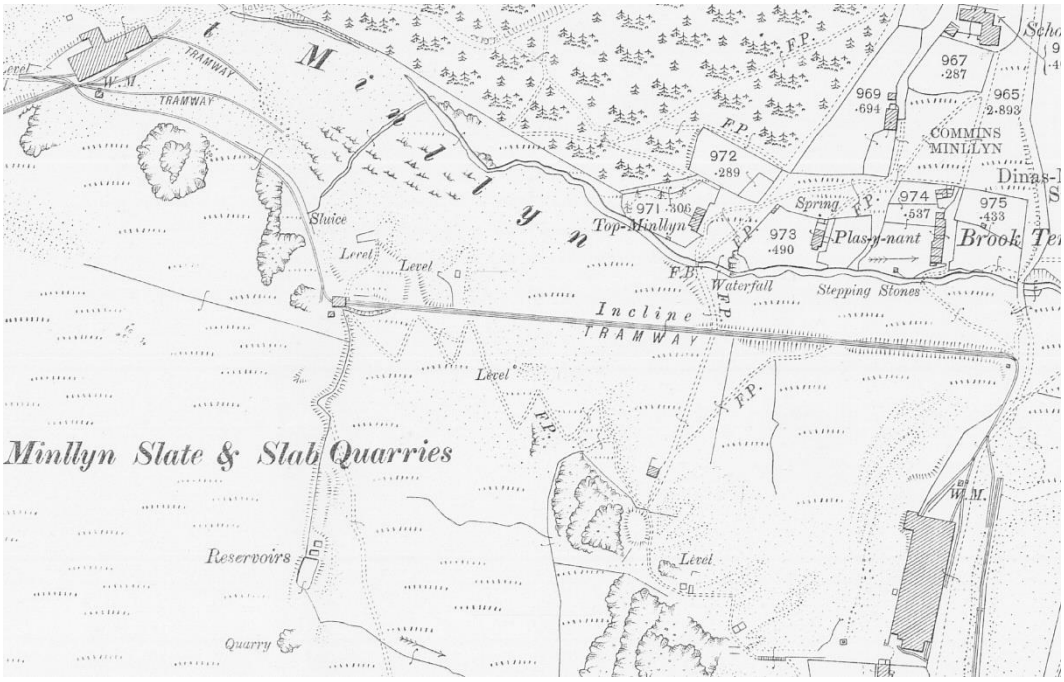


Fig 24 Product exit route, 25” OS map 1901, reduced scale

2. **Drum House and Exit Incline**. The drum house walls are constructed of substantial blocks of country rock. Both walls are badly degraded but the southern appears complete at the back and there measures approx. 2m high. Both walls still contain long holding-down bolts. Adjacent to the southern wall is a small slate platform which was probably the base of the brakeman's shelter. The crimp is 6.3 m from the front of the drum house and the incline formation is 7.75 m wide. Fig 25 is the ground plan and Figs 26 and 27 depict the drum house. The exit incline descends steeply in an easterly direction over a distance of approx 600 m (Fig 28).

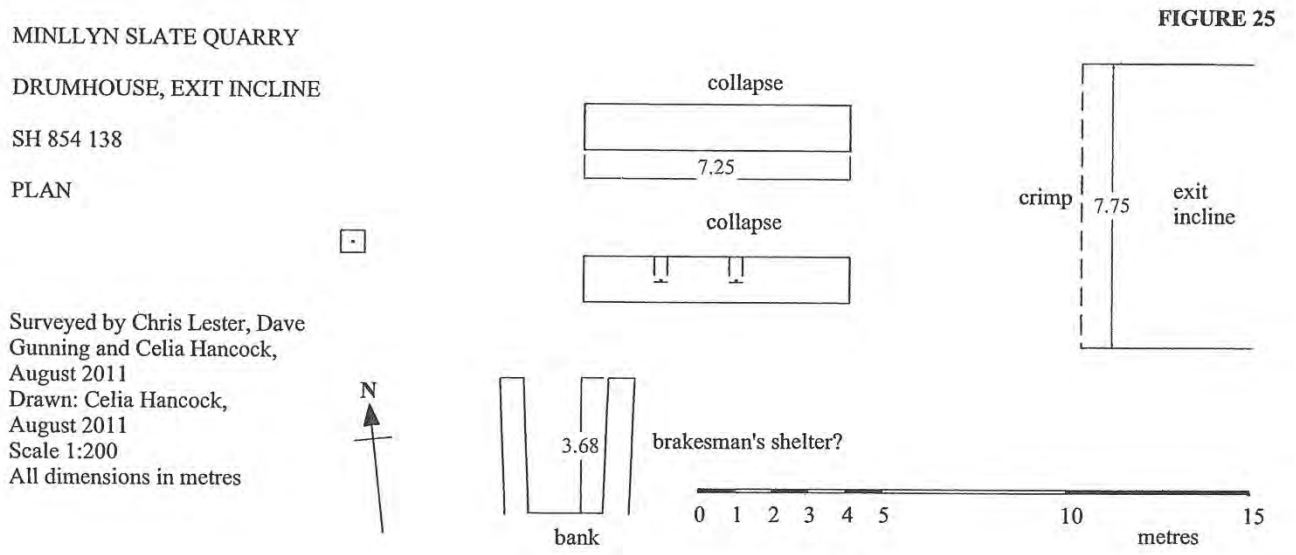


Fig 26. Exit incline drum house.

Fig 27 Drumhouse from crimp

Fig 28 Lower part of incline photo A Hurrell

Report Chris Lester and Celia Hancock. Also on survey, Dave Gunning

Site	Minllyn Slate Quarry			**Doc No**	**ML022-1**
Subject	**Boiler House, floor I**				
Doc Date	2011		See also	002, 003, 004-4	
Doc Type	report		Grid ref	SH 853 140	
Drawing Type			Scale		
Drawing Medium	comp gen		Author(s)	PS, TB, DRG	
Doc Material	paper		Source	Plas Course	
Doc Status	complete	Original		Doc Size	A4, 7 pg
Notes	includes photos				

Electronic version, 6 pages

Boiler House at Minllyn Quarry at SH 853140 (Draft) *(no subsequent report)*

1. Introduction

The Practical Industrial Archaeology course held at Plas Tan y Bwlch between the 1st and 6th August 2011, under the leadership of David Gwyn and Celia Hancock, examined and recorded the Minllyn Slate Quarry at Dinas Mawddwy, Gwynedd, and the associated Cae Abatty Quarry. The main workings of Minllyn Quarry are to the South West of Dinas Mawddwy, with a mill building at SH 853140. In this report *(by Peter Swift),* grid references are taken from the 1979 1:25,000 OS map, for items are identified on this map, and interpolated from the 1901 25" = 1 mile map, for items not shown on the 1:25,000 map.

2. Power supplies to Minllyn Mill

Latterly, this mill was powered by a Pelton Wheel, at the East end of a building on the North side of the mill. A sketch, dated 15th April 1972, has been deposited in Gwynedd Archives. This indicates that the Pelton Wheel was still in place at that date, although it has since disappeared. It carried a patent plate for the Pelton Water Wheel Co. of San Francisco, USA, showing the most recent of a number of patent dates as 1889. The 1901 25" = 1 mile OS map shows the reservoir for the Pelton Wheel, indicating that it must have been installed during the 1890s. The 1889 OS map shows a tramway siding between the mill building and the North extension, which has gone by 1901. This was probably a coal siding for the boiler house. Records show a steam engine in a list of items sold in 1845 and there is no evidence that there was ever a conventional water wheel on the site. It can be assumed therefore that, until the 1890s, the mill was steam powered, with the engine probably at the East end of the North extension to the mill, near the location of the Pelton Wheel. There is a flue leading from the North West corner of the extension, to a chimney a short distance up the hillside. The damper for this flue was visible, above the rubble which covered the floor. The rubble floor in the Western part of the North extension to the mill was higher than that in the Eastern part.

3. Excavation of the Boiler House Floor

On 5th and 6th August, the West end of the floor of the assumed boiler house was excavated by Tony Beardsell, David Gwyn and Peter Swift. The excavation uncovered the brick walls of a system of flues. One flue runs around the sides of the boiler house floor, with another flue, at a lower level, in the centre. The top of the walls of the centre flue are angled, to fit a cylindrical object (e.g. a boiler!) mounted on top of the walls This is typical of the arrangement used under a single flue "Cornish" boiler. The boiler would have been fired at its East end, with the combustion gases passing through the single boiler flue, then down into the West end of the central flue under the boiler. The exhaust gases would have passed to the East end of the central flue, then returned to the West end of the boiler in the outer flues, then through the damper opening in the North West corner of the flue system, to the chimney. The walls of the outer flue are well coated with soot but the inner flue is clean, suggesting that particulates in the combustion gases were being deposited in the outer, but not the inner, flue, as the gases cooled. The boiler would have rested on stools in the centre flue and on the brick walls of the central flue. Heat from the exhaust gases would have been transmitted to the boiler shell, thence to the water in the boiler.

The rubble removed from the floor of the boiler house contained numerous small roofing slates with triangular top edges, assorted random slate blocks and larger slabs, which may have formed a floor. Some of the slabs show evidence of sand sawing. There were also numerous pieces of iron, including large numbers of files and fine rubble of indeterminate content. It would appear that, when the boiler was removed, the flues were filled with any available material, to make a flat floor for what probably then became a fitter's workshop. In the next unexcavated section of the central flue is what looks like one of the boiler support stools, but it is not the right way up to be in situ.

Further excavation will be required to show the length of the boiler and the flue arrangement at its East (firing) end. Further excavation should also show the engine foundations, enabling some idea of the type of engine to be gained.

Photo 1. The excavated West end of the boiler flues. The damper to the chimney flue is on the right.

Photo 2. The West end of inner flue, at a lower level than the outer flue. Combustion gases from the boiler would have entered the flues at this point. An angled boiler support brick can be seen on the right.

Photo 3. David Gwyn measuring the depth of the outer flue.

Photo 4. The South West corner of the outer flue, showing the curved corner and soot deposits. Part of the South wall of the inner flue has gone.

Photo 5. The North West corner of the outer flue, showing the chimney damper and the curved brickwork leading to it.

Photo 6. The damper to the chimney flue. The top 30 cm of the damper was visible above the rubble, before excavation was started.

Photo 7. Looking East into the unexcavated part of the boiler house floor. A T shaped boiler support stool is just becoming visible, but was not in its correct orientation.

Photo 8. Sand sawn slab found in the boiler house floor.

Photo 9. Assorted iron artefacts found amongst the rubble filling the boiler flues.

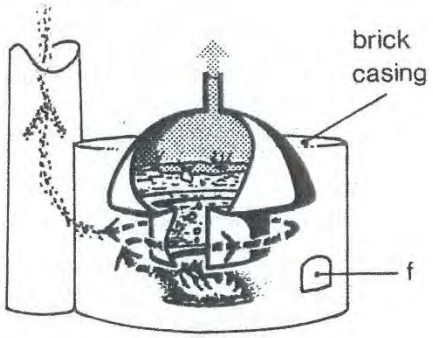
All photos: Peter Swift

Site	Minllyn Slate Quarry			**Doc No**	**ML022-2**
Subject	**Boiler, types of**				
Doc Date	?		See also	003	
Doc Type	extract		Grid ref		
Drawing Type			Scale		
Drawing Medium	photocopy		Author(s)		
Doc Material	paper		Source		
Doc Status	complete	Original		Doc Size	A4, 2 pg
Notes					

TYPES OF BOILER

CUT OPEN TO SHOW INTERIORS

Haystack



steam

water

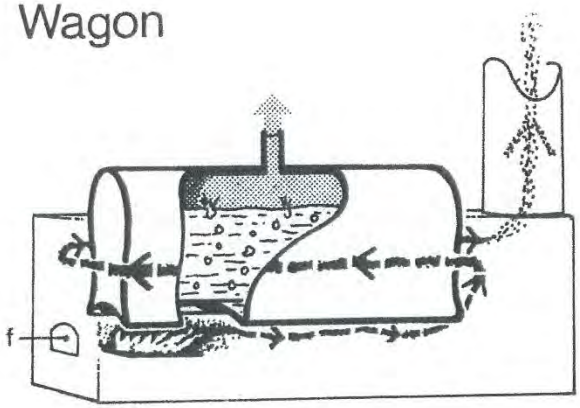
flow of hot combustion gases through boiler

flow of hot combustion gases in brick flues along outer surface of boiler, giving extra heating

smoke to chimney

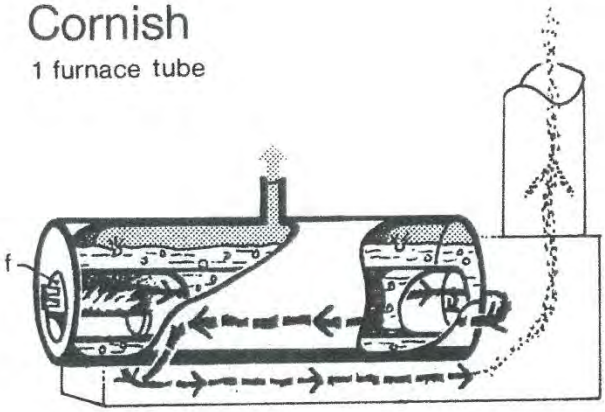
f firehole door(s)

Wagon



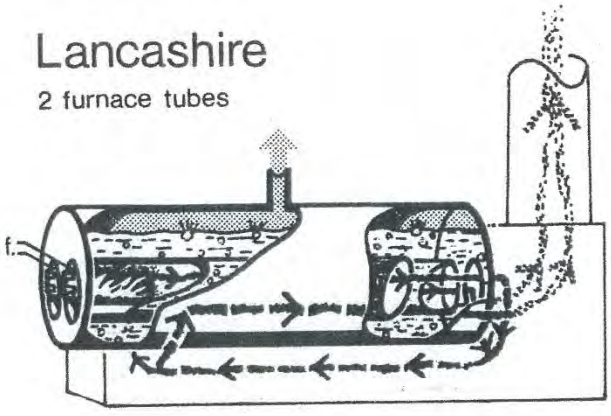
Cornish

1 furnace tube



Lancashire

2 furnace tubes



Fire-tube

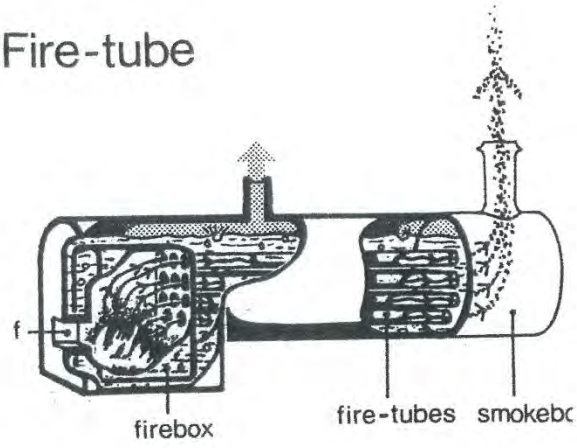


Fig 12

j an open space usually termed the "combustion chamber," in which the gases flash—or are supposed always to flash—into flame as they intermingle with the fresh air supplied by many methods behind the bridge *i*, in the way hereafter to be illustrated. After passing over the bridge *i* and along the chamber *j'* in direction

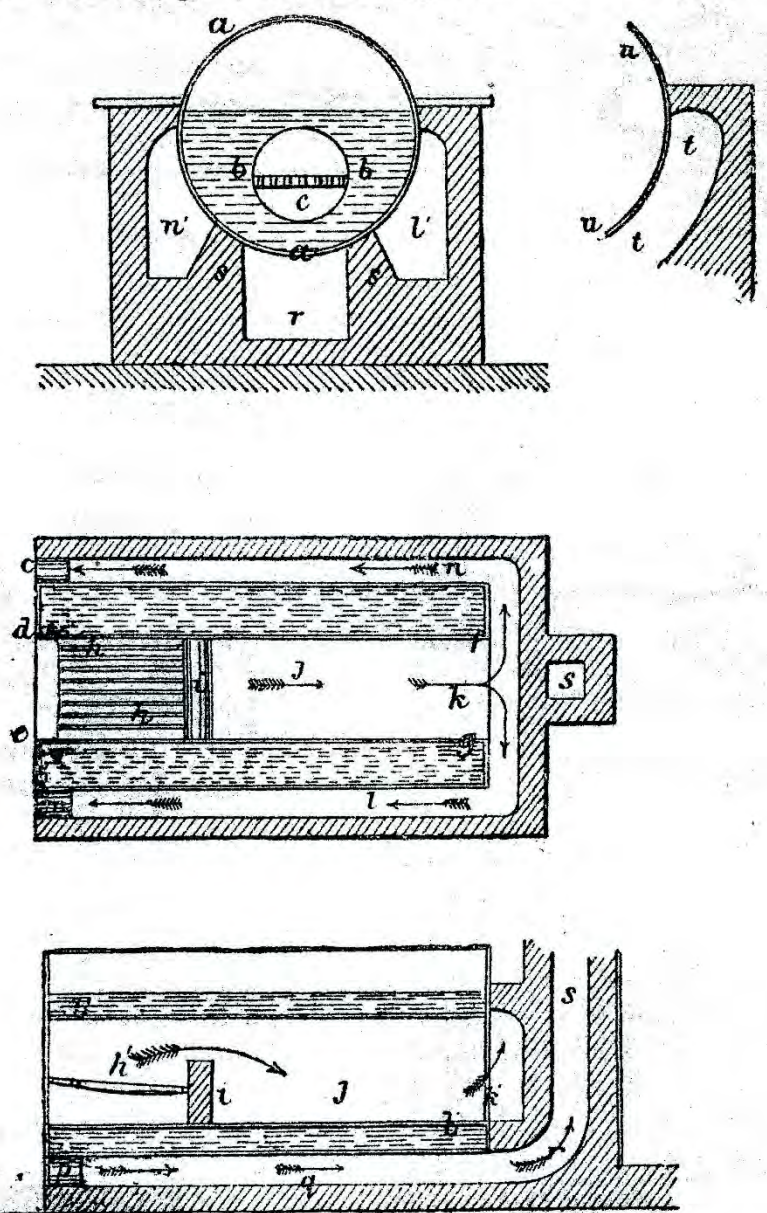
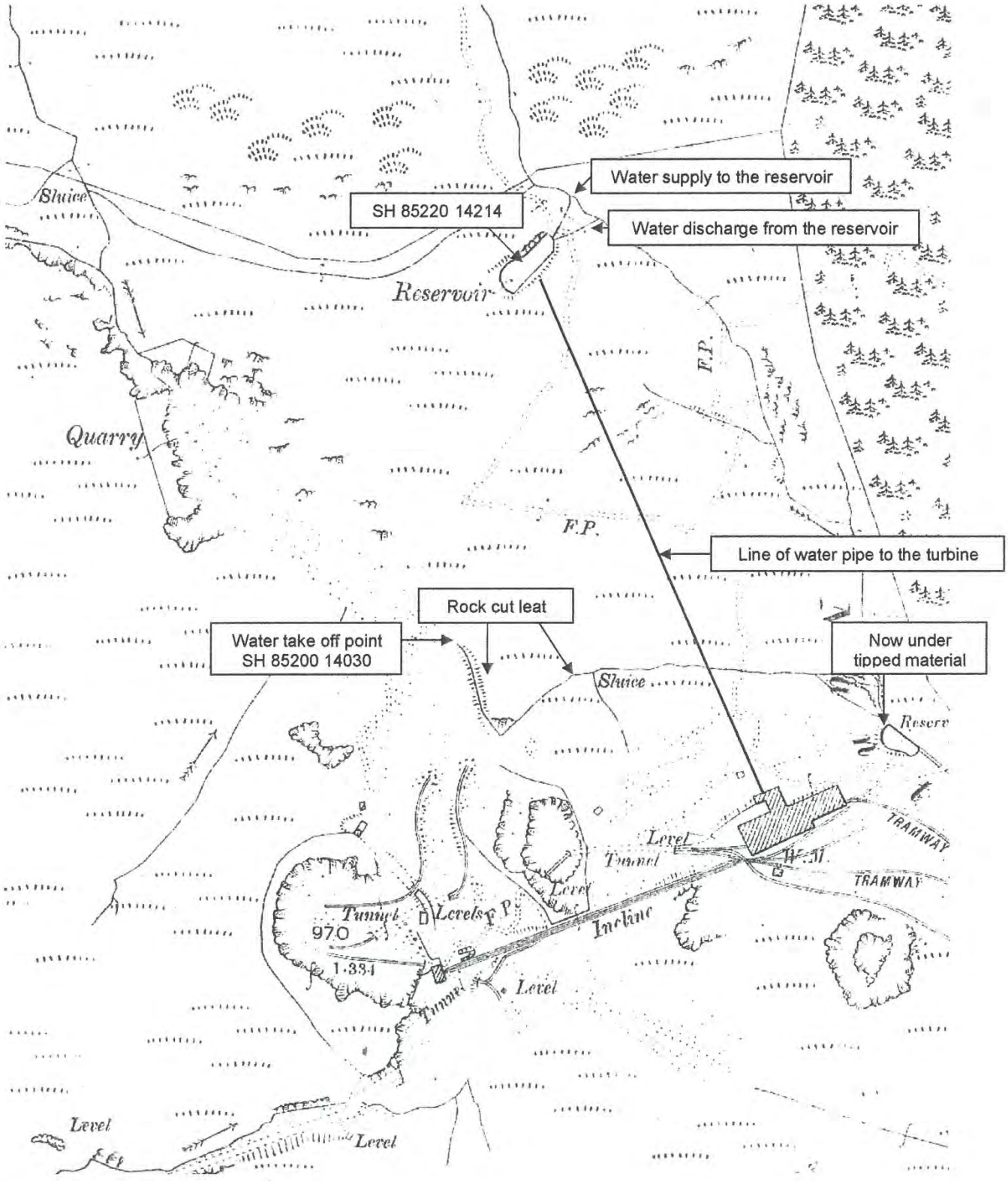


Fig. 57.

of arrow, the heated gases and smoke, as they reach the far end opening of central flue at point *k*, divide or "split" up into two distinctly separate streams or currents, one of which takes to and passes along the right-hand side flue *l l* in direction of the arrow, and enters the opening *m*, which leads to a cross flue at near end of

R Scott Burns, Editor: Ward Lock and Bowden Ltd, 1994

Site	Minllyn Slate Quarry	**Doc No**	**ML023**
Subject	**Water supply routes**		
Doc Date	2011	See also	
Doc Type	report	Grid ref	SH 85 14
Drawing Type		Scale	
Drawing Medium	photocopy	Author(s)	KH, TB, PS
Doc Material	paper	Source	Plas Course
Doc Status	complete Original	Doc Size	A4,13 pg
Notes			



Minllyn Slate & Slab Quarries water supply map
OS 6" = 1 mile Sheet XXXVIII 1901

Minllyn Slate & Slab Quarries
Water Supply & Drainage

Surveyed on August 1st & 2nd 2011 by Tony Beardsall, Ken Hollamby and Peter Swift.

Phase 1

The 1901 6" Ordnance Survey map shows a reservoir to north-east of the Upper Mill on the west bank of Nant Minllyn. There are no signs today of this reservoir and the area is now under a waste tip. It may have been situated at this point to allow surplus water to drain into the stream. It was fed by a rock-cut leat which collected its water from a stream immediately north of Level L. This is now under a waste tip and what remains of the stream drains into the Level I quarry. The leat descends to a right angle bend, clearly shown on the map, and then traverses the hillside to a point north-west of the reservoir when it turns south to supply the reservoir. The 1901 map shows a sluice but there is no evidence of it today.

Location	Photographs	NGR	Relative Height
Water take-off point	MIN129	SH 85200 14030	1012 feet
Leat changes direction	MIN124, 132, 133, 134	SH 85205 14022	1003 feet
Leat crosses open ground	MIN122	SH 85215 14045	990 feet
Leat, yellow, crosses the hillside above tip runs	MIN130, 131		
Leat descends to the reservoir	MIN121	SH 85355 14059	980 feet

Phase 2

The Phase 1 water supply system was replaced by high level reservoir connected by a cast iron pipe to the turbine house in the Upper Mill. The reservoir still contains water. It is 34.45m from east to west and 12m from north to south. It was fed by a leat from Nant Minllyn. The overflow discharged through a short slate lined leat back into the stream. The pipeline is still in situ and is exposed in several places. It is buried beneath the reservoir embankment 9.1m below the reservoir. It bridges over the Upper Drainage leat and the Lower Rock Cut leat. Both leats can be seen on the accompanying photograph (MIN131). The outlet point in the turbine house is still in situ.

Location	Photographs	NGR	Relative Height
Upper Reservoir	MIN009-012	SH 85220 14214	1200 feet
Last surface appearance of the pipe	MIN008		
Pipe crossing Upper Leat	MIN118		
Pipe joint	MIN006	SH 85234 14191	
Exposed section of pipe	MIN119	SH 85284 14073	1050 feet
Exposed section of pipe	MIN002	SH 85305 14046	
Pipe crossing Lower Leat	MIN120	SH 85291 14051	1018 feet
Pipe entering the Turbine Building	MIN112	SH 85327 13998	864 feet

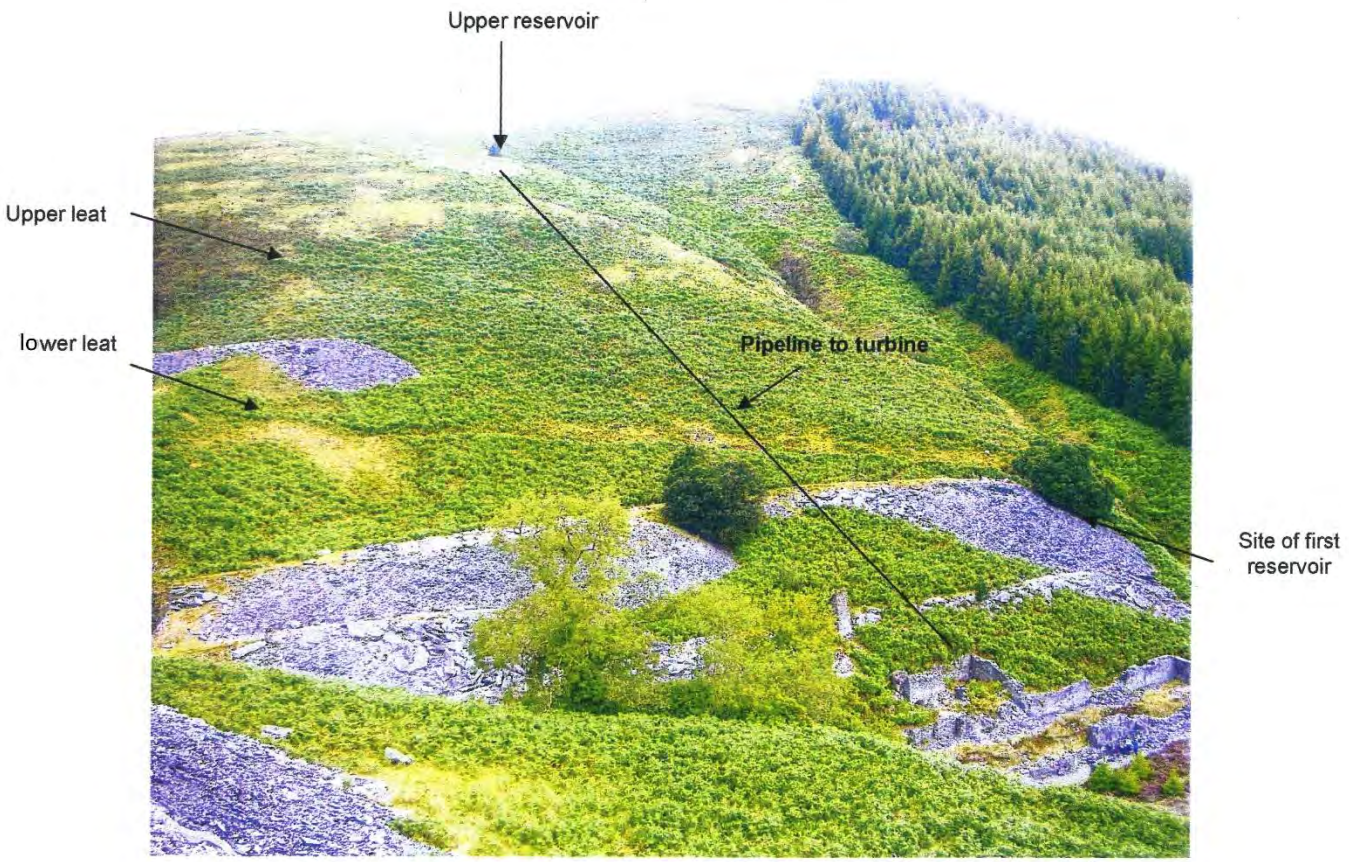
Upper Leat

The Upper Leat can be faintly seen on photograph MIN131. It is not easily followed on the ground but it is exposed where the pipe crosses it (photograph MIN118). The outlet in Nant Minllyn is lost under vegetation. It appears to have been cut to intercept surface run-off to protect the Upper Mill from flooding during heavy rain presumably because the Lower Leat could not cope with the volume.

Note

Heights are relative to each other and not to mean sea level.

Minllyn Slate & Slab Quarries
Water Supply



MIN 002 pipeline looking south

MIN 003 pipeline route looking north

MIN 005 Peter Swift, Tony Beardsell

MIN 004 pipeline route looking south

MIN 006 detail of joint

MIN 009 reservoir looking east

MIN 007 pipe and joint

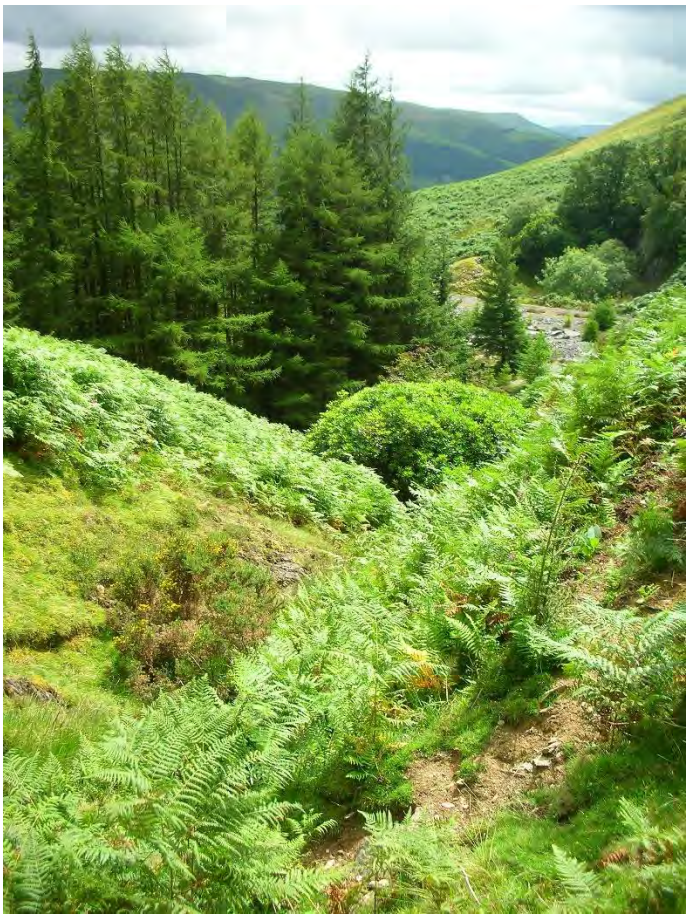
MIN 008 looking south from the reservoir. umbrella= Pipeline under reservoir embankment

MIN 010 reservoir looking south west

MIN 012 looking SW from pipeline to level L

.MIN 112 cast iron pipe entering turbine building

.MIN 011 reservoir looking west



.Min 115 Nant Minllyn looking SE

.MIN 116 Nant Minllyn looking NW

.MIN 117 Nant Minllyn, no sign of mapped reservoir

.MIN 119 cast iron pipe at SH 85284 14073

. MIN 122 line of leat looking east from SH 85215 14045

.MIN 118 cast iron pipeline crossing later leat

.MIN 123 rock cut leat looking NW at SH 85205 1402222

MIN 133 rock cut leat looking north

.MIN 120 cast iron pipe crossing lower leat at SH 85291 14051

MIN 134 lower rock cut leat looking north

.MIN 121 end of lower leat, no reservoir, SH 85355 14059

MIN 124 rock cut leat looking NW at SH 85200 14030

MIN 129 looking north from level M tip run to take off point for lower leat

MIN 130 lower leat looking east to Nant Minllyn

MIN 131 hillside above the upper mill showing water supply landscape

MIN 132 bend in rock cut leat from above, looking south east

All photos Ken Hollamby 2011

Site	Minllyn Slate Quarry	**Doc No**	**ML024-1**
Subject	**Crane base and anchors, floor M**		
Doc Date	2011	See also	007
Doc Type	report	Grid ref	SH 851 140
Drawing Type		Scale	
Drawing Medium	photocopy	Author(s)	CH, CL, DFG
Doc Material	paper	Source	Plas Course
Doc Status	complete	Original	
Doc Size	A4, 4 pg		
Notes			

This document has another entry in the index: ***Drumhouse***

MINLLYN SLATE QUARRY

STRUCTURES ON FLOOR M

Floor M structures, looking south *photo A Hurrell*

DRUMHOUSE, SH 85180 13915

An incline runs east down from floor M to floor I and at the top are the rather degraded remains of the drumhouse. The two slate block walls now stand to a maximum height of only 1.6m. The walls are 5.48 long and 1.1m wide, the internal separation is 2.91m and the distance to the crimp 5.5m. Alongside the north wall are the ruins of a structure, presumably the remains of the brakesmans shelter. Just north again is a rectangular depression of unknown purpose. In the drumhouse a later wall has been added possibly for agricultural use. The drumhouse is shown on both the 1889 and 1901 25" OS maps. The incline is shown as single track on the 1899 map but is double track by the time of the 1901 edition.

A strange feature of the drumhouse is the presence of 'tally' marks on the inside faces of the drumhouse walls, near to the slots at the bottom of the holding down bolts.

Tally marks, north wall

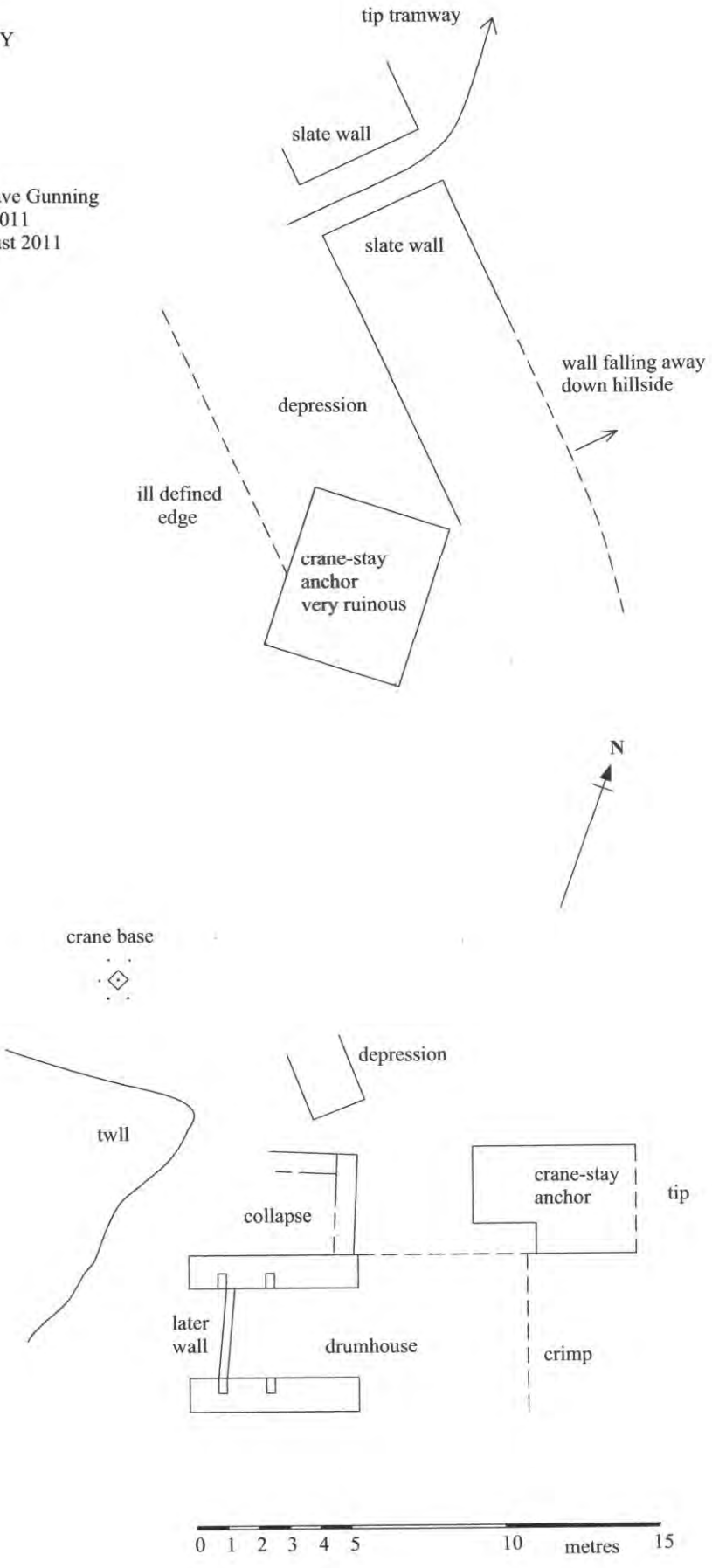
Tally marks, south wall

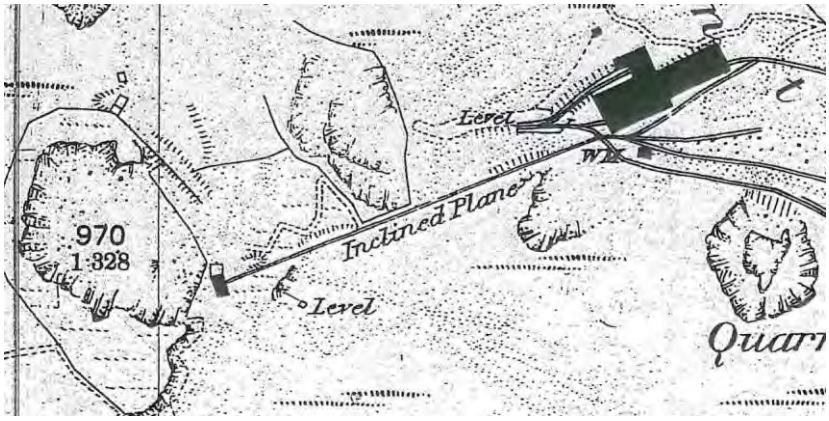
MINLLYN SLATE QUARRY

FLOOR M, PLAN

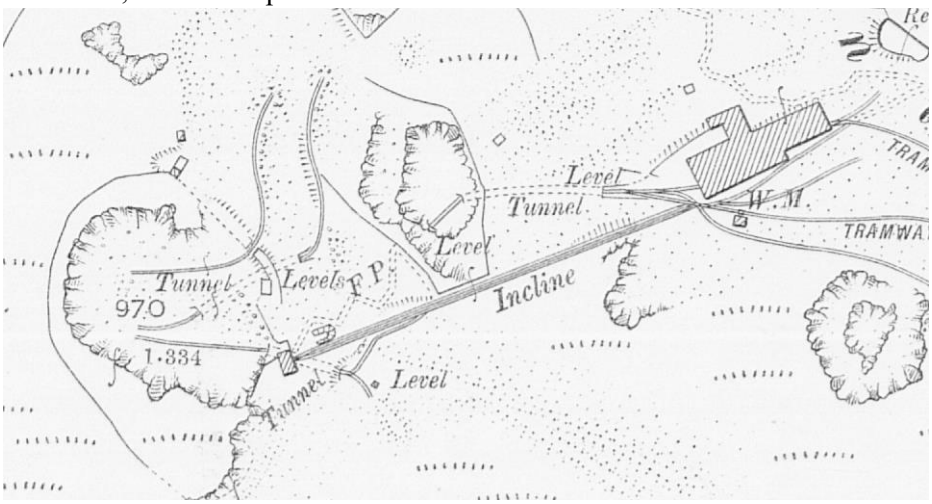
SH 852 139

Surveyed by Chris Lester, Dave Gunning
and Celia Hancock, August 2011
Drawn: Celia Hancock, August 2011
Scale 1:200
All dimensions in metres





1889, 25” OS map



1901, 25” OS map

OTHER STRUCTURES

Behind the drumhouse, to the west, is an open pit working (Pit 4 in Workings report). It goes down to floor L with a opening in its SE corner that connects with floor I via an incline or haulage way (see Workings report). Along the north side of the incline is an L-shaped slate block crane-stay anchor, maximum width 3.5m, the eastern part of which is tending to slide down the hillside. To the north-east is another very ruinous crane-stay anchor, approximately 5.4m by 4.5m. Set back around 3.2m from the edge of the twll are the remains of a concrete crane base.

Beyond the ruined crane-stay anchor is another rectangular depression larger this time and with an ill-defined edge to the west. The opposite edge is formed by a low slate retaining wall that, in the direction of the incline, is also falling away down the hillside.

Crane-stay anchor beside incline

Crane-stay anchor to north east

Concrete crane base

Slot for tramway, crane-stay anchor beyond

The 1889 map would appear to indicate that at that time there was no pit on floor M but that the crag to the west was being worked. The only structure shown is the drumhouse with another structure, presumably the brakesmans position to the north. There may be a 'wall' shown just to the west of the drumhouse. On the 1901 map the pit is shown down to floor L with two tunnels for tipping tramways. There is also a tip tramway on floor M that passes through a retaining wall, a still existing feature. The eastern edge of the pit is shown as a slope rather than a vertical edge. Survey on site shows this to be tipped slate waste. Some of the 'wall' on the 1889 map is still indicated by a line on the map

Alongside the retaining wall a structure is shown that appears to be in the position of one of the later crane stay anchors. One may postulate that the anchor was created by filling in this structure. The crane stay anchor beside the incline is not shown. A possible scenario is that the crane was a later, post 1901, installation, a view supported by the use of concrete, to raise material from the pit, either rubbish for tipping as space was getting short elsewhere or for slate to be raised for lowering down the incline as the route downward through the underground workings had been blocked by a fall. However, there would be some difficulty in raising material onto M due to the lack of a landing place within the arc of the legs.

Another possibility is that the crane was used to raise or lower material along the haulage way underground between floors L and I as described in the Workings report.

Opening to underground on floor L seen at mid left of photo with tipped material from M in foreground *Photo A Hurrell*

There is a horseshoe-shaped structure beside the incline a few yards down shown on both maps that may be some sort of header reservoir, purpose unknown

The structure of unknown purpose (see separate report) is not shown at all on the map and is placed against the cliff face by the T of Tunnel south of the drumhouse.

Report: Celia Hancock
Photos: Chris Lester

Site	Minllyn Slate Quarry			**Doc No**	**ML024-2**
Subject	**Structure, floor M**				
Doc Date	2011		See also	008	
Doc Type	report		Grid ref	SH 852 139	
Drawing Type			Scale		
Drawing Medium	comp gen		Author(s)	CH, CL, DFG	
Doc Material	paper		Source	Plas Course	
Doc Status	complete	Original		Doc Size	A4, 2 pg
Notes					

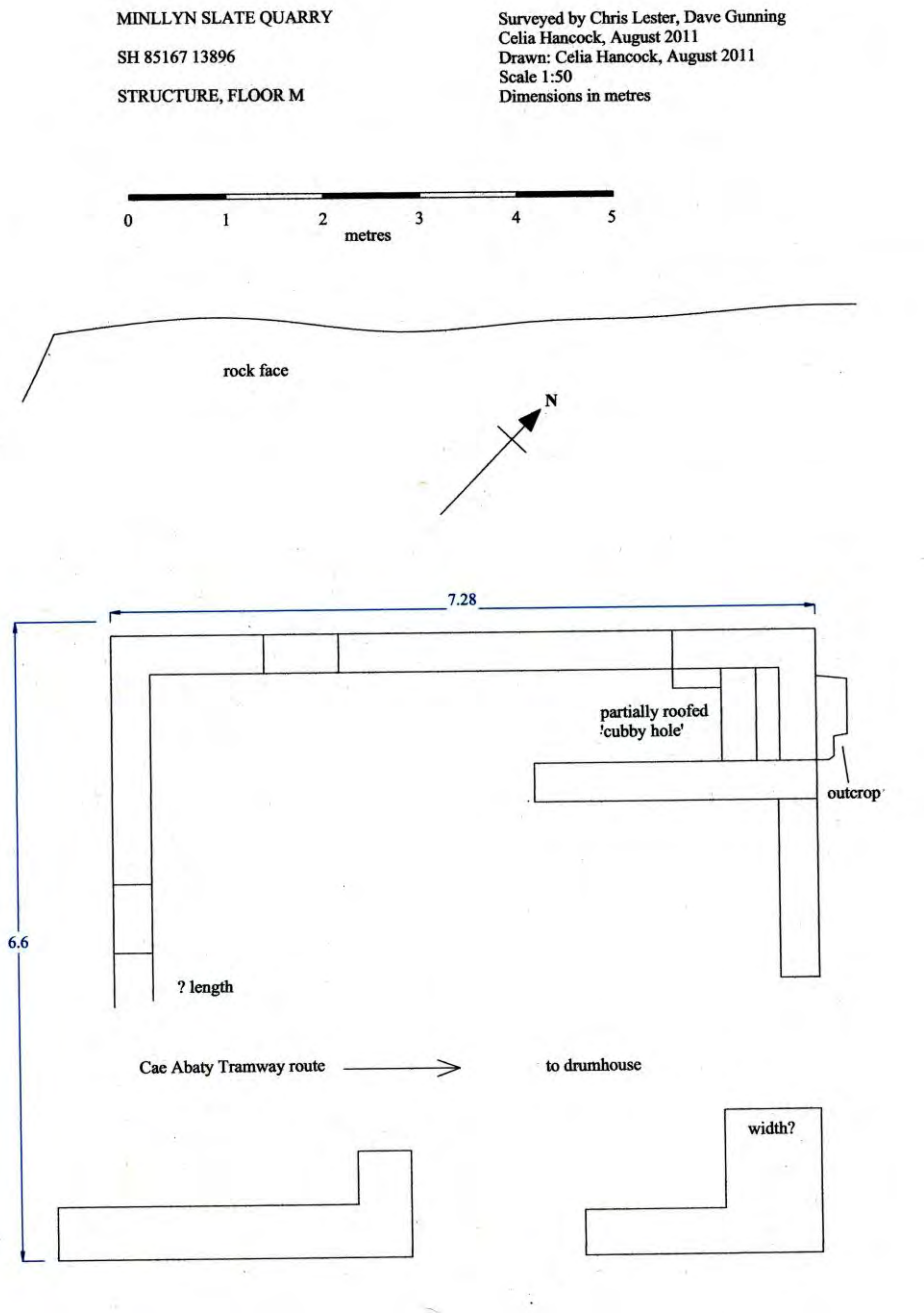
MINLLYN SLATE QUARRY

FLOOR M, STRUCTURE, UNKNOWN PURPOSE, SH 85167 13896

On floor M to the south of the drumhouse between a quarry edge to its rear and the tramway to Cae Abatty to the front is a low slate wall structure. It is aligned NE – SW. The back wall is 7.28m long and in the north corner is a strange, partially roofed 'cubby hole' only 0.96m wide and 0.43m high internally. The front consists of two L-shaped walls with a gap between and there are entrances in both end walls toward the front. The gap between the walls allows the tramway from the Cae Abatty quarry on the other side of the hill (see separate report) to pass through.

The structure is not shown on the 1901 map. At first it was thought it may be a gwal or gwaliau but the evidence is not very convincing. Except at the north-west corner where the wall is built over and including a country rock outcrop, all of the wall remains are very low and there is little debris around so what the upper part of the walls consisted of is a mystery. If it was a wooden frame structure with corrugated iron walls there would be no need for the low slate walls. Its position by the cliff face affords some protection from the elements but if the purpose was for later working of the tips it is a long way from any source material. Its position across the Cae Abatty tramway may be of some relevance.

Diag. 008



Cae Abatty tramway route, looking south-west

looking south-east

looking south-west

looking north-west, showing ‘cubby hole’

Survey: Chris Lester, Dave Gunning, Celia Hancock, August 2100
Report: Celia Hancock, with additional technical input by Tim Oulton. All Photos Chris Lester

Site	Minllyn Slate Quarry	**Doc No**	**ML025-1**
Subject	**Structures, floor N**		
Doc Date	2011	See also	
Doc Type	report	Grid ref	SH 853 140
Drawing Type		Scale	
Drawing Medium	comp gen	Author(s)	PS, TB, DRG
Doc Material	paper	Source	Plas Course
Doc Status	complete Original	Doc Size	A4, 2 pg
Notes			

4. Structures at Level N of Minllyn Quarry SH 852139

4.1. Introduction

Level N was the highest working level of Minllyn Quarry. In the absence of any previously known notation, letters were allocated to the different levels by members of the group. The remains of the structures at level N were examined and recorded by Tony Beardsell and Peter Swift on the 4th August 2011.

Both the 1889 and 1901 25" = 1 mile OS maps show two small structures at Level N, but the level is clearly out of use as no tramways are shown. The structures are shown as white blocks (unroofed) in the 1889 map but shaded (roofed) in 1901 (Figure 1). In 2011, the short (30m) incline leading from level M to level N is clearly cut by a tip tramway from level M. This tramway is not shown on the 1889 map but is shown on the 1901 map, suggesting that it was cut through the incline after it had gone out of use.

4.2. Surviving Structures at Level N

Surviving Structures is a somewhat ambitious title to apply to the low piles of stonework which remain. To the West of the site are the remains of three low walls, the Southern one being longer than the others. The West walls are built into the rising hillside. It would appear that the South and central walls are the remains of the drumhouse, as they are in line with the incline. The walls are only 1.9m apart but only a very small drum would be required for a 30m incline. The West wall is extended forward by 4.3m, as a 1m high brakesman's platform and an iron pin projects from the central wall. There is an irregular structure about 2m square built onto the East side of the drumhouse. 5M to the North is another small structure, about 2m square, the back wall of which is about 1.2m high. Both square structures have the remains of walls across part of the front, and were probably shelters or stores. The structures at Level N are shown in photographs 35 and 36 and drawn in Figure 12.

Report: Peter Swift

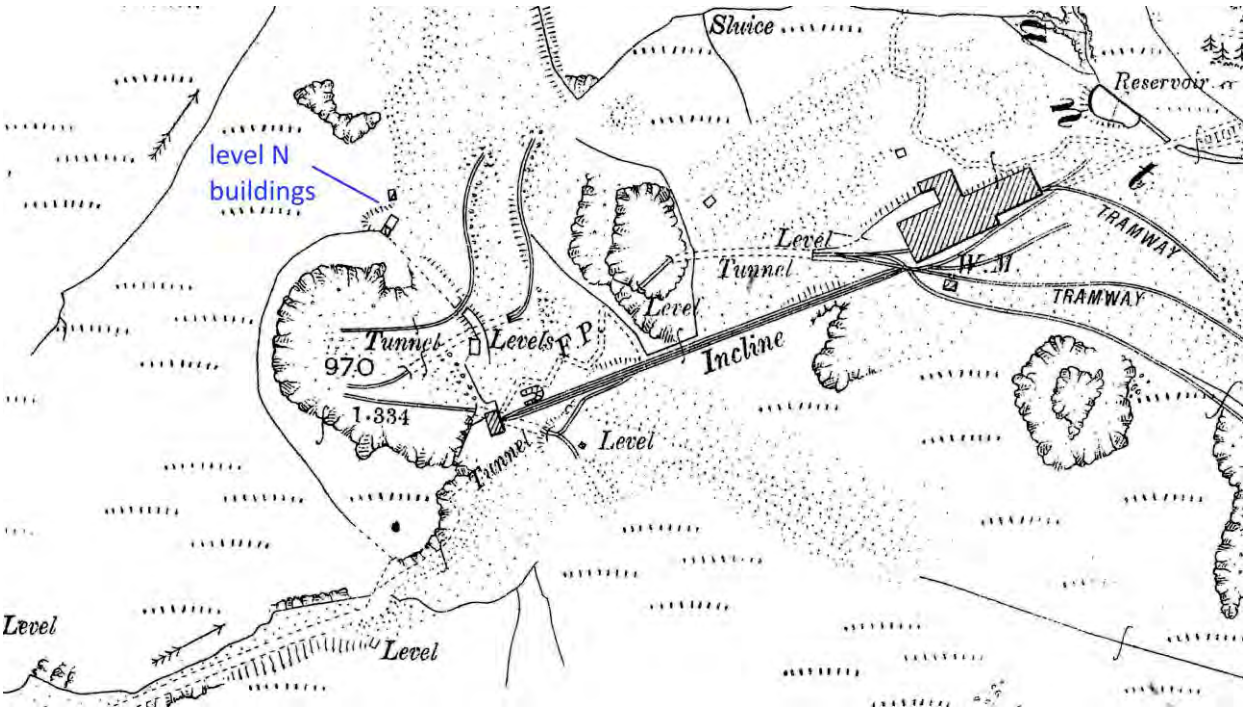


Photo 35. Structures at Level N of Minllyn Quarry, looking North. The extended West wall of the drumhouse is on the left with the East wall of the drumhouse in the centre and tha attached building on the right.

Photo 36. The walls of the building attached to the Level N drumhouse. There is a further small building beyond.

Photos: Peter Swift

Site	Minllyn Slate Quarry			**Doc No**	**ML025-2**
Subject	**Structures, floor N**				
Doc Date	2011		See also		
Doc Type	drawing		Grid ref	SH 852 139	
Drawing Type	plan		Scale	1:100	
Drawing Medium	photocopy		Author(s)	PS, TB	
Doc Material	paper		Source	Plas Course	
Doc Status	complete	Original		Doc Size	A4
Notes	Fig 12				

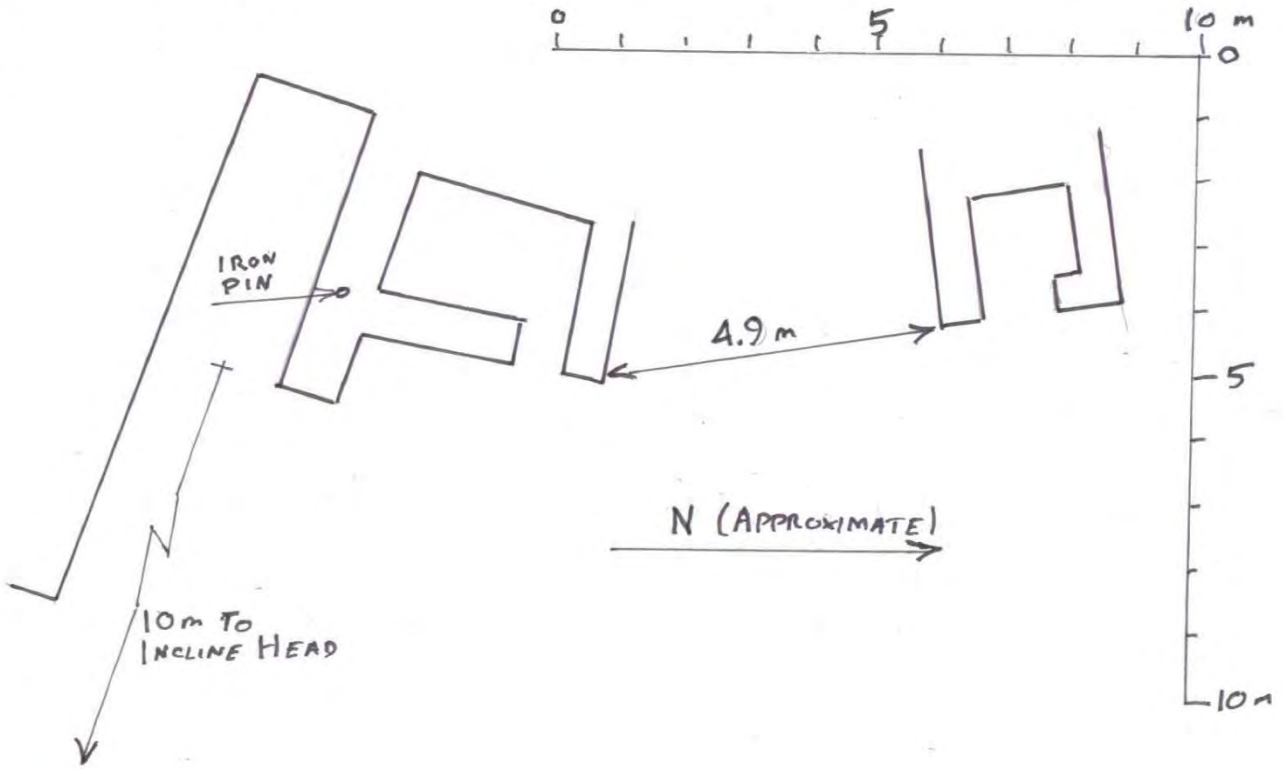
MINLLYN SLATE QUARRY

FIG. 12

STRUCTURES AT LEVEL N

SH 852139

SCALE 1/100



MEASURED BY TONY BEARDSELL AND PETER SWIFT 4 AUG 2011

DRAWN BY PETER SWIFT 14 NOV 2011

Site	Minllyn Slate Quarry	**Doc No**	**ML028**
Subject	**Map, OS old, Cae Abatty**		
Doc Date	1901	See also	
Doc Type	map	Grid ref	SH 846 136
Drawing Type	map	Scale	25" to 1 mile
Drawing Medium	photocopy	Author(s)	OS
Doc Material	paper	Source	Plas Course
Doc Status	Original	Doc Size	A3
Notes			


1901 edition, 25 "
ML 028
Quarry
Waen Fâch
Nant Minllyn
Minllyn
Sluice
Reservoir
Level
Tunnel
Incline
Tramway
Top Minllyn
School
Commins Minllyn
Dinas-Mawddwy Station
Plas-y-nant
Brook Terrace
Buckley Arms Hotel
Pont y Ffinnant
Pont Minllyn
Waterfall
Stepping Stones
Water Column
Old Tramway
Cae-abatty Slate Quarry
Minllyn Slate & Slab Quarries
Reservoirs
Allotment Gardens
The Cottage
Carlyle Terrace
Nant y Gamell
Maes-y-camlan
Quarry Cottages
Craig y Gamell

Site	Minllyn Slate Quarry	**Doc No**	**ML028**
Subject	**Map, OS old, Cae Abatty**		
Doc Date	1901	See also	
Doc Type	map	Grid ref	SH 846 136
Drawing Type	map	Scale	25" to 1 mile
Drawing Medium	photocopy	Author(s)	OS
Doc Material	paper	Source	Plas Course
Doc Status	Original	Doc Size	A3
Notes			


1901 edition, 25 "
ML 028
Waen Fâch
Minllyn
Minllyn Slate & Slab Quarries
Cae-abatty Slate Quarry
Old Tramway
Incline
TRAMWAY
Nant-y-Gamelt
Craig-y-Gamelt
Maes-y-camlan
Quarry Cottages
Brook Terrace
Dinas-Mawddwy Station
Buckley Arms Hotel
Pont y Ffiman
Pont Minllyn
The Cottage
Carlyle Terrace
Reservoirs
Waterfall
Stepping Stones
Top Minllyn
Plasy-nant
School
COMMINS MINLLYN
Allotment Gardens
Quarry
Level
Incline
Tunnel
Shaft
Spring
Well
Sluice
F.P.
W.M.
P.H.
P.O.

Site	Minllyn Slate Quarry	**Doc No**	**ML029**
Subject	**Site plan, Cae Abatty**		
Doc Date	2011	See also	040 - 043
Doc Type	map	Grid ref	SH 846 136
Drawing Type	plan	Scale	25" to 1 mile
Drawing Medium	photocopy	Author(s)	HEF,CH
Doc Material	paper	Source	Plas Course
Doc Status	Original	Doc Size	A4
Notes			

ML 029

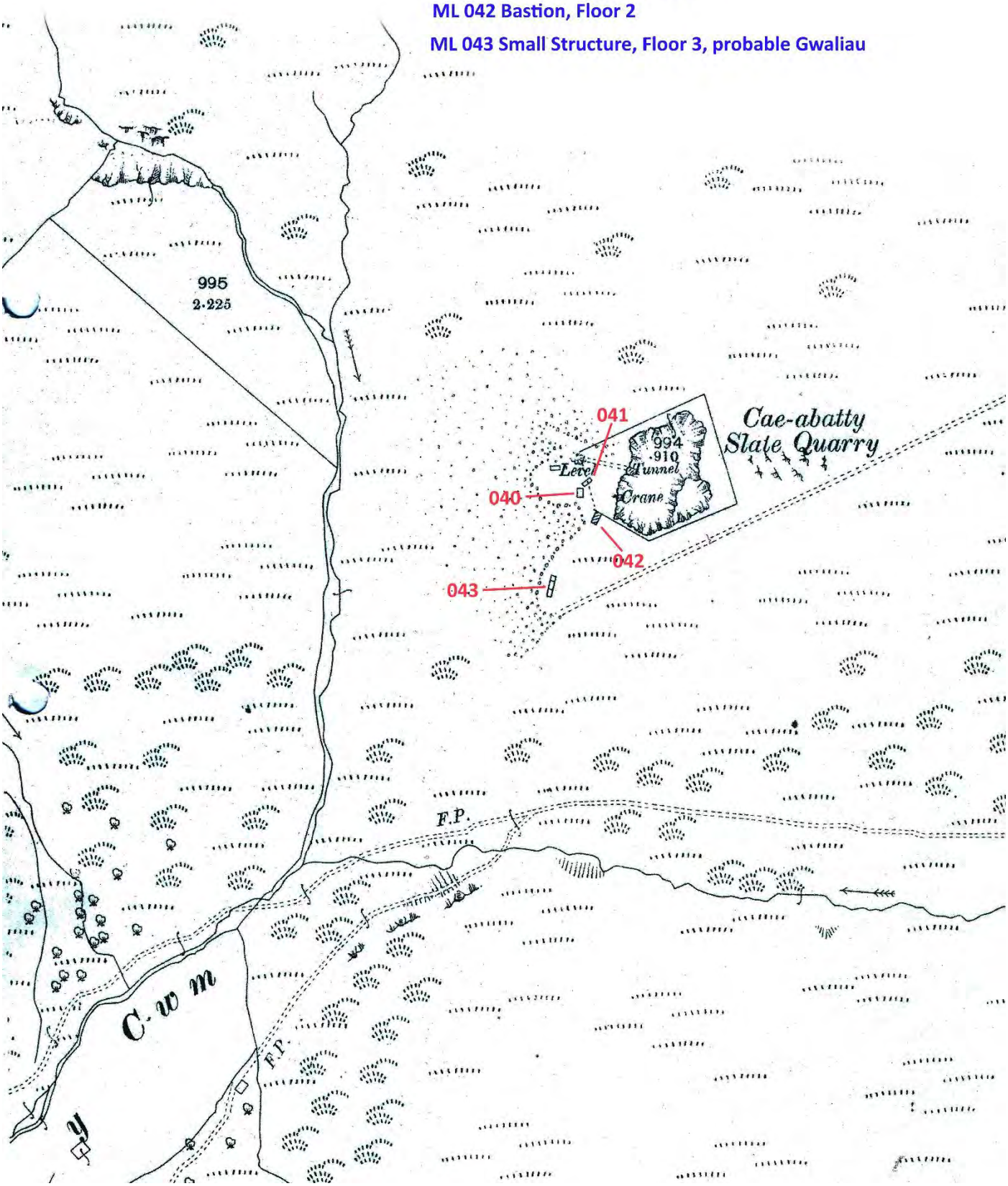
CAE ABATTY - SITE PLAN

ML 040 Drumhouseband Small Structure, Floor 2

ML 041 Small Structure, Floor 2

ML 042 Bastion, Floor 2

ML 043 Small Structure, Floor 3, probable Gwaliau



Site	Minllyn Slate Quarry	**Doc No**	**ML030**
Subject	**Cae Abatty, artefacts**		
Doc Date	2011	See also	031 - 039
Doc Type	report	Grid ref	SH 846 136
Drawing Type		Scale	
Drawing Medium	photocopy	Author(s)	PS, TB
Doc Material	paper	Source	Plas Course
Doc Status	complete Original	Doc Size	A4, 7 pg
Notes			

Artefacts at Cae-Abatty Quarry and Minllyn Level N (Draft)

1. Introduction

The Practical Industrial Archaeology course held at Plas Tan y Bwlch between the 1st and 6th August 2011, under the leadership of David Gwyn and Celia Hancock, examined and recorded the Minllyn Slate Quarry at Dinas Mawddwy, Gwynedd, and the associated Cae Abatty Quarry. The main workings of Minllyn Quarry are to the South West of Dinas Mawddwy, whilst Cae Abatty Quarry is further West. A tramway links the upper workings (level M) of Minllyn Quarry at SH852138 with the lowest working level of Cae-Abatty Quarry at SH846136. The tramway consists entirely of two shallow inclines. The East incline rises from level M of Minllyn Quarry to a summit at SH848137, whilst the West incline falls to the bottom level of Cae-Abatty Quarry. Apart from a length of cutting about half way up the East incline and a shallow embankment to the East of the summit, the tramway is laid directly on the hillside. No definite date for the tramway is known, but it was almost certainly built whilst the quarries were in the ownership of Sir Edward Buckley, and leased to the Merioneth Slate & Slab Co., between 1865 and 1871. The quarries were sold in 1871 and the tramway is shown as disused in the 1889 Ordnance Survey map.

The subject of this report is the remaining artefacts at Cae Abatty Quarry and on the line of the tramway, and the structures at level N of Minllyn Quarry. These were examined by Tony Beardsell and Peter Swift. The inclination of the tramway and the structures at Cae Abatty Quarry were recorded by other members of the team, and are not covered by this report.

Figure 1 is an extract from the 1889 25” = 1 mile OS map, showing the location of the items described in this report. Photographs 1 to 3 show general views of the tramway. Examination of artefacts started at the summit of the incline, then moved to Cae Abatty Quarry. Because interpretation of the artefacts found at the summit depended on subsequent examination of artefacts at Cae Abatty Quarry, the quarry artefacts are described first. Grid references given in this report are taken from the 1979 1:25,000 Ordnance Survey map for locations identifiable on this map and are interpolated from the 1901 25” = 1 mile map for other locations.

2. Artefacts at Cae Abatty Quarry SH 846136

To support the work of Hazel Fleming and Ian Walters in recording the structures at Cae Abatty Quarry, Tony Beardsell and Peter Swift recorded the winding drum of the incline drumhouse in Cae Abatty Quarry. During measurement of the drum, a turntable base was discovered, in line with the cutting leading from the upper working level into the Twll.

2.1 Winding Drum

The winding drum is totally conventional in form, but most unusual in construction, due to its minimal use of metal. Apart from two end castings on the timber axle, the wrought iron braking surface on the drum and the brake band and mechanism, the drum is entirely built from timber. The timber axle has rotted away it its West end, allowing the end of the axle to fall into the drumhouse, leaving the end casting in place in its bearing block on the side wall of the drumhouse (Photographs 4 and 5). The East axle end casting and bearing block have been pulled off the drumhouse wall, still on the end of the axle, but bent sideways (Photograph 6). A similar end casting was found at the summit level of the tramway. This was measured and is shown in Fig. 2 and photograph 7. The casting consists of a shaft 25cm long and 10.5cm diameter, with a bearing journal 12cm long and 7.5cm diameter at one end. The 10.5 cm diameter part of the casting has four 2cm thick wing pieces, with an outer diameter of 27 cm. These carry two rings, 8cm wide and 30cm outer diameter, which appear to have been attached later. To fit the castings to the timber axle of the drum, the axle would have been bored to the diameter of the shaft and its outer surface reduced to fit into the rings on the end casting. Two slots, at right angles, would have been sawn to accommodate the wing pieces. The end castings were then pressed onto the timber axle, and would be held in place between the bearing blocks.

The three timber spiders of the drum have fallen to the lower, West, end of the axle (Photographs 8 and 9).The rims of the spiders have totally rotted away, leaving the iron braking rim and the brake band encircling the axle, leaning against the spiders. There is just enough material left to enable a drawing of the drum to be produced (Figs 3 and 4). The timber axle has lost a certain amount of surface material, but examination of the axle and spider suggests that it was originally 37cm x 37cm (15” x 15”) in section. The square part of the axle is 2.2m long, 2.7m long, over the end castings. Each spider consists of four 15cm x 10cm (6” x 4”) timbers, 1.95m long. One pair are mounted parallel to each other, on either side of the axle, with the other pair crossing at right angles, half jointed together and strapped by iron plates across the open sides of the joint. The rim timbers were bolted to the side of a recess in the ends of the spider cross bars. The size of the recess and bolts remaining in the cross bars show that the rim timbers were 14cm x 8cm (5½” x 3”). One of the 9cm x 5.5 cm (3½” x 2”) surface timbers of the drum remains, indicating that the drum was 2.05m long.

The braking surface rim consists of 4 strips of 8cm x 1.2cm (3” x ½”) wrought iron, bolted together by flanges (Photographs 9 and 10). Three are 1.74m long and one is 1.5m long, indicating a diameter of 2.13m. The one remaining surface timber is still attached to the braking surface rim, indicating that it was mounted directly on the East end of the drum. The brake band consists of two pieces of 8cm x 1.5cm (3” x 5/8”) wrought iron (Photographs 8 and 9), hinged together and fixed to a support to the rear of the drum (Photograph 11) and with a conventional brake mechanism at the front of the drum (Photograph 12).

A reconstruction of the winding drum is drawn in Figures 3 and 4.

2.2 Turntable

A cast iron turntable base was found in the grass to the North of the drumhouse, in line with a cutting leading into the Twll. Time did not permit a full measurement, but it was photographed with a ranging rod and a graduated rule (Photographs 13, 14 and 15), enabling a drawing to be produced (Figure 5). The turntable base consists of a rim about 1.2cm thick and 10cm deep, with four T shaped spokes. The spokes radiate from a centre casting, carrying a spigot, about which the top casting rotated. Outside the rim, at the end two opposite spokes, are casting carrying a raised lip, slotted for the locking bar on the turntable top. Inside the rim are six roller boxes, although the rollers, which carried the turntable top plate, are missing.

The top of the turntable had previously been found, and measured, beside the summit of the incline (Photograph 16 and Figure 6). The top plate consists of a single casting, 1.54m (5ft) diameter, 2cm (¾") thick. Cast into the underside are a 5 cm wide rim, set in from the periphery, and six 2cm wide spokes. The rim would have run on the rollers on the turntable base. The thickness, including the rim and spokes, is 3.5cm. Two cast iron rails 4cm wide and 4.5cm deep are bolted to the plate by three bolts each at a gauge of 66cm (2' 2") between the inner faces of the rails. Centrally between the rails at one side of the turntable top are two lugs, approximately 37cm x 37cm (15" x 15") in section, carrying a locking bar, which can engage in notches in the rim of the turntable base (Photograph 17).

3. Artefacts found at the Tramway Summit SH 848137

Examination of artefacts started at the clearly defined summit of the tramway. The shallow embankment on which the summit and its Eastern approach are built is overgrown by long grass and reeds, compared with the short tussocky grass and bilberry bushes which cover most of the hillside. Visible in the long grass at the summit were the following artefacts:

- The top of a cast iron turntable
- A wrought iron brake band, apparently of about 3 M diameter
- Two cast iron bearing blocks
- A gearwheel and small pinion on a single axle
- A cruciform iron casting with two iron bands around it and a bearing journal at one end.
- Various small iron items, including holding down bolts and straps, suggesting that there had been a large timber structure on the site. (Photo 18)

These appeared to have been laid out on purpose as a puzzle for Industrial Archaeologists. If that was their purpose, it certainly worked, causing a lot of theories which were proved wrong by later discoveries! There are probably more artefacts in, or under, the grass, but no metal detector was to hand and time did not permit random digging over a large area. There were some very decayed timbers lying around, but none

was complete enough to give any idea of what it had been. There is no sign at all of any stonework at the summit, suggesting that any structure was built from timber.

The 1901 25" = 1 mile OS map (Figure 1) shows a small white rectangle on the line of the incline at the summit which, by convention, indicates a roofless building. (Only the section of the 1889 map showing the East end of the tramway was available for examination) The rectangle is 2mm along the line of the incline and 1.5mm across the incline. Extreme optimism suggests that this indicates a structure about 5m x 4m, on the line of the incline.

3.1 The Turntable Top

It was initially thought that the turntable was used to remove wagons from the line of the incline, to allow others to pass. However, when it was raised, it was apparent that there was no base under it. The base was discovered later, in Cae-Abatty Quarry and a description of the two halves of the turntable is in Paragraph 2.2 of this report. It would appear that the turntable top was being removed, possibly for sale, when it became broken, and was abandoned at the summit level.

3.2 The Brake Band

The parts of what appeared initially to be a single brake band of about 3.7m diameter were lying in the grass at the summit of the tramway (Photograph 19 and Figure 7). Initial thoughts were that the large diameter brake band had formed part of a horizontal sheave but examination of its parts showed that some had clearly been fixed to the outside of a wooden drum, whilst others had timber brake linings fixed inside them. It became clear that the apparent single brake band was made up from the parts of the iron rim and brake band of a smaller drum (Photographs 20, 21 and 22). Whilst the brake drum at Cae Abatty quarry has a 4-piece braking surface rim, bolted to the end of the drum surface, and a 2-piece brake band, the pieces found at the summit appear to consist of a 4-piece brake band, with the pieces hinged together (Photograph 23), and one piece of a 2-piece brake rim. This has a flange at one end, for bolting two sections together, but the other end is broken off. If there were two similar pieces, the periphery would have been 7.6m, indicating a drum diameter of 2.4m, although the second piece might have been smaller. One of the three hinges in the brake band had broken and had been repaired with a strap (Photograph 24), whilst another was broken, probably after removal. The four pieces of the brake band have a total length of 7m, excluding the pull rod of the brake toggle, although one end of the fourth section is missing. This indicates a diameter of at least 2.2m, about the same as the drum at Cae Abatty.

3.3 The Bearing Blocks

Two bearing blocks were found, but of differing patterns. Following examination of the drumhouse at Cae Abatty Quarry, it was concluded that the bearing block identifies as Bearing Block A, similar but not identical to those on the drumhouse, supported a winding drum (Photographs 25 and 26), whilst Bearing Block B was part of a winch (Photographs 27 and 28). The drum bearing is mounted on a larger cast iron baseplate

and both bearing blocks still carry holding down bolts, 0.015m diameter and about 0.4m long. The drum bearings on the Cae Abatty drumhouse are bolted down to to the stonework of the drumhouse. It is likely that the baseplate was added to provide a larger surface for mounting on a timber frame, the length of the bolts indicating that the timbers were 0.4m (15") deep. The two bearing blocks are drawn in Fig. 8.

3.4 The Geared Shaft and Large Gear Wheel

A shaft carrying one gearwheel and a small pinion was found at the tramway summit (Photographs 29 and 30). It was quickly concluded that this was part of a winch, but where was the rest of it? The shaft does not have any means of hand winding, such as a squared end, suggesting that there should be another shaft, with a small pinion and means of winding. Half of a larger gearwheel, which could have mated with the pinion on the geared shaft, was found later, beside the tramway below the halfway point of the Eastern incline at about SH851138 (Photographs 31 to 34). The shaft at the summit carries a 76cm diameter gearwheel with 60 teeth and a 17cm diameter pinion with 10 teeth. The half gearwheel next to the tramway would have been 170cm diameter with 120 teeth. It has a 33cm (15") square hole in the middle and carries two pairs of bolts (four pairs for the complete gearwheel) on the periphery. This is compatible with the gearwheel having been bolted to a winding drum, similar to the one at Cae Abatty Quarry. If these two gearwheels were part of the same winch, with a second pinion shaft, the gear ratio would be 12:1 when winding on the shaft found at the summit level or 72:1 when winding on a second 10 tooth pinion shaft. The geared shaft is shown in Fig. 9, the large gearwheel in Fig. 10 and a tentative reconstruction of the winder in Fig. 11.

3.5 The Cruciform casting

Initial thoughts were that this had formed the centre of a horizontal sheave, but it seemed somewhat undersized for the job. Discussions were brought to an abrupt halt by the arrival, from Cae Abatty Quarry, of David Gwyn. He had just seen an identical casting in use as part of a "conventional" winding drum! A description of the casting has been included in paragraph 2.1.

3.6 Incline Operation

It was concluded that the incline was probably wound by a hand operated winch, driving a conventional drum which was mounted on a timber frame. The 1901 OS map suggests that the drum was on the line of the incline, so must have been mounted high enough for wagons to pass under it, with a single continuous cable leading down the two inclines. Compared with most drumhouses, where both ends of the cable pass down the same incline, one from the top and one from the bottom of the drum, this would have had the advantages of equalising the lateral thrust on the drum bearings and both cables could come from the bottom of the drum, reducing the tendency of the cable to lift the front of the wagon being moved. An alternative arrangement might have the drum to one side of the incline, with the cables passing round sheaves to the two inclines. However, this is not what the OS map shows, and no sheaves have been found.

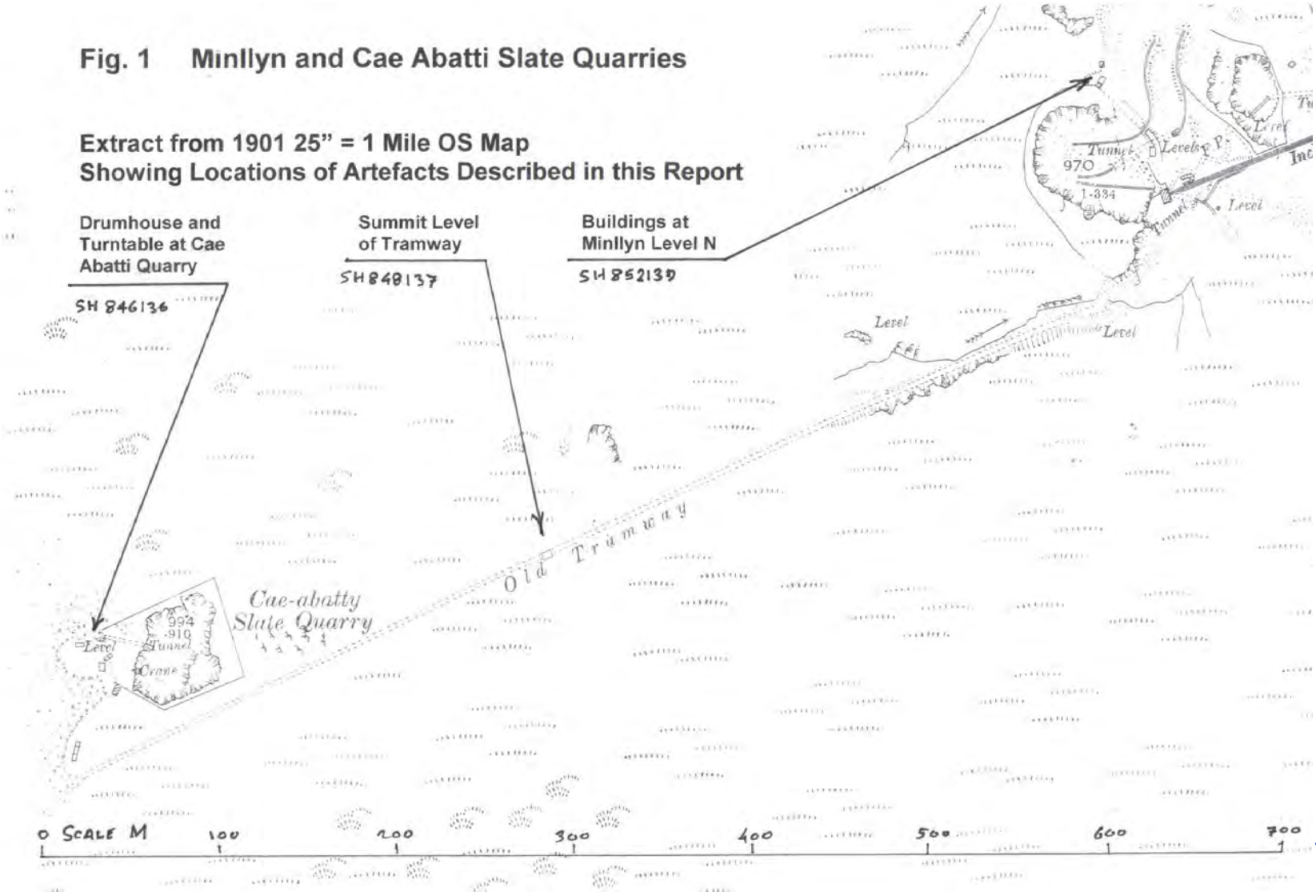
On the East incline, loaded wagons would be descending and empty wagons, or wagons carrying supplies, would be ascending. On the West incline, loads would be ascending and empties descending. The least imbalance would occur with loaded wagons ascending and descending or empties ascending and descending. This could occur if both inclines were operated together, with the added advantage that only a single track would be required on each incline. There is not enough remaining infrastructure to gauge the width of the incline. This method of operation would have the drawback that, when a loaded wagon had arrived at the summit, it could not be lowered to Minllyn until another loaded wagon was ready to follow it from Cae Abatty. There must have been some means of passing loaded and empty wagons at the summit. In the absence of a base, the turntable top does not appear to have been the means of doing this.

To work both sides of the inclines together would require both to be the same length. The 25” = 1 mile map shows the horizontal length of the tramway formation 114mm (290m) on the West side and 130mm (330m) on the East. However, the East tramway probably had a horizontal section at its lower end (Photograph 1).

Allowing for the inclination, the length along each incline was about 330m, requiring 47 turns of the winding drum, and 3400 turns of the winding handle; about six hours continuous work!

Fig. 1 Minllyn and Cae Abatti Slate Quarries

Extract from 1901 25" = 1 Mile OS Map
Showing Locations of Artefacts Described in this Report



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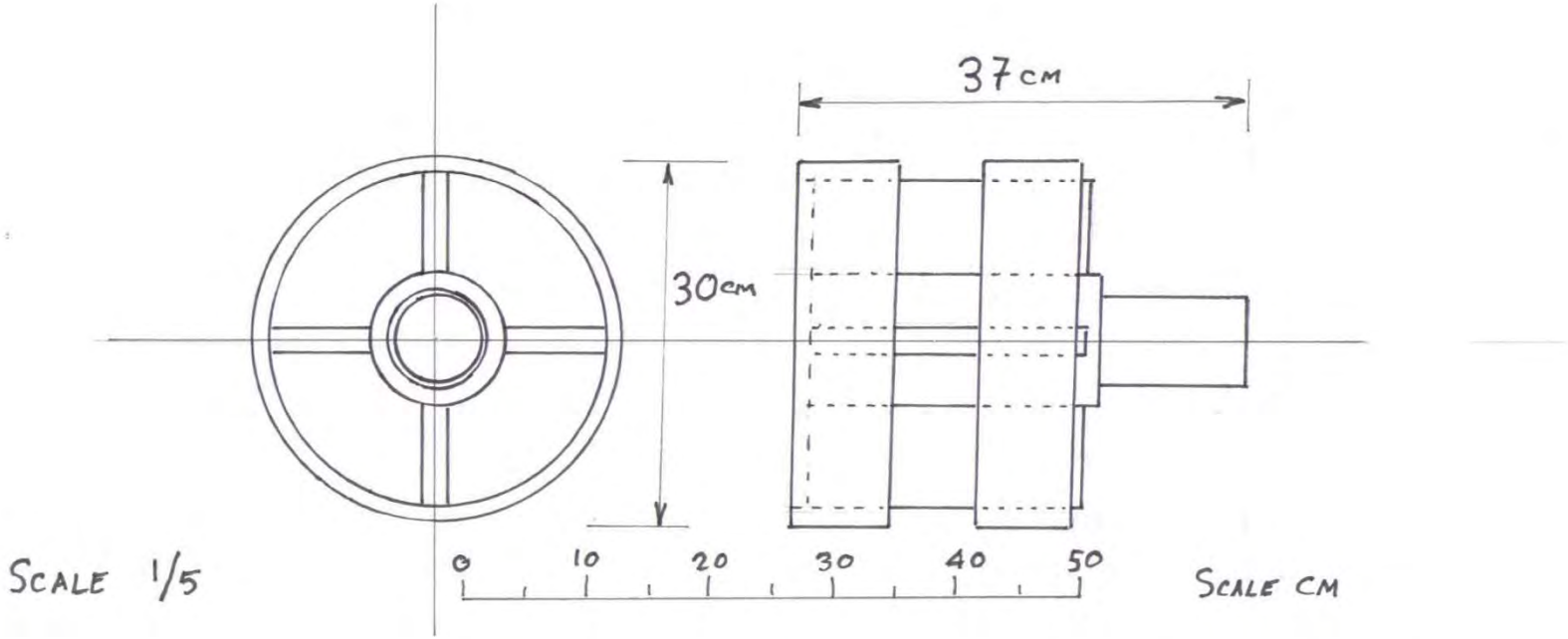
Subject	**Drum axle, end casting, Cae Abatty**				
Doc Date	2011		See also	030, 039	
Doc Type	drawing		Grid ref	SH 848 137	
Drawing Type	plan/elevation		Scale	1:5	
Drawing Medium	photocopy		Author(s)	PS, TB	
Doc Material	paper		Source	Plas Course	
Doc Status	complete	Original		Doc Size	A4
Notes	Fig 2				

Cae Abatti Quarry - Drum Axle End Casting

Fig. 2

Found at Tramway Summit SH 848137



Scale 1/5

Measured by Tony Beardsell and Peter Swift 2 Aug 2011

Drawn by Peter Swift 13 Nov 2011

Site	Minllyn Slate Quarry			**Doc No**	**ML032-1**
Subject	**Drum, winding, reconstruction, Cae Abatty**				
Doc Date	2011		See also	030, 039	
Doc Type	drawing		Grid ref	SH 846 136	
Drawing Type	section		Scale	1:20	
Drawing Medium	photocopy		Author(s)	PS, TB	
Doc Material	paper		Source	Plas Course	
Doc Status	complete	Original		Doc Size	A4
Notes	Fig 3				

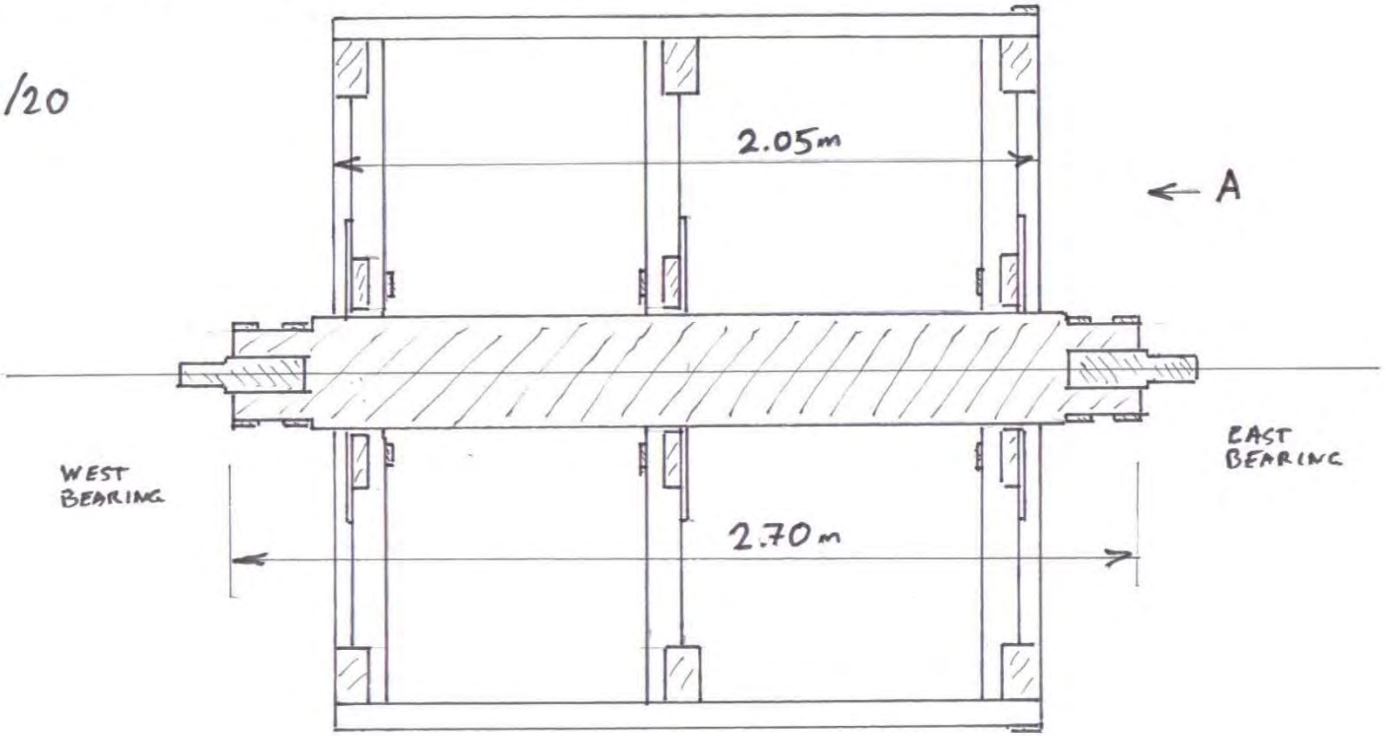
CAE ABATTI SLATE QUARRY SH 846136

FIG. 3

RECONSTRUCTION OF WINDING DRUM

LONGITUDINAL SECTION ON B-B

SCALE 1/20



MEASURED BY TONY BEARDSELL AND PETER SWIFT 4 AUG 2011

DRAWN BY
PETER SWIFT 14 NOV 2011

Site	Minllyn Slate Quarry			**Doc No**	**ML032-2**
Subject	**Drum, winding, reconstruction, Cae Abatty**				
Doc Date	2011		See also	030, 039	
Doc Type	drawing		Grid ref	SH 846 136	
Drawing Type	elevation		Scale	1:20	
Drawing Medium	photocopy		Author(s)	PS, TB	
Doc Material	paper		Source	Plas Course	
Doc Status	complete	Original		Doc Size	A4
Notes	Fig 4				

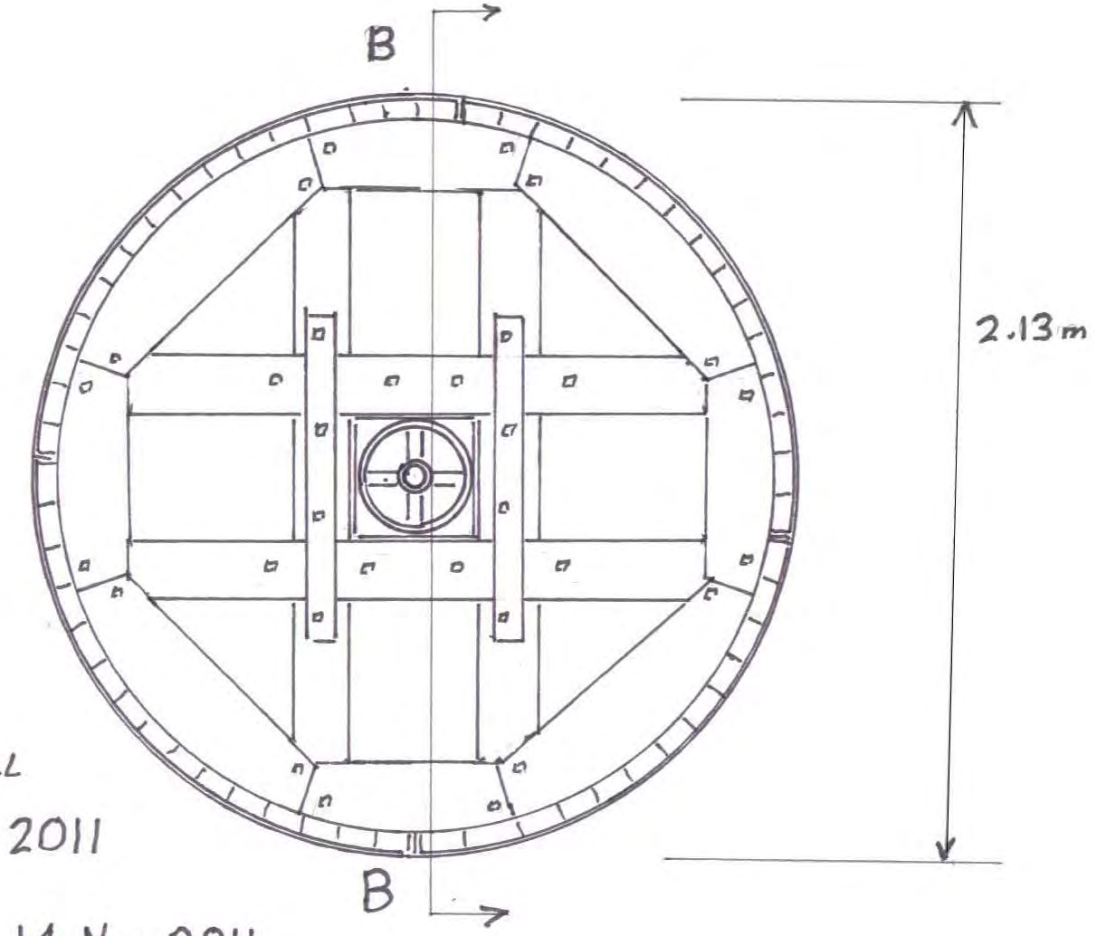
CAE ABATTI SLATE QUARRY SH 846136

FIG. 4

RECONSTRUCTION OF WINDING DRUM

END VIEW ON A

SCALE 1/20



MEASURED BY TONY BEARDSELL AND PETER SWIFT 4 AUG 2011

DRAWN BY PETER SWIFT 14 NOV 2011

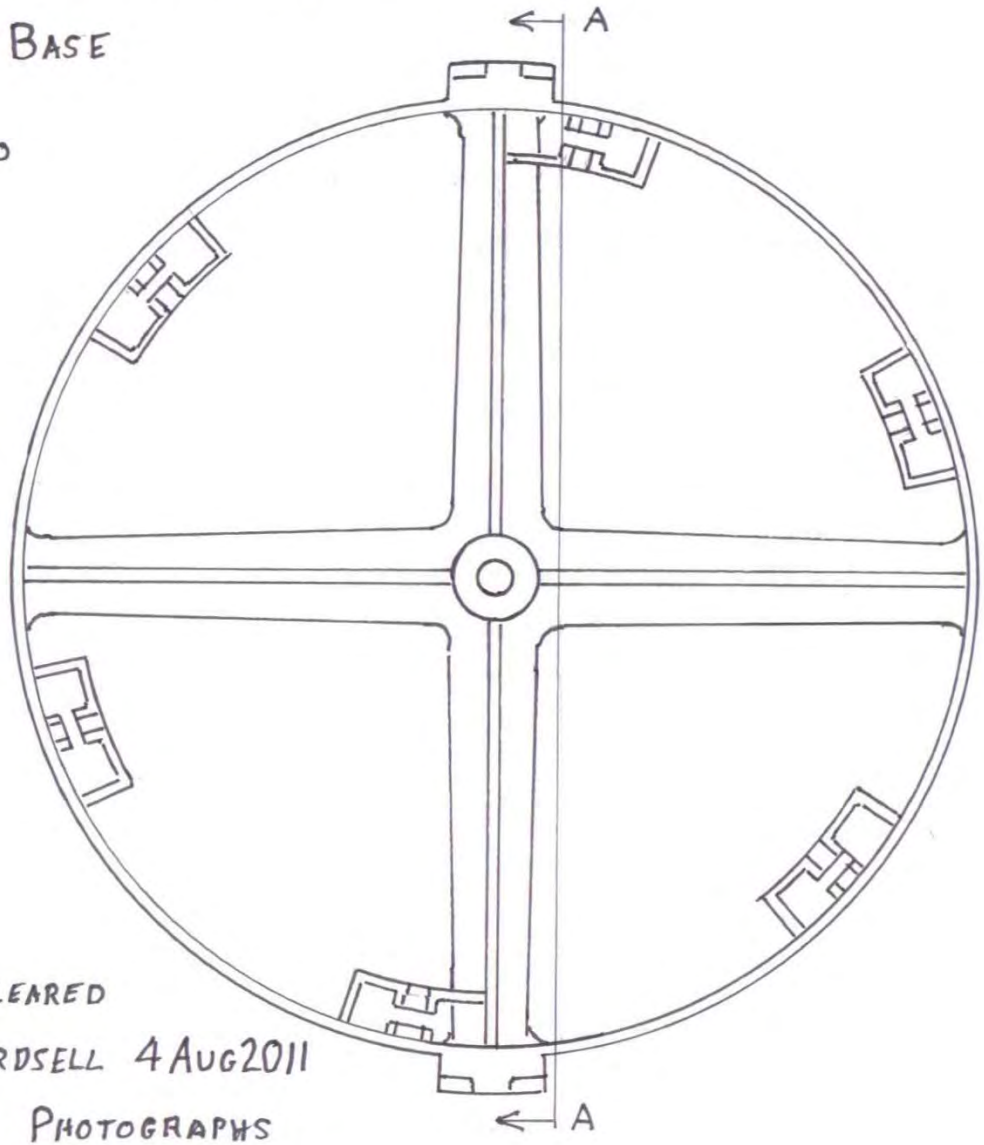
Site	Minllyn Slate Quarry			**Doc No**	**ML033-1**
Subject	**Turntable base, Cae Abatty**				
Doc Date	2011		See also	030, 039	
Doc Type	drawing		Grid ref	SH 846 136	
Drawing Type	plan		Scale	1:10	
Drawing Medium	photocopy		Author(s)	PS, TB	
Doc Material	paper		Source	Plas Course	
Doc Status	complete	Original		Doc Size	A4
Notes	Fig 5				

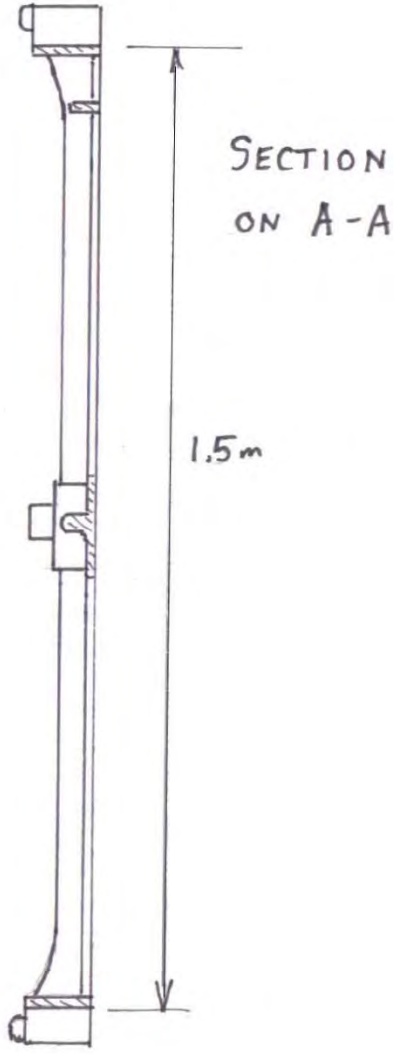
Cae Abatti Slate Quarry SH 846136

Fig. 5

Turntable Base

Scale 1/10





Found and Cleared
by Tony Beardsell 4 Aug 2011
Drawn from Photographs
by Peter Swift 14 Nov 2011

Site	Minllyn Slate Quarry			**Doc No**	**ML033-2**
Subject	**Turntable top, Cae Abatty**				
Doc Date	2011		See also	030, 039	
Doc Type	drawing		Grid ref	SH 846 136	
Drawing Type	plan		Scale	1:10	
Drawing Medium	photocopy		Author(s)	PS, TB	
Doc Material	paper		Source	Plas Course	
Doc Status	complete	Original		Doc Size	A4
Notes	Fig 6				

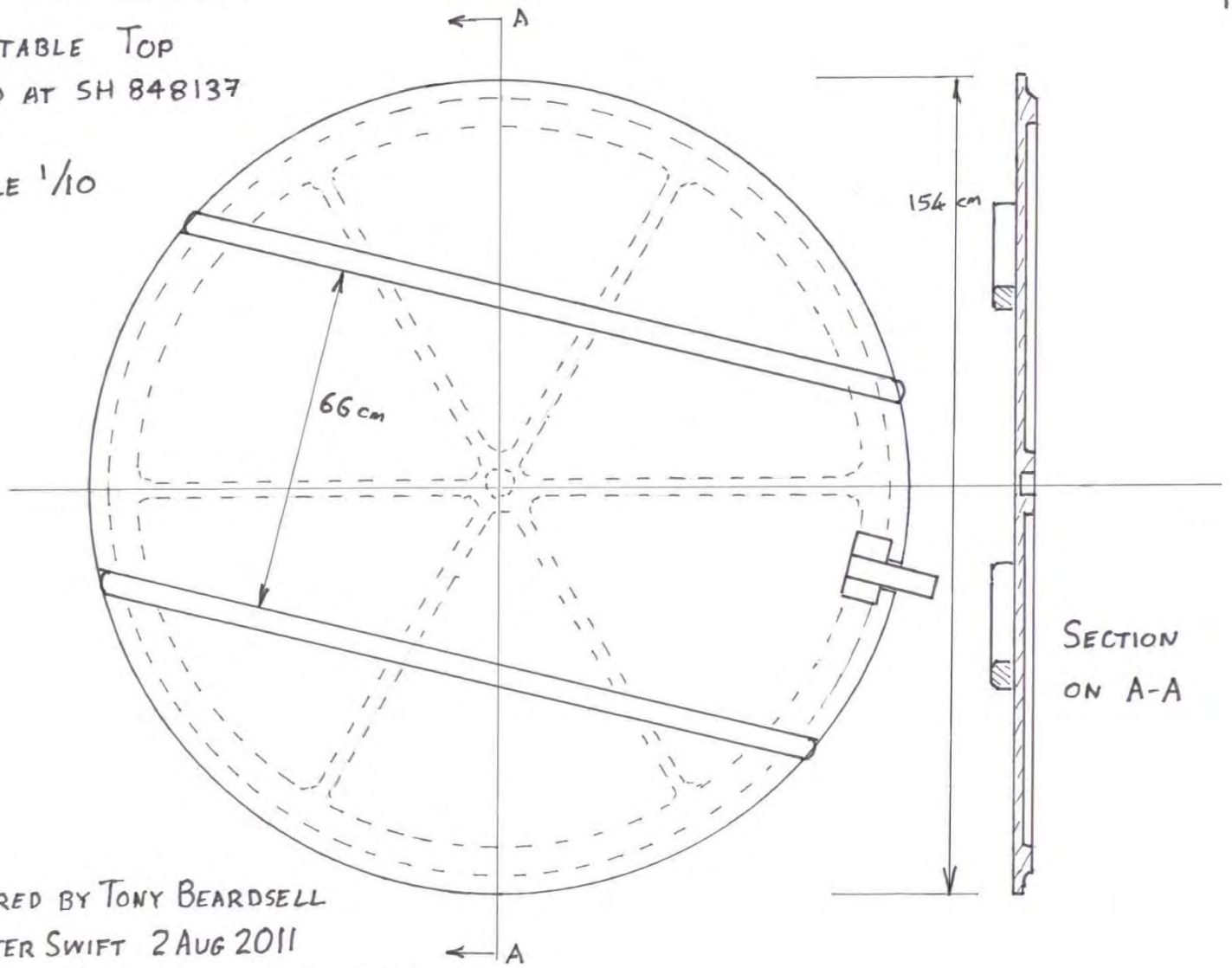
CAE ABATTI QUARRY

TURNTABLE TOP

FOUND AT SH 848137

SCALE 1/10

FIG. 6



MEASURED BY TONY BEARDSELL
AND PETER SWIFT 2 AUG 2011
DRAWN BY PETER SWIFT 13 NOV 2011

Site	Minllyn Slate Quarry			**Doc No**	**ML034**
Subject	**Brake band and rim, Cae Abatty**				
Doc Date	2011		See also	030, 039	
Doc Type	drawing		Grid ref	SH 848 137	
Drawing Type	plan		Scale	1:10	
Drawing Medium	photocopy		Author(s)	PS, TB	
Doc Material	paper		Source	Plas Course	
Doc Status	complete	Original		Doc Size	A4
Notes	Fig 7				

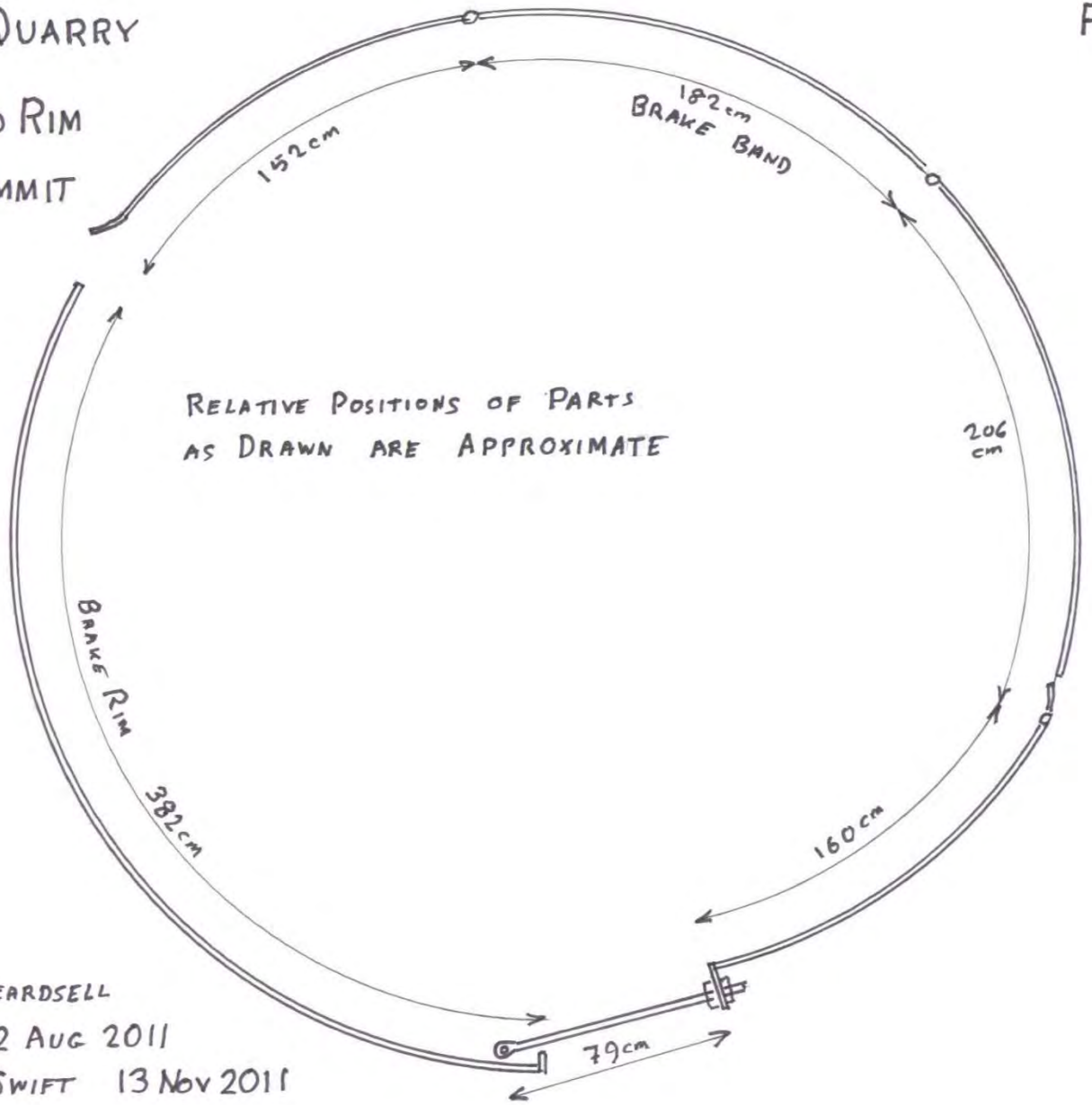
FIG. 7

CAE ABATTI QUARRY

BRAKE BAND AND RIM AT TRAMWAY SUMMIT

SH 848137

SCALE 1/20



MEASURED BY TONY BEARDSELL
AND PETER SWIFT 2 AUG 2011
DRAWN BY PETER SWIFT 13 NOV 2011

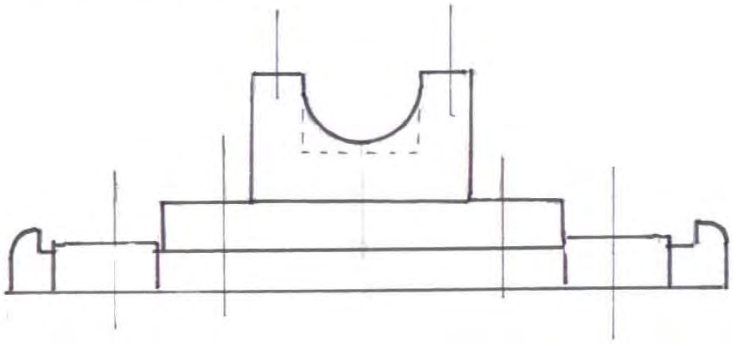
Site	Minllyn Slate Quarry			**Doc No**	**ML035**
Subject	**Bearing blocks, Cae Abatty**				
Doc Date	2011		See also	030, 039	
Doc Type	drawing		Grid ref	SH 848 137	
Drawing Type	plan/elevations		Scale	1:5	
Drawing Medium	photocopy		Author(s)	PS, TB	
Doc Material	paper		Source	Plas Course	
Doc Status	complete	Original		Doc Size	A4
Notes	Fig 8				

CAE ABATTI SLATE QUARRY

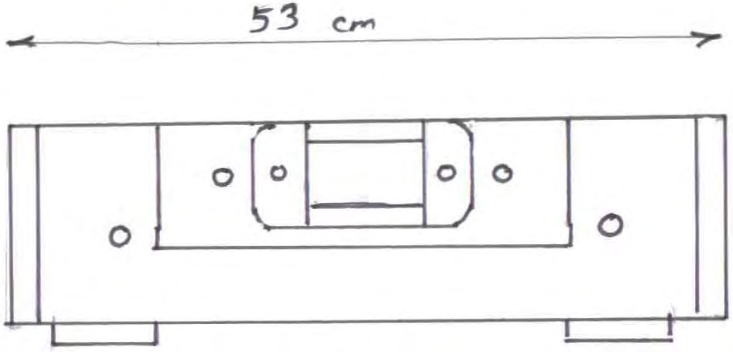
FIG. 8

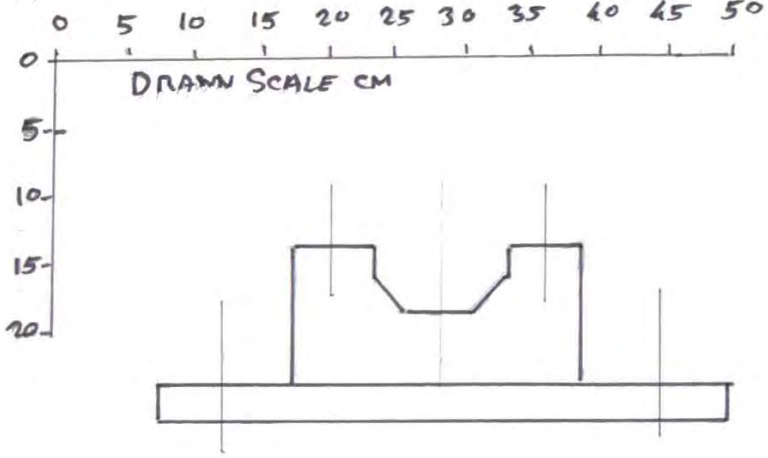
BEARING BLOCKS AT TRAMWAY SUMMIT SH 848137

SCALE 1/5

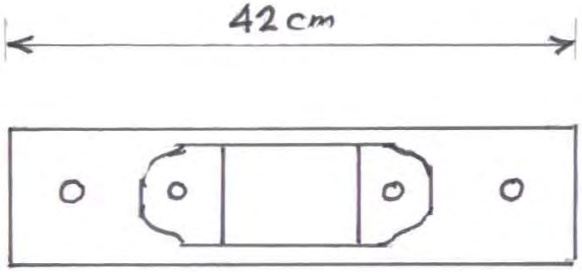


BEARING BLOCK A (DRUM?)





BEARING BLOCK B (WINCH?)



BOTH BLOCKS CARRY 1·5cm BOLTS FOR 40 cm TIMBERS

MEASURED BY CELIA HANCOCK 4 AUG 2011

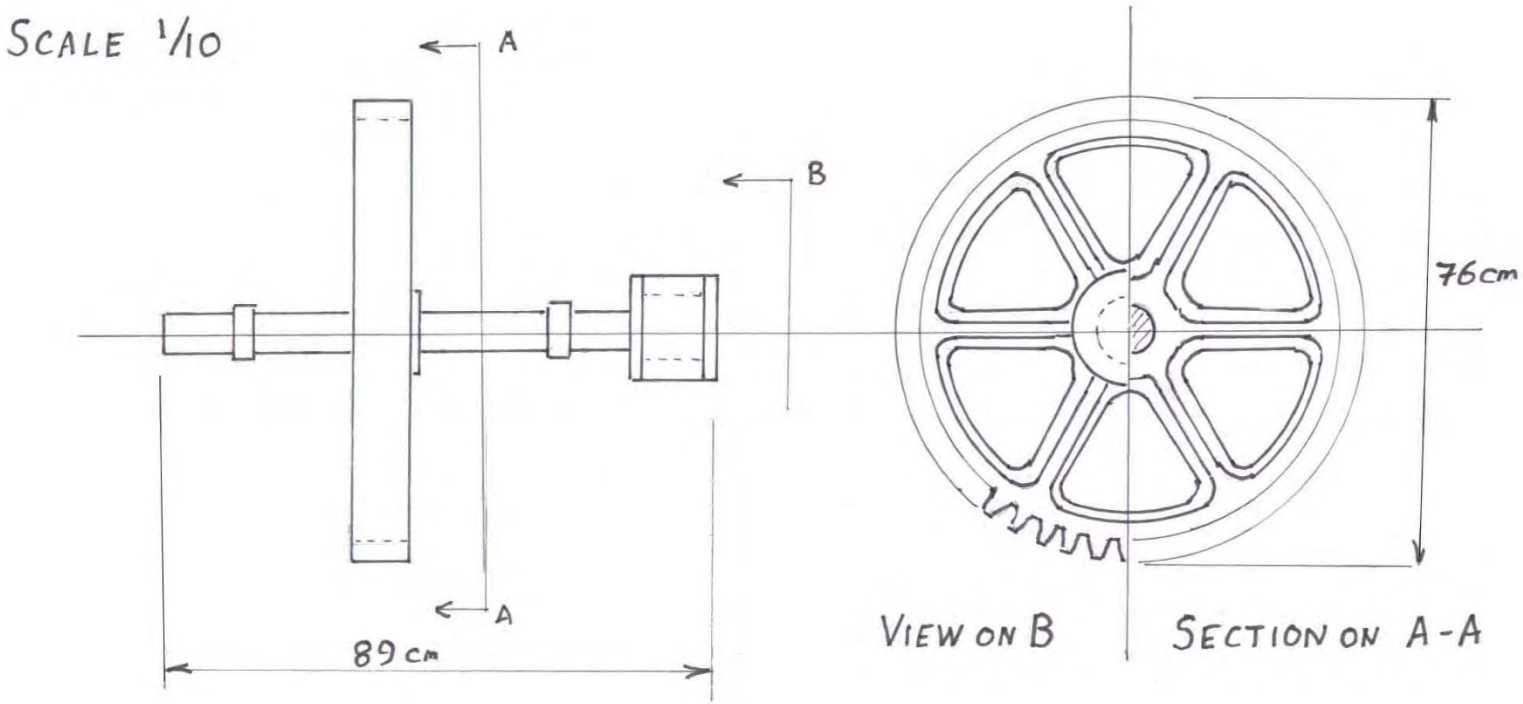
DRAWN BY PETER SWIFT 13 NOV 2011

Site	Minllyn Slate Quarry			**Doc No**	**ML036**
Subject	**Winch, geared shaft, Cae Abatty**				
Doc Date	2011		See also	030, 039	
Doc Type	drawing		Grid ref	SH 848 137	
Drawing Type	plan/section		Scale	1:10	
Drawing Medium	photocopy		Author(s)	PS, TB	
Doc Material	paper		Source	Plas Course	
Doc Status	complete	Original		Doc Size	A4
Notes	Fig 9				

Cae Abatti Slate Quarry

Fig. 9

Geared Winch Shaft at Tramway Summit SH 848137



Measured by Tony Beardsell and Peter Swift 3 Aug 2011

Drawn by Peter Swift 13 Nov 2011

Site	Minllyn Slate Quarry			**Doc No**	**ML037**
Subject	**Gearwheel, Cae Abatty**				
Doc Date	2011		See also	030, 039	
Doc Type	drawing		Grid ref	SH 851 138	
Drawing Type	plan/sections		Scale	1:10	
Drawing Medium	photocopy		Author(s)	PS, TB	
Doc Material	paper		Source	Plas Course	
Doc Status	complete	Original		Doc Size	A4
Notes	Fig 10				

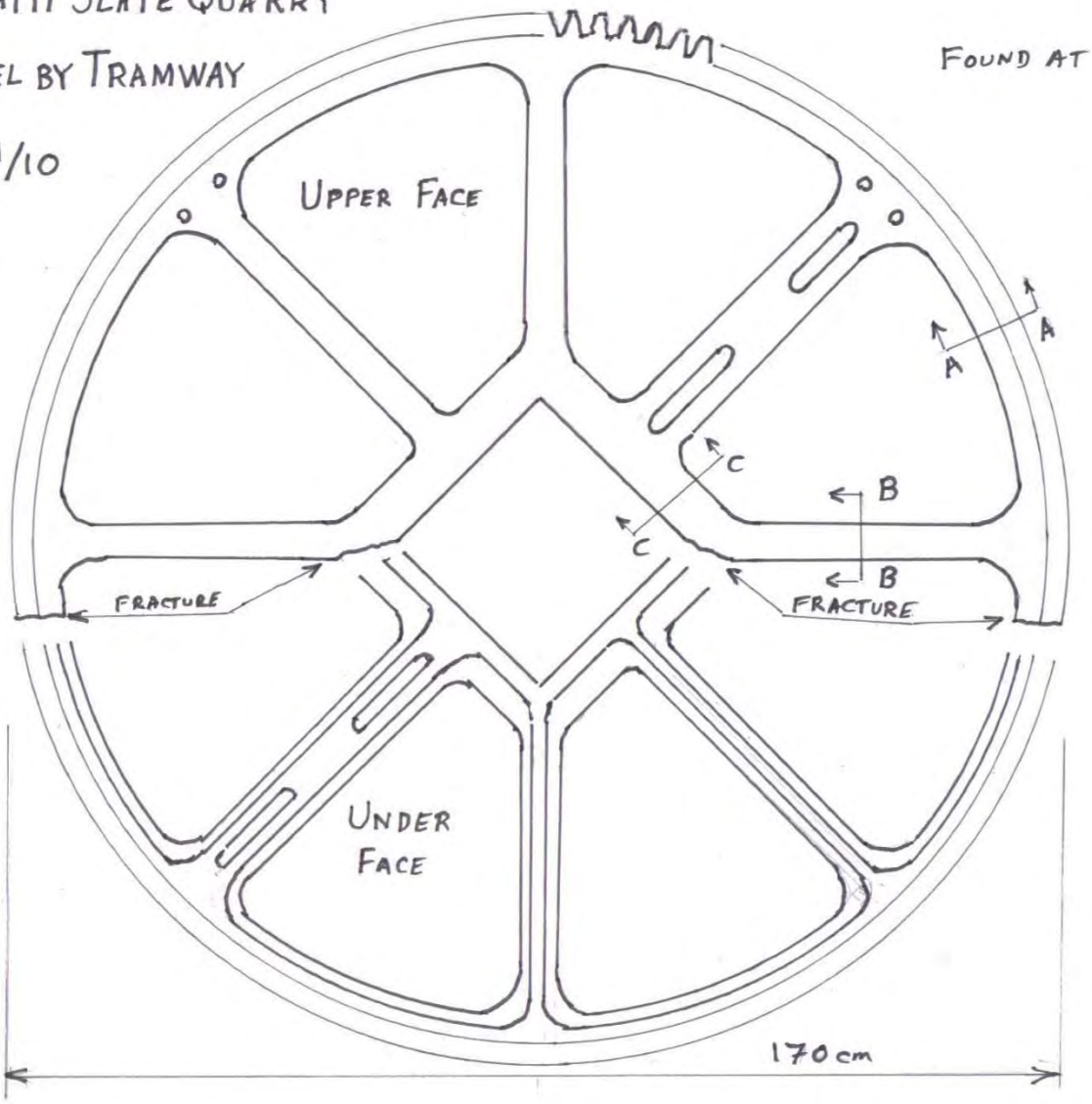
CAE ABATTI SLATE QUARRY

GEARWHEEL BY TRAMWAY

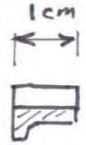
SCALE 1/10

FIG. 10

FOUND AT SH 851138

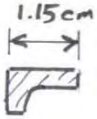


SECTIONS



RIM A-A

SPOKE B-B



CENTRE C-C

MEASURED BY TONY BEARDSELL AND PETER SWIFT 4 AUG 2011

DRAWN BY PETER SWIFT 13 NOV 2011

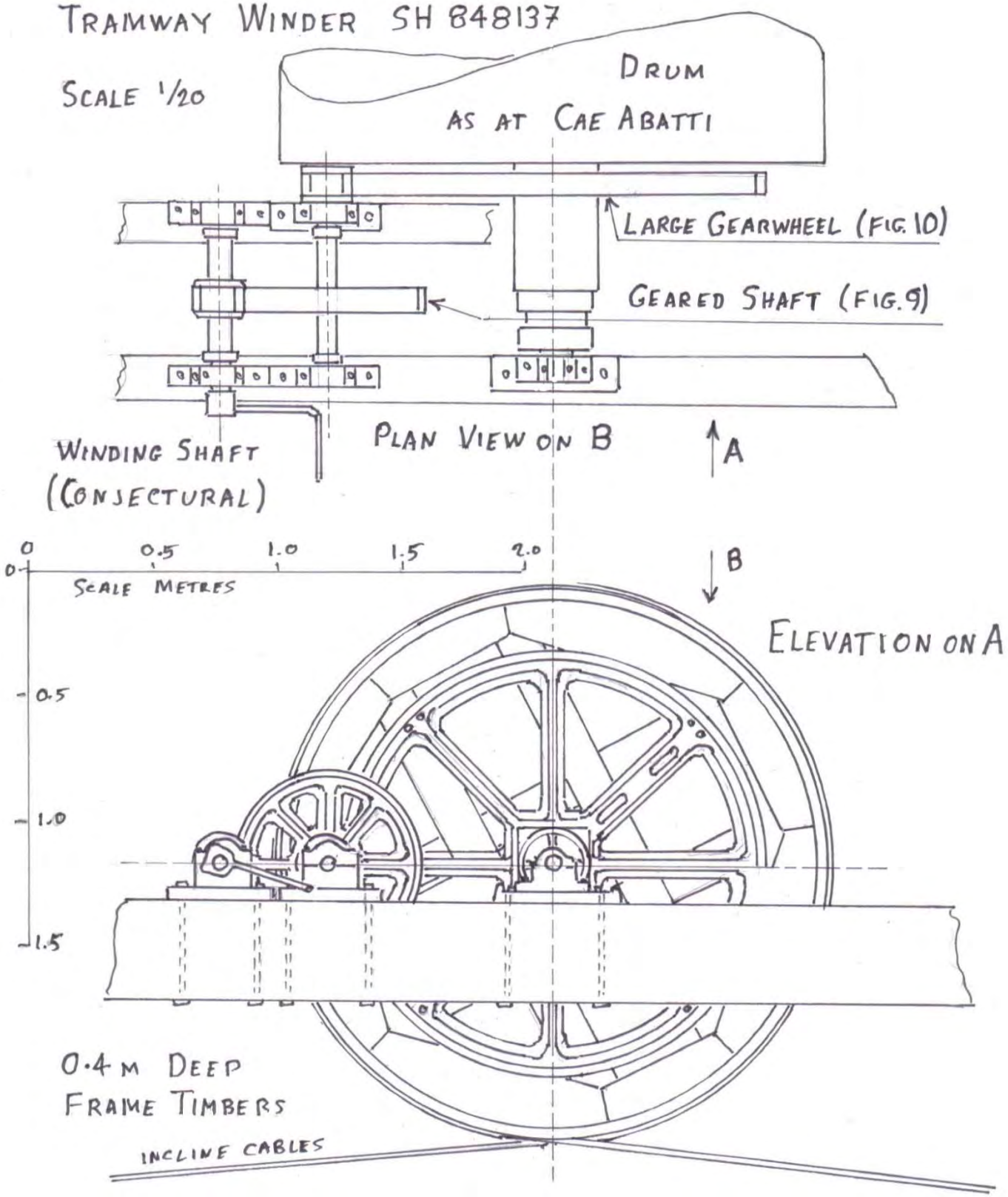
Site	Minllyn Slate Quarry			**Doc No**	**ML038**
Subject	**Winder, tramway, Cae Abatty, reconstruction**				
Doc Date	2011		See also	030, 039	
Doc Type	drawing		Grid ref	SH 848 137	
Drawing Type	plan/elevation		Scale	1:20	
Drawing Medium	photocopy		Author(s)	PS, TB	
Doc Material	paper		Source	Plas Course	
Doc Status	complete	Original		Doc Size	A4
Notes	Fig 11				

CAE ABATTI SLATE QUARRY

FIG. 11

CONJECTURAL RECONSTRUCTION OF TRAMWAY WINDER SH 848137

SCALE 1/20



DRAWN BY PETER SWIFT 14 NOV 2011

Site	Minllyn Slate Quarry			Doc No	ML039
Subject	**Cae Abatty, artefacts**				
Doc Date	2011		See also	030 - 038	
Doc Type	photos		Grid ref	SH 846 136	
Drawing Type			Scale		
Drawing Medium	photocopy		Author(s)	PS, TB	
Doc Material	paper		Source	Plas Course	
Doc Status	complete	Original		Doc Size	A4, 17 pg
Notes					

All photos: Peter Swift

Photo 1. Looking North East down the East Incline of the Cae Abatty Tramway, from the cutting. The large gearwheel is behind the long grass in the foreground.

Photo 2. Looking South towards the cutting on the East Incline of the Cae Abatty Tramway.

Photo 3. Looking West along the line of the East Incline of the Cae Abatty Tramway. The summit level is in the dark vegetation on the horizon.

Photo 4. Looking North between the walls of the Cae Abatty Quarry Drumhouse. The drum axle has broken where it enters the West end cap, which is still on the drumhouse wall. The remains of the three drum spiders, the braking surface ring and brake band have fallen towards the West end of the axle.

Photo 5. The West axle end cap of the Cae Abatty Quarry Incline Drum, still in place in its bearing block on the drumhouse wall. The remains of the axle within the end cap have rotted away.

Photo 6. The East axle end cap of the Cae Abatty Quarry Incline Drum, with the journal still in the displaced bearing block.

Photo 7. Axle end cap from the winding drum at the Summit of the Cae Abatty Tramway. No recognisable timber remains from the drum or its supporting structure.

Photo 8. The cross members of the three spiders of the Cae Abatty Quarry Incline Drum. The rim timbers have totally disappeared, but their size can be derived from the bolts in the ends of the cross members.

Photo 9. East spider of the Cae Abatty Incline Drum. The two cross members are half jointed and strapped across the open sides of the joint. The brake band and the braking surface rim encircle the spider.

Photo 10. Detail of the braking surface rim of the drum, showing one of the four joints and two of the bolts which fixed it to the surface timbers of the drum.

Photo 11. At the rear of the drum, the brake band was jointed and pivoted to a timber member, which has totally disappeared.

Photo 12. Parts of the brake actuation mechanism. This was not examined in detail, but appears to be conventional.

Photo 13. The turntable base, in the upper level of Cae Abatty Quarry. It is to the North of the drumhouse, in line with a cutting leading into the Twll.

Photo 14. The centre pivot of the turntable base.

Photo 15. One of the six roller boxes on the turntable base, and one of four latching points, adjacent to the spokes.

Photo 16. The top of the turntable was found at the summit level of the Cae Abatty tramway. It apparently got broken during removal, and was abandoned. The rails indicate that the gauge used in the quarry was 2' 2".

Photo 17. Latch mechanism on the turntable top.

Photo 18. Ironwork found at the summit level of the Cae Abatty Tramway. The holding down bolts and straps indicate that there was a timber structure on the site.

Photo 19. Parts of the brake band and braking surface rim, laid out as a single circle in the grass at the tramway summit

Photo 20. Pull rod on the end of the brake band for the winding drum of the Cae Abatty Tramway.

Photo 21. End of the section of braking surface rim of the Cae Abatty Tramway winding drum, showing the bolted flange joining the next section. Brake band pull rod beyond.

Photo 22. Detail of the braking surface rim, showing one of the bolts which attached it to the surface of the drum.

Photo 23. One of three joints in the brake band of the Cae Abatty Tramway winding drum.

Photo 24. Another of the joints in the brake band has broken, and has been repaired by a strap.

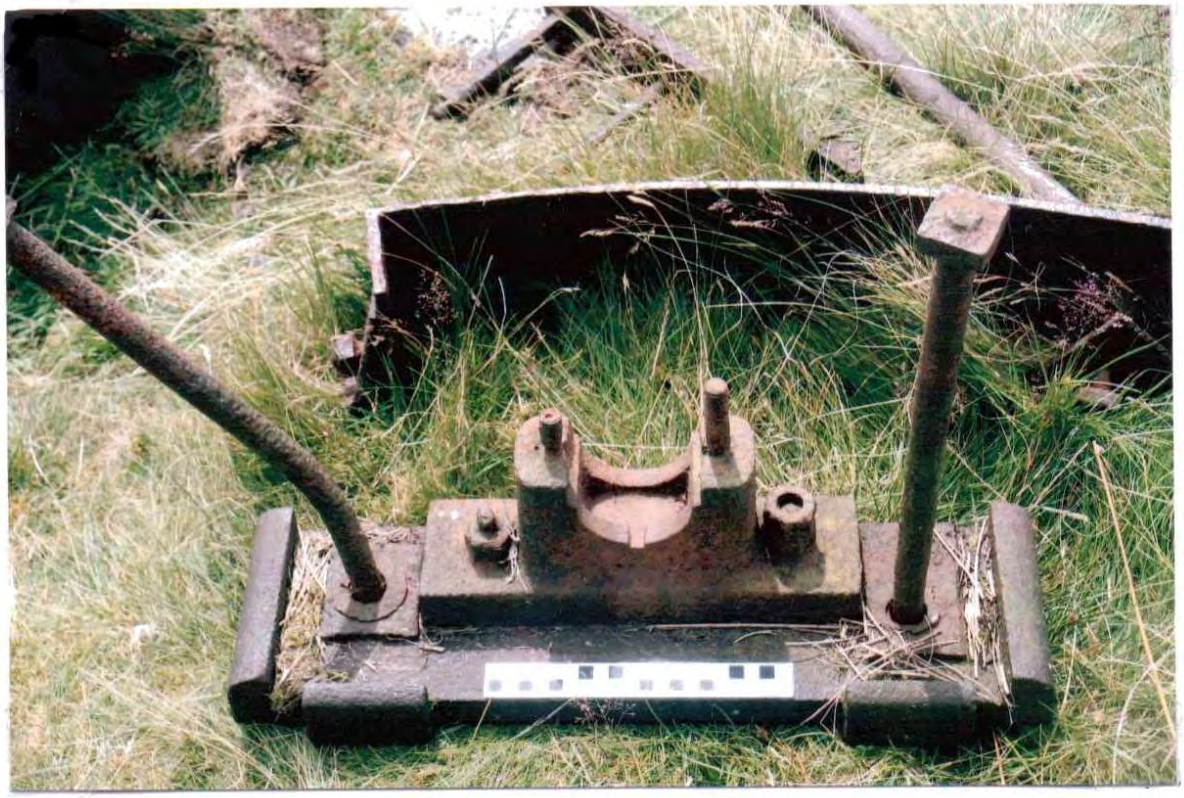


Photo 25. One bearing block found at the summit of the Cae Abatty Tramway is similar to those on the Cae Abatty Quarry Drumhouse, but via to a baseplate to 0.4m (16") timbers. The drum end caps run directly iron on iron, but are provided with an oil reservoir.

Photo 26. The bearing block, with the axle end cap placed in it.

Photo 27. The second bearing blocks found at the summit of the Cae Abatty Tramway, with the axle end cap beyond. Comparison with the bearing blocks on the Cae Abatty Quarry drumhouse suggests that this one was a winch bearing, which was provided with brass bearings.

Photo 28. The winch bearing block, with holding down bolts still in place. These indicate that the timbers which carried it were about 0.4m (16") deep.

Photos 29 and 30. Intermediate shaft of the winder for the Cae Abatty tramway Incline Drum. The small 10 tooth pinion would have meshed with the large 120 tooth gearwheel, found part way down the East incline. The 62 tooth wheel was probably driven by another small pinion, on the same shaft as the winding handle. There is no provision for handwinding this shaft.

Photo 31. Half of a large 120 tooth gearwheel, found part way down the East incline of the Cae Abatty Tramway. This could have been driven by the small pinion on the shaft found at the summit.

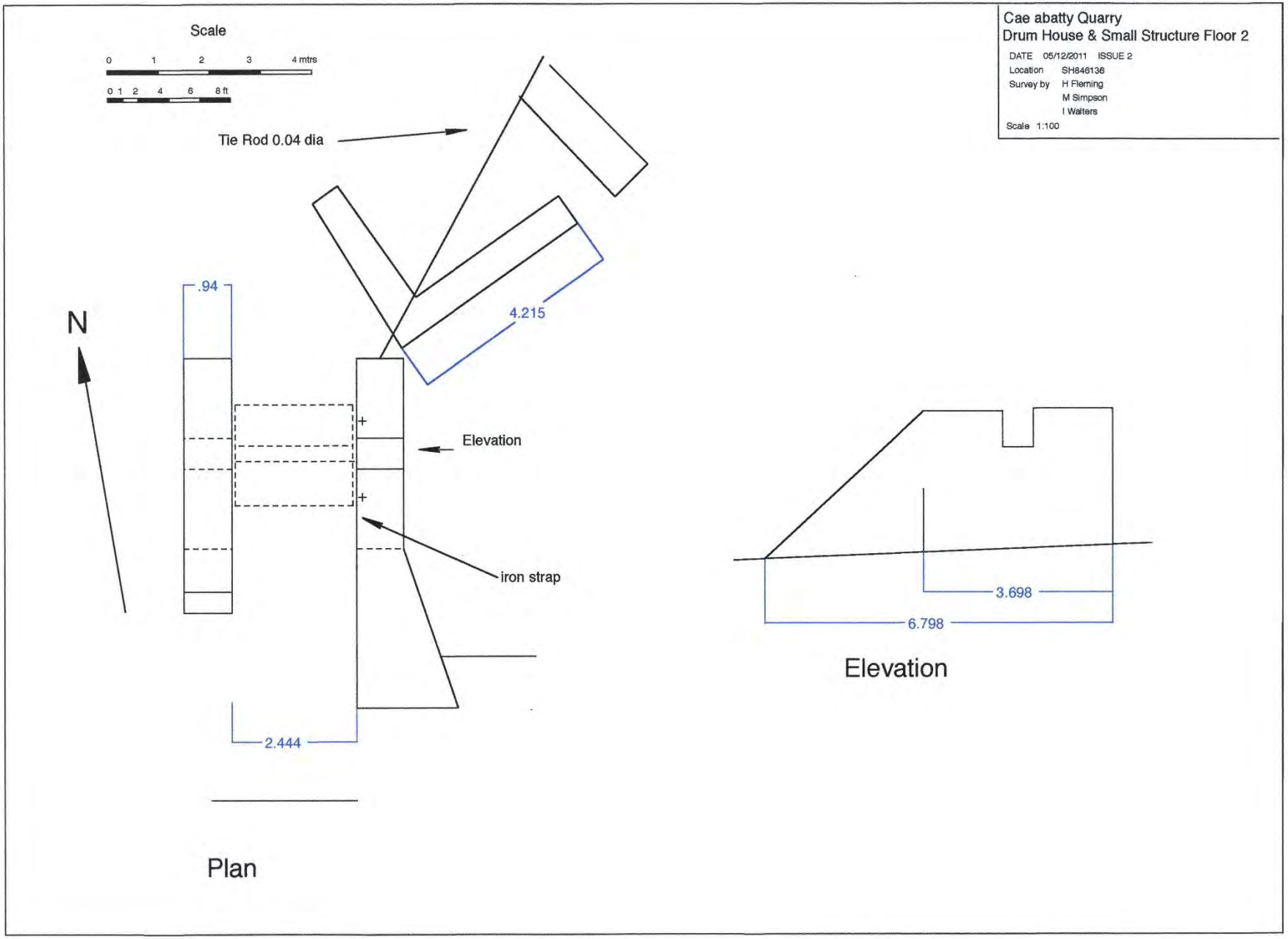
Photo 32. One of two pairs of bolts on the periphery of the large gearwheel. Four pairs of bolts would have fixed it to one spider of the winding drum.

Photo 33. One spoke of the gearwheel has two slots in it, the purpose of which is not clear.

Photo 34. Detail of the centre hole in the large gearwheel. The centre of the gearwheel would have fitted a 0.33m (15") square axle.

Site	Minllyn Slate Quarry			**Doc No**	**ML040**
Subject	**Drumhouse, Cae Abatty, floor 2**				
Doc Date	2011		See also	044	
Doc Type	drawing		Grid ref	SH 846 136	
Drawing Type	plan/elevation		Scale	1:100	
Drawing Medium	photocopy		Author(s)	IW, HF	
Doc Material	paper		Source	Plas Course	
Doc Status	complete	Original		Doc Size	A4
Notes					

This document has an additional entry in the index: ***Structure, small***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0 1 2 4 6 8 ft
Cae abatty Quarry
Drum House & Small Structure Floor 2
DATE 05/12/2011 ISSUE 2
Location SH846136
Survey by H Fleming
M Simpson
I Walters
Scale 1:100
Tie Rod 0.04 dia
.94
4.215
N
Elevation
iron strap
2.444
Plan
3.698
6.798
Elevation

Site	Minllyn Slate Quarry			**Doc No**	**ML041**
Subject	**Structure, small, Cae Abatty, floor 2**				
Doc Date	2011		See also	044	
Doc Type	drawing		Grid ref	SH 846 136	
Drawing Type	plan		Scale	1:50	
Drawing Medium	photocopy		Author(s)	IW, HF	
Doc Material	paper		Source	Plas Course	
Doc Status	complete	Original		Doc Size	A4
Notes					

Cae abatty Quarry
Small Structure Floor 2

DATE 12/08/2011
Location SH846136
Survey by H Fleming
M Simpson
I Walters
Scale 1:50

Scale

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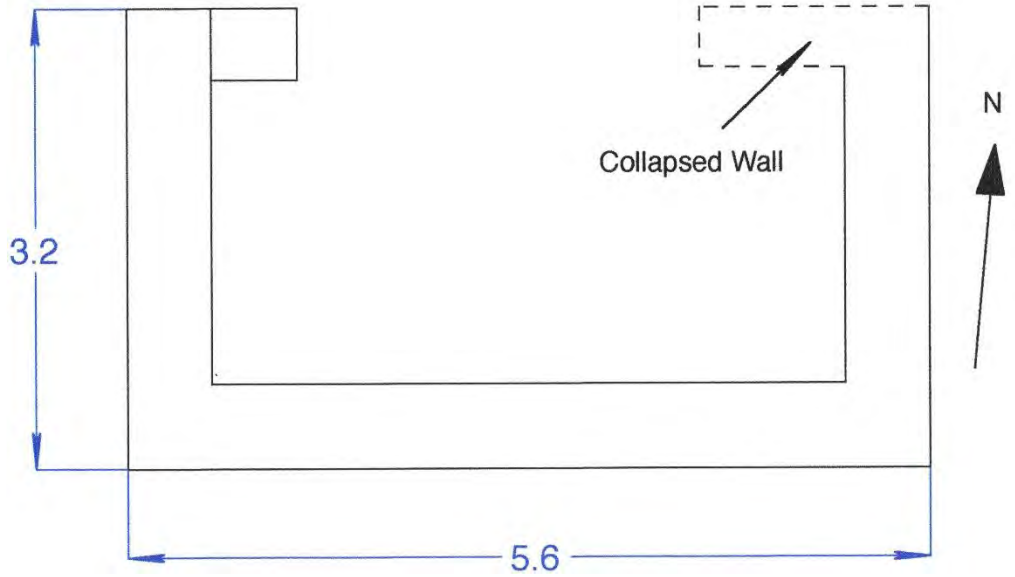
0 1 2 4 6 8 ft



Site	Minllyn Slate Quarry			**Doc No**	**ML042**
Subject	**Bastion, Cae Abatty, floor 2**				
Doc Date	2011		See also	044	
Doc Type	drawing		Grid ref	SH 846 136	
Drawing Type	plan		Scale	1:100	
Drawing Medium	photocopy		Author(s)	IW, HF	
Doc Material	paper		Source	Plas Course	
Doc Status	complete	Original		Doc Size	A4
Notes					

Cae abatty Quarry

Bastion Floor 2

DATE 31/10/2011
Location SH846136
Survey by H Fleming
M Simpson
I Walters

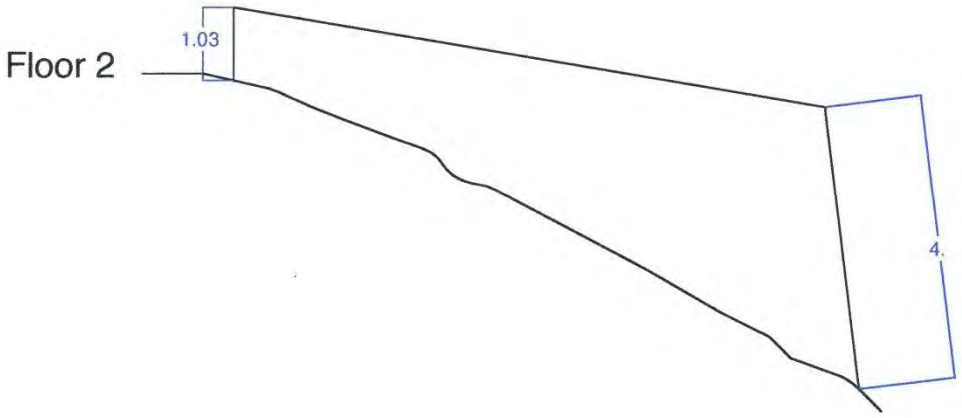
Scale 1 : 100

Scale

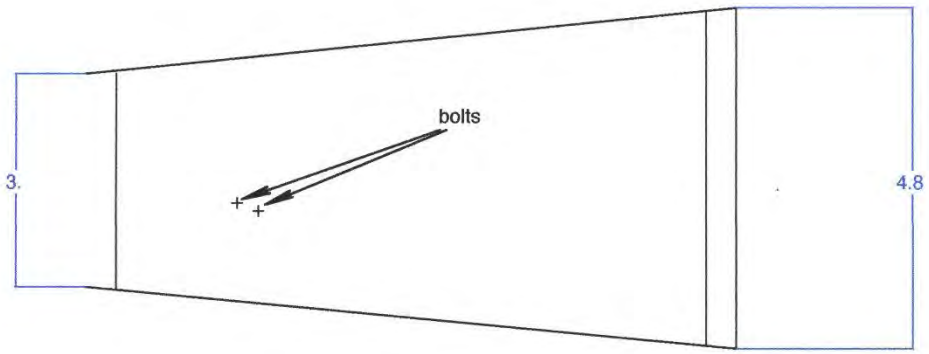
0 1 2 3 4 mtrs

0 1 2 4 6 8 ft

Elevation



Plan



Site	Minllyn Slate Quarry			**Doc No**	**ML043**
Subject	**Structure, small, Cae Abatty, floor 3**				
Doc Date	2011		See also	044	
Doc Type	drawing		Grid ref	SH 846 136	
Drawing Type	plan		Scale	1:100	
Drawing Medium	photocopy		Author(s)	IW, HF	
Doc Material	paper		Source	Plas Course	
Doc Status	complete	Original		Doc Size	A4
Notes					

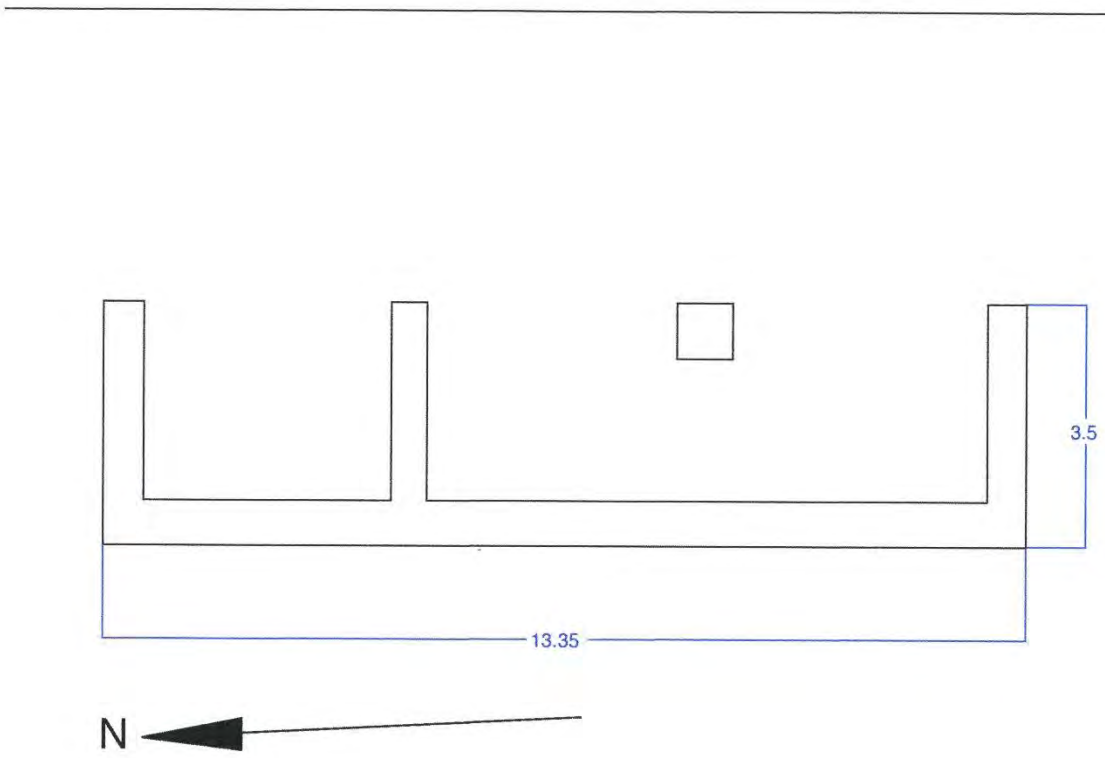
Scale

0 1 2 3 4 mtrs

0 1 2 4 6 8 ft

Cae abatty Quarry
Small Structure Floor 3
DATE 13/08/2011
Location SH846136
Survey by H Fleming
M Simpson
I Walters

Scale 1:100



Site	Minllyn Slate Quarry			**Doc No**	**ML044**
Subject	**Cae Abaty**				
Doc Date	2011		See also	040 - 043	
Doc Type	report		Grid ref	SH 846 136	
Drawing Type			Scale		
Drawing Medium	comp gen		Author(s)	HF, IW	
Doc Material	paper		Source	Plas Course	
Doc Status	complete	Original		Doc Size	A4, 14 pg
Notes					

Cae-abatty Quarry 2011

Chwarel Cae-abatty.

Grid Ref SH845136

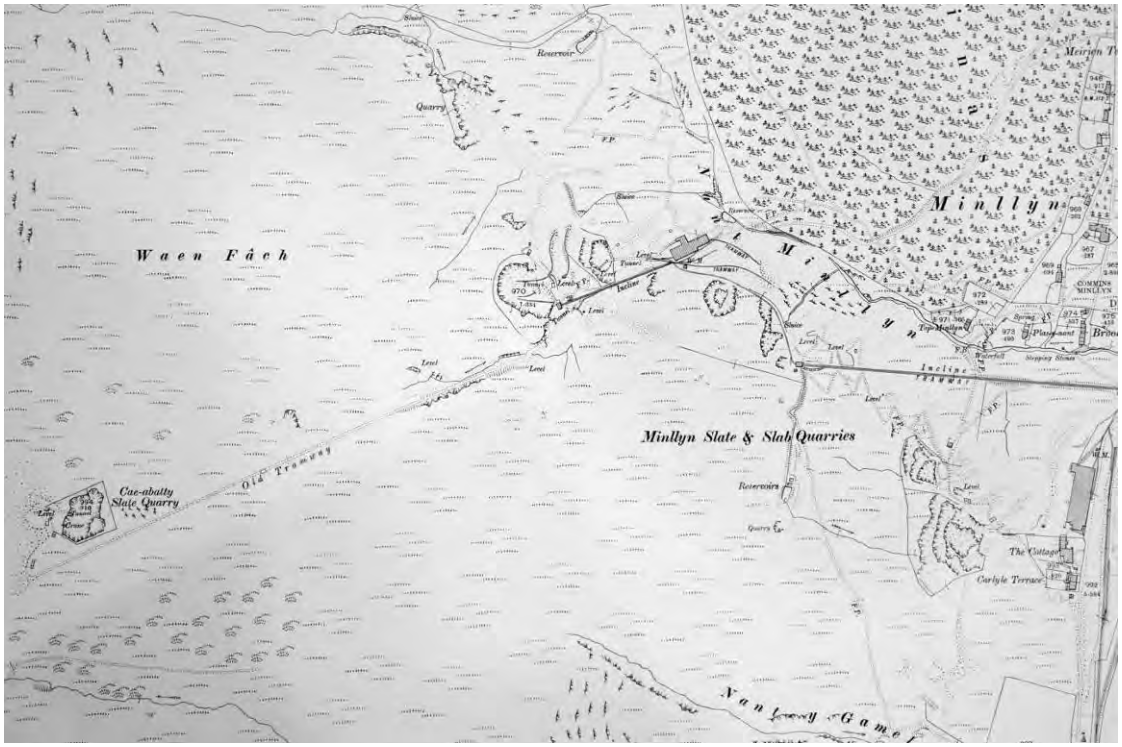


Fig 1. Cae-abatty and Minllyn Quarries.

Cae-abatty quarry is situated on a south-western shoulder of Foel Dinas, approx 1.5kms south west of Dinas Mawddwy.

The quarry and its inclines were surveyed in order to attempt to explain the chronology and working of the exit incline although the remote location prevented any in depth work. There was no attempt to study the working of the twll or whether there was any underground activity.

Very little archive evidence specific to Cae-abatty has been found so far. The name of the area, Cae-abatty, can be translated as the field belonging to a Monastery or Abbot's House but any history of attempts to extract slate by such an organisation would be pure conjecture. A quarry called the Merioneth Slate and Slab Company situated on the "farm and land known as Maescamlan Caebatty" was offered for sale by auction in a liquidation sale in October 1871.[1] Maes-y-camlan lies just over a kilometre to the south east by a row of houses called Quarry Cottages. (SH 857134)

In 1876 the Dinas Mawddwy estate was sold including "all those two farms called Maescamlan and Cae Battyn … situate in the Parish of Mallwyd, in the occupation of Huw Lewis and John Pugh …… and also that Slate Quarry, now being worked by the Carlyle Slate and Slab Company Ltd."[2] The question as to which quarry is being referred to is, therefore, a problem although it is possible that Cae-abatty, Carlyle and Minllyn quarries were worked, for some of the time at least, by the same company. The Lot was purchased by the Carlyle Slate and Slab Company, the previous Lessees.[3]

[1] *Cambrian News* 13 October 1871
[2] *Cambrian News* 22 September 1876
[3] *Cambrian News* 20 October 1876

In 1886 a petition was presented for the winding up of the company. It was liquidated in May 1887[4] The property, described as "… the farms Maescamlan and Cae Bettyn, with the slate quarry known as the Carlyle Slate and Slab Co", was auctioned in 1887.[5]

It seems to have been a productive enterprise for a period of time, such that exploratory scratchings were made in an attempt to extend southwards and the amount of tip waste suggests that decent quantities of useful rock were extracted at some time but the quarry would appear to be out of use by 1889 and, on the 1901 map, the exit incline over the hill to Minllyn is described as an "old Tramway". Interestingly it is an old tramway, not inclines.

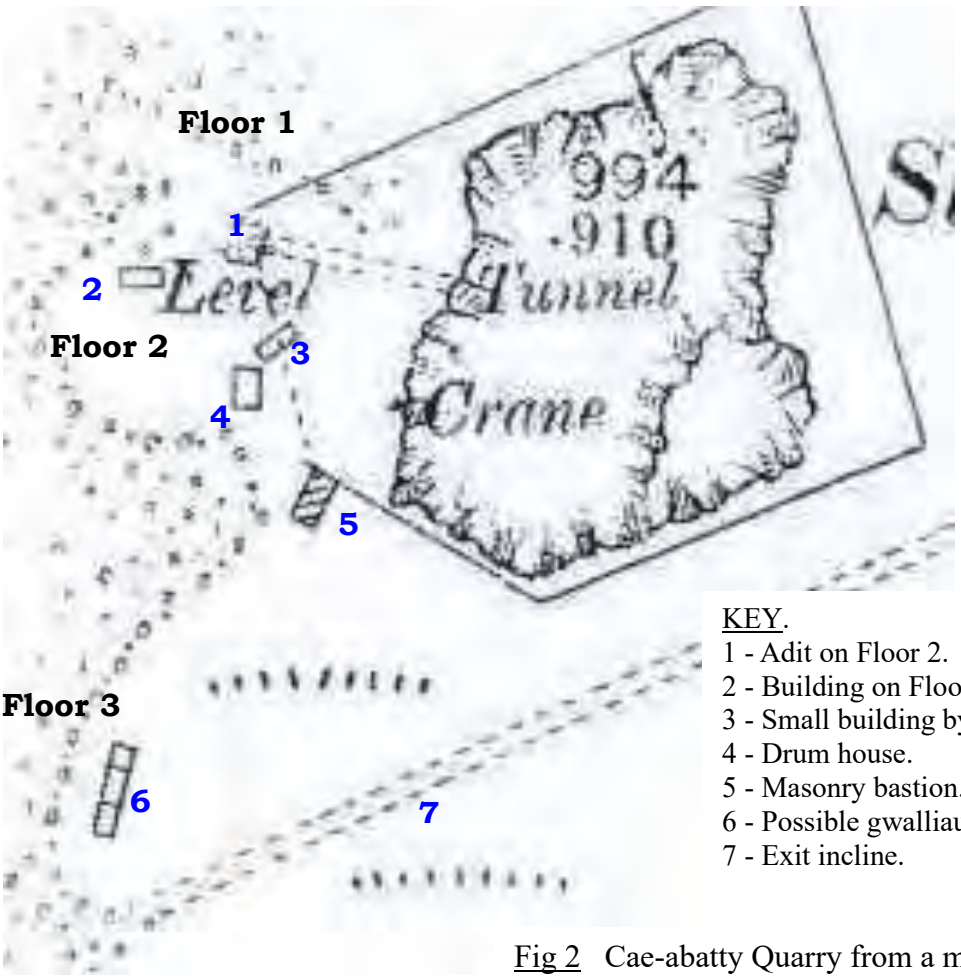
All the buildings on the site are shown on the 1901 map and, therefore, were constructed before that date. They are of rough, undressed rock with no sawn ends though this does not preclude hand sawing on site. The quarry was thought to have produced mainly slab and only one dressed roofing slate was found on site. This was a very coarse piece of dark grey slate being 200 by 200mms to a broken edge by approx 5mms thick and trimmed on the three unbroken edges. Due to the delamination of much of the rock on site it is difficult to say where any slate dressing was done at Cae-abatty as the broken rock looks very similar to dressing waste. Some of the roofing slate found at Minllyn Quarry on the Dinas Mawddwy side of the hill is the same as the piece found here and, as no roofing slate was ever made at Minllyn, it is likely that the buildings in that quarry used roofing slate from Cae-abatty. It is not known how any slabs were treated and it is possible that they were taken as rough blocks to Minllyn for any further work as there is no clear area on the quarry where the dressing of larger slabs could have been done.

Unfortunately, to date, no production figures have been found specifically for Cae-abatty, the only figures found being for Carlyle Quarry which may have included Minllyn and Cae-abatty.[6]

Date	Name	Underground			Above Ground		Total	Output	Remarks
		Age 12 - 13	Age 13 - 16	Age Over 16	Age 13 - 18	Over 18 yrs			
1877	Carlyle's	0	0	48	2	49	99	2564	
1878	Carlyle	0	0	55	2	37	94	2756	
1879	Carlyle	0	0	54	2	50	106	2738	
1880	Carlyle	0	0	48	2	57	107	2678	Dressed slate
1881	Carlyle	0	0	36	2	56	94	2559	
1882	Carlyle	0	0	45	1	62	108		

[4] *London Gazette* 1886 pg 6318 and 1887 pgs 406, 613, 1781, 1991
[5] *Cambrian News* 11 February 1887
[6] Reports of Inspectors of Mines with Statistical Summary. Various dates.

The Quarry.



KEY.
1 - Adit on Floor 2.
2 - Building on Floor 2 tip run.
3 - Small building by drum house.
4 - Drum house.
5 - Masonry bastion.
6 - Possible gwalliau on Floor 3.
7 - Exit incline.

Fig 2 Cae-abatty Quarry from a map of 1901

The quarry was worked on three floors. These have been numbered from the top, the earliest being Floor 1.

Floor 1.

This floor is the first one worked and opened up the twll. There are two tips, both well grassed over, running out from the twll at this level. The southerly tip is extremely narrow along the top, only about a metre wide, too narrow for a waggon to have been used, which suggests that it may have been a barrow run. The other tip is wider, approx 2 ms at the top, and is lower however they were considering raising this in height as, at the twll end of this lower tip, there is a three sided low structure which was to be a tipping platform. There are no further structures on Floor 1 and no evidence of how any saleable slate was removed at this early stage of development. A. J. Richards writes that at this time the slate was transported along the Nant Blaen y Cwm down which the quarry faces although he gives no evidence for this.[7] After dropping into the valley it would have been the easiest and most logical route, leading down to Aberangell on a winding track of approx 5kms.

[7] Richards, A.J. *A Gazetteer of the Welsh Slate Industry* (1991) pg 166

Fig 3 (Right) Narrow tip
(Left) Lower tip with tipping platform
Both views looking towards the twll.

Floor 2.

An adit was driven in to the bottom of the twll from what is now Floor 2 .

This floor seems to have been the busiest working area. Rock was removed both directly from the twll and through the adit which is shown on the 1901 map. (No 1 on Fig 2).

At the mouth of the adit is the base of a turntable, the top of which was found at the summit of the exit incline where, presumably, it had been left by salvage contractors.

Fig 4 Building on Floor 2 tip run.

There is a small open fronted building of unknown use on the southern side of the run from the adit towards the tip. (No 2 on Fig 2) The building measures 5.6ms across the front by 3.2ms front to back. The walls are currently a maximum 500mms high.

As some roofing slates do seem to have been made at Cae-abatty, it is tempting to say that this may have been a gwal although there is a lack of any waste around the building. Structures such as this could have been used for any purpose and without evidence it is impossible to tell what that may have been.

At the same time, rock was lifted from the twll by a crane, a report on which can be found elsewhere. [8]

Fig 5. View of Floor 2.

Bastion

Drumhouse

Small building

From the adit, a track went round to a drum house (No 3 on Fig 2) at the head of an incline down to Floor 3.

Between the drum house and the rock wall behind it there is a small building set at a very awkward angle to the drum house and possible pre-dating it. (No 4 on Fig 2) The back wall of this building is formed by the rock face. The only doorway was in the wall away from the route between adit and drum so it does not appear to have been a weigh house as there is no apparent opening on that side or any remains of a weigh pit - however due to the condition of the building this use can not be completely discounted.

Fig 6

Small building behind the drum house on Floor 2 (Scale is in 20cms sections)

The rod from the drumhouse to the rock runs across from the upper left side of picture.

The drum house has been extended on both sides on the incline ends of the walls. This could have been because of slippage or collapse of the original walls as the extended sections slope backwards creating a buttress effect.

[8] Report by Mark Simpson

Fig 7
The drum house from the west showing extended wall.
(Scale is in 20cms sections)

An iron rod is fixed between the rock wall behind the east wall of the drum house and the drum house wall. It was bolted into the drum house at 1.90ms above the ground and may be connected in some way with a metal plate below it which is also fixed into the drum house. It could not have been to tie the drum house back to the rock as it would have had the opposite effect in that if the drum house wall moved, the rod would have pulled the wall apart. Details of the drum can be found elsewhere. [9]

Fig 8 (Left) End of drumhouse wall showing the rod and plate.

(Below) End of rod bolted into the wall.

The crimp which is 4.90ms from the front of the pre-extended drum house was superficially investigated. The step down formed by the exposed stonework may have been the top of a transporter type of incline but further investigation would be needed to discover the actual arrangement.

[9] Report by Peter Swift.

Fig 9 Crimp looking towards drumhouse.

Only a short length of the incline's structure is visible showing it to have been constructed of undressed slabs.

Fig 10 Side of internal Floor 2/3 incline with the bastion in the background.

Approx 11ms from the east wall of the drum house and to the south east of the twll there is a large masonry bastion measuring 4.8ms wide and 8.4ms long. (No 5 on Fig 2) There are two bolts on the top and no evidence of any others. It is possible that this bastion was in some way connected with lifting rock from the twll but it is too far from the edge and also there are the substantial remains of a jib crane elsewhere on site. The crane and this bastion are both shown on the 1901 map as being quite separate. It is possible that the rock was lifted from the twll onto the bastion to be lowered down to Floor 3 but how this would be done is not known. Its purpose therefore remains a mystery.

Fig 11 Bastion from the incline. (Note that scale is marked in 20cms sections).

There are several places on this floor where masonry indicates that there may have been other walls or structures but they could not be measured or further investigated due to the amount of plant growth and limitations of time.

Floor 3.

This is the lowest floor and the last area to be used. It is a fairly narrow shelf of land varying between 4 to 4.5ms wide between the hillside and the tips of which there are three running out from this floor.

At the base of the internal incline there is a run-in adit and the aerial photograph suggests that originally the exit incline started from around this point. (Fig 15) The adit would have opened into the bottom of the twll but could not be investigated. As it does not appear on the 1901 map it may have been collapsed by that date.

A track runs from the foot of the incline and the adit to the foot of the exit incline. This track is bounded by a retaining wall along the foot of the hill. The height of this wall is undefined as it is in a collapsed state.

There is one main building on this floor. (No 6 on Fig 2) This is a two part open fronted building with an extra section on the northern end. The southern section is approx 10ms wide with a 800cms square pillar in the middle, presumably to support a roof. The existing walls are very much collapsed and stand to only approx 65cms high. The attached northern building is another open fronted structure 3.2ms wide whose walls still stand to 115cms high.

There are some pieces of masonry to the north side but whether they formed part of another structure or not cannot be determined due to the amount of vegetation, especially bracken, which covers much of the site.

The use of this building is unknown but could have been a gwal as there is a quantity of what looks like slate dressing waste behind it. The building would have been too small for working slabs.

Fig 12 Floor 3 building.

From the southern end of the Floor 3 at the end of the retaining wall is the base of the later exit incline although the space between the base of the hill and the tips is still no wider than 4-4.5ms.

Exit Incline.

The incline crossed over the hill to Minllyn so needed to be an uphaul on the west side with a down run on the east. For the purposes of this report the two sides are treated as two inclines - the west being the uphaul and the eastern the down run inclines.

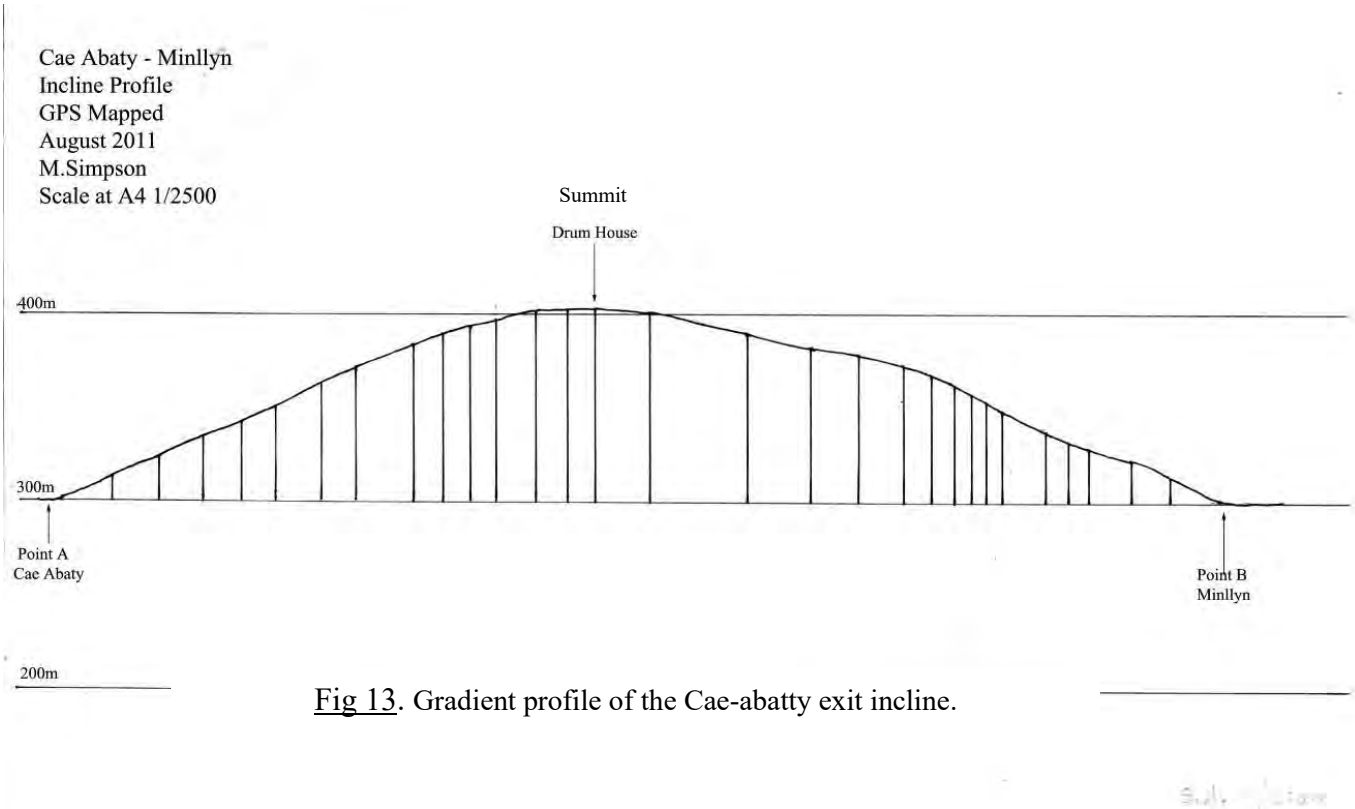


Fig 13. Gradient profile of the Cae-abatty exit incline.

Neither the east or western side of the incline is on any great structure being laid either on the ground with a ditch on each side or in a shallow cutting.

Western Incline. This ascends steeply from the southern end of Floor 3. There is nothing at the foot to indicate an area for marshalling waggons except the track which runs along the floor at the foot of the hill and which is between 4 and 4.5ms wide. This could be because of the low number of waggons, perhaps even only one waggon at a time, to be hauled up to the summit. The lack of any permanent winding facility at the summit would seem to confirm the low amount of uphauling done at any one time.

The lowest stretch is in a very shallow cutting. Further uphill it consists of gutters either side of a raised incline bed. To the north edge of the incline is a shallow depression with some spoil on the downhill side. This was most probably the result of trial excavations to test whether it was worth opening a new area but was abandoned.

Fig 14 View upslope on the western incline showing the raised section.

Above the raised section it is very difficult to trace the incline on the ground until approaching the summit due to the growth of gorse, bilberry and bracken.

The aerial view (Figs 15, 17) suggests there was a previous incline or trackway running down to the quarry but which was cut by the workings in the twll causing it to be rerouted further to the south and also requiring that the formation at the summit be changed. The GPS plan (Fig 16) also seems to show a slight deviation at the summit. The old route led from Floor 3 at a point near the collapsed adit.

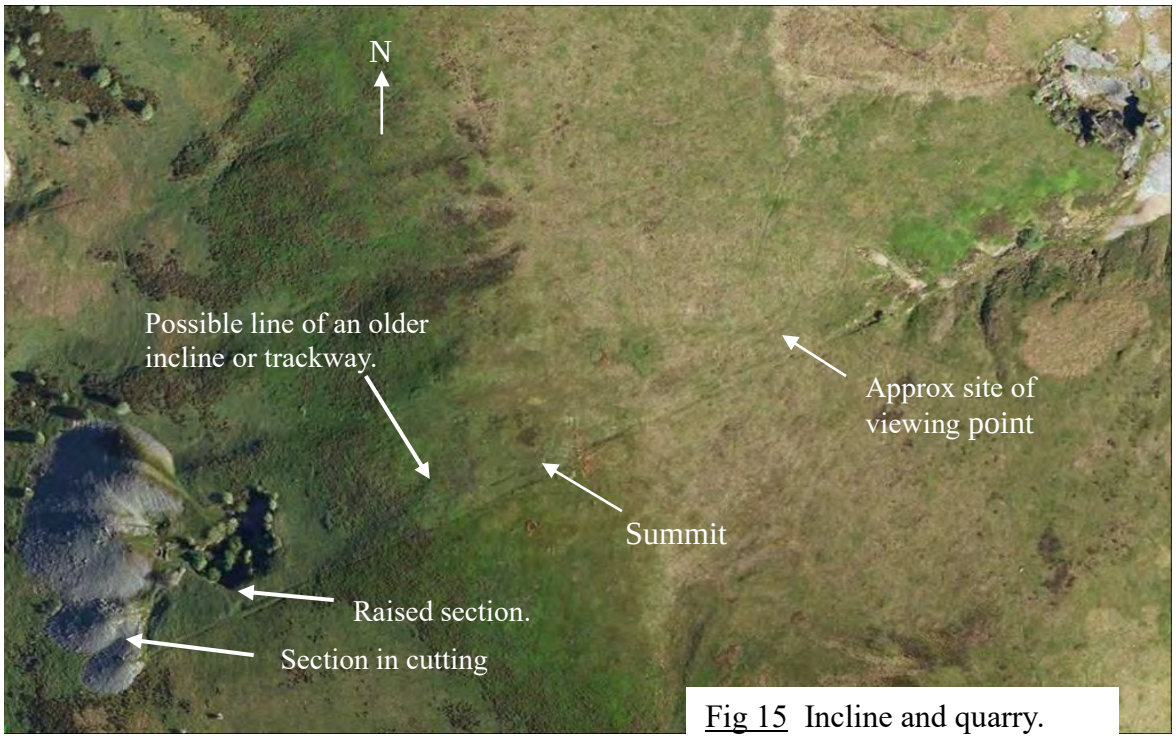


Fig 15 Incline and quarry.

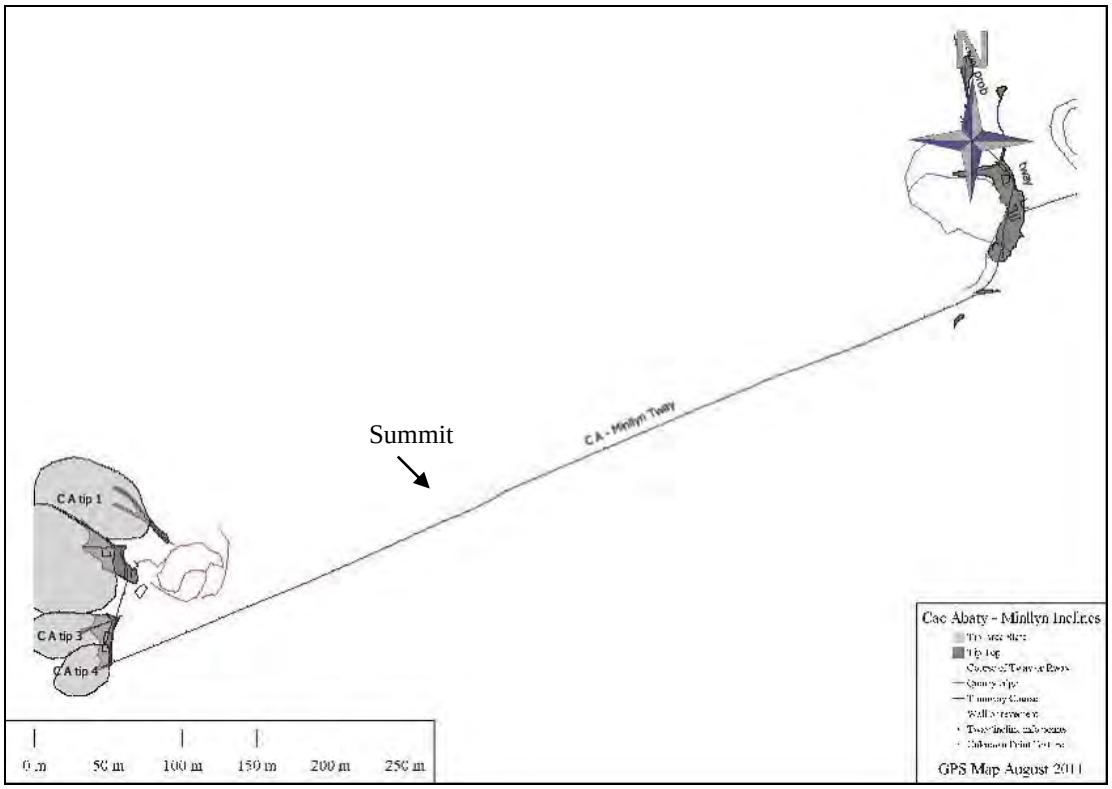


Fig 16 Plan of the Cae-abatty inclines.

Summit There was evidence of haulage equipment at the summit ie an almost full circle of brake banding, gearing, various bolts and a long broken timber, however it is thought that it had been left as it was being scrapped and may have been from the quarry. A report on this area can be found elsewhere.[10] In view of the evidence of the aerial photograph the area of the realignment of the incline at the Summit would possibly repay further investigation.

[10] Report by Peter Swift

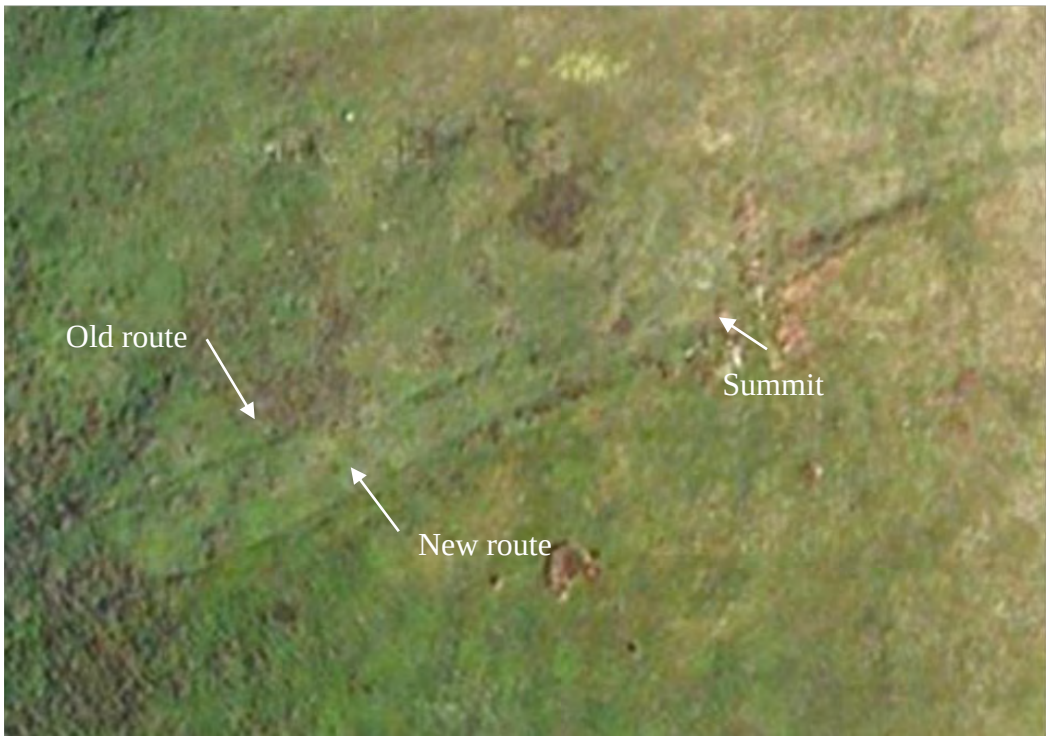


Fig 17. Area around the summit showing an apparent change in the route of the western incline.

Eastern Incline This is generally poorly defined and much eroded or covered by collapse of the hillside. From the summit the first few metres downhill have been built up to ensure a steady gradient from a raised area of out-cropping rocks. This work may have been necessary when the western incline was relaid. The top of the incline has some visible, in situ, sleepers. The incline from here descends over open common land but can be detected as two ditches with a level area of approx 1.50ms between them.

Fig 18 Eastern incline looking back to the summit (on the skyline by the upper figure).

Approx 15.50ms uphill from an abrupt change in inclination there is, to the south edge of the incline, a cut-out recess in the rock with a small rounded platform in front of it. As both the summit and the foot of the eastern side of the incline are visible from this point, about the only place this is possible, someone stationed in this recess would be able to monitor the progress of the waggons on the incline. The cut-out is approx 100cms deep x 700 wide with a platform of approx 600cms deep in front of it.

Fig 19 Cut out by side of eastern incline. From this point both the summit and foot of the eastern incline are visible. (Note that scale is marked in 20cms sections).

The incline then becomes much steeper and passes through a rock cutting. Below this the rest of the route is either washed away by a stream or covered by collapse from the hillside to the south of it. Part way down this section are the remains of a cog wheel which has been recorded elsewhere.[11] At the foot of the incline the track ran round to the head of the incline down to the old mill at Minllyn.

Conclusion.

Cae-abatty was a small and isolated quarry which, like many such enterprises, did not fulfil the potential expected of it. The rock is not good and delaminates easily which would have prevented it being suitable for large slabs and even as durable roofing slates although slates from there do seem to have been used at Minllyn. The transport difficulties could have been overcome if the quarry had proved more productive and profitable although the double incline would always have been a problem unless the underground workings between Cae-abatty and Minllyn were worked through. Without further investigation it is not known whether there was any underground working towards Minllyn and whether there was any plan to link the two concerns.

The slabs may have been dressed at the old Minllyn mill and then taken down to Dinas Mawddwy where, from 1867, it could be exported on the Mawddwy Railway. Access via the Blaen y Cwm valley to the south west and on to Aberangell would have been easier as suggested by Richards although that valley seems to have been under different ownership which could have involved costly wayleaves.

As the twll was worked it became necessary to alter the route of the incline as encroachment of the twll which into the incline route. This also involved realigning the trackwork at the summit and routing the incline further to the south. Trial scratching were made close to this new incline but nothing came of it and the quarry was not enlarged any further.

Hazel Fleming
Ian Walters
With additional reports from Mark Simpson and Peter Swift.
August/October 2011.

[11] Report by Peter Swift

Site	Minllyn Slate Quarry	**Doc No**	**ML050**
Subject	**Historical background**		
Doc Date	2011	See also	
Doc Type	report	Grid ref	SH 85 14
Drawing Type		Scale	
Drawing Medium	photocopy	Author(s)	DRhG
Doc Material	paper	Source	Plas Course
Doc Status	Original	Doc Size	A4, 6 pg
Notes			

MINLLYN AND CAE ABATY SLATE QUARRIES

PARISH: Mallwyd

County; Merioneth

Location: Minllyn SH 858 141

Cae Abatty: SH 846 136

LANDOWNERS

The 1841 tithe map and schedule for the parish of Mallwyd shows Moel Dinas and Mynydd Camlan Common as owned by **Jane Davies** and tenanted by David Edwards, but offer no evidence of quarrying.

Edmund Buckley of Gratton Hall, Yorkshire, and Ardwick, Lancashire, purchased the estate and lordship of Dinas Mawddwy from the **Mytton family** in 1856. The estate and lordship of Dinas Mawddwy passed to Sir Edmund Peck (b. 1834) during the lifetime of Edmund Buckley; the Gratton Hall and Ardwick estates passing to Sir Edmund on the death of Edmund Buckley.

Sir Edmund Buckley, 1st Baronet (16 April 1834-21 March 1910) was born as Edmund Peck, the illegitimate son of Edmund Buckley of Ardwick in Manchester. He assumed the name of Buckley by Royal Licence in 1864 and inherited considerable estates in Lancashire and Wales, including Dinas Mawddwy.

At the 1865 general election he was elected MP for Newcastle under Lyme, holding the seat until 1878, and was made a baronet in 1868. In 1872 he built a lavish Victorian gothic mansion at Dinas Mawddwy called 'y Plas'. In 1873 he built the Buckley Arms hotel, reputedly the oldest reinforced concrete building in Europe. Buckley died at the age of 75. Buckley married Sarah Rees, daughter of William Rees of Tonn near Llandovery in 1860. Sir Edmund's heir was his eldest son, Edmund Buckley (b. 1861)

(DRO: Buckley Trust papers).

REFERENCES

Tithe map and schedule

The 1841 tithe map and schedule for the parish of Mallwyd shows Moel Dinas and Mynydd Camlan Common as owned by Jane Davies and tenanted by David Edwards, but offer no evidence of quarrying.

Ordnance survey

XXXVIII 12. Only the 1901 survey is held by the DRO.

Other map sources

'Quarry' and 'Slate quarry' identified at SH ? respectively on DRO: Z/DCG/13, map of 1831.
Small scale map of 'Cae Abatty Slate Quarry' and 'Carlyle Slate & Slab Works' on Z/DCG/97, map of 1899

Newspapers

Carnarvon and Denbigh Herald 23 August 1845 (p. 2, col. 2) – sale advertisement for Maes y Gamlan quarry, includes 17 tons of wrought-iron rails, 20lbs peryard, 4 tons of chairs, 8 pairs of passplates, 3 tons of 1½" round bar 'used for rails', weighing machines, mill powered by 6-horse power steam engine by Blackburn of the Minories, powers 'three circular saw machines for cutting slate slabs; three superior planning machines, 2 of them on the rotatory principle, the whole of large dimension and great power ... nearly the whole of which is new.'

The Times 11 August 1856 'Dinas Mowddwy ... important rents and royalties insuing and payable from several valuable lead mines, slate quarries &c, now in operation.'
Cambrian News 13 October 1871 'MERIONETH SLATE AND SLAB COMPANY (Limited) Liquidation ... To be sold by auction before Henry Wilbraham Esq., the Registrar of the Manchester Division of the Above Court, by mr H. Pratt ... at the Clarence Hotel, Spring Gardens, in the City of Manchester on Friday the 24th. Day of October 1871. All rocks, slabs slates etc., The Farm and Land known as Maescamlan Caebatty ... All the mountain and unenclosed land known as Moel Dinas ... All the machinery, buildings etc., used in and about the said Quarry.

With the exception of the machinery and plant thje aove property is at present held on lease from Sir Edmund Buckley Bart, by the MERIONETH SLATE AND SLAB COMPANY (Limited) for the residue of a term of 31 years, from 25 December, 1864, with power of removal.'

Cambrian News 11 April 1873

'On Monday the 7th April, whilst some workmen were excavating some earth for the purpose of making a siding to some new workshops which were to be erected for Sir Edmund Buckley, Bart., at Minllyn, they are said to have knocked the pick into some vessel, apparently a very ancient earthen pot.'

Carnarvon and Denbigh Herald 5 April 1873. 'The quarry lies in the slopes of the hill called Bryn-yr-Wylfa, and from the inclination of the vein, which recedes into the depths of the mountain, the company are obliged to work at certain disadvantage, which, however, cannot be avoided, there being an immense quantity of rock lying upon it when approached from the opposite side of the mountain. The cleavage of slate rock is almost vertical, and from the absence of all joints, and the hard nature of the rock, it is far more adapted to the production of slabs. As a slab quarry it is one of th3 most important in the country. The blocks can be literally obtained in any required size. The plan of the quarry is the usual system of underground chambers – the uppermost chamber being uncovered. The blocks are conveyed down inclines to a large machine room at the foot of the hill, where there are over forty planning and sawing machines driven by water power. It is much to the credit of the present agent, Mr O. Roberts, that he has at last made the quarry become so productive: no doubt the directors of his company have no objection to judge of the state of the quarry by results. With the railway so convenient and the briskness in the slate market, we may hope for good things to come. The company style themselves the Caerlylis Slate and Slab Company.'

Cambrian News 22 September 1876

Advertisement of sale of Dinas Mawddwy estate on 17 October 1876. 'Lot 23. All those two farms called Maescamlan and Cae Battyn, containing 117a 0r 13p, and sheepwalks over 346a 0r 2p, or thereabouts, situate in the parish of Mallwyd, in the occupation of Huw Lewis and John Pugh ... and also that Slate Quarry, now being worked by the Carlyle Slate and Slab CompanyLimited, under a lease to them for 31 years from the 16th day of February 1865 (at a rent by way of royalty, which for the year ending 31st March 1876, amounted to £299 1s. 1d.), with the option of renewal on the same terms and conditions as are contained in nthe said lease, for a further term of 31 years, upon a payment of a premium of £2,000, and the machine house, workshops, offices and cottages belonging to the same. This lot will be sold subject to the said lease, and to a perpetual yearly rent charge of £2, payable out of Maescamlan Farm.'

Cambrian News 20 October 1876

'Lot 23 ... This lot was purchased by the Carlyle Slate and Slab Company by private contract'

Cambrian News 11 February 1887

Notice of sale by order of mortgagees, at the Buckley Arms Hotel, Dinas Mawddwy on 23 February 1887, of the farms Maescamlan and Cae Bettyn, with the slate quarry known as the Carlyle Slate and Slab Co. Auctioneers Messrs Mair, Blunt and Yates, solicitors of Macclesfield, who also acted for the Bradwells.

Cambrian News 11 October 1889

'To be let – a large substantially built and well lighted warehouse or workshop of five rooms, situated at Dinas Mawddwy, Merionethshire; they adjoin the Mawddwy Railway Station and have a siding from the railway running into them. For further particulars, apply to Minllyn Slate Company, Dinas Mawddwy, Merionethshire.'

Cambrian News 1 February 1895

Public meeting on 25 January held to protest at refusal of Minllyn Slate Co. to join in scheme for paying higher rates on the Mawddwy Railway in order that the line could meet cost of improvements required by BofT. J.H. Bullock, quarry manager, eventually persuaded to sign document.

Mining Journal

MJ 10 Feb 1866 – company with a capital of £300,000 formed in London for the purchase of Ty'n y Coed quarry at Arthog. Proprietors , D. Davis and Co., have worked this quarry and also Dinas Mawddwy quarry on Mr Buckley's estate. Mr C. Robins is the managing Director here, 'and Mr W. Davies, of the Ty'n y Coed quarry.'

MJ 28 August 1869 'VALUABLE SLAB QUARRY TO BE LET, on the ABERLLEFENY VEIN, situated about three and a half miles from a railway station, in a very advantageous place to work. The sett contains about SEVEN or EIGHT ACRES, with water power to work a large number of machines. The quarry is sufficiently open to prove the quality of the rock and the regularity of the foot joints, which are good. Slabs of large dimensions are made, which can be seen. Apply to Mr EDWARD DAVIES, Mawddwy Cottages, Dinas Mawddwy, Merionethshire'

ARCHIVAL SOURCES

DRO/Z/DCG/8 Letter to Mr Hugh Vaughan at Dinas Mawddwy from J.L. Longueville – no objection to HV's desirev for a take-note to make trials for coal, slate and ore on common adjacent to land belonging to Mr Mytton in township of Maesglassey and Bwlchsiglen as well as on the commons adjoining it in the township of Dinas and in other parts of the common called Briachmelyn ? 1820s

DRO: Z/DCG/97 Counterpart lease of slate quarry at Dinas Mawddwy for 30 years from Sir Edmund Buckley Bart of Plas Dinas Mawddwy and Edmund Buckley esq of 2 Belle Vue Terrace Barmouth to Sir Edmund Buckley.

SECONDARY SOURCES

Thomas Davies: *Dinas Mawddwy a'i Hamgylchoedd* (1893), p. 72. 'Minllyn Quarry. This stands at the top of Moel Maes Camlan above the railway station in Dinas Mawddwy. Sometime between 1793 and 1800, Hugh Vychan worked a quarry in a place that is known today as no. 5. Many worked there at the beginning of the 19th century. A Mr Davies, Celyn Brithion, worked a mine here for a short time; he opened No. 1. After this, Captain Allen, Caergof, worked as an agent here. About 50 years ago, the Lord of the Manor, Mr John Bird, worked the quarry with Mr Hugh Jones, Shop, as steward.

The powder was brought from Shrewsbury or Bala. There was no constant working until in 1865, the quarry was let to the Carlisle Slate and Slab Company, for 31 years, on payment of £2,000. This company was very strong and spent a good deal on the place. In 1867 (the year the railway between Dinas and Cemmaes Road was opened) over 160 worked in the quarry, producing 240 tons of slate (slabs) a month. When Sir Edmund's property was sold in 1876, the company bought the slate quarry and Maes Camlan farm. Things came to a standstill in 1887, but the quarry is now worked constantly.'

Julian Hunt: *Arriving at Dinas Mawddwy* (Dinas Mawddwy 1989), pp. 7-8. 'At Dinas Mawddwy, Sir Edmund let the hillside above the Railway Station to the Merioneth Slate and Slab Company. There had been quarries here since 1800, but the new company opened several new levels and linked them to the Railway with an incline, the line of which can still be seen. The trucks were brought to the large shed on the Aberangell road, where the slate was cut and planed, while the finished slate was stored in the warehouse which now houses Meirion

Mill. The Agent, Mr. C. Bobbins, lived at Dolbrawdmaeth, and became a prominent figure in the community. He had a work-force of 160, producing about 240 tons of slate per month. Unfortunately, Mr. Bobbins over-reached himself. In January of 1871, Sir Edmund took his father-in-law to the quarry, and the gentleman wrote in his diary, "Walked with Edmund and Dr. Whitehead to the farm .... thence to Minllyn Slate Works which are not flourishing ". By October of that year, the company was in liquidation, and at an auction in Manchester, its assets were purchased by the Carlyle Slate and Slab Company. This organisation continued the quarries and lent its name to the two houses next to the cutting shed, Carlyle Terrace'

Diary of William Rees (quoted in Hunt's ts notes)

2 February 1866 'the Minllyn slate works which are also getting on rapidly. After going to the Dinas Stone Quarry we returned to Bryn for dinner.'

29 November 1866 'Rode with Edmund to the Plas and inspected the house, garden, gas works, new cottages, diversion of the Dolgellau road, slate works and buildings. Met Mr Robins and Stephens about diverting the road and having a supply of water for the works.'

20 January 1871 'to Minllyn Slate Works, which are not flourishing'.

Workforce

1872 – 60 (DRO: Z/DBE/58, p. 27)

CAE ABATTY QUARRY SLATE MALLWYD MERIONETH
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Notes:
no company registered with this name

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References:
Richards, Alun J, *Gazetteer of Welsh Slate Industry* 2nd ed. 2007 p. 240

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Persons, companies and organisations:
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1874-1886 Carlyle Slate & Slab Co Ltd, Operator
1876-1877 Longdon, R, Mine Agent
1878-1882 Forster, Thomas, Mine Agent
1883 Waymouth, F J, Mine Agent
1885-1886 Bullock, W H, Mine Agent
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Report of the Departmental Committee upon Merionethshire Slate Mines – 1895 [C.7692]
The Times 23 Jan 1883 p. 4

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see also MINLLYN QUARRY

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References:
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Mining Journal 1883 p. 1164

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DINAS MAWDDWY QUARRY MALLWYD MERIONETH SH855148

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DOLBRAWDMAETH QUARRY SLATE MALLWYD MERIONETH

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MINLLYN NORTH QUARRY SLATE MALLWYD MERIONETH SH851142

References:
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MINLLYN QUARRY SLATE MALLWYD MERIONETH SH854138

Persons, companies and organisations:
1884 Bullock, W, Mine Agent
1884 Carlyle Slate & Slab Co Ltd, Operator (Limited Company)
1887 Bullock, W, Owner or Operator
1888 Bullock, W, Mine Agent
1888-1926 Minllyn Slate Co, Owner or Operator
1889-1926 Bullock, J H, Mine Agent

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1884 Operator (Limited Company) MINLLYN QUARRY [Home Office List of Mines 1884]

Minllyn Slate Co
1888-1926 Owner or Operator MINLLYN QUARRY [Home Office List of Mines 1887–1926]