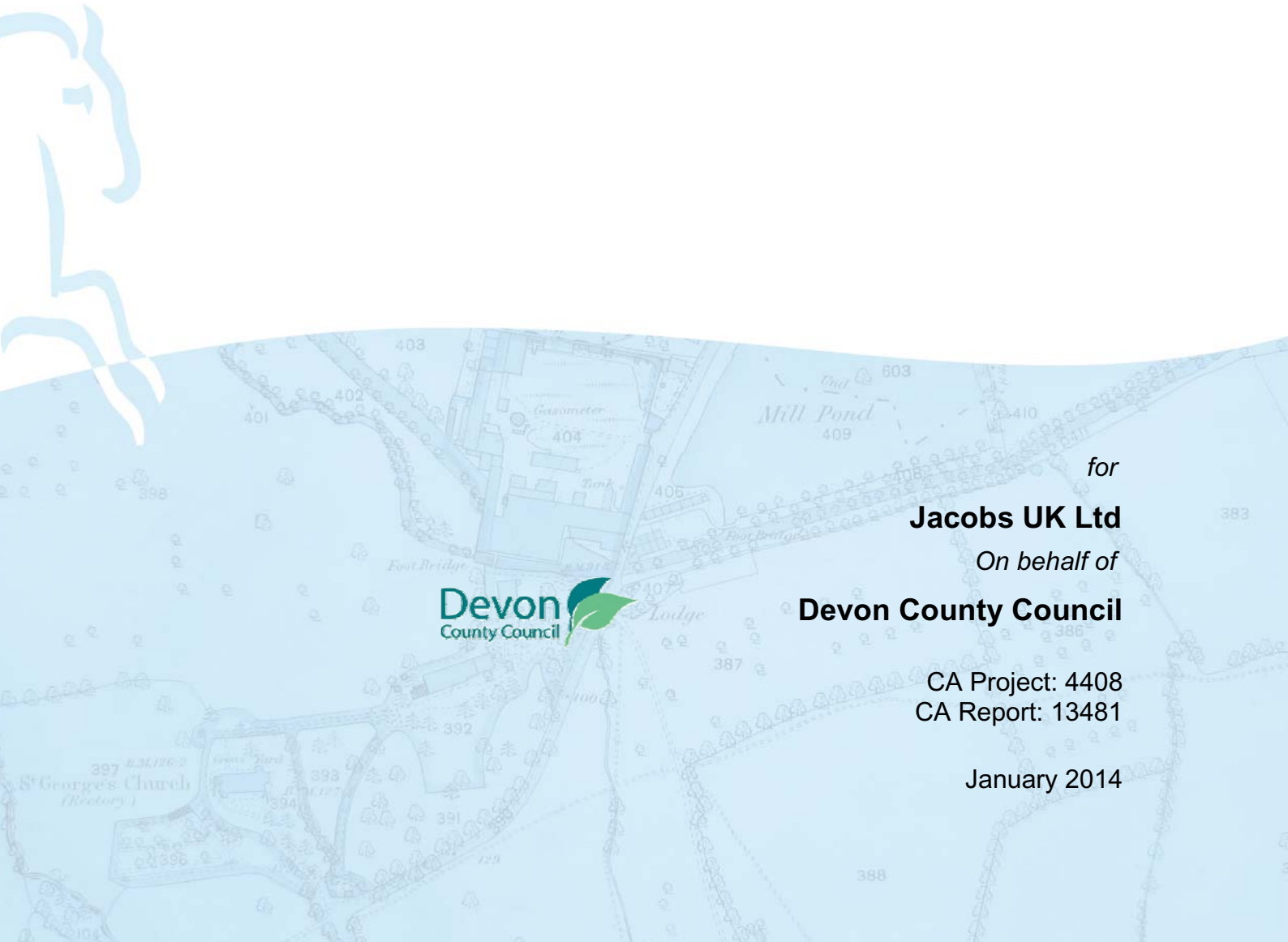
Cotswold Archaeology

The Grand Western Canal
Halberton
Devon

Interpretative earthwork survey, photographic survey and watching brief



for

Jacobs UK Ltd

On behalf of

Devon County Council

CA Project: 4408
CA Report: 13481

January 2014

The Grand Western Canal
Halberton
Devon

Interpretative earthwork survey, photographic survey and watching brief

CA Project: 4408
CA Report: 12382

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LIST OF ILLUSTRATIONS

SUMMARY

Project Name:	Grand Western Canal
Location:	Halberton, Devon
NGR:	ST 01150 13125
Type:	Interpretative earthwork survey, photographic survey and watching brief
Date:	June 2013 – November 2013
Location of Archive:	To be deposited with Royal Albert Memorial Museum & Devon Heritage Centre

An interpretative earthwork survey, photographic survey and watching brief were undertaken on a section of the Grand Western Canal, Halberton, Devon in association with restoration work around a breach in the canal embankment.

Detailed plans, elevations and sections as well as a photographic record of the exposed fabric of the canal and associated infrastructure were completed. Boundary markers on the northern side of the canal which marked the limit of GWR's property in the late 19th century were recorded prior to their temporary removal. A milestone marker was also recorded along the embankment, but this was not subject to disturbance.

The Swing Bridge was recorded and identified as an original structure with a range of repairs and slight alterations. An engineering note from the late 19th century records the structure as it appears today, suggesting limited subsequent alterations.

Prior to the restoration works, the embankment of the canal was observed to be a simple construction consistent with documentary evidence of its construction. The restoration works within the canal route partially exposed *in situ* remains of a stop gate potentially dating to the use of the canal in the late 19th century.

No further features or deposits of archaeological interest were observed during the groundworks and, despite visual scanning of spoil, no artefactual material pre-dating the modern period was recovered.

1. INTRODUCTION

1.1 In June 2013 Cotswold Archaeology was commissioned by Jacobs UK Ltd, on behalf of Devon County Council to carry out an interpretative earthwork survey, photographic survey and watching brief around the site of a breach in, and latterly restoration of, the canal embankment that occurred on 21 November 2012 at land north of Halberton, Devon (centred on NGR: ST01150 13125; Fig. 1).

1.2 The archaeological works were carried out following the agreement of the project objectives by Devon County Council in response to the canal breach and the nature of restorative works. The objectives of the archaeological works were laid out in the Written Scheme of Investigation (WSI) prepared by Jacobs UK Ltd (2013b), and were as follows:

- To provide a documentary record of the Grand Western Canal in the area of the breach in its current form and condition to English Heritage Level 3 standards (2007);
- To create a photographic record of the GWR boundary markers in their current location in accordance with English Heritage guidance (2006), prior to removal for construction of the scheme;
- To identify, investigate and record any archaeological remains revealed by the repair works to the extent possible by the methods put forward in the WSI; and
- To disseminate the results of these works through deposition of an ordered archive at a local museum, the deposition of a detailed report at the Devon Historic Environment Record, and reporting at a level of detail appropriate to the significance of the results.

1.3 The interpretative earthwork survey and photographic survey were completed in June 2013, while the watching brief observations were undertaken during the period June to November 2013. During the course of the interpretative earthwork survey and photographic survey, records were made of the Swing Bridge to supplement the planned mitigation works.

1.4 The specification for the interpretative earthwork survey and photographic survey was informed by *Understanding the Archaeological of Landscapes* (English Heritage

2007), *Standard and guidance for the archaeological investigation and recording of standing buildings or structures* (IfA 2008), the *Management of Archaeological Projects 2* (English Heritage 1991), *The Management of Research Projects in the Historic Environment (MORPHE): Project Manager's Guide* (English Heritage 2006) and *Understanding Historic Buildings: A guide to good recording practice* (English Heritage 2006). The watching brief followed the *Standard and guidance for an archaeological watching brief* (IfA 2009), the *Management of Archaeological Projects 2* (English Heritage 1991), and the *Management of Research Projects in the Historic Environment (MORPHE): Project Manager's Guide* (EH 2006).

The site

1.5 The site comprises areas of land subject to groundworks within and around the area damaged during the canal embankment breach (Fig. 1). The site lies to the north of Halberton and is surrounded by modern farmland. The underlying solid geology of the area is mapped as Sandstone Breccias of the Exeter Group dating to the Cisalurian epoch of the Permian period (BGS 2013). The natural substrate encountered on site comprised sandy clays with occasional patches of gravel and degraded sandstone

2. BACKGROUND

2.1 The archaeological and historical background to the site has been outlined in a Heritage Statement (Jacobs 2013a) and is summarised below.

2.3 There are no remains dating to the prehistoric period within a 100m search area surrounding the site, although a prehistoric struck flake and a Bronze Age axe have been found in Halberton. Furthermore there are no remains from the Roman period within the nearby area, although Roman coins and pottery, ceramic tile fragments and iron tap slag have been found at Batten's Farm 1.2km to the west of the site.

2.4 The fields in the immediate vicinity of the site are believed to have been established in the medieval period. The general field pattern, as seen on early mapping, suggests that the Halberton open fields were enclosed by agreement. The Mid Devon District Council (MDDC) Historic Landscape Characterisation defines Barton Fields to the southwest as relatively large, regular enclosures that are likely to have been laid out in the 15th to 18th centuries. The rest of the area adjacent to the canal is characterised by as modern enclosures based on medieval fields (MDDC 2011).

2.5 The Halberton section of the Grand Western Canal was built between 1810 and 1814 to the designs of John Rennie, and was restored and reopened between 1966 and 1974. It is shown on the 1889 OS 1:2,500 mapping with no visible significant differences from its present condition (Fig. 2). The canal is designated as a Conservation Area. Within the area subject to these mitigaiton works, the canal runs through both cuttings and elevated sections within an embankment

2.6 At the western end of the survey area is the Swing Bridge. It has been known by this name since at least 1886, though notes recovered during the course of this work dated to 1889 termed it Valley House Bridge (the notes and illustration of this date are reproduced in Appendix A and hereafter are referred to as the '1889 engineer's notes').

2.7 Two boundary markers which normally established the boundary of GWR property ownership were known to be present along the embankment. Both are stamped 1897, and are consistent with the general design of boundary markers which GWR used across their territory The installation of the markers followed the assumption of ownership of the canal by GWR in 1888, after a sustained period of decline in competition with the Bristol and Exeter railway. Very little research has been completed with respect to such markers, but a cast iron form painted in black oil tar appears commonplace (Putley 2005).

2.7 The mitigation works were focused around the site of a breach in the canal embankment which occurred in November 2012.

3. METHODOLOGY

3.1 The mitigaiton work followed the methodology set out within the WSI (Jacobs UK Ltd 2013a). With respect to the interpretative earthwork survey and photographic survey, work was underpinned by *Understanding the Archaeological of Landscapes* (English Heritage 2007). This was specified within the WSI to form a level 3 landscape survey. With respect to the watching brief, an archaeologist was present during intrusive groundworks comprising the construction of a contractor's haul road, associated working spaces, the site compound and the canal channel works. Following the completion of initial observations, further archaeological remains were identified by a Jacobs engineer. These remains were not to be subject to further disturbance as part of the restoration works and, furthermore, they were likely to be

in a stable environment which would not be disrupted by the exposure necessary to record them. Following consultation with Devon County Council undertaken by Jacobs on the discovery of the canal gate, it was determined that the Grand Western Canal Trust would take forward any further examination of the structure.

3.2 Where archaeological deposits were encountered written, graphic and photographic records were compiled in accordance with CA Technical Manual 1: *Fieldwork Recording Manual* (2013). This accords with the requirements of the WSI (Jacobs 2013b).

3.3 The archive from the mitigation work is currently held by CA at their offices in Kemble. The paper and digital site archive will be deposited with the Royal Albert Memorial Museum. A summary of information from this project, set out within Appendix E, will be entered onto the OASIS online database of archaeological projects in Britain.

3.4 This report adheres to the standards as presented within the WSI (Jacobs 2013b) including *Understanding the Archaeology of Landscapes* (2007) and *Standard and guidance for an archaeological watching brief* (IfA 2008) and MORPHE (EH 2006).

4. MITIGATION WORKS

4.1 This section provides an overview of the mitigaiton works; detailed summaries of the recorded contexts, finds recovered and photographs taken are presented within Appendices B, C, and D respectively. Appendix D relates to the photographic record of the survey, and relates to Figures 24 and 25 which show the photograph locations.

4.2 The mitigation works resulted in records regarding the canal structure and the related Swing Bridge, boundary markers and milestone marker.

General landscape overview

4.3 The canal follows approximately the 90m AOD contour along the southern edge of the heavily dissected landscape forming the extreme south-eastern edge of Dartmoor, just north of Halberton. This is a small village overlooking the lower and less undulating land of the Spratsford Brook and its unnamed tributaries, which

eventually flow into the River Culm. The Mid Devon Landscape Character Assessment (MDDC 2011) defines the surrounding landscape as Landscape Character Type 3T indicating the area varies between gently rolling and strongly undulating farmed and settled landscape, the farmed areas being intensive.

4.4 The floor of the valley which the embankment crosses is at approximately 75m AOD, but drops gently from north to south as it crosses the site (Fig. 2).

4.5 The Heritage Statement reproduces the proposal maps for the canal route dated 1811 (Jacobs 2013a. Pl. 2), although the final route is to the south of that shown. Comparison of this map with post-construction mapping shows that the present access to Valley House and Swing Bridge post-dates 1811. The alignment follows an earlier field boundary for the most part but, to the north of the Swing Bridge, picks up the line of the original east/west access track from Greenway to the west (as illustrated on the 1st edition OS map). It also indicates a more intricate field pattern based on non-parliamentary enclosure and grouping of strip fields. These divisions were recorded on mapping of 1886, though have been increasingly attenuated by the removal of boundaries to enlarge fields.

4.6 Ordnance Survey maps from 1886 (Jacobs 2013a, Pl. 3) recorded the site after the construction of the canal. These illustrate limited alterations within the study area, which remained in agricultural use throughout the 20th century.

The Swing Bridge and stop lock gates (Fig. 3)

4.7 At the western end of the survey area is the Swing Bridge. It has been known by this name since at least 1889 when it was illustrated on the 1st edition OS map, though the canal engineer termed it Valley House Bridge in 1889 (Appendix A). The bridge serves to facilitate landowners' access to fields split by the canal rather than the crossing of a public road. The bridge deck itself is modern, but of similar form to that shown on the 1889 engineer's notes.

4.8 The abutments are simple and nearly identical on each side (Fig. 4 and 5). The southern side has a long retaining wall running to the east supporting the ramped approach parallel to the canal. To the west, the ramp is a simple earth embankment. The northern side comprises a simple ramp on an embankment at approximately right angles to the canal and is retained by flanking walls as it reaches the bridge. The flanking walls on both sides are of rubble construction (Fig. 6).

4.9 The Swing Bridge as it exists today is a high level fixed crossing, allowing boats to pass under (Fig. 7). The deck was 3.48m above the water level in the canal on 1 July 2013 compared to a recorded clearance of 2.57m on the 1889 engineer's notes. If accurate, this means the canal was full to the bottom of the kerbing course under the bridge in 1889.

4.10 The face of each abutment is constructed of large ashlar blocks, identified as sandstone breccia (Fig. 8). These return a short distance into key into the flanking walls, which are constructed of rubble (Figs 4, 5 and 9). The northern abutment has a continuous ledge or corbel supporting the end of the road deck which was not apparent on the south. The corbel is shown on the 1889 engineer's notes at its present level, suggesting no alterations. The blocks were originally laid in a reddish lime mortar, but this is mostly obscured by a variety of lime and cementitious re-pointings but there is no underlying suggestion of multiple phases of construction.

4.11 The northern abutment rises directly from the tow path level (Fig. 4), but on the south the abutment is set back to allow the tow path to pass in front of it and under the bridge (Fig. 8 and 9).

4.12 The abutments rise from a lower structure forming a stone-built channel (Fig. 10). The sides of this channel are slightly battered and built of large ashlar blocks. The coursing consistently diminishes upwards and then is capped with a deeper capping or kerbing course. The eastern and western ends are splayed and curved as they meet the canal.

4.13 The abutment stone-work is paler and less red than the upper parts, but this is presumably due to it being submerged for its working life and weathering differently. The bedding is different as it appears to be a pale grey, hydraulic lime mortar, again repointed at different times, most recently in a pale grey, cementitious mortar. Much more of this stonework has lost its pointing, especially on the curved entrance walls.

4.14 At the eastern side of the Swing Bridge, evidence of stop lock gates was noted (Fig. 4). It is noticeable that the recesses for the stop lock gates and the curved entrance flanks and the main wall are coursed differently from each other. Despite this they appear to be contemporary, indicated by the way the courses in the north-eastern stop lock and its curving entrance wall interlock (Fig. 10).

4.15 Each recess has a channel in its inner end which held a timber post, traces of which remained (Fig. 10). This was braced back into the wall by a horizontal beam which

ran for an unknown distance into the lower wall structure. Again, some traces of these timbers remained. These observations were supplemented by records completed during the watching brief (see below).

4.16 A small area in the top centre of the southern abutment seems to have had stone blocks removed and replaced: this substitution was clear because of the use of extremely coarse-textured breccia blocks, set in a red mortar (Figs 11). This replacement was not affected by cementitious pointing. There is no sign of such alteration on the northern abutment.

4.17 While it is possible that the alteration to the southern abutment and the existence of a corbel on the north side indicates that the bridge did swing, there is no sign in the present structure that a low level horizontally-pivoted Swing Bridge ever existed. The bridge deck is of modern steel beam and concrete panel construction (Fig. 11), with simple angle-iron hand rails and posts bolted to it and each other.

Milestone and boundary markers (Fig. 2, 12 and 13, 20)

4.18 The extant milestone is probably original to the canal. It is a plain, round-topped stone pier with a simple capital V carved on the face towards the canal. It is drawn on the sketch map made of this part of the canal in August 1889 by the Canal Engineer in his note book, labelled '5 mile' (Fig. 12).

4.19 The boundary markers delimited the edge of the GWR's property on the northern side of the canal west of Swing Bridge (Fig. 2). The cast-iron, disc-shaped heads are marked with "Grand Western Railway Cos" around the edge of the flat top with "Boundary 1897" in the central zone surrounded by a raised rib (Fig. 13).

4.20 The discs are mounted horizontally on posts made of sections of broad-gauge rail (the lightweight 'bridge rail'). This would have been freely available after the final abandonment of broad gauge in 1892.

The canal embankment interpretative earthwork survey

4.21 In an attempt to reduce the number of locks and therefore the amount of water required, Rennie re-routed the canal on a lower line, but one that required more cutting and embanking than originally envisaged (Jacobs 2013a). To cross the valley between Swing Bridge and Rock Bridge required a massive embankment, 15m high, and at its base up to 77m across (Fig. 14). The local source material was the sandy

soil derived from the bedrock and the bedrock itself, as was exposed as a result of the breach (Fig. 15-17).

4.22 Observations at the site of the breach indicated that no structure is apparent in the body of the embankment, which appears to be of simple dump construction (see particularly Fig. 15). The recorded section of the embankment runs for *c.*350m. The foot of the embankment has a low dry-stone rubble wall, dilapidated in places, but not more than *c.* 1.2m high (Fig. 18). It is now referred to as a toe wall. In terms of purpose it is too small to have been designed as a retaining wall, but may have helped keep dumped material in place and/or mark out the area to be raised. Very little of the toe wall was visible during the course of this element of the survey.

4.23 The south toe wall was more carefully built and mortared where it passes over the culvert which took the stream in the bottom of the valley under the embankment (Fig. 2 and 19). The depth of the culvert was estimated to be between 3m and 4m.

4.24 The north toe wall was buried by the material washed over it during the collapse. Mechanical excavation took place to recover the line of the culvert and to allow repairs. This revealed the embankment-foot wall, similarly well-built and mortared, but the extent of this well-built wall could not be established beyond a three-metre length exposed.

4.25 The canal itself was formed by a channel 2.4m to 2.6m deep (from top of bank to base of canal) with sloping clay lined sides (Fig. 20 and 21). The bank material was subject to routine repairs, leaks are mentioned the 1889 Canal Engineer's notebook. What appears to have been clay lining (but was possibly clayey sediment) was visible as a dark greyish-brown clay at the east and west ends of the scoured-out base of the canal either side of the breach itself, and around the empty cut at Swing Bridge (Fig. 22).

4.26 The fields north of the embankment were improved pasture and had clearly been ploughed in the past and presumably occasionally under the present regime. No earthworks were visible in these areas.

The watching brief observations

4.27 Groundworks comprised two distinct activites: the first being the restoration of the ground surface outside of the canal and its embankment (alongside the necessary project infrastructure) shown on Figure 2, and the second being restoration works within the canal channel itself (see Fig. 3).

Groundworks outside the canal

4.28 Groundworks as part of the former activities exposed the natural geological substrate, 102. This comprised sand clays with occasional patches of gravel and degraded sandstone, revealed throughout the monitored areas at a typical depth of 0.45m below present ground level. This was overlain by silt sand subsoil, 101, averaging 0.3m in thickness, which was in turn sealed by 0.15m of topsoil, 100. No features or deposits of archaeological interest were observed during groundworks in these areas and, despite visual scanning of spoil, no artefactual material pre-dating the modern period was recovered.

Groundworks within the canal channel (Figs. 2)

4.29 During the course of the removal of the temporary dam within the canal channel, *in situ* remains of a stop gate were partially exposed adjacent to Swing Bridge. Both Swing Bridge and evidence for the stop gates had previously been recorded (CA 2014). The results as presented here represent the extent of observations permitted by the limited exposure of the stop gate fabric.

4.30 The remains of the stop gate lay at the western side of Swing Bridge (Fig. 23), and comprised elements of the gate frame and door (Fig. 19). The stone abutments for Swing Bridge were constructed with four purpose built H recesses within which the stop gates operated. Elements of the wooden framework (particularly timber 214) were identified, indicating the gate rotated around a point at the eastern extent of the recess. The frame, particularly timber 215, extended under the stone fabric of the bridge abutment within the recess. Timber 214 ran alongside frame timber 215 and sat on top of a horizontal timber beam, 213, itself visible across the width of the canal.

4.31 The stop gate door was positioned horizontally on the base of the canal floor, equating to its open position. Three of the timber beams forming the edge of the gate door were exposed: the top 200, bottom 202, and northern side 201. These were joined together with iron fixings (203 – 207 inclusive as illustrated on Fig. 3). Timber planks 209 – 212 were partially exposed, but the gate as a whole is presumed to measure approximately 2.30m x 5.30m (7 feet 10 inches x 17 feet 5 inches). Timber 202 was rounded on its eastern side presumably to facilitate rotation to the upright, closed position against timbers 213 and 214.

The Finds evidence

4.32 A layer of brown silt, 217, had accumulated over and around the stop gate remains and was the only source of artefacts. Finds recovered from this layer included glass, clay tobacco pipe, leather and a metal object. The finds are of minimal archaeological significance and will not be retained.

Glass

4.33 Three glass vessels and four fragments were recovered. The complete vessels recovered were a modern clear glass ramekin, a modern clear glass bottle with a Bakelite lid and a small, pale green bottle stamped “Foster Clark & Co, Maidstone” on one side and “Eiffel Tower Lemonade” on another. Bakelite was developed in 1907 and Foster Clark & Co was in business from 1891 to 1965.

4.34 The fragments were all of dark green bottle glass, they included a bottle base with “Ricketts, Bristol” stamped on the base and a bottle base with the partial word “verton” stamped on the front. The three-part glass-making mould was developed by Henry Ricketts in 1821, which enabled the company name to be embossed on the base of the bottle.

Clay tobacco pipe

4.35 One fragment of a spurred clay tobacco pipe bowl with attached stem was recovered. The bowl featured vertical rib decoration which suggests a date the 19th century or later.

Leather

4.36 Three fragments from a post-medieval/modern leather shoe were recovered.

Iron

4.37 Three fragments from a cast iron vessel, which most likely dated to the 18th or 19th centuries was recovered.

5. DISCUSSION

5.1 Documentary evidence and primarily engineer's records show that the canal was maintained actively from the late 19th century onward, and the Swing Bridge specifically has been repointed and repaired up to the present.

5.2 Given that the Swing Bridge and earthworks are recognisable from the 1889 engineer's notes, they represent a relatively unchanged example of their type from the late 19th century. The construction of the embankment is consistent with the trends of the period (particularly the early 19th century) when canal construction ceased to be limited to areas conducive for construction through natural topography (such as the Shropshire Union Canal), in addition to existing canals being shortened (for example the Oxford Canal). The Grand Western Canal is one such canal given the embankment was required because of the valley crossing. It seems likely that, in common with the Shropshire Union Canal (Hadfield 1969), the embankment material was in the majority derived from areas of cutting at either end of the embankment site. This would be consistent with the observations of the fabric of the embankment as homogenous clay. The greatest impact upon the embankment since construction would appear to be the breach which occurred in 2012.

5.3 Within the canal channel, groundworks partially exposed *in situ* remains of a stop gate whose form was consistent with engineer notes from the late 19th century. The stop gate was located at the western side of the Swing Bridge, while the eastern side of the bridge was noted be similarly designed indicating a stop gate may have operated there. During the watching brief observations there was insufficient evidence to indicate how the stop gate mechanism actually worked, with all interpretations relying on structural elements not directly observed.

5.4 The stop gate remains appear consistent with the 1872 text "*The Principles and Practice of Canal and River Engineering"* within which Stevenson notes that stop gates typically occurred in pairs that were designed to shut in opposite directions to one another (Stevenson 1872). This is similar to earlier concepts, advanced by a number of 18th century engineers including James Brindley, whose purpose was to guard against the worst impacts of a canal embankment failure. The type most similar to this design are commonly termed safety gates and use pressure of water flow to ensure their closure (Martin 1813:302). The gates at the Grand Western Canal through the addition of a chain (inferred by the metal fixings recorded) are clearly stop gates.

5.5 Apart from within the canal channel itself, the results of the watching brief observations were negative, and did not identify any features or deposits of archaeological interest and, despite visual scanning of spoil, no artefactual material pre-dating the modern period was recovered.

6 REFERENCES

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APPENDIX A: 1889 ENGINEERS NOTES

ENGINEER'S NOTES COMMENTARY

INTRODUCTION

A During the course of observations, the Grand Western Canal Trust provided copies of pages of the engineer's notes relating to the maintenance of the Grand Western Canal, dated 1889.

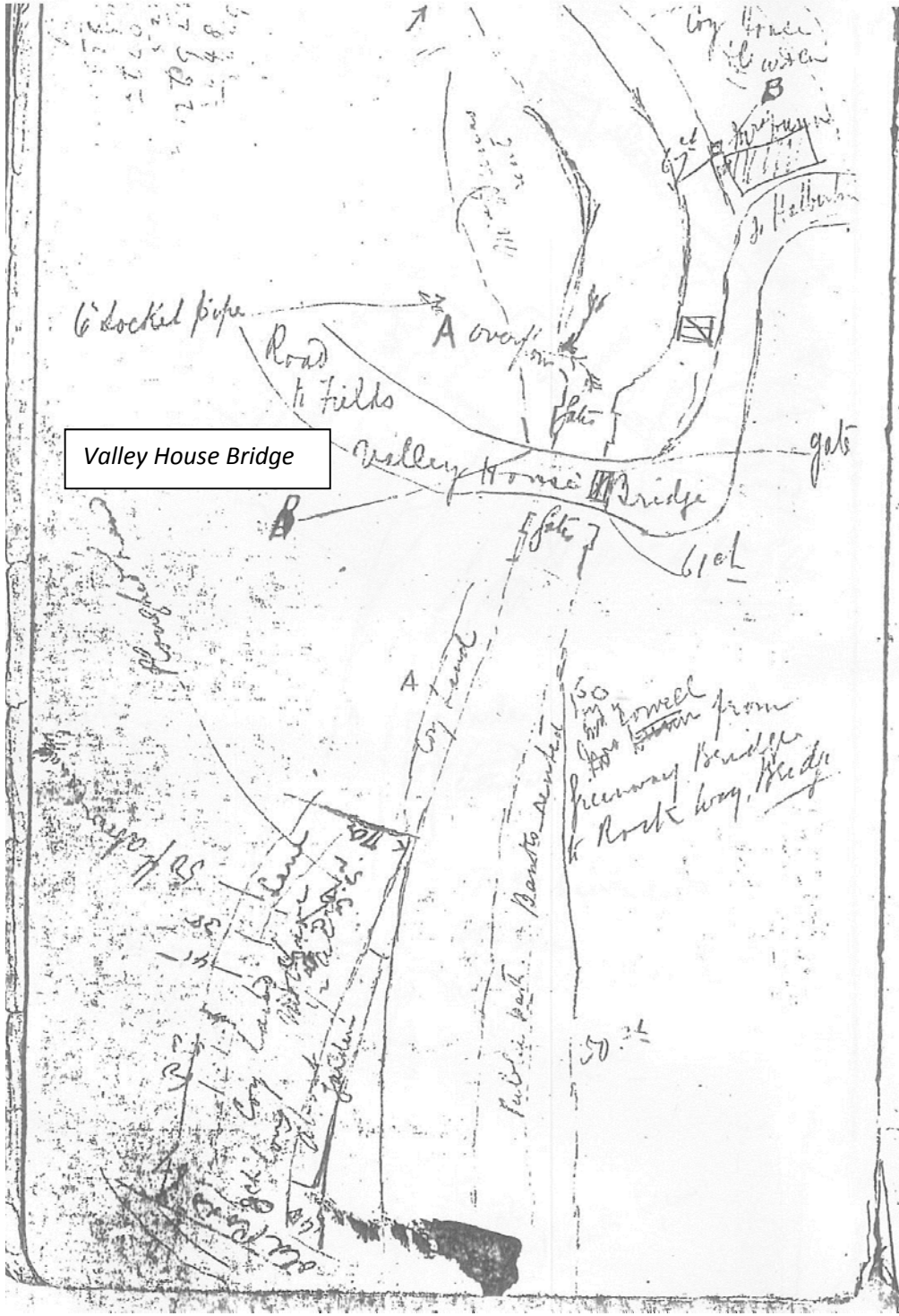
B The excerpt of the notes provided within this appendix relate to the section immediately surrounding the Swing Bridge.

DESCRIPTION

C The notes appear to be a functional description of the on-going maintenance of the canal and associated infrastructure. Whilst the date of the notes overall is 1889, many of the notes appear to relate to events prior to this.

D Two key points of interest are noted on the included excerpt: firstly the Swing Bridge was at that time referred to as Valley House Bridge, and secondly the note of a period of repairs on the eastern stop gate which occurred between the 8th and 24th August 1887.

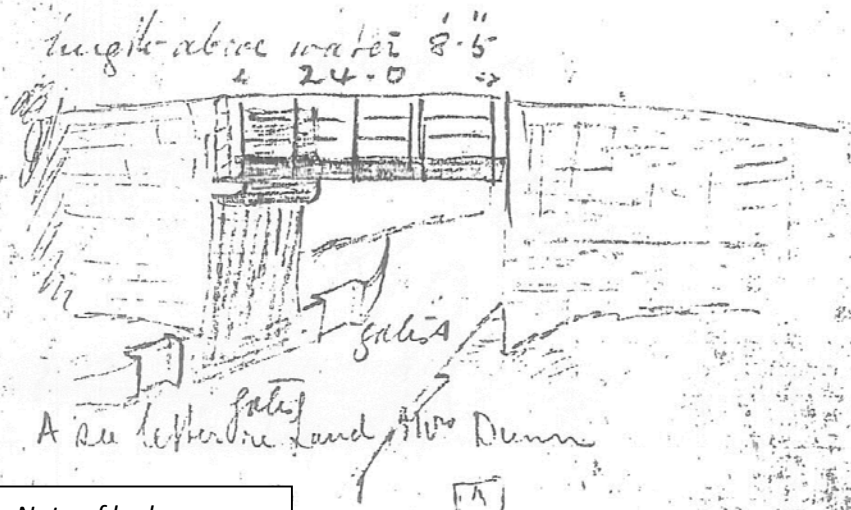
E Given the limited exposure of the stop gates themselves, no evidence of the repairs was noted during the course of these observations.



Valley House Bridge

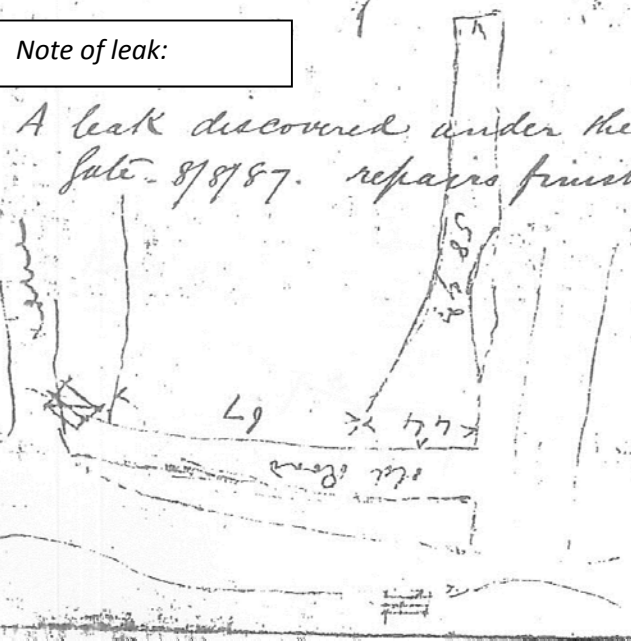
A overflow for which Mrs ~~Ebbett~~ Abbott [illegible] 10/- including right to Causeway

B. 2 Gates put up by Mrs Dunn - ~~Claim~~ asks for allowance 15/- see letter 15/10/89



Note of leak:

A leak discovered under the eastern Gate 8/8/87. repairs finished 24/8/87



APPENDIX B: CONTEXT DESCRIPTIONS

Context	Type	Context Interpretation	Context Description	Length (m)	Width (m)	Depth/ Thick-ness (m)	Spot-date
100	Layer	Topsoil	Brown sand silt			0.15	
102	Layer	Subsoil	Red brown silt sand			0.3	
103	Layer	Natural geological substrate	Orange brown red sand clays with occasional patches of gravel and degraded sandstone			n/a	
200	Timber	Part of stop gate door frame	Square beam aligned N/S, sits slightly oblique to canal floor		0.22	0.22	
201	Timber	Part of stop gate door frame	Square beam aligned E/W, sits slightly oblique to canal floor		0.22	0.22	
202	Timber	Part of stop gate door frame	Square beam rounded on eastern side, aligned N/S, sits slightly oblique to canal floor		0.22	0.22	
203	Metal	Plate holding 200 to 201	Rectangular	0.8	0.1	12mm	
204	Metal	Plate attaching 201 to 202	Rectangular	0.8	0.1	12mm	
205	Metal	Bolt used hold 203 to 200 and 201	Square headed bolt		20mm	20mm	
206	Metal	Bolt used hold 204 to 201 and 203	Square headed bolt		20mm	20mm	
207	Metal	Bolt used hold 204 to 201 and 204	Square headed bolt		20mm	20mm	
208	Chain	Chain used to haul gate from horizontal to vertical position	Chain formed of individual links approximately 80mm long				
209	Timber	Plank attached laterally across 200 - 202 to form body of gate door	Rectangular plank		0.25	80mm	
210	Timber	Plank attached laterally across 200 - 202 to form body of gate door	Rectangular plank		0.25	80mm	
211	Timber	Plank attached laterally across 200 - 202 to form body of gate door	Rectangular plank		0.25	80mm	
212	Timber	Plank attached laterally across 200 - 202 to form body of gate door	Rectangular plank		0.25	80mm	
213	Timber	Frame of stop gate	Square beam aligned N/S, sits horizontally on base of canal floor		0.22	0.22?	
214	Timber	Frame of stop gate	Vertical post, originally square but poorly preserved, set into vertical channel		(originall y) 0.22	0.22?	
215	Timber	Frame of stop gate	Rectangular plank/beam, sits horizontally under base of canal recess wall. Eastern end protrudes into vertical channel and protrusion is cut away to allow 214 to fit	2		0.22	
216	Metal	Metal loop attached to 200	Cast iron loop fixing				
217	Deposit	Silting within base of stop gate recess	Mid brown silt			>0.3	C19th - C20th
218	Deposit	Rubble backfill within vertical channel at inner (estern) corner of recess wall	Large sub-angular and angular stone rubble	up to 0.25	up to 0.2		
219	Masonry	Ashlar stone bricks of canal channel wall	Grey pink stone rectangular bricks	0.6	up to 0.25	>0.3	

APPENDIX C: FINDS

Finds concordance

Context	Description	Count	Weight(g)	Spot-date
217	Post-medieval/modern glass	7	796	LC19-C20
	Clay tobacco pipe	1	10	
	Leather	3	64	
	Iron object	3	240	

APPENDIX D: PHOTOGRAPH REGISTER

The following is provided in accordance with the requirements of the WSI as a record of photography during the project.

Frame no.	Date and Initials	Description
P1030086	July 2013 PD	Swingbridge and towpath to W. Scale 2m
1030087	July 2013 PD	Swingbridge and towpath to E. Scale 2m
1030088	July 2013 PD	Swingbridge and towpath general view to E. Scale 2m
1030089	July 2013 PD	Temp. dam at W side of Swingbridge, to N. Water gauge in 0.5m divisions
1030090	July 2013 PD	Swingbridge from canal bed to W. Scale 2m
1030091	July 2013 PD	Swingbridge S abutment to SW. Scale 2m
1030092	July 2013 PD	S gate housing of E gates at Swingbridge, to S. Scale 2m
1030093	July 2013 PD	Revetment wall to S approach ramp to Swingbridge, to S. Scale 2m
1030094	July 2013 PD	S canal wall under Swingbridge, to WSW, and dam
1030095	July 2013 PD	S canal wall under Swingbridge, to WSW, detail. Scale 2m
1030096	July 2013 PD	E revetting wall of N approach ramp to Swingbridge, to W. Scale 2m
1030097	July 2013 PD	N abutment and canal wall to NW from canal bed. Scale 2m
1030098	July 2013 PD	N gate housing, E side to N. scale 2m
1030099	July 2013 PD	Swingbridge from canal bed to W. scale 2m
1030100	July 2013 PD	N abutment of Swingbridge
1030101	July 2013 PD	Detail of underside of bridge on S abutment, to SSW
1030102	July 2013 PD	Detail of hinge post housing in NE gate housing. Scale 2m
1030103	July 2013 PD	Close up detail of hinge post tie back beam in NE gate housing.
1030104	July 2013 PD	Detail of hinge post housing in SE gate housing. Scale 2m
1030105	July 2013 PD	N abutment to NE. Scale 2m
1030106	July 2013 PD	N abutment to NW. Scale 2m
1030107	July 2013 PD	N abutment to N. Scale 2m
1030108	July 2013 PD	Detail of coarse sandstone conglomerate block in S abutment, prob repair
1030109	July 2013 PD	Oblique view of coarse sandstone conglomerate blocks in S abutment, prob repair
1030110	July 2013 PD	Close up detail of hinge post tie back slot in NW gate housing.
1030111	July 2013 PD	Close up detail of hinge post tie back slot in NW gate housing.
1030112	July 2013 PD	Buttress on E side of N approach ranmp revetment, to S. Scale 2m
1030113	July 2013 PD	The breach in the canal to SE
1030114	July 2013 PD	The breach in the canal to SE closer in with figures
1030115	July 2013 PD	The breach in the canal to SE closer in with figures
1030116	July 2013 PD	The breach in the canal to S with "alluviation" up to 1m deep in the foreground. Scale 2m
1030117	July 2013 PD	The breach in the canal to S with "alluviation" up to 1m deep in the foreground
1030118	July 2013 PD	The "alluvial fan" to the N. Scale 2m
1030119	July 2013 PD	The breach in the canal to the S. Excavations for the culvert to right
1030120	July 2013 PD	Looking along the canal line to the E from centre of breach
1030121	July 2013 PD	Looking along the canal line to the W from E of the breach (centre right)
1030122	July 2013 PD	Looking along the canal line to the W from E of the breach (centre right), remnant canal lining in foreground and centre left
1030123	July 2013 PD	Looking along the N side of the canal embankment across the breach
1030124	July 2013 PD	Swingbridge road deck and N approach road, to N. Scale 2m

Frame no.	Date and Initials	Description
1030125	July 2013 PD	Dry canal and breach in background, E revetment and buffer stone from road deck, to E. Scale 2m
1030126	July 2013 PD	E revetment N side and buffer stone from road deck, to NNE. Scale 2m
1030127	July 2013 PD	Canal company boundary marker, N side of canal, W of Swingbridge. Scales 1m (made of broadgauge rail)
1030128	July 2013 PD	Canal company boundary marker, top face
1030129	July 2013 PD	Canal company boundary marker, side view, bottom of broad gauge rail
1030130	July 2013 PD	Canal company boundary marker, side view, top of broad gauge rail
1030131	July 2013 PD	Canal company boundary marker, side view, detail of cast lettering (illegible) on broad gauge rail, also wear ridge on running surface
1030132	July 2013 PD	Canal company boundary marker, side view, side of broad gauge rail
1030133	July 2013 PD	The other marker nearer the bridge. Scales 1m
1030134	July 2013 PD	Top of the other marker
1030135	July 2013 PD	Ditto
1030136	July 2013 PD	Wooden depth gauge west of the N abutment of Swingbridge
1030137	July 2013 PD	Masonry detail of NE gate housing
1030138	July 2013 PD	The breach from the towpath, to ENE
1030139	July 2013 PD	Part of retaining wall at base of canal embankment opposite breach, S side, to NE
1030140	July 2013 PD	Part of retaining wall at base of canal embankment opposite breach, S side, to NE
1030141	July 2013 PD	Modern manhole over culvert under canal embankment, S side, opposite breach, to NW
1030142	July 2013 PD	Detail of SW canal wall, W of Swingbridge
1030143	July 2013 PD	Detail of NW canal wall, W of Swingbridge. Depth gauge 0.5m divisions
1030144	July 2013 PD	W side N abutment and buttress to N approach revetment wall
1030145	July 2013 PD	Masonry detail of SE gate housing

APPENDIX E: OASIS REPORT FORM

PROJECT DETAILS		
Project Name	Grand Western Canal, Halberton, Devon	
Summary	An interpretative earthwork survey, photographic survey and watching brief were undertaken on a section of the Grand Western Canal, Halberton, Devon in association with restoration work around a breach in the canal embankment. Detailed plans, elevations and sections as well as a photographic record of the exposed fabric of the canal and associated infrastructure were completed. Boundary markers on the northern side of the canal which marked the limit of GWR's property in the late 19th century were recorded prior to their temporary removal. A milestone marker was also recorded along the embankment, but this was not subject to disturbance. The Swing Bridge was recorded and identified as an original structure with a range of repairs and slight alterations. An engineering note from the late 19th century records the structure as it appears today, suggesting limited subsequent alterations. Prior to the restoration works, the embankment of the canal was observed to be a simple construction consistent with documentary evidence of its construction. The restoration works within the canal route partially exposed in situ remains of a stop gate potentially dating to the use of the canal in the late 19th century. No further features or deposits of archaeological interest were observed during the groundworks and, despite visual scanning of spoil, no artefactual material pre-dating the modern period was recovered.	
Project dates	June 2013	
Project type	Interpretative earthwork survey, photographic survey and watching brief	
Previous work	None	
Future work	None	
PROJECT LOCATION		
Site Location	Halberton, Devon	
Study area (M^2/ha)		
Site co-ordinates	ST 01150 13125	
PROJECT CREATORS		
Name of organisation	Cotswold Archaeology	
Project Brief originator	None	
Project Design (WSI) originator	Jacobs UK Ltd	
Project Manager	Ian Barnes	
Project Supervisor	Peter Davenport and Greg Crees	
MONUMENT TYPE	Canal	
SIGNIFICANT FINDS	None	
PROJECT ARCHIVES	Intended final location of archive (museum/Accession no.)	Content
Physical	None	n/a
Paper	Royal Albert Memorial Museum & Devon Heritage Centre	Site notes
Digital	Royal Albert Memorial Museum & Devon Heritage Centre	Digital photos, pdf report
BIBLIOGRAPHY		
CA (Cotswold Archaeology) 2014 *The Grand Western Canal, Halberton, Devon. Historic Building Recording.* CA typescript report **13481**		

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PROJECT TITLE

Great Western Canal Survey and Watching Brief, Halberton, Devon

FIGURE TITLE

Site location plan

PROJECT NO.	**4408**	*DATE*	**19-08-2013**	*FIGURE NO.*
DRAWN BY	**DJB**	*REVISION*	**00**	**1**
APPROVED BY	**PJM**	*SCALE@A4*	**1:25,000**	

012

013

014

133

132

131

ST

Swing Bridge

breach

Great Western Canal

N

area of observed groundworks

Great Western Canal marker

0 50m

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PROJECT TITLE

Great Western Canal Survey and Watchinng Brief, Halberton, Devon

FIGURE TITLE

Site plan, key features and observation area

PROJECT NO.	4408	DATE	21-08-2013	FIGURE NO.
DRAWN BY	DJB	REVISION	00	2
APPROVED BY	PJM	SCALE@A3	1:1250	

P:\4408 great western canal surv and wb\Illustration\Drafts\Earthwork figures\Finalised\4408_Great Western Canal Halberton Fig2.dwg

N

watching brief area

wall

0 5m

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PROJECT TITLE

Great Western Canal Survey and Watching Brief, Halberton, Devon

FIGURE TITLE

Plan of swingbridge

PROJECT NO.	4408	DATE	19-08-2013	FIGURE NO.
DRAWN BY	DJB	REVISION	00	3
APPROVED BY	PJM	SCALE@A3	1:100	

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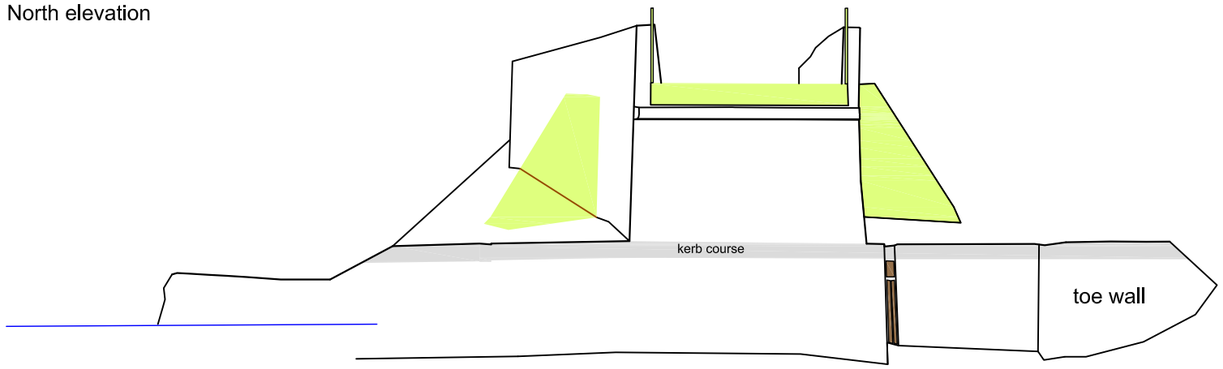
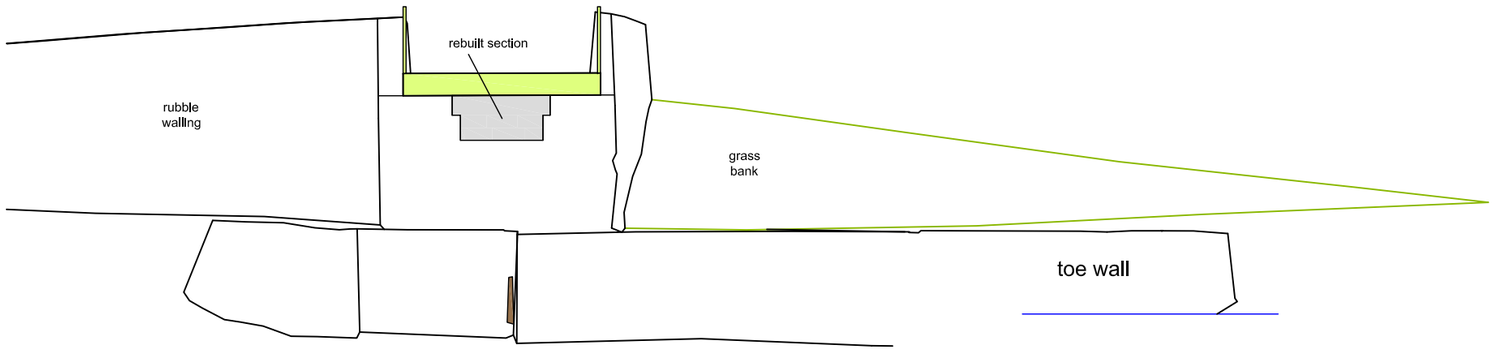
North elevation



South elevation



N

Late 20th Century

wood

0 5m

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PROJECT TITLE

Great Western Canal Survey and Watching Brief, Halberton, Devon

FIGURE TITLE

Elevations of Swing Bridge and toe wall

PROJECT NO.	4408	DATE	19-08-2013	FIGURE NO.
DRAWN BY	DJB	REVISION	00	4
APPROVED BY	ATB	SCALE@A3	1:100	

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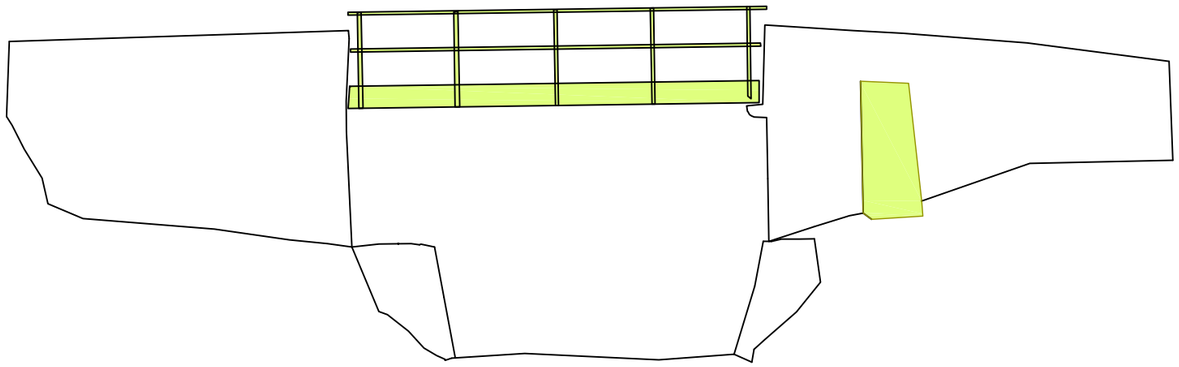
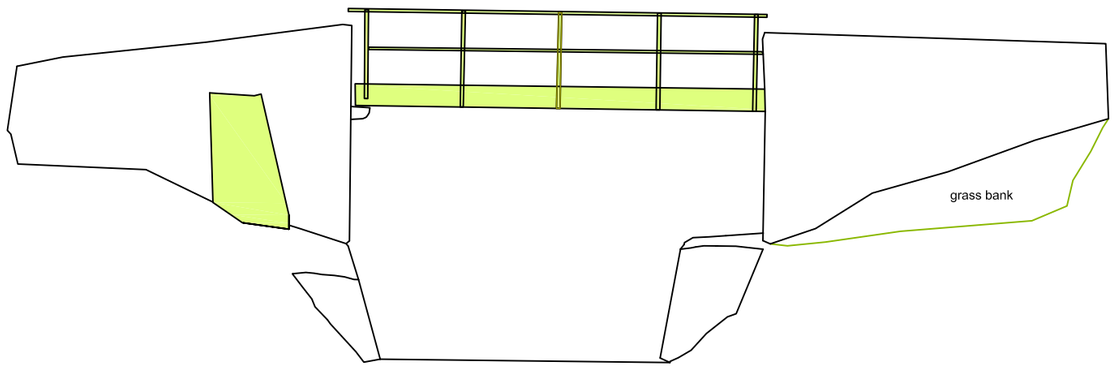
East elevation



West elevation



N

Late 20th Century

0 5m

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PROJECT TITLE
Great Western Canal Survey and Watching Brief, Halberton, Devon

FIGURE TITLE
Elevations of Swing Bridge and canal channel

PROJECT NO.	4408	DATE	20-08-2013	FIGURE NO.
DRAWN BY	DJB	REVISION	00	5
APPROVED BY	PJM	SCALE@A3	1:100	

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6

7

8

9

6 Swing Bridge, east elevation, looking west; the canal drained, dam in black plastic (scale 2m)

7 Swing Bridge, west elevation, looking east-north-east (scale 2m)

8 The southern abutment of the bridge, to the south-west (scale 2m)

9 The western stop lock gate housing on the south side, abutment and flanking wall; note timber hinge post in stop lock for gate (scale 2m)

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PROJECT TITLE
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FIGURE TITLE
Photographs

PROJECT NO.	4408	DATE	31-01-2014	FIGURE NO.
DRAWN BY	DJB/WAF	REVISION	00	6, 7,8 & 9
APPROVED BY	PJM	SCALE@A3	N/A	

10

10 Lower structure of stone-built channel (scale 2m)

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PROJECT TITLE
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FIGURE TITLE
Photograph

PROJECT NO.	4408	DATE	31-01-2014	FIGURE NO.
DRAWN BY	DJB/WAF	REVISION	00	10
APPROVED BY	PJM	SCALE@A4	N/A	

11

11 The underside of the modern concrete and steel bridge deck and the replacement blocks in the southern abutment, to the south-west

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PROJECT TITLE
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FIGURE TITLE
Photograph

PROJECT NO.	4408	DATE	31-01-2014	FIGURE NO.
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APPROVED BY	PJM	SCALE@A4	N/A	

12

12 The five mile milestone on the southern bank of the Canal, towards Rock Bridge

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PROJECT TITLE
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FIGURE TITLE
Photograph

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DRAWN BY	**DJB/WAF**	*REVISION*	**00**	**12**
APPROVED BY	**PJM**	*SCALE@A4*	**N/A**	

13 One of the GWR boundary markers on the west of Swing Bridge, top and side views

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FIGURE TITLE
Photographs

PROJECT NO.	4408	DATE	21-08-2013	FIGURE NO.
DRAWN BY	DJB	REVISION	00	13
APPROVED BY	PJM	SCALE@A4	N/A	

14

15

16

17

14 The canal embankment looking along the top of the northern side, to the west

15 The dump construction of local materials revealed in the breached embankment, looking east

16 The dump construction of local materials revealed in the breached embankment, view from north

17 The dump construction of local materials revealed in the breached embankment, looking west

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FIGURE TITLE

Photographs

PROJECT NO.	**4408**	*DATE*	**31-01-2014**	*FIGURE NO.*
DRAWN BY	**DJB/WAF**	*REVISION*	**00**	**14,15,16 & 17**
APPROVED BY	**PJM**	*SCALE@A3*	**N/A**	

18

18 The low dry-stone wall at the southern foot of the embankment

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FIGURE TITLE
Photograph

PROJECT NO.	**4408**	*DATE*	**31-01-2014**	*FIGURE NO.*
DRAWN BY	**DJB/WAF**	*REVISION*	**00**	**18**
APPROVED BY	**PJM**	*SCALE@A4*	**N/A**	

19

19 Extent of clay flow north of the embankment breach

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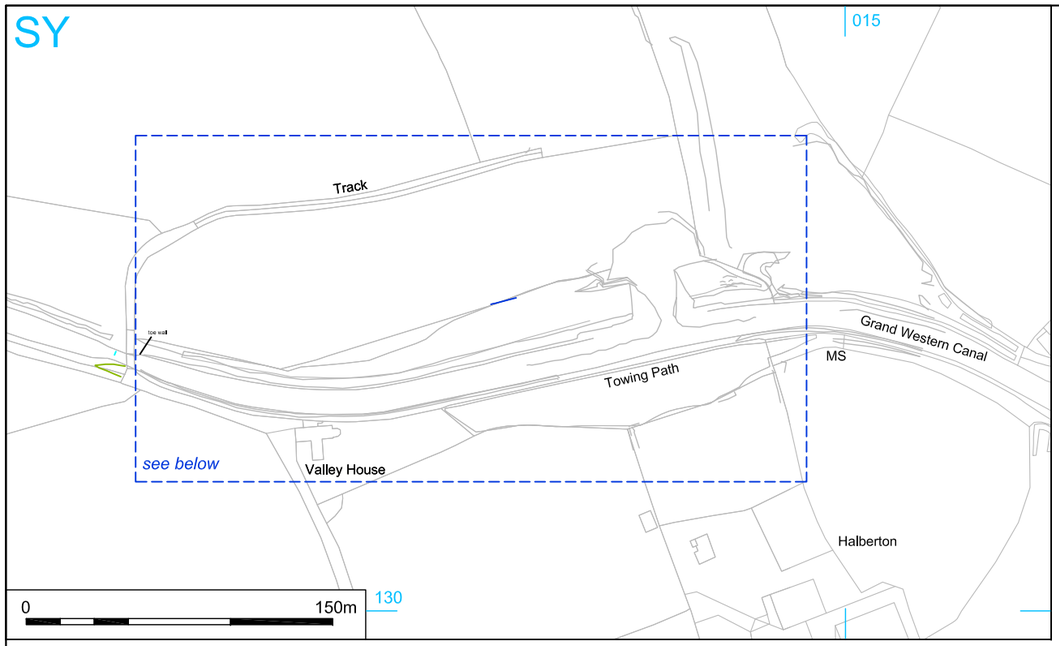
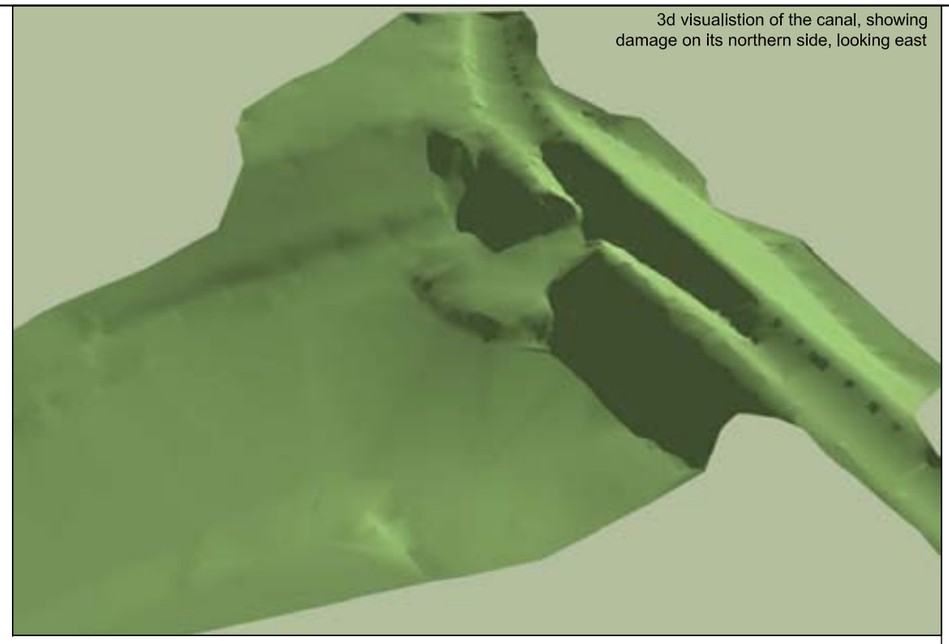
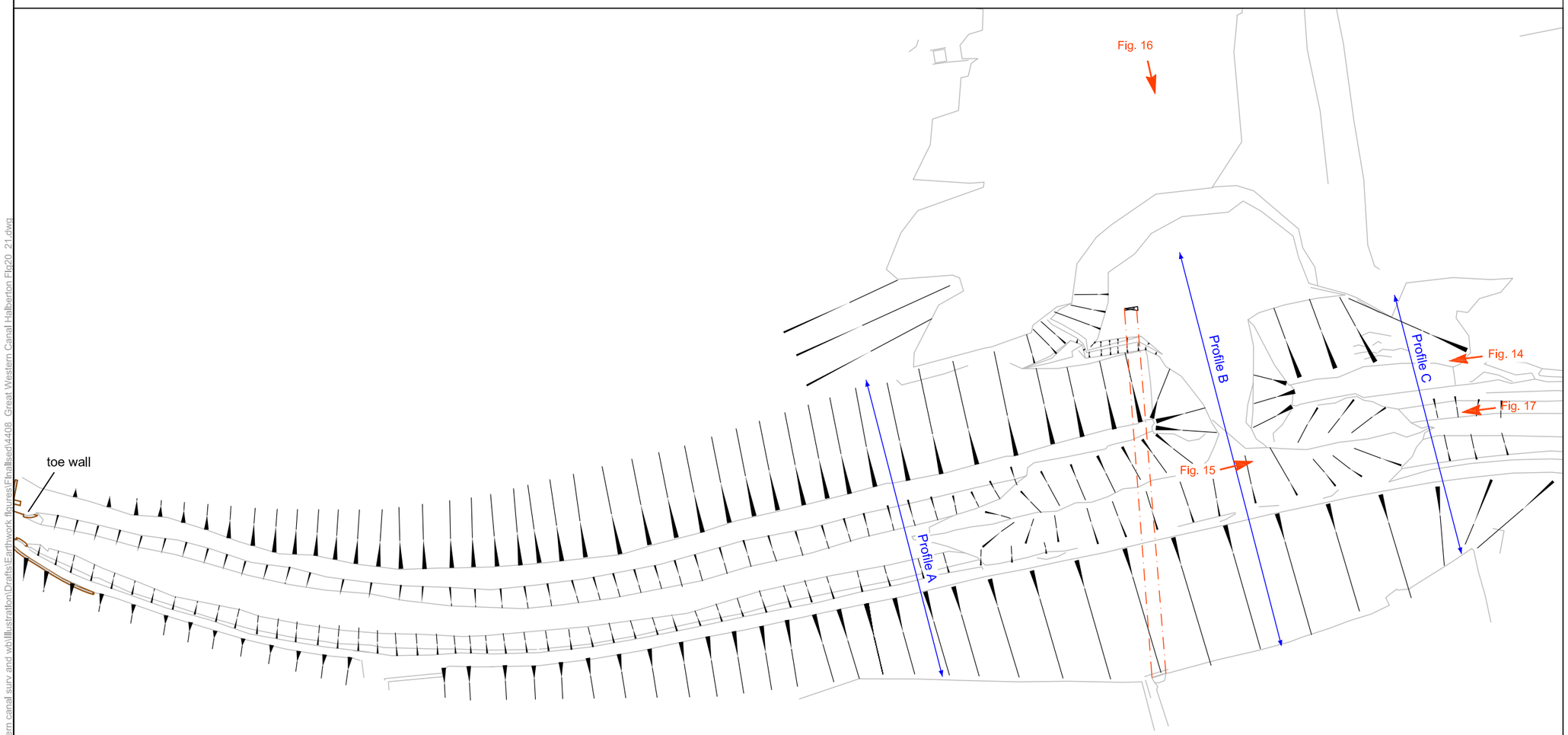
FIGURE TITLE
Photograph

PROJECT NO.	4408	DATE	31-01-2014	FIGURE NO.
DRAWN BY	DJB/WAF	REVISION	00	19
APPROVED BY	PJM	SCALE@A4	N/A	

SY




3d visualistion of the canal, showing damage on its northern side, looking east



N

projected line of culvert running through the earthwork

location of profile

Fig. 16 direction of photograph

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PROJECT TITLE
Great Western Canal, Devon

FIGURE TITLE
Hachure plan of canal embankment

PROJECT NO.	4408	DATE	08-01-14	FIGURE NO.
DRAWN BY	JB	REVISION	00	20
APPROVED BY	AB/LM	SCALE@A3	1:3000 & 1:1000	

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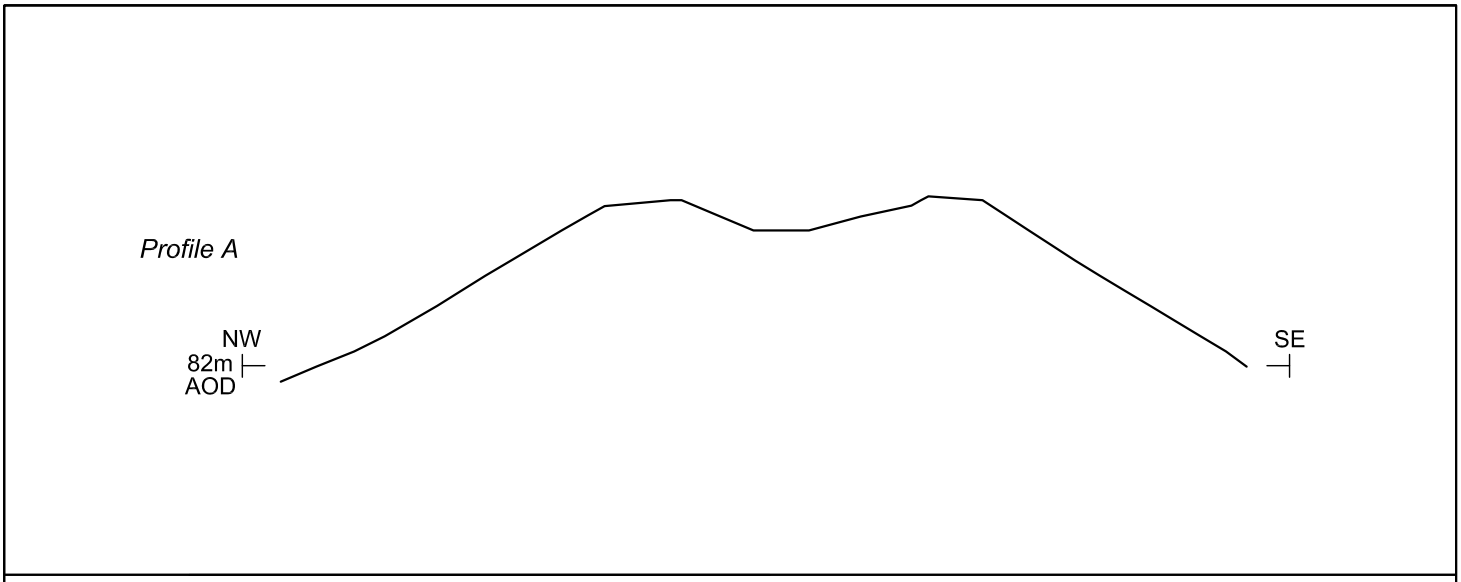

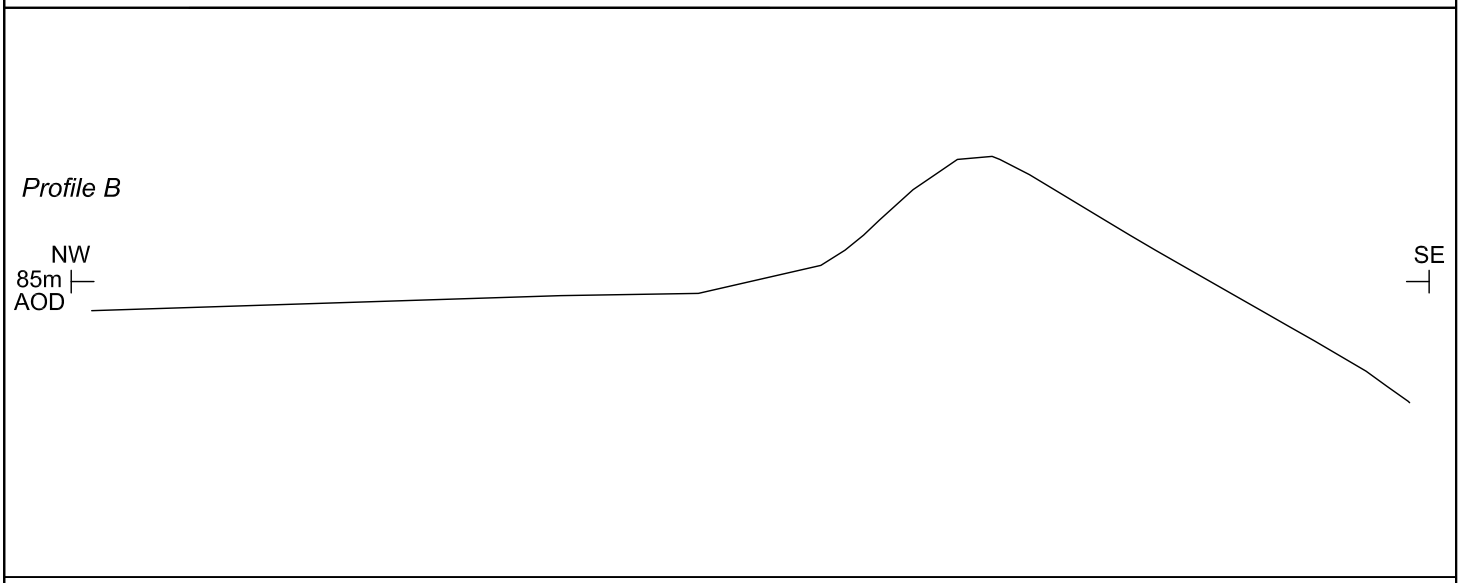

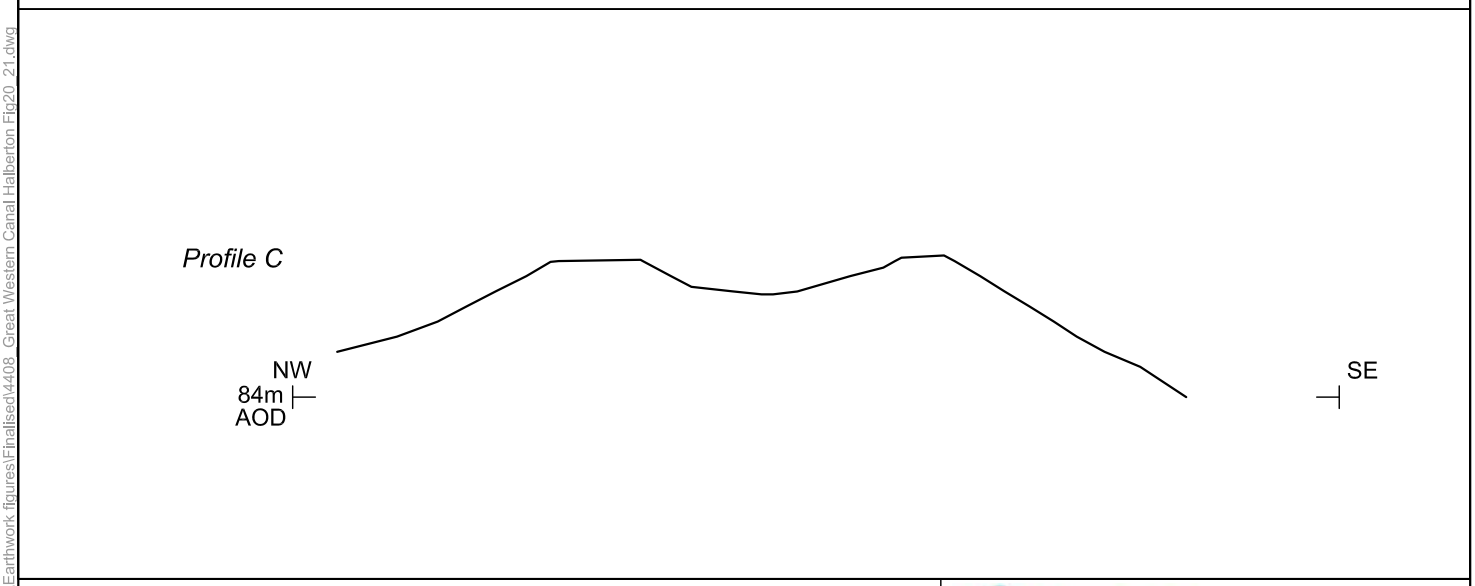

0 20m

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PROJECT TITLE
Great Western Canal, Devon

FIGURE TITLE
Profiles through embankment

PROJECT NO.	4408	DATE	08-01-2014	FIGURE NO.
DRAWN BY	JB	REVISION	00	21
APPROVED BY	AB/LM	SCALE@A4	1:500	

P:\4408 great western canal surv and wb\Illustration\Drafts\Earthwork figures\Finalised\4408_Great Western Canal Halberton Fig20_21.dwg

22 Visible elements of canal lining

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PROJECT TITLE
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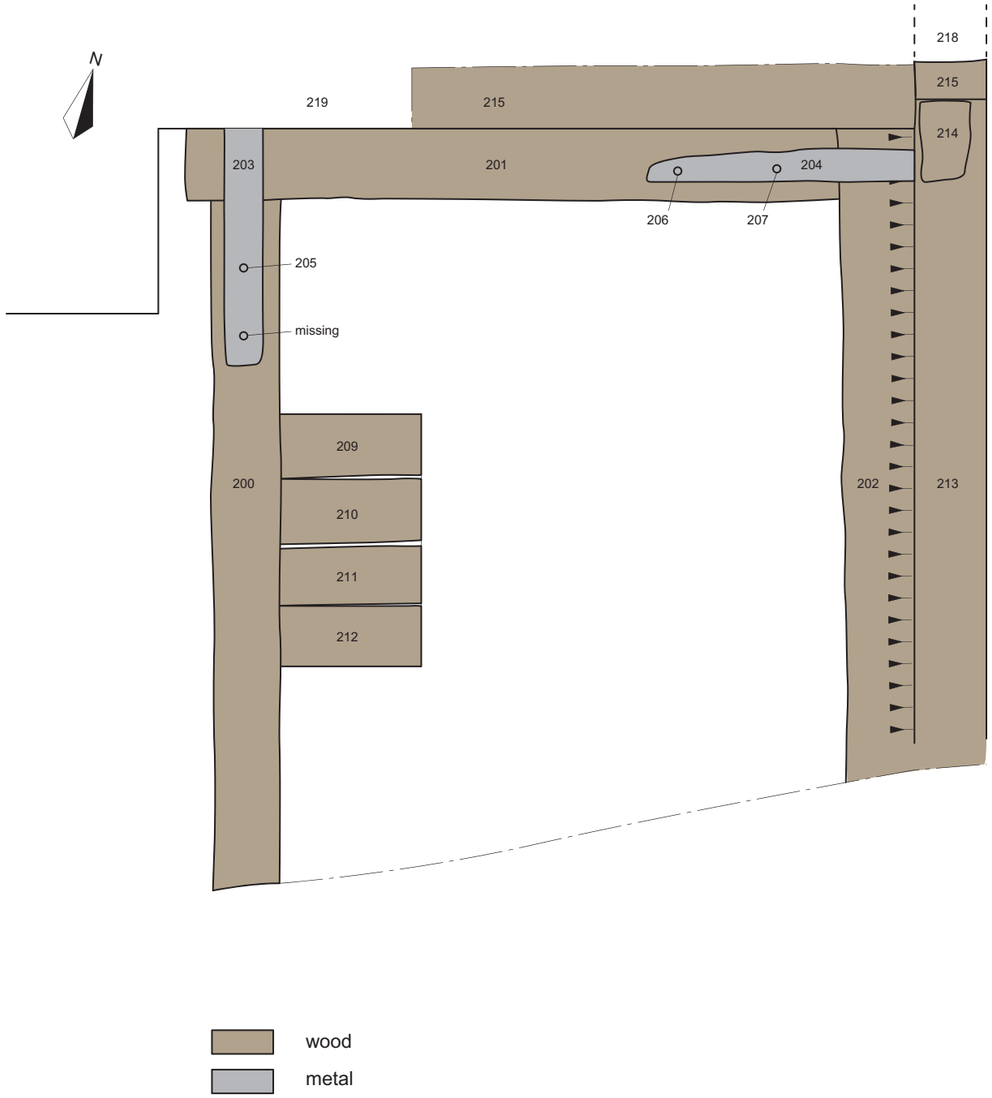
FIGURE TITLE
Photograph

PROJECT NO.	4408	DATE	31-01-2014	FIGURE NO.
DRAWN BY	DJB/WAF	REVISION	00	22
APPROVED BY	PJM	SCALE@A4	N/A	



Stopgate remains, western side of swing bridge, looking north (1m scale)

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PROJECT TITLE
Grand Western Canal, Halberton, Devon: Archaeological watching brief

FIGURE TITLE
Stop gate remains, western side of swing bridge; plan and photograph

PROJECT NO.	**4408**	*DATE*	**10/01/2014**	*FIGURE NO.*
DRAWN BY	**LM**	*REVISION*	**00**	**23**
APPROVED BY	**LM**	*SCALE@A4*	**1:20**	

012

013

014

133

132

131

ST

1030116

1030117

1030118

1030119

Fig. 16

1030133/4/5

1030130/1

1030130/1

1030127/9

1030128
vertically
down

1030133

Fig. 7

1030130/1

Swing Bridge

Fig. 25

1030134/5
vertically
down

1030086

Great Western Canal

breach

Fig. 14

1030123

1030122

Fig. 17

1030121

Fig. 15

1030123

1030138

1030139

1030140

1030141

N

Great Western Canal marker

Fig. 16 direction of photograph

0 50m

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PROJECT TITLE

Great Western Canal Survey and Watchinng Brief, Halberton, Devon

FIGURE TITLE

Photograph locations

PROJECT NO.	4408	DATE	18-02-2014	FIGURE NO.
DRAWN BY	DJB/JB	REVISION	00	24
APPROVED BY	PJM	SCALE@A3	1:1250	

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PROJECT TITLE
Great Western Canal Survey and Watching Brief, Halberton, Devon

FIGURE TITLE
Photograph locations

PROJECT NO.	4408	DATE	18-02-2014	FIGURE NO.
DRAWN BY	DJB/JB	REVISION	00	25
APPROVED BY	PJM	SCALE@A3	1:100	

P:\4408 great western canal surv and wb\Illustration\Drafts\Earthwork figures\Finalised\4408_Great Western Canal Halberton Fig 25.dwg