

British Waterways Scotland

**UNION CANAL:
Reddingmuirhead**

Archaeological Survey and Monitoring
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Kirkdale Archaeology

Site	Reddingmuirhead
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1 INTRODUCTION

Kirkdale Archaeology was asked by British Waterways to undertake an archaeological survey and watching brief of the S side of the Union Canal at Reddingmuirhead prior to the development of a 295m stretch on the S side of the canal between Bridge 56 (map reference NS 9154 7812) and canal basin (map reference NS 9120 7809). The Union Canal, River Avon to Greenbank, is a scheduled ancient monument. The schedule includes the entire stretch of canal in water, the banks on either side, the tow path running along one side, all overflows, distance markers, kicking stones and specific to the site at Reddingmuirhead, Bridge 56 and the Swing bridge at Redding Business Park (Historic Scotland, 2003).

The development took part in two stages; firstly the repair of the canal wall, carried out by Kishorn, following dewatering and the establishment of new moorings; secondly ground breaking work along the S bank of the canal, carried out by Morrisons, to create an access path and service ducts.

The archaeological response to stage 1 consisted of a scoping survey to record the fabric of the canal before and after the dewatering. The survey took place from a vantage point on the opposite bank and comprised panoramic photography, general photography, sketch plans and hand written context records. The removal of puddled clay from below parts of the canal wall was also monitored.

The archaeological response to stage 2 consisted of a watching brief to record the buried archaeology revealed during ground breaking work along the S side of the canal. The watching brief was subject to site specific health and safety restrictions preventing direct contact with machine operators and prohibiting hand digging and cleaning of any features revealed during the ground breaking work. Archaeological records of the Stage 2 work comprise digital photography, site plan and hand written context records.

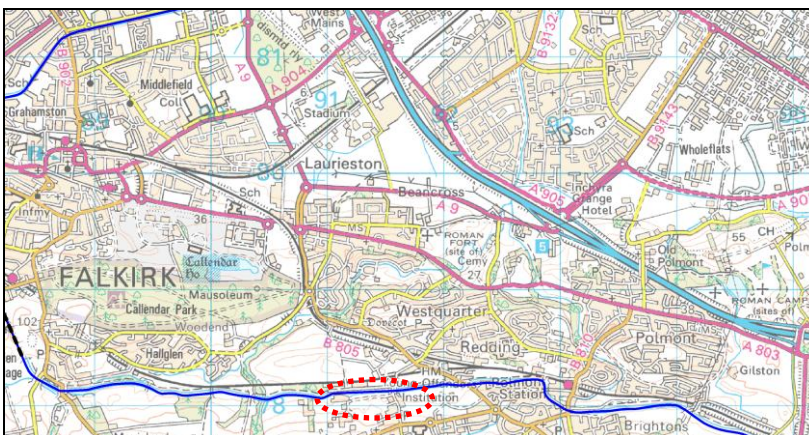


Figure 1: Approximate location of works

2 MONITORING OF STAGE 1 WORKS

Work commenced on site with the construction of two dams; one just to the W of Bridge 56; one just to the E of Redding Basin, to enable the dewatering of a approximately 295m of the canal.

At the E end of the site, the E dam was built across the location of a railway bridge shown on the 1862 1:2500 OS map. The dam therefore obscured any build related to the railway bridge below the water. On the S bank of the canal upstanding build survives in the location of the railway bridge but it is totally obscured by a thick growth of ivy.

The S side of the canal, to the W of Bridge 56 and the site of the railway bridge, has a section of wharf approximately 113m long. The wharf consists of two main builds. The lower build **011** is five rough courses of sandstone rubble with a sixth regular top course of rectangular sandstone blocks. All of the stone is covered with linear dressing and the build is in good condition. The upper build **001** is generally three courses of large rectangular sandstone blocks with a fourth course of very large rectangular coping stones. **001** is in very poor condition, crumbling in several places and with many displaced and missing coping stones. The centreposts of two handcranes **002** and **003** survive in situ. The iron posts sit in the centre of square sandstone platforms abutting and flush with the top of coping stones **001**, constructed from large sandstone blocks similar to the copes. The sandstone platform and the copes are connected and strengthened with iron straps. To the E of **002** set of redundant iron straps across copes **001** suggests that there may have been a third crane centrepost at the E end of the wharf. **002** and **003** will be retained and incorporated into the development of the S side of the canal.

Approximately 18m to the W of crane centrepost **003**, patch of rebuild **013**, in **001** and **011**, houses shuttered outlet **010**. Rebuild **016** is roughly rectangular, approximately 2m wide by up to 1m high. It is characterised by repointing producing a slightly fresher appearance to the build, otherwise it is very similar to builds **001** and **011** and it was probably rebuilt using the original stone.

At the W end of the wharf, there is a curved section of wall just to the E of swing bridge abutment **005**. This wall is mainly obscured by silt deposits banked up against the wall and it is not known how many courses deep this wall is but it appears to be a continuation of lower wharf build **011** - roughly coursed sandstone rubble build with linear dressing across the face.

Three wooden posts **014** were revealed protruding from the silt deposits **019** banked up against curved wall **017**. Close inspection of the posts at this stage was not possible. Two of the posts are

roughly 1m N of the curved section of wall **017**, aligned E-W roughly 6m apart, sitting in an upright position, the top of the posts is just below the top of the curved section wall **017** and the top of the swing bridge abutment **005**. The third post is beside the E upright post and sits at an angle possibly because it is a support or because it has collapsed. The posts are most likely related to swing bridge **005**, possibly forming fendering to guide boats safely around the swing bridge abutment. The swing bridge abutment **005**, is constructed from four courses of large rectangular sandstone blocks with linear dressing across the face. The E and W sides of **005** and the relationship between **005**, curved wall **017** to the E and canal wall **007** to the W is obscured by silt deposits **019**. During an initial site visit on 08/01/08, a curved wall **006** was noted to the S of the swing bridge abutment, protruding from the N edge of the landfill deposits **018** on the side of the canal. This is no longer visible since it has been reburied under **018** but it was probably part of the mechanism of the swing bridge. It is important because it indicates that although no traces of the railway can be seen on the S side of the canal, it is possible that parts of the railway survive buried under the landfill.

To the W of Swing Bridge **005**, canal wall **007** extends W all the way to the W dam which marks the W extent of the site. **007** is roughly coursed sandstone rubble build with linear dressing across the face. It is very similar to both **017** and **011** and it may in fact be a continuation of **017** but the direct relationship is obscured by swing bridge abutment **005**. At the E end of **007** the base of the build is obscured by silt deposits but at the W end of the build the silt has been cleared away to reveal four rough courses of **007** built on top of brown clay **015**.

Repair dock **008** is first shown on the 1897 OS map, the British Waterways Heritage Assessment links the repair dock with Redding Colliery on the N side of the canal. The repair dock is aligned NE-SW with a curving E wall for ease of access, apparently a continuation of canal wall **007**, but given the map evidence most likely a closely matched insertion/rebuild. On close inspection of the panoramic photos of the drained canal it is possible to see a possible break in build between **007** and **008** just where the wall begins to curve in to the repair dock. The W wall of the repair dock forms a sharp corner with canal wall **007**. The repair dock once extended between 30m-50m SW of the canal but it is now blocked approximately 2m S of the canal with brick blocking **009**. The OS maps from 1916, 1922 and 1938 all show the full length of the repair dock but they also show a solid line set back from the mouth of the repair dock which could be blocking **009** or it could be some kind of sluice for draining the dock. The repair dock is shown reduced to its current form on the 1944 OS map. It is not known, how much - if any - of the repair dock survives buried under landfill **025**, however it is likely that planned ground breaking work along the S bank of the canal, to insert service

ducts, will cut through the buried E and W side walls of the repair dock **008** and through blocking **009** or infill behind blocking **009**.

The only other feature seen in the canal wall within the dewatered section was a second shuttered outlet **010** surrounded by patch of rebuild **016**, almost identical to **012** and **013** at the E end of the site. The patch of rebuild is again characterised by fresh pointing indicating that the rebuild uses the original stone and metal shutter **010** is the same style as **012**.

After dewatering, the removal of puddled clay in front of and partially below the canal wall to the west of swing bridge **005** was monitored during the first part of these works. No significant discoveries were made except for the confirmation that the canal wall in this area stood to the height previously recorded, and that the puddled clay was a homogenous layer that the wall was bedded on to. The puddled clay was removed to underpin the canal wall with concrete in order to deepen the canal in order to allow boats to tie up at this point. A comprehensive suite of photographs were taken during this monitoring work and can be found on the accompanying CD.

3 MONITORING OF STAGE 2 WORKS

Following the closure of Redding Colliery in 1958 and abandonment of the site in 1959, the S side of the canal became a landfill site. The 295m stretch of the S side of canal under development is characterised by the landscaped remains of the landfill **018** banked up to a height of between 2.00m-3.00m behind the canal. Work commenced with further landscaping of **018** to create access routes to the canal bank and wharf for the mechanical excavators. The full length of the site was then lightly scraped using a mechanical excavator to remove loose debris and landfill deposit **018**.

The site is divided into 2 work areas. Area 1, the W end of the site, is approximately 182m long. It is characterised by a long stretch of canal wall **007** with few features, inserted repair dock **008** blocked with **009**, swing bridge abutment **005** and curved section of canal wall **017**. Ground breaking work to be carried out in Area 1 included the excavation of a trench for service ducts. Area 2, the E end of the site, is approximately 113m long. It is characterised by wharf **001**, including in situ hand cranes, **002** and **003**. The canal is wider along the length of the wharf but narrows into Area 1 via curved section of wall **017**. Ground breaking work to be carried out in Area 2 included lowering of the ground level by between 300-500mm behind wharf wall **001** to allow removal of the broken coping stones and to construct a new footpath; also a continuation of the service trench from Area 1, to be excavated along the back of the proposed footpath

Area 1

Excavation of the service trench commenced at the W end of area 1. The trench was located approximately 2.00m S of canal wall **007**, 1.20m wide by 600mm deep. Approximately 80m of this trench was excavated under archaeological supervision with only a single context revealed within the trench; brown silty clay **049**. Excavation was suspended during the Stage 1 remedial works to the canal wall. A further section of the service trench approximately 60m long through repair dock **008** was excavated with no archaeological supervision. The excavation of the remainder of the trench has been postponed until further notice and a subsequent report will accompany future work.

Area 2

Lowering of the ground level commenced at the E end of Area 2, 2.50m S of the S edge of wharf wall **001**, up to 300mm deep initially (depth may be increased to 500mm if required). The reduction of the ground level behind wharf wall **001**, immediately revealed several features just below the surface. Behind wharf wall **001**, the canal is lined with mottled yellow clay **021**. Many features are cut into the clay; rectangular cut **041** with dark ashy fill **042**, is the E most of these. **041/042** corresponds to iron straps **040** across the top of **001**. Iron strapping is associated with in situ hand cranes **002** and

003, indicating that **041/042** may be the site of a removed hand crane. To the W two smaller square cuts **036** and **038** through mottled yellow clay **021**, with similar black ashy fills **037** and **039** also indicate possible removed structures or surfaces.

To the S of **036** and **038**, a very clear linear cut **022** through **021** was revealed filled with dark ashy material **023**. The feature was approximately 900mm wide, but most likely continues beneath landfill batter **018**, by approximately 10.00m long but traces of the linear feature continued intermittently to approximately half way along the length of the wharf. The remains of five wooden sleepers were identified at the W end of **022**, all very degraded but apparently still in situ. Cut **022** and fill **023** are cut by N-S iron pipe **020**. Pipe **020** also cuts through yellow clay **021** and wharf wall **001**. The pipe appears to continue under landfill deposit **018**.

Three more pipe/pipe trenches were revealed, one running SE-NW and two running N-S behind wharf wall **001** continuing under landfill **018**; SE-NW c**025**, rubble fill **026**, and ceramic pipe **027**; N-S cut **028** and rubble and brown earth fill **029**; N-S concrete surround **032** and ceramic pipe **033**. Immediately to the W of cut **025** an additional shallow 'V' shaped cut **044** filled with dark ashy material **045** was revealed. This may be related to the rubble filled pipe trench **025** or may be an entirely different feature.

Just to the W of crane post **003** a circular structure **031** was revealed just below the ground surface. The visible structure is approximately 3.00m E-W by 1.50m N-S. The S and E portion of the structure were obscured beneath landfill deposit **018**. The visible structure is one course of yellow rectangular blocks of sandstone wide, by an unknown number of courses deep, mortared together with pale, coarse, gritty mortar. The wall sits in roughly circular cut **030** through clay **021**. The interior of the circular structure was filled with black ashy material **035**.

The excavation of the service trench through Area 2 has been postponed until further notice. The service trench will cut through many of the features revealed during the reduction of the ground level behind the wharf including circular structure **031** and linear feature **022** with sleepers **024**. It is likely that the service trench will affect the visible portion of these features, therefore a record should be made when the opportunity arises.

4 INTERPRETATION AND OBSERVATIONS DURING STAGE 1

The Stage 1 Survey has relied on photographic coverage rather than more detailed examination and recording, however the stretch of canal under examination is not overly complex and it has been possible to identify widely periodised key phases of work.

- **Phase 1: 1818-1822** The earliest build is the lower wharf wall **011**, curved canal wall build **017** and canal wall **007** built on top of clay **007**. These builds represent the original construction of the canal. The width of the canal along the length of lower wharf build **011** along with the level top course of copes suggests that this was originally a wharf, subsequently heightened with upper build **001**.
- **Phase 2: Early 1822-1862** Additions to the canal marked on the first edition 1862 OS map include the swing bridge abutment **005** carrying the railway across the canal, the road bridge (no. 56) to the E of the E dam and the rail bridge to the E of the E dam. It is likely that upper wharf build **001** was part of this phase of work along with handcranes **002** and **003**, possibly related to a railway siding running alongside the canal for loading coal on to the boats. Fendering in the form of posts **014** may have been constructed to the E of swing bridge abutment **005** to guide boats around the abutment, however the fendering could have been constructed during **Phases 2-4** before the removal of the swing bridge in **Phase 5**.
- **Phase 3: 1864-1897** Construction of repair dock **008**, possibly related to the construction of Redding Colliery in 1894. Between 1864 and 1897 the railway bridge to the E of the E dam, beside bridge no.56 was removed; all the tracks were redirected over the swing bridge (**005**).
- **Phase 4: Early-Mid 20th Century** Based on map evidence alone repair dock **008** appears to be reduced to current proportions between 1938-1944 with blocking **009**, however it is possible that the repair dock fell out of use earlier than this.
- **Phase 5: Mid-Late 20th Century** Redding Colliery was closed in 1958 and abandoned in 1959, following closure the swing bridge was removed and the S side of the canal became a landfill site.

- **Phase 6: Late 20th Century-Early 21st Century** Two new shuttered outlets inserted into the E and W ends of the S wall of the canal, these appear to correspond to manholes in the top of the landfill bank **020** and are probably related to the new 21st Century houses built by Kier to the S of the canal.

5 INTERPRETATION AND OBSERVATIONS DURING STAGE 2

Area 1

No archaeological features were revealed in the section of service trench excavated under archaeological supervision. It is likely that the brown silty clay **049** behind the canal wall **007** is the original lining of the canal. The Stage 1 archaeological survey revealed that the canal wall **007** is built on top of brown clay **015**. The section of service trench excavated without archaeological supervision most likely contained the E and W side walls of the inserted repair dock **008** as well as some sort of infill behind brick blocking **009**. It is likely that the continuation of the service trench, postponed until further notice, will cut through some deposits related to the swing bridge abutment **005**.

Area 2

The Stage 1 archaeological survey identified two phases of wharf build **001** and **011**, visible after the dewatering of the canal. It is possible that the original height of the wharf was around 1.00m below the current level, therefore it is possible that there is older buried archaeology surviving below the features revealed during this work.

Due to the site specific health and safety restrictions on this site, it was not possible to investigate any of the features revealed during the ground breaking work in Area 2 through normal procedures such as cross section and detailed excavation. It may be possible to gather more information during the excavation of the service trench through these features.

Many of the features identified are characterised by a dark ashy fill. It is possible that this dark ashy fill, rather than being directly related to the features, represents the first infill across the site filling in low features and cuts. A section through the landfill deposit **018**, shows that the bottom layer is a dark ashy material. The dark ashy layer may have built up over time. The full extent of the ashy fill has not been determined due to site restrictions.

Square and rectangular cuts **036**, **038** and **041** probably represent fixtures or surfaces removed from the wharf side. Based on the position of cut **041** in relation to **002** and **003**, and the iron straps **040** on the wharf wall, **041** was probably a hand crane similar to **002** and **003**.

Linear feature **022** with wooden sleepers **024** was identified on site as a possible railway siding for the colliery. This was confirmed by map evidence; a railway siding is shown in this location on the first edition OS 1862 map of Reddingmuirhead.

Map evidence could not provide an interpretation for circular structure **031**. The 1964 OS map of Reddingmuirhead literally shows a blob mid-way along the railway siding but this may not even represent a real feature. A suggestion was made that the structure may be an old shaft. There was a coal pit on the S side of the canal further to the SE and a old circular shaft is shown on the 1922 map of Reddingmuirhead further to the SW. However, it is highly unlikely that circular feature **031** is an old shaft because it is only one course of sandstone thick and it is too close to the canal. It is difficult to interpret the structure because so much is unknown such as depth, full dimensions and even the shape is uncertain as the structure may become oval or have a square edge hidden under the landfill **018**. It could be related to the railway siding, possible a turning device or buffer for the carriages. It certainly appears mark the extent of the railway siding line because it sits directly in its path (direct relationship is unknown because no investigation was possible) and no traces of the railway siding were observed to the W of this feature.

Many of the features revealed during the ground breaking work appear to continue under the landfill deposit **018**. It is likely that the landfill has buried and preserved the 19th Century industrial landscape on the S side of the canal.

A1. APPENDIX 1: LIST OF CONTEXTS

Context	Description
001	Wharf wall upper build above 011.
002	Crane centrepost E.
003	Crane centrepost centre.
004	Possible crane centrepost W. (No evidence of a hand crane was found during excavation, the wharf copes were damaged here by concrete setting 032 and pipe 033)
005	Swing bridge abutment.
006	Swing bridge turning circle masonry.
007	Canal wall.
008	Inshot for repair dock.
009	Blocking of repair dock 008.
010	Shuttered outlet in canal wall 007 in patch of rebuild 016.
011	Wharf wall lower build below 001.
012	Shuttered outlet in wharf wall 001 and 011 in patch of rebuild 013.
013	Patch of rebuild in wharf wall 001 and 011 around shuttered outlet 012.
014	3 wooden posts in the silt to the E of swing bridge abutment 005.
015	Clay under canal wall 007.
016	Patch of rebuild in canal wall 007 around shuttered outlet 010.
017	Curved section of canal wall to the W of wharf 001/011 and to the E of swing bridge 005.
018	Land fill banked up on the S side of the canal.
019	Silt deposit banked up against the walls of the canal.
020	N-S iron pipe, cuts 023 and 001.
021	Mottled yellow/light brown clay lining the canal to the S of wharf wall 001.
022	Cut through 021, parallel to 001, filled with 023.
023	Black ashy gritty fill of cut 022.
024	5 very degraded rotten sleepers in 023.
025	Irregular N-S cut through 021 and 023 filled with 026.
026	Rubble and brown earth fill of cut 025.
027	Ceramic pipe in fill 026.
028	N-S cut through 021 and 023, filled with 029.
029	Rubble and brown earth fill of cut 028.
030	Roughly circular cut through 021 for structure 031.
031	Circular sandstone structure to the W of 003.
032	N-S concrete surround of pipe 033.
033	N-S ceramic pipe in concrete surround 032.
034	Dump of demolition/industrial debris to the S of the canal.
035	Coal filled deposit within circular structure 031.
036	Rectangular cut filled with 037.
037	Black gritty fill of cut 036.
038	Rectangular cut filled with 039.
039	Black gritty fill of cut 038.
040	Metal straps on wharf wall 001 beside cut 041.
041	Rectangular cut filled with 042.
042	Black gritty fill of cut 035.
043	Rectangular patch of yellow clay within 042.
044	N-S cut through 021 to the W of 025.
045	Black ashy fill of cut 044.
046	Spreads of rubble behind wharf wall 001 on top of clay 021.
047	Spread of black gritty material to the S of 021 along the wharf to the W of 022, 023 and 024.
048	Circular void through 021.
049	Silty brown clay behind canal wall 007 at the W end of the site in Area 2.

A2. APPENDIX 2: LIST OF PHOTOGRAPHS

Stage 1 - Before Dewatering - Digital Photographs

Frame	Description	From	Date
3135	General view E along the canal to bridge 56.	W	16/01/08
3136	General view W along the canal.	E	16/01/08
3137	General view E along wharf 001 before any excavation.	W	16/01/08
3138	General view of the swing bridge abutment 005.	ESE	16/01/08
3139	General view W along the canal wall 007.	E	16/01/08
3140	Crane centrepost 002.	S	16/01/08
3141	General view W along wharf 001.	E	16/01/08
3142	General view E along wharf 001.	W	16/01/08
3143	Possible location of a third crane centrepost 004.	W	16/01/08
3144	Possible location of a third crane centrepost 004.	W	16/01/08
3145	Possible location of a third crane centrepost 004 at a section of missing copes in wharf 001.	W	16/01/08
3146	General view E along wharf 001.	W	16/01/08
3147	Swing bridge abutment 007.	S	16/01/08
3148	Repair dock inshot 008.	E	16/01/08
3152	General shot showing the stabilisation of the batter 034.	W	16/01/08
3154	Modern pipe revealed within the batter 034 joined to modern shuttered outlet 010 in canal wall 007.	N	16/01/08
3155	Repair dock inshot 008.	SW	16/01/08
3156	Landscaping along the top of dump 034.	E	16/01/08

Stage 1 - After Dewatering - Digital Photographs

DCSN	Description	From	Date
3552	Slightly collapsed section of canal wall 007 at the W end of the site.	N	31/1/08
3372	Shuttered outlet 010 with rebuild 016 in canal wall 007.	N	31/1/08
3385	Repair dock 008 and repair dock blocking 009.	N	31/1/08
3391	Swing bridge abutment 005.	N	31/1/08
3392	Swing bridge abutment 005, silt 019 and wooden posts 014.	N	31/1/08
3393	Curved section of canal wall 017 to the W of wharf wall 001 and 011 and to the E of swing bridge abutment 005.	N	31/1/08
3399	Shuttered outlet 012 with rebuild 013 in wharf wall 001 and 011.	N	31/1/08
3403	Crane centre post 003.	N	31/1/08
3408	Crane centre post 002.	N	31/1/08

Stage 1 - After Dewatering - Panoramic Photographs (See Appendix 3)

Photo Number	Description	From	Date
1	E end of the site showing wharf wall 001 and 011.	N	29/01/08
2	Wharf wall 001 and 011 and crane centre post 002.	N	29/01/08
3	Wharf wall 001 and 011, crane centre post 003 and shuttered outlet 012 with rebuild 013.	N	29/01/08
4	Wharf wall 001 and 011.	N	29/01/08
5	Wharf wall 001 and 011, canal wall 007, wooden posts 014 and swing bridge abutment 005.	N	29/01/08
6	Swing bridge abutment 005 and canal wall 007.	N	29/01/08
7	Canal wall 007, E side of repair dock 008 and E side of repair dock blocking 009.	N	29/01/08
8	Canal wall 007, W side of repair dock 008 and W side of repair dock blocking 009.	N	29/01/08
9	Canal wall 007.	N	29/01/08
10	Canal wall 007 and clay 015.	N	29/01/08
11	Canal wall 007, clay 015, and shuttered outlet 010 with rebuild 016.	N	29/01/08
12	Canal wall 007 and clay 015.	N	29/01/08
13	Canal wall 007 and clay 015.	N	29/01/08
14	Canal wall 007 and clay 015.	N	29/01/08
15	Canal wall 007 and clay 015.	N	29/01/08

Stage 2 – Ground Breaking Work - Digital Photographs

Frame	Description	From	Date
3164	General shot showing scraping of the canal bank 007.	SW	18/01/08
3165	General shot showing scraping of the canal bank 007.	SW	18/01/08
3172	General shot showing scraping of the wharf 001.	SE	18/01/08
3173	General shot showing scraping of the wharf 001.	SE	18/01/08
3174	General shot looking along the canal bank 007 after scraping.	ESE	18/01/08
3175	General shot showing scraping of the canal bank 007.	SW	18/01/08
3176	General shot showing scraping of the canal bank 007.	SW	18/01/08
3177	General shot showing the reduction of the ground behind the wharf wall 001.	E	18/01/08
3181	General shot showing the reduction of the ground behind the wharf wall 001.	S	18/01/08
3182	General shot showing the reduction of the ground behind the wharf wall 001.	ESE	18/01/08
3183	General shot showing the reduction of the ground behind the wharf wall 001.	ESE	18/01/08
3184	General shot showing the reduction of the ground behind the wharf wall 001.	E	18/01/08
3185	General shot showing the reduction of the ground behind the wharf wall 001.	E	18/01/08
3186	General shot showing the reduction of the ground behind the wharf wall 001.	S	18/01/08
3187	General shot showing the reduction of the ground behind the wharf wall 001.	S	18/01/08
3188	General shot showing the reduction of the ground behind the wharf wall 001.	E	18/01/08

Frame	Description	From	Date
3189	General shot showing the reduction of the ground behind the wharf wall 001.	E	18/01/08
3190	General shot showing the reduction of the ground behind the wharf wall 001.	E	18/01/08
3191	General shot showing the reduction of the ground behind the wharf wall 001.	E	18/01/08
3192	General shot showing the reduction of the ground behind the wharf wall 001.	E	18/01/08
3193	General shot showing the reduction of the ground behind the wharf wall 001.	ESE	18/01/08
3194	General shot showing the reduction of the ground behind the wharf wall 001.	ESE	18/01/08
3195	General shot showing the reduction of the ground behind the wharf wall 001.	E	18/01/08
3197	Shot showing the reduction of the ground behind the wharf wall 001, showing the beginning of cut 022 and fill 023.	E	18/01/08
3198	Shot showing the reduction of the ground behind the wharf wall 001, showing the beginning of cut 022 and fill 023.	E	18/01/08
3199	Shot showing the reduction of the ground behind the wharf wall 001, showing the beginning of cut 022 and fill 023.	ESE	18/01/08
3200	Shot showing the reduction of the ground behind the wharf wall 001, showing the beginning of cut 022 and fill 023 and cut and fill 036 and 037 and cut 038 and fill 039.	S	18/01/08
3201	Shot showing the reduction of the ground behind the wharf wall 001, showing the beginning of cut 022 and fill 023 and cut and fill 036 and 037 and cut 038 and fill 039.	ESE	18/01/08
3202	Shot showing the reduction of the ground behind the wharf wall 001, showing the beginning of cut 022 and fill 023 and cut and fill 036 and 037 and cut 038 and fill 039.	E	18/01/08
3203	Shot showing the reduction of the ground behind the wharf wall 001, showing the beginning of cut 022 and fill 023 and cut and fill 036 and 037 and cut 038 and fill 039.	E	18/01/08
3204	Shot showing the reduction of the ground behind the wharf wall 001, showing the beginning of cut 022 and fill 023 and cut and fill 036 and 037 and cut 038 and fill 039.	E	18/01/08
3205	General shot showing the reduction of the ground behind the wharf wall 001 with pipe 020 just revealed.	ESE	18/01/08
3206	Iron pipe 020.	E	18/01/08
3207	Iron pipe 020.	E	18/01/08
3208	Continuation of cut 022 and fill 023 on the W side of pipe 020 with wooden sleepers 024.	E	18/01/08
3209	Continuation of cut 022 and fill 023 on the W side of pipe 020 with wooden sleepers 024.	E	18/01/08
3210	Cut 022, fill 023 and wooden sleepers 024.	N	18/01/08
3211	Cut 022, fill 023 and wooden sleepers 024.	NW	18/01/08
3212	Continuation of cut 022 and fill 023 on the W side of pipe 020 with wooden sleepers 024.	E	18/01/08
3213	View along the length of feature 022/023 showing wooden sleepers 024.	W	18/01/08
3214	View along the length of feature 022/023 showing wooden sleepers 024.	W	18/01/08
3215	Continuation of cut 022 and fill 023 on the W side of pipe 020 with wooden sleepers 024.	NE	18/01/08
3216	General shot showing the reduction of the ground behind the wharf wall 001 with cut 025 just revealed.	E	18/01/08

Frame	Description	From	Date
3217	General shot showing the reduction of the ground behind the wharf wall 001 with cut 025 just revealed.	E	18/01/08
3218	General shot showing the reduction of the ground behind the wharf wall 001.	E	18/01/08
3219	View along the length of feature 022/023 showing wooden sleepers 024.	W	21/01/08
3220	View along the length of feature 022/023 showing wooden sleepers 024.	W	21/01/08
3221	View along the length of feature 022/023 showing wooden sleepers 024.	W	21/01/08
3222	Detail of E sleepers 024.	N	21/01/08
3223	Detail of central sleepers 024.	N	21/01/08
3224	Detail of W sleepers 024.	N	21/01/08
3225	General shot showing the W end of feature 022/023 and sleepers 024.	NW	21/01/08
3226	General shot of the excavation of the duct trench at the W end of the site behind canal wall 007.	SE	22/01/08
3227	General shot of the excavation of the duct trench at the W end of the site behind canal wall 007.	SE	22/01/08
3228	General shot of the excavation of the duct trench at the W end of the site behind canal wall 007.	SE	22/01/08
3229	General shot of the excavation of the duct trench at the W end of the site behind canal wall 007.	SE	22/01/08
3231	General shot of the excavation of the duct trench at the W end of the site behind canal wall 007.	SW	22/01/08
3232	General shot of the excavation of the duct trench at the W end of the site behind canal wall 007 showing the duct pipes being laid.	E	22/01/08
3234	General shot of the excavation of the duct trench at the W end of the site behind canal wall 007 showing the duct pipes being laid.	E	22/01/08
3235	General shot of the excavation of the duct trench at the W end of the site behind canal wall 007 showing the duct pipes being laid.	E	22/01/08
3236	General shot of the excavation of the duct trench at the W end of the site behind canal wall 007 showing the duct pipes being laid.	ENE	22/01/08
3237	General shot of the excavation of the duct trench at the W end of the site behind canal wall 007 showing the gravel packing going in.	E	22/01/08
3239	General shot of the excavation of the duct trench at the W end of the site behind canal wall 007 showing the gravel packing going in.	E	22/01/08
3245	Cut 044 and fill 045.	E	22/01/08
3246	Cut 044 and fill 045.	ENE	22/01/08
3247	General shot showing the reduction of the ground behind the wharf wall 001 with cut 044 and fill 045, and pipe trench cut 028 and fill 029.	E	22/01/08
3248	Cut 044 and fill 045.	E	22/01/08
3249	General shot showing the reduction of the ground behind the wharf wall 001 with the W side of pipe trench cut 028 and fill 029.	E	22/01/08
3250	General shot showing the reduction of the ground behind the wharf wall 001 with cut 044 and fill 045, and pipe trench cut 028 and fill 029.	E	22/01/08
3252	General shot of tip batter 034 showing pipe trench cut 028 and fill 029 where it disappears under the edge.	NE	22/01/08
3253	Pipe 027 and rubble fill 026.	WSW	22/01/08
3254	Pipe 027, cut 025 and rubble fill 026.	W	22/01/08
3255	General shot showing the reduction of the ground behind the wharf wall 001 with spreads of black material 047.	E	22/01/08
3256	General shot showing the reduction of the ground behind the wharf wall 001 with spreads of black material 047 and rubble 046.	E	22/01/08
3257	General shot showing the reduction of the ground behind the wharf wall 001 with spreads of black material 047 and rubble 046.	E	22/01/08
3258	Detail showing lumps of coal in the spreads of black material 047 behind	N	22/01/08

Frame	Description	From	Date
	the wharf wall 001.		
3259	General shot showing the reduction of the ground behind the wharf wall 001 with spreads of black material 047 and rubble 046.	E	22/01/08
3260	A patch of rubble 046 behind wharf wall 001.	E	22/01/08
3264	General shot showing the reduction of the ground behind the wharf wall 001 with spreads of black material 047 and rubble 046.	E	22/01/08
3266	General shot showing the reduction of the ground behind the wharf wall 001.	W	22/01/08
3268	Shot showing a section through the base of the tip batter 034.	NE	22/01/08
3269	Shot showing a section through the base of the tip batter 034.	N	22/01/08
3270	Shot showing a section through the base of the tip batter 034.	N	22/01/08
3271	General shot showing the reduction of the ground behind the wharf wall 001 with circular structure 031 just revealed.	ESE	22/01/08
3272	General shot showing the reduction of the ground behind the wharf wall 001 with circular structure 031 just revealed.	ESE	22/01/08
3273	General shot showing the reduction of the ground behind the wharf wall 001 with circular structure 031 just revealed.	E	22/01/08
3275	Circular structure 031, cut 030 and fill 035.	E	22/01/08
3276	Circular structure 031, cut 030 and fill 035.	NE	22/01/08
3278	Circular structure 031, cut 030 and fill 035.	E	22/01/08
3279	Circular structure 031, cut 030 and fill 035.	W	22/01/08
3280	Detail of structure 031 where it disappears under batter 034.	N	22/01/08
3281	Circular structure 031, cut 030 and fill 035.	E	22/01/08
3282	Circular structure 031, cut 030 and fill 035.	NE	22/01/08
3283	Circular structure 031, cut 030 and fill 035.	NE	22/01/08
3284	General shot of the excavation of the duct trench at the W end of the site behind canal wall 007.	W	23/01/08
3285	General shot of the excavation of the duct trench at the W end of the site behind canal wall 007.	W	23/01/08
3286	General shot showing the reduction of the ground behind the wharf wall 001 with spreads of black material 047 and rubble 046.	E	23/01/08
3287	General shot showing the reduction of the ground behind the wharf wall 001 with spreads of black material 047 and rubble 046.	E	23/01/08
3288	General shot showing the reduction of the ground behind the wharf wall 001 looking E showing circular structure 031.	W	23/01/08
3289	Circular structure 031, cut 030 and fill 035.	W	23/01/08
3290	General shot showing the reduction of the ground behind the wharf wall 001 with spreads of black material 047 and rubble 046.	E	23/01/08
3291	General shot showing the reduction of the ground behind the wharf wall 001 looking E showing circular structure 031.	W	23/01/08
3293	General shot showing the reduction of the ground behind the wharf wall 001 with concrete pipe surround 032 just revealed.	E	23/01/08
3294	General shot showing the reduction of the ground behind the wharf wall 001 with concrete pipe surround 032 just revealed.	E	23/01/08
3295	Concrete pipe surround 032.	E	23/01/08
3296	Concrete pipe surround 032.	NE	23/01/08
3298	General shot showing the reduction of the ground behind the wharf wall 001 with concrete pipe surround 032.	E	23/01/08
3299	General shot showing the reduction of the ground behind the wharf wall 001 looking E along the excavated stretch.	W	23/01/08
3300	General shot showing the reduction of the ground behind the wharf wall 001 looking E along the excavated stretch.	W	23/01/08
3301	Concrete pipe surround 032.	NE	23/01/08

Frame	Description	From	Date
3302	General shot showing the reduction of the ground behind the wharf wall 001 with concrete pipe surround 032.	E	23/01/08
3303	General shot showing the reduction of the ground behind the wharf wall 001 looking E showing concrete pipe surround 032.	W	23/01/08
3304	General shot showing the reduction of the ground behind the wharf wall 001 looking E showing concrete pipe surround 032.	W	23/01/08
3305	General shot showing the reduction of the ground behind the wharf wall 001.	E	23/01/08
3306	General shot showing the reduction of the ground behind the wharf wall 001 with circular void 048.	E	23/01/08
3307	Circular void 048.	E	23/01/08
3308	General shot showing the reduction of the ground behind the wharf wall 001 looking E along the excavated stretch	W	23/01/08
3309	General shot showing the reduction of the ground behind the wharf wall 001 looking E along the excavated stretch	W	23/01/08
3310	General shot showing the reduction of the ground behind the wharf wall 001.	E	23/01/08
3311	General shot showing the reduction of the ground behind the wharf wall 001.	E	23/01/08
3316	General shot of the excavation of the duct trench at the W end of the site behind canal wall 007.	SE	23/01/08
3317	W wall of the repair dock inshot 008.	E	23/01/08
3318	E wall of the repair dock inshot 008.	W	23/01/08
3320	Removal of concrete pipe surround 032 and pipe 033.	SE	23/01/08
3321	General shot along the wharf following the completion of the reduction of the level.	SW	23/01/08
3322	General shot along the wharf following the completion of the reduction of the level showing circular structure 031.	SW	23/01/08
3325	General shot of the excavation of the duct trench at the W end of the site behind canal wall 007.	W	23/01/08
3326	General shot of the excavation of the duct trench at the W end of the site behind canal wall 007.	W	23/01/08
3327	General shot of the excavation of the duct trench at the W end of the site behind canal wall 007.	W	23/01/08
3328	General shot of the excavation of the duct trench at the W end of the site behind canal wall 007.	W	23/01/08
3329	General shot of the excavation of the duct trench at the W end of the site behind canal wall 007.	W	23/01/08
3332	Repair dock inshot 008.	ESE	23/01/08
3334	Repair dock inshot 008.	S	23/01/08
3339	Repair dock inshot 008.	ENE	23/01/08
3340	Repair dock inshot 008.	E	23/01/08
3341	Repair dock inshot 008.	E	23/01/08

A3. APPENDIX 3: STAGE 1 PANORAMIC ANNOTATED PHOTOGRAPHS



Figure 2: Panorama Part 1



Figure 3: Panorama Part 2



Figure 4: Panorama Part 3



Figure 5: Panorama Part 4



Figure 6: Panorama Part 5

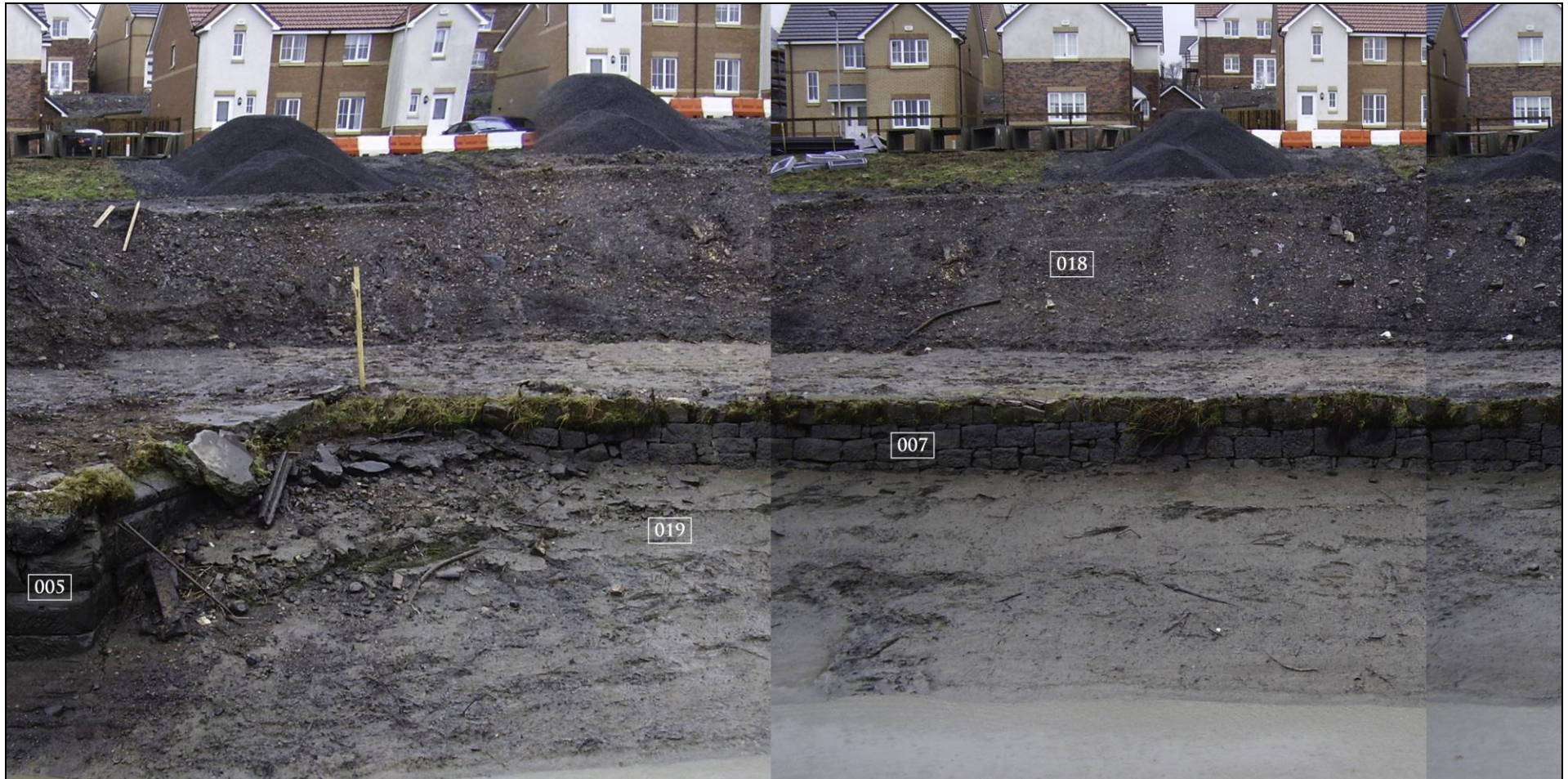


Figure 7: Panorama Part 6



Figure 8: Panorama Part 7



Figure 9: Panorama Part 8



Figure 10: Panorama Part 9



Figure 11: Panorama Part 10



Figure 12: Panorama Part 11

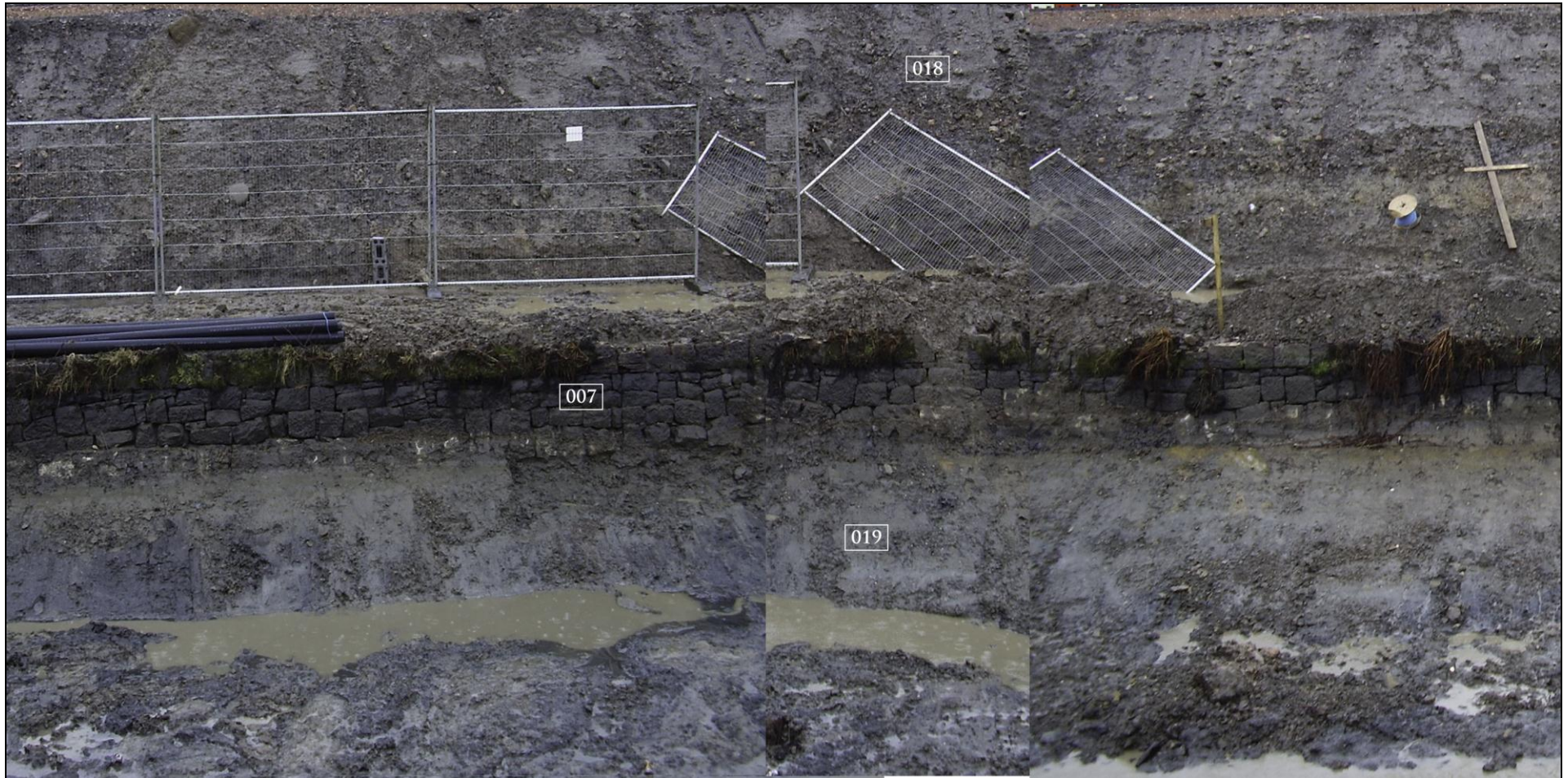


Figure 13: Panorama Part 12

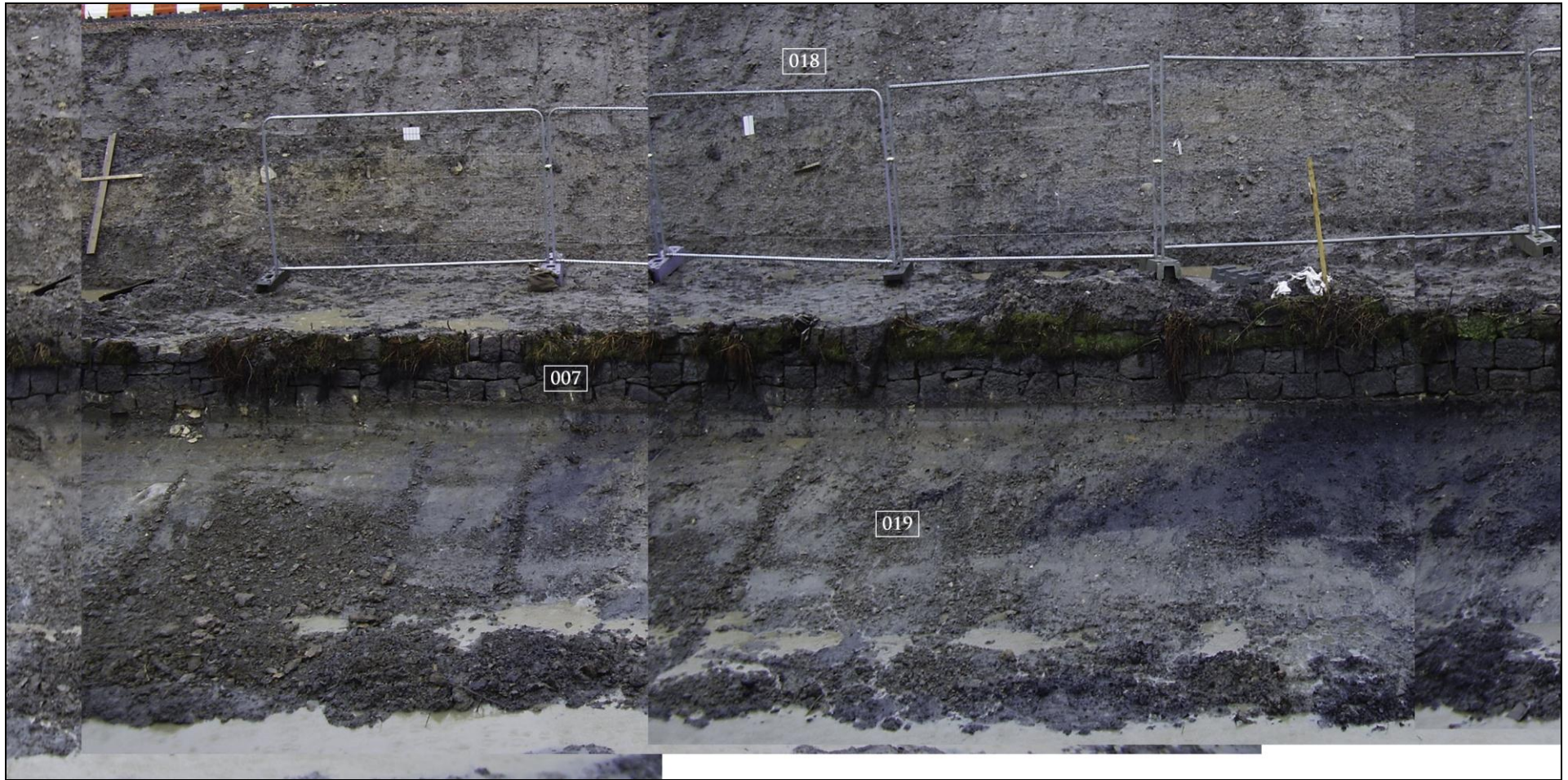


Figure 14: Panorama Part 13



Figure 15: Panorama Part 14



Figure 16: Panorama Part 15