ARCHEAOLOGICAL WATCHING BRIEF AT TEME BRIDGE, TENBURY WELLS, WORCESTERSHIRE

Graham Arnold and Tom Vaughan

Illustrated by Carolyn Hunt

27 May 2011
Revised 3 June 2011

Historic Environment and Archaeology Service,
Worcestershire County Council,
Woodbury,
University of Worcester,
Henwick Grove,
Worcester WR2 6AJ

Project 3678
Report 1851
WSM 45754

Archaeological watching brief at Teme Bridge, Tenbury Wells, Worcestershire

Graham Arnold and Tom Vaughan

Background information

Client	Highways Contracts and Programme Unit, Worcestershire County Council
Site address	Teme Bridge, Tenbury Wells, Worcestershire (See Figure 1)
National Grid reference	SO 5955 6859
Scheduled Ancient Monument reference	WT 322
Scheduled Monument Consent reference	S0008423, dated 3 May 2011
Historic Environment Record reference	WSM 05309
Project design	HEAS 2011
Project parameters	IfA 2008a and 2008b

Archaeological and historical background and

The bridge is described as follows in the Victoria County History, 'Tenbury Bridge, which crosses the Teme at the north end of the town, is a fine structure of six semicircular sandstone arches. It does not cross the river in a straight line, but, taking a bend in the centre, presents an angle to the current. The three northern arches, each strengthened by four strong ribs which die into the piers at their springing points, probably date from the 14th century, and the other three, having been destroyed, probably in the flood of 1770, were rebuilt in the early part of the 19th century. In 1908 the sterlings on the east side were rebuilt and the bridge widened by the addition of reinforced concrete arches on both sides which rest upon the sterlings, while the ancient parapet wall has been replaced on both sides by modern iron railings' (VCH IV, 363).

It has been suggested that the present stone bridge replaced a previous timber structure, although there is as yet no evidence for such. The 19th century rebuilding is reported to have been undertaken by Thomas Telford in 1818, with iron embellishments. It is further reported that widening of the bridge took place in 1874, which removed Telford's features (Gwilliam 1976). It should be noted that the dating of construction of the three northern stone arches to the 14th century has been called into question (WSM 05309).

Previous archaeological work on the site

Four watching briefs have been undertaken in association with the bridge, two during the removal of gravel shoals which had built up between the arches (Topping 1995, WSM 29692; Wichbold 1992, WSM 30169) and two on the bridge itself (Cook 1998, WSM 27079; Sworn 2007, WSM 36087). During the latter project the medieval fabric of the bridge was identified within the three trial holes excavated along the eastern side of the parapet. It comprised roughly hewn red sandstone blocks at a depth of 0.32m below the present road surface (Sworn 2007, 2-3).

Previous archaeological work on associated sites

Tenbury Wells has been the subject of a recent survey undertaken as part of the Central Marches Historic Towns Survey (Dalwood 1996) which contains a summary of previous archaeological work undertaken in the town.

Aims

The aim of the watching brief was to observe and record the structure of the bridge and any other archaeological deposits in the area and to determine the impact of the modern widening.

Methods

General specification for fieldwork	CAS 1995, RCHME 1996
Sources consulted	Worcestershire HER
Date(s) of fieldwork	8 to 22 May 2011

A number of investigative trenches, trial holes and boreholes were carried out as follows (Figure 2):

Trenches and Trial holes

- 6x trial holes (0.75m wide) to crown of arch (to establish existing features and services);
- 2x trial holes (1.50m²) to 0.56m maximum depth in piers (to explore depressions in carriageway);
- 1x slit trench (3m by 0.70m) from south-east abutment to pier (to establish location of Severn Trent water main);
- 1x trial hole (6m by 0.65m) to south-east of bridge(to establish services);
- 2x trial holes (to establish depth of pier (2.6m by 0.70m) and wing (2m by 1.2m));
- 2x access holes to voids in south-west wing (1m high by 0.60m wide and 0.50m high by 0.60m wide) (Figure 3);

Boreholes

- 2x boreholes to the south-east of the bridge (3m and 10.5m deep);
- 1x borehole to the northern pier (10m deep)

Cores (Figure 3)

- a 100mm diameter core through the southern pier to determine its construction;
- a 75mm diameter core through sandstone below Span 6 to establish the thickness of the spandrel and enable a compression test;
- 50mm diameter cores to identify the presence or absence of any backing in arch barrels 4-6 (if not identified in the initial trial holes);
- cores to investigate the fill in the piers/cutwater extensions beneath the widening;
- 2x 25mm diameter holes in masonry joints in the spandrels (one upstream and one downstream), to confirm the thickness of the spandrel walls below the internal edge beams

Dimensions of excavated areas observed

Trial holes to crown of arch (Spans)	length 8.2m width 0.75m depth 0.46 – 0.56m
Trial Holes on bridge	length 1.5m width 1.5m depth 0.30 and 0.56m
Trial hole for pier and wing wall	length 2.60m and 2m width 0.70m and 1.20m depth 1.35m and 0.70m
Access Holes 1 and 2 to voids	height of opening 0.50m (AH1), 1m (AH2) width of opening 0.60m thickness of arch 1.90m (AH1), 2.70m (AH2)
Boreholes 1-3	depth 3-10.5m

Access to or visibility of structure/deposits

Observation of the excavated areas was undertaken both during and after machine and hand excavation. The exposed surfaces were sufficiently clean to observe archaeological deposits. Access was not made into Access Holes 1 and 2 due to health and safety considerations.

Statement of confidence

Access to, and visibility of, deposits and structures allowed a high degree of confidence that the aims of the project have been achieved.

Deposit description

Trenches 1-4, 5-7, 13 and 14 (excavations over the bridge arches and access holes)

Context	Description	Date	Interpretation	Depth (below ground level)
100	Tarmac	Modern	Present road surface	0 – 0.08m
101	Compact grey stones, gravel, and sand	Modern	Hardcore make-up for tarmac surface	0.08 – 0.35m
102	Reinforced concrete	1908	Early 20th century widening of bridge	0.25 – 0.43m
103	Compact reddish brown sandy gravel	Modern	Levelling layer for hardcore	0.35 – 0.45m
104	Roughly hewn sandstone blocks in a sandy matrix Undulating	Medieval	Existing medieval sandstone Bridge Structure	0.40 – 0.56m
105	Flat, smooth degraded sandstone blocks	Medieval	Existing medieval sandstone structure after rebuilding in 1770	0.40 – 0.50m

Trench 9 (excavation underneath bridge)

Context	Description	Date	Interpretation	Depth (below ground level)
900	Friable yellowish brown fine shingle and sand	Modern	Sands and shingles on beach area	0 – 0.50m
901	Moderately compact mid brown silty clay with frequent rounded river gravels	19th century	Hardcore make-up for tarmac surface	0.20 – 0.50m
902	Compact dark greyish black Clay	Unknown	Waterlogged clay at river bank	0.40 – 0.60m
903	Black organic sandy silt	Unknown	Organic material from recent river level rising.	0.02 – 0.15m
904	Compact reddish orange and grey mudstone	Natural	Natural mudstone	0.60 – 1.30m+
905	Concrete	Modern	Foundation of bridge widening	0 – 0.50m

Trench 10 (excavation underneath bridge)

Context	Description	Date	Interpretation	Depth (below ground level)
1000	Friable yellowish brown fine shingle and sand	Modern	Present river bank level sands and shingles	0 – 0.40m
1001	Moderately compact mid brown silty clay with frequent rounded river gravels	Late 19th - early 20th century		0.20 – 1.10m
1002	Compact dark greyish black clay	Unknown	Waterlogged clay at river bank	1.10 -1.30m
1003	Grey gravels and brick fragments	Modern	Modern backfill for 0.25m water pipe	0.30 – 1.25m
1004	Compact reddish orange mudstone	Natural	Natural ground	1.30m +
1005	V – shaped cut	Modern	Cut of water pipe trench	0.30 – 1.25m

Trench 11 (excavation underneath bridge)

Context	Description	Date	Interpretation	Depth (below ground level)
1100	Concrete	Modern	Slip way surfacing	0 – 0.08m
1101	Grey angular stone in brown sands	Modern	Hardcore makeup for concrete slip way	0.10 – 0.30m
1102	Reinforced concrete	Modern	Modern hardstanding encasing services	0.30 – 0.90m
1103	Brown sandy gravel with brick fragments	Modern	Made ground backfill of construction cut	0.50 – 0.70m

Trench 12 (excavation underneath bridge)

Context	Description	Date	Interpretation	Depth (below ground level)
1200	Reinforced Concrete and Tarmac	Modern	Present footpath surface	0 – 0.08m
1201	Compact grey stones, gravel, and sand	Modern	Hardcore make-up for tarmac surface	0.10 – 0.30m
1202	Red sand and concrete	Modern	Backfill of modern services that run throughout trench	0.30 – 0.90m
1203	Compact reddish orange gravelly clay	Natural	Natural ground	0.90 – 1.10m+

The borehole logs are attached as Appendix 2.

Discussion

Trenches and trial holes across bridge arches (Figure 2, Plates 4-14)

The excavations of each of the spans entailed removing tarmac from footpaths to reveal services 0.20m below ground level. The road surface was then removed, first by machine through the modern tarmac and hardcore to the sandy gravel layer and then by hand to reveal the original medieval bridge surface. The excavations revealed the modern makeup of the road surface (100, 101 and 103), the concrete widening (102) on the east side of the bridge and the original medieval

sandstone structure on the west side (104 and 105). The surface (104) of roughly hewn sandstone blocks was revealed in the western side of Spans 1 – 4 and was in good condition. In Spans 4 – 6 in the southern section of the bridge, the existing sandstone structure was made of flat, smooth degraded sandstone blocks (105) and was in good condition.

The trial hole to explore the carriageway depressions on the bridge road surface (Trench 4) revealed the modern road surface (100 and 101) with modern reinforced concrete and brick fragments at the base (102), a maximum of 0.30m below ground level.

The borehole drilled through the pier between Spans 1 and 2 (Borehole 3; Trench 8) revealed sand between 0.16-0.70m below the surface, probably degraded sandstone. This overlay fragmentary sandstone to 7m depth, which represents the full depth of the foundation of the pier, over natural reddish brown and mottled grey mudstone (Appendix 2).

Trial holes to establish depth of pier and water main (Trenches 9 and 10, Plates 15-17)

The foundations of the bridge pier in Trench 9 were found to be made of reinforced concrete (905), a maximum of 0.50m below ground level, with waterlogged clay and natural mudstone (902 and 904, similar to Trench 10) beneath this, observed to a maximum of 1.30m below the ground level. This was overlaid by backfilled material of brick and ceramic building material (901) within the clay including a cream stoneware from a possible flagon of mid 19th to early 20th century date (Angus Crawford pers comm), sands and shingles from the river flooding. Black organic silty clay (903) was close to the surface on the river side and is thought to be a recent accumulation lying just below the sands (900).

Trench 10 underneath the spandrel of the bridge had a similar stratigraphy to Trench 9. The water main was 1.25m below ground level and backfilled with modern brick fragments and redeposited gravels (1003). This was cut through a compact clay (1002) that contained 19th century material including a brown stoneware bottle (Angus Crawford, pers comm). It overlay a grey, waterlogged clay (1002) with the natural mudstone beneath (1004), observed at 1.30m depth.

Trial holes to establish depth of wing and services (Trenches 11 and 12, Figure 2, Plates 18-20)

Trench 11 was excavated to establish the depth of the wing foundations. However modern concrete encasing water services (1100 – 1104) meant that the wing foundations were not reached. Early 20th century made ground backfilled the construction cut of the wing wall, excavated to a maximum of 0.70m below ground level.

Trench 12 contained only modern deposits associated with the footpath surfacing and services (1200-1202), overlying the natural ground (1203) at 0.90m below ground level. No significant archaeology was present.

Access Holes 1 and 2 into voids within bridge (Trenches 13 and 14, Figure 3, Plates 25-34)

Creating the two access holes into the blocked up voids below the ramp at the south end of the bridge involved cutting through the concrete face, which was reinforced with re-bar (0.10m thick), and a single course of red stock bricks (9" x 4½" x 3") with occasional blue engineering bricks (Plates 25 and 30).

Within Access Hole 1 the arch was comprised of concrete to the outer, south-east, side of the bridge. The inner, approximately two-thirds of the arch, was of red stock brick. The brick and concrete arches butted against one another. The brick arch butted against the earlier sandstone block wall, which lay approximately 1.90m back from the front of the infilled arch. Iron corrosion and horizontal bands of silt along the rear sandstone wall appeared to indicate that a corrugated iron sheet had previously lain flat against the wall, but was no longer in evidence (Plates 26-8).

Within Access Hole 2 the arch was comprised almost entirely of red stock brick, although the outer edge was comprised of concrete. As in Access Hole 1, the brick arch butted against the earlier sandstone block wall, which lay approximately 2.70m to the rear of the front of the infilled arch (Plates 31-3).

Cores for Compression Tests (Nicholls Colton and Partners Ltd; Figure 3, Plates 21-24)

The horizontal core through the Southern Pier was 2.56m long. It comprised 0.59m and 0.50m of reinforced concrete with re-bar, green sandstone, 0.15-0.18m, with a solid core of red sandstone 1.16m thick at the centre (Plate 22).

The core for compression tests through the spandrel of the old bridge below Span 6 demonstrated that the facing sandstone blocks were 0.25m thick on the south side and 0.21m thick on the north side (Plate 24) with large cracks 0.05m long in the stone and a loose gravel fill material behind.

Boreholes 1 and 2 on the south riverbank (Nicholls Colton and Partners Ltd; Figure 3, Appendix 2)

Borehole 1 lay on the edge of the riverbank, close to Span 6. Made ground lay to 0.90m depth, comprising coarse sand with frequent brick, concrete and sandstone, which may represent construction debris associated with a number of periods of the bridge. Gravely clay lay below, over mudstone at 2.80m depth.

Borehole 2 lay further away from the bank. Various deposits of made ground were identified to a depth of 2.80m, including a thin concrete surface at 0.50-0.55m, over sandy gravel with brick debris to 0.90m depth, over coarse sand with brick, concrete, sandstone, slag and clinker inclusions. This is probably related to the reconstruction of the bridge in 1908 or riverine debris. The natural clay and gravel lay directly below this, over mudstone from 6m depth.

Conclusions

The investigations across the spans of the bridge demonstrated that the earlier bridge structure is extant under the present road surface at a depth of approximately 0.40m. On the west side of the bridge it comprises roughly hewn sandstone on the three northern arches and a smooth sandstone surface on the south side, where it was reconstructed *c* 1770. This is slightly deeper than the findings of the 2007 watching brief, which identified the sandstone matrix at approximately 0.32m below the surface in three test pits excavated within the northern half, along the east side of the carriageway.

The cores through the spandrels demonstrated that the facing stone is 0.25m thick with a loosely packed hardcore behind. The extent of the modern widening in 1908 has also been demonstrated with concrete covering the east side of the bridge and visible in all of the spans and the core through the southern pier. The foundation of the southern pier was constructed of concrete, 0.50m deep below the present surface, and bedded directly onto the natural mudstone.

The access holes into the voids within the south-east wing of the ramp at the south end of the bridge revealed the earlier sandstone bridge wall. It was set back 1.90-2.70m from the present outer face of the bridge. The brick arches which butted the sandstone wall were in turn butted by concrete arches used to widen the structure.

Publication summary

The Service has a professional obligation to publish the results of archaeological projects within a reasonable period of time. To this end, the Service intends to use this summary as the basis for publication through local or regional journals. The client is requested to consider the content of this section as being acceptable for such publication.

An archaeological watching brief was undertaken on behalf of the Highways Contracts and Programme Unit, Worcestershire County Council, at Teme Bridge, Tenbury Wells, Worcestershire (NGR ref SO 5955 6859; HER ref WSM 45754) as part of investigative works for the bridge structure to comply with Scheduled Monument Consent. The earlier sandstone structure of the bridge was recorded along the west side of the carriageway, between 0.42-0.56m below the present road surface. To the east the structure was largely comprised of concrete which related to the 1908 refurbishment and widening of the carriageway. The access holes into the voids below the southern ramp on the south-east side of the bridge revealed the earlier sandstone wall, butted by the later brick arches, which were in turn butted by concrete arches used to widen the carriageway. The

foundation of the southern pier was constructed of concrete, 0.50m deep below the present surface, and bedded directly onto the natural mudstone.

Acknowledgements

The Service would like to thank the following for their kind assistance in the successful conclusion of this project, Richard Attwood (Highways Contracts and Programme Unit, Worcestershire County Council), Stephen Powell (Halcrow Group Ltd), Bridget Morley and Tony Fleming (English Heritage).

Bibliography

CAS 1995 (as amended) *Manual of Service practice: fieldwork recording manual*, County Archaeological Service, Hereford and Worcester County Council, report, **399**

Cook, M, 1998 *Watching brief at Teme Bridge,* Archaeology Service, Worcestershire County Council, report **682**, dated 29 July 1998, WSM 27079, WR8007

Dalwood, H, 1996 *Archaeological assessment of Tenbury Wells, Hereford and Worcester*, County Archaeological Service, Hereford and Worcester County Council, report **348**, P945

EH 2006 *Understanding Historic Buildings, A guide to good recording practice,* English Heritage, **51125**

Gwilliam, H W. 1976 *Worcestershire's Historic Bridges*, Worcs Industrial Archaeology & Local History Society

HEAS 2008 *Standards and guidelines for archaeological projects in Worcestershire,* Historic Environment and Archaeology Service, Worcestershire County Council unpublished document dated November 2008

HEAS 2011 *Proposal for an archaeological watching brief at Teme Bridge, Tenbury Wells, Worcestershire*, Historic Environment and Archaeology Service, Worcestershire County Council, unpublished document revised 28 March 2011, **P3678**

Hurst, J D, 1994 (as amended) *Pottery fabrics. A multi-period series for the County of Hereford and Worcester*, County Archaeological Service, Hereford and Worcester County Council, report, **445**

Hurst, J D, and Rees, H, 1992 Pottery fabrics; a multi-period series for the County of Hereford and Worcester, in Woodiwiss, S G (ed), *Iron Age and Roman salt production and the medieval town of Droitwich*, CBA Res Rep, **81**

IfA, 2008a *Standard and guidance for an archaeological watching brief,* Institute for Archaeologists

IfA, 2008b *Standard and guidance for the archaeological investigation and recording of standing buildings or structures,* Institute for Archaeologists

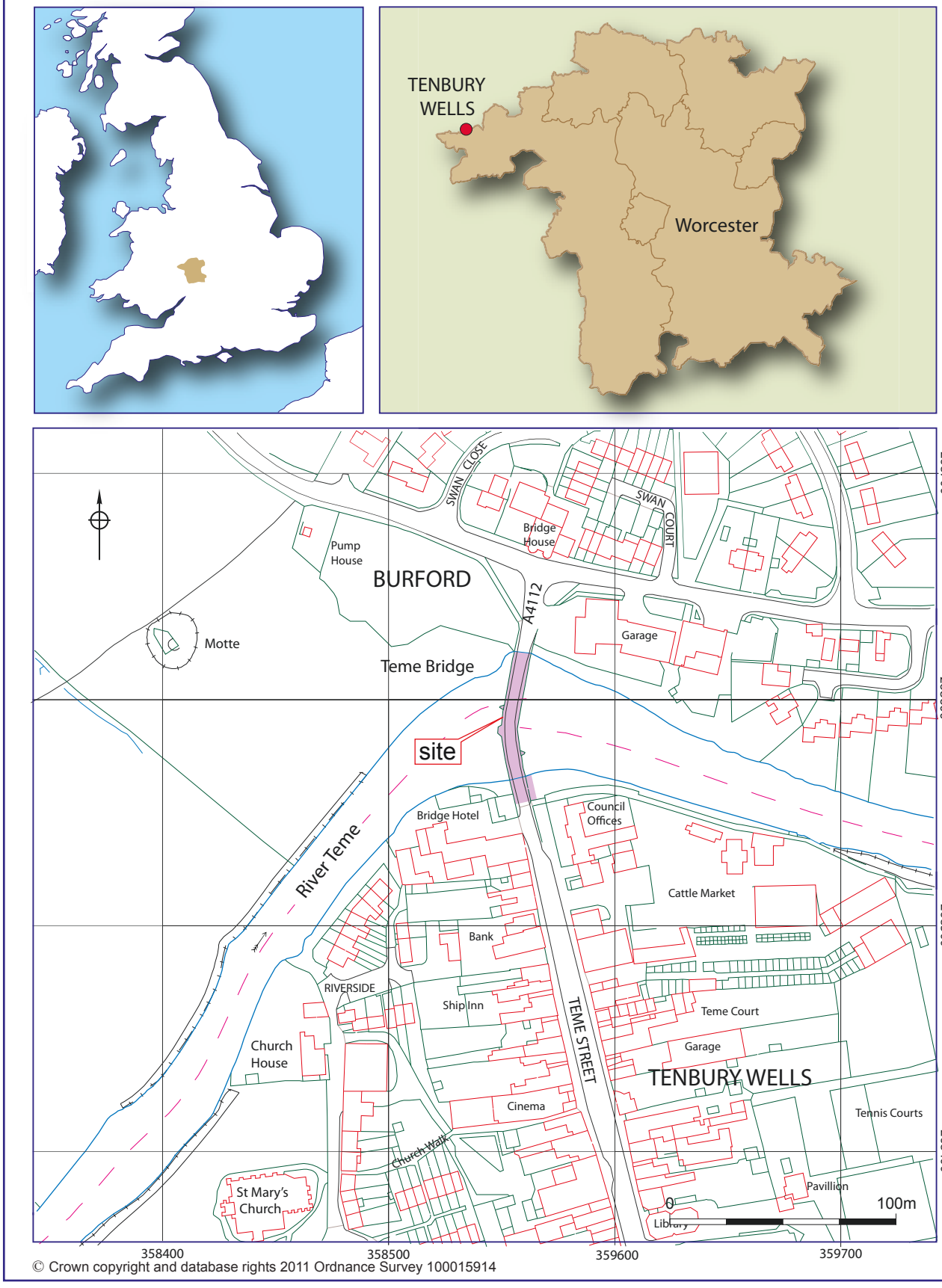
Sworn, S J, 2007 *Archaeological watching brief at Teme bridge, Tenbury Wells, Worcestershire,* Historic Environment and Archaeology Service, Worcestershire County Council, report **1506**, dated 20 March 2007, WSM 36087, WR4320

Topping, J, 1995 *Watching brief at Tenbury Bridge, Teme Street, Tenbury Wells,* County Archaeological Service, Hereford and Worcester County Council report **408**, dated October 1995, WSM 29692, WR7662

VCH IV, Page, W (ed), 1924 *Victoria History of the County of Worcestershire*, **IV**

Wichbold, D W, 1992 *Watching brief on Tenbury Bridge, Teme Street, Tenbury Wells,* County Archaeological Service, Hereford and Worcester County Council, unnumbered report, WSM 30169, WR1145

Figures


TENBURY
WELLS
Worcester
SWAN CLOSE
SWAN COURT
Bridge House
Pump House
BURFORD
A4112
Garage
Motte
Teme Bridge
site
Bridge Hotel
Council Offices
River Teme
Cattle Market
Bank
RIVERSIDE
Ship Inn
TEME STREET
Teme Court
Garage
Church House
TENBURY WELLS
Cinema
Tennis Courts
Church Walk
St Mary's Church
Pavillion
Library
0
100m
268700
268600
268500
268400
358400
358500
359600
359700
© Crown copyright and database rights 2011 Ordnance Survey 100015914

Trial Hole 1
(Trench 2)

Trial Hole 2
(Trench 4)

Tr8
BH3

102
104
102
concrete
105

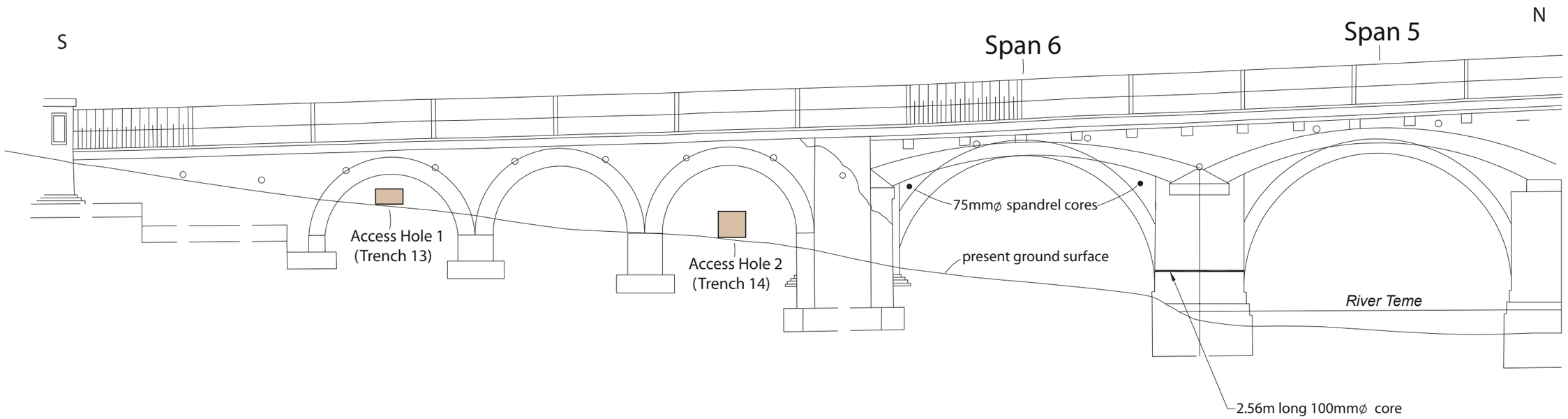
Span 1 (Trench 1)
Span 2 (Trench 2)
Span 3 (Trench 3)
Span 4 (Trench 7)
Span 5 (Trench 5)
Span 6 (Trench 6)

Tr9
under bridge
(see inset)
Tr10
Tr11
Tr12
Tr13
Tr14
BH1
BH2

0
10m

AREA UNDER BRIDGE

Tr5
Tr6


S
N
Span 6
Span 5
Access Hole 1
(Trench 13)
Access Hole 2
(Trench 14)
75mmø spandrel cores
present ground surface
River Teme
2.56m long 100mmø core

Plates

Plate 1 The east side of the bridge looking north

Plate 2 The west side of the bridge looking north-east

Plate 3 Example of depth of modern services within footpath

Plate 4 Span 1 (Trench 1) roughly hewn sandstone surface (104) of existing medieval bridge

Plate 5 Span 1 (Trench 1) roughly hewn sandstone surface (104) close up

Plate 6 Span 2 (Trench 2) south facing section showing roughly hewn sandstone surface

Plate 7 Span 3 in plan looking east showing sandstone surface and concrete widening

Plate 8 Trial hole 2 (Trench 4) showing concrete and hardcore at the base

Plate 9 Span 4 (Trench 7) looking east at the existing sandstone bridge and concrete extensions

Plate 10 Span 5 (Trench 5) looking north

Plate 11 Span 6 (Trench 6) looking north

Plate 12 Location of Borehole 3 (Trench 8) looking east

Plate 13 Trenches on the bridge during reinstatement, looking south

Plate 14 Trenches on the bridge after full reinstatement, looking north

Plate 15 Trench 9 east facing section showing concrete foundations and natural mudstone at base

Plate 16 Trench 10 during excavation adjacent to the southernmost bridge arch (Span 6)

Plate 17 Trench 10 east facing section showing water main and clay deposits

Plate 18 Trench 11 looking north showing concrete covering water services and slip road, and 0.50m square trial hole cut through concrete

Plate 19 Trench 12 location and slip way down to riverside looking north

Plate 20 Base of Trench 12 looking west

Plate 21 Coring for compression tests through southern pier looking north-west

Plate 22 Parts of the core through southern pier (2.56m in total) showing reinforced concrete at either end, and green sandstone encasing red sandstone at the centre

Plate 23 Spandrel core below Span 6 north pier

Plate 24 Thickness of spandrel facing stone

Plate 25 Access Hole 1 (Trench 13), removal of concrete and brick infill

Plate 26 Internal void in Access Hole 1 (Trench 13), view west showing concrete and brick arches and earlier sandstone block wall to rear

Plate 27 Access Hole 1 (Trench 13), view south-west

Plate 28 Access Hole 1 (Trench 13), view north-west

Plate 29 Access Hole 1(Trench 13) reinstated

Plate 30 Access Hole 2 (Trench 14) opened showing concrete and brick infill wall

Plate 31 Access Hole 2 (Trench 14), view south-west (enhanced image)

Plate 32 Access Hole 2 (Trench 14), view north-west (enhanced image)

Plate 33 Access Hole 2 (Trench 14), view west (enhanced image)

Plate 34 Access Hole 2 (Trench 14) reinstated

Appendix 1 Technical information

The archive (site code: WSM 45754)

The archive consists of:

5	Context records AS1
4	Field progress reports AS2
2	Photographic records AS3
112	Digital photographs
1	Drawing number catalogues AS4
3	Scale drawings
15	Trench record sheets AS41
1	Computer disk
1	Copy of this report (bound hard copy)

The project archive is intended to be placed at:

Worcestershire County Museum
Hartlebury Castle
Hartlebury
Near Kidderminster
Worcestershire DY11 7XZ
Tel Hartlebury (01299) 250416

Appendix 2 Borehole logs (Nicholls Colton and Partners Ltd)

NICHOLLS COLTON AND PARTNERS LTD. Tel: 0116 - 2536333	**BOREHOLE RECORD** (Rotary Core)	Borehole Number **BH01**
Site Ground Investigation at Teme Bridge, Tenbury Wells		
Client Halcrow/Worcestershire County Council	Boring diameter: 100 mm to 3.00m Casing diameter: 120 mm to 3.00m	Logged by: PM Scale: 1:50
LR: G11063 Ground Level:	Date: 14/05/2011 Location: -	Sheet 1 of 1

Samples & Tests			Water	Level (m)	Depth (m)	Description	Legend	Install-ation
Depth (m)	Type	SPT N						
						MADE GROUND - brown fine to coarse sand. Frequent fragments of fine to coarse brick, concrete and sandstone.		
0.90	C	50/125mm			0.90	Very stiff red brown slightly gravelly CLAY. Gravel is subangular to rounded fine to coarse grey sandstone and fine to medium mudstone. No core recovered.		
1.50	C	50/40mm						
					2.80			
					3.00	Moderately strong red brown MUDSTONE.		
						End of Borehole at 3.00 m		

Remarks and Water Observations

1. Hand dug starter pit to 1.20m.
2. Advanced from 0.90m to 3.00m bgl using rotary coring techniques.
3. No recovery from 0.90m to 2.80m bgl due to the presence of cobbles in the cohesive soils.
4. No ground water entries recorded, however use of a water flush may have masked any minor inflows.
5. Drilling operations stopped at 3.00m bgl by client due to compressed air/water flush disrupting adjacent ground and river bed.
6. Borehole backfilled with gravel on completion.

NICHOLLS COLTON AND PARTNERS LTD. Tel: 0116 - 2536333	**BOREHOLE RECORD** (Rotary Core)	Borehole Number **BH02**
Site Ground Investigation at Teme Bridge, Tenbury Wells		
Client Halcrow/Worcestershire County Council	Boring diameter: 100 mm to 10.50m Casing diameter: 120 mm to 6.00m	Logged by: PM Scale: 1:50
LR: G11063 Ground Level:	Date: 13/05/2011 Location: -	Sheet 1 of 2

Samples & Tests			Water	Level (m)	Depth (m)	Description	Legend	Install-ation
Depth (m)	Type	SPT N						
					0.13	MADE GROUND - concrete hardstanding . . . Rebar reinforcement at 0.13m.		
					0.50 0.55	MADE GROUND - grey brown fine to coarse sand with frequent fragments of angular to subangular fine to coarse roadstone and sandstone.		
					0.90			
1.20	C	N=25				MADE GROUND - concrete hardstanding		
2.00	C	50/275mm				MADE GROUND - brown sandy gravel. Gravel is subangular to angular fine to coarse brick, sandstone and roadstone. Frequent cobbles of brick.		
					2.80	MADE GROUND - brown fine to coarse sand. With frequent fragments of fine to coarse brick, concrete, sandstone, slag and clinker.		
3.50	C	50/50mm				Very stiff red brown slightly gravelly CLAY with occasional cobbles. Gravel and cobbles are subangular to rounded fine to coarse grey sandstone. No core recovered.		
5.00	C	50/40mm				. . . Frequent fine to medium mudstone from 5.00m.		
6.00	C	50/40mm			6.00	Moderately strong red brown occasionally mottled grey MUDSTONE.		
6.00-7.50	CR	66 62 43						
7.50	C	50/40mm						
7.50-9.00	CR	100 72 7						
9.00	C	50/25mm						
		TCR SCR RQD FI FS				*(continued next sheet)*		

Remarks and Water Observations

1. Hand dug starter pit to 1.20m.
2. Advanced from 1.20m to 2.80m bgl using rotary open hole drilling techniques.
3. Advanced from 2.80m to 10.50m bgl using rotary coring techniques.
4. No recovery from 2.80m to 6.00m bgl due to the presence of cobbles in the cohesive soils.
5. No ground water entries recorded, however use of a water flush may have masked any minor inflows.
6. Groundwater level recorded at end of drilling at a depth of 9.60m bgl.
7. Borehole backfilled with arisings and surface reinstated on completion.

NICHOLLS COLTON AND PARTNERS LTD. Tel: 0116 - 2536333	**BOREHOLE RECORD** (Rotary Core)	Borehole Number **BH02**

Site
Ground Investigation at Teme Bridge, Tenbury Wells

Client	Boring diameter:	Casing diameter:	Logged by: PM
Halcrow/Worcestershire County Council	100 mm to 10.50m	120 mm to 6.00m	Scale: 1:50
LR: G11063 Ground Level:	Date: 13/05/2011	Location: -	Sheet 2 of 2

Core Data				Water	Level (m)	Depth (m)	Description	Legend	Install-ation
Depth (m)	Type	TCR SCR RQD	FI						
9.00-10.50	CR	100 88 60		▽			Moderately strong red brown occasionally mottled grey MUDSTONE.		
						10.50	*End of Borehole at 10.50 m*		
		TCR SCR RQD	FI FS						

Remarks and Water Observations

1. Hand dug starter pit to 1.20m.
2. Advanced from 1.20m to 2.80m bgl using rotary open hole drilling techniques.
3. Advanced from 2.80m to 10.50m bgl using rotary coring techniques.
4. No recovery from 2.80m to 6.00m bgl due to the presence of cobbles in the cohesive soils.
5. No ground water entries recorded, however use of a water flush may have masked any minor inflows.
6. Groundwater level recorded at end of drilling at a depth of 9.60m bgl.
7. Borehole backfilled with arisings and surface reinstated on completion.

NICHOLLS COLTON AND PARTNERS LTD. Tel: 0116 - 2536333	**BOREHOLE RECORD** (Rotary Core)	Borehole Number **BH03**

Site
Ground Investigation at Teme Bridge, Tenbury Wells

Client	Boring diameter:	Casing diameter:	Logged by: PM
Halcrow/Worcestershire County Council	100 mm to 10.00m	120 mm to 3.00m	Scale: 1:50
LR: G11063 Ground Level:	Date: 07/05/2011	Location: -	Sheet 1 of 2

Samples & Tests			Water	Level (m)	Depth (m)	Description	Legend	Install-ation
Depth (m)	Type	SPT N						
					0.16	MADE GROUND - Macadam.		
					0.30			
					0.70	MADE GROUND - brown gravelly fine to coarse sand. Gravel is angular to subangular fine to coarse sandstone.		
1.00-2.50	CR	100 17 0				MADE GROUND - brown fine to coarse sand. Frequent cobbles of concrete and sandstone. ... Steel tie-bars embedded within concrete in south face of the service pit (related to bridge extension works circa 1900).		
2.50-4.00	CR	66 5 0				MADE GROUND - moderately weak to moderately strong red brown fine to medium grained sandstone. Recovered as cobble sized fragments.		
4.00-5.50	CR	50 0 0						
5.50-7.00	CR	13 0 0						
					7.00	Weak locally very weak red brown occasionally mottled grey MUDSTONE.		
7.00-8.50	CR	81 22 0						
		TCR SCR RQD FI FS				*(continued next sheet)*		

Remarks and Water Observations

1. Hand dug starter pit to 0.70m.
2. Advanced from 0.70m to 10.00m bgl using rotary coring techniques.
3. No ground water entries recorded, however use of a water flush will have masked any minor inflows.
4. Groundwater level recorded at end of drilling at a depth of 9.1m bgl.
5. Borehole backfilled and surface reinstated on completion.

NICHOLLS COLTON AND PARTNERS LTD. Tel: 0116 - 2536333	**BOREHOLE RECORD** (Rotary Core)	Borehole Number **BH03**

Site
Ground Investigation at Teme Bridge, Tenbury Wells

Client	Boring diameter:	Casing diameter:	Logged by: PM
Halcrow/Worcestershire County Council	100 mm to 10.00m	120 mm to 3.00m	Scale: 1:50
LR: G11063 Ground Level:	Date: 07/05/2011	Location: -	Sheet 2 of 2

Core Data				Water	Level (m)	Depth (m)	Description	Legend	Install-ation
Depth (m)	Type	TCR SCR RQD	FI						
8.50-10.00	CR	99 47 25					Weak locally very weak red brown occasionally mottled grey MUDSTONE.		
						10.00	*End of Borehole at 10.00 m*		
		TCR SCR RQD	FI FS						

Remarks and Water Observations

1. Hand dug starter pit to 0.70m.
2. Advanced from 0.70m to 10.00m bgl using rotary coring techniques.
3. No ground water entries recorded, however use of a water flush will have masked any minor inflows.
4. Groundwater level recorded at end of drilling at a depth of 9.1m bgl.
5. Borehole backfilled and surface reinstated on completion.